

Ontario Professional Surveyor



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on the cover ...

**20 cm Aerial Imagery
of Cobourg, ON**

also in this issue ...

**Ontario's Imagery Strategy
Canada's New Vertical Datum
Small UAS for Geomatics
Is the Crown Bound by the
Copyright Act? An Encore**

**plus our
regular features:**

**Educational Foundation
News from 1043
Book Reviews**



CONTENTS

Ontario's Imagery Strategy - Mike Robertson and Tom Malone	4
Occam's razor at Gull River Indian Reserve: The south boundary - Dr. Brian Ballantyne	10
Is The Crown Bound by the Copyright Act? An Encore - Will O'Hara and Stephen Thiele.....	16
Discipline Decision	18
Failed Business Models - and what to do about them - Wilson Phillips	22
Canada's New Vertical Datum - Philippe Lamothe, Marc Véronneau, Morgan Goadsby and Ron Berg	24
Improving the Articling System – An Explanation of the “Essential Areas of Knowledge” - Crystal Cranch	30
Small UAS for Geomatics - Costas Armenakis	32

REGULAR FEATURES

President's Page	2
Calendar of Events	35
Educational Foundation	36
Book Reviews	38
News from 1043	39
Sites to See	39
The Last Word - 100th Anniversary of the Canadian Arctic Expedition 1913-1918	40

ADVERTISERS

Sokkia	2nd cover
Leica Geosystems Ltd.	3
Carlson Software	5
Cansel	7
The Connectors Insurance Group Ltd.	9
Topcon Positioning.....	13
Northway/Photomap/Remote Sensing Ltd.	15
The CG&B Group	17
Dias & Dias	20
J.P. Morasse Inc.	21
Hayward Iron & Metal	23
GeoShack Canada	25
Tekmet Ltd.	27
Altus Positioning Systems	29
T2 Utility Engineers	31
DW Technologies	33
Teranet Inc.	37
Trimble	3rd cover
MicroSurvey Software Inc.	4th cover

ON THE COVER ...

The 20 cm resolution aerial image of the Cobourg, Ontario waterfront (2013) is from Land Information Ontario's latest acquisition in south central Ontario. See the article “Ontario's Imagery Strategy” on page 4.

*Professional
Surveying
in
Ontario*

*encompasses
the
Disciplines of*

*Cadastral,
Geodetic,
Hydrographic,
Photogrammetric
Surveying
&
Geographic
Information
Management*





President's Page

By Eric L. Ansell, O.L.S., O.L.I.P.



As I write this I am at the top of the roller coaster ride ready to make the descent into the last half of my term as your President. It is amazing how quickly the first six months have flown by. I have come to the realization that there just isn't enough time to get

all the things done that I wanted to do.

I had promised to get to every regional group meeting at least once during the year but that has been an almost impossible task to accomplish. I really want to apologize to the members of the North Western Regional Group who have scheduled a number of meetings, keeping me well informed of their planned dates and yet there has always been a conflict with my schedule.

And yet again another conflict with an event involving all of the Regional Groups is only a few weeks away. A Regional Group Chairs' meeting has been scheduled for the day before the Geomatics Picnic but I however, will be in Quebec representing our association at the 45e Congrès de l'Ordre des Arpenteurs-Géomètres du Québec. However, it is still my goal to make it to each regional group meeting this fall.

There have also been a number of issues that I wanted to tackle this year and see some resolution on. These issues include;

- ODCC,
- changes to the articling process,
- fees for research,
- the use of sketches,
- Professional Surveyors Canada,
- the AOLS website, and
- the issue of copyright.

You can see that it is quite a list but we are well on our way to seeing some if not most of these important issues come to fruition, but there is still plenty of work left to do. I will continue to work over the next six months to ensure that these seven issues are all well positioned to be completed.

Of course all of this is not the work of one individual. There is an army of volunteers who have committed themselves to various committees to lead these initiatives and make final recommendations, but more of that later.

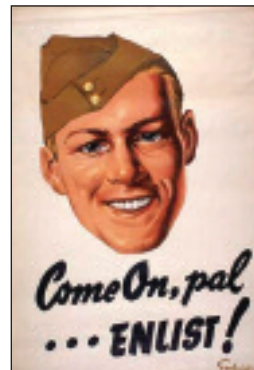
We are also through the first half of our first year of mandatory professional development. I have stated before that the word mandatory should not have to be there as it is incumbent on all of us as members of an ethics-based professional association to follow a program of continuing professional development and I firmly believe that most of us do. By

having it mandatory it only keeps us all aware of our responsibilities to keep current and to be involved. The Continuing Education Committee is working hard to develop and provide courses of interest and importance to our members. The tracking of your activities is still not as easy as it should be but hopefully with the end in sight for the "new" web site we will have an easy and reliable online tracking system.

I started this article with the analogy of a roller coaster ride. I think you will agree that roller coasters can be a lot of fun and a little scary as well. But I am sure that the fun will continue on the second half of the ride but I am also sure there will be a few bumps in the track along the way. I would challenge all of you who love the roller coaster experience to get on board, get more involved with our association, and enjoy the ride of your life. For those who are a little shy about getting in the line and taking a seat in the car, I say face your fears, get into that roller coaster car and hang on.

I would like to put out "A Call to Arms". There are a couple of WW II recruiting posters that tell the story quite nicely: "Come On, pal ... ENLIST!" poster and The Women's Army Corps poster.

The posters worked in the 40's and perhaps they will work again. Recently Mel Truchon joined the Nominating



Committee and I suspect that a few of you may well be on her list of people to solicit to run for Council. If you are called please give serious consideration to running. Being



on Council can be quite time consuming and sometimes very frustrating but it's a rewarding experience. I would like to thank all of our members who participate on the numerous committees within our association and I especially want to thank all current and past members of Council who decided to hop in the car and take that roller coaster ride.

My one real concern is that the roller coaster is going at break neck speed and the ride will be over much too soon. The next six months will be very busy and I will do my best to keep Council focused on the issues at hand and hopefully I will be able to make some exciting and timely announcements at our Annual General Meeting in Niagara Falls in February 2014.



Ontario's Imagery Strategy

By Mike Robertson (Project Manager) and Tom Malone (Manager, Mapping and Geomatic Services) Ministry of Natural Resources

The Government of Ontario has a new five year strategy to acquire and regularly update imagery across the province. The strategy will reduce costs for all project partners and increase access and use of current, high quality imagery.

The strategy recommends:

- Acquiring 20 cm resolution, leaf-off digital ortho-photography for selected areas of southern and northern Ontario and commercial satellite imagery in other areas, such as the far north.
- Refreshing the ortho-photography every five years and provincial satellite imagery every ten years.
- Establishing a governance model that includes senior managers from various ministries and annual project steering committees consisting of government and non-government representatives.
- Formalizing Land Information Ontario's role in coordinating multi-partner acquisition projects and storing and distributing imagery data.
- Developing a funding model to cover Ontario's share of costs in projects and a funding model to share costs between all project partners.
- Creating polices to access new and existing imagery products.

Implementing the Strategy

Two contracts were tendered and awarded for the collection of digital ortho-photography across the province:

Imagery Acquisition Area	Frequency	Vendor Name
Greater Toronto Area	Once in 2013 with options to 2017	First Base Solutions
Selected areas of the province	Annual collection starting in 2013 and going to 2017	Fugro Canada

GTA Project

This project is funded 100 percent by government ministries that require ortho-photography covering the five municipalities that comprise the GTA (Metro Toronto, Halton, Durham, York, and Peel). The ministries can only use this imagery for internal government use.

New imagery of the GTA was captured in spring 2013 and will be delivered to Land Information Ontario this fall. The project contract provides options that allow the Province to acquire imagery for all or parts of the GTA on an as needed basis to 2017.

Land Information Ontario cannot provide access to the imagery. Businesses or individuals can acquire the imagery products through the vendor (First Base Solutions). There

are several other private sector firms that provide access to imagery products and services covering the GTA.

GTA 2013 Project

Collected April 2013

Number of days to acquire imagery = 11

Number of planes used = 1

Number of sq km = 7,029

Number of flight lines = 122

Total length of flight lines = 6,035 km

Number of images = 12,694

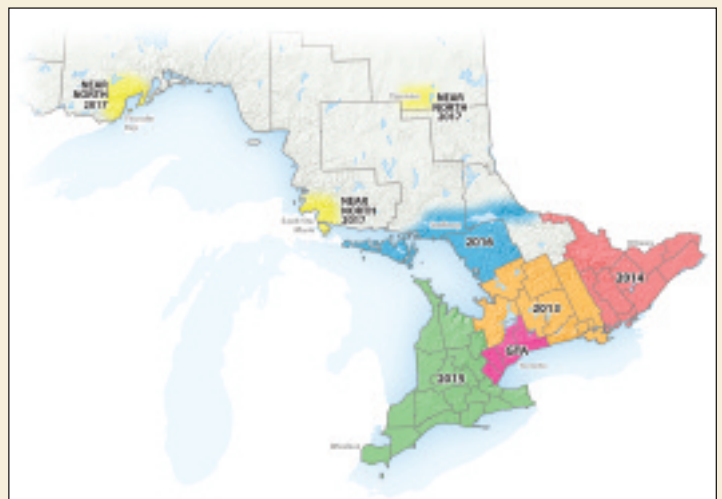
Size of the data = 1Tb



First Base Solutions aircraft equipped for imagery acquisition.

Selected Areas of the Province

Projects ranging in from 35,000 to 40,000 sq km will be collected over the next five years (see Map 1). These annual projects are funded by the Province and eligible project partners including municipalities, conservation authorities, non-government organizations, first nations and the private sector.



Map 1

A Partnership Approach to Projects

Land Information Ontario's imagery acquisition projects use a partnership funding model that provides significant cost savings and allows organizations to access imagery they might not afford to acquire on their own. For example, in 2010, Land Information Ontario coordinated an imagery acquisition project in southwestern Ontario. The total project cost was \$2.2 million or approximately \$48 per sq km. Over 60 organizations joined the project which reduced the partners' costs to less than \$8 per sq km. This type of huge savings would simply not be available without a partnership approach to the acquisition projects.

Imagery Standards

The imagery standard includes digital ortho-photography with a 20 cm resolution accurate to 50 cm with leaf-off, no-snow conditions to ensure users can identify and map features under deciduous tree canopies. These standards also permit highly accurate elevation mapping.

Eligibility and Licenses

Municipalities, conservation authorities, federal departments, First Nations, non-government and private sector organizations are all eligible to participate in these acquisition projects.

All products generated from these projects, including ground control, stereo imagery and the ortho-rectified imagery itself will be owned by the Government of Ontario. Contributing organizations are granted a licence to use the imagery and associated products.

Funding Model

The funding model was designed to allow organizations to share acquisition costs. Each partner selects the area(s) they are interested in acquiring. The total number of square kilometres is used to calculate a shared cost, based on the overall project costs. Municipalities can select their jurisdiction, plus a "buffer" if they choose. Private sector and non-governmental organizations can order imagery for their area(s) of interest. There is a minimum contribution limit of \$1,000 for any participating organization.

For organizations that want to take advantage of the cost savings but do not have a predefined area of interest, a "subscription" option is available. The subscription option allows any organization to provide a minimum of \$1,000 towards the acquisition and order imagery within the current project area "as required". The imagery costs would be the same as the partner cost and the imagery can be ordered for a period of up to three years after delivery. The first delivery of those products is available for no charge while any subsequent orders would be subject to a \$100 administrative fee. This option is beneficial to organizations who do not know in advance where future projects might be located.

Year One – South Central Ontario

More than 80 organizations attended a kick-off meeting showing strong support for the five year strategy and the first acquisition project in south central Ontario.

Acquisition began in the spring of 2013 but experienced a series of challenges along the way. Snow and ice were present across the entire area almost until mid-April, which is normally the start of the "flying season" in southern Ontario. When flying finally started, although most of the snow and ice was gone, the buds on the trees had already started to swell (Image 1). Further north was a different scene altogether. Ice was predominant across the Kawartha Lakes (Image 2) and, even further north the snow was deep and the ice on the lakes was still over 30 cm (Image 3).



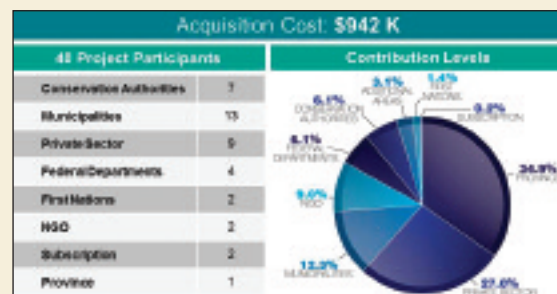
Image 1

Image 2

Image 3

A total of 40 partners participated in the project. The funding model provided partners with 85 percent cost savings compared to doing the acquisition on their own. The value of entering into these partnerships cannot be understated.

The diagram below shows a breakdown of partners and the percentage of funds contributed to the project. Imagery products will be delivered to Land Information Ontario for quality assurance processing this fall. Delivery to project partners will begin later this year. The partners will conduct their own quality assurance processes and identify errors or



Fugro aircraft equipped for imagery acquisition.

cont'd on page 8

omissions. Land Information Ontario will then inform the vendor for their correction and subsequent re-delivery of the imagery products.

South Central Ontario 2013 Project

Collected April/May 2013

Number of days to acquire imagery = 10

Number of planes used = 4

Number of sq km = 35,762

Number of flight lines = 288

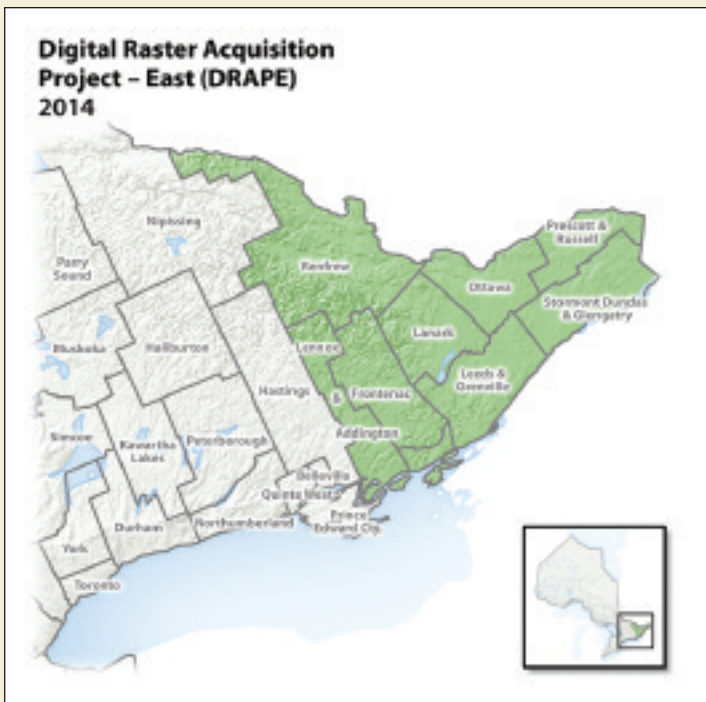
Total Length of flight lines = 20,763 km

Number of images = 35,762

Size of the data = 90 TB

Year Two – Eastern Ontario

Land Information Ontario is developing the partnership for the next project area in south eastern Ontario (see Map 2) which will be acquired in the spring of 2014. That area is similar to the Digital Raster Acquisition Project – East (DRAPE) that was completed in 2008.



Map 2

Benefits to Ontario Land Surveyors

The two largest government ministries with professional surveying staff are the Ministry of Natural Resources (MNR) and the Ministry of Transportation (MTO). Their use of imagery includes:

MNR

- Creating descriptive maps showing imagery and base data layers (e.g. lakes, rivers, wetlands, roads, railways, utilities, private ownership, lot fabric)
- Defining map features such as roads and/or utility corridors that are visible but might not exist in the vector data (e.g. hydro poles, etc. to identify a strip as

a utility corridor).

- Defining the extents of pits, quarries, boat launches or other improvements.
- Identifying unauthorized occupations on Crown land or the extent and location of Licences of Occupation.
- Locating parcels where the lot fabric data might be significantly misaligned.

MTO

- Planning and designing highway route improvements.
- Managing property and corridors.
- Maintaining asset inventories.
- Supporting legal issues.
- Supporting drainage and environmental assessments.

Within the private sector, surveyors use ortho-rectified imagery to support a variety of surveying activities, including: planning field surveys, identifying features on the landscape that should be investigated, comparing existing conditions to proposed site plans, checking the possible locations of registered and previously surveyed monuments and using the elevation products to pre-design and allow designers to estimate development activities. Imagery can also be used in reports and plans to provide context and detailed site information.

Ontario's surveyors can become partners in any Land Information Ontario acquisition project and can pre-purchase imagery through a reduced 'subscription' agreement. By participating in these acquisition projects, partners are provided a copy of all of the project deliverables (e.g. ortho tiles, raw/stereo data products, mass points and break lines used to orthorectify imagery, metadata for all deliverables)

The licence does not allow the re-selling of imagery to other parties; however under these agreements you can create and own derivative products.

Alternatively, Ontario's surveyors can work with a commercial vendor that will provide access to various imagery products and services.

Going Forward

Ontario's imagery strategy has been implemented exactly the way the founders had hoped; good people doing good work with a lot of strategic planning. We are well on our way to delivering excellent images of all of Ontario over the next five years. Organizations that need current imagery are now able to plan for projects in advance. Join our adventure; save money and improve the quality of the products that you deliver to your clients.



For more information on this or any other acquisition project, please visit the LIO website <http://www.mnr.gov.on.ca/en/Business/LIO> and search under Ontario Imagery or contact **Mike Robertson** at mike.robertson@ontario.ca or 705-755-1280.

Occam's razor at Gull River Indian Reserve: The south boundary

By Dr. Brian Ballantyne
Surveyor General Branch, NRCan¹

Abstract:

The south boundary of the Gull River Indian Reserve is a straight line through the river. The evidence strongly suggests that the intention was that the river be part of the Reserve; it was integral to the survival of the community.

Shaving:

Occam's razor is a metaphor for the principle of shaving away the irrelevant and unlikely, until one is left with the most reasonable explanation. Occam's razor should be used to re-establish a parcel boundary when 10 things conspire: cursory description; preliminary instructions; faulty geography; cancelled plan; sporadic traverse; ambiguous line; inconsistent tracings; suspect annotation; inapplicable legislation; and disparate opinions. Such a conspiracy describes the re-establishment of a small section of the south boundary of Gull River Indian Reserve, on the west shore of Lake Nipigon.

The south boundary has a length of 6.5 km; the problematic section is some 520m in length. For that section, the question is: What boundary most reasonably represents the intention of the parties in 1850 (at the time of the Treaty) and in 1887 (at the time of the survey). In particular: Is the southerly boundary a rectilinear boundary through the river,

or does it somehow follow the right bank, left bank or middle thread of the river? Let's parse the conspiracy.²

Cursory description:

The Robinson-Superior Treaty was entered into in 1850 between the Crown and the various First Nations along the north shore of Lake Superior. The First Nations ceded a large tract of land in return for various things; including Reserves. At Gull River, the Reserve was described as: "Four miles square on Gull River near Lake Nipigon on both sides of same river for the Chief Miskimuckqua and tribe."³

This description is rather vague as to whether the river is included in or excluded from the Reserve. The intention was that three boundaries of the Reserve are rectilinear – straight lines, as reflected in the parcel description ("four miles square"). There is no hint in the description that any part of the southerly boundary should be riparian. Only "Lake Nipigon" is referred to as an external riparian boundary and it forms the east (not the south) boundary of the Reserve.⁴

Preliminary instructions:

Little happened until survey instructions were drafted on August 26, 1886 by the Department of Indian Affairs. The instructions are not an exact copy of the instructions that were issued to surveyor Alexander Lord Russell at that time,

because they are not addressed, are unsigned and are in a draft form (some words are crossed out and other words inserted). They do, however, provide the gist of the instructions for Survey #1 of the Reserve.

Faulty geography:

Sadly, the gist of the instructions is based on a misconception of local geography: that the Gull River ran due west to east through the proposed Reserve to Lake Nipigon, perpendicular to the lake. The instructions anticipated that:

- the mouth of the river would be halfway between the north and south boundaries (two miles distant from each);
- the west boundary would be parallel to the general shoreline of the lake (north-south orientation);

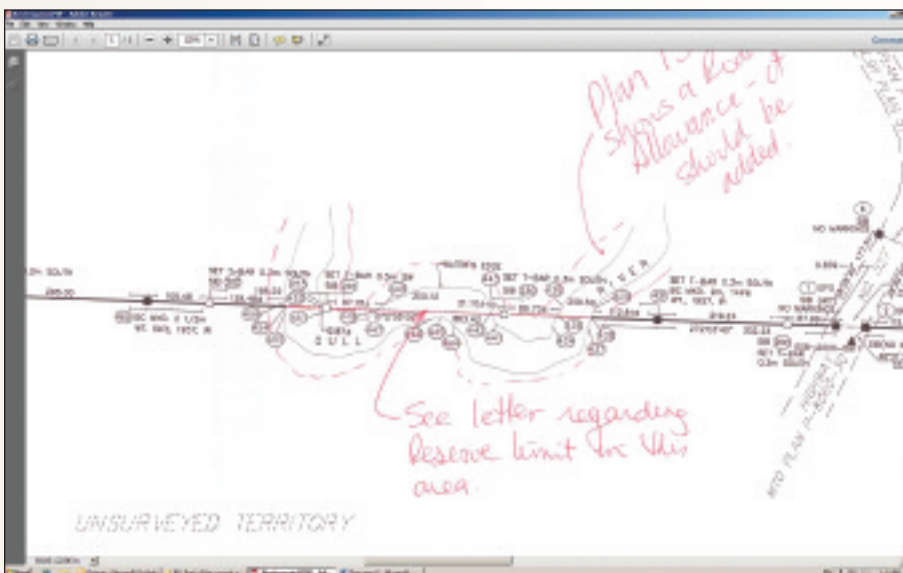


Figure 1 – Extract from draft plan showing section between stations 438 and 454 (2011)

¹ This article does not necessarily reflect the views of NRCan, nor of the Government of Canada.

² Don't even get me started on the issue of an illusory road allowance along the banks of the river.

³ Extract from the Robinson-Superior Treaty annotated in a corner of CLSR Plan 475.

⁴ For an excellent analysis of how intention, Treaty, negotiation, surveying and confirmation led to Reserve boundaries see: Marlatt. The calamity of the initial Reserve surveys under the Robinson Treaties. Papers of the 35th Algonquin Conference. University of Western Ontario. 2003.

- the north and south boundaries would be parallel to the river.

Such criteria did not anticipate that the river flowed in a large counter-clockwise curve, first south-easterly and then north-easterly. This geographic reality meant that not all the criteria could be met.

Cancelled plan (Survey #1):

Plan 474 was signed by Russell on October 19, 1886. It showed that Russell traversed one bank of the river, from Station #11 at Lake Nipigon to Station #58 (near the westerly boundary) to “ascertain the general bearing” of the river and to allow the side lines of the Reserve to be run parallel to the river. He followed the instructions, which contemplate that the river is part of the Reserve:

- boundaries are referred to only in the context of three rectilinear lines (the north, south and west boundaries) and to the shoreline of Lake Nipigon (the east boundary), not with reference to the river;
- the river is described as “running through the centre of the Reserve”;
- the other bank of the river was not traversed; it did not serve as a boundary.

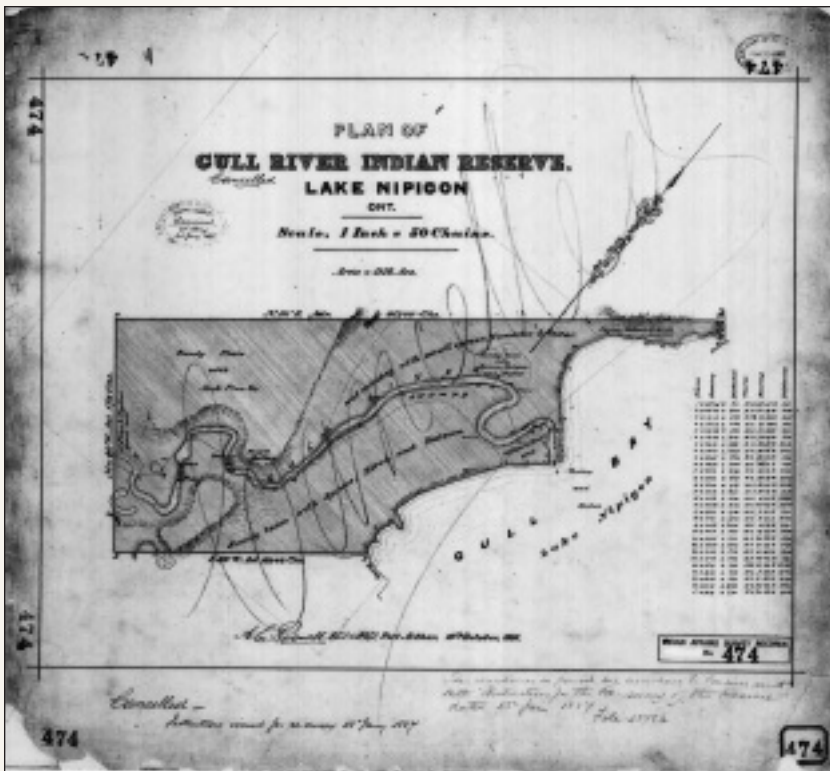


Figure 2 – CLSR Plan 474 (1886)

Sporadic traverse:

Russell’s traverse in autumn 1886 was incomplete; he had no ties to the river between Stations 56 and 57, a distance along the river of some 73 chains. He thus was ignorant of the extent to which the river dipped some 100 ch to the

south of the traverse line at that location. More significantly, Russell was ignorant of the meandering nature of the river at that location, as it curved three times (north, south and then north) over a distance of 26 chains. This meandering is significant.

Ambiguous line (Survey #2):

There must have been dissatisfaction with Plan 474,

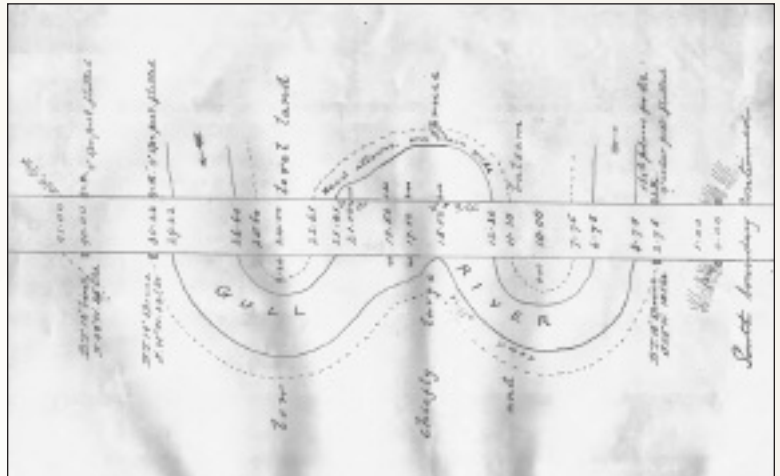


Figure 3 – Extract from CLSR FB 282 (1887)

because in early 1887 Russell returned to Gull River and surveyed a new Reserve, as reflected on Plan 475. The 1886 traverse of Lake Nipigon and of the Gull River (at least as far as Station # 58) was reused. However, at the area now in dispute, the river was tied in another 12 times.

Certainly, the south boundary was traversed as a straight line by Russell in 1887 between the posts he set at chainages 2.75 and 30.22,⁵ sequentially through river, upland, river, upland and river. Thus, the fieldwork is consistent with a straight line boundary.⁶ Indeed, CLSR Plan 475 does show a faint line between chainages 3.75 and 29.22. Admittedly, CLSR Plan 475 does not show a heavy line (representing the south boundary) as running through the river. However, neither does it show a heavy line along either bank of the river, nor along the middle thread of the river.

Russell’s intention was probably to run the south rectilinear boundary entirely south of the river, an objective to be met by starting the south boundary at Point B on Lake Nipigon (thus shifting the mouth of the Gull River towards the north of the IR). However, this goal was not achieved because his 1886 traverse was incomplete. That is, owing to a sporadic traverse in 1886, he was probably unaware when he surveyed the south rectilinear bound in 1887 that the river meandered south of that south boundary.

cont'd on page 12

⁵ All references to chainages refer to CLSR FB 282: Russell’s 1877 original survey of the south boundary.

⁶ Had a different (non-straight line) boundary been contemplated by Russell, then he could have traversed entirely to the south of the river, or to the north of the middle meander of the river.

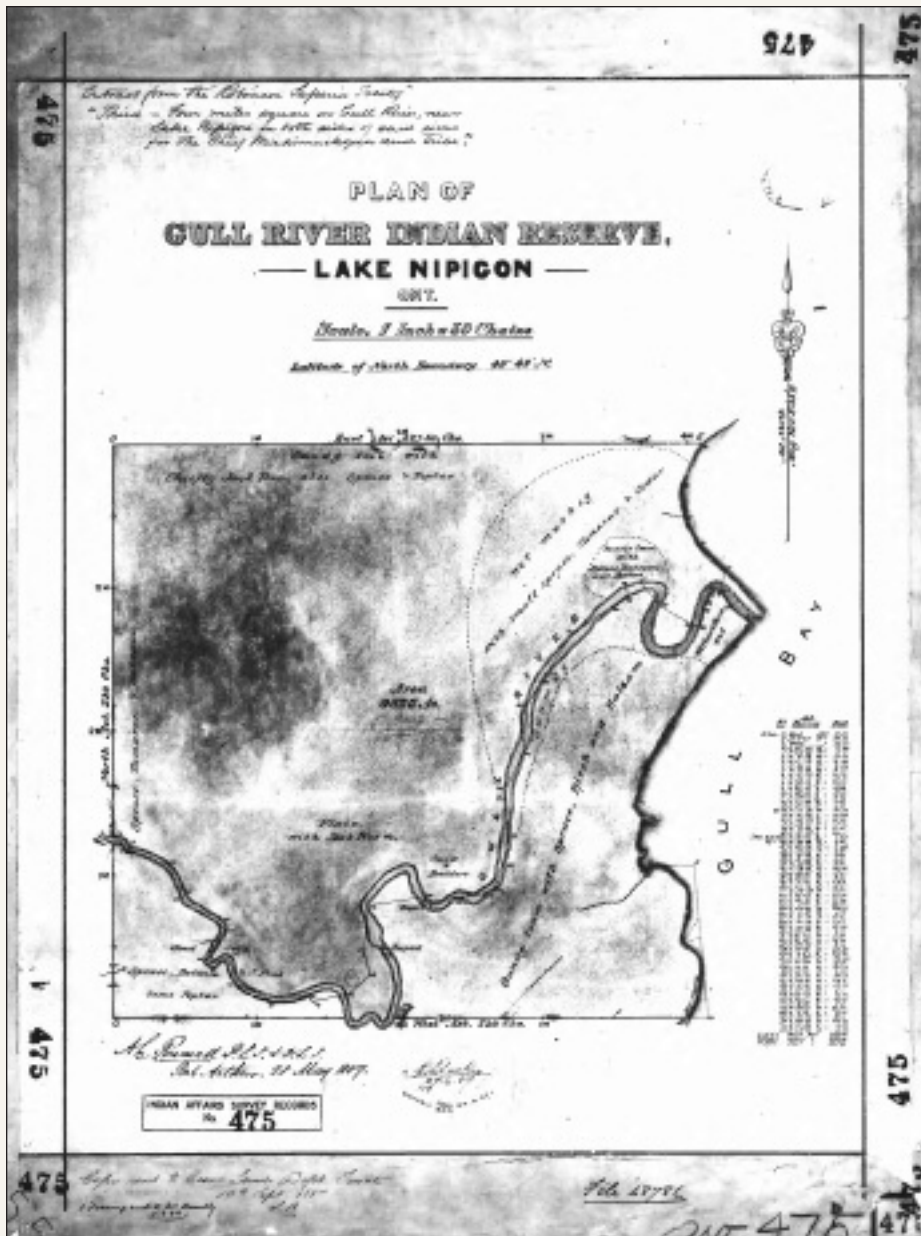


Figure 4 – CLSR Plan 475 (1887)

The suspicion that the intention was to include the river in the Reserve in 1887 is supported by various pieces of evidence:

- there is no indication that the 1886 intention – that the river was to be part of the Reserve (“running through the centre of the reserve”) - had been changed;
- there is no indication that both edges of the river were traversed, which would have been required to either establish boundaries or to calculate an area;
- Russell annotated “IR” over the river, not on either side of the river (p24 of FB 282);
- Russell reported that the river “affords easy access at all times through the heart of the Reserve ...” (p5 of Report within FB 282);
- Russell reported that the river was a “favourite fishing

ground for sturgeon and other fish – the principal food of the Indians in this district” (p6 of Report);

- Russell suggested “that the cultivation of rice in the shallow streams and marshes at the Mouth of Gull River be tried so as to afford food for the Indians.” He cautioned that in the absence of fishing in the river and cultivating rice in the river, the Indians will be “occasionally reduced to starvation” (p6 of Report).

Plan 475 appears to have been accepted by the Crown – there are various signatures and seals littering the bottom of the plan dated June 27, 1887 and September 16, 1888.⁷ The rectilinear bounds surveyed in 1886 are noted in the 1887 survey.⁸ Russell reported that the Chief “heartily approved of the New Reserve”; he advised the Chief “that the new survey at Gull River was the governing one and that all the old lines were abandoned and of no effect whatever.”

Inconsistent tracings:

There were at least two tracings made of Plan 475: T58 at time unknown (unsigned) and T656 in 1906 (unsigned by Russell; signed by Department of Indian Affairs). The pink line on Plan T656 that suggests that the river is not part of the IR is not overly persuasive, because:

- it was applied to the tracing at least 19 years after the survey;
- it contradicts the very strong evidence of the intention to include the river, at the time of the Treaty, instructions and survey;

- there is a legacy⁹ of pink lines being applied incorrectly to plans in that era. Indeed, an ambiguous pink line on Plan T-781B (Henvey Inlet IR) was debunked in 1901 by the Crown as an error, owing to “rapidity in drafting.”¹⁰

Even if one accepted the pink line as legitimate; it is inconsistently applied. On the one hand, in not crossing the Gull River along the south and west boundaries it fails to enclose a polygon. On the other hand, in crossing the Gull River at its mouth, it appears to include the bed in the Reserve.

Inapplicable legislation:

Navigability of the Gull River is irrelevant. The *Beds of Navigable Waters Act* only applies to Crown grants and thus not to this Reserve, and the *ad medium filum* (amf)

⁷ The plan is annotated with the initials of Samuel Bray, Chief Surveyor, Department of Indian Affairs.

⁸ The notes show the “old line” (pp 3 & 12).

⁹ I assume that a legacy can consist of only two pink line imbroglios.

¹⁰ Ballantyne. Rhapsody in pink: Jurisdictional boundaries of Henvey Inlet IR. Ontario Professional Surveyor. pp.6-10. Summer 2013.

presumption applies to riparian parcels on non-tidal rivers in Ontario.¹¹ There is no explicit exclusion of the river, meaning that the amf presumption has not been rebutted.

Disparate opinions:

In early 2011, the south boundary was re-surveyed, and seven parties began weighing in with opinions. The parties included the Canada Lands Surveyor, Indian Affairs - Canada (Gatineau and Thunder Bay offices); the Surveyor General – Ontario; and the Surveyor General – Canada (Ottawa, Toronto and Edmonton offices). Those who argued that the south boundary was not a straight line over that 520m section implied either that the boundary was ambulatory or that the bed was excluded from the Reserve; they relied on a mixture of fact and assertion:

- there is no heavy line through the Gull River on Plan 475 (fact);
- the 1850 Treaty description vested the bed in Ontario (assertion);
- the 1886 draft instructions excluded the river, because the Reserve was to have “an area of sixteen Square Miles exclusive of the Gull River or any large lakes you may come cross in your survey” (assertion);
- the pink line on Plan T656 does not cross the bed of the Gull River (fact).

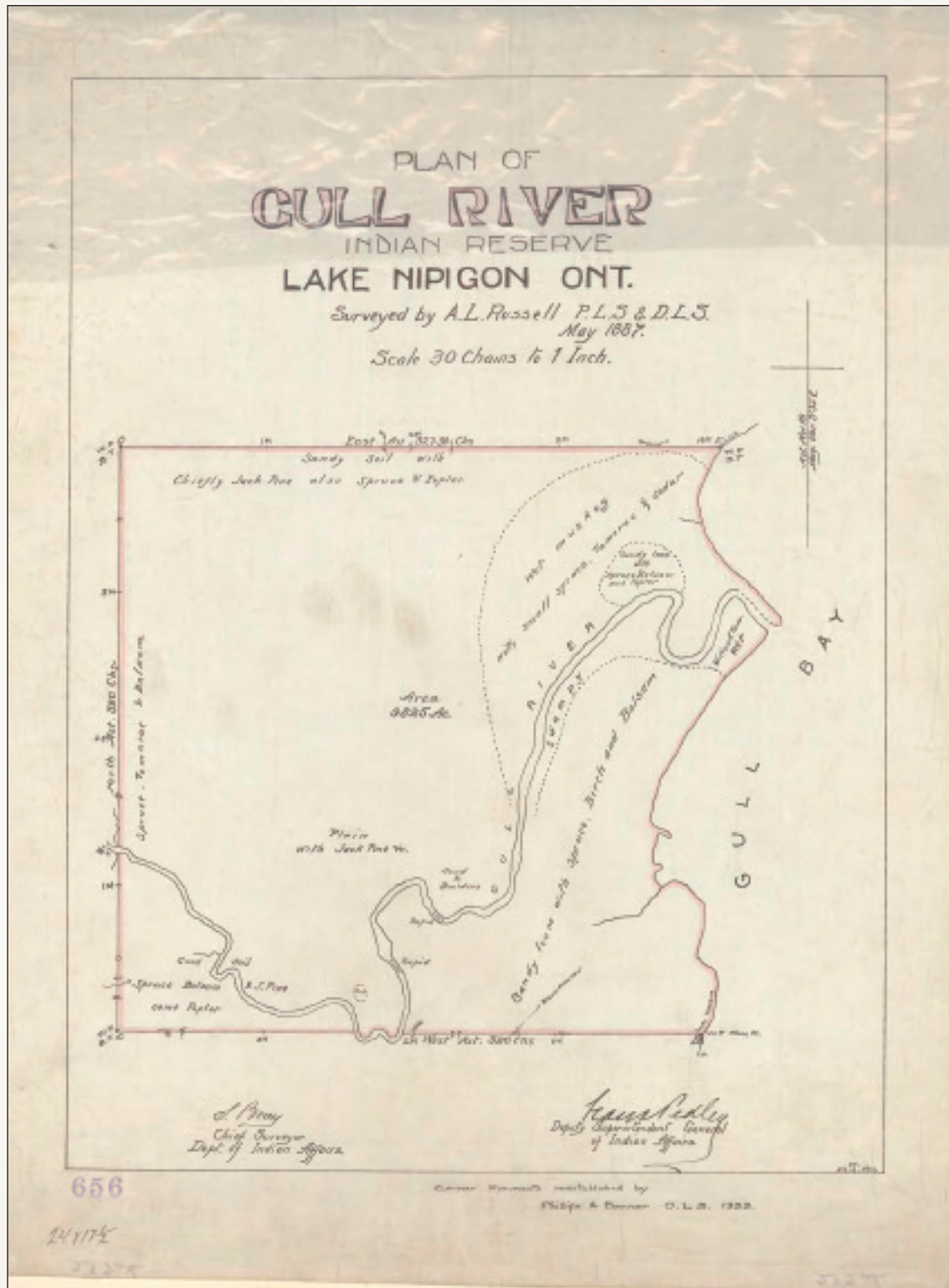


Figure 5 – CLSR Plan T656 (1906)

In the absence of Occam:

Sadly, those who rejected the boundary as a straight line did not propose an alternative boundary. The only alternative is that the southerly boundary of the Reserve between the 1887 chainages 3.75 and 29.22 (akin to between the 2011 stations 438 and 454)¹² is a riparian boundary. Let’s

¹¹ Keewatin Power Co. v. Kenora, (1908 - Ont CA).

¹² The river has shifted insignificantly over the 124 years.

examine the hypotheses that the boundary is the middle thread¹³ or the south bank of the Gull River. First, neither interpretation (middle thread or south bank) is supported by the parcel description. That is, the “four miles square” is interrupted by three offsetting bits if middle thread is used, and by two southerly bits if south bank is used.

If the middle thread is the boundary, then two bits are added to the Reserve (south of the projected straight line) and one bit is subtracted from the Reserve (north of the projected rectilinear boundary):

- 5.5ch south with an area of about 7.5ac, between chainages 5.25 and 13.65;
- 3.5ch south with an area of about 5.5ac, between chainages 18.31 and 27.91; and
- 1ch north with an area of about 0.9ac, between chainages 13.65 and 18.31.

Thus, rejecting a rectilinear boundary in favour of the middle thread over that 22.66ch distance has the net effect of adding some 12.1 ac to the Reserve.

If the south bank is the boundary, then two bits are added

to the Reserve (south of a projected rectilinear boundary):

- 7ch south with an area of about 12.4ac, between chainages 3.75 and 15.00; and
- 4.8ch south with an area of about 10.6ac, between chainages 15.00 and 29.22.

Thus, rejecting a rectilinear boundary in favour of the south bank over that 25.47ch distance has the net effect of adding some 23ac to the Reserve.

The moral of the story:

In setting out on an expedition to re-establish a boundary, researchers (surveyors and other experts) should equip themselves with four things: a sense of wonder (be curious), an aura of indefatigability¹⁴ (be dogged); Occam’s razor (be reasonable); and the spirit of Santayana¹⁵ (know your history). Those four tools are indispensable to arriving at a rigorous answer.



Dr. Brian Ballantyne advises on land tenure and boundaries for the Surveyor General Branch of Natural Resources Canada. He can be reached by email at Brian.Ballantyne@NRCan-RNCan.gc.ca for further discussion.

¹³ If the boundary is the north bank, then the Reserve is presumed to extend to the middle thread: R v. Nikal, (SCC- 1996); R v. Lewis, (SCC – 1996).

¹⁴ As captured by the injunction to “leave no stone unturned.” Not to be confused with “no left turn unstoned,” the mantra of the Merry Pranksters: Wolfe. The Electric Kool-Aid Acid test. 1968.

¹⁵ Those who cannot remember the past are condemned to repeat it: Santayana. The life of reason. 1905.

Is The Crown Bound By The Copyright Act? An Encore



By Will O'Hara and Stephen Thiele

In 2010 we examined the question about whether the Crown is bound by the federal *Copyright Act*.¹ The issue arose from a presentation that one of us² gave at the 2010 Annual General Meeting of the Association of Ontario Land Surveyors about copyright in plans of surveys, in particular plans that had been registered in the provincial Land Titles and Registry Offices. Some members wanted to know if the Crown could copy plans in its possession, or license others to do so, without paying royalties to the surveyor who holds the copyright in the survey. One member who was present at the time said that federal and provincial Interpretation statutes provided the answer. According to these statutes, only those Acts that expressly state that the Crown is bound will bind the Crown. And since the *Copyright Act* does not say that the Crown was bound, the Crown is not bound by the *Copyright Act*. “Case closed”, said that member.

But was the case really closed? Could the Crown take the benefits of the *Copyright Act*, on one hand, and then ignore the *Act* when it suited its purposes under the guise that it was not bound by the *Act*? We expressed the view in our 2010 article that the law was not quite that simple. We argued that the Crown was bound by the *Act* and must respect copyrights belonging to others. It was our view at the time that “the Crown has no legal right to flaunt the law of copyright.” (It is important to note that the federal Crown had always taken the position that it was not bound by the *Act*, but it ‘voluntarily’ complied with the *Act* by seeking authorization from copyright holders where necessary and paying royalties that were appropriate, at least in the view of the Crown.)

We argued that the long-recognized ‘benefit-burden’ exception to Crown immunity from a statute meant that the Crown couldn’t take the benefits of the *Act* without taking the burdens as well. The Crown couldn’t have it both ways. It was our view that public policy in Canada required the Crown to be part of the efforts to protect intellectual property and promote investments, research and economic growth. Our closing words were “The case is not closed – it is wide open and in need of resolution.”

Three years after we expressed those views in the pages of the *Ontario Professional Surveyor* the courts answered this important question.

On April 3, 2013 the Federal Court of Appeal released its decision in *Manitoba v. Canadian Copyright Licensing Agency (Access Copyright)*³, in which it dispelled any doubt about the Crown’s obligation to comply with the *Copyright Act*. The Crown is bound.

The case involved a dispute among Access Copyright (on behalf of the copyright owners) and various provincial governments about the reproduction of copyrighted works by employees of the governments. Access Copyright is a not-for-profit organization set up by authors and publishers to license copyrighted works and collect royalties on behalf of its members. Although the dispute was about the *amount* of the tariffs to be charged, the provincial governments said they weren’t obligated to pay anything, as they were immune from the *Copyright Act*. They asked for a declaration that they were immune from the *Act* as a whole, not just the proposed tariffs.

The dispute was heard first by the Copyright Board of Canada, which concluded that the *Act* was intended to bind the Crown. The Board rejected the claims of Crown immunity.

The Federal Court of Appeal examined the decision of the Board and unanimously agreed with its findings. The Federal Court of Appeal used the federal *Interpretation Act* as a starting point, noting again that the *Copyright Act* did not expressly say that the Crown was bound, but then moved on to examine whether “through a purposive and contextual statutory analysis, it could discern a clear parliamentary intention to bind the Crown.”

The court first considered the objectives of the *Act* – “encouraging creativity and providing reasonable access to the fruits of the creative endeavour” – and then reviewed the specific wording of s. 12 of the *Act*, which deals with Crown copyright, giving that provision a very limited interpretation.

The Federal Court of Appeal examined the many exceptions to copyright included in the *Act* that favour the Crown and its agents, including some educational institutions, libraries, archives, museums, and pointed out that the exceptions in favour of the Crown would not be necessary if the Crown were immune from the *Act* as a whole. The Federal Court of Appeal summarized its conclusions in this way:

In my view, the references in the *Act* to very strict conditions, to tariffs fixed by the Board, to the consent of the copyright owners, and to the power of the court

¹ *Is the Crown Bound by the Copyright Act?*, published in the *Ontario Professional Surveyor*, Volume 53, No.1, Winter 2010

² Will O'Hara

³ 2013 FCA 91

when the defendant is an “educational institution”, including a federal or provincial government department, all point to only one logical and plausible conclusion as to the intent of Parliament: the Crown is bound.⁴

On the effect of the *Interpretation Act* raised by the AOLS member in 2010, the Federal Court of Appeal made this finding:


I have considered that the *Act*, unlike other statutes such as the *Patent Act*, R.S.C., 1985, c. P-4, s.2.1, does not contain an “expressly binding” clause at the beginning, as was recommended in the 1985 report entitled *A Charter of Rights for Creators*. I am still irresistibly drawn to the conclusion that Parliament clearly intended to bind the federal and provincial Crowns by the express language of the *Act* and through logical inference.⁵

In view of this decision, there can no longer be any argument about the Crown being immune from the provisions of the *Copyright Act*. The Crown is bound by the *Act*, like any person or other legal entity and it must comply with the *Act* in all respects. Subject to limited users’ rights such as fair dealing (which are generally non-commercial uses), it cannot reproduce copyrighted plans of survey in its possession without the consent of the copyright owner, or license others to do what it can’t do.

In our respectful view, the Federal Court of Appeal reached the only acceptable conclusion in the *Manitoba* case. The

question we asked in 2010 has now been answered definitively and the decision was not appealed. *Now the case is closed.*

Members of the land surveying profession are considering the implications of this decision. Among the questions raised is this: If the Crown is bound by the *Act*, like everyone else, how can it license other privately held corporations to sell copies of registered or deposited plans of survey for a profit without paying a royalty to the land surveyor who prepared the plans – something no one else can do?

In our view, this case is of critical importance to members of the land surveying profession. Crown immunity from copyright is a thing of the past. The Crown has no legal right to flaunt the law of copyright. 

Will O’Hara is a partner at the firm of Gardiner Roberts LLP, practicing in professional liability litigation, intellectual property, insurance and dispute resolution. He is certified by the Law Society of Upper Canada as a Specialist in Civil Litigation. wohara@gardiner-roberts.com

Stephen Thiele is a partner and the director of legal research at Gardiner Roberts LLP. sthiele@gardiner-roberts.com

This article is not intended to provide a legal opinion on the issues discussed therein, but is intended for educational purposes only.

⁴ at paragraph 47 ⁵ at paragraph 49

DISCIPLINE DECISION Mr. Ward Houghton

IN THE MATTER OF the *Surveyors Act*, R.S.O. 1990,
Chapter S.29, as amended

AND IN THE MATTER OF Ward Houghton, O.L.S.

AND IN THE MATTER OF a Disciplinary Hearing
of the Discipline Committee of the Association of
Ontario Land Surveyors held in accordance with
Sections 26 and 27 of the said Act

Order and Reasons

This panel of the Discipline Committee convened on July 3, 2013. The Member had retained Mr. Robert Taylor, Barrister and Solicitor, and Mr. Houghton, O.L.S., and Mr. Taylor were both present at the commencement of the hearing. The Association was represented by Mr. Robert Fenn, Counsel; both Mr. Fenn and the Association's Deputy Registrar, Ms. Maureen Mountjoy, were present throughout. The panel was assisted by counsel, Carol Street.

On convening, the panel was presented with an Agreed Statement of Facts and Undertaking. Counsel for the parties jointly proposed that the panel dismiss the allegations or charges before it, without costs to either party.

The panel recessed to consider counsel's proposal, followed by additional questions put to both counsel, and a further *in camera* discussion by the panel.

The panel ultimately concluded that it was prepared to accept the proposal put forward jointly by both parties that the allegations set out in the Notice of Hearing dated March 13, 2013 should be dismissed without costs to either party. A copy of the said Notice of Hearing is attached hereto as Appendix 1.

The initiating source of those allegations was a fee dispute between the member and another member. The panel was advised that this dispute has been resolved by agreement between those two members and that the determination of the appropriate fee will be dependent on whether the member pursues litigation in the Superior Court of Ontario

and, if so, the outcome of that litigation.

Having reviewed and considered the Agreed Statement of Facts, having questioned the parties regarding the circumstances surrounding the Joint Submission, and being mindful of the due consideration such a Joint Submission is to be given, the panel was satisfied that the proposed resolution put forward by the parties adequately protects the public interest, and is an acceptable resolution of the matters in issue between the member and the Association. For these reasons, the allegations made against the member as set out in the Notice of Hearing dated March 13, 2013 are dismissed, without costs to either party.

Pursuant to section 26(5) of the *Surveyors Act*, R.S.O. 1990, c. S.29 this decision is required to be published in an official publication of the Association.

This decision was provided orally on July 3, 2013 to the Association and its counsel, and to Mr. Houghton's counsel, Mr. Houghton no longer being present at that time.

This Order may be signed in counterparts and by electronic signatures.

Oral Decision given July 3, 2013.

Robert Jordan, O.L.S.

Tom Kristjanson, O.L.S.

Doug Hunt, O.L.S.

Robert Fligg, O.L.S.

Patricia Meehan, Lieutenant-Governor Appointee

Appendix 1

NOTICE

TO: Mr. Ward I. Houghton, O.L.S.
Houghton + Houghton Inc.
15 St. Catharine Street
St. Thomas, Ontario N5P 2V7

WHEREAS Section 26 of the *Surveyors Act*, R.S.O. 1990, Chapter S.29, as amended (the "Act") provides that where a discipline panel finds a member of the Association guilty of professional misconduct or incompetence, it may, by order,

- (a) revoke the licence or certificate of registration, as the case may be, of the member;
- (b) suspend the licence or certificate of registration, as the case may be, of the member for a

stated period, not exceeding twenty-four months;

- (c) accept the undertaking of the member to limit the professional work of the member in the practice of professional surveying to the extent specified in the undertaking;
- (d) impose terms, conditions and limitations on the licence or certificate of registration, as the case may be, of the member, including but not limited, in the case of a member, to the successful completion of a particular course or courses of study, as are specified by the discipline panel;
- (e) impose specific restrictions on the licence or certificate of registration, as the case may be, or on the certificate of authorization, including but not limited to,
 - i) requiring the member to engage in the practice of professional land surveying only under the personal supervision and direction of another member,
 - ii) requiring the member to not alone engage in the practice of professional land surveying,
 - iii) requiring the member to accept periodic inspections by the discipline panel or its delegate of the books, accounts, records and plans of the member in connection with the member's practice,
 - iv) requiring the member to report to the Registrar or to such Committee of the Council as the discipline panel may specify on such matters in respect of the member's practice for such period of time, at such times and in such form, as the discipline panel may specify;
- (f) require that the member be reprimanded, admonished or counselled and, if considered warranted, direct that the fact of the reprimand, admonishment or counselling be recorded on the register;
- (g) revoke or suspend for a stated period of time the designation of the member by the Association as a specialist in any branch of professional surveying;
- (h) impose the fine that the discipline panel considers appropriate, to a maximum of \$5,000, to be paid by the member to the Minister of Finance for payment into the Consolidated Revenue Fund;
- (i) require the member to repay, waive or reduce the fee charged by the member in respect of the practice of professional surveying related to

the finding of professional misconduct or incompetence;

- (j) Repealed
- (k) fix and impose costs to be paid by the member to the Association;
- (l) direct that the imposition of a penalty be suspended or postponed for the period and upon the terms or for the purpose that the discipline panel specifies, including but not limited to any combination of the following:
 - (i) the successful completion by the member of a particular course or courses of study;
 - (ii) the production to the Discipline Committee of evidence satisfactory to it that any physical or mental handicap in respect of which the penalty was imposed has been overcome.

AND WHEREAS pursuant to subsection 22(4.3)(a) of the Act, the Complaints Committee of the Association, by a Decision dated September 24, 2012 has directed that Mr. Houghton be referred to the Council of the Association with a recommendation for further disciplinary action.

AND WHEREAS the Council of the Association pursuant to Section 25(7)(a) of the *Surveyors Act*, by a Motion dated December 20, 2012, directed the Discipline Committee to hold a hearing in respect of allegations of professional misconduct against Ward I. Houghton, O.L.S.

AND WHEREAS a copy of the aforesaid allegations is attached as Schedule "A" to this Notice.

NOW THEREFORE TAKE NOTICE that the Discipline Committee has appointed the 3rd, 4th, 10th and 11th day of July, 2013 at the hour of 10:00 o'clock in the forenoon (local time) at the office of the Association of Ontario Land Surveyors, 1043 McNicoll Avenue, in the City of Toronto, in the Province of Ontario, to conduct a hearing to inquire and investigate the above-mentioned allegations made against you in accordance with the provisions of the above-mentioned Act.

AND TAKE FURTHER NOTICE that you are required to produce the original notes, letters and correspondence, in connection with the subject matter of the said complaint.

AND TAKE FURTHER NOTICE that if you do not attend at the above-mentioned hearing, the Discipline Committee of the Association may proceed therewith in your absence and you will not be entitled to any further notice of the said hearing or the proceedings in connection therewith.

You are entitled to be represented by Counsel or agent at the said hearing and to adduce or introduce such evidence on your behalf as you consider desirable or necessary.

DATED at Toronto this 13th day of March, 2013

cont'd on page 20

SCHEDULE "A"

ALLEGATIONS OF PROFESSIONAL MISCONDUCT

CANADA)	IN THE MATTER OF the <i>Surveyors Act</i>
)	R.S.O. 1990, Chapter S.29
)	
PROVINCE OF)	AND IN THE MATTER OF Ward Houghton, O.L.S.
ONTARIO)	
)	AND IN THE MATTER OF a Disciplinary Hearing
)	of the Discipline Committee of the Association of Land
)	Surveyors held in accordance with sections 26 and 27
)	of the said Act.

I, MAUREEN V. MOUNTJOY, O.L.S. of the City of Brampton, in the Region of Peel, am the Deputy Registrar of the Association of Ontario Land Surveyors.

1. The Council of the Association of Ontario Land Surveyors (AOLS) pursuant to Section 25(7)(a) of the *Surveyors Act*, by a Motion dated October 22, 2012, directed the Discipline Committee to hold a hearing in respect of allegations of professional misconduct against Ward I. Houghton, O.L.S.
2. It is alleged that Ward I. Houghton, O.L.S. (herein referred to as "Mr. Houghton"), in his personal capacity, and as the official representative for the firm Houghton + Houghton Inc., is guilty of professional misconduct within the meaning of Section 35 of Regulation 1026, R.R.O. 1990, as amended, all on the following grounds:
 - (a) By a letter dated April 15, 2012 to the Registrar of the AOLS, Robert Stirling, O.L.S. filed an official complaint against Ward Houghton, O.L.S. alleging that Mr. Houghton was not complying with the AOLS guidelines for the distribution of field records and that Mr. Houghton's actions were preventing him from completing his work in a timely manner.
 - (b) On May 25, 2012, the Complaints Committee of the AOLS issued an Interim Decision that offered Mr. Houghton an opportunity to review his response to this complaint in light of the recent resolution to previous complaint file C-11-04 which considered similar issues.
 - (c) Upon reviewing Mr. Houghton's responses to the committee's May 25, 2012 Interim Decision, the committee purported to separate the issues of the content of the field records from the amount that could be charged for the said records. It issued a Second Interim Decision, dated July 16, 2012 directing Mr. Houghton to release specific materials to Mr. Stirling within 5 days, and advised him that the issue regarding his fees for supplying this information could be resolved at a later date in a different forum.
 - (d) By letter to the AOLS Registrar dated July 19, 2012, Mr. Houghton's counsel, Mr. Tracy Warne, advised that Mr. Houghton was prepared to submit the fees dispute to arbitration by the Fees Mediation Committee of the AOLS.
 - (e) On September 24, 2012, the Complaints Committee was advised by the Registrar that Mr. Houghton had agreed to refer the fees dispute to the Fees Mediation Committee. However, Mr. Houghton had not yet supplied his field notes and records to Mr. Stirling, as requested in the Second Interim Decision dated July 16, 2012. Therefore, the Complaints Committee issued a Final Decision that referred Mr. Houghton to Council with a recommendation that he be referred to the Discipline Committee.
 - (f) On October 22, 2012, AOLS Council passed a Motion referring Mr. Houghton to the Discipline Committee.
 - (g) On November 2, 2012, AOLS Council passed a Motion that the question of the fees Mr. Houghton was entitled to charge Mr. Stirling for the requested materials be determined by the Fees Mediation Committee in a binding arbitration.
 - (h) Council, by Motion passed December 20, 2012, reconsidered and rescinded its Motion passed November 2, 2012. Council concluded that the question of what materials are to be included in responding to a request for field records and what associated costs of those records might reasonably be charged are not severable. It referred all matters in dispute between Mr. Houghton and Mr. Stirling, being both the content of the field records to be provided, as

well as the reasonable cost for those records, to the Discipline Panel assigned to conduct the discipline hearing.

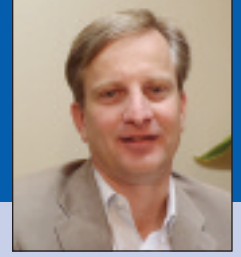
3. It is alleged that the member has committed an act of professional misconduct, as defined by Section 35(1) of Regulation 1026 of the *Surveyors Act*, in that he contravened Section 4 of the *Surveyors Act*, which states that “Every surveyor shall make and preserve exact and regular field notes of all his or her surveys and shall keep a proper record and index of all such field notes and shall exhibit or give copies of the same to any

surveyor for a reasonable charge.”

4. It is alleged that the member has committed an act of professional misconduct, as defined by Section 35(21) of Regulation 1026 of the *Surveyors Act*, in that his failure to comply with a decision of the Complaints Committee and with his own commitment to comply with AOLS Bulletin 2007-1 would reasonably be regarded by members as dishonourable or unprofessional.

Dated at Toronto, Ontario, this 13th day of March, 2013.

Failed Business Models - and what to do about them



By Wilson Phillips, M.L.S., C.L.S.

Professional Land Surveyors have a long history of serving the public interest and protecting the public. Being a professional land surveyor, I share that obligation and sense of service. As an economics freak as well, I often wonder about markets and the price of goods and services and how they are perceived, derived, assigned, and manipulated. I would like to suggest some changes to the profession that are overdue and that I think will provide lower costs to the public and change common perceptions.

In Manitoba the public perception of risk and cost for professional land surveys is not based in reality. To the public, the introduction of GPS and faster and better equipment means that land surveys should cost less and take less time. Generally this is true. However, the perception is based on an assigned value of the GPS and equipment and little else. To the public a GPS receiver that costs \$300 dollars in Canadian Tire means that a professional grade GPS for surveyors should cost \$2,000, not \$46,000 and that there is little training behind it. The perception then is that surveyors just measure and that is it. Perceptions are dangerous.

When the public asks about the cost of a survey, I explain what is involved in staking a lot or subdivision, etc. They say things like "I had no idea". Price perceptions do not match prices on a broad level. However, even though they know what is required, the public still looks for the cheapest price. Why? One answer is perceived risk. The public knows that every surveyor is insured and licensed and so has recourse for errors. If the perception is that professional land surveyors just measure, what can possibly go wrong, and why is the cost for a survey not cheaper yet? Therefore in the public's view the perceived risk is lower so a lower value is assigned to the service.

However, when the public is given the choice between a \$300/hr lawyer and a \$200/hr lawyer they will "want" the \$300/hr lawyer. Why? The answer may be risk as well. If Joe public is going to sue someone, he/she wants to win and the \$300 lawyer is perceived to be more knowledgeable about risk thereby reducing the perceived risk of losing. What if something goes wrong? Would you sue your \$300/hr lawyer to recover costs? Is there risk?

Change to the Practices of Professional Land Surveyors

First, let's look at what we can change. Does your practice do detailed billing? This matters because the longer every

business lists all the costs that go into a service the more perception of price is understood. This benefits a private practitioner, the public and your peers. This is something that we can learn from the legal profession.

Like Starbucks, why not offer a variety of versions of the same thing? Why are we still issuing certificates for stakings? The public wants the monuments placed on the corners or along the property line. If they want a certificate, that should be an extra. Sound crazy? Justify the added cost to the public when you have to maintain the record anyway. A certificate is free information that can be resold without the control but with increased risk to you.

The Big One

Don't do work for free. Sounds simple. Why then do professional land surveyors provide Real Property Reports (RPR's) or Building Location Certificates (BLC's) in the case of Manitoba? These are not registered public documents. They are usually prepared so that a seller, vendor, bank, lawyer, utility, zoning department or title insurer, can be assured that the property is clear of encroachments, etc. That is a lot of clients. How many are paying you? I bet they are going to copy that copywrote document till the cows come home too. Imagine if Title Insurers did this?

What if the seller, vendor, bank, lawyer, utility, zoning department or title insurer, etc. each came to you for that information? The unit cost would be low with about the right amount of risk to price ratio and all would pay a lower cost but with increased perception of the service, not the product.

The financial model behind title insurance is based on the fact that it is bought multiple times for the same properties and the end risk is covered by the public purse or individual insurance. What you may not know is that banks purchase bulk title insurance to secure all their mortgages and by requiring the purchaser to acquire title insurance, the bank's risk is virtually eliminated. Furthermore, title insurance reduces the cost to the lawyer involved in a land transaction by covering some of the associated risk. This is a big selling point for title insurers to get lawyers on board. How does the public benefit from this exactly? It is a good question, yet when the government looked at this very topic it decided to allow this charade to go on. Why? The perception is that there is value in the products.

So if you are selling a service and a product, (never good economics to combine these) and have uncontrolled, unlim-

ited risk with a one shot reward, what to do? Stop doing that. Follow the title insurance model. Land Surveyors need to move towards a model where the information is controlled like the title insurers. What would your insurance premiums be if the risk associated was limited to a single purchaser at a time? Don't think about a product, think about a service. Services can be resold by you. Sound crazy? The very association rules that guide individual practitioners are set up for failure. Think about that. Who benefits from that model?

Your government does something everyday that makes millions of dollars. They take a title, transfer it, make amendments, add encumbrances, etc. and store and maintain those records in the public system. So why, at least in Manitoba, does it make so much money? The answer is that the government controls the information and assigns risk to the price and makes money not in one shot, but in many, many transactions where the cost per unit service is relatively low. Would you want to sell one Mercedes a month and get the commission or get \$1 for every land transaction in Manitoba? I thought so. Even our government is smarter than us.

Creating products for multiple users and little front end benefit is not a good model for the surveyor or the public. The risk then is severely discounted and the perception of value is low. Therefore the only model that fits is to have

multiple smaller cost sales of the same risk. The only thing we can change is the profession and in doing so we will change the way the public and the governments perceive us and the valuable current land information we provide.

Move Fast or Die Slow

So how do we lower the cost to the public, increase the use of current land data, change the perception of the public and reduce risk? First, change the way that you see the market you sell into. Demand changes at the association and business group level. Change the products you offer and evaluate risk to reward ratios and extract the maximum value out of everything. The products that land surveyors provide are usually stipulated by a static, "not changed in fifty years" book of what you should do. Do you know of another industry that does this? Look beyond the everyday and realize that if you do not change you are on the way out. The end result; you will be more successful and your clients will be happier.



Wilson Phillips is a Manitoba Land Surveyor, Canada Lands Surveyor and planning consultant in Winnipeg. He is a self-professed economics freak and studies markets and perceptions incessantly. He can be reached for discussion at wilson@phillipsstevens.com

Canada's New Vertical Datum

By Philippe Lamothe, Marc Véronneau, Morgan Goadsby and Ron Berg

Introduction

What is height modernisation? Height modernisation is the introduction of a new vertical datum for Canada, compatible with modern positioning technologies. In November 2013, the Geodetic Survey Division (GSD) of Natural Resources Canada (NRCan) will nationally release the Canadian Geodetic Vertical Datum of 2013 (CGVD2013). This new vertical datum will progressively replace the current Canadian Geodetic Vertical Datum of 1928 (CGVD28) adopted by a federal Order in Council in 1935. The national release of CGVD2013 brings three very important changes. First, the new vertical datum will be defined by an equipotential surface and not by mean sea level at specified tide gauges. Second, it will be realized by integrating gravity data instead of adjusting a network of levelling lines. And third, the vertical datum will be accessible throughout Canada using a geoid model instead of a network of benchmarks with published elevations. But most importantly, CGVD2013 will be compatible with Global Navigation Satellite Systems (GNSS) such as the Global Positioning System (GPS).

Transition from CGVD28 to CGVD2013

The levelling technique has served the Geodetic Survey of Canada well over the last century in establishing a precise national vertical datum. The technique has barely changed over the years. Naturally, instrumentation has improved and improvements such as motorized levelling and digital instruments have been introduced, but levelling still remains a time consuming method that is cost effective only over short distances. It still requires measuring the height difference between two graduated rods that are about 100 metres apart, making the technique prone to systematic errors, especially when the vertical datum extends across a country as large as Canada.

Over the last 100 years, more than 80,000 federal first-order benchmarks have been installed across Canada on some 160,000 km of levelling lines. The benchmarks are located mostly along major roads and railways in the southern half of the country, meaning that most of Northern Canada's established benchmarks are not tied to CGVD28. Today, many of these benchmarks are destroyed or could be considered unreliable as they have not been surveyed for many decades.

CGVD28 was defined by mean sea level at five tide gauges: Yarmouth and Halifax on the Atlantic Ocean, Pointe-Au-Père on the St-Lawrence River, and Vancouver and Prince Rupert on the Pacific Ocean. In addition, the establishment of CGVD28 included the set elevation of a

benchmark in Rouses Point, New York (next to Lake Champlain) accepted as fixed by the US and Canada in March 1925. By constraining CGVD28 to sea level on the east and west coasts, the assumption was made that the Pacific and Atlantic oceans at the gauges were at the same zero elevation. In fact, this is not the case. The Pacific Ocean near Vancouver is about 55 cm higher than the Atlantic Ocean near Halifax. This incorrect assumption, as well as other systematic errors (e.g. inaccurate gravity data, vertical crustal motion), has created distortions in the datum. These contribute long wavelength errors in CGVD28 that range from approximately -65 cm to +50 cm across Canada.

The alternative approach to spirit levelling for the realization of a vertical datum is geoid modelling. If the two approaches were errorless, they would define the same datum. A vertical datum realized with spirit levelling only provides height values at benchmark locations. On the other hand, the geoid model is realized in relation to an ellipsoid (e.g. GRS80) and represents a continuous surface known everywhere across the Canadian territory. This allows for complete national coverage and compatibility with GNSS.

Thanks to GNSS, users can recover heights with respect to an ellipsoid with centimetre accuracy at any location. However, a height above an ellipsoid does not have any physical meaning as water could flow from a lower ellipsoidal height to a higher ellipsoidal height. For meaningful elevations, the GNSS ellipsoidal heights must be converted to orthometric heights. This is done through the use of a geoid model which gives geoid heights, that is, the separation between the ellipsoid and geoid as shown on Figure 1. The geoid height (N) establishes the connection between ellipsoidal height (h), which can be obtained by GNSS, and the orthometric height (H): $H = h - N$.

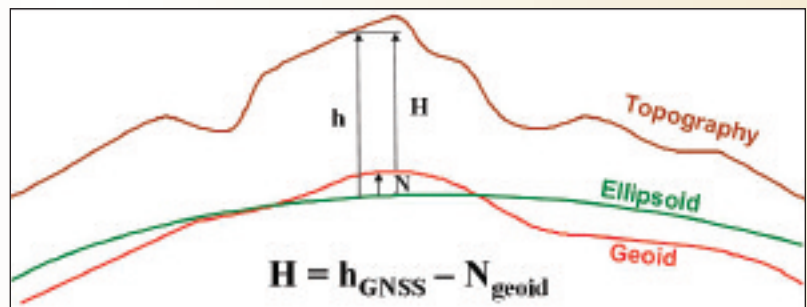


Figure 1: The orthometric height (H) is the separation between the geoid and topography. It is determined by the difference between the ellipsoidal height (h), measured by GNSS, and the geoid height (N), interpolated from a geoid model. An orthometric height difference (ΔH) can also be determined by levelling technique.

Thus, the application of the geoid model for height determination involves a simple subtraction, as long as the

cont'd on page 26

ellipsoidal heights and geoid heights are in the same reference frame (e.g. NAD83(CSRS)).

As for the accuracy of the geoid model (or calculated orthometric heights), this is determined through analysis of error propagation in the modelling. The current published geoid model, the Canadian Gravimetric Geoid model of 2010 (CGG2010), has an absolute accuracy of 2 cm for most regions outside the Western Cordillera at the 67% confidence interval, or 1 sigma. In rough terrain, the accuracy approaches a decimetre. The relative precision of the geoid model is generally 1 to 2 cm for baselines as long as 100 km, even in the Rocky Mountains. The forthcoming geoid model, CGG2013, which realizes the new vertical datum CGVD2013, will be published with an uncertainty model that estimates its absolute accuracy with respect to the reference equipotential surface. The current precision and accuracy of the geoid model can support most of our national height referencing requirements.

Monumented height network in CGVD2013

CGVD28 will continue to co-exist with CGVD2013, but NRCan will no longer maintain the network of first-order benchmarks, which have already started to deteriorate over the last 20 years. The national monumented network for heights, at the highest level, now consists of the stations forming the Canadian Active Control System (CACS) and the Canadian Base Network (CBN). Densification is provided by the provincial High Precision Networks (HPN) and Real Time Networks (RTN) from public and private providers. In Ontario, the Ontario High Precision Network (OHPN) now consists of over 7,500 stations related to the NAD83(CSRS) epoch 2010.0 realization. Both OHPN station data and private sector RTN station data are available through the provincial geodetic database known as COSINE (COntrol Survey INformation Exchange) provided by the Ontario Ministry of Natural Resource (MNR).

CGVD2013 heights of existing NRCan primary first-order benchmarks will be published alongside the old CGVD28 heights. This requires an overall readjustment of the levelling networks. It should be noted however that the historic levelling observations have their limitations and the new adjustment will not account for or correct for benchmark instability, nor for changes in the Earth's crust (uplift/subsidence) that affect the accuracy of individual benchmark heights. The availability of heights referenced to the new datum for the existing network will greatly facilitate the transition to the new datum. To help ease the potential burden associated with moving information to a new datum, NRCan will provide transformation and other software tools to support the conversion of existing data sets from CGVD28 to the new datum. These tools will be discussed in more detail below.

MNR will be establishing the Height Modernisation Working Group in Ontario this fall. This Working Group will include representatives from MNR, Ministry of

Transportation Ontario (MTO), other provincial government ministries, Ontario municipalities and Conservation Ontario (which represents Conservation Authorities within Ontario). The Ontario Height Modernisation Working Group will look at the specific needs of Ontario regarding:

- Potential readjustment of secondary and tertiary levelling networks on the new CGVD2013,
- Planned transition to the new vertical datum in Ontario, including timing, communication to user community and duration of the maintenance of the former datum, and
- Tools or resources needed to meet the specific needs of Ontario users.

In anticipation of a potential future vertical readjustment in Ontario, MNR and MTO have begun reviewing existing provincial secondary and tertiary levelling networks for quality and consistency, and will determine the availability of the appropriate digital data for readjustment.

Data impacts

The implementation of CGVD2013 corrects for the distortions in CGVD28 that range from -65 cm and +55 cm. The largest absolute changes will be in the Maritimes where the new datum will be higher by 65 cm, meaning lower elevations for the region. In the Rocky Mountains, the datum will be lower by 50 cm, meaning higher elevations. Figure 2 shows the changes for Ontario.

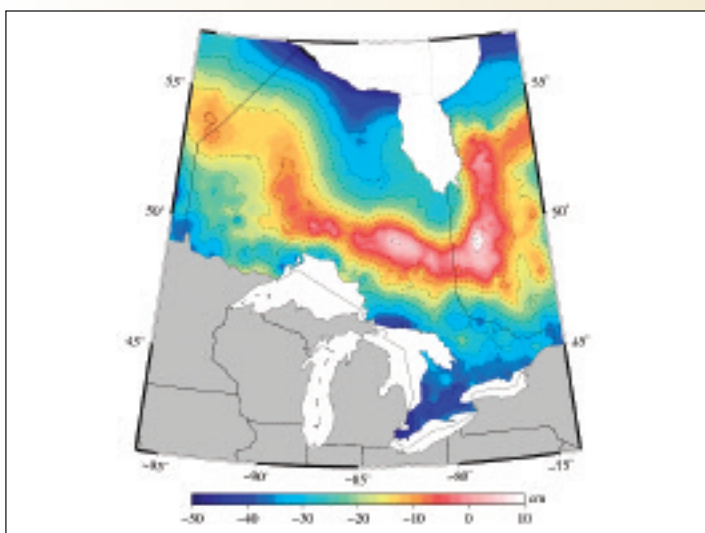


Figure 2: The separation between CGVD28 and CGVD2013 in Ontario: HTv2.0 - CGG2010 ($W_0 = 62,636,856.0 \text{ m}^2\text{s}^{-2}$). Contour interval: 5 cm.

The zero elevation is the equipotential surface ($W_0 = 62,636,856.0 \text{ m}^2\text{s}^{-2}$), which represents the coastal mean sea level for North America. The selection comes from an agreement between the Geodetic Survey Division of Natural Resources Canada and the US National Geodetic Survey. This potential value also coincides with the value already adopted in conventions by two international scientific organisations to represent the global mean sea level. The agreed upon surface between Canada and USA lies below the coastal Pacific sea level (near Vancouver) by 17 cm and

above the coastal Atlantic Sea level (near Halifax) by 38 cm. This means that the eastern coastline in the area of Halifax will have a negative elevation of -38 cm while the western coastline for the area of Vancouver will have a positive elevation of 17 cm.

The Canadian coastline does not have a zero elevation because the ocean, like land, has a permanent topography not directly associated with gravity. It is referred to as the Dynamic Ocean Topography or Sea Surface Topography. Globally, the Dynamic Ocean Topography ranges roughly from -1.5 metres to 1.5 metres in reference to the geoid, which is truly a level surface.

The impact of these differences on users will depend on the required accuracy, location and size of their project. There are three main categories of users. The first category comprises those who require CGVD28 heights with a few metres of accuracy (e.g. digital elevation model). In this case, the difference between CGVD28 and CGVD2013 can be neglected. Those who require precision of less than 10 centimetres along corridors of tens of kilometres (e.g. LiDAR survey) make up the second category. For these users the difference between CGVD28 and CGVD2013 must be considered. Lastly, the third category represents those who transfer heights with precision of less than 2 cm over small regions (e.g. municipal infrastructure). For these users the difference between CGVD28 and CGVD2013 should be considered, but generally applying a constant offset will suffice.

Ontario professional land surveyors should also play a substantial role in mitigating the impact of the new vertical datum by providing appropriate advice and expertise to their clients and stakeholders.

Conversion tools

If you are using NRCAN primary first order benchmarks established by levelling, you can continue to do so for the time being as the benchmarks, even though they are not maintained, will still be available. The only difference is that the GSD website database will provide two heights at each benchmark: a CGVD28 elevation and a CGVD2013 elevation. The easiest approach for conversion will be to make use of a grid reflecting the difference between CGVD2013 (realization of CGVD2013) and HTv2.0 (which represents CGVD28) - see Figure 2. The limited precision of the conversion should be carefully considered in view of user requirements. Ultimately, for the highest accuracy conversions, the best approach is to conduct GNSS surveys on benchmarks.

GNSS users can install their own benchmarks, on demand and at a location that is practical for them. They can then proceed with a local survey by levelling or using the GNSS technique. The following approaches can be used to determine the ellipsoidal heights of new benchmarks:

- Submit RINEX files to NRCAN's CSRS - Precise Point Positioning (PPP) software to obtain coordinates (latitude, longitude, ellipsoidal and orthometric heights) for

your GNSS based control;

- Perform differential GNSS with respect to Active Control Points, stations of the Canadian Base Network or provincial High Precision Network or any other stations with a precise ellipsoidal height in NAD83(CSRS); and
- Perform a Real Time Kinematic (RTK) survey using corrections from public or private providers with reference stations integrated into NAD83(CSRS).

Thus, there are several options for determining ellipsoidal heights. Once you have established your GNSS heights, it is only a question of subtracting the geoid height from the geoid model CGG2013 instead of any previous models that you used. By doing so, you will immediately be in the new vertical reference system for Canada, a system which may become seamless across North America in the future.

On-line and stand-alone applications are available on the NRCAN website to help with this transition. GPS-H can be used to convert ellipsoidal heights to orthometric heights. It enables the use of any geoid model and works with different types of coordinate systems (geographic, UTM, MTM, and Cartesian) and different geometric reference frames (NAD83(CSRS) and ITRF). Also available is TRX, new software that transforms coordinates between different geometric reference frames, epochs and coordinate systems.

Conclusion

NRCAN will nationally release a new vertical datum in November 2013, called the Canadian Geodetic Vertical Datum of 2013 (CGVD2013) that is realized by a geoid model compatible with the GNSS positioning technique. This new vertical datum will provide national coverage. It must be emphasized that CGVD28 will continue to co-exist during a transition period, but NRCAN will no longer maintain the primary first-order levelling networks. However, this is not the end of spirit levelling as the technique of choice for many local surveying projects. The difference between CGVD2013 and CGVD28 will range between -65 cm and +55 cm and has a long wavelength pattern.

NRCAN's existing monumented first-order levelling network will be readjusted by constraining it to orthometric heights derived from ellipsoidal and geoid heights at selected sites across Canada. The adjustment will make use of historical levelling data. Local height differences will maintain the same relative precision of a few millimetres (assuming the benchmarks are stable), but country-wide these values will change as indicated by the range above. NRCAN will be providing on-line and stand-alone tools to ease the adoption of a modernized height system. Further information can be found at: <http://webapp.geod.nrcan.gc.ca/geod/>



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Summer 2013 Article Update

In the article "Correcting Errors in Registered Reference Plans", published in the Ontario Professional Surveyor, Volume 56, No. 3, Summer 2013, Frank Bowman and Christina Porretta wrote about a recent Ontario Court of Appeal decision in *MacIsaac v. Salo*. That case provides surveyors with a mechanism for correcting mistakes relating to boundaries in parcel registers. It also held that only an up-to-date survey can confirm the location of the boundaries of a parcel of land as they exist on the ground. The application filed by the defendant Salos for leave to the Supreme Court of Canada was dismissed in its entirety on August 15, 2013. Therefore, the Court of Appeal's decision stands as the most current law in Ontario regarding rectification of a reference plan.

Improving the Articling System – An Explanation of the “Essential Areas of Knowledge”

By Crystal Cranch, O.L.S.

About 9 years ago I began talking about the advantages our profession could reap if we revised our articling process to be more in line with other competing professions. Since that time I have more than once muttered the word “EEK” to myself as this initiative took shape and especially when I began to realize what a monumental task this would be.

Little did I know that the new acronym “EAK” would become a part of the semantics of this new system. The entire improved system is dependent upon identifying the Essential Areas of Knowledge – the E.A.K.’s – required to reach a professional level. A list of 10 Essential Areas of Knowledge has been identified through a process that included consultation with members from all sectors and from across the province. The list is by no means all inclusive, but it certainly covers the big ticket items and will ensure that there will NOT be a dilution of knowledge or skills as students advance through the new articling process.

At the outset, the Academic and Experience Requirements Committee (AERC) is focussing on the cadastral stream, but it is our intention to replicate the process for each of the other disciplines.

The cadastral E.A.K.’s are listed as follows:

1. Research

Outcomes: The AERC is looking to ensure that cadastral candidates have a solid knowledge of the sources of research, both historical and modern, that are required to offer a competent opinion on a boundary retracement.

2. Retracing Boundaries.

Outcomes: Cadastral surveyors hold the exclusive right to offer opinions on boundary retracements. It is the single most important role that we play. We need to ensure that the cadastral candidates have solid background knowledge in the case law that is to be applied, as well as the ability to properly apply this case law to the individual boundary retracements.

3. Water Boundaries / Natural Boundaries

Outcomes: The AERC would like to ensure that cadastral students understand the different types of natural boundaries and are competent to offer opinions on the location of natural boundaries.

4. Adverse Possession

Outcomes: Cadastral students should have a basic knowledge of adverse possession and be able to determine when possession may mark a boundary and when possession is adverse. They must understand that adverse possession is a title issue and the domain (once identified by a surveyor) of a lawyer.

5. Roads and Easements

Outcomes: The AERC would like to ensure that cadastral students have a firm knowledge of the origins of roads and easements, how that origin affects boundary establishment of a road or easement. The historical background of a road or easement is essential in determining the extent, and the evidence/research required to retrace the boundary of a road or easement.

6. Descriptions

Outcomes: The AERC would like to ensure that cadastral students can interpret the various forms of legal descriptions and work to resolve issues created by poor descriptions. Boundary descriptions will often dictate what evidence can and cannot be used in boundary retracements and students must be able to identify the evidence they should use when completing boundary surveys.

7. Ethics and professionalism

Outcomes: Students will understand the importance of ethics within the profession and act accordingly in their professional lives. Protection of the public interest must be recognized and maintained.

8. Business practices

Outcomes: The cadastral student will understand the basics of business practices as well as how to offer good communication between surveyor and client, surveyor and surveyor, and surveyor and other professionals.

9. Application of survey methods from the Surveys Act

Outcomes: The AERC wants to ensure that cadastral students are aware of the statutory methods of re-establishing lost lot corners, concession corners or township corners as set out in the Surveys Act.

10. Projections, datums, reference systems

Outcomes: The AERC wants to ensure that all students understand the requirements and best practices for geo-referencing plans.

The Academic and Experience Requirements Committee has also identified three specific Acts that need some attention during the articling process; the Condominium Act, the Planning Act and the Mining Act. The AERC will be ensuring that students gain some exposure to these Acts during the articling process.

The AERC is in the process of identifying subject matter (SM) experts for each of the E.A.K.'s and these SM experts will be available to answer questions from any articling student. Ultimately the student may need some advice or assistance in an area that the articling surveyor may not have a lot of experience. The ability to contact a SM expert will ensure that all students have access for help with all of the E.A.K.'s. There will also be a section on our new Learning Management System (a website for our articling students) that will include each Essential Area of Knowledge, together with links to contact the SM expert, a question and answer forum, resource materials for that E.A.K., a "Frequently Asked Questions" forum, and an assignment that will offer credit for that E.A.K.

With this new emphasis on E.A.K.'s we will have to get used to some new phrases in the industry. I have assembled

a small glossary of terms that will become commonplace in our profession.



EAK Weak – you (the Articling Student) still have a lot to learn.

EAK Streak – a term used to celebrate an especially progressive period of time where the student gains credit for several E.A.K.'s in a short period of time.

EAK Freak – a term of endearment for that overly enthusiastic member of the AERC.

EAK Week – a seven day push to gain credit for one E.A.K.

EAK Geek – a term of endearment for our dedicated group of subject matter experts.

As always, the AERC will be pleased to hear your views on the planned improvements to the articling process; you can reach me at crystal.cranch@ibwsurveyors.com for further discussion.



Small UAS for Geomatics

By Costas Armenakis, PhD, PEng

1. Introduction

We are witnessing a paradigm shift with a new and exciting tool for geospatial data acquisition and 3D mapping. The ever-increasing use of small and light weight Unmanned Aerial Systems (UAS), also known as Remotely Piloted Aircraft Systems (RPAS) or Unmanned Aerial Vehicles (UAV), is transforming geomatics applications and creating new and innovative opportunities for our profession. Small UAS can complement and, in many cases, replace total stations and laser scanners, and operate as low altitude aerial mobile survey systems.

UAS have been mainly developed for military applications, and are commonly known as drones. Long range and expensive UAS have been considered by NASA for fire fighting. In recent years, commercially available UAS have appeared as low-cost platforms to provide aerial real-time surveillance. The idea of user-controlled platforms for mapping purposes is not new. The use of a remotely controlled (RC) helicopter for photogrammetric purposes was reported in 1980. In late 2004, a mini helicopter UAS was used for photogrammetric image acquisition for archaeological mapping and at the same time the generation of a digital surface model (DSM) was reported from a helicopter UAS equipped with a digital camera and a LiDAR. The ability for real-time surveillance with UAS has also started to be investigated in traffic applications. In 2005, a photogrammetric DSM generated from helicopter UAS was compared to a terrestrial laser scanner DSM. In 2007, the use of UAS has been considered here in Canada to acquire imagery for emergency response for disaster management.

The use of small UAS for remote sensing geospatial applications was made possible due to the technological developments in direct georeferencing, photogrammetric image-processing software, sensor and platform miniaturization, micro-electronics and wireless communications.

2. What are UAS?

Small UAS are usually fixed or rotating (multi-copters) wing type aerial platforms. Airships can also be used. They can be remotely piloted or fly autonomously using an autopilot, relying on onboard processors and sensors and having a pre-programmed flying path.

Usually a UAS system for geomatics applications consists of the airborne and ground segments and data processing software. Typical components of the airborne segment are: aerial platform, avionics (autopilot, GNSS, IMU, altimeter, compass, navigation cameras), telecommunications (command and control, downlink telemetry and sensor data), power generation (for propulsion, avionics and

sensors) and mapping sensors (still/video optical cameras, thermal, multispectral sensors, LiDAR; usually with onboard data storage). The ground segment comprises the command and control unit, communications, power unit and optionally, launch and landing systems for the fixed wing platforms. The data processing module consists of photogrammetric software for flying, route planning, image matching, bundle adjustment, generation of digital surface models (DSM), 3D point clouds and orthoimages. Obviously we should not underestimate the role of a well-trained human operator, not only when it comes to operating the UAS but also to ensure that the legal requirements are met and to ensure the safe operation of the aerial platform -

for example in case of unexpected system failure.

UAS can be easily deployed as they do not require much mobilization for preparation and flying. They can fly in environments that are unfriendly to humans, and thus gather geospatial data in in dangerous environments without risk to flight crews.

Canadian manufacturers of UAS include the Brican and CropCam Micropilot fixed wing platforms, the Aeryon Scout quad-copter and the Draganflyer double helix tri-copter, while Trimble US markets the UX5 fixed wing aerial imaging rover.



Julien Li-Chee Ming, PhD graduate student, Geomatics Engineering program, York University carrying the fixed wing UAS he is working on.

3. Applications, products and accuracies

Aerial data collection is a way to obtain a better perspective and coverage over an area, and also has the ability for targeted coverage at flexible visiting times. The emerging low-cost small UAS are an effective aerial platform carrying imaging and ranging sensors for geospatial data collection. Usually UAS are used for generating rapid 3D mapping products over relatively small, remote and inaccessible areas.

UAS can be used in many and diverse applications. They include mapping (3D point clouds, DSM, orthoimages), cadastral surveys, land cover/land use monitoring, corridor mapping (inspections of pipelines and power lines), volumetric surveys, landslides, mining, precision farming, forest fire fighting, disaster management, search and rescue oper-

cont'd on page 34



Aeryon Scout

ations and emergency response, traffic and accident monitoring, conservation and monitoring of biodiversity including wild life and forest tree diseases, mapping and monitoring of remote arctic areas (glacier studies and ice flow), geophysical exploration, surveillance, border patrol, and archaeology.

Currently the most common sensor used for data collection is a small format digital camera. The air survey conducted by the UAS is similar to the one used by the higher altitude airplanes. The autonomous operation of the UAS is based on a predefined flight path determined by waypoints using the onboard GNSS/IMU autopilot system. The flying height, rate of taking images, flying speed and the interval between flight lines need to be entered. A 70/70% forward and lateral overlap is recommended to ensure complete coverage of the survey area. Due to the small format of the camera a large number of images are collected, thus we have to deal with a high volume of data. Payload capacity and battery life are currently the weak points of the small UAS. Privacy is also a debatable issue.

To effectively process the large number of images for the derivation of the final geospatial products, a high level of



Microdrone MD 4 -1000

automation is recommended to ensure rapid data processing and product delivery. Fast data processing with fully automatic workflow for operations such as multi-view image matching, bundle adjustment, 3D point clouds, DSM and orthoimages can be performed with both Internet accessible and commercially available software. For example, the Canadian SimActive, the Swiss Pix4D and Trimble US offer photogrammetric solutions for UAS.

The low flying altitude, the high resolution data, the use of ground control points and the geometrically strong photogrammetric block create the necessary conditions to achieve high positional accuracies of the determined 3D object coordinates despite the possible instability of the UAS platform. Using aerial triangulation, an absolute accuracy of 0.5-pixel ground spatial distance (GSD) in planimetry and 1 pixel GSD in height is possible. This translates to accuracies in the 5 cm level. The quick launch of the UAS together with the rapid capture of the aerial images and the automated data processing result in significant time and cost savings compared to the field surveying methods.



Draganflyer-X6

4. Regulations

In Canada, Transport Canada governs the uses of UAS which have been operating commercially since 2008—from aerial photography and mapping to supporting the police and the RCMP with surveillance and search and rescue operations. According to the Canadian Aviation Regulations (CARs), UAS are treated differently than model aircraft. “Model aircraft” means an aircraft with a total weight that does not exceed 35kg, that is mechanically driven or launched into flight for recreational purposes and that is not designed to carry persons or other living creatures. Although some small/micro unmanned air vehicles may weigh less than 35kg, if they are operated by research institutions and commercial operators for non-recreational purposes then they do not fall in the category of model aircraft.

For every flight, commercial operators are required to

obtain a Special Flight Operation Certificate (SFOC) and receive approval. Section 623.65 of the CARs outlines the information that should be submitted when making an application for a SFOC. The request has to be submitted as early as possible and as much information as possible must be provided. The predictability and reliability of the unmanned air vehicle must be demonstrated; essentially that it has the ability to perform in the desired environment. The requirement for a SFOC is intended to ensure the safety of the public and protection of other users of the airspace during the operation of the unmanned air vehicle.

5. Outlook

UAS fill the space between terrestrial and aerial mapping systems and their popularity is continuously increasing. Already Canadian companies are operating successfully in this field. For example, Accuas Inc. specializes in aerial surveys and mapping using UAS equipped with compact digital cameras. They use a fleet of 10 unmanned aircraft ranging in size from small, multi-rotor helicopters to much larger fixed-wing planes.

Transport Canada is changing the process of SFOC application for small UAS. Applicants complying with the regulatory requirements would have greater assurance of SFOC approval, and the regional inspector workload would be reduced when reviewing renewal applications from organizations that have been determined to meet the regulatory requirements. National mapping organizations in Europe have started investigating the use of UAS in their operations. The U.S. Federal Aviation Administration (FAA) is planning the full integration of Civil / Commercial UAS into the National Air Space (NAS) by 2015. In the meantime two types of unmanned aircraft for civilian use have been certified in the US: the Insitu's Scan Eagle X200 and the AeroVironment's PUMA. A major energy company plans to

fly the Scan Eagle off the Alaskan coast to survey ice floes and migrating whales.

According to the 2013 Association for Unmanned Vehicle Systems International (AUVSI) Economic Report "The Economic Impact of Unmanned Aircraft Systems Integration in the United States", the economic impact of the integration of UAS into the National Air Space (NAS) will total more than \$13.6 billion in the first three years of integration and will grow sustainably for the foreseeable future, cumulating to more than US\$82.1 billion between 2015 and 2025. The integration into the NAS will create more than 34,000 manufacturing jobs and more than 70,000 new jobs in the first three years. By 2025, total job creation is estimated at 103,776, while the manufacturing jobs created will be high paying (US\$40,000) and require technical baccalaureate degrees.

The UAV-g 2013 conference focusing on the use of UAVs in the geomatics sector was held in Rostock, Germany from 4 to 6 September 2013. More than 200 participants attended the event. One particular highlight was the UAV air show, where a total of 15 companies demonstrated various operational systems, payloads and technologies. The Geomatics Engineering program of York University will host the UAV-g 2015 conference. The Unmanned Systems (US) Canada conference fostering success in unmanned vehicle systems will be held in Vancouver from 12-14 November 2013.

We foresee endless uses of UAS. It is time to refresh our photogrammetric knowledge!



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Calendar of Events

November 4 to 8, 2013

Africa GIS 2013 and GSDI 14

Addis Ababa, Ethiopia

www.gsdi.org/gsdiconf/gsd14

November 11 to 13, 2013

European LiDAR conference

Amsterdam, The Netherlands

www.sparpointgroup.com/Europe

November 11 to 17, 2013

ISPRS2013-SSG

Serving Society with Geoinformatics

Antalya, Turkey

www.isprs2013-ssg.org

November 20, 2013

GIS Day

Discovering the World Through GIS

www.gisday.com

November 27 to 29, 2013

3D GeoInfo 2013/ISPRS WG II/2 Workshop

Istanbul, Turkey

<http://3dgeoinfo.com>

February 26 to 28, 2014

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EDUCATIONAL FOUNDATION NEWS

Fundraising Event

At the South Central Regional Group golf tournament, which was held in August at Lionhead Golf and Country Club in Brampton, Shawn Hodgson, a former Educational Foundation award winner, together with Graham Bowden and Al Jeraj raised \$485 by selling "mulligans" for \$5 each. Thanks to all who supported this event.

Two New Awards to be offered at Ryerson University

Two new awards of \$1000 each will be given to 2 full-time students in the third year of the Civil Engineering Program who have achieved the highest grades in the second year course CVL323 - Fundamentals of Surveying. This brings a total of 8 awards of \$1000 each available for Ryerson students.

November 1st – Time to join or renew your membership

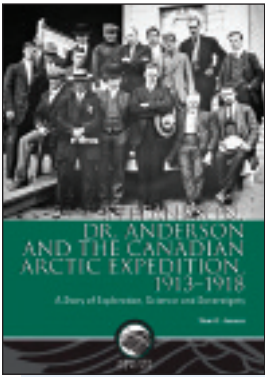
The Educational Foundation was founded in 1973 with a \$5000 donation from Jack Barnes, founder of J.D. Barnes Limited. Since 1975 the Educational Foundation has awarded over \$311,000 to 304 students in post-secondary Geomatics programs. Currently 7 of our award winners are articling students and to date 71 have become Ontario Land Surveyors. This year the Foundation is making \$28,850 available for awards to students in Geomatics at Ryerson University, York University, the University of Waterloo, Loyalist College and Fleming College. You too can show your support for students by becoming a member of the Foundation or by sending a donation. For further information please contact the AOLS office.

BOOK REVIEWS

Stefansson, Dr. Anderson and the Canadian Arctic Expedition, 1913-1918

A Story of Exploration, Science and Sovereignty

By Stuart E. Jenness



Published by Canadian
Museum of Civilization
Corporation
ISBN 978-0-660-19971-9

This book represents the first comprehensive account of one of the great sagas of Arctic exploration and discovery, the Canadian Arctic Expedition of 1913-1918, led by the ethnologist/explorer Vilhjalmur Stefansson and the zoologist Dr. Rudolph M. Anderson. Within its pages are details of the Expedition's successes and tragedies, including the discovery of all but one large island north of the Canadian mainland, the accumulation of considerable scientific informa-

tion and valuable collections, and the personal feud of the Expedition's two leaders. Four appendices list Expedition personnel, fifty-three geographical sites in the Arctic named after them, locations of their diaries and collected specimens, and the thirteen government volumes arising from the Expedition. The book is illustrated with sixty-four photographs and twenty maps.

Information taken from the back of the book.

The Measure of Manhattan

The Tumultuous Career and Surprising Legacy of John Randel Jr.,
Cartographer, Surveyor, Inventor

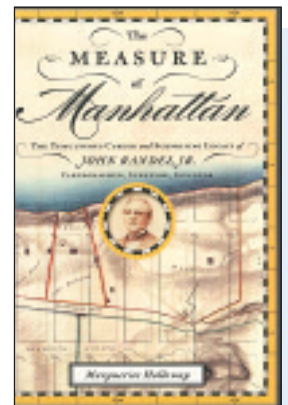
By Marguerite Holloway

John Randel Jr. (1787-1865) was an eccentric and flamboyant surveyor. A nineteenth century genius renowned for his inventiveness as well as his bombast and irascibility, Randel plotted Manhattan's famous city grid but died in financial ruin. Telling Randel's engrossing and dramatic life story for the first time, the eye-opening biography introduces an unheralded pioneer of American engineering and mapmaking.

The Measure of Manhattan is more than just the life of an unrecognized engineer. It is about the ways in which surveying and cartography changes

the ground beneath our feet. Bringing Randel's story into the present, Holloway travels with contemporary surveyors and scientists trying to envision Manhattan as a wild island once again. Illustrated with dozens of historical images and antique maps, *The Measure of Manhattan* is an absorbing story of a fascinating man that captures the era when Manhattan – indeed, the entire country – still seemed new, the moment before canals and railroads helped draw a grid across the American landscape.

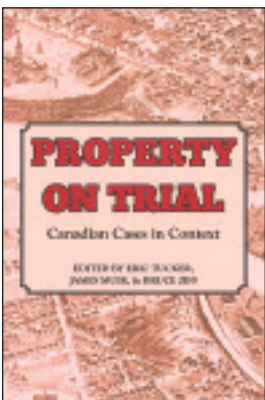
Information taken from inside the front cover.



Published by W. W. Norton &
Company
ISBN 978-0-393-07125-2

Property on Trial Canadian Cases in Context

Edited by Eric Tucker, James Muir & Bruce Ziff



Published for The Osgoode
Society for Canadian Legal
History by Irwin Law
ISBN 978-1-55221-296-7

Property on Trial is a collection of 14 studies of Canadian property law disputes – some well known, some more obscure – that have helped to shape the contours of the principles and rules of property law over 150 years. These studies, written by some of Canada's leading legal historians, range in time from a discussion of a nineteenth-century dispute over the ownership of seal pelts in Newfoundland to modern questions of what constitutes private property in a digital age. They investigate the relationship between private and public interests in property; the limits of private property owners' rights in relation to others, particularly neighbours and family; and the intersection of property law prin-

ciples with other branches of the law, including criminal law, family law and human rights.

The authors describe, in rich detail, the social, cultural, and political contexts in which the events unfolded, the backgrounds and the personalities of the litigants, the skills of the lawyers, and the judicial attitudes of the day. On the one hand, *Property on Trial* is a collection of thoughtful and compelling stories about conflict in a wide variety of contexts, each with its own heroines and heroes, villains and ne'er-do-wells, winners and losers. On the other, it is an insightful look at the history of property law doctrine in Canada.

Information taken from the back cover.

NEWS FROM 1043

Changes to the Register

MEMBERS DECEASED

Patrick Anthony Monaghan	814	June 9, 2013
Basil Joseph Haynes	785	Sept. 6, 2013

RETIREMENTS/RESIGNATIONS

William E. Bennett	1292	July 31, 2013
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COFR AND LICENCE CANCELLED

Christopher R. Eckstein	CR119	June 18, 2013
Peter J. Heney	CR14	June 18, 2013
Alan J. Little	CR168	June 18, 2013
Stephen G. Fletcher	1818	June 18, 2013
David U. Maughan	1884	June 18, 2013
William J. Plaxton	1161	June 18, 2013

COFA'S RELINQUISHED

David G. McGeorge Ltd.
Chatham, January 1, 2013

D.J. Cullen Limited
Orangeville, August 1, 2013

COFA'S CANCELLED

David U. Maughan
Parry Sound, June 18, 2013

William J. Plaxton Limited
Downsview, June 18, 2013

LICENCE REINSTATED

David U. Maughan	1884	July 5, 2013
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COFAS REINSTATED

David U. Maughan
Parry Sound, July 5, 2013

Surveyors in Transit

The field notes and records of **David G. McGeorge Ltd.** remain at their office at POB 82, 5 Sixth Street, Chatham, ON, N7M 5K1. Phone: 519-352-2722.

All requests for the field notes and records of **D.J. Cullen Limited** are to be made to **David J. Pesce Surveying**, 43 McCague Crescent, Alliston, ON, L9R 1A7. Phone: 705-434-9475.

Dasha Page is now with **Matthews, Cameron, Heywood – Kerry T. Howe Surveying Ltd.** at 5233 Stanley Avenue, Unit 1, Niagara Falls, ON, L2E 7C2. Phone: (905) 358-3693.

Roy Mayo is now with **Mackay, Mackay & Peters Limited** at 3380 South Service Road, Burlington, ON, L7N 3J5. Phone: (905) 526-7471.

Simeon Mitrev is no longer with **Tarasick McMillan Kubicki Limited** and is now with **MMM Geomatics Ontario Limited** at 100 Commerce Valley Drive West, Thornhill, ON, L3T 0A1. Phone: 905-882-1100.

The Huntsville office of **Tulloch Geomatics Inc.** has moved to 80 Main Street West, Huntsville, ON, P1H 1W9. Phone: 705-789-7851.

Adam Stephen is no longer with **Miller & Urso Surveying Inc.**, and is now with **Focus Corporation** at 42 Inglis Place, Truro, NS, B2N 4B4. Phone: 902-893-7026.

André Roy is now with **Annis O'Sullivan Vollebekk Ltd.** at PO Box 579, Rue Industriel, Embrun, ON, K0A 1W0. Phone: 613-443-3364, ext. 225.

Eric Rody is no longer with **Exp Geomatics Inc.** and is now with **Vector Geomatics** at Box 6428, Fort St. John, BC, V1J 4H8. Phone: 250-785-7474.

Yahui Hu is now with **J.D. Barnes Limited** at 140 Renfrew Drive, Suite 100, Markham, ON, L3R 6B3. Phone: 905-477-3600, ext. 244.

Leslie M. Higginson Surveying Ltd. has relocated to 1064 Gardiners Road, Kingstons, ON, K7P 1R7. Phone: 613-389-7986.

THE AOLS IS PLEASED TO ANNOUNCE THAT FOUR NEW ONTARIO LAND SURVEYORS WERE SWORN IN:

Haron Afzalzada	1961	July 22, 2013	Arthur J. Lise	1963	July 22, 2013
Boney Cherian	1962	July 22, 2013	John Ho-Ting Yuen	1964	July 22, 2013

Erratum

In the article "Unusual" Township Names by Allan Day, published in the Ontario Professional Surveyor, Volume 56, No. 3, Summer 2013, there was a typographical error. Solski Twp formerly Twp 114 is not Twp 114E as shown in the article.

Sites to See

The Down Survey of Ireland, Mapping a Century of Change

<http://downsurvey.tcd.ie/>

Taken in the years 1656-1658, the *Down Survey of Ireland* is the first ever detailed land survey on a national scale anywhere in the world. The survey sought to measure all the land to be forfeited by the Catholic Irish in order to facilitate its redistribution to Merchant Adventurers and English soldiers. Copies of these maps have survived in dozens of libraries and archives throughout Ireland and Britain, as well as in the National Library of France. This Project has brought together for the first time in over 300 years all the surviving maps, digitized them and made them available as a public online resource.

The Last Word

100th Anniversary of the Canadian Arctic Expedition 1913-1918

This year marks the 100th anniversary of the Canadian Arctic Expedition—the Canadian government’s first effort to survey, map and establish a sovereign foothold in Canada’s Arctic territory.

In 1913, Prime Minister Robert Borden was informed of two new American expeditions destined for Arctic waters and further threatening Canada’s sovereignty. When Manitoba-born Vilhjalmur Stefansson, leader of one of the American-sponsored expeditions, approached the Canadian government for additional funding, Borden saw this as an opportunity to strengthen Canada’s control and jurisdiction over the Arctic. The Geological Survey’s director, Dr. Reginald W. Brock, was impressed with Stefansson’s exploration plans and, aware of the sovereignty concerns in the North, sought an expanded role for Canada. In February 1913, Dr. Brock arranged for a meeting between Stefansson and Prime Minister Borden. After this meeting, a Cabinet sub-committee sent Stefansson an offer. To Stefansson’s surprise, the Canadian government offered to pay for the entire Arctic expedition so that any new lands discovered would be recognized as belonging to Canada.

The Expedition was divided into two parties to accomplish its dual goals of exploration and scientific research. The Northern Party, led by Stefansson, was responsible for discovering new lands, if any existed, on the Beaufort Sea. The Southern Party, led by Stefansson’s long-time colleague, zoologist Dr. R. M.

Anderson, was to conduct scientific research around the Coronation Gulf. The Southern Party made significant advances in geography, largely due to the work of Canadian geographers John Ruggles Cox and Kenneth Chipman.

Over the course of five years, the Expedition’s work led to unparalleled discoveries, including the discovery of previously unknown islands and the collection of thousands of photographs, specimens and artifacts. These discoveries further defined Canada’s northern boundaries and provided significant scientific and cultural knowledge of the Arctic and of Northern peoples. The Expedition also had a significant impact on the North, including the introduction of new knowledge, tools and industry to Inuit and Inuvialuit, as well as the establishment of new settlements.

Source: <http://www.northernstrategy.gc.ca/sov/cae-eng.asp>

John Cox taking latitude measurements at harbour at Cape Barrow, Northwest Territories (Nunavut) Canadian Museum of Civilization, Kenneth Gordon Chipman, 1915, 43279



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4th Cover
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1/2 page B&W
1/4 page B&W

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Not Sold	\$750
\$640	\$600
\$440	\$400
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\$175	\$150

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D.P.S.: 17” wide x 11” deep with bleed
D.P.S.: 16” wide x 10” deep without bleed

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Four colour: Colour separations supplied, type assembly and progressive proofs with colour bars.
Black, black and one or two colours: Either film or art supplied with layout and copy; or complete assembly.

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