Ontario Professional Surveyor

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on the cover ...

Surveying during World War One

(Credit: Ordnance Survey)

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ONTARIO PROFESSIONAL SURVEYOR

VOLUME 57, No. 4 Fall 2014

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ON THE COVER ...

Cover photo: Surveying during World War One. Credit: Ordnance Survey, U.K.
On August 4th Canadians stopped to remember the 100th anniversary of World War One. During the Great War Canadian military mappers and surveyors wearing the badge of the Canadian Corps were commanded by Major Andrew G.L. McNaughton who was credited with developing a whole new strategy of information gathering or "artillery intelligence" to locate and destroy enemy artillery and minimize the risk for Canadian gunners and infantry. See the article on page 29.

Professional Surveying in Ontario

encompasses the Disciplines of

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

President's Page

By Dasha Page, Hon. B.Sc., O.L.S.

My last article ended with my summary from the Alberta conference. To my surprise, I have realized that one page is not enough space to cover my travel experiences while keeping the membership up to date on Council activities. There is so much to know but so little time to learn, let alone to write about it. The following four conferences occupied my May and June agenda.

The Changing Tides of Technology **National Surveyors' Conference** held by the Association of Canada Lands Surveyors (ACLS) and Professional Surveyors Canada (PSC) at Algonquin Resort in St. Andrews By-the-Sea in New Brunswick.

Dr. John McLaughlin, Professor and President Emeritus of the University of New Brunswick provided a keynote speech titled "Professional Renewal in an Era of Deep Change". He mentioned that we are experiencing times that compare to the post-war era and we need to re-imagine the world just like people did in the late 40's and early 50's; times when a new world was being imagined and shaped in part by public policy, the emergence of a middle class society and a market-based economy. Surveying and mapping agencies, driven by revolutionary technology, played a significant role in support of the post-war agenda to build modern institutions and infrastructure by developing innovative systems and processes.

Today, Dr. McLaughlin continued, we need to allow for innovation and different ways of organizing the world. From 2006 to 2011 traffic on the Internet increased by a factor of 12. It has been five years since the release of Google Maps and Google Earth, and Google may well be the world's most important mapmaker. More than 600 million people have downloaded Google Earth. Google's fleet of self-driving cars went from the stuff of science fiction to on the road reality in little more than half a decade.

While there are concerns over the end of the Long Boom of economic growth (1945-1973), low growth rates, lack of productivity growth, aging population and growing inequality, the quest for meaning and value in a new world is palpable and widespread. Once again, we are in an era of having to confront a deep change. Is there a place for the surveying profession? Dr. McLaughlin says that it is not a given but he believes there is an opportunity from three interrelated perspectives: geography, environment and interface between the local and global markets.

104th Annual General Meeting (AGM) of the Saskatchewan Land Surveyors Association (SLSA) held at Elk Ridge Resort in Saskatchewan.

The Saskatchewan surveyors had a great session lead by senior surveyors who gave an interactive presentation with members in the audience on how the world of Land Surveying in Saskatchewan has evolved over the years.

Saskatchewan has a Survey Monument Restoration Program that is designed to help maintain and preserve Saskatchewan's primary survey infrastructure. It is supported with an annual fund of $150,000 through Information Services Corporation (ICS), a publicly-traded business corporation responsible for registry-related information services.

Sharing Our Solutions and Forging Our Vision **61st Annual General Meeting of the Association of Newfoundland Land Surveyors** (ANLS) held in St. John's, Newfoundland (NL).

The AGM opened with a Riparian Rights seminar presented by the NL Department of Environment & Conservation followed by seminars on Power Line Hazards and The Land Surveyor as an Expert Witness. The welcoming comments during the official opening ceremonies were delivered by Deputy Mayor of St. John's, Ron Ellsworth and the NL Minister of Service David Brazil. The business meeting was occupied with By-law approvals, which included ratification of the Professional Surveyors of Canada membership. Of course, to welcome all out of town delegates to Newfoundland and Labrador, we were "Screeched In" and to my surprise with a real dead cod. Wow, was that ever salty!

Canadian Geomatics Community Round Table (CGCRT) held in Ottawa.

CGCRT is not a government entity. It is a collaboration between governments, industry, educators, students, and not-for-profit organizations with the primary goal to examine common issues facing the Geomatics Sector. The objective is to better meet the needs of the Geospatial Community which depends on reliable, accurate and fit-for-purpose geospatial services and expertise. Attending this conference confirmed that the Geospatial Community is a very fragmented sector that is in a desperate need of cohesion and the Land Surveying Community, although small, is an integral part of this sector. It is strategically important for our profession that we remain engaged in the Round Table discussions.

There has been a lot said about our demographics. Our Executive Director Blain Martin keeps reminding us with his statistical charts that so bluntly indicate our aging membership. Clearly, one of our most critical challenges is the ability to attract young people. How do we catch the attention of ***Generation Y*** (GY, those born between 1982 and 1995), the fastest growing segment of our workforce? How do we motivate them?

As this is not a problem unique to our industry, much has been written about GY professionals. They are being described as

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The Case of The Walking Man

When does the limitation clock start to run for claims in Ontario?

By Will O'Hara, C.S.

The limitation period for claims against land surveyors in Ontario (and others) is generally understood to be two years. That's clear from the *Limitations Act, 2002*.[1] But it raises an important question: two years from what? From the day the work was done? The date of the invoice? The date of payment? If the clock starts ticking sometime after the work was done, the 'two-year limitation period' could stretch far beyond the two years.

This question was considered by the Ontario Court of Appeal recently in *Longo v. MacLaren Art Centre*, 2014 ONCA 526 (CanLII). The result might keep land surveyors awake at night.

The claim

The case dealt with damage to a plaster sculpture, aptly called the *The Walking Man*, attributed to the revered French sculptor Auguste Rodin. The owners of the work claimed that the defendant art gallery had caused the damage while the sculpture was in the gallery's possession. The gallery defended the claim by saying it was out of time – the plaintiff owners had known about the damage for more than two years before they started the law suit.

The defendant gallery then brought a motion to strike out the plaintiffs' claim as statute barred. The motion was successful. The judge hearing the motion found that the plaintiffs knew about the damage long before they started the law suit. They had not commenced their claim within two years of the date they discovered the loss. The motion judge dismissed the plaintiffs' claim.

The plaintiff owners felt that the result of the motion was unfair to them, so they appealed to the Ontario Court of Appeal.

The appeal to the Ontario Court of Appeal

The two-year limitation period is so well known that it did not need to be cited by the Court of Appeal. Section 4 of the *Limitations Act, 2002*, which sets out the basic limitation period, refers specifically to the discoverability rule:

Basic limitation period

4. Unless this *Act* provides otherwise, a proceeding shall not be commenced in respect of a claim after the second anniversary of the day on which the claim was discovered.

Knew or ought to have known

The discoverability rule is codified in s. 5 of the *Act*, which sets out when a claim is 'discovered' within the meaning of the *Act*. The discovery of a claim starts the limitation clock running.

5. (1) A claim is discovered on the earlier of,
   - (a) the day on which the person with the claim first knew,
     - (i) that the injury, loss or damage had occurred,
     - (ii) that the injury, loss or damage was caused by or contributed to by an act or omission,
     - (iii) that the act or omission was that of the person against whom the claim is made, and
     - (iv) that, having regard to the nature of the injury, loss or damage, a proceeding would be an appropriate means to seek to remedy it; and
   - (b) the day on which a reasonable person with the abilities and in the circumstances of the person with the claim first ought to have known of the matters referred to in clause (a).

In clearer terms, a claim is discovered when a plaintiff either had *actual knowledge* of the specified details of the claim, or when the plaintiff *ought to have known* the specified details. Subparagraph 5(2) of the *Act* says that a person with a claim shall be presumed to have known of the matters referred to in clause (1)(a) on the day the act or omission on which the claim is based took place, unless the contrary is proved.

The court stressed that the items listed in s. 5(1)(a) are conjunctive. They *all* have to be known before a plaintiff can have actual knowledge of the claim. The limitation period does not begin to run until the plaintiff is actually aware of all of those matters or until a reasonable person, with the abilities and in the circumstances of the plaintiff, first ought to have known of all of those matters.

The court stressed the point that plaintiffs are not permitted to be idle in bringing their claims. A plaintiff is required to act with due diligence in determining if he/she has a claim. A limitation period will not be put on pause while a plaintiff sits idle and takes no steps to investigate the matters referred to in s. 5(1)(a). The plaintiff must act reasonably in investigating and determining whether he or she has a claim.

Certainty of a valid claim is not required to start the clock running. All that's required is that "the plaintiff has *prima*

[1] *Limitation Act, 2002*, S.O. 2002. c. 24, Sched. B

facie grounds to infer that the acts or omissions were caused by the identified parties."

It is not even necessary to obtain an expert's report. The establishment of *prima facie* grounds can be done *without* obtaining an expert report.

The Court of Appeal found that the motions judge had made clear errors about the evidence and concluded that the plaintiffs did not have actual knowledge of the damage to the sculpture. The court then went on to consider whether the plaintiffs ought to have known about the damage to the work in the period of time two years before the law suit was commenced. Hourigan J.A. gave his own views about that:

> The question becomes whether a reasonable person with the abilities and in the circumstances of the appellants ought to have known of the matters referred to in s. 5(1)(a) in November 2007.
>
> While this is a question that can only be properly determined at trial, my own view is that a reasonable person, aware that concerns had been raised with respect to the condition of *The Walking Man*, would have arranged for an inspection of the sculpture. Based on the evidence tendered at the motion, that is what the appellants did and there is no suggestion that they were dilatory in arranging that inspection. There was also no evidence before the motion judge that the damage was so obvious and well known that an inspection was unnecessary. The appellants needed to know if this was a conditioning problem or whether it was something more substantial. No doubt the information they gleaned regarding the extent of the damage would also help to determine whom, if anyone, might be responsible for the damage.

The Court of Appeal concluded that it was not possible to determine the starting date of the limitation period by looking at the written evidence before it, so it sent the case back for a full trial on that issue, with live witnesses and full cross-examinations.

What is the starting date?

The *Limitations Act, 2002*, was designed to strike a balance between the need for finality in old claims for old wrongs on one hand and flexibility to prevent claims from becoming statute barred before they are discovered. The courts continue to grapple with this balancing act and as a result there is no clear answer to the question about the starting date.

If a land surveyor did work for a land owner on January 1, 2014 that was erroneous, and that error – and the resulting loss – are not discovered until January 1, 2018, despite due diligence on the part of the land owner, the limitation period for the land owner suing the land surveyor would not expire until January 1, 2020, two years after the claim was discovered. A claim brought at that time would certainly be challenged by the land surveyor and a court would have to determine whether the landowner had *actual* knowledge of all the details listed in s. 5(1)(a), or whether a reasonable

The Walking Man **- Rodin Museum – Photo: Christian Baraja.**

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person with the abilities and in the circumstances of the person with the claim first ought to have known of the matters referred to in that section. As can be seen from the case of *The Walking Man*, this is not a cold, scientific inquiry. The outcome depends on a number of factors that are matters of judgment – matters that are difficult to predict. Different judges may have different views about what a reasonable person would do – or what constitutes due diligence on the part of the plaintiff.

All that can be said with any certainty is that the starting date for the limitation period is not necessarily two years after the work was done. That's the earliest possible starting date – the best case scenario from the point of view of land surveyors and other professionals. The actual starting date will vary widely depending on the factors set out in the *Act* and could extend far beyond the basic two-year limitation period.

Land surveyors should keep *The Walking Man* case in mind when they are buying and selling professional practices, or when they are dealing with professional liability insurance, especially after retirement. The passage of two years from the date the work was done will not insulate land surveyors from claims.

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**

Sites to See

New Land Information Ontario (LIO) Website

www.ontario.ca/environment-and-energy/land-information-ontario

The Land Information Ontario (LIO) website has moved to Ontario.ca. As a result of this change, the look and feel of the website, the navigation and some of the content will be different. Ontario.ca is a central website that hosts online web content for all provincial ministries. All Ontario government ministries will be moving to this online destination over the coming months.

The LIO applications you use to find and download data including the Metadata Management Tool and the LIO Data Warehouse have not changed.

Advertiser's News

GIS/GPS Field Data Collection Technology: Another Tool in Your Surveyor's Toolbox

By Brock Kingston, GPS Mapping Sales Representative, Cansel

As technology advances, there are certain questions that you inevitably ask yourself. The first and foremost is usually, how can this technology benefit my business, drive future business and perhaps create new business opportunities? If the answer doesn't equate to better, faster and cheaper … you move on.

GIS/GPS field data collection solutions are not new tools, but they are perhaps tools that you've never considered before, or have overlooked in the past. After all, if you've got survey grade GPS equipment that provides you with reliable, repeatable, centimetre accuracy why would you consider using anything else?

It really boils down to choosing the right tool for the job and realizing the potential to expand into a new market segment industry. Surveying is typically somewhat confined to cadastral surveys, as-built construction, road surveys, topographic surveys, and geodetic control, while GIS/GPS field data collection solutions have focused on data acquisition and span across every industry, opening up a world of opportunities. In most cases these opportunities will have a spatial component, but in some cases - maybe not. It could be a means of taking your business paperless, and establishing a better connection between your office and the field.

What are the primary differences in these technologies?

Workflow: Survey equipment is the workhorse that is focused on collecting information with the highest accuracy and precision. A one-word label or code is used to identify a spatial point and that is typically the extent of the attribute data entered. In comparison, the focus of GIS mapping field data collection is on collecting information about an asset at a particular location. Along with its spatial location, GIS/GPS field data collection technology allows you to enter numerous attributes/notes to describe the asset. In addition to these digital field notes, a picture is also usually captured and information from other devices is streamed wirelessly or manually entered, so that the data is centrally managed in the field. Many people think of it as a digital clipboard, which has been set up as a menu with drop-down lists, check boxes, etc. to replace the traditional paper inspection sheet. It's a way of significantly reducing sources of error associated with data entry and data management in the field, as well as bringing about significant time savings by reducing data re-entry and data management back at the office.

Accuracy & Cost: In most cases, you pay for accuracy. If you are providing inspection and maintenance services for a client, you most likely do not need centimetre accuracy to find an above ground asset. Sub-metre or 1-5 metre accurate solutions will get you in the right area, so that you can identify the right asset, perform the inspection/maintenance and move on. GPS

Forestry is just one industry where data collection is used to gather important information such as tree health, diseases and inventory.

field data collection equipment is available in centimetre, decimetre, sub-metre and 1-5 metre accuracies; with a focus on data acquisition they open up a variety of opportunities. There are also efficiencies that can be realized using a handheld device that is compact, and by nature designed to facilitate entering large quantities of data versus your typical survey base/rover solution. If we look at the training aspect, the degree of training to maximize your efficiency in the field for land surveying is typically much higher than for GPS field data collection, as the workflows are more specialized and complex.

What does this process look like?

In order to further differentiate GIS tools from survey tools, a more in-depth look at the workflow helps:

Step 1: Data Collection – first, build your data collection menu manually, or auto create it from an existing GIS database structure. Collect the new data in the field (a spatial location, a picture, attributes/notes- such as the type of sign, pole, condition and date inspected), a reflectivity reading and barcode scan (to verify you are looking at the correct sign) , then populate the GIS database. For example, a public works department will collect road signs as they need to understand what they own, where it is and the condition it's in. Higher accuracy GPS field data collection units (i.e. sub-metre or 10 cm) are typically used for first time data collection.

Step 2: Data Maintenance – next, extract your existing data from your GIS database/Asset Management system, revisit and inspect the signs to meet legislative/liability due diligence requirements (depending on the asset type this might be required bi-annually or annually), and identify/perform/document required maintenance. This data would be uploaded into the GIS database to update it. For example, signs have to be inspected and maintained to ensure that they are not obstructed by vegetation, their reflectivity is

cont'd on page 10

adequate and their condition acceptable. Typically lower accuracy GPS field data collection units are used with barcode scanners to better track and verify that the correct sign was inspected.

Step 3: Data Usage – now that the data is collected and stored in the GIS database/Asset Management system, it's used to make budgeting decisions and long term capital planning around repair and replacement of assets (asset life cycle analysis). Depending on the type of asset, the information is used in reporting to meet legislative requirements, or to show due diligence if legal issues arise. It is also sometimes used in combination with other data for analysis and long term planning. For example, if you were to continuously replace a sign that was being hit by motor vehicles, accident data could be overlaid or used in the analysis to possibly determine that speed limits need to be reduced, a traffic light installed, or other possible scenarios.

It should be noted that the three steps outlined above are a simplified description of a GIS/GPS field data collection project. It sounds easy enough, but this is where working with a company with extensive experience and knowledge in this area can help you create a data collection menu that is user friendly, intuitive and easy to use, which will maximize the efficiency of your field staff. Some field projects require a lot of work upfront before heading to the field. In a case like this, you would start at Step 3 first, looking at the questions you want to answer and working backwards to determine which data you need to collect; this is a complete exercise in business workflow analysis, which usually involves numerous stakeholders and experienced consultants. From here you develop the database structure, followed by form design; you would choose the right hardware and software solution based on the scale of the project. For a project of this nature, you should enlist the help of an experience professional in this field.

Where is GIS/GPS field data collection technology applicable?

"Spans across every industry and opens up a world of opportunity," is a broad statement, but it's true. GPS field data collection technology is being used in many sectors, including Health (tracking the West Nile virus), Public Works (street light replacement), Agriculture (crop mapping), Transportation (road assets such as guard rails, culverts), Forestry (tree inventory, health) and Utility (pole inspections, capturing above/below ground infrastructure). Where should you start? Look at your existing projects and ask your customers where you could be collecting more data for them (look beyond the survey) … you are out there anyway. Then look at the equipment you are using to determine if it's the right fit for the job. As you increase the opportunity within your existing markets, keep an eye open for areas where you can expand your extended data collection services.

Looking forward

There has always been a bit of a grey area between Survey and GPS/GIS field data collection. Survey data is used for design with CAD software followed by construction/build, and GIS has been dubbed at times as the manager of those designs and a tool for visualization and spatial analysis. Either way, it still goes back to choosing the right tool for the job. However, to enable these different data collection industries to play together nicely, we're starting to see solutions evolve that work together and allow users to manage this data as well as expand the products they are able to offer to their clients.

If you would like to speak to a professional about further information on workflow analysis, data collection methodology/integration and software choices contact me at **Brock.Kingston@cansel.ca**

President's Page continued

ambitious, creative, technologically savvy and excellent multitaskers but they need constant praise, have very low employer loyalty and insist on job flexibility. What do we do? ***Lets' give them what they need!***

Experts claim that GY's commitment will grow when they find the right employer who will stimulate their minds, allow them to do something meaningful in their field while recognizing their achievements and supporting a better work-life balance.

In May, we had a Council meeting at York University as part of the collaborative efforts between the AOLS and the Lassonde School of Engineering to work together towards a renewal of our profession. This cooperative working relationship is focused on maintaining the current York curriculum, which satisfies the compulsory academic requirements needed prior to the commencement of the articling process, and attracting more students into the Geomatics Engineering Program.

Our joint summer Council and Academic Experience Requirements Committee (AERC) meeting was held in July at Fern Resort in Orillia. Our ambitious agenda included an update for our upcoming AGM at Deerhurst Resort, the theme fittingly named *Building Our Geospatial Future;* a motion for the topic of the State of the Surveying and Mapping Industry, an in depth analysis of supply and demand as it relates to surveyors; the Practice Manual ratification; the Constitutional Challenge review, the salary survey results review, an approval of a new AOLS investment advisor, an ODCC update, the Manual of Procedures for the Complaints Committee ratification, an AERC update, a Continuing Education update, and a task force to examine digital plan submissions.

In closing, I would like to extend a sincere thanks to our Lay Councillor Julaine Palmer who just completed her three-year appointment. Julaine's invaluable public perspective will be missed at our Council meetings. In her tribute to Council she summarized our challenges in one simple sentence:

"The Association of Ontario Land Surveyors is an unknown profession that does incredibly good work for the people of Ontario."

What do Nike and De Beers have in common?

By Georgia Fotopoulos, PhD, PEng.

What do Nike and De Beers have in common? This question is often posed by Dr. Fotopoulos to graduate students in her course on 'Satellite Positioning'. Students with backgrounds in various fields of engineering and geosciences fill the room with potential answers. Ultimately, the class settles down and a detailed discussion on what happens to navigation signals as they travel from the satellites orbiting the Earth through the atmosphere and are eventually received by the antenna somewhere above or on the Earth's surface begins. The students are all in the classroom to learn more about what has now become a common everyday tool, GPS (and GNSS). What is striking from year-to-year is the increased awareness of geospatial tools and applications that are available to students in both teaching and research environments. At the Geodesy and Geophysics Laboratory in the Department of Geological Sciences and Geological Engineering at Queen's University, graduate students use their backgrounds in surveying engineering, aerospace engineering, electrical engineering, civil engineering, geomatics engineering, physics and the geosciences to embark on innovative research centered on understanding the limits and challenges posed by the geospatial technologies available today.

Currently, the research group at Queen's is focused on understanding how natural (geological) surfaces determined through mathematical modelling and parameterizations could result in the ability to distinguish between different surfaces types/features (e.g., roughness) using terrestrial LiDAR data and fundamental surveying techniques. Another project involves quantifying the uncertainty in digital elevation models and gravity data obtained from multi-sensor platforms (from terrestrial-to-airborne-to-satellite). Applications vary from 3D modelling of aging infrastructure (e.g., bridges), reporting metrics for transportation hazards, and virtual visualizations of rock samples and core samples in a desktop environment.

Queen's students setting up for a scan of local outcrops.

Perhaps the most rewarding activity involves bringing this research into the undergraduate classroom and exposing the next generation of geoscientists and engineers to emerging technologies. The key is to provide the link between these technologies and the fundamental elements of surveying engineering which can be found in the data acquisition, processing/modelling and application. Error analysis and a little bit of least-squares adjustments (the short answer to our original question posed in class) still go a long way even as the profession of surveying evolves.

Georgia Fotopoulos is an Associate Professor in the Department of Geological Sciences and Geological Engineering at Queen's University. She holds a Bachelor's, Master's and PhD from the University of Calgary in Geomatics Engineering and is a practicing member of the Professional Engineers of Ontario. Her previous posts include the University of Toronto, Department of Civil Engineering and The University of Texas at Dallas, Department of Geosciences. She is also on the editorial board for three international journals on surveying, geomatics and geodesy. **georgia.fotopoulos@queensu.ca**

Sites to See

Canadian Geodetic Vertical Datum of 2013 (CGVD2013)

www.nrcan.gc.ca/earth-sciences/geomatics/geodetic-reference-systems/10781

CGVD2013 was released on November 28, 2013. Geoid model CGG2013, which is the realization of CGVD2013, is now available on the Natural Resources Canada (NRCan) website under Geodetic Reference Systems/Height Reference System Modernization. Benchmarks are now published with heights in CGVD28 and CGVD2013. NRCan's Precise Point Positioning software offers the option to determine orthometric heights from GPS measurements in either CGVD28 or CGVCD2013.

Over 100 Children Learn the Historical Significance of Land Surveying!!

By Julia Meldrum Smith, O.L.S., C.L.S., O.L.I.P

Over the course of the summer, the Time Travellers camp at Upper Canada Village introduced 125 children to surveying by re-enacting the surveying of the township lots for the United Empire Loyalists.

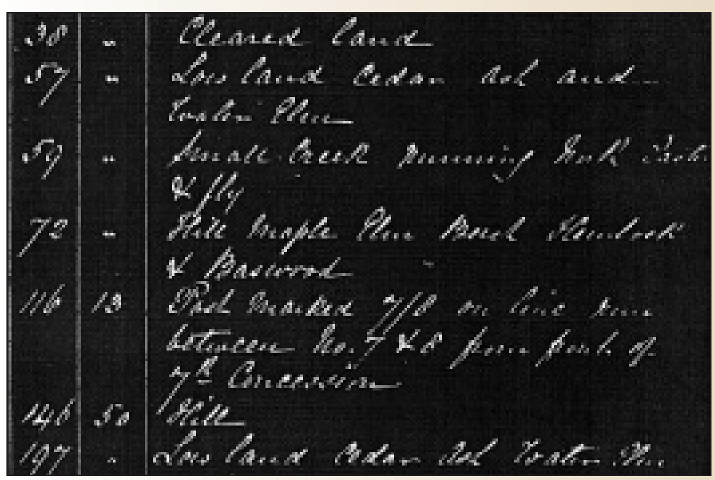
Upper Canada Village is a St. Lawrence Parks Commission tourist attraction in Morrisburg, Ontario. This 1860s village brings history to life and allows visitors "to step back to pre-confederation Canada, and experience all the sights, sounds and smells that went along with village life on the St. Lawrence River."(Photo and quote courtesy of Upper Canada Village's facebook page.)

Each summer, Upper Canada Village runs week long "Time Travellers" camps for kids aged 9 to 14, giving them the opportunity to *"discover the past through meaningful participation"*. (http://www.uppercanadavillage.com)

Each of the Time Travellers eats and sleeps in a 19th century residence, wears a period costume and takes on the role of a child from a specific time in history.

This year's Time Travellers program focused on the United Empire Loyalists and the settling of Johnstown (which later became Cornwall, Ontario). At the request of Upper Canada Village's Children's Programming Officer, Kerry-Lyn Smith, I gathered some historical documents that illustrated the field notes and plans from the early township surveys. Together we developed an exercise that would have the children pretend to be a field crew laying out lots for the United Empire Loyalists.

Every week for nine weeks, a new group of children learned about the parcels of land that were granted by the Crown to displaced British colonists and soldiers, and the role that land surveyors played in creating these parcels and preparing the area for settlement. As part of the experience, the children learned about the creation of township lots and concessions and the method of survey used to lay them out.


38 .. Cleared land
57 .. Low land Cedar ash and
[illegible]
59 .. Small Creek running North [illegible]
& fly
72 .. Hill Maple Elm Beech Hemlock
& Basswood
116 13 Post marked 7/8 on line [illegible]
between No. 7 & 8 [illegible] of
7th Concession
146 50 Hill
197 . Low land Cedar ash [illegible]

A sample page of field notes from the settlement era.

Base Camp.

Each camper reviewed the AOLS pamphlet "Surveying for Settlement", and received a copy to keep as a souvenir.

Prior to their survey exercise, the Time Travellers had re-enacted the migration of a group of colonists escaping to Upper Canada during the American Revolution. The children set up a camp that was similar to what these refugees would have sheltered in as they travelled north from New York.

On the day of the re-enactment of the township surveys, the campers examined the *Historical Atlas of Stormont, Dundas and Glengarry* (H. Beldon & Co., 1879) and passages and illustrations from the book *They Left Their Mark*, by John L. Ladell. The children were read passages from the book *Life of the Loyalists*, Growth of a Nation Series, by Rosemary Neering and Stan Garrod, Fitzhenry & Whiteside Limited, Toronto, 1975:

> *"The land given to the Loyalists lay along the north shore of the St. Lawrence River, between what are now Cornwall and Kingston. There were no maps to show them where their slice of land was.*
>
> *In 1783, before the settlers left Sorel, the British governor had ordered a survey of the area. Trees and brush covered the land and surveyors had little time to mark out each individual grant before the settler came. Instead, the surveyors decided to mark the outer edges of each township and divide each township into concessions."*

The re-enactors chose which roles they wanted to play as part of the field crew: head surveyor, deputy surveyor, axemen, chainmen and picketmen. The head surveyor was in charge of the survey and recorded the field notes. The deputy surveyor had to make sure that everyone had their equipment and their food and that everyone was getting paid for their work. The axemen pretended to cut line through the densely wooded land and learned to look out for fruit trees, as these trees were precious and orchards were not to be cut down. The picketmen marked each chain length. The children worked together to ensure that their lines were straight.

Unfortunately, I was not able to obtain any actual historical equipment for the children to use or look at. In the true spirit of creativity, the kids were more than happy to improvise. Our chain was a length of rope, the axes were actually wooden mallets and the pickets were straight sticks that the children gathered themselves from the woods nearby. They used an old-fashioned looking compass which they laid flat on a board to layout the direction and to keep the pickets in a straight line.

Deputy surveyor, axeman and picketman reviewing the site.

Getting a compass reading.

The survey was "completed" just in time for lunch, which had been cooking over an open fire at base camp. Vegetable soup served in tin cups with bread and cheese from Upper Canada Village's bakery and cheese shops rewarded the hard-working crew!

Time for lunch!

Julia Meldrum Smith is an Ontario Land Surveyor and Canada Lands Surveyor born and raised in Cornwall, Ontario. Julia is the president of Meldrum Surveying and her family has proudly practiced professional land surveying in Cornwall and surrounding areas since 1957.

All photos courtesy of Upper Canada Village.

Aerial Photogrammetry from Unmanned Platforms: Challenges and Opportunities for Surveyors

By Bruno Schertzinger

BACKGROUND

Direct Georeferencing of aerial imagery, enabling the production of mapping grade orthophotos without the labour- and time-intensive requirement to survey ground control points, has been the standard in manned flight for over fifteen years. Mounted in a light aircraft, such a system typically consists of a high-end camera, a GNSS receiver and an inertial measurement unit, all calibrated to provide a location for every pixel in an image to within a couple of centimetres on the ground.

Small unmanned aerial systems (SUAS) are emerging as an alternative to full size manned aircraft for acquiring this photogrammetry data from the air. These SUAS have evolved from relatively low-cost RC electric model aircraft technologies into purpose-designed, autonomously guided sensor platforms capable of cost-effective image acquisition suitable for photogrammetry processing over small areas.

The first generation of photogrammetric SUAS, as exemplified by the Trimble Gatewing X100, is a fixed-wing aircraft constructed of carbon fiber and plastic foam with a wingspan in the range of 1 to 2 metres and an airframe designed to be light, rugged and portable. It carries as payload a high-end commercial digital camera that looks down through the bottom of the fuselage. The aircraft flies a "low and slow" survey trajectory lasting in the order of 30 minutes while the onboard flight controller triggers the camera to shoot images and record them to an internal data card.

Applanix direct mapping solution for larger UAVs: from top to bottom, camera, inertial sensor, GNSS receiver.

The operator determines the area to be surveyed and the landing point using a mission planning application running on a tablet computer, and then transfers the en route survey and landing trajectory information to the on-board flight controller. The operator either launches the airplane by hand or from a compact catapult, and then waits while the aircraft flies its programmed survey trajectory and then lands at the designated landing position.

Aerotriangulation software running on a PC or in the cloud can then be used to produce an orthomosaic map and digital surface model (DSM) via bundle adjustment from the acquired images, provided they have the required along- track and cross-track overlaps and if georeferencing information is available. The current georeferencing information used for SUAS photogrammetry is a sufficiently dense field of ground control points, the same technique that was employed by aerial photogrammetry with manned aircraft up until about 20 years ago.

cont'd on page 18

Letter to the Editor

Dear Editor,

I was most interested in the "Dear DWL" letter [Summer 2014]. David was an interesting person and a great asset to the surveying program and to the Association. He certainly helped me and also provided much interest as he illustrated the latest boundary problem with a sketch drawn on the napkin during the course of the many lunches I had with him.

Robert C. Gunn, OLS (Ret)
Former Professor of Survey Science,
Erindale College, University of Toronto

Test range in New Jersey: image collected using modified Nikon D800 sensor, georeferenced with Applanix AP-15, aboard American Aerospace RS-16 UAV. November 2013.

THE CHALLENGE

The ultimate success of the SUAS for small-area photogrammetric applications will depend in part on how well they compete with small single engine full-size aircraft such as a Cessna 172 carrying an aerial camera system. Two key value propositions of the SUAS photogrammetry versus manned platforms are the ability to produce very large scale map products through their low flying heights, and low cost on-demand photogrammetry of single small areas that don't warrant the flight-hour cost of a full size aircraft. The operator of a full-size photogrammetry platform can serve this market profitably only by accumulating several such job orders and flying them in a single mission. The SUAS operator by contrast can set up and execute a single small photogrammetry mission inside of an hour, and its low capital cost and ease of use means it is feasible to place a SUAS at each site that requires frequent repeat surveys. This permits cost-effective applications such as local terrain profiling, excavation volume estimation and farm crop stress mapping that would not be feasible with a full size photogrammetry system.

THE OPPORTUNITY: DIRECT GEOREFERENCING FROM A SUAS

Cost-effective direct georeferencing (DG) significantly reduces ground control expenses. The cost-benefit tradeoff between direct georeferencing and ground control surveying emerged some 20 years ago in traditional airborne photogrammetry, and appears to be repeating for SUAS. The DG solution that has become a standard in wide area photogrammetric mapping is a GNSS-aided INS comprising an inertial measurement unit (IMU), a GNSS receiver, and a processing engine that implements a GNSS-aided INS solution both in real time and post-mission via post-processing software with optimal smoothing running on a PC. The post-mission DG solution has a dynamic camera position accuracy of a few centimetres and a camera orientation accuracy of 20 arc-seconds, thus providing decimeter mapping frame accuracies from several kilometres flying altitudes. The cost of such a DG system is a small fraction of the cost of the mapping cameras and aircraft, and is significantly lower than the cost of acquiring ground control over large areas, thus making for a strong value proposition.

Direct Georeferencing for SUAS photogrammetry has a different set of requirements. One key difference is the significantly lower cost of the SUAS (a few tens of thousands of dollars) and the finished data that it generates, and hence the allowable cost of a DG system that fits this cost model. Another key difference is the high sensitivity of the SUAS to size, weight and power consumption of additional payload components. Every additional ounce of payload increases the wing loading and hence the power consumption required to fly the aircraft, which in turn reduces the mission duration and hence the area surveyed. On the other hand, the low survey altitudes of a few hundred metres makes the required orientation accuracy for a given mapping frame accuracy significantly lower than that of a higher flying full-size photogrammetry system. The position accuracy requirement will depend on the particular end data product, and may well be the same centimetre-level requirement as with full-scale photogrammetry.

The emerging technology that appears to meet the challenging and sometimes conflicting requirements of DG accuracy, size, weight, power consumption and cost is a new generation of GNSS-aided INS products using micro-electro-mechanical system (MEMS) accelerometers and gyros. A MEMS device is an extremely small mechanical device whose parts are etched out of a silicon wafer using integrated circuit fabrication methods. The first generation of MEMS accelerometers and gyros were fairly crude but good enough for automotive applications such as air bag

deployment detection and vehicle stability control. Subsequent generations have exhibited increasing accuracies, and as of recently MEMS inertial sensors with fairly low noise characteristics have emerged for applications such as camera stabilization, general aviation instruments and short-term inertial navigation.

A DG system for SUAS photogrammetry requires as sensors a survey-grade dual frequency embedded GNSS receiver and antenna to achieve RTK position accuracies of a few centimetres plus MEMS accelerometers and gyros of sufficient quality to obtain orientation accuracies on the order of a few tenths of a degree in post-processing. The DG system that meets these requirements is essentially a small precision GNSS receiver with onboard MEMS inertial sensors plus post-mission processing software that computes an optimally smoothed best estimate of position and orientation at the camera exposure times. In fact one can envision an even smaller hardware form factor, comprising a single silicon wafer containing all inertial and GNSS sensing and computing resources, similar in size to the current GNSS receiver chips found in automobile navigation systems and cell phones. Such chip-level GNSS receivers currently do single frequency code phase tracking only and hence do not generate the dual frequency carrier phase measurements required to compute a precise RTK position solution. To date precision GNSS receivers continue to require discrete components assembled on a printed circuit board, which in turn defines the smallest achievable DG system hardware implementation.

Direct georeferencing offers a compelling value proposition to this new breed of photogrammetry system, and as a result a new generation of smaller, lighter and cheaper DG systems driven by ever improving MEMS inertial technology is emerging. In fact, Applanix has come to market with a complete directly georeferenced aerial mapping system for unmanned platforms.

In the next issue of this publication, you will find a detailed article on this system and how directly georeferenced mapping imagery is being produced today.

Bruno Schertzinger is a co-founder and the Chief Technology Officer for Applanix Corporation, where he is responsible for advanced navigation technology development, and the core navigation technology behind the Applanix product line of position and orientation systems. He obtained his B.Eng. degree from McGill University in 1977, followed by M.A.Sc. and Ph.D. degrees in System Control Engineering from the University of Toronto in 1979 and 1983 respectively. Bruno has more than 15 years experience in GPS-INS integrated navigation systems technology, and has been a member of ION for 8 years and a member of the IEEE for 26 years.

Commissioners of Crown Lands

By Allan Day *(Part 1 appeared in Volume 57, No. 3, Summer 2014)* Part 2

DEPARTMENT OF CROWN LANDS

1867 - 1905

Honourable Stephen Richards (1 July 1867- 25 July 1871) Was a lawyer and political figure. He represented Niagara in the Legislative Assembly of Ontario as a Conservative member from 1867 to 1874. He was called to the bar in 1844. In 1858, he was named Queen's Counsel. He was elected to the provincial legislature in an 1867 by-election after the sitting member resigned. He served as Commissioner of Crown Lands in the Executive Council of the province from 1867 to 1871 and provincial secretary in 1871. He died in Toronto in 1894.

Honourable Sir[8] Matthew Crooks Cameron, QC[13] (July 25 1871 – 21 December 1871) Was a lawyer, judge and politician in the Canadian province of Ontario. During his studies at Upper Canada College, he lost one leg after a shooting accident. Cameron later articled in law, was called to the bar in 1849 and entered practice with William Henry Boulton in Toronto. In 1861, he was elected to the Legislative Assembly of the Province of Canada for North Ontario; he was defeated in 1863 but was elected in an 1864 by-election when the incumbent, William McDougall, was forced to run for re-election after he was named to the Executive Council. Cameron was opposed to Confederation, preferring a legislative union. In 1867, he ran unsuccessfully in Ontario North in the federal election but was elected for Toronto East to the provincial legislature. He was created a Queen's Council on 27 March 1863, and elected a bencher of the Law Society of Upper Canada in April 1871. Cameron entered the Cabinet of Premier John Sandfield Macdonald in 1867 as Provincial Secretary and Registrar of Ontario. In 1871, he became Commissioner of Crown Lands. With the defeat of the Macdonald government in the provincial election that December, Cameron became leader of the Ontario Conservative Party, but stepped down in 1878 to become Chief Justice of the Court of Common Pleas. In 1887 he was created a Knight Bachelor[17] shortly before his death.

Honourable Sir[8] Richard William Scott, PC,[11] KC[13] (21 December 1871- 30 November 1873) Was a politician and cabinet minister. He was born in Prescott, Ontario in 1825. A lawyer by training, Scott was admitted to the bar in 1848 and established a practice in Bytown. He became a member of municipal council in 1851, was Mayor of Bytown in 1852, and held a seat in the Legislative Assembly of the Province of Canada from 1857 until 1863. With Canadian Confederation, Scott won a seat in the Ontario legislature as a Liberal representing Ottawa from 1867 to 1871. He was Speaker of the Legislature briefly in December 1871 before being appointed to the provincial cabinet as Commissioner of Crown Lands. Scott played a leading role in passing legislation ensuring the rights of separate schools in Ontario. In November 1873, he left provincial politics when he was appointed minister without portfolio by Alexander Mackenzie in the federal Cabinet. Mackenzie had become Prime Minister after Sir John A. Macdonald's government had been forced to resign due to the Pacific Scandal. Scott was appointed to the Canadian Senate by Mackenzie in January 1874, and became Secretary of State for Canada and Leader of the Government in the Senate. A supporter of temperance, he drafted the *"Scott Act"* which allowed any county or municipality in Canada to prohibit the retail sale of liquor by majority vote. With the defeat of the Liberal government in the 1878 election, Scott became Leader of the Opposition in the Senate until the return of the Liberals to government under Wilfred Laurier. Scott resumed his old Cabinet position of Secretary of State. Scott retired from the cabinet in 1908, but remained in the Senate until his death in 1913.

Honourable Timothy Blair Pardee (4 December 1873- 19 January 1889) After leaving school Timothy Blair Pardee articled briefly in the Brockville law office of William Buell Richards, later Chief Justice of Canada. But Pardee grew restless and abandoned law and the settled life of a small provincial town for the excitement of the California gold-rush in 1849. He passed two eventful but fruitless years in California before gold fever carried him, along with so many others, to Australia. After five years in the gold-fields there, he returned to Canada– *without a fortune*– to resume his studies in the office of Joshua Adams of Sarnia. He was called to the bar in 1861. Soon afterwards he was appointed Crown Attorney for Lambton County, a position he gave up in 1867 to run for political office. He was to be elected a bencher of the Law Society of Upper Canada in 1871. Premier Oliver Mowat chose Pardee on 25 October 1872 as Provincial Secretary in his first administration. A little more than a year later on 4 December 1873, upon the resignation and removal to Ottawa of Richard William Scott, Pardee replaced him as Commissioner of Crown Lands, a post he would hold for the next 16 years, longer than any other incumbent. The appointment of the popular but inexperienced western Ontario lawyer to a cabinet position usually reserved for an eastern Ontario lumberman surprised many people at the time. But Mowat, intent upon breaking up the cozy relationship that had developed between the department and the lumbermen, wanted someone with Pardee's ability and detachment to end the timber sale scandals and clean up the administrative chaos left behind by Scott. During his long term as commissioner Pardee did much, as

did his long-time deputy, Thomas Hall Johnson Assistant Commissioner of Crown Lands from 1869 to 1887, to regularize the administration of the province's natural resources and to restore the reputation of the department.

Honourable Arthur Sturgis Hardy, QC[13] (19 January 1889- 21 July 1896) Was a lawyer and Liberal politician who served as the fourth Premier of Ontario, Canada, from 1896 to 1899. Hardy attended school at the Rockwood Academy.[18] He was first elected to the Legislative Assembly of Ontario in 1873 and was promoted to the Cabinet of Sir Oliver Mowat in 1877 as Provincial Secretary. In 1889 as Commissioner of Crown Lands, Hardy established Algonquin Park. Entering his sixties and having been in government for over twenty years, Hardy lacked the energy and strength to take the government forward or excite the populace when he succeeded Mowat as both Premier and Attorney-General in 1896. In the 1898 election Hardy's government was returned with a narrow six seat majority due to the collapse of the agrarian Patrons of Industry Party which had served as the Liberal's allies in the legislature. Exhausted and needing money, Hardy retired from politics in 1899 and died two years later from appendicitis. He became town solicitor for Brantford in 1867, a bencher of the Law Society of Upper Canada in 1875, and a Queen's Council in 1876.

Honourable Sir[8] **John Morison Gibson, KCMC,**[10] **KC**[13] (21 July1896- 21 October 1899) Was born in Toronto Township. After a year of school in Oneida Township, John was sent to Hamilton, where his sister Jane had located after her marriage, to attend the Hamilton grammar school. In 1854 he transferred to the recently opened Central School, where he flourished academically. In later years he would attribute his success to hard work and perseverance, which he credited Principal John Herbert Sangster with teaching him. In June 1859, as the school's head boy, he was selected to test the jets of the Hamilton waterworks during their first public display, in Gore Park. As his career developed, he and his supporters would frequently cite this event as proof of his identification with progressive change in Hamilton. Gibson was made Commissioner of Crown Lands in 1896, in the government of A.S. Hardy. During his tenure until 1899, he encouraged reforestation in northern Ontario and oversaw new game legislation and the Forest Reserves Act of 1898. In March 1898 he again lost his seat, but in a by-election in Wellington East in October he was returned to Queen's Park. In October 1899 Gibson was appointed Attorney General in the government of George William Ross. A frequent spokesman for an administration that was losing public confidence, his own reputation tainted by scandals that suggested he had participated in or gone along with vote rigging, he found his political position increasingly tenuous. Lost in the bitter partisanship of the Ross years were some of his better pieces of work, including the new Municipal Assessment and Taxation Act of 1904. Ross's cabinet shuffle of November 1904, including Gibson's demotion to minister without portfolio, recognized his professions of ill health, and most likely his political liability. Never close to Wellington East, he was a prime candidate for defeat in James Pliny Whitney's Conservative sweep of January 1905.

H**onourable Elihu James Davis** (21 October 1899- 22 November 1904) Was an Ontario businessman and political figure. He represented York North in the Legislative Assembly of Ontario as a Liberal member from 1888 to 1904. He entered business with his father who owned a tannery in King Township. Davis served on the council for King Township and was Reeve from 1883 to 1886. He also served as Warden for York County in 1884. In the same year, his father retired and Davis took ownership of the business. He was first elected to the Legislative Assembly in 1888 after the resignation of Joseph Widdifield. Davis was Provincial Secretary and Registrar of Ontario from 1896 to 1899 and Commissioner of Crown Lands from 1899 to 1904.

Honourable Sir[8] **Alexander Grant MacKay** (22 November 1904- 8 Febrary1905) Was a teacher, lawyer and provincial level politician. He served prominent posts in two provincial legislatures as Leader of the Opposition in Ontario and as a Cabinet Minister in Alberta. He attended post secondary studies at the Owen Sound College and the University of Toronto obtaining a Master of Business degree. After University he became the Principal of Port Rowan High School. In 1891 he joined the Ontario bar and served as a criminal lawyer until 1894 when he became Crown Attorney for Grey County. He served that role until 1912. MacKay began his political career on the municipal level with his election to the Owen Sound Board of Education in 1894. He served in that role until he entered Ontario provincial politics in 1902. MacKay ran and was elected to the Ontario legislature in 1902 and re-elected in 1905, 1908 and 1911. He served in the government of Premier Ross as Commissioner of Crown Lands until the government's defeat in 1907. On September 7, 1907 MacKay was elected leader of the Ontario Liberal Party and Leader of the Opposition and held that position until he resigned in September 1911. MacKay moved to Alberta in the spring of 1912, he was accused by the Toronto press of leaving Ontario because he was unable to get along with new Liberal opposition leader Newton Rowell. MacKay officially resigned his seat in the Ontario Legislature when he ran in the 1913 Alberta general election on April 12, 1913.

Honourable James Joseph "J.J." Foy (8 February 1905 - 13 May 1905) Was a lawyer and political figure. He represented Toronto South in the Legislative Assembly of Ontario as a Conservative member from 1898 to 1916. He was educated at St. Michael's College, Toronto and Ushaw College.[19] He was called to the bar in 1871 and set up practice with a law firm in Toronto. In 1879, he married Marie Cuvillier. Foy was named Queen's Counsel in 1883. He

served as Attorney General from 1905 to 1914. Foy helped finance the *Catholic Register*, a Catholic weekly newspaper based in Toronto. He died in office in 1916.

Allan Day worked in the Office of the Surveyor General, Ministry of Natural Resources for 28 years as a Survey Records Information Officer. He now owns a survey and research business in Peterborough. **E-Mail surveyresearch@cogeco.ca**

The documentation in this article was found in the following places ... "Renewing Nature's Wealth" Centennial History of the Public Management of Lands, Forests & Wildlife in Ontario 1763–1967 by Richard S Lambert, MA and Paul Pross, MA Pages 22-3 and 101-2, "Canadian Dictionary of Biography", "Dictionary of National Biography 1885=1900 Volume 35", "First Report - Bureau of Archives" by Alexander Fraser Archivist 1903" Pages 18-21,"Report of the Minister of Lands and Forests 1928" Pages 7-9, "Acts, Orders and Regulations respecting Crown Lands, etc in Ontario" complied by The Honourable Arthur Sturgis Hardy, CCL Pages iii-vii "The Quebec History Encyclopaedia",Biography of Robert Baldwin Sullivan found on the AOLS web site Annual Report 1899 Pages 181-87. "ask.com" and Wikipedia,

[8] **How a person becomes a Sir.** A knighthood (or a dame hood, its female equivalent) is one of the highest honours an individual in the United Kingdom can achieve. While in past centuries knighthood used to be awarded solely for military merit, today it recognises significant contributions to national life. Recipients today range from actors to scientists and from school head teachers to industrialists. A knighthood cannot be bought and it carries no military obligations to the Sovereign. The Queen (or a member of the Royal Family acting on her behalf) confers knighthood in Britain, either at a public Investiture or privately. The ceremony involves the ceremonial dubbing of the knight by The Queen, and the presentation of insignia.

[10] The **Most Distinguished Order of Saint Michael and Saint George** is an order of chivalry founded on 28 April 1818 by George, Prince Regent, later King George IV, while he was acting as Prince Regent for his father, King George III. It is named in honour of two military saints, St Michael and St George. The Order of St Michael and St George are awarded to men and women who render extraordinary or important non-military service in a foreign country. It can also be conferred for important or loyal service in relation to foreign and Commonwealth affairs.

[11] **Her Majesty's Most Honourable Privy Council**, usually known simply as the **Privy Council**, is a formal body of advisers to the sovereign in the United Kingdom. Its membership is mostly made up of senior politicians who are (or have been) members of either the House of Commons or the House of Lords.

[13] **Queen's Counsel** postnominal **QC** known as **King's Counsel** postnominal **KC** during the reign of a male sovereign, are jurists appointed by letters patent to be one of *Her [or His] Majesty's Counsel learned in the law*. Membership exists in various Commonwealth jurisdictions around the world, while in some other jurisdictions the name has been replaced by one without monarchical connotations, such as "Senior Counsel" or "Senior Advocate". Queen's Counsel is a status, conferred by the Crown that is recognized by courts. Members have the privilege of sitting within the Bar of court.

[17] **Knight Bachelor** (**Kt**) is a part of the British honours system. It is the most basic rank of a man who has been knighted by the monarch but not as a member of one of the organized Orders of Chivalry. Knights Bachelor are the most ancient sort of British knight (the rank existed during the 13th century reign of King Henry III), but Knights Bachelor rank below knights of the various orders. There is no female counterpart; a woman deserving an honour of this rank is appointed a Dame Commander of the Most Excellent Order of the British Empire instead. **Criteria** It is generally awarded for public service; amongst its recipients are all male judges of Her Majesty's High Court of Justice in England. It is possible to be a Knight Bachelor and a junior member of an order of chivalry without being a knight of that order;

[18] Rockwood Academy was a private school. It was founded in 1850 by William Wetherald, a Quaker. Former students of the school were Sir Adam Beck, hydroelectric pioneer and surveyor John McAree.

[19] Ushaw College, a former Catholic seminary and Licensed Hall of Residence of the University of Durham, covers 400 acres in the village of Ushaw Moor in the United Kingdom. It was founded in 1808 by scholars from English College. The English College Douai was founded in 1568 but was forced to leave France in 1795 following the French Revolution. Part of the college settled temporarily at Crook Hall northwest of Durham. In 1804 Bishop William Gibson began to build at Ushaw Moor.

Calendar of Events

November 3 to 5, 2014
Geomatics Atlantic 2014
St. John's, Newfoundland
http://geoatlantic.org

November 3 to 5, 2014
Trimble Dimensions
Las Vegas, Nevada
www.trimbledimensions.com

November 9 to 11, 2014
Digital Earth Summit 2014
Digital Earth for ESD
Nagoya, Japan
www.isde-j.com/summit2014

November 11 to 13, 2014
3D GeoInfo 2014/FIG 3D Cadastre Workshop
Dubai, United Arab Emirates
http://3dgeoinfo2014.org

November 19, 2014
GIS Day
Discovering the World Through GIS
www.gisday.com

February 25 to 27, 2015
123rd AOLS Annual General Meeting
Building our Geospatial Future
Huntsville, Ontario
www.aols.org

Rising From the Ashes:
An IT guy's story of disaster recovery

By Larry Nicholson

There is a Boy Scout expression that I am sure you've heard before: "Always Be Prepared". In the world of IT, this motto is a part of our daily existence. We've grown to expect that some sort of issue will pop up with a server or that an end user's desktop will misbehave at some point. While many situations can be corrected remotely, some are more involved and require an on-site visit with parts and tools to fix the problem. Sometimes, however, there is nothing that can be done except wait for the event to end and pick up the pieces after the ordeal has passed. This was the case with David B. Searles Surveying Ltd. one Friday night in January 2013.

It started as an ordinary Friday night. I was at another client's site rebuilding their server which had suffered a hard drive failure. There were backups and recovery disks so it was just a matter of changing the drives and rebuilding. Something our company had done many times before. At about 8 p.m. I received THE CALL.

"Larry, it's Andrew [Searles], I am on my way down to the office to meet with the fire marshal and discuss the fire at the office," said the voice. I paused for a moment then chuckled.

"Ha, ha, that's a good one Andrew. Very funny." Silence.

Then for a second time I hear, "Larry, it's Andrew, I am on my way down to the office to meet with the fire marshal and discuss the fire at the office." It dawned on me that this was no joke.

"Andrew, are you serious?" I asked. Silence. Then for a third time, "Larry, I am on my way…."

Ok, I get it. "What's going on?" I asked, stunned.

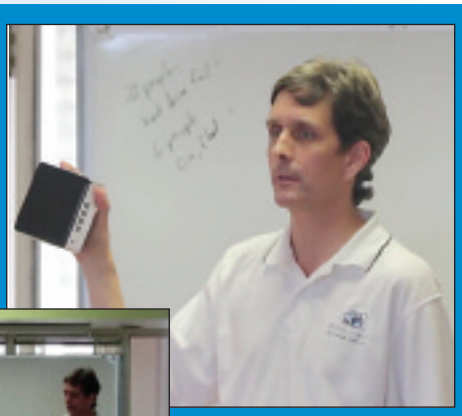
"I'll call you when I get there and know more," he says. I agree that we'll talk later and end the call. My current client had overheard this entire conversation and looked at me with concern. He completely understood that the priorities had shifted. We got his server up and running so he could take over and work on getting the desktops and other devices running and connected to the server and then work on restoring the data over the next few days.

The following morning Andrew called me at 8 a.m. and we agreed to meet at his office at 9 a.m. The fire marshal was there along with several other crew members. Andrew Searles and Alister Sankey were outside standing on the sidewalk and as I approached I saw police tape and boards on all the windows. Andrew and I discussed the previous nights' events and he told me that the server was in the trunk of his car. The fire marshal began his debriefing and told us how the fire had started and what the investigators were looking for. Using his hands he illustrated the size of the arc that jumped out of the power feed in the office and said, "An eighteen to twenty four inch arc leapt across the power feeds in the office and instantly ignited all the combustible materials around it."

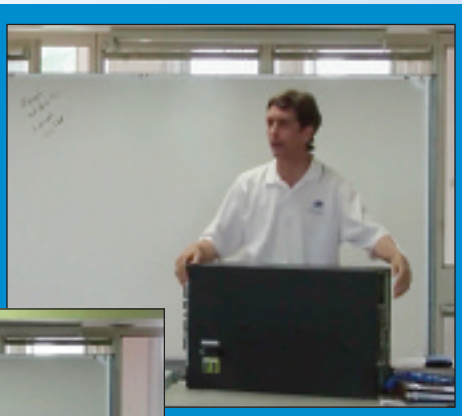
Following the debriefing the fire marshal asked if we would

cont'd on page 28

Larry Nicholson Backup and Recovery Presentation



IT PRO Toronto, June 10, 2014



like to see the office. Having never seen an office fire before, I said, "Sure". Andrew had already been down in the office earlier to pick up the server. Dark isn't the word I'd use to describe the space. It was pitch black. There was no hydro, the windows were boarded up and every surface in the office was covered in black tar. Where I had once seen offices and cubicles, I now saw a black hole. A fireman's six foot tall trouble light stood where offices used to be. The backup drive had melted from the heat. The network switch still had water sitting on it. The two UPS's were coated in black tar and the desk that they sat on had a black coating except where the UPS's sat.

The smell was like nothing I had ever experienced before. You hear about smoke being very destructive but you have to see it first hand to know the real impact. It is this acrid, black tar that coats everything and can kill people and destroy everything in its path. It is nasty stuff. It's hard on people as well as technology equipment. Thankfully, no one was in the office at the time of the fire. The cleaners had left before the blaze started.

After surveying the damage, Andrew, Alister and I went to inspect the server. I pulled the drives out one by one and commented how clean they were. I pulled the side panel off and noticed how black and coated all the components were. The drives looked good but the server did not. I said, "I'll try to clean up the chassis as best I can but I think the drives are fine." Turns out the drives were okay as they are still in operation today in the new server. I could not clean the server of the black coating and I could not get the smell out of the chassis. The drives were the only things that were saved. You can see the server chassis in a video on the NicholsonNet YouTube channel (http://www.youtube.com/user/nicholsonnet). It stands as a reminder to "Always be Prepared"!

The David B. Searles Surveying Ltd. office was down for the weekend. Andrew worked on getting a new office setup and I worked on getting some new network components, desktop PCs and monitors. We used a Rogers wireless modem as a network connection to the Internet and used wireless adaptors to connect all the desktops. A cordless phone was the new office phone.

What did I learn from this experience? Being prepared is important, yes. Making sure your data is backed up and off-site is important too. But making sure that your employees have a place to sit, a desk to use, a computer to work with and access to data to allow them to do their jobs - that is by far the most important thing. Disaster planning is not just about computers and data. It is about people and the business process and making sure everyone knows what to do when disaster strikes.

How prepared are you?

Larry Nicholson is the President of **Nicholson Network Services Inc.** (http://nicholsonnet.com). He can be reached by email at **larry@nicholsonnet.com** for further information.

Andrew G.L. McNaughton and Canada's Mapping Weapons of the Great War

Major Andrew G. L. McNaughton, educated in electrical engineering at McGill University, led the 4th Battery of the First Canadian Divisional Artillery to France in 1914. Often referred to as the *Father of Sound-Ranging*[1], McNaughton focused on target acquisition or "artillery intelligence", which was gathered by *flash spotters* and *sound rangers*. Flash spotters after spotting an enemy gunnery flash, would take a bearing to it with a theodolite and report it to all other spotting posts and headquarters where the position would be plotted. Sound rangers used a new skill called sound ranging. "A sound-ranging battery, made up of a headquarters and six microphones, was placed forward of the friendly lines anywhere between one and two miles, along with a listening post. When the enemy fired, the forward listener pressed a key. This key would start the recorder at headquarters. By examining the time intervals between the microphones, the location of the source could be determined. Once the shell burst on the friendly side, it too triggered the microphones and the target could be determined."[2]

Canadian Corps Barrage Map showing boundaries and objectives for assault on Vimy Ridge, 1st Field Survey Company, 1917. Credit Library and Archives Canada, Mikan No. 178448

The theory was that after the target positions were surveyed and plotted, the allied gunners could determine where to shoot by calculating the range and bearing from existing maps, however, the maps were almost a century old and were very poor and outdated. McNaughton initiated more accurate surveys and with the aid of his mappers pioneered the use of aerial photographs to create better maps to locate the enemy's artillery and destroy it with accurate shelling, thereby minimizing risk to his infantry. Many pilots took their own cameras on reconnaissance flights and took oblique photographs similar to the high altitude, panoramic photos that were taken by Canadian surveyors to map the Rocky Mountains some thirty years earlier. McNaughton's tactical use of artillery intelligence with the aid of aerial mapping has been widely acknowledged as instrumental in the Canadian Corps' victory at Vimy Ridge in 1917.

Brig.-Gen. A.G.L. McNaughton, Commander, Canadian Corps Heavy Artillery. Oct. 1918. Pittaway/Library and Archives Canada/PA-034150

On the day before the armistice McNaughton was promoted to Brigadier-General and appointed General Officer Commanding Canadian Corps Heavy Artillery. In an address to the Association of Dominion Land Surveyors in 1926 on the importance of the map to the artillery in WW1, General McNaughton said "this efficient organization of map makers and of survey sections is responsible for many people walking the streets of Canada today."[3]

[1] Andrew McNaughton: His influence on Artillery and Intelligence during the First World War by Capt Jamie Phillips, RCAS, 2010

[2] IBID

[3] Annual Report of the Association of Dominion Land Surveyors, 1926, General McNaughton's Address, Page 29

Reference: Terra Nostra, 1550-1950 The Stories Behind Canada's Maps by Jeffrey S. Murray, Chapter 12.

A sergeant of the Royal Flying Corps demonstrates a C type aerial reconnaissance camera fixed to the fuselage of a BE2c aircraft, 1916. Credit Imperial War Museum's Catalogue Number Q33850 (http://www.iwm.org.uk/collections/item/object/205193165)

Advertiser's News

Topographic LiDAR Survey of Ashbridge's Bay Yacht Club

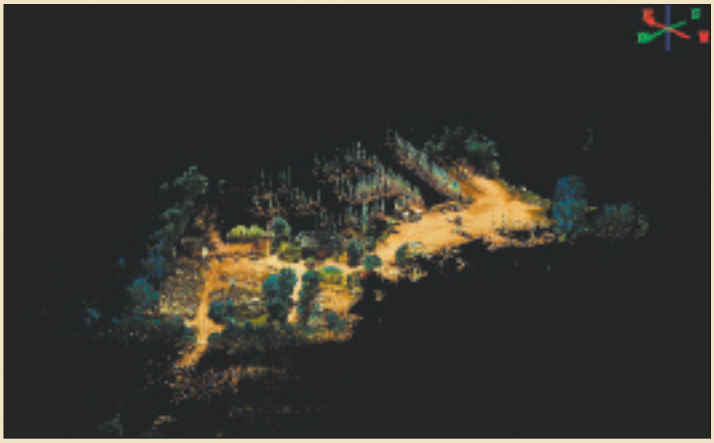
By Rajive Sharma, B.Eng., MCMP, Manager - Imaging & Monitoring, Topcon Sokkia

Ashbridge's Bay Yacht Club (ABYC), one of Toronto's premier sailing clubs for both novice and experienced sailors is built on activity, on the water and ashore. Their members are involved in racing, cruising, and day-sailing during the boating season and participate in a diverse range of social events throughout the year. It is a family-friendly club with activities and facilities for all ages. (http://abyc.on.ca)

ABYC's management team on the initiative of Bruce Morrison, ABYC's Vice-Commodore of Marine Services, embarked on a joint project with a research group from George Brown College. The purpose of the project under the flagship of Clint Kissoon, Chair of the School of Construction Management (www.georgebrown.ca/construction) was to do a topographic survey of Ashbridge's Bay Yacht Club using the latest LiDAR scanning technology. The goal was to create a site plan of the property, a 3D model of the club's main building, and floor and elevation plans to assist in a retrofit design of a ramp for wheel chair access. The School at George Brown recently acquired two GLS 2000 LiDAR scanners to use on projects at their newly designed BIM facilities, so faculty members were ready to go out with the new equipment and apply their knowledge for social augmentation.

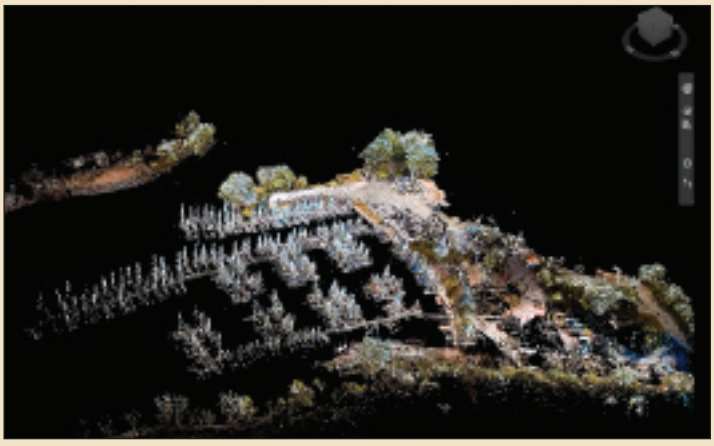
A kick off meeting was held with George Brown's Junior Project Manager Yuchen Sun, the ABYC core group and the George Brown research team to outline the project plan. Once the project scope and charter was put in place it was time to set up the milestones and initiate the project.

The challenge ahead was to scan the pier and the landing stage before the start of the sailing season while the boats were still out of the water and the dock was clear. The progression of the scanning was to continue to the staging area once the sail boats were off the dock.



Topographic model built from the LiDAR point cloud

Three different groups were formed under the leadership of George Brown Technologist, Petro Karanxha, who was managing the work necessary to complete the topographic site plan, Nashraf Poor, who was managing the expectations for the 3D BIM modeling using AutoDesk Revit, and Theodor Popescu, who was managing the data for the survey control and other subsurface information.



Topographic model from point cloud in true color

Once the registered point cloud data passed the QA/QC

procedure, the scan to CAD process begins. ScanMaster is used to extract most of the topographic features, contours, break lines etc. and exports to a DWG format.

The mission planning required observations from Google Earth for the site selection so that the scanning observations could optimise the data capture with minimum obstructions. Another challenge was the project control and communication. This was managed by Yuchen Sun, the Project Manager, who exceeded the expectations of all of the stake holders. All the teams had to work together closely and the data had to be managed by a centralised team leader.

Clint Kissoon, Chair of the School of Construction Management taking delivery of 2 new scanners.

Once the methodology and registration techniques were decided, the survey team under the supervision of Theodor worked alongside to capture the station control and back sight information. Since different teams were working on focused areas, the collected data and transfer of information between the groups became critical. More than 24 occupation stations were chosen throughout the site for data acquisition. The data collection took more than 30hrs with many constraints including long working hours and difficult conditions.

It was decided that that the 3D BIM model of the club's main building was to be created using AutoDesk Revit software. A dedicated focus group managed the expectations for the 3D BIM model. The objective of the team leader was to follow the life cycle of the BIM model generation independently of the group working on the topographic site plan. Hence scans of the building's ground floor, top floor, interior and exterior and the data processing were completed separately.

Also, different parameters were chosen for the data collected during the topographic scanning as compared to that collected for the building modeling. Both of the scanning teams faced different challenges.

The resolution for the topographic scan was selected to provide break lines, feature recognition, utilities, tree lines, edges, hydrological enforcement and other information easily. The purpose of the building scan was to provide architectural, structural, mechanical, electrical and plumbing information easily.

ScanMaster was the primary post processing software used to convert the raw data into a registered point cloud. The QA/QC procedure was set up as a gating method to qualify the data before production. Standard operating procedures were set up to qualify data within set deviation limits before the CAD work could begin. Once the registered point cloud data passed the QA/QC procedure, the scan to CAD process began. ScanMaster was used to extract most of the topographic features, contours, break lines, etc. and export them to a DWG format.

For the building modeling, the point cloud data stored in LAS format was exported using ScanMaster. These files were then inserted in Revit for further rendering of the model.

Rajive Sharma can be reached at **rsharma@topconsokkia.com** for further information.

Armow Wind Farm

By Kevin Kujala, O.L.S., O.L.I.P.

The Armow Wind Farm is an 180MW development project near Kincardine, ON. The project will provide enough clean and renewable energy equal to the energy needs of approximately 70,000 homes. The 180 MW wind project will bring many benefits to the Kincardine community, including approximately $40 million from tax and lease royalty payments and a long-term community benefits program. The Armow Wind Farm is one of the largest renewable energy development projects in Ontario, and has a capital cost that puts it in the top 100 construction projects in Canada. The project developers (Samsung and Pattern Energy) recognized early in the development of this project that a strong surveying and geospatial team was required to assist the development and construction teams.

Tulloch Engineering and MMM Group were separately invited to submit proposals for Real Property Survey Services. After individually reviewing the request for proposal and the required timelines it became very apparent that neither firm had the staffing resources available to meet the aggressive schedule requested by the developers. Within a matter of days Tulloch and MMM had a teaming agreement in place and work began to pull together the proposal.

Web-Based GIS Platform

With the large number of parcels and landowners in this development project, the breadth of geomatics services that was required during the development and the short project timeframe, Tulloch and MMM assembled strong geospatial and surveying teams to tackle the project.

As the project site is approximately 196km^2, a robust control network was required so that base/rover GPS could access every square metre of the project. Tulloch led the control work for the project and mobilized a control crew to the site in advance of the remaining Tulloch and MMM crews. Existing published control points and static GPS observations were used to densify and establish control points at intervals not exceeding 3.0 kilometres. Following the static GPS adjustment, base/rover observations were made between successive control points to provide a QC check on the adjustment.

The second task was to prepare American Land Title Association (ALTA) plans for all 114 effected properties. The majority of these properties were large agricultural parcels and therefore different types of evidence were required to assess where to re-establish the boundaries. Since the majority of this land was "settled" with little monumentation, fencing and verbal evidence was used quite often to establish the sidelines of the farm parcels. The timeframe to complete all of the ALTA plans was extremely aggressive. Both MMM and Tulloch mobilized 4 field crews, as the window to complete all of the field work for the 114 parcels was 7 weeks. With a very interactive team and great communication, all of the field work was completed in the tight timeframe.

Since ALTA plans require more information than just the property boundaries, MMM ordered the most recent stereo and ortho imagery within the project site and produced photogrammetric mapping. The mapping consisted of building definitions, road platforms, fencing and other topographic features. This information was added to the ALTA plans to define project setbacks and design constraints. This information was also used as the foundation of a project-based GIS. MMM created a web-based GIS system that all of the development project team could utilize. The GIS system used the orthophoto as the background of the system and incorporated all of the legal boundaries, land registry research, and the defined topographic features. In addition to the information produced by the survey team, there were multiple sources of other information added, including (virtual) noise receptors, shape files from the environmental and geotechnical reports, turbine and road layouts, and civil design constraints. The web-based GIS system was invaluable to all members of the development team. At any time any member of the development team, with access to the web GIS, could very easily log on to the site and obtain up-to-date infor-

Web-Based GIS Platform

mation for the project and quickly view Lease sketches and other drawings. As the project evolved and there were changes made to the design, the GIS made it very easy to incorporate them and automatically update the existing drawings to match the changes.

The tight timeframe for this project would have made it virtually impossible for either Tulloch or MMM to individually take on the project and meet the deadlines and the requests of the developer. Through communication, leveraging of available technologies and boots on the ground survey retracement, Tulloch and MMM were able to collaborate and successfully complete this challenging project.

Kevin Kujala is the General Manager of Tulloch Geomatics Inc. He is responsible for the day to day operations of Tulloch's surveying activities throughout the province.

NEWS FROM 1043

Changes to the Register

CofA's Revised

Was: Hopkins, Cormier & Chitty Surveying Consultants Inc.
Is: Hopkins Chitty Land Surveyors Inc.
Kingston, September 4, 2014

Surveyors in Transit

Mart Himma is no longer with **MMM Geomatics Ontario Ltd.**

Jim Nicol is no longer with **MTE Ontario Land Surveyors Ltd.**

Ron M. Jason Surveying Limited is now located at Suite B., Main Street South, Alexandria, ON, K0C 1A0. Phone: 613-525-2309. Hours are by appointment only.

Rouse Surveyors Inc. is now located at 56 Fort York Blvd., Toronto, ON, M5V 4A6. Phone and Fax remain the same.

Jim Johnson is now the managing OLS at **West & Ruuska Ltd.**

Thomas Gondo is no longer with **MMM Geomatics Ontario Limited.**

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

Greg Ford	1974	July 24, 2014	Seyed Abdolmajid Fathi	1975	July 24, 2014

EDUCATIONAL FOUNDATION

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ALEX WILSON SURVEYING INC.

EDUCATIONAL FOUNDATION NEWS

Peter Dunsworth – 2013 Educational Foundation Award Winner

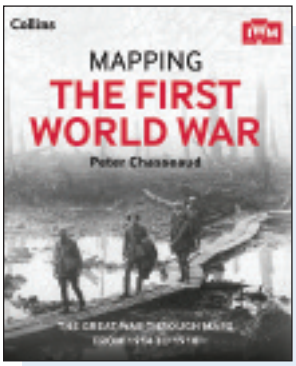
Peter Dunsworth is a second year student in Geomatics Engineering at York University. He is one of two recipients of the 2013 Geomatics Engineering Entrance Award who had a final high school average of 85% or more. Peter worked at the AOLS office this summer and has future aspirations of becoming an Ontario Land Surveyor. When asked what this award meant to him, Peter replied, "This award has meant that this is an organization that is willing to provide tangible and emotional support to students who are considering pursuing a career in Geomatics Engineering. The monetary award helped greatly as the university costs to pursue this type of program are significant, and the emotional support is even greater as I have been introduced to a network of people that I can turn to for practical support beyond what is offered within the university campus."

November 1st – Time to join or renew your membership

For many members the fall season brings back memories of their "school days". Many also remember that being a university or college student can be very difficult financially. By becoming a member of the Educational Foundation you can help promising future surveyors supplement their tuition costs and ensure that they are recognized for their academic achievements and their involvement in the broader community. Donations can now be made online on the AOLS website www.aols.org by clicking *Donate to the Educational Foundation* under the Careers heading.

The AOLS Educational Foundation is dedicated to *Investing in the Future* of our profession.

BOOK REVIEWS



Published by Collins an imprint of HarperCollins Publishers

ISBN 978-0-00-752220-0

Mapping the First World War
The Great War through Maps From 1914 to 1918

By Peter Chasseaud

Over 150 maps demonstrating how the Great War was fought around the world. With single battles often waged across thousands of miles and large troop numbers moving across huge distances, these maps show both a unique overview and the details of the Great War, as it happened on the ground.

Types of maps featured:

- Small scale maps showing country boundaries and occupied territories
- Large scale maps covering the key battles and offensives on all fronts of the war
- Trench maps showing detailed positions of the front line
- Maps from newspapers, battle planning and propaganda

Along with the maps, key historical events are described, giving an illustrated history of the war from an expert historian.

Information taken from inside the front cover.

GIS for Surveyors
A Land Surveyor's Introduction to Geographic Information Systems

By Rj Zimmer, PLS

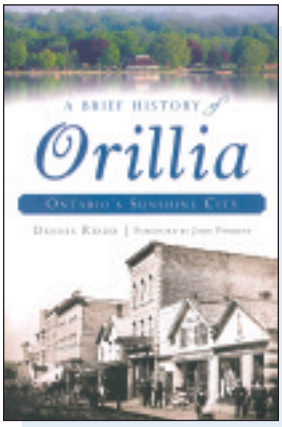
Published by Montana Technical Writing

ISBN 978-0-9888737-2-8

The GIS for Surveyors book explains how surveyors use Geographic Information Systems (GIS) technologies to support land surveying activities and how GIS helps surveyors work more effectively and efficiently. Additionally, the book covers how surveyors support GIS data development, integrity, and spatial accuracy.

GIS concepts, overviews, and specific examples are presented on a variety of topics related to Geographic Information Systems relevant to land surveying. The book also addresses important issues and helpful applications. Major topics covered are GIS fundamentals, data sources, using GIS in the survey office, using GIS in the field, surveying for GIS, and spatial accuracy considerations.

Information supplied by the author.



Published by The History Press

ISBN 978-1-62619-104-4

A Brief History of Orillia
Ontario's Sunshine City

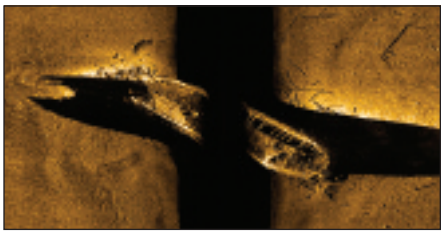
By Dennis Rizzo

First populated by the Huron, Iroquois and Chippewa Nations, Orillia is now a well-loved, year-round recreation destination. Its history is deeply tied to its water. Situated in the narrows where Lake Simcoe flows into Lake Couchiching, Orillia was a gathering place for centuries before Europeans used it to bring furs to market. Sir John Simcoe, first governor of Upper Canada, fostered permanent settlement of the region after commanding Loyalist regiments in the American War of Rebellion. A gateway to the Muskoka region, it has been home to lumbering, manufacturing and artistic endeavours. Today, summer cottagers and winter athletes enjoy the Sunshine City and its more than twenty annual festivals. Local author Dennis Rizzo tells the fascinating and diverse history of Orillia, Ontario.

Information taken from the back cover.

The Last Word

The Victoria Strait Expedition Discovers one of Franklin's Lost Ships



The first image of the Franklin shipwreck obtained from side-scan sonar data. Photo credit: Parks Canada.

This past summer many organizations from the public, private and non-profit sectors joined forces to search for the remains of the HMS Erebus and HMS Terror, the two ships lost on the ill-fated 1845 British Arctic Expedition commanded by Sir John Franklin.

The Victoria Strait Expedition was supported by many agencies and their ships: the Canadian Coast Guard's CCGS *Sir Wilfrid Laurier*, the Royal Canadian Navy's HMCS *Kingston*, the Arctic Research Foundation's research vessel *Martin Bergmann,* and One Ocean Expeditions' *One Ocean Voyager*. Additionally, smaller survey vessels were employed, such as Parks Canada's HMCS *Investigator* and the Canadian Hydrographic Survey (CHS) vessels *Gannett* and *Kinglet,* which were equipped with the latest in side-scan and multi-beam sonar technology and designed specifically for the type of grid pattern searches required for this project.

Working closely with the Canadian Coast Guard and the Royal Canadian Navy, the CHS hydrographers collected and interpreted the data from the side-scan and multi-beam systems, along with data collected by the other vessels, to map the seabed in ultra high resolution and search for evidence of Franklin's ships. Support was also received from the Canadian Space Agency and its RADARSAT-2 satellite, which provided high resolution images of the coastal features and shoreline and information about the sea ice type and extent.

On September 9th Prime Minister Stephen Harper announced that this year's Victoria Strait Expedition had solved one of Canada's greatest mysteries; one of Franklin's ships had been discovered. He told reporters, "This is truly a historic moment for Canada. Franklin's ships are an important part of Canadian history given that his expeditions, which took place nearly 200 years ago, laid the foundations of Canada's Arctic sovereignty."

Parks Canada's Ryan Harris (second from left) shows Canadian Coast Guard Ship Sir Wilfrid Laurier's Commanding Officer Bill Noon (far left) the side-scan sonar image of the wreck, with Marc-André Bernier (third from left), Jonathan Moore (fourth from left) and Chief Officer Rich Marriott (at far right). Photo credit: Theresa Nichols, Fisheries and Oceans Canada.

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2nd and 3rd Cover	Not Sold	$650
4th Cover	Not Sold	$750
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1/4 page B&W	$175	$150

Colour ads: Add $50 for each colour up to 4 colours
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Material Requirements:
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