

Ontario Professional Surveyor



on the cover ...

**Sergeant-at-Arms
Drew Annable (Thomas Talbot)**
presided over the 124th
AGM in London, Ontario

also in this issue ...

124th AGM Photos
Academic-Industrial Collaborations
on LiDAR Technology Development
Spatial Complications for a
Tunnel Surveyor
UAVs — Key Exposures to Loss
and Ways to Protect Yourself

plus our regular features:

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ON THE COVER ...

Sergeant-at-Arms Drew Annable was asked by the AGM Planning Committee to portray Colonel Thomas Talbot (1771-1853), who was the founder of the Talbot Settlement in Southwestern Ontario. Read about Colonel Talbot and why he was chosen in The Last Word on page 40.

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President's Page

By Murray Purcell, O.L.S., O.L.I.P.



After a full week of Council meetings, and Annual General Meeting functions and seminars as your Vice President, I proudly accepted the new chain of office (aka “my precious”) as President on the evening of February 25th. My official reign (or is that “rain”?) commenced Saturday, February 27th. On March 1st (three days later) I was on a plane to Kimberly, as your representative at the Association of British Columbia Land Surveyors’ Annual General Meeting. I arrived home late on Saturday the 6th. On Wednesday the 9th, your Executive Director Blain Martin and Councillor Dan Dzaldov and I attended a meeting with MPP Peter Milczyn, Parliamentary Assistant to the Minister of Economic Development, Employment, and Infrastructure. On Tuesday March 8th, Maureen Mountjoy reminded me that my first Quarterly Magazine report was due that week...the following week at the latest. Sheesh!! Two weeks in and I’m already writing my first President’s Page.

I am very excited and proud to serve as your president for the upcoming year. I believe we have a strong Council and AOLS support staff in place to serve the membership well. As I mentioned in my platform and inaugural address, the two items that I feel must stay at the forefront of our Association and the profession for the upcoming year are Education and Marketing.

Education includes high school, college and university levels and I encourage everyone to get involved. Your Public Awareness Committee, Geomatics Recruitment & Liaison Committee, and the University and College Student Liaison Committee can use your help. High school students need to know who we are, and the activities and education that are required to become a land surveyor. We are a very eloquent and adventurous group and we share several passions that our youth can associate with; things like the great outdoors, computers, highly technical equipment, law, history, geography, and much more. So we need to hit the schools and classrooms to present our occupation BEFORE the students have made up their minds on a

career path. College educated survey technicians are worth their weight in gold. If anyone needs a success story for hard working, well mannered, well educated, and fun loving hires, my office will attest to college geomatics programs. We need to encourage and support our college programs. Preserving the domestic university survey programs and promoting the acceptance of international university graduates are key factors in the succession plan for Certificate of Authorization holders. Our Academic and Experience Requirements Committee is doing a marvelous job of evaluating and moving prospects through the system. Our Articling Student numbers are growing. At the recent meeting in British Columbia, much of the conversation was around the Canadian Board of Examiners for Professional Surveyors (CBEPS). This is the organization that evaluates and sets examinations for candidates in provinces outside of Ontario and Quebec. Perhaps some shared coordination/efficiencies between the three organizations are available?

Marketing is something we need to work on as an Association. Let’s face it, we are good at what we do, but very few of the public appreciate what that is or what it represents. It is time for the public to understand our “superhero” qualities, education and efforts. Professional Surveyors Canada (PSC) is the new national organization whose agenda is to provide a national marketing scheme for land surveyors. This group is working at the forefront with our own AOLS Marketing Task Force. I strongly encourage all of you to support PSC with your membership and assistance. Many of you heard Wilson Phillips, the PSC Chair, speak at the AOLS webinar presentation last year. Having met Mr. Phillips, I can tell you that he is a passionate representative whom I am confident will move PSC in a favourable direction for all of us. This comes at a perfect celebratory time in AOLS history. With our 125th anniversary arriving in February, accompanied by Canada’s 150th birthday, and our collaborative event with the Quebec and Canada Lands surveyors associations, this is a BIG one shot marketing opportunity. Let’s take advantage of it!





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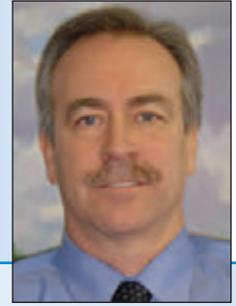
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Learning from Google

Testing the boundaries of fair use



By Will O'Hara

One of the most interesting copyright decisions about 'fair use' was released recently by the United States Court Of Appeals for the Second Circuit. The case is *Authors Guild v. Google Inc.*, a class action.¹ Although it's an American case, there's much that Canadians can learn about the parallel Canadian concept of 'fair dealing'.

The case arises from Google's Library Project, an ambitious project started in 2004 with the aim of scanning vast numbers of books into a machine-readable format. The contents of each book could then be searched in Google's database, yielding brief snippets² of the book. Some of the books scanned were in the public domain³ but many others were protected by copyright. Authors of the copyrighted books complained that Google was infringing their copyrights by making copies of their books from cover to cover. They sued Google to prevent the use of their copyrighted books in this way and to recover damages. Google defended on the grounds of fair use. Under the American Copyright Act, fair use of a copyrighted work is not an infringement.⁴

The procedural history of this case spans ten years and is far too twisted and tangled to describe in a short article, though it is summarized in the judgment. At one point the parties had negotiated a settlement that would have had Google pay the authors for the use of their works, but the court refused to approve the class action settlement. The authors amended the complaint⁵ four times before they were able to have their case adjudicated. On the fourth amended complaint Google was so confident in its position that it brought a motion to dismiss the case on a summary judgment. The District Court for the Southern District of New York heard the case and agreed with Google – it was making fair use of the authors' books. The District Court dismissed the case.⁶ The Authors Guild appealed.

The judgment of the United States Court of Appeals for the Second Circuit was given by Leval, *Circuit Judge*, who stated the issue clearly at the outset: "This copyright dispute tests the boundaries of fair use." He went on to describe the facts in detail. In a nutshell Google had copied over 20 million books since 2004, the vast majority being non-fiction and many being out of print. All of the digital information created by Google was stored on secure servers. Each book was searchable by using terms selected by the researcher and the snippets would appear on the screen – not the entire book, just the snippets.

The authors argued on the appeal that the Google project

was flawed and their rights as authors were compromised by the Library Project. They said even though Google provides the search and snippets free to the public it was still motivated by commercial profit. They argued that the free search function deprived them of revenues from licensed search markets and exposed them to the risk of having their books hacked and made available for free on the Internet.

Google argued on the appeal that it was making fair use of the books in the Library Project. It argued that the work it created was *transformative* in the sense that it was so different from the original works that it didn't really compete with them or diminish the authors' copyrights.

The court made use of the opportunity presented by the case to review the law on fair use, starting with the goal of copyright:

The ultimate goal of copyright is to expand public knowledge and understanding, which copyright seeks to achieve by giving potential creators exclusive control over copying of their works, thus giving them a financial incentive to create informative, intellectually enriching works for public consumption.⁷

It is clear from the decision that the court found the Library Project met the ultimate goal of expanding public knowledge and understanding.

The search tool permits a researcher to identify those books, out of millions, that do, as well as those that do not, use the terms selected by the researcher. Google notes that this identifying information instantaneously supplied would *otherwise not be obtainable in lifetimes of searching*.⁸

Superlative phrases like "lifetimes of searching" appear throughout the decision and they demonstrate that the court approached the Library Project with a certain amount of respect, if not outright awe.

The court also took the opportunity to review the American law on fair use, which had been recognized at common law but was not included in the Copyright Act until 1976. The Act restated the common law and included four factors for determining whether a use – like the use Google made of the authors' books – was fair use and therefore not an infringement of copyright. The four factors are found in s. 107 of the American Copyright Act:

[T]he fair use of a copyrighted work . . . for purposes such as criticism, comment, news reporting, teaching (including multiple copies for classroom use), scholar-

ship, or research, is not an infringement of copyright. In determining whether the use made of a work in any particular case is a fair use the factors to be considered shall include –

- (1) the *purpose and character* of the use, including whether such use is of a commercial nature or is for nonprofit educational purposes;
- (2) the *nature* of the copyrighted work;
- (3) the *amount and substantiality of the portion used* in relation to the copyrighted work as a whole; and
- (4) the *effect of the use upon the potential market for or value of the copyrighted work*.

The fact that a work is unpublished shall not itself bar a finding of fair use if such finding is made upon consideration of all the above factors.

Though the Canadian *Copyright Act* recognizes ‘fair dealing’ in ss. 29 to 29.2, it does not list the factors to be used in determining whether a dealing is fair. Unlike the United States, those factors are defined by case law. The Supreme Court of Canada has listed them as: the purpose, character, and amount of the dealing; the existence of any alternatives to the dealing; the nature of the work; and the effect of the dealing on the work.⁹

It is obvious that the factors considered in both countries are quite similar. One difference is the way the fourth factor is treated in both countries. The United States Supreme Court has made it clear that the *effect of the use upon the potential market for or value of the copyrighted work* is “undoubtedly the single most important element of fair use.”¹⁰ This makes sense: a use that negates the potential market for or the value of the copyrighted work destroys the rights that copyright is designed to protect. In short, fair use can’t gut copyright protection. The two are mutually exclusive.

It is worth noting that Canadian courts tend to give equal weight to the factors for determining fair dealing, including the effect of the dealing on the work. As Chief Justice McLaughlin noted in *CCH Canadian Ltd. v. Law Society of Upper Canada*¹¹:

Although the effect of the dealing on the market of the copyright owner is an important factor, it is neither the only factor nor the most important factor that a court must consider in deciding if the dealing is fair.

Nevertheless, it is difficult to imagine a decision that allows fair dealing to destroy the protection given by the Canadian *Copyright Act*.

The court in *Google* applied the facts to the four factors set out in the American Copyright Act, bearing in mind the different weights given to the different factors.

Purpose and character

This factor was considered in light of case law that asked whether the use in issue created a work that competed with the original creation or creates a new work that was “transformative”. According to the decision, a transformative use

is “one that communicates something new and different from the original or expands its utility, thus serving copyright’s overall objective of contributing to public knowledge.”¹² Of course Google claimed that its use of the authors’ works was transformative and the court agreed. As Justice Leval held:

Google’s making of a digital copy to provide a search function is a transformational use, which augments public knowledge by making available information about Plaintiffs’ books without providing the public with a substantial substitute for matter protected by the Plaintiffs’ copyright interests in the original works or derivations of them.¹³

On this reasoning Google’s new use created an entirely new creation, something that described and illuminated the authors’ books but did not compete with them – all the time expanding public knowledge.

Although the “transformative use” issue is important in determining purpose and character of a use in the United States, Canadian courts have not recognized “transformative use” as a characteristic of fair dealing.¹⁴

Nature of the copyrighted work

The court started the second part of the analysis by implying that this factor was not very important. As Justice Leval noted: “The second factor has rarely played a significant role in the determination of a fair use dispute.”¹⁵ The inquiry dealt mainly with the distinction between fictional and non-fictional works. The court observed that facts and ideas cannot be protected by copyright – only the author’s manner of expressing those facts and ideas – and that might mean that the courts would more readily protect fictional works. But he concluded that in most cases fictional and non-fictional works deserve the same protection.

The amount and substantiality of the portion used...

The third factor means that finding of fair use is more likely when small amounts, or less important passages are copied than when the copying is extensive or encompasses the most important parts of the original. Justice Leval explained the reason for this approach:

The obvious reason for this lies in the relationship between the third and the fourth factors. The larger the amount, or the more important the part, of the original that is copied, the greater the likelihood that the secondary work might serve as an effectively competing substitute for the original, and might therefore diminish the original rights holder’s sales and profits.¹⁶

The implication is clear. If someone can get a copy of all or most of the original work from another source, they won’t bother getting it from the author. That will have a direct

cont’d on page 6

bearing on the rights holder's sales and profits. The amount of the copying is directly related to the degree to which the copied work serves as a market substitute from the original.

The court noted that Google makes copies of the entire book, but it does not reveal the digital copy to the public. The copy is made to enable the search function and to provide important information about the books. The snippets that are revealed to the public were regarded by the court as too small to amount to a free substitute for the original books.

The effect of the use upon the potential market for or value of the copyrighted work

The important fourth factor focuses on “whether the copy brings to the marketplace a competing substitute for the original, or its derivative, so as to deprive the rights holder of significant revenues because of the likelihood that potential purchasers may opt to acquire the copy in preference to the original.”¹⁷ This is every creator's nightmare: will someone else make and sell copies of my work at such a low price that I won't be able to sell mine at a fair price – or at all?

The court examined this factor in detail and made the critical observation that no more than 16% of a book would be shown in all of the discontinuous and tiny snippets produced by Google. Although the court recognized that the snippet function might cause the loss of *some* sales, that was not enough to tip the balance. There had to be a *meaningful or significant* effect upon the potential market for or value of the copyrighted work.¹⁸

Considering the four fair use factors in light of the goals of copyright, the court concluded that making a complete digital copy of the authors' works for the purpose of providing the public with its search and snippet view functions was a fair use that did not infringe on the authors' copyrights in their books.

What can we learn from Google?

Although Google is an American case based on a different

Copyright Act, the principles behind the decision are very similar in Canada and the United States. Both are members of the Berne Convention and NAFTA, among many other international copyright conventions. Though not identical, copyright in the two countries should at least be harmonized. After all, copyright in both countries flows from the same source.¹⁹ American cases have been used by Canadian courts – including the Supreme Court of Canada – as a source of guidance.²⁰

Canadian creators of copyrighted works can take some comfort and guidance from the importance given by the American courts to the fourth factor in determining fair use – the effect of the use upon the potential market for or value of the copyrighted work. This is “undoubtedly the most important element of fair use.” When interpreting the parallel Canadian element – the effect of the dealing on the work – courts in Canada should give this element the importance it deserves. As the court said in Google: “Because copyright is a commercial doctrine whose objective is to stimulate creativity among potential authors by enabling them to earn money from their creations, the fourth factor is of great importance in making a fair use assessment.”²¹ Copyright in both countries is designed to reward creators – for their good and for the greater good – so they will continue creating. A fair use/fair dealing interpretation that destroys the potential market for or value of the copyrighted work runs counter to the underlying reasons for copyright and defeats copyright altogether.



Will O'Hara is now a partner at the firm of **Magyar, Bogle & O'Hara LLP**, practicing in intellectual property, real property, professional liability and dispute resolution. He is certified by the Law Society of Upper Canada as a Specialist in Civil Litigation. Will can be reached at wohara@mbollp.com or 416-300-7733.

The views expressed in this article are solely those of the author and do not necessarily reflect or represent the position of the AOLS.

¹ *Authors Guild v. Google, Inc.* 13-4829-cv, released October 16, 2015

² A term used throughout the decision: a horizontal segment of a book comprising ordinarily an eighth of a page.

³ The copyright had expired or was non-existent.

⁴ This is the same for fair dealing in Canada: *CCH Canadian Ltd. v. Law Society of Upper Canada*, [2004] 1 SCR 339, 2004 SCC 13 (CanLII), at paragraph 12: “In general terms, those who deal fairly with a work for the purpose of research, private study, criticism, review or news reporting, do not infringe copyright.”

⁵ Similar to a statement of claim in Canada.

⁶ *Authors Guild, Inc. v. Google Inc.*, 954 F. Supp. 2d 282 (S.D.N.Y. 2013)

⁷ at page 12

⁸ at page 7

⁹ *Alberta (Education) v. Canadian Copyright Licensing Agency (Access Copyright)*, [2012] 2 SCR 345, 2012 SCC 37 (CanLII)

¹⁰ *Harper & Row Publishers, Inc. v. Nation Enterprises*, 471 U.S. 539 (1985), at 566.

¹¹ [2004] 1 SCR 339, 2004 SCC 13 (CanLII), at para 59

¹² at page 17

¹³ at page 4

¹⁴ *Century 21 Canada Limited Partnership v. Rogers Communications Inc.*, 2011 BCSC 1196 (CanLII), per Prunnett J., at para 234

¹⁵ at page 27

¹⁶ at page 29

¹⁷ at page 33

¹⁸ at page 35

¹⁹ An Act for the Encouragement of Learning, by Vesting the Copies of Printed Books in the Authors,” Statute of Anne [1710]

²⁰ *Halsbury's Laws of Canada, Copyright 2015*, at page 83, and footnote 15 at page 85.

²¹ at page 34

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UAVs - Key Exposures to Loss and Ways to Protect Yourself

By Mark Sampson

Drones are referred to interchangeably by various names: Unmanned Aerial Vehicles (UAVs) or Unmanned Aircraft Systems (UAS). They are a growing part of the surveying profession. Transport Canada regulates the use of all aircraft, manned or unmanned. UAV users are considered pilots and as such, are legitimate airspace users.

The Canadian Aviation Regulations define a UAV as “a power-driven aircraft, other than a model aircraft, that is designed to fly without a human operator on board and is required to operate in accordance with a Special Flight Operation Certificate (SFOC)”. In November 2014, Transport Canada issued two exemptions to the SFOC requirements and guidance material for lower risk UAVs operating within specific conditions and weighing 25kgs or less. (Source: Transport Canada - CARAC Activity Reporting Notice #2015-012 Date May 28, 2015).

These exemptions are valid until December 2016, as they are meant to be a temporary solution until Transport Canada introduces further regulatory requirements.

Regardless of the use (recreational or non-recreational), or the weight (+/- 25 kg), UAVs are operated in airspace and as such, have unique exposures to loss. The typical insurance policies carried by surveyors (professional liability, general liability, automobile, or property insurance), do **not** cover damage to, or damage caused by UAVs while airborne. A surveyor who employs a drone must obtain a specific Aviation Hull and Liability Insurance Policy.

Key Exposures to Loss when owning and/or operating a UAV

1) Aviation Liability

The most significant exposure to loss to a survey firm when owning or operating a UAV is the potential of the drone causing injury to a person or causing damage to property. An example of this exposure is a surveyor operating a UAV and it crashes to the ground. The best case scenario is that the drone falls from the sky and only damages itself. The worst case scenario is that the drone hits and injures a person or damages property, or both.

A mechanical failure or operator error could cause the drone to crash into a building and cause a fire. The surveying firm could be sued for damage to the structure, the contents within the building, and the potential loss of income from the interruption of operations within the building.

Aviation liability insurance is a third party coverage that

is designed to protect the individual or surveying firm from actions that you have negligently caused that injures someone (bodily injury), or something (property damage).

More specifically, bodily injury includes physical injury sustained by a person including mental anguish and death. Property damage includes physical injury to tangible property, including loss of use of that property.

Transport Canada requires firms that operate UAVs to carry minimum aviation liability coverage of \$100,000. However, I would recommend that all survey firms carry at least \$1 million of coverage. Based on the potential liability exposures associated with operating drones, I would strongly suggest you obtain a quote to increase your coverage to \$2 or \$5 million. The cost to increase the liability coverage to a higher amount is not as costly as you may think.

2) Physical Damage to the UAV

The cost of UAVs designed for the surveying profession represent a significant financial investment for your firm. There are many examples of drones being damaged:

- a) While airborne - collision with transmission lines, trees, buildings, wildlife, etc.
- b) During landing - mechanical failure, operator error, inclement weather, etc.
- c) On route to the jobsite – the drone is damaged while being transported to the jobsite in an automobile collision.

In addition, there is a risk of the drone being stolen either from a truck (field crew stops for a coffee and the truck is broken into), or from a break-in at the office where the UAV is stored.

Transport Canada does not require the individual/firm to insure the physical damage to the drone or its component parts, however based on the common loss scenarios listed above, I believe it is wise to protect your asset by purchasing an insurance policy.

The typical property insurance policy will **not** cover equipment while airborne, therefore I recommend that surveyors obtain a policy specifically designed to insure the UAV hull and its component parts, i.e., ground station equipment and apparatus, mounted camera, surveying and sensing equipment, spare parts, and batteries, etc.

The physical damage coverage for a UAV includes direct, physical and accidental loss or damage to all or part of the property insured. If there is damage to the UAV, then a typical hull aviation insurance policy will pay the least of

cont'd on page 10



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For information about Surveyors First aviation and other programs contact:

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the cost to repair the physical damage, the insured value, or the actual cost to replace the UAV with an aircraft of the same make and model. Make sure that the total insured value includes any additional modifications that you make to the vehicle which increase its value.

3) Personal and Advertising Injury including Privacy Liability

UAVs collect a wide variety of images and data. There may be an exposure for a surveyor who unintentionally collects private material and causes an injury to a third party. Personal and advertising injury means injury, including consequential bodily injury, that arises out of oral or written publication of the material that:

- Violates a person's right of privacy
- Slanders or libels a person or organization, or disparages a person's or organization's goods, products or services
- Infringes upon another's copyright, trade dress or slogan in your advertising

A typical aviation liability policy does not automatically include coverage for personal and advertising injury liability. Based on the nature of the operations of a surveyor, it is a good idea to insure this exposure.

A third party can bring a legal action against you claiming a violation to their right of privacy (groundless or not). If you do not have personal injury coverage included as part of your insurance program, then you will not have the protection of an insurance policy to defend you. One of the advantages of transferring this exposure to an insurance company is that it will pay for the cost to investigate and defend you from suits brought against you by third parties.

Ways to protect yourself: Risk Management and Insurance

1) Risk Management

There are many inexpensive and easily attainable risk management solutions to help surveyors operate UAVs safely:

- Training – attend a UAV specific ground school training course that will help the operator understand the hazards and operate the vehicle safely
- Safety Management Systems – pre-flight checklists, logbooks and standard operating procedures
- Maintenance – ensure that the drone, ground equipment and systems are inspected and are safe for operation
- Weather – operate in safe weather conditions
- Environmental Hazards – limit the proximity to people, airports, congested areas and government facilities
- Privacy Issues – operate in a reasonable and ethical manner

2) UAV Insurance Protection designed for Surveyors

In addition to the risk management techniques outlined above, surveyors can protect themselves by transferring some of the exposures of owning and operating a UAV to an

insurance company by purchasing an aviation hull and liability policy.

Many businesses and industries are using drones in their daily operations; however, not all are as professional as the surveying industry. With this knowledge, I have developed a UAV insurance program specifically designed for surveyors. It is competitively priced and contains broad coverage for aviation liability, physical damage to the UAV, component parts and payload (camera, etc.), and personal and advertising injury liability.

There are many exclusions and limitations contained in an aviation insurance policy. If you currently have an aviation policy covering a drone, or will be purchasing a UAV in the future, please contact me and I will give you professional advice on how to best protect you/your firm from these many exposures to loss.

Please remember that not all insurance policies are created equal.



Reference: Transport Canada - CARAC Activity Reporting Notice #2015-012, May 28, 2015

<http://www.wapps.tc.gc.ca/Saf-Sec-Sur/2/NPA-APM/doc.aspx?id=10294>

Mark Sampson, BBA, FCIP is the Senior Vice President of The CG&B Group, part of Arthur J. Gallagher Canada Limited. He can be reached by phone at 905-948-2631 or by email at Mark.Sampson@cgbgroup.com

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Spatial Complications for a Tunnel Surveyor

By Aleks Kubilius

Tunnels are designed and constructed in various engineered geometries; they can be 200m or 20km in length, 5m or 15m diameter, curved or straight, shallow or deep. According to Google, the world's longest tunnel is the Delaware Aqueduct at 120km! Here in Ontario, construction of new tunnels is required to support the booming population levels that are placing extreme demand on existing utility and transit systems. This article is back-dropped with recent ongoing experience from tunnel surveying techniques and methodologies implemented on Toronto's own \$5.3 billion Eglinton Crosstown project; a 19km Light Rail Transit (LRT) project that includes 10km of twin-tunnels.

Early construction work for the Eglinton Crosstown project consists of three mining phases:

Drive 1-2: Black Creek Drive - Allen Road (3.5km)

Drive 3-4: Allen Road - Yonge Street (2.7km)

Drive 5-6: Yonge Street - Laird Drive (3.5km)



The Eglinton Crosstown tunnel drive arrangements (credit Kubilius).

Dennis, Lea, Don, and Humber are the names of the four 6.5m-diameter, \$13.5 million, 511 ton tunnel boring machines (TBMs). Dennis and Lea are mining for tunnel drives 1 – 4, they broke ground in the Spring of 2013, while Don and Humber are mining for tunnel drives 5 – 6 and broke ground in the Fall of 2015.

THE TUNNEL SURVEYOR

Professional surveyors collect data and measurements from boundary retracement to topographical surveys. To ensure the highest quality of results in any given field of surveying, the professional must apply a specific approach and method of data collection, handling and evaluation that is unique to those fields. Boundary retracements require a significant amount of time devoted to cadastral research and investiga-

tion, while topographical surveys require implementation of a comprehensive code table and CAD standards.

Underground surveying, specifically in tunnel construction, is akin to these other fields of surveying in that it requires a specific set of methodologies tailored to its client, project, and environmental needs. The overarching goal of the tunnel surveyor in this scope is to accurately transfer coordinates underground from one known surface location to another, in turn guiding the TBM from design start to finish. From our experience, surveyors will experience three spatial complications throughout tunnelling projects:

- Geometry of launch and extraction shafts
- Complexities of tunnel guidance and traversing
- Limited opportunities to close survey networks

These pressure points make it difficult to produce a high quality result and thus the entire survey team must remain diligent at all times. Overlooking these key geometric areas of complication may result in gross absolute errors such as

tunnel misalignment, which can cost millions of dollars in damages. As such, it is imperative to share these three specific areas of spatial complications faced during the Eglinton Crosstown project.

1. GEOMETRY OF LAUNCH AND EXTRACTION SHAFTS

Transferring project coordinates from the surface into the tunnel via the shaft is a complicated and dynamic task and it requires a significant amount of planning and coordination with the Construction Management team. The most paramount area of a tunnelling project is at the launch shaft. This chaotic area acts as the launch pad for the TBMs, the point of entry for all personnel, machinery and tools, the location of muck output, and also houses the project offices. The tunnel shafts are excavated in a rectangular or cylindrical shape,

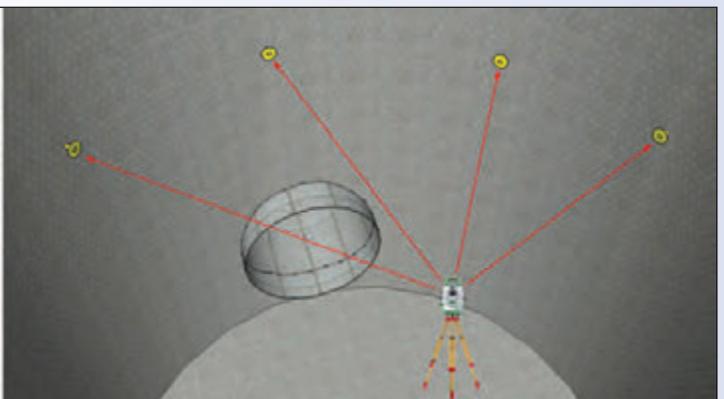
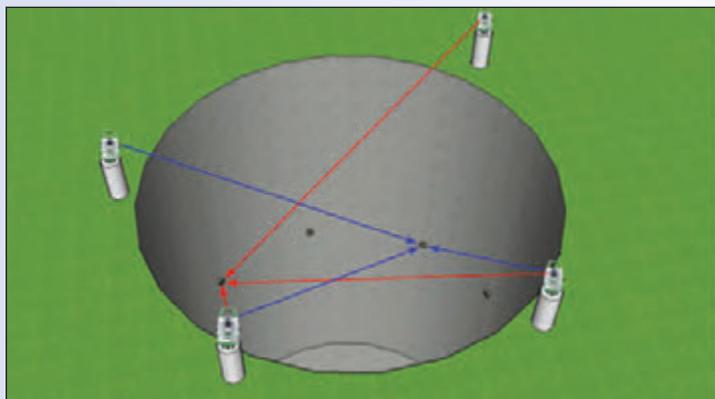


Ben Oldfield (Monteith & Sutherland Ltd.) measures into the tunnel portals (credit Kubilius).

where dimensions typically vary anywhere from 5m to 50m in depth, and 5m to over 100m in length and width.

The Eglinton Crosstown project is engineered with three launch shafts; two of which are shallow and open, and the other, deep and heavily obstructed. Shallow and open launch shafts work into the surveyors' favour by allowing a direct line-of-sight into the tunnel portals. In the case where steep and narrow shafts are constructed, the Total Station's downward sighting axis is limited by shaft obstructions. In this case where Total Stations cannot sight directly to the base of the shaft, alternative methods are required. Coordinates can be transferred optically with a high precision plummet, such as the Leica Zenith and Nadir Plummet (ZNL), which has the ability to transfer coordinates with a standard deviation of 1:30,000, or 1mm at 30m.

When tunnel shafts are too active for optical transfers,



Launch shaft coordinate transfers via target arrays (credit Kubilius).

another method of coordinate transfer involves the set and measure of control point arrays. A standard control point array consists of approximately 8 high grade targets embedded into the shaft wall at vertical intervals of 5-10m. Control point arrays are coordinated from multiple fixed surface positions. Subsequently the same points will be used for resections at the base of the shaft. However, this method is the least favourable as steep resections may create orienta-

tion skews that are difficult to detect. Multiple sets of angles should be measured several times in two faces from more than two positions.

and production engineers must be attentive at all times to keep the TBM within a prescribed 3-dimensional tolerance of the DTA. Guiding each Eglinton Crosstown TBM is a 0.5" Total Station with a top-mounted laser with its axis set parallel to the optical axis of the Total Station. The forced centred brackets planned out in the pre-analysis are coordinated relative to the project reference frame via several

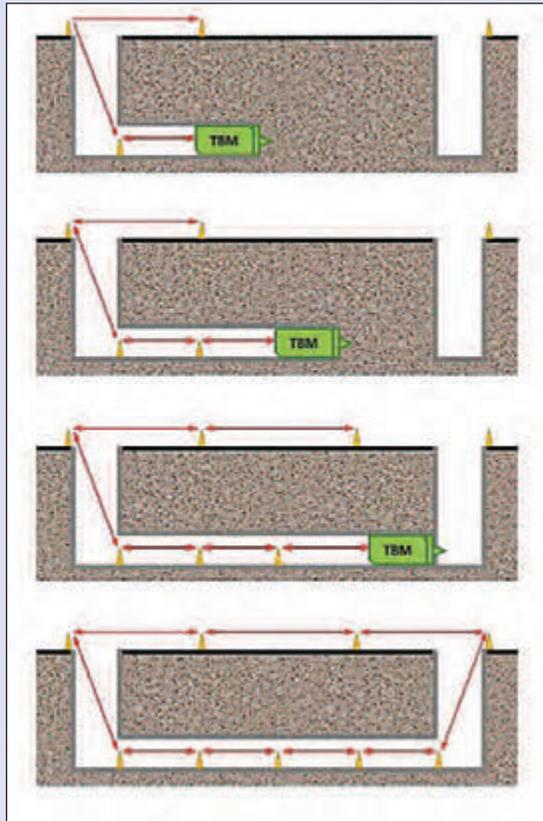
2. COMPLEXITIES OF TUNNEL GUIDANCE AND TRAVERSING

Unlike conventional ground-based surveying where the worker often has the freedom of choice to set-up in a location that best suits their needs; tunnel survey traverses are constrained to long narrow corridors. On the Eglinton Crosstown project, at every 60-100m force-centred brackets are set at the springline level and above to create a narrow criss-crossed traverse. Successfully transferring accurate and precise coordinates along this traverse

network begins with comprehensive pre-analysis to ensure that a carefully designed traverse network will meet contractual tolerances. Alignment tolerance allows for just 100mm of deviation between the design intrados and the constructed intrados (interior curve of the tunnel). Conducting pre-analysis estimates the quality and deviation of the traverse by uploading the Design Tunnel Alignment (DTA) to Least Squares Adjustment (LSA) software and allows simulation of various proposed network arrangements.

Once the TBMs are launched from the shaft they begin mining and extracting material while simultaneously constructing the tunnel with precast concrete segments. The Eglinton Crosstown tunnels average just over 3km in length between shafts. The TBMs guidance system ensures mining and construction follows the DTA. TBM guidance surveyors

cont'd on page 14



Tunnel traverse guiding the TBM is limited in closure until breakthrough
(credit Kubilius).

launch shaft transfers. From the bracket, a backsight orientation is set to a reference monument, the Total Station and top-mounted laser measure to a video target mounted within the TBM head. The TBM's spatial position is then calculated by determining its roll, pitch, and distance. With this, the

guidance system determines the TBM's deviation from the DTA and adjusts its next push accordingly.

The tunnel traverse is extended relative to the pace of the TBM. As this continues, stations and measurements are added to the network. As the TBM continues mining, its position and direction becomes more dependent on the quality of the traverse network. However, in this environment, Infrared Laser (IR) beams are subject to heavy amounts of refraction caused by atmospheric inconsistencies near the tunnel lining. There is no constant that can be applied to mitigate these inconsistencies, therefore traverse networks need to be cross-braced between brackets, diagonally and laterally. Cross-bracing not only helps mitigate the effects of refraction, but also confirms long distance measurements by right angles and shallow angles by short distance measurements. Maintaining excellent traverse quality by cross-bracing is complemented by reciprocal measurements, a minimum of six angles in two faces. A significant surplus of measurements to and from a single monument allows the processor to eliminate outlier values and improve the quality of LSA results. On the first 3.5km drive of the Eglinton Crosstown tunnel, tunnel surveyors collected thousands of traverse measurements from over 80 station brackets!

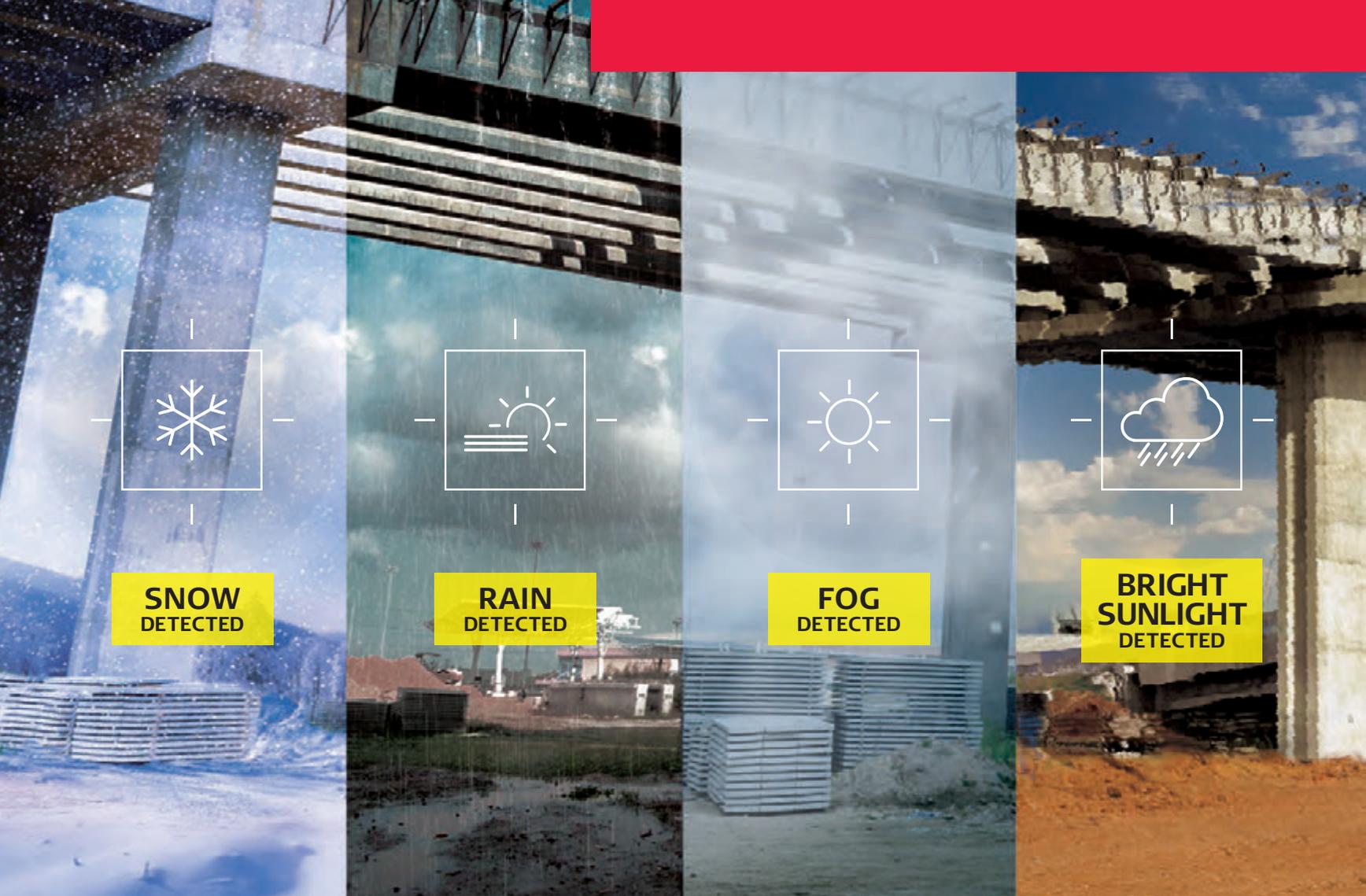
3. LIMITED OPPORTUNITY TO CLOSE SURVEY NETWORKS

Imagine traversing every day for a year without closing your traverse. Eglinton Crosstown surveyors are limited to only one direct traverse closure – at the end of mining. With 3km constructed sections, the Eglinton Crosstown tunnels

cont'd on page 16



Atmospheric conditions are applied to the instrument in real-time (credit Kubilius).



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Rob Pearlman (Monteith & Sutherland Ltd.) conducts gyro measurements (credit Kubilius).

offer no opportunity to check or close a traverse until the end portal, at the TBM extraction shaft. Without a known point closure over this length it is inevitable that tunnel traverses undergo deviation. This third geometrical complexity for the tunnel surveyor has the ability to freeze Construction Management meetings and have the entire crews biting their nails wondering whether the traverse will close to within tolerance or not. In order to mitigate this as much as possible, surveyors and engineers must take alternative measurements to avoid guess work where the stakes are high.

Alignment holes can be drilled from the surface into the tunnel and provide an opportunity to check and close the traverse, but this comes at a significant price to the constructors. Alignment holes can cost upwards of hundreds of thousands of dollars, disturb road traffic and residents, wreak havoc on drill machinery and underground utilities, offer little time to surveyors to conduct vertical transfers, and are subject to questionable confidence levels due to refraction, condensation, and plumb-bob sway. Alternatively, the use of a Gyrotheodolite can help mitigate the abovementioned issues by providing quicker and more reliable methods of traverse check and correction. On the Eglinton Crosstown project, a 3"

DMT Gyromat is implemented to correct deviations by measuring traverse azimuths from true geodetic north. The measured azimuth is calibrated to the project datum and applied to the overall tunnel LSA with a significant weighting.

SUMMARY

On top of the regular day-to-day construction activities that routinely flow out of a \$5.3 billion project, overcoming the three areas of spatial complication described above is part of the due-diligence that we as tunnel surveyors must apply to our work flow to make sure that the Eglinton Crosstown tunnelling project is a success. 

Aleks Kubilius is the Chief Operating Officer at Monteith & Sutherland Ltd. in their Toronto branch location. Mr. Kubilius has been in the Geomatics industry for 10 years, he graduated from the University of South Australia with a Bachelor of Geoinformatics and Surveying, and moved to Canada in 2013. Mr. Kubilius holds a C.Tech designation with the Ontario Association of Certified Engineering Technicians and Technologists (OACETT) and is about to complete a Professional Certificate in Business Communications with Harvard University. Mr. Kubilius can be reached at aleks@monteith-sutherland.com

Sites to See

Open Government

<http://open.canada.ca>

Welcome to Canada's new Open Government portal. Here you can explore how the Government of Canada is working with the national and international open government community to create greater transparency and accountability, increase citizen engagement, and drive innovation and economic opportunities through Open Data, Open Information, and Open Dialogue. This site also includes a link to Retirement Pension and Planning information under the Benefits/Public Pensions section.

Calendar of Events

April 11 to 15, 2016

IGTF 2016 (formerly ASPRS)
Imaging and Geospatial Technology Forum
Fort Worth, Texas
www.asprs.org

May 4 to 6, 2016

National Surveyors Conference 2016
Gateway North: Traversing the currents
Edmonton, Alberta
www.acls-aatc.ca

April 26 to 27, 2016

GISTAM2016
Rome, Italy
www.gistam.org

July 12 to 19, 2016

ISPRS XXIII Congress
Prague, Czech Republic
www.isprs2016-prague.com

May 2 to 6, 2016

FIG Working Week 2016
Christchurch, New Zealand
www.fig.net/fig2016

October 31 to November 3, 2016

GIS-Pro 2016 – URISA's 54th Annual Conference
Toronto, Ontario
www.urisa.org



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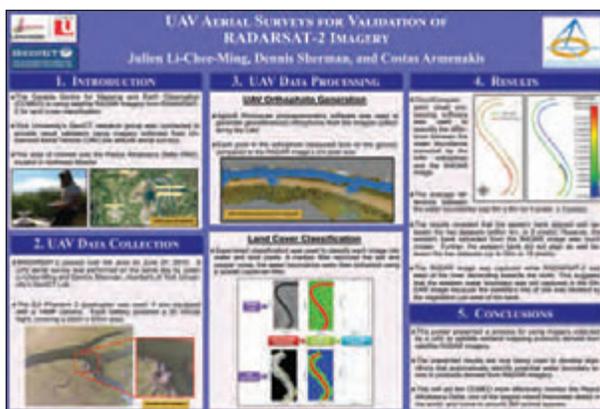
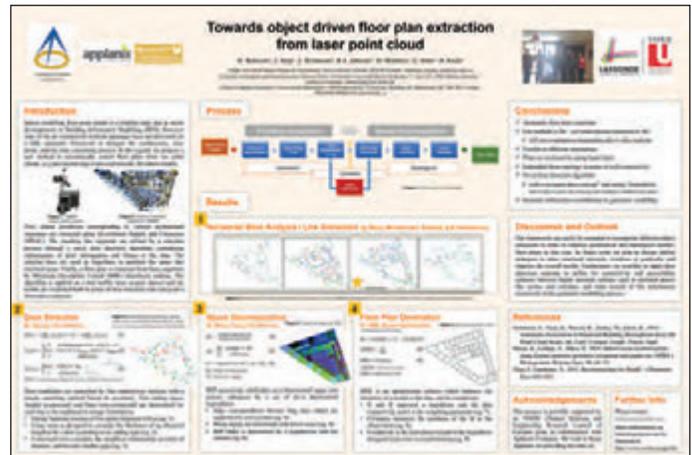
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TENTH Annual AOLS Graduate Student Geomatics Poster Session Award Winners

FIRST PLACE: Kivanc Babacan, Ph.D. Student and Jaewook Jung, Ph.D. Student, Department of Earth & Space Science & Engineering, York University, supervised by Dr. Gunho Sohn.

TOWARDS OBJECT DRIVEN FLOOR PLAN EXTRACTION FROM LASER POINT CLOUD.

ABSTRACT — During the last years, the demand for indoor models has increased for various purposes. As a provisional step to proceed towards higher dimensional indoor models, reliable and accurate floor plans are needed. Therefore, several methods have been proposed that provide automatically generated floor plans from laser point clouds. The prevailing methodology seeks to attain semantic enhancement of a model (e.g. the identification and labelling of its components) built upon already reconstructed (a priori) geometry. In contrast, this poster demonstrates preliminary research on the possibility to directly incorporate semantic knowledge, which is itself derived from the raw data during the extraction, into the geometric modelling process. In this regard, we propose a new method to automatically extract floor plans from raw point clouds. It is based on a hierarchical space partitioning of the data, integrated with primitive selection actuated by object detection. First, planar primitives corresponding to vertical architectural structures are extracted using M-estimator Sample and Consensus (MSAC). The resulting line segments are refined by a selection process through a novel door detection algorithm, considering optimization of prior information and fitness to the data. The selected lines are used as hyperlines to partition the space into enclosed areas. Finally, a floor plan is extracted from these segments by Minimum Description Length (MDL) hypothesis ranking. The algorithm is applied on a real mobile laser scanner dataset and the results are evaluated both in terms of door detection and consecutive floor plan extraction. Email: babacan@yorku.ca



SECOND PLACE: Julien Li-Chee-Ming, Ph.D. Student and Dennis Sherman, M.Sc. Student, Department of Earth & Space Science & Engineering, York University, supervised by Dr. Costas Armenakis.

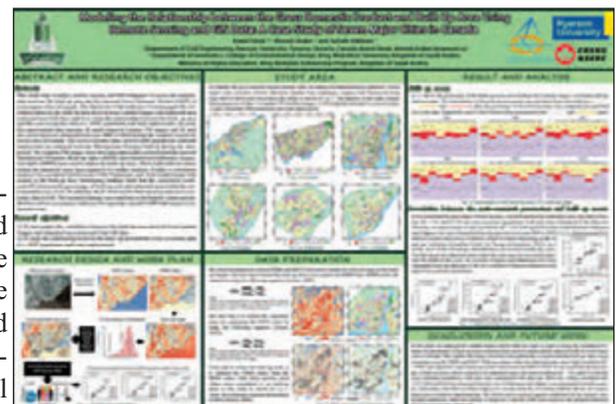
UAV AERIAL SURVEYS FOR VALIDATION OF RADARSAT-2 IMAGERY.

ABSTRACT — We used a DJI Phantom 2 Quadcopter Unmanned Aerial Vehicle (UAV) to provide low altitude aerial surveys of wetlands in the Peace Athabasca Delta (PAD), located in northeast Alberta. This work aims to provide an understanding of using UAVs for low-altitude aerial surveying; describing planning, execution, and delivering georeferenced ortho-mosaics. This poster describes this project in detail. Email: julienli@yorku.ca

THIRD PLACE: Kamil Faisal, Ph.D. Student, Department of Civil Engineering, Ryerson University, supervised by Dr. Ahmed Shaker.

MODELING THE RELATIONSHIP BETWEEN THE GROSS DOMESTIC PRODUCT AND BUILT-UP AREA USING REMOTE SENSING AND GIS DATA: A CASE STUDY OF SEVEN MAJOR CITIES IN CANADA.

ABSTRACT — This study aims to utilize remote sensing and GIS techniques to assess the relationship between the built-up area and the reported real Gross Domestic Product (GDP) of seven major cities in Canada. The objectives of the study are (1) to investigate the correlation between the built-up area derived from Landsat images and industrial area extracted from Geographic Information System (GIS) data, and (2) to study the relationship between the built-up area and the socio-economic data (i.e. real



GDP, total population and total employment). The experimental data includes 42 multi-temporal Landsat TM images and 42 land use GIS vector data sets obtained from year 2005 to 2010 during the summer season (June, July and August) for seven major cities in Canada. The socio-economic data, such as the real GDP, the total population and the total employment are obtained from the Metropolitan Housing Outlook during the same period. Both the Normalized Difference Built-up Index (NDBI) and Normalized Difference Vegetation Index (NDVI) were used to define the built-up areas. Those high built-up values within the industrial areas were acquired for further analysis. Finally, a correlation analysis was conducted between the real GDP, the total population, and the total employment with respect to the built-up area. Preliminary findings showed a strong linear relationship ($R^2 = 0.82$) between the percentage of built-up area and industrial area within the corresponding city. In addition, a strong linear relationship ($R^2 \approx 0.8$) was found between the built-up areas and socio-economic data. Therefore, the study justifies the use of remote sensing and GIS data to model the socio-economic data (i.e. real GDP, total population and total employment). The research findings can contribute to the federal / municipal authorities and act as a generic indicator for targeting a specific real GDP with respect to industrial areas. Email: kamil.faisal@ryerson.ca

FOURTH PLACE: Wei Huang, Ph.D. Student, Shahram Sattar, Ph.D. Student, Annie Chow, Ph.D. Student, and Shishuo Xu, Ph.D. Student, Department of Civil Engineering, Ryerson University, supervised by Dr. Songnian Li.

AN INTERACTIVE WEB-BASED 3D GIS PLATFORM FOR ESTIMATING URBAN SOLAR ENERGY POTENTIAL.

ABSTRACT — Solar energy potential in complex urban environments depends on available irradiance, geographical location and local environment, technology efficiency and social and economic factors. Studies have been conducted on factors such as terrain, size and orientation of building rooftops/facades, shading from buildings, trees and other structures and available rooftop areas, which affect the solar irradiance received. Accurate and timely estimation of solar energy potential in consideration of building forms and local environments will be crucial to future facilities planning at the macro and micro levels, in addition to the cost factors related to the installation and maintenance of the solar equipment.

In this study, an innovative web-based 3D GIS platform is developed that enables users to explore 3D models of their rooftops, play and place the selected solar panels, and get instant estimation of the output of electricity generation, with other simulation results such as environment footprints (power generation, CO₂ emission, equivalent trees saved, etc.). With this 3D solar tool, solar energy potential simulation and analysis can be easily run in a web browser without installation of any software components and that provides a user-friendly interface to assist the design and decision-making of rooftop solar by solar installation contractors and the public, as well as grid planning by utility companies. A case study in Woodstock, ON, Canada is conducted to test the system. The results show that the simulated solar energy potential is accurate. Email: wei1.huang@ryerson.ca



FIFTH PLACE: Manas Khurana, M.Sc. Student, Geomatics Engineering, Department of Earth & Space Science & Engineering, York University, supervised by Dr. Costas Armenakis.

ROBOTIC NAVIGATION AND MAPPING USING CATADIOPTRIC OMNIDIRECTIONAL CAMERA.

ABSTRACT — Catadioptric cameras comprise of a combination of a conventional camera and mirrors to obtain a 360° panoramic view of a scene. They are of particular interest in the field of navigation and mapping owing to their wide field of view. Most commonly used catadioptric cameras for such applications are central catadioptric cameras which have an effective viewpoint and thus are easy to model, however they have very specific configurations.

This research provides a general model for application of non-central catadioptric cameras for navigation and mapping. It can be used for several different configurations. The configuration most useful for this application, however, is a mirror in shape of a quadratic surface, for example a hemisphere, a paraboloid or a hyperboloid, symmetric about the optical axis of the camera.



The camera and mirror face each other thus forming an omnidirectional sensor. The model allows for calibration of the catadioptric system and accounts for any asymmetry of the mirror about the optical axis. It then makes use of reflection properties of the mirror and previously determined coordinates in an indoor environment for positioning and utilizes epipolar geometry from two or more different positions to obtain further 3D coordinates. These two steps form the basis of an iterative process which is used for navigation.

Results based on experiments performed in controlled environments are provided to validate the methodology and analyze the effectiveness of the model. Email: manaswho@gmail.com

124th Annual General Meeting



Peter J. Devlin, retired Lieutenant General of the Canadian Armed Forces and current President of Fanshawe College, was the keynote speaker at the Opening Ceremonies.



Renowned author Charles Wilkins, who is writing a book celebrating the surveyors of Ontario for the AOLS 125th Anniversary in 2017, delivered the "Charge to the New Surveyors" at the Convocation Luncheon. His speech can be found on page 30.

The 124th Annual General Meeting was called to order as the Sergeant-at-Arms Drew Annable laid down the Standard Measure, which historically was used to control the accuracy of surveys in Upper Canada.



Incoming President Murray Purcell (left) presented the Past President's gavel to Travis Hartwick.



Members Commissioned in the Last Year

Front left: Matthew de Jager, Sophie-Rose Côté, Vaitheki Kumar, Oussama El-Chanti, Tony Pu, Amar Loai



AOLS Executive Director Blain Martin (right) offered his congratulations to Izaak de Rijcke as he presented him with a Professional Recognition Award, one of the highest honours for an AOLS member, for his outstanding contribution to the status of the profession of land surveying.



During the Convocation Luncheon, AOLS Office Manager Lena Kassabian was presented with a special award from AOLS Executive Director Blain Martin for her dedication and support of all AOLS applicants and members.

“Connecting our Profession”



Theresa Syer, founding partner of the Syer Hospitality Group Inc., lead the Plenary Session with a presentation on “Creating the WOW Customer Experience”. See Theresa’s article on page 24.



Back left: Guy A. Fletcher, Simon A. Kasprzak, Nedim Oren, Sabir Ahluwalia, Christopher Michael Fox, Patrick Levac, Gualberto C. Calonia, Wickramage Sunil Perera, missing from the photo Mansour Ghofrani



Debbie Hartwick (left) accepted a thank you gift from Roselle Purcell after Debbie presented her with the AOLS medallion.



Mark Sampson (left) Senior Vice President of The CG&B Group, part of Arthur J. Gallagher Canada Limited, presented Travis Hartwick with a plaque in recognition of 30 years of partnership between his company and the AOLS. To commemorate the event, Mark presented a \$1000 donation to The AOLS Educational Foundation. Thank you Mark!



During an evening out with nine other surveyors, AOLS Councillor Dan Dzaldov criticized one of the surveyors for wearing a “colourful” shirt. Dan was then challenged to wear this same shirt up to the podium during the business meeting on Friday if each of the nine surveyors paid \$100. Dan accepted the challenge (pictured above) and added in his own \$100 to raise \$1000 for The AOLS Educational Foundation. Thanks to all who contributed!

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The Connectors Insurance Group represented by Bob Morrow and his wife Leslie



iLookabout represented by Mike Power



Land Survey Records Inc. represented by Peter Raikes



Rick and Patty Brooks, guests from the New York Association of Professional Surveyors, attended the AGM to continue the long standing relationship between our associations that Malcolm Shaw, who sadly passed away last year, and his wife Janice began many years ago.

Thanks also to
Teranet Inc.



Honorary Member George Wortman and his wife Janet have been regular attendees at the AGM since George was appointed as a Lay Councillor in 2001. In 2009 when he finished his term on Council, George was presented with an Honorary Membership for his continued interest in our association.



Hockey at the AGM Sponsored by Cansel

Thanks to everyone who joined in this year's hockey game at the AGM. There was a 35-year separation from the youngest to the most senior player this year but we all felt like kids out there! Make sure you don't miss the event next year in Ottawa when we will invite our Quebec counterparts to join in the game as well.



Parliamentarian Jack Young was the Master of Ceremonies at the Veterans' Dinner. Veterans are those who have been licensed or registered members for 25 years or more.

Veterans' Dinner



Charles Wilkins, author of the upcoming AOLS book, was the speaker at the Veterans' Dinner. He has interviewed many of the Veterans for the book and he shared some of their stories.



Front left: Bill Buck, Scott McKay, Wayne Brubacher, Brent England, Helmut Grander
Back left: Ron Dore, Rick Miller, Doug Culbert, Stewart McKechnie, Martin Knisley



Front left: Geoff Aldworth, Vladimir Krcmar, Ivan Wallace, Rod Reynolds, Andrew Smith
Back left: Colin Trivers, Phillip Hofmann, Marty Nisbet, Roy Simone, Ralph Benedict



Front left: John Jackson, Ross Clarke, Ted Williams, Colin Bogue, Omari Mwinyi
Back left: Steve Balaban, Paul Gregoire, Andrea Tieman, John Galejs, Murray Shantz



Front left: Paul Church, Paul Wyman, Maureen Mountjoy, Guido Consoli, Ted Van Lankveld
Back left: Ron Jason, Peter Moreton, Duncan Ashworth, Tim Hartley, Bob Clipsham



Front left: Dan Vollebekk, John Goltz, Steve Gossling, Eric Ansel, Gord Good
Back left: Talson Rody, Dave Dorland, Paul Torrance, Daniel Kreze, Kerry Hillis



Front left: Peter Stringer, Jim Hill, Mike Maughan, Jim Purcell, Dan Dolliver
Back left: Graham Bowden, Grant Bennett, Jack Keat, John Hiley, Tom Glassford



Front left: Terry Dietz, Terry Callon, Peter Lamb, Kevin Jenkins, Bruce Baker
Back left: Adam Kasprzak, Rob Harris, Bob Hawkins, Paul Miller, Brent Collett



Front left: Sue MacGregor, Ron Denis, Dave Woodland, Martha Burchat, Ed Herweyer
Back left: Helmut Grander, Erich Rueb, Jeff Shipman, Brian Lynch, Brian Maloney



Front left: Michael O'Sullivan, Jack Young, Jack Monteith, Gary Phillips, Leslie Higginson
Back left: Drew Annable, Marvin McNabb, Blain Martin, Izaak de Rijcke, Ron Stewart

Creating the “WOW” Customer (Client) Experience!

By Theresa Syer

In today's competitive climate, where we are all constantly connected in some form of social media, there is still a need for face to face communication. Even in this age of automation and innovation, delivering superior levels of customer service are more important than ever to be relevant and remembered by your customers.

We have to understand that good service is no longer good enough. Good Customer Service is simply transactional but the Customer Experience is purely emotional.

The Customer Experience is about suspending all of your own preconceived ideas of what you think the customers want and instead seeing the experience from their point of view.

The Customer Experience is your customers' overall perception of your organization, subsequent to every moment of contact throughout the duration of the relationship. It's about differentiating your business by connecting with your customers on an emotional level and offering a level of service that your competition can't duplicate.

The Customer Experience is all about; “how you made them feel.” The reason this can't be duplicated is because it's solely created from the makeup of your employees' attitudes, personalities and behaviours. This becomes your own unique signature; it's your business DNA.

Industry brands today that do not have an emotional connection with their customers fail to grow. They become commoditized, fighting over the lowest price and eventually losing market share to a competitor offering similar services/pricing but a better overall experience.

So where do you start to raise the bar from your current level of service? You need to understand the experience from your customers' point of view. Only then will you know what your customers want and have the opportunity to deliver a positive experience that they'll always remember. Now stop and ask yourself; when was the last time you truly analyzed your customers' experience from their point of view? You'd be surprised how many of us believe we deliver great service until we actually put ourselves in our customers' shoes...this can be a real eye opener for many.

The secret is understanding how to connect with your customers on an emotional level. It's understanding whether you're making an impact strong enough that your customers



will want to return and experience it again. If so, they are likely to become an advocate for you.

Don't underestimate the power that great service can have over your customers. Although it seems simple, it can be quite difficult to deliver consistently. It takes specific strategies and tactics to sustain such a program.

It starts by moving your employees from a task driven mentality to an experiential mentality. When serving customers, they have to decide whether they'll simply complete the task at hand or treat it as an opportunity to create an experience—only one will have a very profound impact on your business.

Those few moments of service delivery are your make or break points and your reputation is either confirmed or denied. To win or even survive in the service battles, customer experience must be everybody's business. From the owners, surveyors, office admin, field team, full time veteran employees to part-time students; no one is above it. Everyone has the potential of being the point of contact with the customer and everyone can have an impact on the experience. We all have to be experiential and lead by example.

THREE STEP APPROACH TO CREATING THE CUSTOMER EXPERIENCE:

1. MAP YOUR CUSTOMER EXPERIENCE CYCLE

You can only deliver a WOW Customer Experience if you understand the experience from the customers' point of view and consistently be delivering above and beyond on those expectations.

You have to identify every interaction your team has with your customers through the customer experience cycle. Have each department map out their individual touch points with your customers. Do not focus on the task side of the job but rather the one-on-one personal interaction, the human touch points, and the emotional connections.

At each touch point identify what you currently do to engage and connect with your customers. Then take the time to identify how you could enhance the experience, going above and beyond to deliver experiential levels of service.

When each and every team member fully understands the various touchpoints and identifies; “how can I better engage the customers?” only then will you start to create a consistent customer experience. Think of it as taking an otherwise

ordinary situation and making it extraordinary!

2. DEFINE KEY EMOTIONAL DRIVERS

Brainstorm with your team the key touch points that offer the opportunity to truly engage your customers. Identify key emotional drivers that can be used by all employees at all levels in order to make the emotional connections. Understanding the key emotional drivers that engage your customers is crucial to achieving a customer-centric culture. Once you've identified a number of key drivers, try to narrow down the most critical ones to a short list.

Perhaps start by focusing on a maximum of seven drivers. This will make it easier for your employees to understand, memorize and put them into practice.

Create an acronym that is easy for your team to remember and reference back to it often. Once everyone on your team, from all departments, is utilizing the same drivers at each customer touch point, you'll start to deliver consistent levels of experiential service.

Once you are all focused on making emotional connections, you will build stronger relationships and have your customers shift from a state of being merely satisfied to being loyal. This results in a measurable increase in advocacy, revenue and profits.

3. DEVELOP A CUSTOMER CENTRIC CULTURE

Your culture will need to be seen, felt and heard for it to be relevant. It is the very behaviour that your team will need to embrace from within, not only from the front line staff to the customers but also from the leadership team to all the staff. It's putting the customer (and internal customer) first and believing that they are the most central part of the organization from which all business decisions are based. Understand it's a culture and not an event. It's an ideology, rather than an isolated action.

In order to own a customer-centric culture, everyone in your company has to be aligned with the sole purpose of creating a renowned customer experience. It's not just a few individuals but rather everyone buying in and getting involved. Customer centricity is not just about delivering good customer service, it's about delivering a WOW customer experience and at all touch points throughout the duration of the relationship.

SUMMARY

The experience that matters most to your customers is not the chocolate on the pillow (as we say in hospitality) but rather the gratifying human interaction. We believe this is the connection, when emotions are evoked and the customer experience is measured against intuitive moments of contact. This is the connection that is lacking in so many business interactions and yet is more essential than ever in creating a renowned Customer Experience.

In order to be remembered by your customers and have them be advocates for your company, you will have to earn a position in their mind.

When great service is the sole area of serious competition, then it is the **Customer Experience** that will differentiate you from the others!

*"They may forget what you said,
but they will never forget how you made them feel"*

Carl W. Buechner



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Academic-Industrial Collaborations on LiDAR Technology Development

By Ahmed Shaker, Wai Yeung Yan and Salem Morsy, *Department of Civil Engineering, Ryerson University*

The emergence of Light Detection and Ranging (LiDAR) technology has evolved not only in bringing the geometry of objects but also the strength of the returned signal for surveyed objects. This value added data characteristic can aid in distinguishing different features. Such groundbreaking technology has provoked the development of remote sensing and its widespread applications have come across multidisciplinary fields. Specifically, land surveyors reap benefits from the state-of-the-art sensor technologies to improve their work efficiency and the desired accuracy toward their surveying tasks. Without question, LiDAR technologies have been widely used to aid in different missions for topographic and bathymetric surveying. This article presents three recent research outcomes that have been achieved by our research team at Ryerson University and through industrial collaborations with one of the LiDAR sensor manufacturers (Teledyne Optech) and a local surveying firm (Tulloch Engineering).

1. Automatic extraction of highway lighting utilities using mobile LiDAR data

One of the challenging tasks for municipal transportation authorities is to maintain and update the latest 3D highway/road inventory. Such a need not only serves the purpose of asset management, but most importantly addresses roadway safety concerns. Through a collaboration with Tulloch Engineering, Ryerson's research team explored the use of mobile LiDAR data to extract highway lighting utilities. A section of highway 401, bounded by the exit of Bayview Avenue to the west and the exit of Don Mills Road to the east, was surveyed by a RIEGL VMX-250 mobile LiDAR mounted on a 2011 Nissan Pathfinder. The data collected by the LiDAR sensor is provided in 36 *las* files, having 156 million points resulting in a file size of 4.09GB.

Ryerson's research team developed an automatic data processing algorithm for extracting highway light towers and poles from the collected mobile LiDAR data.¹ A ground filtering algorithm was first imple-

mented to separate the aboveground and ground features. The separated point cloud data storing the ground features were used to generate a digital elevation model (DEM) so that the height value of all the aboveground features can be normalized with reference to the DEM. These height-normalized point cloud data underwent an unsupervised clustering algorithm to group the point cloud data into clusters. With reference to the existing highway lighting specification/manual, a set of decision rules were built and used to classify the clusters as light towers, poles or other road features. Finally, all of the extracted lighting utilities were filtered by a least-squares circle fitting mechanism to remove the ground points from the pole structure.

The accuracy of pole detection was examined and

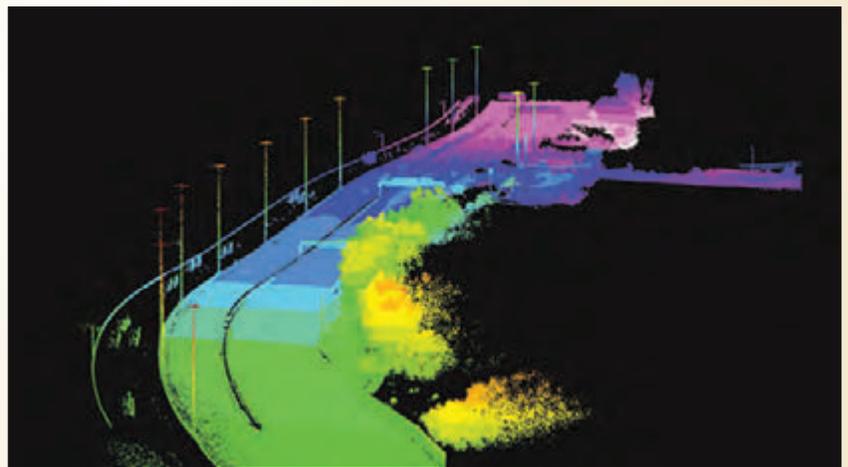


Figure 1a. Mobile LiDAR data collected

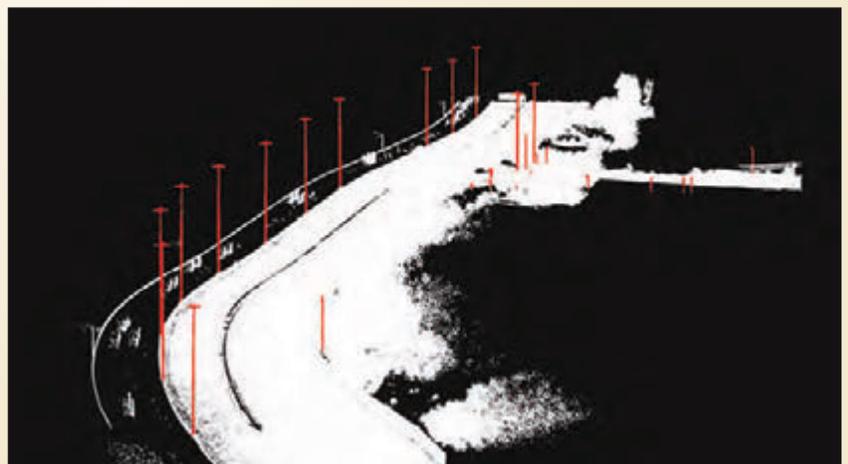


Figure 1b. Lighting utilities extracted

recorded for 33 light towers and poles. The results show that there exist 33 detected clusters which are presumably a potential source of light poles/towers within the mobile LiDAR data collected. Finally, through fitting the pole radius in the data cleaning part, we identified that three of them are non-pole structures due to the high RMS error in least-squares circle fitting. As a result of the experiment, we successfully identified and extracted 13 high-mast lighting towers, two CCTV camera poles, five typical luminaire poles, six light poles on the GO train platform, and four light poles within the parking lot next to the train station. The overall accuracy of the pole detection and classification yielded 91%. Figure 1b shows all the extracted lighting utilities along the study area.

2. Improving radiometric quality of LiDAR intensity data by removing the intensity noise

Though airborne LiDAR has been applied in mapping large extents of area, the majority of applications can only be found in generating topographic maps or generating digital elevation models. Utilization of the recorded backscattered signal strength (i.e. intensity) is still limited since the radiometric information is not standardized in the way that the geometric information did. Particularly, when multiple LiDAR data strips are surveyed in order to provide a large coverage, one can easily find the existence of stripping noise appearing in the overlapping region that further limits the use of intensity data for surface classification and object recognition. As a result, Ryerson's research team has researched various ways to reduce the intensity noise by developing radiometric correction and normalization techniques through working closely with Teledyne Optech.

The correction technique which includes a physical model that is built upon the radar (range) equation, aims to remove the attenuation effects of range, angle and atmospheric correction factors. After correcting most of the known factors, two normalization techniques are proposed to handle the system-induced distortion which is either unknown to the users or is difficult to be modelled (e.g. gain control or dynamic range factor). The first approach is based on the use of a Gaussian mixture modelling (GMM) technique to perform sub-histogram matching of overlapping LiDAR data strips.² However, the use of GMM requires iteration and provision of initial guesses and thus an alternative approach was proposed to develop a simple but robust solution.³ The second approach utilizes the concept of a joint-histogram plot fitting by first looking for pairs of closest points in an overlapping region, and subsequently a joint intensity histogram can be generated where a high order polynomial model can be fitted within the histogram based on a weighted least-squares fitting. The fitted polynomial model can act as a

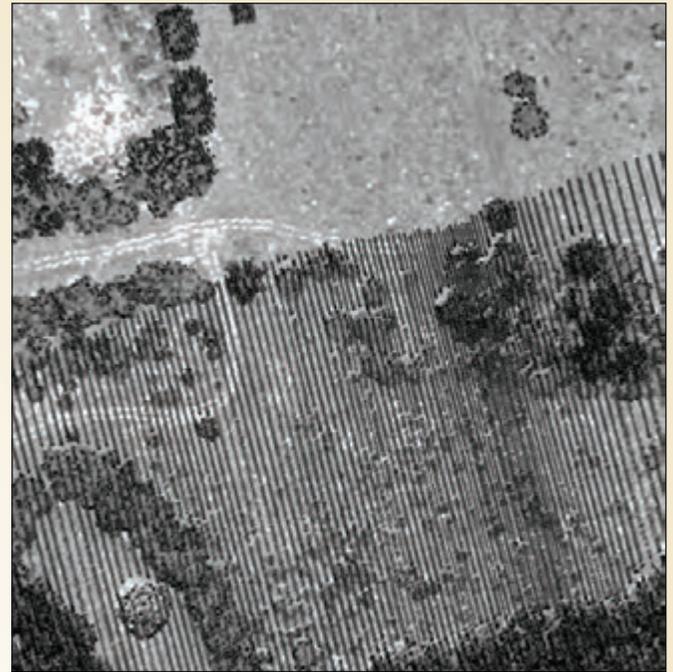


Figure 2a. Original LiDAR intensity data with noise

normalization model to reduce the stripping noise when

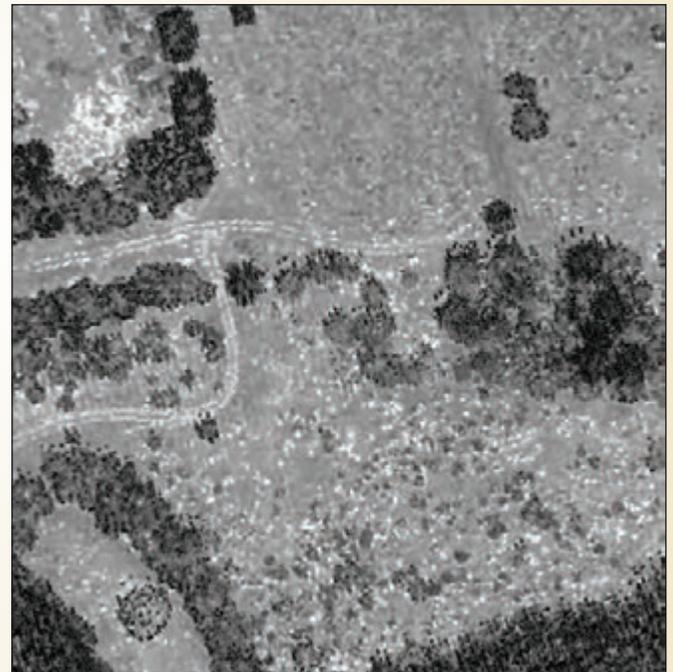


Figure 2b. Corrected and normalized intensity data

mosaicking the partially overlapped LiDAR data strips. As a result of these models, Figure 2 shows that the intensity noise is dramatically removed after implementing the proposed technique, and the accuracy of feature extraction and land cover classification yields an accuracy improvement over 20% after these stripping noises have been removed.³

3. Automatic land-water classification in coastal area using multispectral LiDAR data

Land-water mapping plays a crucial role in applications such as water resources assessment, coastal zone

cont'd on page 28

management, flood monitoring and surface water area estimation. Recently, Teledyne Optech launched the world's first multispectral airborne LiDAR sensor, named "Optech Titan", which operates at three different wavelengths; mid-infrared (MIR): 1550 nm, near-infrared (NIR): 1064 nm, and green: 532 nm. This opens a new door of exploration of using such new data for land-water delineation by reaping its benefit of multi-spectral radiometric and 3D geometric information.

Ryerson's research team has developed an innovative algorithm for automatic 3D land-water delineation from multispectral airborne LiDAR data. The algorithm is based on two Normalized Difference Water Indexes (NDWIs) namely, $NDWI_{G-NIR}$ and $NDWI_{G-MIR}$, derived from the reflectance values (Intensity) of the three wavelengths, as well as the recorded number of returns from

each wavelength.⁴ The algorithm starts with applying a low pass filter to the intensity data as a pre-processing step, thus making water intensity values more consistent. A grid of 1m cell size was then created for each channel, and the mean intensity value of points within each cell was calculated. Then, the mathematical operation of the NDWIs was conducted using grid cells. Based on the data point's location, a NDWI value was assigned to each point using bilinear interpolation. The data clustering method – the Jenks natural breaks optimization method, which is designed to maximize the between-classes variance, was then used to cluster the 3D point data into two classes: land and water. The clustered classes were finally constrained by the recorded number of returns from different features at green, NIR, and MIR channels.

Teledyne Optech provided Ryerson's research team with a LiDAR data set from the new sensor "Optech Titan" of a flight mission, conducted on September 3rd, 2014 over Lake Ontario in Scarborough, Ontario, Canada. The study area covers a variety of land features, such as buildings, roads, parking lots, high vegetation (trees) and low vegetation (shrubs and grass), as well as part of Lake Ontario. The Optech Titan sensor acquired the LiDAR data in three channels at ~420m altitude, $\pm 15^\circ$ scan angle, 200 kHz/channel Pulse Repetition Frequency (PRF) and 40 Hz scan frequency. A subset of LiDAR data was clipped with the dimension of 600m x 200m for the experimental testing. The classification results show that the proposed automatic algorithm achieved over 96% overall accuracy for 3D land-water mapping, as demonstrated in Figure 3.

Conclusions

The intention of this article is not to urge the professional readers to reform their current practices of field surveying by using LiDAR technologies, but instead, to promote the use of this new technology which can help to achieve certain tasks that are difficult to accomplish or require considerably large numbers of people for data collection. Moreover, the aforementioned work has been



Figure 3a. Aerial Photo

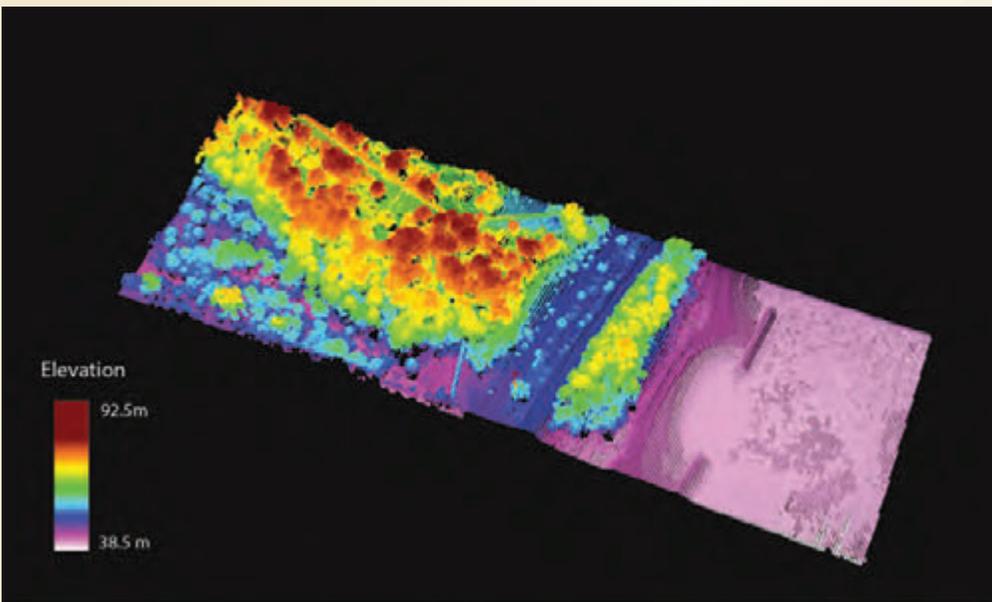


Figure 3b. Multispectral LiDAR data



Figure 3c. Landwater delineation

beneficial as a result of the academic-industrial collaboration made possible through two six-month NSERC Engage grants, in which the industrial partners were only required to inject in-kind funds through their provision of data, equipment and professional advice. Thus, this has opened new opportunities for both parties to further explore new work practices and applications that prove to be difficult with the use of traditional surveying methods.



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Convocation Address

Money, risk, art, and the importance of surveying



By Charles Wilkins

It's a wonderful honour to be asked to speak to all of you, and in particular a thrill to address the newly commissioned surveyors. You'll be relieved to hear I have absolutely nothing to tell you about surveying or business, and very little to say about engineering or technology – or for that matter romance.

I do have five messages for you, each of them about the larger business of being afoot on the planet. The first three I'm going to impart to you by way of a couple of stories. And the first of those, I'm happy to say, is a love story that goes back to my days as a university student, a science student of all things, at the University of Toronto. In the autumn of I think 1969, I met a lovely young woman – I would say I fell in love with her, but I've never really understood why we should “fall” in love; it seems to me, rather, that we should “ascend” into it, or something. Anyway, I realized almost right

away that the route to this young woman led at least partly through her family. And, sure enough, when we'd been going around for a couple of weeks, she said to me, “You've got to come for dinner; my parents want to meet you.” I should add that at this point in my life, I was almost chronically impoverished – absolutely broke. Nevertheless, I got cleaned up, and the next Sunday, I went out to her place in the east end of Toronto. Her parents were there, and her brothers and sisters. However, I realized pretty much right away when I got in the house that the most significant person there, at least in terms of measuring my acceptability, was a 90-year-old woman, a kind of mythic immortal, referred to by everybody as “Grandma.” Grandma Hood.

We eventually sat down to eat, and at some point during the meal they got talking about some break-ins that had been occurring at houses in the east end of Toronto, and what you would do if somebody broke into your house while you were there: would you flee or would you stand your ground? At a lull in the conversation, the 90-year-old grandma suddenly turned to me (I thought, here comes the test), and she said in a very measured voice, “Charles, what would YOU do if you woke up in your apartment in the middle of the night and there were violent thugs going through your drawers and your cupboards looking for money?”

I said, “Well, given the state of my finances, I'd get up

immediately and help them look.” And that was apparently a satisfactory answer because I did have a very happy year or so with the old lady's lovely granddaughter. However, it's not the punch line of the story. Later during that visit Grandma Hood came to me in a corner of the living room and said to me very gravely, “Charles, don't waste too much of your life rooting through the cupboards looking for money.”

So, Message One, rather bluntly put, is essentially Grandma Hood's message of so many years ago: Don't waste too much of your life looking through the cupboards for money.

My second and third brief messages come from a slightly more complicated story, and we're going to leap forward forty years now. I am in my sixties by this time, and I have managed to talk my way into a grand adventure aboard a fragile, experimental, high-tech rowboat: two hulls, sixteen rowers, our mission being to row across the Atlantic Ocean in record time – 33 days, from Morocco to Barbados.

This, perhaps needless to say, was all terribly exciting for me. I was basically an old man with a bunch of powerful young rowers. I trained hard. Realistically, I had no business being out there, except that I'm a writer and was going to write a book about it all – which was the lynchpin of my acceptance aboard.

Anyway, we got out there off the coast of Africa, where our intention was to locate the westbound Trade Winds, which were crucial to our crossing. Initially, we believed we could get into them within five or six days.

Unfortunately, it ended up taking twenty-four days – days of storms and high winds and sharks and whales and the threat of piracy, and of course sixteen frustrated people living in a cabin the size of a Volkswagen van.

In the end, a crossing that was supposed to take 33 days took 53. Among several difficult consequences of this we ran out of food. I went from 175 pounds down to 135 and believe now that I probably had, at most, another day or two of life in me if we had not arrived in Barbados when we did. It was a very tough trip.

A couple of months later, I started to write about it, and it was easy at first because I could just disappear into a room and write. The difficulty began when I came out of that



room a year later, and began talking to people, who, immediately, and above all, wanted to know *Why?* Why as an old man would you head out there with 15 strangers under these frightful conditions – the storms and privations and the possibility of piracy, and so on, all of this aboard a boat that by mid-Atlantic had begun to fall apart?

I realized at that point that if I could not provide a satisfactory answer to the question it would in a way invalidate my participation in this grand adventure that, despite the drawbacks, had meant so much to me.

And there was of course an easy answer: I did it because I felt like it – an answer that had the double advantage of being true and of being more or less irrefutable. But deeper down I knew the question required a more detailed, less frivolous, explanation. And, eventually, with contemplation, I did evolve a pair of answers, both of which I believe communicated something fundamental about my reasons for going.

The first, the simplest, was nothing more complicated than my deep, lifelong affection for the planet on which we live – my need to experience it, often travel it, in revealing and compelling ways. As a coefficient of that, I have always been keenly interested in the importance of our *connections* to the planet, and, conversely, the disaster that is *disconnection* from planet Earth.

The second of my two rationales came to me in the form of a question that was on my mind long before the trip

started: essentially, What would happen if rather than merely enduring risk and uncertainty as we add years we decided, rather, to embrace risk and uncertainty – to juice up on it, to reclaim our bodies and psyches, in effect our destinies, in some adventurous way?

I would explain these things to people, some of whom would say immediately, “But why at 63? Why not earlier in life?” And I would attempt to explain that in my twenties, say, I didn’t have what I now think of as the inner strength to go and do such a thing. In my thirties I didn’t have the imagination. In my forties I didn’t have the time; I was raising kids and writing books and so on.

Where it gets interesting for me is that in my fifties I still lacked what I eventually came to see as the all-important awareness that mortality is not a disease – is neither to be feared nor particularly respected; and that the gist of the ripening moment was, at least for me at that point in my life, this compulsion just to go, to embrace the risk and to see what an adventure might turn up about my role in the human comedy. So I went. And I’ve never regretted it.

In that spirit, **Message Two** is: Don’t back away from, or be afraid of, a little risk or uncertainty. In fact, when possible, try embracing it – you may be surprised what good medicine it can be for weariness or complacency, and what a boost to morale.

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The third message, also derived from the rowing story goes back to our sense of linkage to the planet. In this case, your linkage, because as surveyors you have a very special historic connection to the earth. At this point, I want to turn briefly to the book that I've been working on, which as many of you know celebrates surveyors and surveying in Ontario. Part of that manuscript records that you people, surveyors, are, and I quote, "people of place – not just of water, soil, riverbanks, forests and the like, but of cities, of skyscrapers, of highways and bridges and tunnels... of farmlands and fiords. Those of you with a less literal affinity for shoreline and rock tend to attach yourselves to the *mathematics* of place: the curvature of the earth, the shifting poles, the azimuth of the star... to geographic information on every aspect of the wherefore and why of the physical world."

Continuing from the manuscript, "There is no limit to the significance of establishing boundaries in a culture whose foundational ideal was and remains the right to own or control land, to mortgage it, develop it, farm it, build on it, play on it, pray on it, dig in it, to make a living or in some cases a fortune from its bounty."

During a 63-day walk that I took from Thunder Bay to New York City back in 2001, I got what I would call an inescapable look at the profusion of Ontario's divisions and subdivisions, the seemingly endless gridwork of boundaries – which is to say, everything you and your forbears have laid down over the years. But before saying more about those

lines and boundaries, I should say that during the course of that walk I also got an inescapable look at everything that *cannot* be measured and circumscribed, or fenced off; and I'm talking now about the continuity of forests and mountains and beaches and water and air; and all the endless interlacing of habitats and species ranges; and sunlight and soil; of streams making lakes making clouds; making rain and maple syrup and moose blood.

The point I want to make here is that unless one recognizes and appreciates the continuity and oneness of the planet, the grand ecology of it all, it is impossible to understand with any depth the *fragmentation* of that oneness into districts, townships, counties, municipalities, police precincts, political ridings, conservation zones... Native land, Crown land, park land, private land, and so on.

The famous Erindale professor David Lambden called surveying one of the "professions of the land," and you as surveyors are, as much as anybody, the *people* of the land, and of the planet. Which in a sense we all are... and not just "of" the planet. In a very real way, we *are* the planet. We breathe it, we eat it, we drink it – it is our economy, our history, our recreation, our dreams, our sense of ourselves. It is our home. And of course, finally, in one way or another, we return to it.

Message Three, then, is that we must honour our connection to the planet, and thereby honour the planet itself.

Message Four, in brief, is: Keep your creativity alive.

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Nurture your imagination; nurture the artist within you. I used to go occasionally to high schools to talk to the kids about writing. In order to bring a kid out a bit, I'd sometimes say to him or her, "What is *your* art?" And the kid would invariably say, "Well I don't have one." And I'd say, "What, you don't ever write anything down or draw a picture or play a guitar or dance or take part in a school play?" And with prodding, the kid would often eventually admit, "Well, yeah, I do have a few poems that I've written, but I can't show them to anybody; or I occasionally make videos on my phone, or I draw or fool around on the piano." And gradually they'd come to accept that, okay, yes, they had an art. We all have an art. People in my writing classes would say to me when I urged them to use their imaginations, "I don't have any imagination." And I'd try to convince them that sure they did. As we all know, the head of the average human being is so full of fantasies and dreams and strange forces that most of us, except maybe for the writers, would be afraid to loose those fantasies and forces on the world; because if we did we'd be written off as a menace... *It's all in there*, and that is the imagination at work. The importance of letting it out a little bit, of keeping it alive, of making art of it, is that in one small way or another, in rare moments, when perhaps a lot of other things have failed us, it is our art, our imagination, that will be there to help sustain us – that's the power of creativity, of dream. Keep it alive.

Message Five is that you are important folk – all 350 of you, although in particular now I am addressing the fourteen new surveyors. And I am not merely tossing out some phony self-help prescription. You as *surveyors* are important. Again, to make the point, I shall turn for just a minute to a few paragraphs from our upcoming book: specifically, "While writing these chapters, I've frequently worked late into the night, alone, at the AOLS offices on McNicoll Avenue in Northeast Toronto. For those of you who have never visited those offices, they exist in a presentable but unremarkable building, in a presentable but unremarkable office park, adjacent to a vast and unremarkable parking lot, in a remarkably unremarkable suburb sometimes described jokingly as Scarberia.

"There on a snowy night in February 2015, perhaps six weeks after I had begun work on the book, at maybe 3 a.m. I got up from my desk in the office's second floor library, sauntered down the hall to the much larger boardroom and laid out a map on a giant table that pretty much fills the room. Twenty minutes later on a break as I stared out the window through a scrim of falling snow, it dawned on me that everything of substance within view had begun with a surveyor: the street, the sidewalks, the curbs, the street lighting, the parking lot, the other buildings in the office park, our own building, the pipes that delivered gas to the

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buildings for heat, the lots on which the buildings sat, the landscaping, the houses in the distance, the apartment complexes, the massive hydro towers and lines that cut the sky into triangles and scimitars; the power dams and reactors and gas-fuelled generators that somewhere out yonder were feeding their endless supply of electrical power into the nearby wires. I cannot recall whether at that moment I saw any of the hundreds of jetliners that fly over the Association office on their way into or out of Pearson in the course of a day, but it is worth noting that even they depend on surveyors – not just for the making and maintenance of airport runways, but for every detail of a jet’s flight plan, as described to me one day by the Midland surveyor Dale Eplett, who has worked on such plans. The sky itself with its stars and planets was for centuries one of the surveyor’s closest working companions.

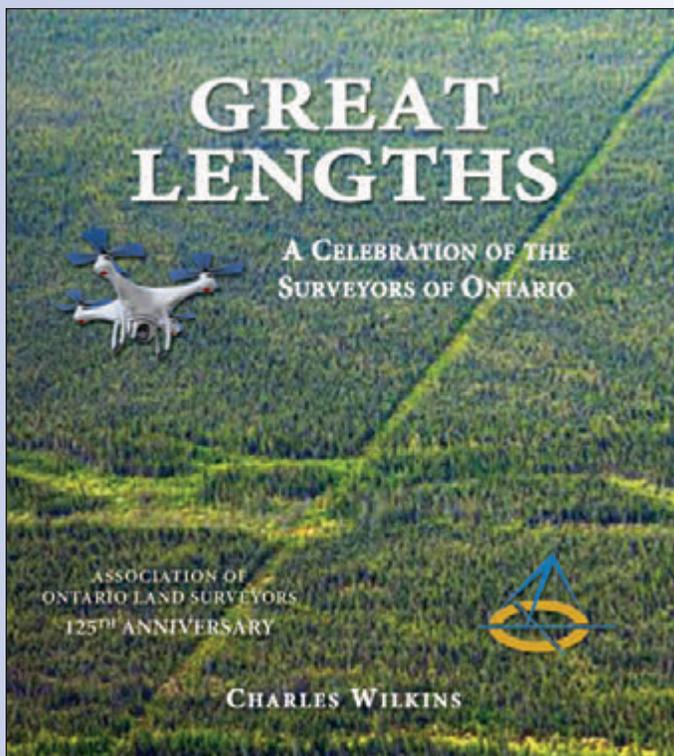
“The gist of that memorable moment was my recognition that surveyors, the amiable and intelligent tribe with whom I had been at work for the past six weeks had been present not just at the shaping of Ontario but are still fundamental to almost every residential, industrial or infrastructure development that occurs within the province’s borders, and to much else as well. Walk up Yonge Street or along a trail

in Algonquin Park; drive the north shore of Lake Superior; climb the CN Tower; sit in the Rogers Centre; board the train in Cochrane; take the escalator at the Thunder Bay airport; shoot a puck in the Meridian Centre in St. Catharines. Do any of these things and know that they are possible because at some point in the near or distant past, a *surveyor* has made a precise assessment of the surroundings and has determined, say, that *this* is where the highway must run in order to provide the safest driving or the solidest or straightest roadbed; or that *this* is where the power dam or hydro tower should be constructed, or where the piers must be located to properly support the bridge.” My point of course is that it all begins with you people, the surveyors. You have a tremendous responsibility, not just for yourselves and for those who are the beneficiaries of your work, but for the association of which you are now a vital part. Perhaps most importantly, you are – we all are – responsible for this little spinning ball that we call Planet Earth, which is of course home.

That said, I must thank you all very much for your patience. It’s been an honour to speak to you as you head off into your careers.



Charles Wilkins has been a fulltime writer for more than 30 years. He is the author of 15 books, including, most recently, *In the Land of Long Fingernails* (a memoir about a summer spent working in a large Toronto cemetery) and *Little Ship of Fools* (about his 2011 row across the Atlantic Ocean). His journalism has earned five National Magazine Awards, and he has been a finalist for half a dozen national literary awards. Four of his books have been named to the *Globe and Mail’s* annual Top 100 Books. Charles is writing *Great Lengths – A Celebration of the Surveyors of Ontario* for the 125th Anniversary of the Association of Ontario Land Surveyors which will be celebrated in March 2017 in Ottawa. To aid in the book’s preparation, several sponsorship opportunities have been made available. Please see below.



SPONSORSHIP OPPORTUNITIES

Great Lengths is being prepared with the generous support of our professional community.

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NEWS FROM 1043

Changes to the Register

MEMBERS DECEASED

George W. Bracken	1054	Dec. 27, 2015
Alexander R. Wilson	1331	Feb. 23, 2016
Guido Papa	1345	Mar. 17, 2016

RETIREMENTS/RESIGNATIONS

Richard Hackett	1447	Dec. 31, 2015
Robert Woodcock	1453	Dec. 31, 2015
Michael F. Tulloch	1604	Dec. 31, 2015
Ronald Jaros	CR187	Dec. 31, 2015
Wayne F.R. Crann	CR161	Dec. 31, 2015
Raphael Sussman	CR186	Dec. 31, 2015
Mark T. Watson	CR207	Dec. 31, 2015
Seppo M. Ruuska	1416	Dec. 31, 2015
W. James Bowman	1278	Dec. 31, 2015
J. Trevor Carnegie	CR109	Dec. 31, 2015
Laura A. Kingston	CR115	Dec. 31, 2015
Allard V. Flim	1790	Dec. 31, 2015
Ross M. Johnson	1262	Dec. 31, 2015
Donald J. Cullen	1253	Dec. 31, 2015
Michael J. Clancy	1387	Dec. 31, 2015
Menno P. Van Harten	1155	Dec. 31, 2015
Cathryn A. Nadjiwon	CR170	Dec. 31, 2015
Raymond A. Moore	1793	Dec. 31, 2015
G. Brian Vaughan	1355	Dec. 31, 2015
Murray A. Boileau	CR184	Dec. 31, 2015
Lydia M. Torbicki	CR129	Dec. 31, 2015
Margaret J. Parkin	CR195	Dec. 31, 2015
Tom Czerwinski	1537	Dec. 31, 2015
Adam Michael F. Stephen	1948	Dec. 31, 2015
Songnian Li	CR167	Dec. 31, 2015
Michael J. Simpson	1794	Dec. 31, 2015
Paul C. Wyman	1344	Dec. 31, 2015
Khairul Amin	CR203	Dec. 31, 2015
Dennis H. Goff	CR162	Dec. 31, 2015
Michael J. Wallace	CR139	Dec. 31, 2015
Darrell W. Jones	CR128	Dec. 31, 2015
David A. Barron	CR76	Dec. 31, 2015
Kevin D. Perkins	1695	Mar. 1, 2016

COFA'S REVISED

Was: RS Geomatics

Is: RS Geoinformatics, Toronto, Ontario, March 18, 2016

COFA'S ISSUED

Topotec Inc., Richmond Hill, Ontario - January 11, 2016

Ronald J. Stewart, O.L.S., Alliston, Ontario, Feb. 17, 2016

Lejan Land Surveying Inc., Stoney Creek, Ontario, Jan. 1, 2016

COFA'S RELINQUISHED

R.G. Hackett Surveying Ltd.

Chatham, Ontario, December 31, 2015

Menno Van Harten, O.L.S.

Coldwater, Ontario, December 31, 2015

Brian Vaughan Surveying Limited

St. Thomas, Ontario, December 31, 2015

Ross M. Johnson Surveying Ltd.

Kenora, Ontario, December 31, 2015

True Grit Surveying Limited

Thunder Bay, Ontario, December 31, 2015

Surveyors in Transit

Rugged Geomatics Inc. has closed its office in Dinorwic, ON.

Frank Mauro is no longer with **WSP Geomatics (Ontario) Inc.**

Jeff Fee is now the managing OLS at **WSP Geomatics (Ontario) Inc.**

Stantec Geomatics Ltd. has moved its Kitchener office to 100-300 Hagey Boulevard, Waterloo, ON, N2L 0A4.

Timothy A. Young is no longer with **Young & Young Surveying (Etobicoke 2006).**

Amy Li is no longer with **Public Works and Government Services Canada.**

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Bahram Amirnezhad is now the managing OLS of **Topotec Inc.** located at 170 Old Surrey Lane, Richmond Hill, ON, L4C 7E5. Phone: 416-219-9956.

Thomas Gondo is now the managing OLS of **Lejan Land Surveying Inc.** located at 8-78 Peachwood Crescent, Stoney Creek, ON, L8E 5Z8. Phone: 647-823-9124.

Ronald J. Stewart is now the managing OLS of **Ronald J. Stewart, O.L.S.** located at 3756 Tottenham Road, Alliston, ON, L9R 1V4. Phone: 647-222-1249.

The notes and records of **Brian Vaughan Surveying Limited** are available through **Archibald Gray & McKay Limited** in London, ON.

The notes and records of **R.G. Hackett Surveying Ltd.** are available through the owner. Contact the Association for information.

The notes and records of **Menno Van Harten, O.L.S.** are available through the owner. Contact the Association for information.

The notes and records of **Ross M. Johnson Surveying Ltd.** are available through the owner. Contact the Association for information.

The notes and records of **True Grit Surveying Limited** are available through the owner. Contact the Association for information.

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Tony Pu	1993	January 20, 2016	Nedim Oren	CR208	January 20, 2016
Wickramage Sunil Perera	1994	January 27, 2016	Sabir Ahluwalia	1995	January 27, 2016



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EDUCATIONAL FOUNDATION NEWS

Report from the Annual General Meeting

During the Educational Foundation Annual Meeting of Members, Jack Monteith, who stepped down from the Board of Directors after 15 years, was presented with an Award of Recognition for his continued support for the Educational Foundation. Jack became a Director in 2001 and served as the Vice-President since 2004.



Educational Foundation President Jim Hill (right) presented Jack Monteith with an Award of Recognition and thanked him for his many years of service on the Board of Directors.

The Board of Directors would like to thank all of the Exhibitors who donated a prize for the Exhibitor Draw at the Welcoming Party and also our ticket sellers,

Lena Kassabian, Penny Anderson and Julia Savitch, and Master of Ceremonies David Raithby. The Foundation would also like to thank Ed Bowyer who sculpted a porcelain figure titled "Surveyor and Assistant" for the draw. Doug and Vicky Culbert were the happy winners.

The 10th Annual Graduate Student Geomatics Poster Session attracted 10 entries from Ryerson and York Universities this year. The purpose is to give graduate students the opportunity to showcase their research projects and compete for monetary prizes, which are sponsored by the Educational Foundation. The top five winning posters can be found on page 18. Thanks to our judges; Boney Cherian, Sophie-Rose Côté and Reuben Mc Rae.



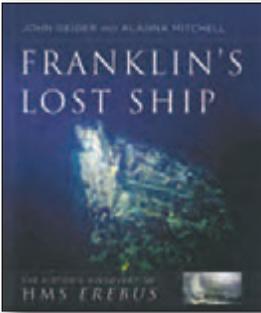
"Surveyor and Assistant" by Ed Bowyer merits "a place of honour" in Doug Culbert's office.

The Educational Foundation would like to recognize with thanks a donation made in the memory of George W. Bracken.

BOOK REVIEWS

Franklin's Lost Ship The Historic Discovery of HMS - Erebus

By John Geiger and Alanna Mitchell



Published by HarperCollins
Publishers Ltd.

ISBN 978-1-44344-417-0

The greatest mystery in all of exploration is the fate of the 1845-1848 British Arctic expedition commanded by Sir John Franklin. All 129 crewmen died, and two ships seemingly vanished without a trace. The expedition's destruction was a mass disaster spread over two years. With the vessels beset in ice and abandoned, the crew confronted a horrific ordeal, resorting to cannibalism in their final days. The mysterious fate of the ships, HMS *Erebus* and HMS *Terror*, has captured the public's imagination for seventeen decades.

Now one of Franklin's lost ships has been found. During the summer of 2014, the Victoria Strait Expedition, the largest effort to find the ships since the 1850s, led by Parks Canada, used world-leading technology in under-

water exploration and drew on Inuit traditional knowledge to succeed in a major find – the discovery of *Erebus*. News of the discovery made headlines around the world.

In this fully illustrated account, readers will learn about the challenging search efforts and the ship's discovery, while also revisiting the story of the original Franklin expedition and the many early rescue efforts. Featuring the first underwater images of *Erebus* and some of the first artifacts recovered from the ship, as well as archival documents, this stunning book weaves together a story of historical mystery and modern adventure.

Information taken from inside the front cover.

White Eskimo

Knud Rasmussen's Fearless Journey into the Heart of the Arctic

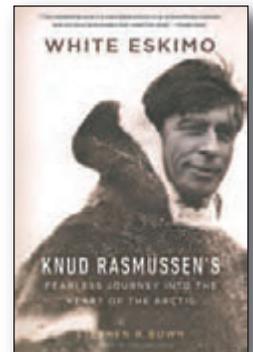
By Stephen R. Bown

Though less known today than contemporaries like Amundsen and Peary, Knud Rasmussen (1879-1933) was one of the most intriguing of the great early 20th century Arctic explorers. Born and raised in Greenland, and part Inuit on his mother's side, Rasmussen could shoot a gun and harness a team of sled dogs by the time he was eight. He was also well versed in the arts and came to exploration after failing to make a career as an opera singer in Europe. He was obviously more at home on the ice floes than the stage, and undertook some of the most astounding feats of endurance in the annals of polar exploration including his record-setting 18,000-mile "Great Sled Journey" – the first to traverse the Northwest Passage

by dogsled. More impressively, he travelled without the elaborate preparations and large support staffs employed by other explorers, surviving with only a few Inuit assistants and living off the land.

Despite his extraordinary physical prowess, Rasmussen was one of the most intellectual of the great explorers, more interested in scientific study than glamorous feats, producing (among many other works) a ten-volume account documenting Inuit spirituality and culture, an accomplishment that earned him the title "the father of Eskimology."

Information taken from the publisher.

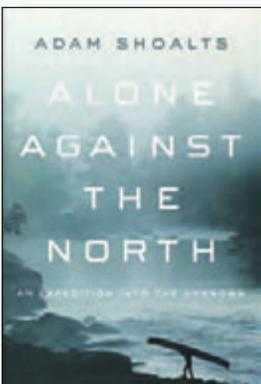


Published by Douglas &
McIntyre

ISBN 978-1-77162-001-7

Alone Against the North An Expedition into the Unknown

By Adam Shoalts



Published by the
Penguin Group

ISBN 978-0-670-06945-3

When Adam Shoalts ventured into the largest unexplored wilderness on the planet, he hoped to set foot where no one had ever gone before. What he discovered surprised even him.

Shoalts was no stranger to the wilderness. He had hacked his way through jungles and swamp, had stared down polar bears and climbed mountains. But one spot on the map called out to him irresistibly: the Hudson Bay Lowlands, a trackless waste of muskeg and lonely rivers, moose and wolf – an Amazon of the north, parts of which to this day remain unexplored.

What Shoalts discovered as he paddled downriver appeared in no satellite imagery or map: a series of waterfalls that could easily have killed him. Just as astonishing was the media reaction when he got back to civilization. He was crowned "Canada's Indiana Jones" and appeared on morning television. He was feted by the Royal Canadian Geographical Society and congratulated by the governor general. People were enthralled by Shoalts's proof that the world is bigger than we think.

Information taken from the front and back covers.

The Last Word

Sergeant-at-Arms "Colonel Thomas Talbot"

By Drew Annable, O.L.S.

Colonel Thomas Talbot (1771-1853) was the one responsible for settling a good portion of Southwestern Ontario, along the North shore of Lake Erie. He was the Aid-de-Camp to the first Lieutenant-Governor of Upper Canada, John Graves Simcoe and Simcoe assigned him to the task of exploring the Southwest area for the possibility of settling it. The British wanted to defend the area from the Americans, who were just across the river at Fort Detroit, so Simcoe thought the best way of protecting the area was to have British settlers inhabit it. After seeing how fertile the soil was throughout the Southwest, Talbot realized the potential so, with Simcoe's blessing, he returned to England to resign his military commission and obtain the rights to settle the area. The agreement was, for every 50 acres settled, he would receive 150 acres for himself. He and his trusty surveyor, Colonel Mahlon Burwell, spent the next 50 years surveying the area into townships. Colonel Talbot made many trips



Portrait of Colonel Thomas Talbot (1880) by James B. Wandesford (1817-1902). Credit: Library and Archives Canada, Acc. No. 1984-163-1.

back to England to entice young families to come to the New World and settle in his settlement. Over the years he, with the aid of Burwell, surveyed some 28 townships and settled over 40,000 people.

Surveyors have always had a close relationship with those who developed and settled the land. As a way of honouring those folks who take great risks in doing so, and provide much employment to surveyors and their staff, our salute to Colonel Thomas Talbot is also a salute to all land developers, then and now. Colonel Talbot was the first of many who, with their fierce determination,

helped make Ontario what it is today...with the help of their trusty surveyors of course!

My period dress comes from the Stratford Festival Costume and Props Warehouse. I would like to thank the production staff for their virtual loan of it and thank my good friend, Peter Moreton, who has a surveying practice in Stratford, for arranging for it.



Published by:

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Lori Veljkovic

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The Ontario Professional Surveyor Magazine and its publisher accept no responsibility for these views and opinions.

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Full page 4 Colour	\$705	\$660
1/2 page B&W	\$280	\$245
1/2 page 4 Colour	\$500	\$465
1/4 page B&W	\$190	\$165
1/4 page 4 Colour	\$410	\$385

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Digital File Requirements:

Supplied files should be "Press Quality" PDFs with trim and bleed marks included and with all fonts applied in the ad embedded.

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Colour profile included in the file should be GRaCo_2006_Coated with Relative Colorimetric Intent.

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