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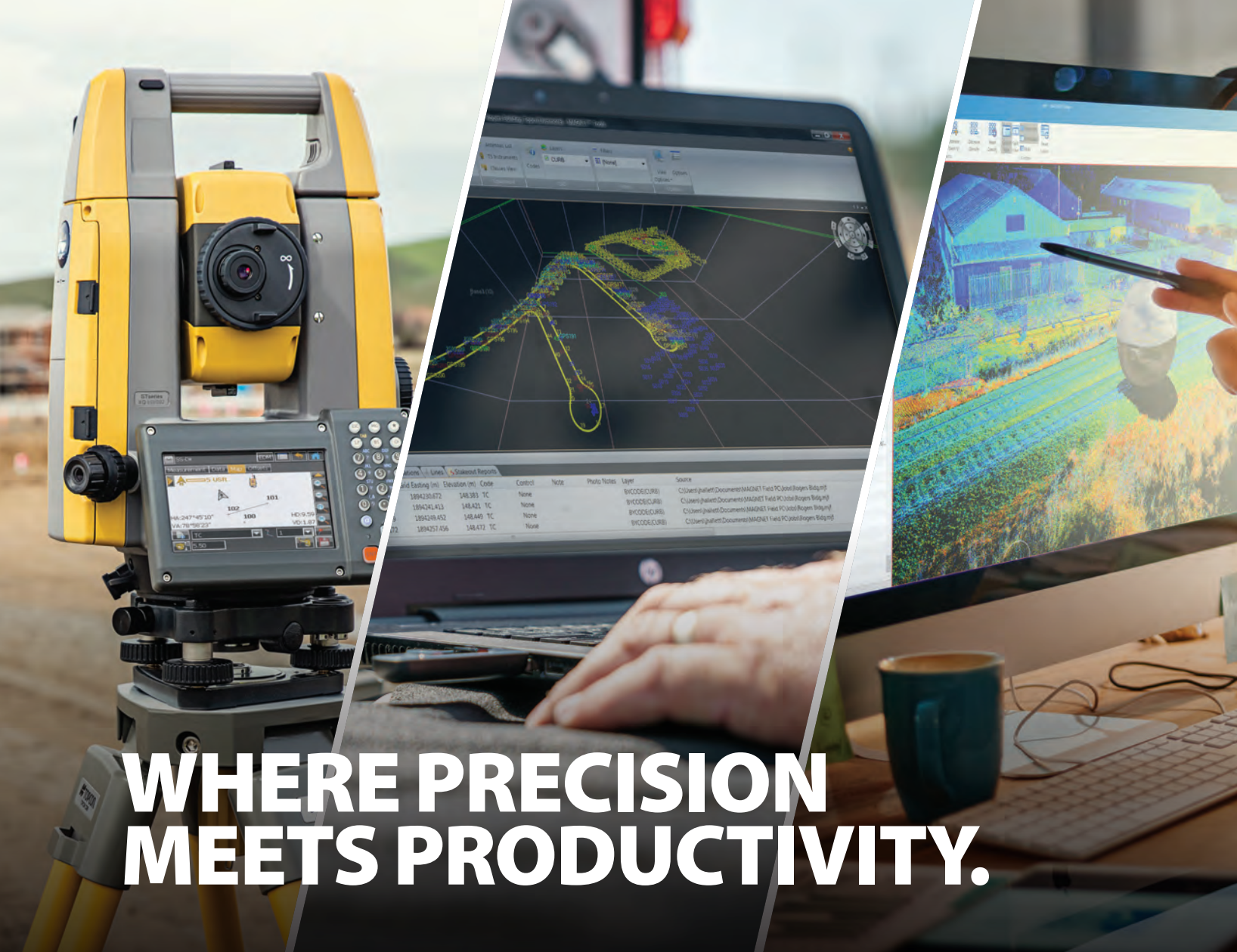
on the cover ...
Galileo Satellite in Orbit

also in this issue ...

**Know your History – Part 9
Prospects for the New
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Surveyors as Expert Witnesses:
From Stellar to Egregious**

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ONTARIO PROFESSIONAL SURVEYOR



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President's Page

By Gavin Lawrence, O.L.S., C.L.S., MBA



As a Nation, the most recent COVID-19 wave has again, to an ever-increasing degree, tested our resilience and patience. Evidence seems to point to declining numbers of cases as we pass the crest of the third wave. This descent comes as we approach our highest rates of inoculations, and vaccine delivery schedules stabilize and become reliable. These good news stories remind us how blessed we are compared to the devastation that developing countries are experiencing. Just as importantly, it cements our resolve to continue to abide by health care guidelines. To save your life, the lives of your loved ones, and the greater community, we all need to get fully vaccinated as soon as possible.

Also at this time, our thoughts and prayers are with those affected by the horrific impact of the discovery of the remains of children at a former residential school in the Tk'emlúps te Secwepemc community. This has unsettled all Canadians and again shone a light on these atrocious acts. The same sentiments are shared after hearing the heart-wrenching news of the attack on a Muslim family in London, Ontario. In order to progress, we must confront our sordid past and face the injustice of recent events. As an association, we start moving forward on this path by recognizing that these events occurred, condemning these acts, respecting differences, educating ourselves, offering comfort and a kind ear - love each other, and being peaceful!

Please join me in welcoming our new Surveyor General Bruce Clark as he fills massive shoes. Regardless of the challenges that lay ahead, I know Bruce will act in the best interest of the public while serving our profession well and I look forward to working closely with him.

Over the years, our association has been fortunate to have diligent Lay Councillors dedicated to serving the public. They have diverse skillsets that are critical to providing a variety of opinions that spark meaningful debate. Without their time and effort, we would not exist, so we owe them a debt of gratitude. This past year, we said farewell to a few and welcomed new Lay Councillors to our fold. Hopefully COVID-19 is on its way out and we can soon meet them in person.

Since my last article, I attended virtual AGMs held by our fellow associations and two President's Forums. The presentations at the AGMs dealt with standard themes, such as, surveying, COVID-19, mental health and modified working environments. At the open forum sessions, I was particularly

interested to hear the types of issues raised by each associations' members. Some issues were jurisdiction-specific, but most had varying degrees of overlap with issues facing our own association. The President's Forums are more focused and afford an opportunity to gain a better understanding and background of issues affecting the surveying industry in the various Associations across Canada. Even with all of the meetings going virtual, these social learning opportunities allow us to have a forum to share experiences and opinions so we can learn from one another. There is so much to learn from fellow surveying associations. We must continue to work closely with each other to better govern our members and protect the public. Professional Surveyors Canada (PSC) was quite visible and active at all of these meetings. Although seen as an advocacy group, PSC offers valuable country-wide educational material for both surveyors and the public, so feel free to visit their web page. For those who are interested in using the P.Surv designation, please contact PSC for information on its use.

By the time you read this article the amendments to Ontario Regulations 1026, 216/10 and 525/91 should be in effect. Now that these amendments are done, we are proceeding with plans to open the *Surveyors Act*. Our next step in the process is a review of our regulatory activities to gain a better understanding of what legislative changes are required to modernize the Act and identify interim changes that can be made in the meantime.

Whether it be as a member of the Association and/or as an individual in a workplace, everyone has a part to play in preventing harassment and discrimination. These preventative actions will result in more positive behaviours, attitudes and practices that can improve workplace culture and nurture our emotional health. They will help to ensure that everyone can work free from unfair practices. To that end, the Harassment and Discrimination Prevention Committee was formed and has already drafted a Terms of Reference based on the results of the Survey Monkey. The committee's vision is that "the Association and its members promote diversity and operate in a manner that is free of harassment and discrimination"- let's strive to make all feel welcome.

Fair fees for field notes remains a polarizing topic. Nevertheless, we are still steadfast in our aim to find a workable solution that will accommodate proper research and protect the public interest. Judging by members' comments, a handful of firms continue to misunderstand or

cont'd on page 4



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Executive Director's Notes



By Brian Maloney

In Izaak de Rijcke's recent course "Complex Cadastral Problems: Searching for Solutions" he mentioned on several occasions that surveyors do not have the monopoly on measuring and cited a case to that effect. As we embark on the project to update the *Surveyors Act* and consider changes to definitions related to Professional Surveying and Cadastral Surveying, I have been thinking about where the right line is between protecting the public and ensuring that adequate competition exists.

The Competition Bureau wrote an extensive paper dealing with this topic: "Self-regulated professions Balancing competition and regulation" in 2007. It remains relevant and is worthy of consideration. The paper discusses reasons for the need for regulation of which a couple apply to our profession:

- There is "Asymmetric Information" where the parties on both sides of the transaction cannot equally understand the service/product, and
- There are "Negative Externalities" which is a negative impact on someone not involved in the work being undertaken. In our case it could be a negative impact on a neighbouring property as a result of a survey done for a client without neighbour involvement. If a poor-quality survey is performed and places the boundary in the wrong location, then the neighbours can be negatively impacted.

In the case of Asymmetric Information, it makes it difficult for a consumer to understand the quality of the product they are acquiring. This can result in "adverse selection" where companies with higher quality more expensive products are forced to leave the market since the consumer cannot differentiate the quality of products and chooses the lower quality product whether or not it meets their needs. As a result, products and services need to be regulated to ensure that they meet a reasonable quality that meets the needs of the clients. This can and has led to adverse consequences where the quality of the product is set artificially high and exceeds the needs of the client. This certainly adds a challenge for the regulator to find the correct services, products, and standards to meet the client's needs in particular circumstances. The AOLS has chosen a relatively narrow set of

products and services and applied standards to those. It makes me wonder about the restrictions this may have caused. Are we guilty of forcing the public to buy a product that exceeds their needs in some cases? As we update our legislation and regulations, we need to ensure that we set appropriate standards for our products and services while at the same time allowing flexibility to employ more efficient and effective processes that closely meet the needs of the client, while protecting other third parties that can be impacted. It could also be argued that Asymmetric Information becomes less consequential as the consumer becomes more educated. Is that situation changing? Does the client we are working for make a difference?

It has been clear in boundary surveys that surveyors need to act in an unbiased fashion and do adequate work to ensure that the boundary is located in the correct location to avoid negative impacts on neighbouring parties. Does this same argument apply to forms of surveying beyond cadastral surveys? If a geodetic survey generates the wrong values, can they negatively impact parties beyond the original client? If mapping is missing features, has misrepresented features, or has errors in location beyond expected tolerances, can that negatively impact parties beyond the original client? What about hydrographic or other geographic information products? Are there emerging services and products that have similar concerns? There is no doubt that we can all think of circumstances that could result in harm to those beyond the original contract and this needs to be considered.

These arguments for regulation need to be carefully balanced against the overall need for competition to allow for innovation, new products, and services to be generated, entry of new qualified players and price competition. We should be challenged to find the least restrictive practices that protect the public by meeting their needs in their particular circumstances and protecting other expected users. As we seek legislative or regulatory changes, we need to consider each change in the light of competition and the balance discussed above.



President's Page (cont'd from page 2)

misinterpret Bulletin 2020-01 and more importantly the intent of making survey records available to other surveyors. The Fees for Field Notes Committee is taking another look at the effectiveness of the bulletin, and you can expect another slightly modified Survey Monkey questionnaire to be distributed soon.

This past year has had more downs than ups that have

highlighted inequalities in our society. Compared to other industries, ours continues to do well during the pandemic, so I leave you with a quote that will hopefully inspire you to give to those who are less fortunate.

"Think of giving not as a duty but as a privilege."
John D. Rockefeller Jr.



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Reflections of a Lieutenant Governor in Council Appointee



By Patricia L. Meehan

I was advised by Surveyor General Extraordinaire, Susan MacGregor that she and I would be leaving together, and I thought it was time for me to reflect on the 11 years that I have been the legal lay person, Lieutenant Governor in Council Appointee, on the Council of the Association of Ontario Land Surveyors.

I served 3 renewed, 3-year terms and then, although at the end of my allowable time and not re-appointed, I continued for another 2 years or so, until a new legal lay person was appointed to replace me. There was no way that my commitment to this organization would allow me to leave my position without a legal lay person on Council.

When I began this journey, I was unsure of what would be expected of me and if I could be of help. I knew little about surveying, in a practical sense, beyond occasionally assisting a client in my law practice to obtain a survey for mortgage purposes, or deal with an encroachment problem, or similar issues.

While sitting as a Small Claims Court Judge, I had 3 different local Sudbury surveyors give evidence in cases before me and found them knowledgeable and helpful, but I still knew or understood very little about what they did on a daily basis.

I can advise that at my first Annual General Meeting, which occurred in Toronto, I was surprised by the more casual dress than I was used to as a lawyer, but I was pleased at the warm welcome. I met and sat with the late Jack Young during the Veterans' Dinner (I was invited, and no one told me I couldn't attend) and truly enjoyed some of his historical tales. Who knew that cows could be so frightening to a city boy! Acting President, Eric Ansell, then Executive Director, Blain Martin and Surveyor General, Susan McGregor conned me into believing that I had to participate in everything, including preparing limericks for the Council dinner. I did refuse to drink scotch for toasts and used red wine as an alternative, so there were some boundaries I did draw.

I need to admit to you that it took me a considerable amount of time to learn the surveyor lingo, to understand short forms and initials, and acronyms representing organizations, concepts and plans that you use all the time, for example: AERC (Academic and Experience Requirements Committee).

I would like to tell my fellow lay councillors and any future lay councillors to ask questions, ask for definitions, and ask what the "in group" is talking about. You will be much more helpful to the Ontario Land Surveyors and the public and feel better about your contribution.

Remember also that our role is to speak on behalf of the public and not to simply rubber stamp decisions of the rest of Council. We each, as lay people, have unique skills and perspectives, and we cannot be afraid to utilize them and speak up! For those surveyors who know me, you are aware that speaking up is rarely a problem for me, however even I was intimidated at first.

I am very proud of the work that I have done while on Council, including being on your Executive Committee during some difficult times for the Association. I have participated in and sat on some very sad and some very frustrating discipline hearings over the years. I am pleased that I have been able to participate in the creation of a Discipline Committee Manual and on-going amendments, including for cost recovery measures. I advocated for and participated in training of panel members for their difficult and crucial role in a self-governing profession. It is not a pleasurable occurrence to judge your peers and to order consequences, sometimes even as and when necessary.

I began annual meetings between the members of the Complaints Committee and the Complaints Review Councillor, so the Association can more procedurally fairly deal with complaints, and I improved the notice and disclosure process and procedures for both the public and the member.

I have acted as the Complaints Review Councillor for the Association since my appointment and because there was a bit of a backlog, I was thrust into the role immediately. Without direction from any previous holder of that statutory position, I followed what I interpreted the Act to be and scared former long-term Registrar, Bill Buck, by establishing an entirely new procedure. As Bill always did, he considered first and then, once convinced, was a staunch supporter and aide.

In that role, as Complaints Review Councillor, I provided oversight and review about the process and procedures used by the Complaints Committee and the Association in dealing with Complaints. I was required to deal generally with members of the public, or on occasion another surveyor, who were dissatisfied first with a particular surveyor and then further unhappy over how their complaint was handled or dealt with by either the Association, the Complaints Committee or both. I have learned much from this role including how vitally important procedural fairness is.

When one belongs to a self-governing profession, members govern themselves. They run their Association, volunteer their time and efforts on its committees and councils, all with wonderful commitment. Surveyors are not trained as lawyers,

hearing officers nor Judges, but self-governance is difficult and becoming more complex.

Generally, the principles of natural justice, like adequate notice, being heard, a right to participate, be given reasonable and sufficient reasons for a decision, etc., will ensure a fair result. At least, even if a Complainant remains unhappy with the result, they can be assured that their complaint was heard, it was considered seriously, they participated in the process, an answer was provided, and they have reasons for that decision.

Over the years I have made numerous recommendations to surveyors and firms in their interactions with the public based on the complaints that I heard. I won't repeat the procedural ones incorporated into the Association's processes. I would like to reiterate some of the practical ones that every surveyor may – I hope – already do or perhaps new surveyors may follow, or simply remind you of best practices.

- Give notice – as much as possible - by any means possible, but in writing is preferred, if you will be on someone's property.
- I know (now!) and you know that pursuant to Section 6 of the *Surveys Act*, R.S.O. 1990, C.30, you have a right to enter or pass over the land of any person and even enter buildings (although only at times suitable to the occupant) if it is for the purpose of the survey. Few members of the public know this and even fewer appreciate it. The surveyor or the owner of a building does not determine the suitability of your entrance to a building, the occupant does. Be more mindful of tenants in multi-residential or commercial buildings.
- Put printed notices on doors and in mailboxes. Get your firm to do a standard one and keep them in your vehicle and have your crews carry them. This is becoming a safety issue for surveyors and the public.
- Wear photo ID and have ID for all field calls.
- Wear a company logo and branded shirts, sweatshirts, jackets with bold letters "Survey Crew" or something similar on the back.
- Do have written retainer agreements and use them, especially to determine or clarify your scope of work and the fees associated with same. Do not be afraid to stipulate what work is not included rather than a simple description of what is planned.
- Make sure you park your vehicle in the driveway or on the property of the individual or business which has retained you.
- Often in residential areas in particular, the reason for retaining a surveyor is to resolve an already existing dispute between neighbours. It is much better not to escalate the situation, have the police attend, have them explain a surveyor's rights to avoid trespass, other complaints, or potential charges.
- Communicate primarily in writing, including via email or text, or remind yourself to follow up a conversation with a client with a written summary forwarded to them. This lessens future misunderstandings.

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Serving as the legal lay councillor on the Council of the Association of Ontario Land Surveyors has been an interesting and rewarding challenge. During the more than a decade that I served, my hair turned from red to silver. It was not all age-related, and some can directly be attributed to my work for your Association.

I have met and worked with a remarkably diverse and wonderfully committed group of people, surveyors, and lay councillors, some who have become running buddies or fellow artists; and with many of whom I hope will remain friends. There are too many to mention individually, but I do thank you.

I hope I will see many of you if you are ever in Sudbury or Manitoulin and would be pleased to assist any one of you in the future if I could. I will miss the people and your profession. Thank you for some wonderful and fulfilling years. 

*Alas now, Adieu I must say
Though long truly did I enjoy my stay
Many surveyors I shall miss
About you I will reminisce
My citation proudly on display
Now to another I do give way!*

Land Surveyors Need Locates



By Sarah Burke, Compliance Investigator at Ontario One Call

Ontario One Call wants to remind Ontario Land Surveyors that they need to call or click before placing land survey monuments in the ground. Requesting and receiving locates is a legal requirement and helps to keep everyone safe. In Ontario, the phrase ‘Call or Click before you dig’ has been around for years. However, the meaning behind the phrase carries more weight now than it did even just ten years ago.

In Ontario, the ‘call or click before you dig’ program is administered by Ontario One Call - a not-for-profit organization that provides notifications to buried infrastructure owners, like public utilities and municipalities, of proposed excavations. This allows these infrastructure owners to respond to an excavator with critical information related to the location of their buried assets to ensure the safety of the excavation and protect the integrity of the services below the ground.

The term ‘excavation’ means to break ground. It includes all types of digging, boring, trenching, grading, and excavating, including the placing of land survey monuments. It is important to remember that excavations of any size could damage buried pipes, cables, and services, causing a serious safety risk to the people involved, the surrounding community, and the environment. It is for this



reason that the rules and regulations do not differ based on the size or type of excavation taking place.

The process of requesting locates through Ontario One Call is mandated by provincial legislation that came into effect in 2012. The *Ontario Underground Infrastructure Notification System Act* outlines requirements for both sides of this process. Firstly, the

legislation requires that before any excavation starts in Ontario, a locate request must be placed via Ontario One Call. By doing so, buried infrastructure owners within the vicinity of the proposed excavation will be notified.

The legislation also requires infrastructure owners to be registered with Ontario One Call to be notified on locate requests. Once the request is submitted, the infrastructure owners are required to respond to the



excavator allowing them to break ground safely around any services that may be below the surface.

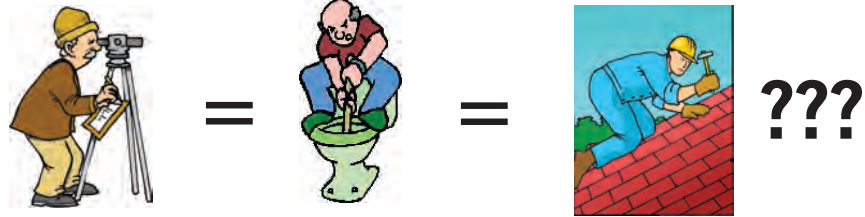
Contacting Ontario One Call provides benefits for all involved. Don't take the risk. Be Safe this season by contacting Ontario One Call.

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Ontario One Call is a not-for-profit organization that acts as a communications link between utility companies, underground infrastructure owners, and individuals who are planning to dig in the province of Ontario. The *Ontario Underground Infrastructure Notification System Act*, 2012, S.O. 2012, c.4 stipulates that anyone in the province of Ontario must contact Ontario One Call before they dig.



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Infrastructure Asset Management – An Emerging Practice for Geomatics Professionals

By Dr. Robert Radovanovic, P.Eng., A.L.S., C.L.S., ENV Sp. and Nathan Sikkes, P.Eng., A.L.S., C.L.S., S.L.S., P.Surv

Topics such as “infrastructure asset management”, “smart cities” and “digital twins” have been receiving wide exposure, as we have all become aware that our networks of roads, bridges and utilities are reaching their ends of life, and that large re-investments in these networks are going to be required to maintain our current standards of living. New technologies, which analyze large amounts of usage, condition, performance and cost data, can optimize investment allocation so that most critical assets are appropriately prioritized and unexpected failures minimized. As much of this underlying data has a geospatial component, it seems the geomatics professionals have a promising role to play in gathering up all this data.

However, although the definition of “geomatics” focuses on the collection and processing of geographic data, the *practice* of geomatics and surveying has always been a fundamentally multi-disciplinary pursuit. Surveyors have always played multiple roles in delivering projects for clients, whether it is providing advice on regulations pertaining to development and planning, liaising on the client’s behalf with stakeholders, such as property owners and government agencies, or even supervising construction. At the same time, surveyors have been deeply involved in the design and maintenance of cadastral registration systems around the world (and one can consider ‘land’ as essentially the ‘original asset’). For these reasons, the role of geomatics professionals in the Infrastructure Asset Management practice should not be limited to collectors of information.

What is Asset Management?

The “practice of asset management” is about optimizing the total life cycle costs of operating infrastructure assets so that they can provide appropriate levels of service in a sustainable way.

In an asset management system, the first step is to know:

- what assets exist,
- physical properties of the assets

such as location, age, material, connectivity,

- the expected remaining service life of the assets, and
- the current condition of the assets.

Beyond this basic inventory information, we also need to understand what services the asset needs to support and what demands will be placed on it. This information includes:

- Service levels describing what the asset is supposed to support (i.e., ride comfort, water quality, distance to farthest residence),
- Demand trends indicating how the asset will be relied upon in the future (which includes both usage trends and external effects such as climate change),
- Condition degradation curves indicating how remaining expected life is correlated to condition, and
- Severity outcomes associated with failure of the asset, and associated risk probabilities tied to asset condition levels.

Essentially, one can envision asset management as a ‘recommendation engine’ as shown in Figure 1, which brings in a number of inputs in the categories of data, people and finance, and applies analytics to the data to output optimized project recommendations. Ancillary to the primary work being done by the ‘engine’ and its components, is overall strategy, policy and management work required to establish the process and make sure everything is running properly.

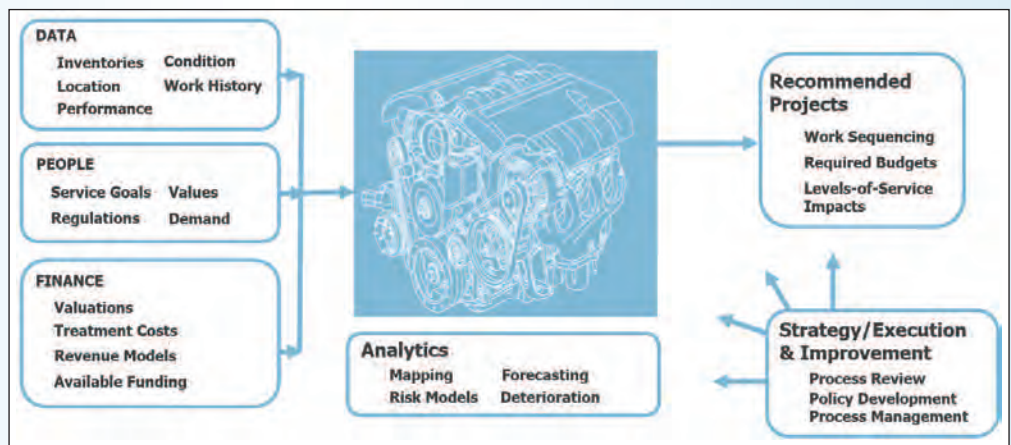


Figure 1. Asset Management as a Recommendation Engine.

As you can imagine, there are many areas in this engine that benefit from the experience of a geomatics professional!

Why does Asset Management matter (right now)?

Fundamentally, asset management practices let organizations stretch dollars further by ensuring they are spent in an optimal way. While avoiding waste is a good thing, there are additional benefits that a quantitative approach to investment decision making can bring to the table, namely:

- Demonstrating that investment decisions are being done in a data-centric fashion, as opposed to being ad-hoc, increases confidence that resources are being stewarded appropriately,
- Documented levels-of-service expectations and budget forecasts improve communication and transparency with taxpayers, customers and investors,
- Increased engagement with stakeholders ensures that service outcomes better meet overall community and end-user needs,
- Evaluating risk with regard to service delivery minimizes unexpected infrastructure failures and the impacts of severe unusual events, and
- Thinking about asset investment on a long-term basis avoids implementation of short-term, “band-aid” solutions, which improves overall outcomes for future generations.

A focus on improved asset management practices is particularly relevant now, as the majority of Canadian civil infrastructure was built in the post-war era and is now nearing the end of its life [1]. For example, the 2019 Canadian Infrastructure Report Card indicated that over 12% of Canadian civil infrastructure is in poor or very poor condition [2]. Alternatively, if estimates place the total value of Canadian civil infrastructure at \$1.1 trillion [3], the implication is that over \$132 billion will need to be spent to replace this poor-quality infrastructure.

Underinvestment in infrastructure is not a purely Canadian phenomenon. A World Economic Forum report estimated in 2014 that global infrastructure investment amounted to \$2.7 trillion (USD) annually. However, based on asset degradation rates, \$3.7 trillion (USD) annually would be required to maintain current service levels [4].

This degraded infrastructure has a direct impact on end-users financially. For example, a recent Canadian Automobile Association study found that poor roads cost Canadian drivers over \$3 billion annually in higher vehicle costs [5].

In addition to the municipal infrastructure, utilities such as gas system and powerline operators are focusing heavily on improved asset management practices, as proper accounting and management of assets significantly reduces the risks associated with operating those assets. For example, liabilities associated with wildfire risk due to vegetation proximity to powerlines have led many transmission line owners to increase the amounts they are spending on mapping lines and modelling the encroachment of vegetation into rights-of-way.

To improve the condition of Canadian infrastructure, the federal government has announced programs such as the “Investing in Canada Plan”, which committed \$180 billion of funding over 12 years [6]. However, governments have also recognized that these investments must be partnered with improved accountability for funds spent – for example, the Federal Government has also created an 8-year, \$110 million program via the Federation of Canadian Municipalities to support the asset management programs such as condition assessment, system implementation and competency building at the municipal level. Additionally, it is increasingly becoming a requirement for municipalities wishing to access Federal Gas Tax funding to have a documented Asset Management Plan in place.

Geomatics in Asset Management

As suggested previously, there are many roles that geomatics professionals can play in the asset management field. Generally, the roles most applicable to those with geomatics experience include:

1. Data collection,
2. Data analysis, visualization, and processing, and
3. Strategy and management.



Figure 2. Aspects of Asset Management.

Data Collection

Data collection forms the ‘base’ of the asset management pyramid and is a natural fit for geomatics practitioners. Regardless of the specific asset class being assessed (i.e., roads, bridges, water infrastructure, etc.), basic information about the asset needs to be properly measured and recorded.

Crucially, the *level of certainty* of the measurement information is important, since, as the old adage goes, ‘garbage

cont’d on page 12

in, garbage out’. This is an area where geomatics experience shines, as surveyors are uniquely suited to think about things like accuracy, precision, noise profiles and the significance of a particular measurement (be it a location, quantity or magnitude). Unfortunately, in many asset management programs, data is assumed to be ‘perfect’ which causes serious problems when outliers in data cause unexpected results and no one thinks to check the underlying measurement methodologies. Surveyors live in a world of error bars and significant figures, so this perspective would significantly help the practice.

Table 1 highlights typical measurement and data collection requirements as an example of the types of information collected in an asset management program. As can be seen, many of these are well within the scope of what surveyors currently do on other projects.

talking to community residents. Skills developed by parsing through old deeds or caveats, or asking landowners about how a fence came to be where it is, are undoubtedly transferable in these cases.

Data Analysis, Visualization and Processing

Beyond data collection, surveyors have the potential to provide value-added services within the asset management process through supporting data analysis and processing. In particular, the power of geospatial analysis when prioritizing renewal projects has been widely recognized, with Geographical Information Systems becoming a central part of most Asset Management systems. As shown in Figure 3, an example available online from Assetic (a provider of asset management software), GIS visualization allows people to rapidly interpret trends in condition assessment data [7].

Table 1. Asset types, measurements and sensors used in condition assessment.

Asset Type	Level Of Service	Measurement Type	Sensors Used
Roads	Ride Roughness	Density / severity of pavement cracking	Mobile Laser Scanners, Visual Inspections with GPS-enabled data collectors
Roads	Traffic Capacity	# vehicles / hour	Traffic counts with tablet-based collector applications, video systems
Sewer networks	Pipe condition	# blockages / 100 m	In-pipe video cameras, underground utility location
Stormwater	Catchment volumes	Flood modelling based on digital elevation models	Aerial Lidar, topographic surveys
Parks and Recreation	Accessibility	# facilities with accessibility restrictions and locations	On-site surveys and assessments
Powerlines	Vegetation Clearance	Obstructions within ‘x’ m of line	UAVs, aerial and ground-based laser scanners
Utility Networks	Failure Risk Minimization	Location, depth of cover, network connectivity	Line locators, Ground-Penetrating Radar

It is also important to point out, that beyond the ‘measurement data’ of asset inventories, condition and location, a significant part of asset management is gathering ‘people data’ in terms of stakeholder engagement, defining community priorities, and unearthing historical local knowledge about what assets exist and what maintenance work has been completed. Given that many assets are over 50 years old, and often poor records were kept, it is surprising how much information is gleaned simply by

A considerable amount of work is required to turn ‘dumb’ raw inventory and condition data into useful information. For example, although a laser scan of a streetscape may take minutes to complete, the resulting data is simply a mass of

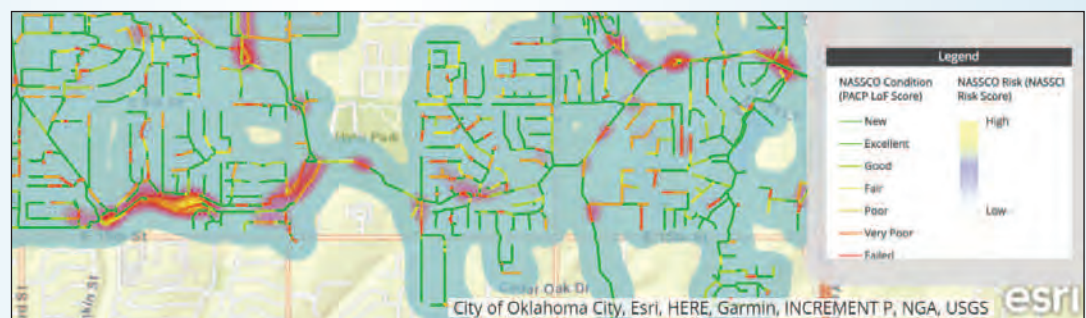


Figure 3. Example of a web map displaying pipe condition information (from Assetic Inc.)

3D points. Creation of a 'digital twin' of the area requires considerable work with 3D modelling and CAD software to then create attributed drawing sets that identify a grouping of points, such as those corresponding to a 'stop sign', with a height of '1.8 m', of 'fair' condition, etc.

The volume of digital data created from asset management processes (and the need for consistent, standardized information for analysis) means that many municipalities are increasing the requirements for digital as-builts of infrastructure post-construction. This is creating a volume of work associated with maintaining growing digital drawing databases, enforcing georeferencing requirements and general QA/QC. Surveyors are well placed to be at the forefront of this digital data curation.

Finally, surveyors should not overlook the idea of being involved in the financial planning and cost estimation portion of asset management. Without discounting the nuances and technical skill involved in robust quantity surveying, cost estimation for asset management purposes is often at the Class D level (+/-30%) and is based on standardized unit cost tables. As a part of their normal course of practice, many surveyors develop a 'feel' for typical construction costs and practices, which provides a good basis for diving further into broader infrastructure cost estimation.

Strategy and management

As more and more organizations look to implement asset management practices, there is a growing requirement for

professionals to assist with the establishment of asset management processes. This includes developing policies on how asset management will be implemented in practices, as well as providing expert advice on methods for collecting data, implementing software solutions and so on. For example, recognizing the need for building competency in Asset Management to support its sustainability goals, the United Nations recently released a handbook on Infrastructure Asset Management for local and national governments [8]. Similarly, there is considerable new work being done in 'best-practice' establishment through organizations such as the International Standards Organization, which only released its first version of asset management process standards (ISO 55000) in 2014 [9].

To the authors, much of this policy-related and capacity-building work has a similar feel to the work done by those working on the establishment of cadastral systems in international locales, or work in the 90's and 00's on development of digital cadastres across the country. Interestingly, one can consider rights-in-land to be a fundamental asset that societies enjoy, and so it would seem natural that surveyors, who have much experience in developing fair, impartial and long-lasting systems for ensuring land assets are properly recognized, would now assist in the development of analogous frameworks for infrastructure management.

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Next Steps!

Although awareness of asset management as a distinct practice is only recently growing in public perception, Canada is fortunate to have a well-developed network of asset management knowledge sharing networks. At a provincial level, almost every province has an industry group that provides an arena for sharing best-practices, showcasing projects and discussing developments in the industry. For example, in Ontario, AMONTario (www.amontario.ca) has an active user group and even provides an excellent set of fundamental training materials for download. Nationally, organizations such as the Canadian Network of Asset Managers (www.cnam.ca) draw together a broader group of asset-management practitioners from across the country.

From an accreditation and education standpoint, there currently is no regulated “asset management profession” in the same vein as land surveying or engineering. However, various training organizations have trademarked certain designations and restricted their use to people who complete their training. For example, the “CAMP (Certified Asset Management Professional)” is managed by the PEMAC Asset Management Association of Canada, while the Institute of Public Works Engineering Australasia provides a “Professional Certificate in Asset Management Planning.” Currently, there is relatively little training in asset management theory at the University or Polytechnical levels outside of traditional plant and maintenance disciplines, although the Department of Geomatics Engineering at the University of Calgary is providing a “Fundamentals of Asset Management and Sustainability” course geared towards 4th year students, graduates and interested professionals. Those interested in the University of Calgary course are welcome to email the author for details.

The establishment of asset management practices does not require deep knowledge of specific civil or mechanical engineering arcana – rather, it requires a holistic understanding of how gathering appropriate information in a consistent and reliable manner as well as using it to produce unbiased analysis of how infrastructure projects should be executed to deliver good outcomes for communities. With a strong background in measurement science and geospatial analysis, the geomatics community is well placed to play a big role in the emerging infrastructure asset management market and land surveyors, in particular, are in a unique situation to step up

(again) to help with creating systems for the orderly development of their communities.



With over 20 years of experience in land surveying, advanced positioning technologies and 3D scanning, **Dr. Radovanovic** is actively involved in educational initiatives in the land surveying and infrastructure asset management professions. He is the Calgary Engineering Branch Manager with McElhanney Ltd., a consulting firm specializing in civil engineering and surveying, based in Western Canada. Dr. Radovanovic can be reached by email at RRadovanovic@mcelhanney.com

Nathan Sikkes is the Manager of the Major Projects branch at McElhanney Ltd. and has extensive experience in delivering large-scale geomatics projects. Additionally, he is involved in assessing emerging trends in the broader energy sector, including how they relate to Environmental, Social and Governance factors.

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9. International Organization for Standardization, ISO 55000:2014 — Asset Management (Geneva, ISO, 2014).

Sites to See

Google Earth Pro

<https://www.google.com/earth/versions/>

Google Earth Pro on desktop is free for users with advanced feature needs. It allows you to create maps with advanced tools, import and export GIS data, and go back in time with historical imagery.

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Know your History — Part 9

By Tom Bunker, O.L.S., C.L.S., P.Eng., C.P.A. (Ret)

The following article is Part 9 in a series of historical articles by Tom Bunker.

Finding Your Roots using Land-related Records

There has been an explosive growth in genealogical interest since the advent of the Internet. Dedicated sites like no-fee WikiTree.com and FamilySearch.org, as well as fee-based Ancestry.com and MyHeritage.com, offer access to billions of scanned birth/marriage/death records, census data, maps, directories, schoolbooks, voters lists and other documents, as well as user-constructed family trees. These databases are fraught with errors however, because of poor penmanship and spelling on original records and faulty interpretation by the transcribers. User family trees often copy the work of others that might include factual errors.

Some government websites and genealogical societies offer access to further records.

One example of a database error is the difficulty I had in finding the 1853 marriage of my 2nd Great-Grandfather John George Mertens. This first wife had never been recorded in our family's history, likely dying during her first childbirth in 1855, but I had found her headstone and a guess of her likely maiden name in a church membership list. The original marriage record correctly showed his name but it was indexed as John with surname George. Elizabeth Bennett had two check marks through her surname on the original marriage document so it was unreadable and had been indexed as Balow. I was able to locate the scanned images of their church minister's marriage records and read through them until I discovered the actual registration.

The following examples illustrate how access to and understanding of land-related records can be used to identify and clarify ancestral families.

My Jones Roots

I have the family Bible of my 2nd Great-Grandfather Abijah Jones where he recorded important family events (birth/marriage/death). He starts by noting he was born in the Township of Markham on November 7, 1807, the son of

Abijah Jones and Susan Brown.

Although my family lived at Altona, adjacent to the Lot 1, Concession 1, Uxbridge Township farm that was in the ancestral family from 1836 until 1959, I had no idea who these 3rd Great-Grandparents might be. I had been helping my wife Josie find her ancestors and we had discovered a document that said one of them had been granted land in Uxbridge Township in 1805.

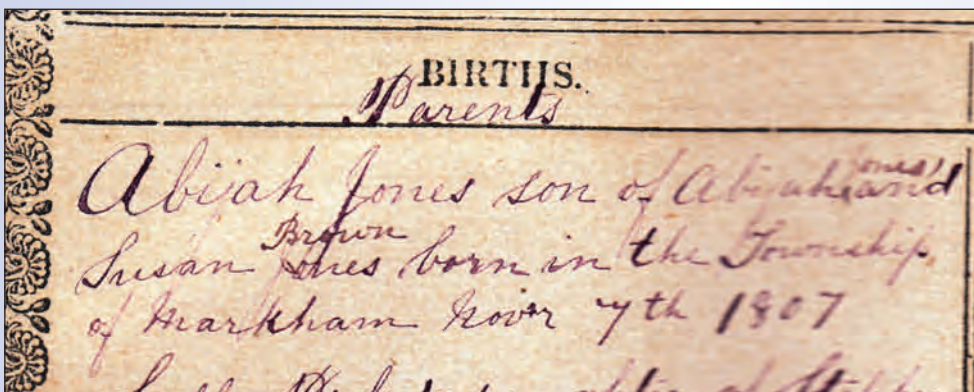
The original Township planⁱ identifies the original patentees and I was surprised to see an Abijah Jones shown on the plan.



I obtained a copy of the Abstract for Lot 22, Concession 2 and determined that this Abijah Jones acquired the Patent in March 1806, had sold the property immediately and that he was "of Markham". In order to be granted a Patent, the potential patentee had to swear an oath of allegiance (this is shortly after the American War of Independence) and to file a petition for land. I discovered a publication of the Oaths of Allegiance taken at York, 1804 – 1806ⁱⁱ which included one for March 1806 describing Abijah Jones as lately from New York and 31 years old from which I calculated his birth in

1775. His 1806 land petitionⁱⁱⁱ described that he had been in Upper Canada for six months with a wife and four children, but that his wife and one child had died. Could this be my 3rd Great-Grandfather?

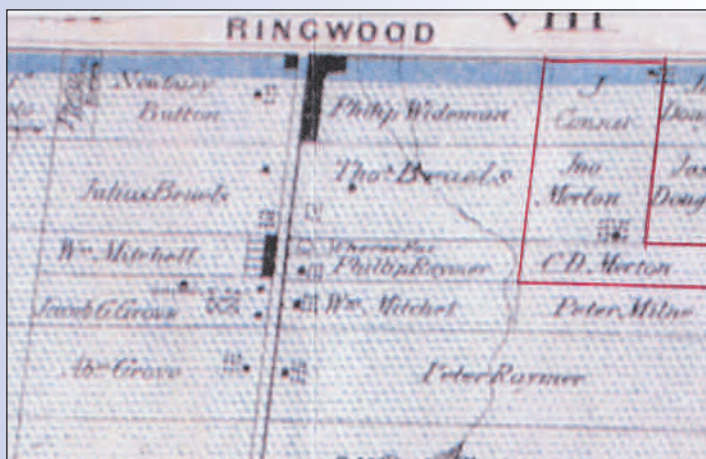
I did a Google search for Abijah Jones born in New York about 1770 and found a post by a descendant that listed Abijah with his wife and children and a son Abijah born in



Markham, NY in 1808^{iv}, “from the family Bible”, so it seemed that this was likely the same family. Some Ancestry.com user trees showed this family with the first wife dying in 1807 and the second wife named Susan as the mother of Abijah, born 1808. I have recently connected with the original data poster who lives in Syracuse, NY and confirmed the data was transcribed from a family Bible that is unfortunately now unreadable. A search of Surrogate Court records^v found a record of Abijah Jones, of Markham, who died intestate on September 30, 1807. I now know that Susan became a widow before my 2nd Great-Grandfather was born and this explains why his half-siblings grew up in the United States.

But who was Susan Brown? The Jones’ history in the Altona Women’s Institute Tweedsmuir History^{vi} includes a note that Abijah “was born at Ringwood on the east side of the Eighth Concession of Markham that is now the Breuls’ farm”.

A reference to the 1878 County Atlas^{vii} for York shows Thomas Bruels [sic] in Lot 34. A search at the LRO revealed John Breuls acquired the property from James Brown and his wife Mary in 1836. I attended the libraries at Newmarket



and Stouffville and found reports on the Klinck^{viii} and Brown families. Each described the Brown^{ix} family’s historical background from Pennsylvania and gave an exact birth and death date for their daughter Susan but no marriage information. My 2nd Great-Grandfather Abijah Jones is buried beside James and Mary Brown.

Susan’s documented death in 1857 meant that she should have been included in the 1851 (52) Canada Census so I searched Ancestry.com for any Susan born in the USA in the relevant period. I found no Susan Jones or Brown and eliminated many other Susans, and Susannahs, who did not die in 1857. The most reasonable match was a Susannah Kester that is in the Census in Markham Township. I used Ontario Cemetery Finding Aid^x to locate her burial site and attended the cemetery. Her death date and calculated birth date from age at death shown on her headstone matched the Brown family record exactly. I also learned that the Kester family came to Upper Canada from the same Township in Pennsylvania in the same year as the Brown family and

settled near each other in Markham. Michael Kester died in 1855 and left his farm by will^{xi} to descendants. I obtained a copy, but it failed to disclose his wife’s maiden name. The copy from the Surrogate Court^{xii} included an inventory list compiled by Abijah Jones (Susan’s son?) of Uxbridge and Andrew Lindsay. Susan and Michael’s son Leonard Kester was a witness to 2nd Great-Grandfather Abijah Jones’ first marriage. I have not yet found a marriage of Susan and Michael but am confident that she is my 3rd Great-Grandmother.



My Cornish Roots

A first cousin of my Grandfather Bunker prepared a Bunker family summary in 1961 and had reported my 2nd Great-Grandparents William Bunker and his wife Jane Cornish had first settled near Hayden, Darlington Township, Durham County. I found their marriage at Plymouth, Devon, England in 1848 and their location in Darlington Township in the 1851(2) Canada Census^{xiii}. I was able to track their movement to East Whitby (near Taunton) in 1871 from the County Atlas and later to the Duffins Creek area of Pickering from LRO Abstracts.

I knew little of my 2nd Great-Grandmother Jane, except her birth and death dates that were shown on the family headstone.

A great grandson of Jane’s oldest daughter Elizabeth provided me with a copy of Elizabeth’s 1876 wedding certificate that showed the witnesses as her sister Mary F. Bunker and Mary G. Cornish. Thinking Mary Cornish may be a cousin about the same age led my research to her family at Port Hope and in particular her father Samuel Cornish.



cont'd on page 18

Samuel was found unmarried in 1852^{xiv} living with his married brother Saul Cornish in Darlington Township not far from Hayden. Ancestry.com included several Cornish family trees that included Saul and Samuel but with a Jane that was born the year before my 2nd Great-Grandmother. The Jane in the trees married a Maynard at Bowmanville, Upper Canada in 1845. I found three Cornish family websites (one authored in the UK, one in Australia, one in British Columbia) all with similar material but one of them noting that there were possibly two distinct families due to the large number of children baptized at Stratton, Cornwall, England.

A search of baptismal records at Stratton^{xv} found eighteen children baptized between 1808 and 1832 to John Cornish and his wife "Ann". There were duplicate Johns, Janes and Anns. The only distinguishing thing was that one father John was a Yeoman while the other was a labourer. I found a Cornwall parish record for a John Cornish married to Ann Parsons dated 1805 and another John Cornish married to Ann Smeeth in 1809. Finding the birth date of these Anns and matching to the 1841 British Census^{xvi}, segregating families by father's occupation and starting chronologically with children born between 1805 and 1809 and allowing about 2 years between them allowed me to create the two likely families. Only one John and Ann Cornish couple were in Stratton in 1841. Luckily the 1842 Canada Census for Darlington^{xvii} still exists and I was able to identify a John Cornish family in that Township.

Another website^{xviii} gave me the date of death of John Cornish at Darlington in 1849 and having downloaded family tree data on these descendants I was able to locate a son-in-law on the County Atlas^{xix} map. (Map shown at the top.)

Son-in-law Richard Souch is shown in Lots 3 and 4, Concession 4 east of Bowmanville. The LRO Abstract revealed that John Cornish had purchased his land in Lot 4 in 1833.

A review of the Abstract gave me the 1847 will of John Cornish in which he sets out the distribution of his assets to two named sons and six named daugh-

ters. The will was registered after his death in 1849^{xx}, with its veracity attested by a William Parsons, likely a brother of the surviving Ann Parsons Cornish. The 1842 Census suggests a third youngest son who is not named in the will

and therefore likely died between 1842 and 1847, but that is a matter for this "other" family to research.

Having this evidence in hand allowed me to confirm my Cornish family was the actual descendant line of John

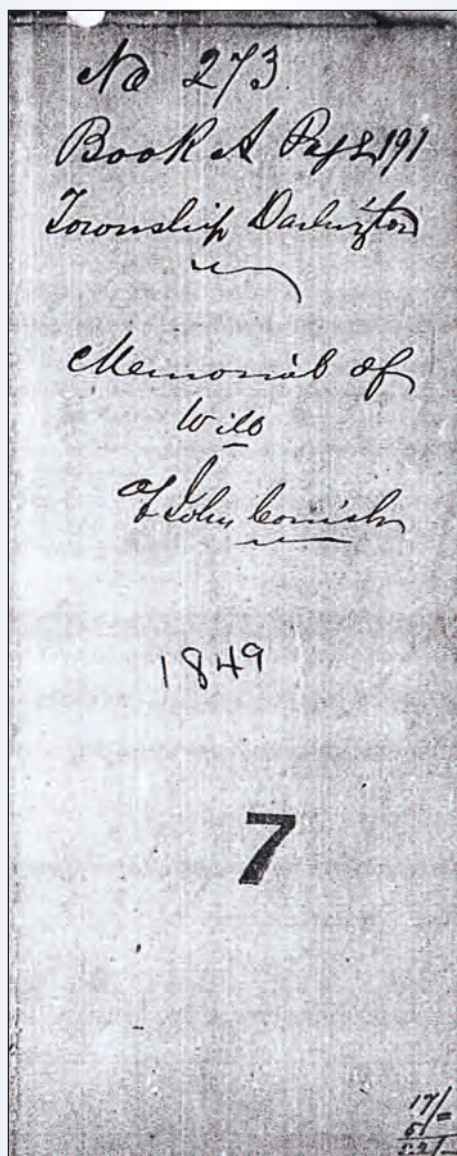
Cornish and Ann Smeeth and I forwarded my research to the website owners who accepted my data and updated their trees, one indicating that she and I are 10th Cornish cousins.

Conclusion

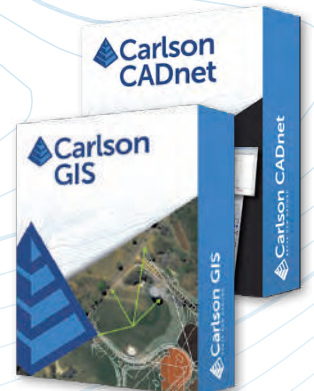
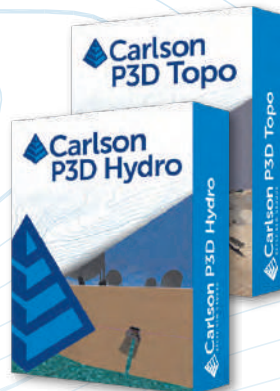
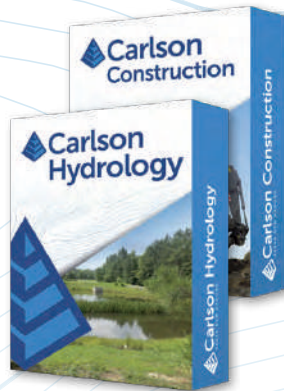
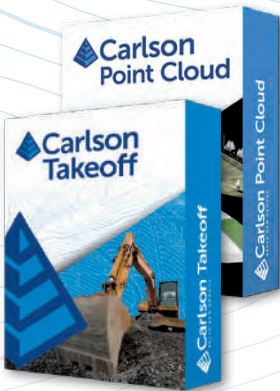
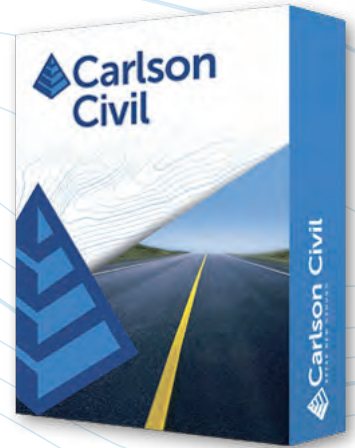
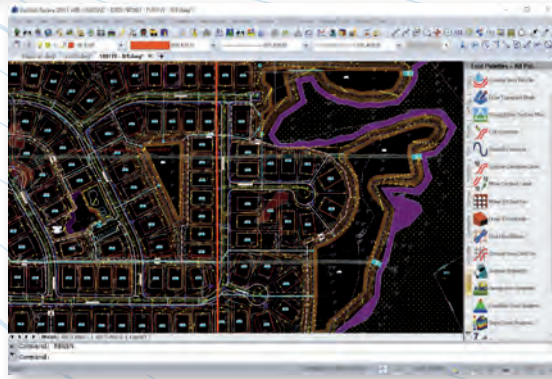
Access to LRO abstracts and documents as well as various maps is important to the genealogical research of our past. The material can both prove and disprove assumptions made from reliance on other sources.



- ⁱ Uxbridge Township by Dy. Surveyor Samuel Wilmot, dated Apr 8, 1805
- ⁱⁱ See manuscripts held in Baldwin Room, Toronto Public Library as printed in "Oaths of Allegiance sworn before William Willcocks, J.P. 1800 – 1806", Phyllis H. White, Peterborough, ON, 1997
- ⁱⁱⁱ Library and Archives Canada, Upper Canada Land Petitions, Reel C-2109, Image 440
- ^{iv} Posted in September 1999 to genforum.genealogy.com
- ^v Archives of Ontario, RG 22-305, York County Surrogate Court Estate Files MS638, Reel 87
- ^{vi} Pickering Ajax Digital Archive, on-line research resource
- ^{vii} Courtesy, Rare Books and Special Collections, McGill University Library, images available on-line
- ^{viii} The Klinck Family – Leonard Klinck and Elizabeth Brown Grant dated 1955, Newmarket Public Library
- ^{ix} The English Browns of Markham and Uxbridge Townships 1800 – 1985 by Victor Gordon Brown (LOCHIST VF Brown), Stouffville Public Library
- ^x Record now also available at www.findagrave.com
- ^{xi} INST 56991, Lot 30, Con 10, Markham; LRO York (#65)
- ^{xii} Archives of Ontario, RG 22-305, York County Surrogate Court Estate Files MS638, Reel 87
- ^{xiii} 1851 Census Place, Darlington, Durham County, Canada West; Schedule A; Roll C_11718; Page 59; Line 49
- ^{xiv} 1851 Census Place, Darlington, Durham County, Canada West; Schedule A; Roll C_11718; Page 39; Line 33
- ^{xv} www.cornwall-opc-database.org/search
- ^{xvi} 1841 England Census; HO107; Piece: 151; Book 9; Civil Parish: Stratton; County Cornwall. GSU: 241273
- ^{xvii} Library and Archives Canada; Censuses; Census of 1842, Canada West
- ^{xviii} www.ontariogenealogy.com/uppercanadanewspapermotices
- ^{xix} Courtesy, Rare Books and Special Collections, McGill University Library, images available on-line
- ^{xx} INST 273, Lot 4, Con 3, Darlington; LRO Durham (#40)



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Surveyors as Expert Witnesses: From Stellar to Egregious

By Dr. Brian Ballantyne, O.L.S. (Hon), A.L.S. (Hon)

Miss Ann Elk

Ann Elk was an expert. Her expertise was dinosaurs, particularly the morphology of brontosaurus. Thus, she had a keen interest in brontosaurus-centric litigation and yearned to be an expert witness. One day, she was retained as an expert witness to assist the court in resolving a brontosaurus-centric dispute (BCD). And so, after years of observation and analysis, and months of trial preparation, it was her inescapable conclusion that: “All brontosaurus are thin at one end, much, much thicker in the middle, and then thin again at the far end.”¹ The court did not find her opinion to be helpful.

What of expertise involving real-world characters (i.e., those not in a Monty Python skit)? How have land surveyors fared as expert witnesses? What follows are five accounts of expert witnesses used to resolve boundary disputes hither and yon since 2011; accounts that illustrate the extent to which each assisted the court or tribunal.² Some are stellar while others are egregious (they are in no particular order).

Duty to court

Ontario courts require that an expert witness acknowledges in writing that it is her/his duty to provide:

- Opinion evidence that is fair, objective and non-partisan.
- Opinion evidence that is related only to matters that are within one’s area of expertise.
- Additional assistance as the court may reasonably require, to determine a matter in issue.³

Similar constraints on expert witnesses exist across all courts and tribunals in Canada.

In other words, expert witnesses exist solely to help the court to understand difficult stuff: “To provide opinions ... that are sufficiently informed by specialized knowledge and expertise to which the Court would not otherwise be privy.”⁴ This means that an expert witness’ duty to the court prevails over any obligation to the client. It might well be that an expert witness’ opinion contradicts a client’s position.⁵

In a dispute over damming a river in British Columbia, expert witnesses were rejected because they:

- Baldly concluded, unsupported by any real technical or scientific analysis.
- Offered value judgments.
- Rendered conclusions outside his/her area of expertise.
- Collaborated with another author (one person must be responsible for the opinion).

- Argued in the guise of opinion.⁶

In a nutshell, the courts ask two questions of expert witnesses:

- Will the opinion help the court to understand/resolve the issue? – Admissibility
- How much will the opinion help the court? – Weight

Assessing admissibility and weight are not easy tasks for the court. In a dispute over flooding of land in northern Ontario, there were 22 expert witnesses, including historians, foresters, erosion specialists, hydrologists, economists, and appraisers.⁷ The court found “all of the expert witnesses, with one exception, to be honest and forthright in giving evidence and approached the task with a genuine desire to assist the Court in the matter at hand.”⁸

The exception was an expert witness who was “an argumentative witness ... an advocate for the client rather than an independent expert providing evidence to assist the Court.”⁹ She/he:

- Refused to accept the obvious when it ran counter to his/her opinion.
- Engaged in unsupported speculation.
- Ignored publicly available evidence that contradicted some of her/his assumptions.
- Used generalized opinions, rather than data.
- Appeared to pick numbers with no evidentiary basis.

The court concluded that the “alleged expert opinion is mere speculation and quite worthless as an aid to the Court. For these reasons, his/her evidence is suspect and unhelpful, and I give it no weight.”¹⁰

Account #1 – Focus on the issue

In an Ontario dispute over the setback of a guesthouse, the defendant relied on a surveyor (expert witness #1). Expert witness #1 concluded that there was no alteration in the location of the crest of the escarpment, that the guesthouse was set back 16 m from the crest, and that it did not contravene the setback requirement.¹¹

The court accepted the opinion of expert witness #1 without reservation, given that he focused on the central issue, was a licensed surveyor, who visited the site twice, prepared an initial survey plan and an amended survey plan, and “gave a cogent explanation for why his plans of survey are more accurate on this issue than past surveys.”¹² The opinion of the plaintiff’s expert witness, however, was rejected because he/she did not have the same expertise, was not a licensed surveyor, had not visited the site, had not

retained a surveyor to inspect it, and relied overmuch on historical plans of survey, photographs and observing the site from the neighbouring parcel.¹³



Figure 1- The escarpment in question, overlooking Adolphus Reach.

Account #2 – Discount client’s beliefs

In an Ontario dispute over whether a watercourse was navigable and whether there was an express grant of the watercourse, the plaintiff relied on a surveyor (expert witness #2). Expert witness #2 concluded that the watercourse was not navigable and had been included in his/her client’s parcel. The court was unable to rely on the opinion, for three reasons:

- The opinion was heavily influenced by the client’s belief. The client believed that the river was included in the parcel, and expert witness #2 advanced his/her client’s belief rather than objectively analyzing the material: “Belief is really not what the court requires of an expert.”¹⁴
- Surveys of two adjacent parcels with similar Crown patent descriptions – done 40 years apart by expert witness #2 – yielded contradictory opinions. That is, the same facts led to the 1970 conclusion that the river was excluded from Parcel A and to the 2010 conclusion that the same river was included in Parcel B. This “significant prior inconsistent statement” was described by the court as “waffling.”
- The opinion was influenced by a rejection of the *Beds of Navigable Waters Act*, because expert witness #2 “did not believe in retroactive legislation.”

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Thus, the court found that expert witness #2 had “misapprehended his role as an expert witness.”

Account #3 – Be nice

In a Nova Scotia dispute between two brothers over a common boundary, each brother retained a surveyor as an expert witness. Expert witness #3 was retained to provide an opinion on the boundary, after it had been surveyed by the other surveyor. The court was critical of the opinion of expert witness #3, because he/she went beyond merely critiquing the other surveyor’s reports, by alleging that the other surveyor:

- Ignored, misused and misrepresented evidence, and relied on inferior evidence.
- Acted in a manner “contrary to the responsibilities of the surveyor in regard to his or her duty to the public and the Court as a professional Surveyor.”¹⁵
- Committed a gross error.

The court described these assertions of wrongdoing as “unwarranted, unfair and ... an inappropriate personal attack.” The opinion of expert witness #3 was rejected because she/he was not an impartial, independent expert providing objective evidence to the court. Rather, he/she entered the fray of advocacy, and had an adversarial approach.¹⁶

Account #4 – Admit the obvious

In a Quebec dispute over the flooding of lands by downstream damming, the respondent relied on a surveyor (expert witness #4). Expert witness #4 tried to discredit the other expert witness, because the latter was a hydraulic engineer and not a licenced surveyor.¹⁷ However, the tribunal held that:

Surveyors do not have a monopoly on area measurement technology, and engineers are also qualified to use these techniques, particularly the photogrammetric and planimetric methods, to calculate area.¹⁸

The tribunal noted that experts assist by applying a scientific skill to a set of facts and then expressing an opinion as to the conclusions.¹⁹ The tribunal was critical of expert witness #4 because he/she:

- Hesitated to answer questions clearly, particularly on the correctness of original surveys.²⁰
- Concluded that the area of the upland parcel remained unchanged, despite systemic raising of the reservoir by 8.5 ft (1,321.5 ft to 1,329 ft) since the time of the survey in 1943²¹.
- Disagreed that the average water level at the time of the 1943 survey was not 1,328 ft.²²

- Failed to do a rudimentary survey to calculate the location of the water boundary in 1943, despite visiting the Reserve “a few times” to do the cartography, to situate control points and to re-survey the rectilinear boundary.²³
- Refused to conclude that, if there was a gravitational slope in the reservoir, the waters would be higher upstream (at the Reserve) than downstream (at the dam).²⁴
- Thought that the standard when re-establishing a boundary was proof “beyond any doubt;” whereas it is only on a balance of probabilities.²⁵

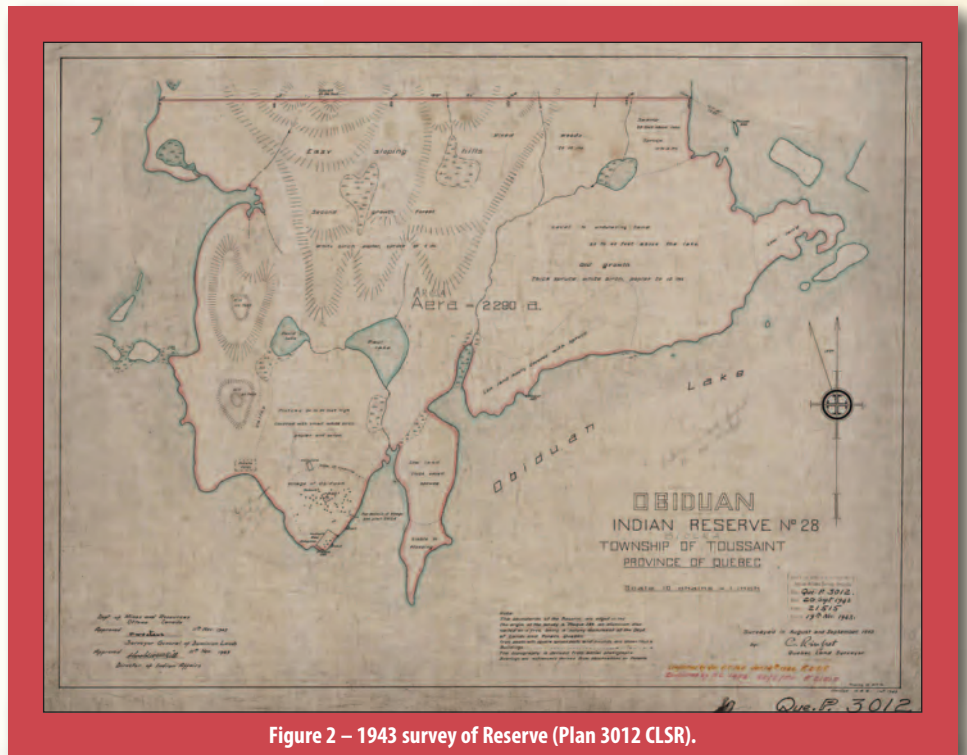


Figure 2 – 1943 survey of Reserve (Plan 3012 CLSR).



Figure 3 - 2015 orthophoto of south part of Reserve (Map 5894 RSQ).

The tribunal found the conclusion of expert witness #4 “perplexing” and noted that she/he had worked for six weeks to discredit the opposing expert witness, “even though common-sense dictates that the raising of the dam’s operating level resulted in the flooding of part of the Reserve.”²⁶

But wait – there’s more! The tribunal authorized expert

witness #4 to produce a supplementary report on a specific, narrow point: The source of a survey error made in the original survey (to explain the discrepancy between the area shown on the survey plan and the area that was surveyed) and the surveyor's mandate with respect to the error. However, the supplementary report of expert witness #4 exceeded the tribunal's mandate, engaged in argument, did not confine itself to technical knowledge, and sought to "embellish" his/her client's evidence. The tribunal rejected entire chapters and parts of chapters of the supplementary report.²⁷

Account #5 – Describe and explain

In a British Columbia dispute over the spatial extent of a parcel and the location of a rectilinear boundary, the respondent relied on a surveyor (expert witness #5). At issue was whether a parcel which had been conveyed to the Presbyterian Church should instead have been part of the Reserve. Expert witness #5 was instructed to:

- Describe surveys and boundaries in general.
- Explain how surveys were conducted in an historical context, including the instructions, regulations and standards that surveyors were expected to follow.²⁸
- Address the initial survey of the Reserve.

The tribunal found that the report of expert witness #5 assisted the tribunal by expressing an impartial opinion as to the Reserve boundary, discussing the role of the surveyor back in the day, and retracing the history of surveys of the Reserve. In short, the tribunal referred to and relied on 12 sections of the report of the expert witness and twice quoted his/her testimony. With two exceptions, the tribunal found his/her report helpful.²⁹

Conclusion - #humblebrag

This glimpse of land surveyors as expert witnesses in boundary disputes reveals that they either help or hinder the court. To be clear, the goal is to help the court. Humility is a virtue. Thus, avoid the temptations to promote the client's cause or to exclaim: "That's why I'm the expert and you're asking the questions."³⁰



Dr. Brian Ballantyne, O.L.S. (Hon), A.L.S. (Hon), BoundaryIntelligence <https://boundaryintelligence.ca/> advises surveyors, lawyers, administrators, landowners and First Nations on boundary principles. He also assists the courts with boundary-centric litigation. For further discussion, you can reach him at brian_ballantyne@hotmail.com

¹ Monty Python. Episode 31 – *All-England summarize Proust Competition*. November 16, 1972.

² The Specific Claims Tribunal resolves many boundary issues bedeviling First Nations Reserves.

³ Ontario *Court of Justice Act*, Form 53.

⁴ *West Moberly First Nation v British Columbia*, 2018 BCSC 1835, at para 122.

⁵ At which time, you will likely be shown the door.

⁶ *West Moberly First Nation v British Columbia*, 2018 BCSC 1835, at para 113 & 144.

⁷ *Southwind v Canada*, 2017 FC 906, at para 12.

⁸ *Southwind v Canada*, 2017 FC 906, at para 85-91.

⁹ *Southwind v Canada*, 2017 FC 906, at para 88.

¹⁰ Ironically, even the client of the expert witness distanced itself from his/her evidence.

¹¹ *Gobalian v Poxon*, 2020 ONSC 6750, at para 29.

¹² *Gobalian v Poxon*, 2020 ONSC 6750, at para 51.

¹³ *Gobalian v Poxon*, 2020 ONSC 6750, at para 28 & 52.

¹⁴ *Simpson v Ontario (Natural Resources)*, 2011 ONSC 1168, at para 49-53.

¹⁵ *Gallagher v Gallagher*, 2016 NSCA 2, at para 23.

¹⁶ *Gallagher v Gallagher*, 2016 NSCA 2, at para 25.

¹⁷ Despite conceding that photogrammetry "is not used as part of a survey mandate."

¹⁸ *Atikamekw d'Opitciwan First Nation v Canada*, 2016 SCTC 9, at para 152.

¹⁹ *Atikamekw d'Opitciwan First Nation v Canada*, 2016 SCTC 9, at para 176.

²⁰ *Atikamekw d'Opitciwan First Nation v Canada*, 2016 SCTC 9, at para 184.

²¹ *Atikamekw d'Opitciwan First Nation v Canada*, 2016 SCTC 9, at para 200.

²² *Atikamekw d'Opitciwan First Nation v Canada*, 2016 SCTC 9, at para 201.

²³ *Atikamekw d'Opitciwan First Nation v Canada*, 2016 SCTC 9, at para 227.

²⁴ *Atikamekw d'Opitciwan First Nation v Canada*, 2016 SCTC 9, at para 219.

²⁵ *Atikamekw d'Opitciwan First Nation v Canada*, 2016 SCTC 9, at para 222.

²⁶ *Atikamekw d'Opitciwan First Nation v Canada*, 2016 SCTC 9, at para 235.

²⁷ *Atikamekw d'Opitciwan First Nation v Canada*, 2015 SCT 1, at para 37-41.

²⁸ *Ahousaht First Nation v Canada*, 2019 SCTC 1, at para 86.

²⁹ *Ahousaht First Nation v Canada*, 2019 SCTC 1; with two exceptions, at para 136 and 201.

³⁰ Admittedly, exclaimed by a historian and not a surveyor. *Simpson v Ontario (Natural Resources)*, 2011 ONSC 1168, at para 15.

Sites to See

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

AND IN THE MATTER OF Eric Salzer, O.L.S.

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

SUMMARY OF THE DECISION OF THE DISCIPLINE PANEL

A virtual discipline hearing into allegations of misconduct by Eric Salzer, O.L.S., proceeded before a Panel of the Discipline Committee on April 22, 2021. The Association and Mr. Salzer jointly advised the Panel that Mr. Salzer was prepared to plead guilty to certain allegations; the parties had prepared an Agreed Statement of Facts as well as a Joint Submission on Order with respect to the penalty they proposed the Panel should accept.

The Statement of Facts provided facts regarding the complaint made by the Registrar, Kevin Wahba, O.L.S. Those facts can be summarized as follows.

The Facts

The allegations against Mr. Salzer arose out of a pattern of concerns related to Mr. Salzer's practice over a period of approximately 4 years. Over this period of time, the Association made several attempts to assist Mr. Salzer, including agreements as to how Mr. Salzer's practice could be improved and the involvement of a Monitor, Review Consultants, the Registrar, Complaints Committee and a previous Panel of the Discipline Committee. The Agreed Statement of Facts (ASF) was signed by Mr. Salzer and described a pattern of behaviour which demonstrated that Mr. Salzer is ungovernable when practicing on his own.

Mr. Salzer's guilty plea

Mr. Salzer agreed in the ASF that his conduct was constituted professional misconduct as described in the following sections of Regulation 1026 under the *Surveyors Act*:

- 35.1 (Contravening Legislation)
- 35.2 (failing to comply with performance standards)
- 35.18 (undertaking work beyond the competence or resources of the member)
- 35.21 (dishonourable or unprofessional conduct)

Mr. Salzer also agreed that his conduct was contrary to the following Code of Ethics requirements under Regulation 1026:

- 33(2)(a) (public trust and confidence)
- 33(2)(b) (abide by standards of practice)
- 33(2)(e) (ensure clients are aware)

The Panel accepted the ASF and accepted Mr. Salzer's guilty plea.

Penalty

The Panel accepted the Joint Submission which was agreed to and signed by Mr. Salzer prior to the Hearing. The penalty includes the following:

- a reprimand by the Panel to be recorded in the register;
- a revocation of Mr. Salzer's Certificate of Authorization for the firm LG Woods Surveying Inc., effective June 16, 2021;
- Costs of the proceeding fixed at \$2,500, to be paid by Mr. Salzer in no more than five (5) equal installments of \$500 due on the 15th of each month, beginning in June, 2021.
- Publication of a summary of the decision and reasons in the Quarterly, in In Sight, and on the AOLS website.

Discipline Panel Members

Tom Kristjanson (Chair) Ophir Dzaldov Douglas Hunt Julia Meldrum Smith Peter Meerveld, LGA

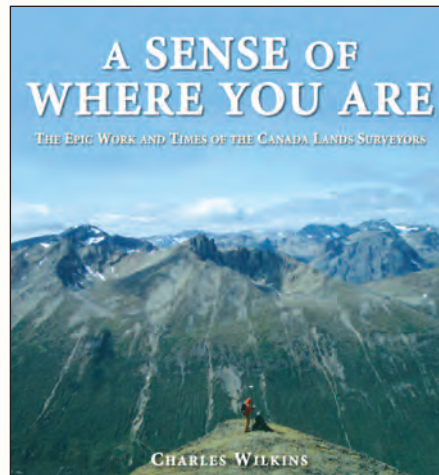
ACLS Book — Coming Soon!

The Association of Canada Lands Surveyors is working on a new book entitled **A SENSE OF WHERE YOU ARE: The Epic Work and Times of the Canada Lands Surveyors.**

Scheduled for publication in late 2021, the book is being written by Charlie Wilkins, author of numerous books, including **GREAT LENGTHS: A Celebration of the Surveyors of Ontario**, published in 2017, and is being designed by the award-winning designer of that publication, Dan Diamond.

A Sense of Where You Are is a story in the grand sense: one that brings together not only tales of individual surveyors and their work in far-flung parts of Canada but the story of the larger themes and elements that have shaped the Canada Lands and the history and character of a nation. The offshore waters; the National Parks; the fierce grandeur of the North; the Indigenous Lands – collectively,

these are the stage on which the Canada Land Surveyors work. This densely illustrated book is based on the author's travels to some of the most remote parts of the country, as well as on his interviews and interactions with more than a hundred surveyors and observers, and on months of historical research. While offering praise and attention where it is due, the book does not shy away from controversy or from the more complex issues that have confronted Canadians historically, and that provide an ongoing challenge to our surveyors today. Meanwhile, it is a captivating travelogue on our oceans and shores and hinterland, and a deeply personal testament to the many ways in which the Canada Lands



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For information, contact Jean-Claude Tétreault at executivedirector@acsl-aatc.ca



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NEWS FROM 1043

Changes to the Register

MEMBERS DECEASED

Ronald H. Gunn	946	Jan. 19, 2021
Harold A. Potten	CR26	Feb. 16, 2021
Talson E. Rody	1096	May 8, 2021
Robert W. Mackey	1063	May 18, 2021
David W. Lambden	821	June 4, 2021

RETIREMENT

John Kennedy	1442	Feb. 1, 2021
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COFAS APPROVED

AK & M Surveying Limited
Brampton, Ontario
April 9, 2021

Kevin P. Kujala Surveying Inc.
Huntsville, ON
May 25, 2021

COFAS REVISED

Was: L.U. Maughan Company Limited
Now: L.U. Maughan Surveyors (a Division of
Ivan B Wallace Ontario Land Surveyor Ltd.)
Parry Sound, ON
April 30, 2021

Was: Greg Bishop Surveying and Consulting Ltd.
Now: Bishop Geyer Surveying Inc.
Haliburton, ON
May 7, 2021

COFA CANCELLED

L.G. Woods Surveying Inc.
Dundas, ON
June 16, 2021

Surveyors in Transit

Correction from Spring 2021: In the last issue, **Lawrence Biason** was reported as retired. He is still an active OLS.

Rick Gauthier and **André Roy** are now with the **City of Ottawa**.

Fereidoon Khosravirad is now with **Alpha Surveyors Inc.**

Steve Gossling is now with **BaseLine Geomaterials Inc.**

Dave Hawley is now with **Genesis Land Surveying Inc.**

Athiththan Kanaganayagam is now the Managing OLS at **AK & M Surveying Limited** located at 15 Great Plains Street, Brampton, ON, L6R 1Z6.

Mayank Tandon is now with **AK & M Surveying Limited**.

Pearson & Pearson Surveying Ltd. has opened a new office located at 20 Waterton Way, Bradford, ON, L3Z 0R3. **Robert G. Pearson** is the Managing OLS.

L.U. Maughan Surveying Ltd. has been acquired by **Ivan B. Wallace Ontario Land Surveyor Ltd.** and is now **L.U. Maughan Surveyors (a Division of Ivan B Wallace Ontario Land Surveyor Ltd.)**. Robert Hawkins is the Managing OLS.

Sophie-Rose Côté is now with **L.U. Maughan Surveyors (a Division of Ivan B Wallace Ontario Land Surveyor Ltd.)**

Kevin P. Kujala is now the managing OLS at **Kevin P. Kujala Surveying Inc.** located at 857 Waseoka Lake Road, Huntsville, ON, P1H 2N5. Phone: 705.349.1636.

Rodney H. Geyer is now the managing OLS at **Bishop Geyer Surveying Inc.** located at 121 Mallard Road, Haliburton, ON, K0M 1S0.

Mojtaba Tavallae is now with **A.J. Clarke and Associates Ltd.** in Hamilton, ON.

Cole Raikes is now with **Avanti Surveying Inc.** in Etobicoke, ON.

Robert Fligg is no longer with **Natural Resources Canada**, Surveyor General Branch.

Rudy Mak Surveying Ltd. has opened a Consultation Office located at 32 Port Severn Road, Port Severn, ON, L0K 1S0. The office is open on Fridays.

Tulloch Geomatics Inc. has opened a Consultation Office located at 10-12 Brunswick Walk, Elliot Lake, ON, P5A 2A8. Hours are by appointment only and **Bill Webb** is the contact.

Ron Bridges is now with **Tulloch Geomatics Inc.** located in 1925 18th Ave. NE, Suite 115, Calgary, AB, T2E 7T8.

Robin Fleguel is now with **Tulloch Geomatics Inc.** in Huntsville, ON.

The office of **Farley, Smith & Denis Surveying Ltd.** has moved to 30 Colonnade Road North, Unit 275, Ottawa, ON, K2E 7J6.

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Survey Review Department Forum



By Tom Packowski, O.L.S., Chair Continuing Education Committee,
Manager Survey Review Department

Tracking Continuing Professional Development (CPD)

On December 31, 2021, the majority of AOLS Members will come to the end of their current CPD cycle, which began on January 1, 2019. My, how the world has changed in the ensuing interval. In January 2020, the AOLS migrated its continuing professional development over to GeoED www.geoed.ca and in July 2020, the AOLS introduced its new website www.aols.org. Both of these sites are essential to keeping a record of your CPD and both sites require a personal username and password. If you have not yet obtained a username and password for either site or, are having any trouble logging into either of these two sites, please contact member services at memberservices@aols.org. If you have not done so, you are encouraged to sign in and have a look around both websites.

CPD on GeoEd

In Issue 16, August 2020 of the AOLS “In Sight” newsletter <https://www.aols.org/about/media/in-sight-newsletter> there was a detailed article on how to access and use GeoEd. After a statistical analysis of user participation to date, it appears that a significant number of members are either not on track or not participating in the program. There are only six months left in the current three-year cycle. This is a concern for the Association since participation in a CPD program is a requirement of the Code of Ethics and Section 41 of O. Reg. 1026. The following is a summary of the August 2020 article.

In re-organizing the AOLS website, the CPD portion of the AOLS website is now located in the **members-only Portal**. In order to access the CPD portion, the members will need to click on *Membership Login* from the home page. If this is the **first time** you are logging in on the *new* website, please use the **“Reset Password”** function and you will be emailed a link to set up your password.

Once logged in, you will see the home screen of the Portal. Click on the image of the “globe” in the left-hand side menu to get to what we call the “Splash page”: From the Splash page, click on **My Membership**. You will be presented with the menu that includes

“My CPD”: and three options:

- Update my information;
- Renew my membership; and
- My CPD.

Click the CPD section and you are in. The **home page** of that section includes the CPD Program Summary, as well as the links to the full CPD Program and the Regulation. AOLS CPD activities for the period 2019 – 2021 may be viewed using the following path: **Home > Splash > My Membership > My CPD > AOLS CPD Activities 2019 – 2021**. This page is updated as new CPD opportunities are made available.

There is lots to see and explore on the first page of “My CPD”. The first option available to you on the menu at the left-hand side of the page is “Access GeoEd”. Please read, then save the [GeoEd User Guide](#) for your reference. It is a short read, only 10 pages but contains valuable information about the online CPD tracking system from the perspective of a Member of the AOLS. Remember GeoEd is used by other professional survey associations throughout the country, not just the AOLS.

To access the GeoEd site itself, click **GeoEd.ca**. It will bring you to the GeoEd site where you will be able to submit, edit and review your CPD activities.

Please note: The GeoEd site that is used for hosting our online CPD tracking is **completely separate** from our website. Your login for the AOLS site should be with your personal email, while your login for the GeoEd site would be the email that we had in our system for you prior to the switch to the new website (most likely, your work email). As always, if you have any questions, or are having difficulty logging in to either the AOLS Members-only Portal or the GeoEd site, please do not hesitate to contact member services at memberservices@aols.org.

If this is your first time on the GeoEd homepage you will see lots of information about what GeoEd is, what they do and what educational opportunities are available, many of them are free. But since you are interested in CPD input, you will have to wait for another time to explore. Once you have read the user guide and have obtained your username and password, click the User Login located at the bottom of the menu on the right-hand side of the home page.

The first page shows your profile. If this is your first time you will have to update your profile. Once you have updated your profile select “CPD” from the bottom of the menu located at the right-hand side of the profile page. You will be presented with a number of options including “View Cycle CPD Report” and “Add CPD”.

When you view your CPD report, you will have to select the organization you are with. Remember this site is used by several survey associations and some OLSs are also CLSs. Click “Association of Ontario Land Surveyors”. This will take you to the first page, a summary of your CPD report including name, number, home province, cycle start, and end dates and a total of the hours acquired within the Formal or Professional designations.

When you click “Add CPD”, you will first select one from the following five categories: Courses and Seminars (Formal for AOLS); Participation (Council or committee participation); Presentations and Papers; Meeting attendance (for example the AGM); and finally, Self-Study. Let’s use ‘meeting attendance’ as an example. Once you select this category you will be taken to the ‘create meeting attendance’ page. Simply fill in the requested information and click save. Review your input and edit if required. Note, you cannot edit out the category. If you select Meeting attendance and you meant Participation on a committee, you will have to start over from the category selection and re-enter the details.

CPD input takes time. The easiest and quickest way to input your CPD is to enter it as you acquire your credits. The hardest and most time-consuming method is to wait until the last minute. Choose wisely.

SRD Stickers, Virtual Stickers and Physical Stickers

On November 27, 2020, the Members passed By-Law 2020-02 dealing with stickers. This By-Law, effective January 1st, 2021, changed the fees for Plan Submission Forms. The By-Law also allowed for the usage of a physical Plan Submission Form (sticker) or a digital sticker.

Both the physical sticker and the digital, or virtual sticker, are purchased from the Survey Review Department (SRD) of the Association of Ontario Land Surveyors and are to be placed on one print of every deposited or registered plan, and on every original plan of a Surveyor’s Real Property Report (SRPR) and/or Plan of Survey (see By-Law 2008-01).

So, what is the difference between a physical sticker and a virtual sticker?

A physical sticker is a plastic sticker purchased from the SRD. Upon receipt of payment the Department mails or couriers the physical sticker to your Firm. On the other hand, a virtual sticker is a unique number, also

purchased from the SRD. Upon receipt of payment, the unique number is emailed to your Firm. Once you receive the virtual sticker number you digitally insert the number into an AutoCAD template of a sticker. The template of the sticker would be a drawing that your Firm has prepared and is available from your Firm’s AutoCAD library of pre-drawn templates.

How do I use the physical sticker and/ or the virtual sticker?

Both the physical sticker and the virtual sticker are used in the same manner and for the same purposes. If you are manually depositing or registering a plan at the LRO, you affix either the physical sticker or the virtual sticker as per O. Reg. 43-96 – Part 2 Plans - General, Sec. 7 (3). The LRO is instructed to accept either the physical or the virtual sticker.

If you are depositing or registering an electronic version of a plan under Part 13 of O. Reg 43-96, the process is only slightly different. The electronic version does not have a physical or virtual version of the sticker attached to the plan. Instead, an e-Reg plan has a statement referencing the sticker number only. The statement might reference a physical sticker number e.g., 123456 or a virtual sticker number e.g., V-12345. This statement is inserted directly below the Surveyors Certificate at the time of deposit or registration. Refer to O. Reg. 43-96 – Part 13 Electronic Registration and Deposit of Plans - General Sec. 75. Again, the LRO is instructed to accept a statement containing a reference to either the physical or the virtual sticker number.

If you are preparing a plan of survey or an SRPR for a private client, you affix either the physical sticker or virtual sticker to a reproducible copy of the plan or SRPR.

What are the advantages of virtual stickers?

The advantages include:

- quicker delivery so less inventory is required;
- less chance for the shipment to be lost or delayed in transit;
- potential reductions in scanning/printing - no requirement to scan a copy with the sticker affixed; and
- reduced costs to the AOLS.

Handling physical sticker purchases, preparing the packaging, labelling and shipping costs are all time consuming and involve additional expense, costs that are ultimately paid for by you the Members. With virtual stickers, aside from the initial setup, the recurring cost of physical stickers can be avoided.

If you are interested in a sample sticker template in dwg format with a ctb file for line weight, please feel free to contact the SRD.



Registrar's Review



By Kevin Wahba, B.Eng., LL.B., O.L.S., Barrister & Solicitor

Over the past few months, the Association has received several calls from members' clients to discuss concerns they have with their surveyors. Many of the calls were related to contractual disputes or lack of accurate communications between the client and their surveyor. Many concerns arise when, during a project, changes are requested or previously unknown issues arise, which require a change to the scope of work initially proposed. From the outset, it is highly recommended that any project be accompanied by a written contract (work order) outlining the scope of the work, the timeline, and cost of the work. Although this may seem obvious, many surveyors may be pressured to commence a project immediately and forgo the need for a contract. In other instances, surveyors who have worked with long-time clients may feel that a verbal agreement is sufficient and would not lead to issues during the project. Members of the public have contacted the Association in both contexts, and it is recommended that all communications, especially initial contracts

and scope changes, be documented wherever possible. A great resource to refer to would be the Business Practices Guide drafted by Julia Meldrum Smith, OLS. You can find this resource when logged in on the Members' side of the AOLS website. Home> Splash> Member Tools> Practice Manual> Survey Practice> Best Practices.

This is not the first article I have written about business practices, and certainly not the first to appear in the OPS, but in the past year, statistically speaking, issues arising from poor communications between surveyors and clients, contractual disputes, and inordinate delays have been received more frequently than boundary disputes, right of entry concerns and technical errors. This subject cannot be stressed enough and even the most business savvy and experienced surveyors can fall into the trap of not having strong documentation in place. Once a dispute arises, the AOLS attempts to resolve these issues without the need to escalate the matter to the Complaints Committee or another form of



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formal investigation, but most instances of negotiation must include compromise from both parties to come to a successful resolution.

Recently, many surveyors with whom I have spoken have highlighted the increase in workload they have experienced since the Pandemic began. Simultaneously, the AOLS has also received an increase of public inquiries and concerns from surveyors' clients, or their clients' neighbours, regarding issues they have faced with a surveyor. Often, these individuals are simply looking for clarification on how their surveyor came to the opinion illustrated on their final product or plan. Some members of the public are hoping to discuss the increase in fees charged or change in timelines

over the project. Others call in to ask for the AOLS to get involved directly with a dispute between them and their surveyor. The common theme between these and most other calls from the public is poor communication, or lack thereof. Whether the communication issue arose from a delay in response from their surveyor, their receipt of a final invoice without proper accounting or explanation, or a lack of clarity when describing the work done or to be done, these issues can typically be avoided by a simple and frank discussion between the surveyor and the client. Good communication is the key to good surveyor/client/neighbour relations.



Sites to See

Ministry of Northern Development, Mines, Natural Resources and Forestry (MNDMNR)

<https://www.ontario.ca/page/ministry-northern-development-mines-natural-resources-forestry>

The AOLS, which was formerly under the authority of the Ministry of Natural Resources and Forestry, will now be under the authority of the newly formed Ministry of Northern Development, Mines, Natural Resources and Forestry.

Also, within this site under "Topographic Maps", there is an application that allows you to view and make topographic maps, which also include the parcel fabric.

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Discussion Paper related to research of Private Survey Records

Research related to survey records continues to be a challenge for some surveyors with practices varying across the province. The Professional Standards Committee has prepared the following paper as a proposal to get feedback from members.

Background/Purpose

Concerns have been expressed by members about the level of research being undertaken by other members when searching for and acquiring other surveyors' records. This paper discusses the challenges, expectations and potential options related to searching surveyors' private records. It provides an alternative to acquiring "all" survey records in the vicinity of the survey. It does not offer definitive solutions but rather discusses considerations. It does not address the range of other researching that surveyors may have to perform in completing a survey. Members need to satisfy themselves that they have performed adequate research to confidently reestablish the location of a boundary.

Related Legislation and Regulation

The *Surveys Act* requires surveyors to maintain and provide survey records to other surveyors:

"Section 4 (2) Every surveyor shall make and preserve exact and regular survey records and shall index all such survey records and shall exhibit or give copies of the same to any surveyor for a reasonable charge. 2020, c. 34, Sched. 27, s. 2."

Regulation 216/10 under the *Surveyors Act* requires the following:

"6. (1) A professional member shall retain properly indexed records of all professional services provided to the public, including projects, and of all pertinent information necessary to reconstruct the details of the projects. O. Reg. 216/10, s. 6. (1).

(2) The professional member shall retain and maintain the records in a secure manner and in accordance with,

- a) the *Surveys Act* for records prepared for cadastral surveys; and
- b) the *Limitations Act*, 2002 for all other records. O. Reg. 216/10, s. 6. (2).

(3) In the records, the professional member shall provide sufficient evidence that the work conducted for a project meets the specified requirements and end results. O. Reg. 216/10, s. 6. (3).

8. When undertaking a survey, a licensed member shall,
 - (a) refer to the documentary evidence related to the land under survey and the land adjoining the land under survey;
 - (b) carry out a thorough field investigation for the best available evidence of all lines, boundaries, and corners of the land under survey; and
 - (c) give priority to the evidence in accordance with common law and statute law. O. Reg. 216/10, s. 8."

Documentary evidence indicated in sub-section 8 (a) of

Ontario Regulation 216/10 includes survey records created by other surveyors.

The need to search other surveyors' records (field notes) has been widely accepted historically. The Association of Ontario Land Surveyors (AOLS) Bulletin 1982-014 describes this clearly. It was again addressed by AOLS Bulletin 1988-031 which again requires the searching of other surveyors' records.

Other AOLS Bulletins address the provision of records 2007-01 (which superseded 1995-046) and 2020-01.

These noted bulletins are still current and are expected to be abided by.

Why Perform Research?

The courts and legislation have been very clear that a surveyor's duty when retracing a boundary is to use the best available evidence. Without proper research it will be impossible for the surveyor to be aware of the evidence and thereby consider it.

The principal object of the *Surveyors Act* is to regulate the practice of professional surveying and to govern its members and holders of certificates of authorization in accordance with this Act, the regulations, and the by-laws in order that the public interest may be served and protected. Without performing adequate research on other surveyors' survey records, it is possible, and in fact likely, that surveyors will differ in their opinions on boundary location. Besides the fact that an opinion without proper research is likely wrong, unnecessary differences in boundary locations will occur, which reduces the public's confidence in surveyors and results in unnecessary angst and expense for the public.

For simplification of the discussion on research, two primary categories of evidence are considered for other surveyors' survey records. The first relates to field notes and records associated with a survey related to a boundary creation. In today's environment that would normally be records associated with a registered plan (e.g., plan of subdivision, expropriation plan) or reference plan. Historically this could also include the first running of lines to define boundaries based on descriptions or plans that did not have the benefit of a field survey.

The second category of evidence relates to retracement surveys of existing boundaries. While these surveys are not creating boundaries, they provide an opinion of the location of the boundary and often include additional measurements to features that can help verify the location of monuments and can provide additional evidence to the location of a boundary.

It is acknowledged that surveys often include information

related to both creation of boundaries and retracement of boundaries (i.e., both categories noted above).

The first category of survey records provides additional information that may not be evident on the plan such as actual lines run and progression of the survey. This information may be very valuable in assisting to determine if monuments are in their original location or provide additional evidence beyond that shown on the plan where monuments are missing. They may also assist where measurements or other evidence shown on the plan do not agree with what is observed in the field.

As noted above, the second category provides additional information such as building ties, location of fences, or new monumentation that may help verify the location of the boundary or provide necessary additional information for retracement where monuments are missing or there are discrepancies in observations on the ground versus those found in the boundary creation surveys.

What is the Extent of Research Required?

An approach similar to that provided in the topic of performing research in the Land Registration System, which was presented by Izaak de Rijcke and Anne Cole at the 2020 Annual General Meeting, is proposed. Essentially it requires that a surveyor conduct enough research to be satisfied that they have acquired the relevant evidence to correctly retrace a boundary in its original location. This approach provides a pragmatic view, and many surveyors may argue that the only approach is to acquire all survey records. While this may be

preferable, depending on the survey activity in the area, acquiring all survey records could result in a significant amount of additional work and effort that may not be in the client's interest as they do not improve the accuracy of the boundary retracement. Surveyors have an obligation to consider all relevant evidence but perhaps not all evidence found in survey records is relevant to the survey at hand. This is a challenging proposition. How do you know that you have all "relevant" evidence? The following reasoning provides a proposal; however, it is recognized that it is impossible to describe all the scenarios and therefore surveyors must use professional discretion in making this determination.

The premise of using this approach, as opposed to acquiring all survey records, is that the surveyor has acquired sufficient survey records to be confident that they have reestablished the boundary in the correct location. It is also recognized that if a surveyor chooses to use this approach, they must realize that this could result in multiple trips to the site, since it will be impossible at the outset to gauge how confident you can be of the results until you have been to the site and considered the evidence on the ground. This may offset the benefit of not acquiring all survey records.

Considerations for confidence in your boundary decision include:

- original monuments exist and appear undisturbed, and match those identified in the records that have been collected,

cont'd on page 34

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- measurements shown on plans agree with observations taken during the current survey,
- occupational evidence aligns with the evidence shown on previous plans or field notes and does not indicate any potential encroachments, and
- the location of natural boundaries agrees with that shown on previous plans or field notes.

If you find any evidence of differing monuments (types or identification marks), measurements that do not agree, differing occupational evidence, etc. this should cause you to consider additional evidence to gain confidence that you are retracing the boundary properly. Further to this statement, a trend of showing monuments with “origin unknown” has been witnessed. This hardly lends confidence to a boundary decision that relies on a monument of unknown provenance. It would have to be supported by a variety of other evidence. Surveyors should make every effort to acquire the survey records that show the planting of the survey monuments found.

Category One Survey Records

Many surveyors do not bother to acquire the survey notes associated with previous plans creating new boundaries. By using the approach outlined here, that may be acceptable. If all the evidence agrees (e.g., monuments, natural boundaries and measurements all align) then using information on the face of the plan may be sufficient. If on the other hand, there are conflicts in the evidence on the ground (including any occupational evidence) then the field notes should be consulted to shed additional light on the reasons for any discrepancies. It is recognized that many of the plans being relied upon under this section will also have a component of retracement associated with them. In those cases, it is necessary to go back to the underlying plans/surveys and treat them in the same way. As such, boundaries being retraced under the plan would be included in the second category.

Category Two Survey Records

These survey records are particularly beneficial as time passes from the date of the original surveys and evidence associated with the original survey is lost or disturbed. Where there is contradictory evidence and/or missing monuments from the original survey, category two survey records should be acquired and considered. The question then is what records need to be considered?

At least two questions arise: how far from the subject survey should gathering of evidence be considered, and how many survey records in the subject area are necessary?

The requirements in regulation 216/10, as noted above, refer to the land being surveyed and the adjacent land. At the minimum survey records on the subject property and adjacent property need to be acquired and considered. Keeping with the notion of confidence in the boundary retracement, redundancy is required, which means at least three points should be established along a tangent (generally the street line). You will need sufficient survey records to provide evidence that agrees. If the three points do not line up and fit together, then additional points (and survey records) are required. In the ideal world records along the entire tangent or block front would be

obtained. Additionally, evidence on either side of your survey should be found if possible.

In many areas of the province, multiple surveys will have taken place on or adjacent to the survey being considered. The value of the previous retracement survey depends upon the relationships to existing evidence on the ground. You should have the survey records associated with any monumentation on the surveyed property or adjacent to it. The alignment (i.e., fit) with the original survey will lend a high degree of confidence in the retracement. The nature of the evidence on the ground will also influence which survey records will be of most value (e.g., if a lot has been cleared and new buildings put up, there will be little value of house ties to the previous building; if what appears to be the existence of original buildings, then those retracements closest to the original survey may provide better evidence). As such the age of features on the ground will impact which records may be of most value. Using the survey records, which appear most appropriate, provides a starting point, but acceptance of those alone will depend on the fit with evidence on the ground. If everything agrees, it may be unnecessary to obtain further survey records, however, if discrepancies still exist then further survey records should be acquired to seek additional evidence.

The methodology defined here assumes that the surveyor is at least aware of all survey records, and to then consider which ones may have the most relevance. Unfortunately, this assumption means that either an organized survey record catalogue, such as the Provincial Survey Records System, has been put in place and propagated, or that searches have been done of other firms practicing in the area. If searches have to be performed by other surveyors, the survey records should likely just be acquired, since the effort of finding and obtaining survey records is generally in the searching of them as opposed to the copying.

What about my own records?

If your firm has been in the practice of doing proper research, and you have previously surveyed the subject boundaries and are confident with your work, and there are no physical changes to the subject property or adjacent properties, then research for survey records behind that survey may be unnecessary since you should already have been aware of those. As noted above, if the observations in the field do not align with your previous work, additional research is likely necessary.

What factors contribute to inadequate research?

In discussions with surveyors, it would appear that the following factors contribute to inadequate research or not acquiring necessary survey records:

- Surveyors are unaware that another surveyor performed surveys in the area, (hopefully with the adoption of the Provincial Survey Records Index this factor will be removed in the future),
- Poor record management or systemic problems (e.g., non-surveyors holding survey records) has resulted in lost or

unavailable records, and/or

- Costs of searching or acquiring records is seen as too expensive.

The regulations will change to require surveyors to submit a record of their surveys into the Provincial Survey Records Index (PSRI) or an affiliated system. After the next five or so years this will allow surveyors to confidently search for appropriate survey records in the area of their survey. The process of loading the metadata into the PSRI will inevitably help surveyors with their record management. Many surveyors have already scanned plans and some field notes and are making them available efficiently. This has improved the records management.

The recent revisions to the *Surveys Act* will ensure that current survey records remain in the hands of practicing surveyors. While this does not address historical survey records that may have been lost, it should ensure their protection into the future.

The pricing of field notes and survey records has been an issue going back over several decades. In 2020 Council put forward Bulletin 2020-01 capping the price of survey records that may be charged to other surveyors. While this has helped, challenges still remain, and further consideration is required. The price of research and acquiring survey records is a cost of doing a survey and needs to be included when pricing a project for a client. There is no excuse for not performing sufficient research and acquiring survey records in order to be confident

in determining the correct boundary location. If the process noted above is adopted, any quotes or estimates for work would have to include a contingency for additional research and survey record acquisition.

Conclusion

Ultimately the level of research and acquisition of underlying survey records that have relevant evidence will impact the quality of the surveyor's opinion of a boundary and the AOLS obligations to the public. Surveyors need to do sufficient research to have confidence in their boundary decisions. It is up to the surveyor to acquire sufficient survey records to be confident that they have all the relevant evidence required to properly retrace a boundary. If in doubt, acquire all the survey records of the property in question and of adjacent properties. Failure to perform adequate research and consider relevant evidence is grounds for professional misconduct and/or incompetence. At least two members have had disciplinary action within the last year as a result of insufficient research. The Survey Review Department recently pulled apart the points awarded for insufficient research and have created a category specifically related to research of other surveyors' records.

Please forward any comments you have in this regard to the Executivedirector@aols.org, who will bring them to the attention of the Committee for consideration.



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Prospects for the new Galileo High Accuracy Service in Surveying

By Sunil Bisnath, Ph.D. P.Eng.

Introduction

In the early 1990s, as a summer student working for MTO, I gained my first experience carrying out geodetic surveys with something called the Global Positioning System (GPS). Much planning was required to perform static (relative positioning) surveys, given that there were only certain periods of the day that afforded enough satellite coverage overhead. Fast forward, GPS and now the generic GNSS (Global Navigation Satellite System) are the ubiquitous technologies for outdoor positioning, navigation and timing (PNT) applications. Central to GNSS use has been an “evolution” of satellite constellations and satellite capabilities, along with significant improvements in hardware performance, software capabilities, and GNSS PNT services. Figure 1 illustrates the current number of globally orbiting GNSS satellites and the number of signals they transmit. We are now living in a 100+ global navigation satellite world. Figure 2 shows the instantaneous number of GNSS satellites observed across the Earth’s surface (average over one day for satellites $>10^\circ$ above the horizon) as we add GNSS constellations. With so many satellites and signals to observe, it’s typical for signals from an average of over two dozen satellites to be available over much of Canada.

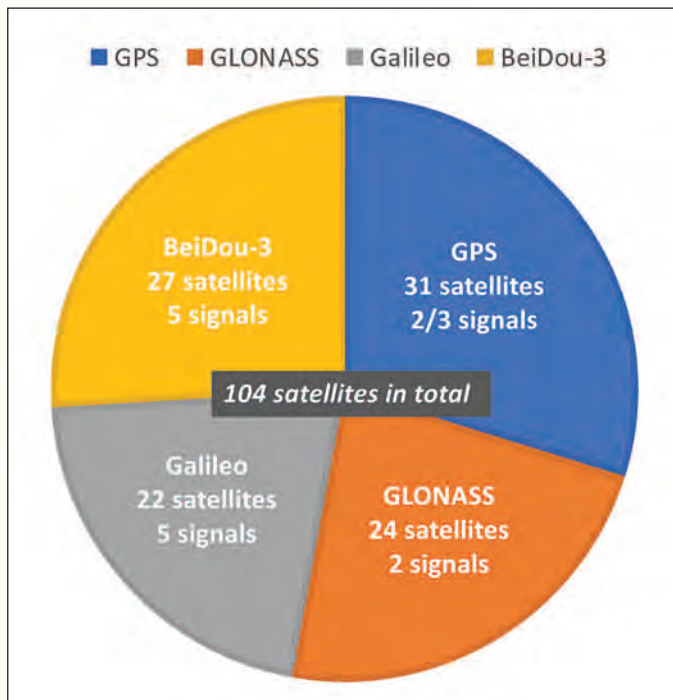


Figure 1: Current number of global satellites and signals.

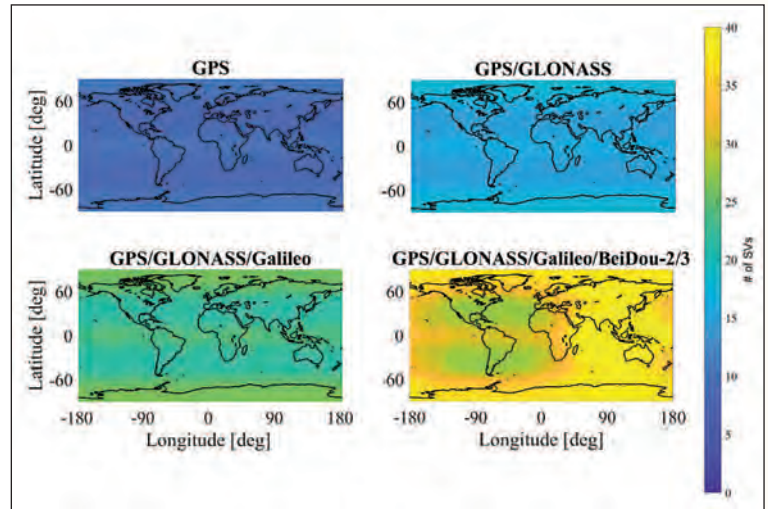


Figure 2: Average number of visibly satellites above 10° elevation angle (averaged over one day).

The purpose of this article is to describe a new service that is currently being implemented: the European Union’s Galileo GNSS High Accuracy Service (HAS) and a research project to assess its utility for cadastral surveys, in which the GNSS Laboratory at the Lassonde School of Engineering, York University is a participant. To set the stage for this discussion, this article will: review GPS/GNSS augmentations; summarize the Precise Point Positioning (PPP) GNSS measurement processing technique; describe Galileo and HAS; introduce the research project; and provide some early results and conclusions.

GPS/GNSS augmentations

GPS/GNSS technology is designed to produce so-called *point positioning* results, in which metre-level ranging measurements (pseudoranges) from each observed satellite are combined in a 4D trilateration (aka resection) formulation to estimate receiver position and time, given known locations of each satellite and several measurement error corrections, most notably the error in each satellite’s atomic clock. This measurement processing mode produces metre-level positioning accuracy under open sky conditions. Over decades, various augmentations have been developed to improve upon this positioning accuracy. Key to surveying has been relative positioning, which makes use of both pseudorange measurements and the more precise carrier-phase measurements that are carrier cycle ambiguous, and combines these measurements from a reference receiver (of known position) and the unknown location rover receiver to estimate relative position at the centimetre-level. From relative positioning, baseline *RTK* (Real-Time Kinematic) was

developed, and over regions, *NRTK* (network RTK), which interpolates estimated (satellite orbit, ionospheric and tropospheric) errors over a network of reference stations to provide RTK corrections to a rover receiver. Finally, *PPP* (Precise Point Positioning) was developed as a means of augmenting point positioning directly, by providing additional error corrections (from a sparse global network of reference stations) in the trilateration process without local reference/rover measurement combination. Figure 3 illustrates these different GNSS processing modes. In surveying, baseline RTK and NRTK commercial services are the typical methods to rapidly access consistent, few cm-level georeferenced, horizontal positioning. PPP tends to be used in real-time commercial or free web-based post-processing for geodetic surveys, with some commercial services having multiple NRTK and PPP options.

- 2) Adding the precise, but ambiguous carrier-phase measurements;
- 3) Adding additional measurement error modelling; and
- 4) Replacing the epoch-by-epoch least-squares estimator with a sequential least-squares or Kalman filter.

This expansion from point positioning to PPP is illustrated in Figure 4. Conventional PPP has been enhanced with additional functionality to increase positional accuracy and reduce solution initialization and re-initialization time as shown in Figure 5. Carrier-phase ambiguity resolution (AR) is now possible with PPP under certain conditions. The application of external atmospheric refraction corrections (mostly for the ionosphere) can aid in initialization and re-initialization time. And, as PPP does not benefit from local/regional calibration stations as is the case with

Mode	Typical operation	Operational range	Horizontal accuracy (1σ)
Point positioning	Real-time	Global	m
RTK	Real-time / post-processing	15-20 km baseline	cm
Network RTK	Real-time	Within network	cm
PPP	Real-time / post-processing	Global	dm-cm

Figure 3: Subset of GNSS modes of operation.

PPP enhancements

While RTK/NRTK are mature technologies, PPP research continues and enhanced commercial services continue to be introduced. The concept of PPP involves expanding point positioning by:

- 1) Replacing the broadcasted satellite orbit and clock information with much more precise orbits and clocks;

RTK/NRTK, significant measurement strength is introduced with additional constellations and signals, which can result in RTK-like performance. For two decades, commercial providers have developed the necessary global reference station infrastructure, error correction processes, communication satellite links and protocols, and GNSS receiver processing of PPP corrections. Some constellation providers and governments asked why the constellations can't provide such PPP corrections directly. BeiDou and Galileo have answered that call.

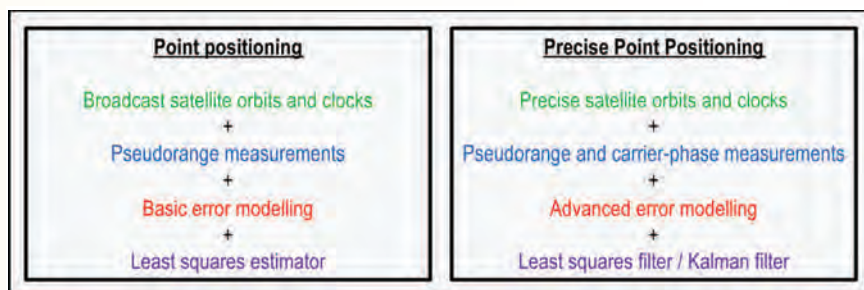


Figure 4: Point positioning and Precise Point Positioning (PPP).

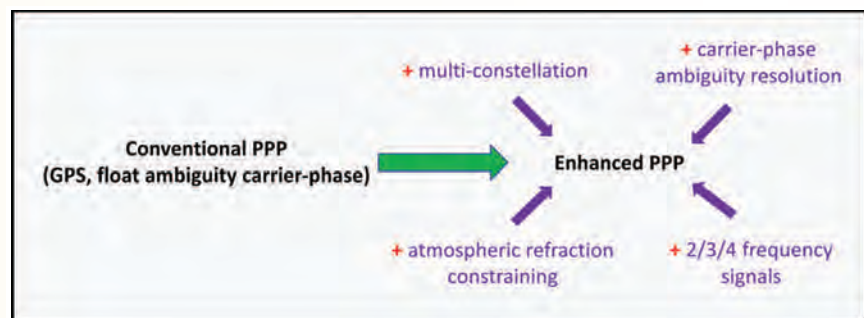


Figure 5: Enhancements to conventional PPP.

Galileo and High Accuracy Service (HAS)

Galileo is the European Union's GNSS. It attained initial operational capability in December 2016. Key highlights of Galileo are the advanced atomic clocks onboard each satellite, the large number of frequencies and signals transmitted, its interoperability with other GNSSs, and the multiple levels of services that will be provided. Figure 6 summarizes these services. The Open Service (OS) operates as the civilian GPS service does and provides freely available signals. The High Accuracy Service (HAS), the subject of this article, will provide additional accuracy in the form of PPP corrections and can be encrypted.

cont'd on page 38

Service	Key attributes	Status
Open service (OS)	<ul style="list-style-type: none"> Free service Future satellite data security through message authentication 	Operational
High Accuracy Service (HAS)	<ul style="list-style-type: none"> Additional precise navigation data Can be encrypted 	Testing
Public Regulated Service (PRS)	<ul style="list-style-type: none"> Restricted service for government authorized users High level of service continuity 	Initial service
Search and Rescue Service (SAR)	<ul style="list-style-type: none"> Search and rescue distress alert detection system 	Initial service

Figure 6: Galileo services.

The Public Regulated Service (PRS) is for government-authorized users, providing security and service continuity. The Search and Rescue Service (SAR) is a search and rescue distress alert detection system. The HAS signal structure has been developed and is currently undergoing initial testing. Its target market includes professional users (including land surveyors), mass market applications (such as for autonomous vehicles and drones) and safety of life applications (air, rail, marine, etc.). More information can be found at https://www.gsc-europa.eu/sites/default/files/sites/all/files/Galileo_HAS_Info_Note.pdf. HAS will provide a signal containing Galileo and GPS corrections for satellite orbits, clocks and biases and atmospheric refraction over Europe, allowing for better than 20 cm horizontal position accuracy (95%) within minutes. Figure 7 provides a summary of the service and performance.

Parameter	Service Level 1	Service Level 2
Coverage	Global	Europe
Corrections	<ul style="list-style-type: none"> Satellite orbits Satellite clocks Satellite biases 	<ul style="list-style-type: none"> Satellite orbits Satellite clocks Satellite biases Atmospheric refraction
Supported constellations	<ul style="list-style-type: none"> Galileo GPS 	<ul style="list-style-type: none"> Galileo GPS
Horizontal accuracy (95%)	<20 cm	<20 cm
Convergence time	<300 sec	<100 sec

Figure 7: Galileo High Accuracy Service (HAS) primary service and performance specifications.

GISCAD-OV Project

Galileo Improved Services for Cadastral Augmentation Development On-field Validation GISCAD-OV (<https://giscad-ov.eu/>) is a multimillion-dollar, multi-year project funded by the European Union and its purpose is to design, develop and validate an innovative

Objectives
Reduction of local augmentation service fees for cadastral surveyors (by at least 50% in medium term)
Reduction of local augmentation maintenance costs (through reduction of number of reference stations)
Re-sizing of local augmentation services: from raw measurements and satellite corrections to PPP, and precise estimation and broadcasting of atmospheric corrections
Adoption of low-cost receivers for cadastral surveying
Implementation of crowdsourcing approaches for exchange of local measurement errors for quick PPP
Preliminary testing of cloud services for infrastructural monitoring, also paving way for 3D cadastre

Figure 8: GISCAD-OV project objectives.

and cost-effective High Accuracy Service for cadastral surveying applications based on GPS and Galileo HAS using the PPP-AR technique. Some of the project objectives listed in Figure 8 are to develop processes to reduce GNSS augmentation service fees, reduce GNSS augmentation infrastructure maintenance costs, and adopt low-cost receivers.

A unique aspect of this project is that it brings together GNSS specialists from hardware and software developers, communications, the surveying profession and academia. The project team consists of ITC (information technology and communications) companies, GNSS companies, surveying organizations, research institutes, and universities. Partners and affiliations are listed in Figure 9. The primary role of the GNSS Laboratory (<https://gnsslab.lassonde.yorku.ca/>) at the Lassonde School of Engineering, York University is to provide independent validation of PPP corrections and PPP methodologies in the achievement of the project's positioning performance objectives. To gauge the potential impacts of this work for surveyors, some relevant questions the York team and our partners are expecting to answer are:

- Can PPP be efficiently and effectively used for cadastral surveys?
- What GNSS measurement processing is required?
- What GNSS corrections are required?
- What GNSS infrastructure is required?
- Can non-geodetic hardware be employed?

Some early York results

A great deal of project design and

Category	Partners
Information technology and communications	<ul style="list-style-type: none"> • Geoweb (Italy) • Exagone-teria (France) • SOGEI (Italy) • Geo++ (Germany) • NovAtel (Canada) • Geoflex (France) • Telespazio (Italy)
Surveying organizations	<ul style="list-style-type: none"> • National Centre for Geographic Information (Spain) • Council of European Geodetic Surveyors (Belgium)
Universities and research institutes	<ul style="list-style-type: none"> • University of Padova (Italy) • York University (Canada) • Technical University Delft (The Netherlands) • Research Institute of Geodesy, Topography and Cartography (Czech Republic) • Roma Tre (Italy)

Figure 9: GISCAD-OV project partners.

planning, and GNSS measurement processing software coding has been done with many interesting results to date. Two results are presented here to give a sense of the benefits of multi-constellation, multi-frequency PPP-AR processing for surveying. Figure 10 illustrates the benefits of multi-constellation observations in the presence of obstructions through the proxy of elevation masks above the horizon, e.g., operating in urban areas. Position Dilution of

Precision (PDOP) is a measure of point position precision based on the number of satellites observed and their geometry with respect to the receiver. A good PDOP is ~3-4 or lower. Our analysis shows that PDOP is similar for a four-constellation scenario with a 20° elevation mask, as for a GPS and GLONASS solution with only a 10° elevation mask (green circles), and not much worse with a 30° mask than for a GPS-only solution with a 10° mask (blue circles).

cont'd on page 40

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Mean PDOP for constellations / masks	10°	20°	30°
GPS	2.9	8.3	20.0
GPS + GLONASS	1.4	3.1	9.1
GPS + GLONASS + Galileo	0.9	2.0	5.2
GPS + GLONASS + Galileo + BeiDou-3	0.6	1.3	3.5

Figure 10: Mean PDOP values for constellation combinations with varying elevation masks to simulate effect of obstructions on multi-GNSS point positioning precision.

Figure 11 illustrates an example of PPP-AR initial convergence and horizontal positioning performance using surveying-grade hardware at a site in New Brunswick and PPP-AR processing with GPS and Galileo constellations simulating an RTK survey using planned Galileo HAS-like corrections. Each of the independent GPS and Galileo solu-

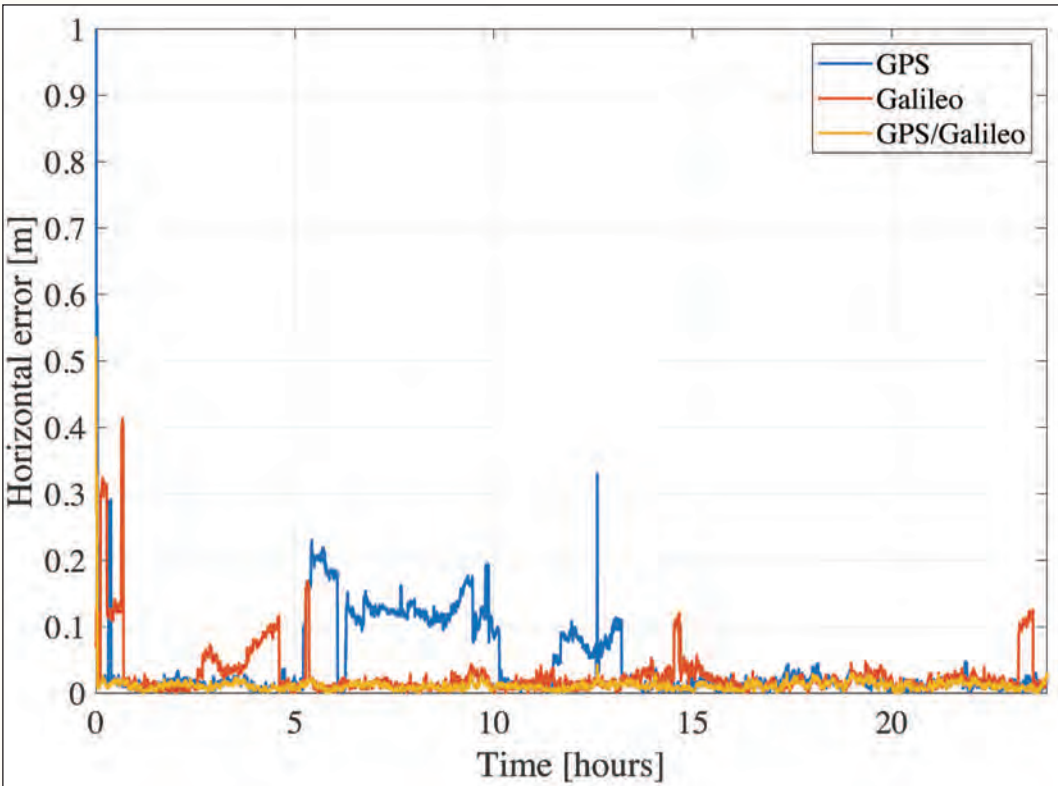


Figure 11: York PPP-AR simulated real-time, kinematic, horizontal positioning error results for a geodetic station in New Brunswick.

tions contain decimetre position jumps. Measurements from Galileo’s four frequencies allow for faster initial convergence than GPS. And the combined constellation PPP-AR processing allows for RTK-like performance – convergence

to 5 cm horizontal error in under 2 minutes and daily horizontal rms error of 2 cm.

Conclusions

GNSS, despite its limitations, has had a significant impact on surveying – which continues to grow. While PPP is not a mainstay in cadastral surveying, enhancements continue to increase the technique’s utility. The Galileo High Accuracy Service (HAS) will provide additional functionality to the surveyor in Europe and around the world. HAS and similar PPP services will further enhance RTK and NRTK options in the surveyor’s toolbox. And while physical limitations to GNSS use will always exist, expect continuous reductions of these negatives. Finally, it must be noted that mass market forces from, e.g., the automotive and smartphone industries are driving down the cost of positioning sensors, while allowing for greater sensor integration. The combination of these two forces will further positively impact the survey industry – perhaps the subject of a future article. 

Sunil Bisnath is a professor in the Department of Earth and Space Science and Engineering at the Lassonde School of Engineering, York University. He received his B.Sc. and M.Sc. in Surveying Science from the University of Toronto, and his Ph.D. in Geodesy and Geomatics Engineering from the University of New Brunswick. For over 25 years, he has been actively researching GNSS processing algorithms for a myriad of positioning and navigation applications. He can be reached at sunil.bisnath@lassonde.yorku.ca for further information.

Sites to See

The European Space Agency (ESA)

<https://www.esa.int/>

The European Space Agency (ESA) and European Union (EU) have signed a new Financial Framework Partnership Agreement (FFPA) to celebrate the launch of the new EU space programme and mark a fresh start for space activities in Europe. The ESA website features many interesting stories, videos and images.

Building Awareness for Geomatics at the Lassonde School of Engineering, York University

By Stacy Raivich

How do you increase student enrolment for Geomatics Engineering? It starts with awareness.

When high school students hear “Geomatics Engineering,” the vast majority have no idea what that means. In fact, many may not even understand what *engineering* means at all – and the few who do are likely only familiar with larger disciplines like civil and mechanical. That said, it is no wonder that increasing student enrolment in the geomatics program is a challenge, and as a result, the surveying profession experiences similar challenges.

So, how do we fix this problem? The first step is building awareness, because students cannot choose to pursue a program they have never heard of.

In the spring, the Lassonde School of Engineering at York University embarked on an awareness campaign for Geomatics Engineering. The campaign involved a refreshed webpage (<https://lassonde.yorku.ca/academics/geomatics-engineering>), series of videos, organic social promotion across a variety of networks and a paid email marketing campaign.

The video campaign featured three perspectives on the geomatics program. One from Geomatics Professor, Sunil Bisnath, who explained what geomatics is, provided real-life examples of geomatics at work and explained what types of students may enjoy the program and what projects they may work on. The next video came from a geomatics alumnus, Eros Gulo, who talked about his experience at Lassonde, what he enjoyed about the program and his career path after studying geomatics. The final video featured a current geomatics student, Krystal Reyes, who discussed her personal journey and reasons for studying geomatics, highlighted her favourite parts of the program and gave advice to future students.

“When students and parents hear about what geomatics – and surveying – is, they are surprised. They are impressed by what we do, the technologies we work with and the impact we make on society,” said Sunil Bisnath. “That’s why it’s important for us to increase awareness of our work and our field.”

To build awareness, it’s important to leverage a variety of channels – that’s why all videos were shared across Lassonde’s social networks including LinkedIn, Twitter, Facebook and Instagram, where, to date, they have reached

nearly 50,000 users, making over 13,000 impressions and garnering thousands of views.

In addition to organic channels, a paid campaign was launched to increase the impact and reach of the content. Lassonde partnered with an external company which ran a five-week drip email campaign to promote the geomatics program to a database of high school students, reaching over 9,000 unique recipients.

Now, one may ask, did this awareness campaign – which had an impressive reach – lead

to a drastically higher number of applications? The answer is no, at least not yet. Awareness campaigns take time – they are meant to introduce a program to prospective students, along with parents, guidance counsellors and other decision-influencers and encourage them to learn more about it. Over a longer period of exposure, as students build an interest and an understanding about geomatics, there will likely be a visible impact on the number of applications. However, this takes time; an awareness campaign is not the same as a recruitment campaign and a recruitment campaign can be much more successful after an impactful awareness push.

In the larger scheme, the more that students are exposed to science, technology, engineering and mathematics (STEM) education throughout elementary and high school, the better their understanding will be of engineering and its disciplines. This reality is just one of the reasons that Lassonde is investing in programs and initiatives, including with the AOLS, designed to make real systemic change in pre-university education to help build a more inclusive future, where students from underrepresented backgrounds can see themselves in an array of STEM pathways and become our geomatics engineers, land surveyors and industry innovators.

Stacy Raivich is the Communications Manager at York University’s Lassonde School of Engineering. She is responsible for brand storytelling, communications strategy development and creative initiatives at Lassonde for both internal and external audiences.



Krystal Reyes has just completed the Geomatics Engineering program at Lassonde. She will be graduating in October 2021.



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EDUCATIONAL FOUNDATION NEWS

Congratulations to our Spring Award Winners!

University of Waterloo – A *Geomatics Excellence Award* was presented to **Andrew Ding**, based on academic excellence as a full-time undergraduate student enrolled in year three of the Geomatics program in the Faculty of Environment.

York University – **Lassonde School of Engineering** – **Nathan Stachow** and **Felipe Gonzalez** received awards for the highest grades in *LE/ESSE 4670 Survey Law* and demonstrating a strong interest in cadastral surveys during the course.

Loyalist College – On June 24th, **Matthew Robinson** received the *Eastern Regional Group Leadership Award*, which is presented to a graduating student in the Survey Engineering Technician program for achievement in field surveying in courses Geomatics 1 and 2 and overall leadership. **Taulant Ndoj** received the *Eastern Regional Group Achievement Award*, which is presented to a graduating student in the Survey Engineering Technician program, for achievement in computer

assisted drafting in the course Survey Drafting.

Fleming College – **Dana McKee** received the *GIS Award*, which is presented to the student in the GIS Applications Specialist Program who exemplifies leadership in project management. The *Kawartha-Haliburton Surveyors Scholastic Award*, this year named in memory of William (Bill) A. Beninger, was presented to **Sonya Shuster**, a student in the GIS Applications Specialist program who attended Survey Camp and exemplifies leadership in the participation of assignments, and prepared exemplary field notes.

Your Donations make a lasting Impact!

When you donate to the Educational Foundation, you are helping Geomatics students achieve their goals. One of this year's Ryerson University Civil Engineering award winners, who is interested in pursuing a career in Geomatics Engineering, wrote in his thank you letter, "Receiving this award has reminded me that pursuing a path in engineering is not solely about reaching one's potential, but also about giving to and back to people".

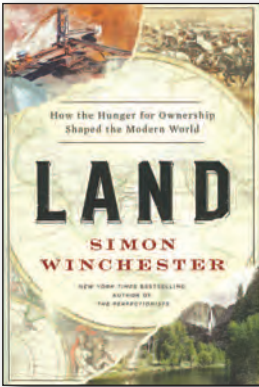
The Educational Foundation would like to recognize with thanks a donation made in the memory of Talson Rody.

BOOK REVIEWS

Land

How the Hunger for Ownership Shaped the Modern World

By Simon Winchester



Published by
HarperCollins Publishers
ISBN 978-0-06-293833-6

Land – whether meadow or mountainside, desert or peat bog, parkland or pasture, suburb or city – is central to our existence. It quite literally underlies and underpins everything. Employing the keen intellect, insatiable curiosity, and narrative verve that are the foundations of his previous bestselling works, Simon Winchester examines what we human beings are doing – and have done – with the billions of acres that together make up the solid surface of our planet.

Land examines in depth how we determine where the land lies, how we acquire it, how we steward it, how and why we fight over it, and, finally, how we can, and on occasion do, come to share it. Ultimately, Winchester confronts the essential questions: who actually owns the world's land, and how much of it do we really need, and why does it matter?

Information taken from inside the front cover.

Icebound

Shipwrecked at the Edge of the World

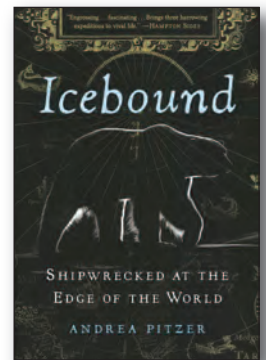
By Andrea Pitzer

The human story has always been one of perseverance – often against remarkable odds. The most astonishing survival tale of all might be that of sixteenth-century Dutch explorer William Barents and his crew of sixteen, who ventured farther north than any Europeans before and, on their *third* polar exploration, lost their ship off the frozen coast of Nova Zembla to unforgiving ice. The men would spend the next year fighting off ravenous polar bears, gnawing hunger, and endless winter.

In *Icebound*, Andrea Pitzer masterfully combines a gripping tale of survival with a

sweeping history of the great Age of Exploration – a time of hope, adventure, and seemingly unlimited geographic frontiers. At the story's center is William Barents, one of the greatest navigators of his time, whose larger-than-life ambitions and obsessive quest to chart a path through the deepest, most remote regions of the Arctic ended in both tragedy and glory. Journalist Pitzer did extensive research, learning how to use four-hundred-year-old navigation equipment, setting out on three Arctic expeditions to retrace Barents' steps, and visiting replicas of his ship and cabin.

Information taken from inside the front cover.



Published by Scribner an
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ISBN 978-1-9821-1334-6

Expedition Deep Ocean

The First Descent to the Bottom of all Five Oceans

By Josh Young



Published by Pegasus
Books
ISBN 978-1-6431-3676-9

Humankind has explored every continent on earth, climbed its tallest mountains, and gone into space. But the largest areas of our planet remain a mystery: the deep oceans. At over 36,000 feet deep, these areas closest to earth's core have remained nearly impossible to reach—until now.

Technological innovations, engineering breakthroughs and the derring-do of a unique team of engineers and scientists, led by explorer Victor Vescovo, brought together an audacious global quest to dive to the deepest points of all five oceans

for the first time in history.

Expedition Deep Ocean tells the inside story of this exploration of one of the most unforgiving and mysterious places on our planet, including the site of the *Titanic* wreck and the little-understood Hadal Zone. The expedition pushed technology to the limits, mapped hidden landscapes, discovered previously unknown life forms and began to piece together how life in the deep oceans affects our planet—but it was far from easy.

Information taken from the publisher.

The Last Word

Parting Words from Susan F. MacGregor, Surveyor General



Looking back over the past 35 years in surveying, I'm struck by the amount of change in technology and never-ending learning. I feel blessed by the opportunities I've been given and the relationships that developed from them. I was very fortunate to have had very patient Party Chiefs, experienced surveyors and mentors who took time to talk, and train, and share best practices or even mistakes in hopes that I might learn from them. I have also enjoyed working with incredibly dedicated civil servants with the highest integrity and desire to serve. Together we accomplished much.

At the Ministry of Transportation, we embarked on automating a Digital Title Record System and transferred hundreds of miles of highway to municipalities to rationalize the Provincial road network. I participated in several township retracements, control surveys and technical projects that furthered the development of aerial and ground-based data collection methods.

I was fortunate to work as Assistant Examiner of Surveys at the Ministry of Government Services at a time when the province was automating the land registration system. We provided advice and resolutions to Land Registrars who were charged with creating one uniform provincial system from localized practices dating back to 1796.

At the Ministry of Natural Resources and Forestry, under the guidance of Brian Maloney, I became Surveyor General. I provided

input to international trade agreements, hosted international visitors, supported a modern-day Algonquin treaty and saw several land claims to resolution. I participated in revisions to several Acts and Regulations, including a fundamental shift for securing mineral rights under the Mining Act Modernization initiative; in a project with Quebec to jointly re-establish the eastern boundary of Ontario; in planning exercises that clarified or defined the boundaries of protected lands and provincial parks; and I conducted several boundary hearings. I feel honoured to have served on the Ontario Geographic Names Board with colleagues who have historical and linguistic knowledge of Ontario that is second to none.

I have many good memories serving on the AOLS Council with many talented and dedicated members, lay members and AOLS staff. Their tireless efforts on your behalf are largely responsible for the continued trust the public have for this profession.

It has been a pleasure serving as your Surveyor General for the past eleven years. I would like to thank the staff of "The Office of the Surveyor General". They are the very best at what they do and regularly deliver real value to the people of Ontario and to this profession. I know you will be well served by Bruce Clark, our new Surveyor General. Welcome Bruce and enjoy the journey!!



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