The official publication of Engineers Geoscientists Manitoba

THE KEYSTONE PROFESSIONAL

AUTUMN 2019

October 16-18
2019

Ingenium

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1 thestar.com, "Average amount owing on mortgages rises 5 per cent, TransUnion Canada says," August 22, 2017.
2 moneysense.ca, "The real cost of raising kids," April 15, 2015.
3 Statistics Canada, "Average spending on goods and services and shares of spending of major categories by province, 2016," 2017.
4 See full First-Time Applicant Offer eligibility and offer details at www.manulife.com/springfree.

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The Keystone Professional Committee would like to hear from you. Please email your comments to: *DWawryk@EngGeoMB.ca.* Members are also encouraged to submit articles and photos on topics that would be of interest to the membership.

Available in alternate formats upon request

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FRIENDS OF ENGINEERING

SUPPORTING STUDENTS SUCCESS AT THE UNIVERSITY OF MANITOBA

The Friends of Engineering (Manitoba) Inc. are a unique group of Manitoba industry influencers and employers who strive to grow relationships between the Faculty of Engineering at the University of Manitoba and the engineering sector. Friends of Engineering increases networking opportunities between students and employers and strengthens the engineering practice components in the curriculum at the University of Manitoba. Their mission is to support the Faculty of Engineering's commitment to excellence in Engineering education.

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Friends of Engineering funding supports the following initiatives:

- UMSAE (Society of Automotive Engineers) Teams
- UMSATS (Satellite & Rocketry)
- We (Wind Energy) Design
- UM ecoMotion Team (Shell Eco-marathon)
- Technical Communication Course Prize
- BMED (Bio-Medical) Design Group
- U of M Great Northern Concrete Toboggan Race
- U of M Steel Bridge Team
- University of Manitoba Engineering Society
- Co-op/IIP Student of the Year Award
- Committee for Increasing the Participation of Women in Engineering

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U of M Steel Bridge Team placed 3rd in aesthetics category and 8th overall

UMSAE AeroTeam won 1st place at International Competition 2nd year in a row

We (Wind Energy) Design traveled to Netherlands to showcase their design

BioMedical Design Group won 1st place at Competition in Seattle, Washington

UM ecoMotion traveled to Shell Eco-marathon in Sonoma, California, USA

FRIENDS OF ENGINEERING

University of Manitoba

R. Eden, P.Eng., President 2018-2019

It Has Been an Honour to Serve as **Your President**

In my first *Keystone* article as President, I focused on the significance of the upcoming year for our Association – we are transitioning from our past 100 years towards our next 100. I discussed how we needed to ensure that the lessons learned from our past are not to be forgotten as we begin the thoughtful process of shaping our future. It was important to me that Council continued with initiatives that ensure we have a sound and strategic vision to begin the next 100 years. As I reflected on the past year while writing this article, I couldn't help but be proud of what has been accomplished and that we did indeed take big steps forward into our future.

During the past year, Council completed a full review of our Ends and Executive Limitations – these are two of the four policy instruments that identify our priorities and how we conduct business. Our CEO has also finalized a 3-Year Strategic Plan based on these Ends. Fiscal oversight has been improved with the addition of a Finance Committee and an Audit Committee to our governance structure. Council also held a Strategic Planning Session and identified the following two initiatives that should be given more consideration in the near future: possible regulation of computer software and new technologies (e.g. artificial intelligence, autonomous vehicles, Boeing 737 Max) and preparing our graduates for the "future of tomorrow".

I am very pleased to note that one of Council's long-term goals has been met – the entire set of bylaws has been reviewed and updated before our Centennial. This was a concerted effort by a number of dedicated and committed councillors and staff during the past four years. I want to assure all members that this review was not taken lightly, and countless hours were spent on this initiative by everyone involved. The end product speaks for itself.

Out of all the good work and initiatives that Council focused on over the past year, I am especially proud of one – approving a budget that creates a new program focused on increasing the diversity of newly registered engineers and geoscientists. Our professions can only be the best they can be when our membership is a true reflection of society. It is well known that our membership did not reflect society over the past 100 years. By creating this new program, we have taken a huge step forward in positioning our association to do just that in the next 100 years.

Even though I was warned that this year would fly by, it is still surprising to me just how quickly the end of my term has arrived. I would like to extend a sincere and very appreciative "thank you" to my fellow councillors, staff, and volunteers of the Association who supported and also challenged us over the past year. We are a better organization for it – now and in the future.

Council is very much looking forward to our Annual General Business Meeting in October and to the accompanying conference. Please be sure to say "hi" to me and all your councillors at *Ingenium*. If you have any questions or comments, please email me at *President@EngGeoMB.ca*.

It has truly been an honour to serve as your President.

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G. Koropatnick, P.Eng., FEC, CEO & Registrar

Changing the **Culture**

We often hear the expression *"The only constant is change."* Changes are happening all the time. Nothing remains the same over time. I've been a part of the engineering profession for 35 years. I've had the opportunity of observing it closely for the past 14 years as CEO and Registrar of Engineers Geoscientists Manitoba, therefore I have a pretty good idea of what the profession is like. So what is the culture of engineering? How would you define it?

> The time is right for more women to provide leadership in the engineering profession.

What is the Culture?

What are some of the attributes which we know about the culture of engineering? What are the things we are prepared to admit to ourselves (and are known and observed by others)? Here's one, there are way more men in the profession than women, about 9 in 10 engineers are men. Here's another, engineers are underpaid compared to doctors, lawyers, accountants, and others. A third characteristic, we're regarded as "geeks and nerds." In pop culture we're cast as the quirky science guy. Have you seen the popular sitcom "*Big Bang Theory*"? Wolowitz the engineer is denigrated by his Ph.D. genius friends and referred to as "only an engineer." How about "*Myth Busters*"? The hosts are curiously interesting and nerdy. Is it possible to change the culture? Is it possible to change how the public views us? I think so.

Too much cultural change too quickly can cause stress for some people. It can sometimes result in a pushback from those within the culture. Observers from outside might applaud and cheer, but they don't live within the culture. For example, one engineer said to me "There have always been more men than women. Why bother attempting to change the profession? It is what it is." Well, for a long time in history women were not allowed to vote, but that changed. On January 28, 1916, Manitoba became the first province in Canada to extend the vote to women. For a long time, the legal, medical, accounting, and dental professions had more men than women, but that changed too.

Difficulty Changing

Why is it difficult for some to change? Perhaps there are many reasons and no simple explanation. However, some people are both stubborn and emotionally unprepared to leave behind previous times and experiences, afraid to move forward. Why do a few people react with anger or some other emotion? Because they believe their values were not respected; they are offended. In some cases, they feel personally hurt.

Trying to Change

Engineers Geoscientists Manitoba is trying to change the culture of engineering with respect to women. This is a huge undertaking. Recently, Council moved to fund the "Engineering Changes Lives" project as an internal, ongoing program. A large group of stakeholders have been assembled to challenge parents, educators, employers, government leaders, and the general public to think differently about the role of women in engineering. The short-term goal is to get school-aged girls and women from diverse communities interested in an engineering career. Currently, the situation is lop-sided where only 1 in 10 engineers are women. The long-term goal is to create better workplaces by having more women practice engineering. More equitable workplaces mean that society will be better served by the engineering profession and others.

This is our generation's opportunity to encourage girls and women in our lives, daughters, nieces, granddaughters, and their friends, to join our profession in the same way the law, medical, accounting, and dental professions did decades ago.

Let Them Lead

The time is right for more women to provide leadership in the engineering profession. So men, let's let them lead. Some are really good at it; others have great potential and deserve the opportunity. It's already known that many women have the skills for teambuilding, coaching, and managing groups of people. This is a necessary input to any project or program. So once more, let's let them lead.

Your feedback is important. If you have any thoughts on anything you read in *The Keystone Professional* magazine, please email me at *GKoropatnick@EngGeoMBb.ca*.

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Meet the People That Make Life Work Better

Ray Hoemsen, P.Eng., FEC

Member Profile

Ray Hoemsen, P.Eng., FEC, is the Executive Director, Research Partnerships & Innovation for Red River College (RRC). In this role for over 15 years, he has overseen a rapid expansion of research infrastructure at the College, backed by numerous local, national, corporate, and institutional partnerships with over $85 million in external capital investment for research-related facilities and equipment. Ray is the recipient of a Gold Leadership Excellence Award by the Association of Canadian Community Colleges (2011), was appointed a Fellow of Engineers Canada (2010), and most recently, an Honorary Life Membership from Engineers Geoscientists Manitoba. In June 2019, he was appointed to the governing Council of the National Research Council Canada.

What was the catalyst for you to enter the engineering profession?

I grew up on the family farm, so I was always interested in how things work and that led me towards agricultural engineering. As an added incentive, in grade 9 or so I took an aptitude test which said I was not mechanically inclined. So, in part, I studied engineering to prove that that particular aptitude test was wrong.

What does a typical workday at Red River College look like for you? How has it changed over the 15 years you've been there?

As part of the Senior Leadership Team, a fair bit of time is spent on institution-wide matters. However, I am fortunate to have daily contact and interaction with our research team, as well as our external (and internal) partners so I continue to spend a significant amount of time networking and building/maintaining relationships.

Growth of the College's research enterprise has been constant since day one. Therefore, I would have to say that the biggest change has been in the increasing diversity and reach of our applied research programs and projects which are focussed on community/industry-driven problem solving and knowledge translation (putting theory into practice).

What advice do you have for people considering entering the geoscience and engineering professions?

Be ready to be challenged, stay focused and manage your time. But don't forget to balance study/work with other activities especially your family. And take time for yourself – to engage in a hobby, sports, volunteer or whatever else you find enjoyable.

Can you tell us about the new research facilities opening in 2019 and 2020? What was your role?

By the fall of 2019 our three new research facilities will be fully operational.

The Culinary Research Kitchen will build on Manitoba's strengths in food research, development, and innovation, enabling the College and our culinary experts to help our clients bring new food products or services to the market.

The Smart Factory is a state-of-the-art learning facility and applied research space that will directly support Manitoba's growing aerospace and manufacturing industries, and RRC's applied research initiatives emerging technologies such as metals additive manufacturing, collaborative robotics and autonomous factory vehicles, flexible robotic work cells, industrial automation, high-speed 3D laser metrology, and industrial networking.

MotiveLab™ is an extreme temperature climatic chamber with integrated 1,000 HP chassis dynamometer, capable of achieving extreme temperatures under full load on a year-round basis, and able to accommodate large on- and off-highway vehicles such as transit buses, agricultural tractors and fire trucks. MotiveLab™ also has a separate engine (1,000 HP) dynamometer test cell. Unique in Western Canada, MotiveLab™ will enable original equipment manufacturers, and their suppliers, in the heavy vehicle and automotive sectors to accelerate their product development cycles and get product to market faster. However, the focus will be broader than vehicle-related design evaluation and performance testing any application (e.g. civil infrastructure, building products, aerospace components, etc.) which require controlled climatic conditions are candidates for MotiveLab™.

You're a dedicated volunteer to many organizations, events, committees and boards – are there any that you'd like to get involved with in the near future that you have yet to?
I have been fortunate to serve on several technical, professional, and community organizations (primarily locally and nationally). I believe at this stage of my career, I would expect future opportunities at the national and international level to become available, as well as locally.

In your role at RRC do you have the opportunity to mentor students? If so, how, and why is it important?
I have limited opportunity to directly mentor students, however many of our research staff are able to through research-related projects. I encourage our research team to support design competitions (in all disciplines) since I find that students really benefit from the opportunities to develop their work-related skills, build teamwork, do things that interest them and have fun.

What do you get out of engineering that you couldn't get out of any other line of work?
It is hard to comment about other lines of work (it has been a long time since I worked in construction or the lab as a student) but I believe that the engineering profession is very satisfying since you get to see the results of your work helping others and making the world a better place.

Why is it important that there is diversity amongst the geoscience and engineering professions?
There are a lot of capable individuals who have a lot to offer our professions, we need to be more inclusive so that all benefit.

When you're not working or volunteering, you can be found doing what?
Normally, Joan and I spend a lot time with our grandsons (at the rink, pitch, diamond, pool, museums, out-and-about, and on sleepovers).

"I believe that the engineering profession is very satisfying since you get to see the results of your work helping others and making the world a better place."

University of Manitoba's Design Build Collaboration with Shoal Lake 40

New Feasting Pavilion for Shoal Lake 40 First Nation is the first structure built from Freedom Road. *Photography by Shawn Bailey*

By A. Nguyen, M. Arch.

"As a loose metaphor, engineers are not all stiffs and architects are not all sparkles." These were the words of a student who partook in a collaborative design and build course for engineering and architecture students at the University of Manitoba this summer. Eleven students from the two faculties had the unique opportunity to work with Shoal Lake 40 First Nation, an Indigenous community located on Shoal Lake at the Manitoba and Ontario border, to collaboratively design and build a feasting pavilion that acts as a place of celebration and memorial, a project chosen by the community.

A century ago, Shoal Lake 40 became landlocked when an aqueduct was built to service fresh water to Winnipeg. The aqueduct construction resulted in the community being permanently cut off, leaving residents to travel by water or an ice road to get to the mainland. This year marks the completion of the appropriately named Freedom Road, a 24 km long road connecting Shoal Lake 40 to the Trans-Canada Highway. The road will allow for a new water treatment plant to be built ending the community's boil-water advisory – with plans for a new school in the future. The new feasting pavilion is the first structure built with access from Freedom Road and celebrates its completion while paying respect to the lives lost due to prior dangerous travel conditions.

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Rear: Percy Mcleod, Sean Vandekerkhove, Kamal Kalsi, Daniel Funk, Jesse Adamson, Carl Balan, Aaron Balan, Shawn Bailey, Farhoud Delijani, Eva Yao, Braden Goodall, Amanda Nguyen, Nan Jiang, Resham Thind, Curtis Greene | Front: Neil Redsky, Eric Schillberg, Chelsea Dubiel, Sarah Dankochik (missing), Addison Greene (missing). *Photography by Robyn Adams*

University of Manitoba students attending Shoal Lake 40 First Nation's Freedom Road Pow Wow celebrations in June 2019. *Photography by Braden Goodall*

The course was led by faculty members Shawn Bailey and Farhoud Delijani from Architecture and Engineering Faculties respectively, with the support of faculty leadership. The course was held over eight weeks in May and June 2019, taking the students through a complete process from conceptual design to detailed design, culminating in a week of on-site construction at Shoal Lake. Student portfolios documented their work.

The design process began with a site visit to Shoal Lake 40 by the students, where they joined a drum ceremony and listened to life stories from community members. The students participated as the community chose a site on the shore of Shoal Lake for the pavilion. Back in studio, students participated in a design charette to brainstorm ideas and narrow in on one idea for development. Talks from Elders at Migizii Agamik, the Indigenous student centre on campus, helped students gain a deeper understanding of the Indigenous culture throughout the weeks of design. This process entailed group discussions, computer 3D modelling, and a physical scale model of the pavilion presented to the community on the day of the Freedom Road Celebration Pow Wow. Students created a full set of construction drawings for the 18 x 30ft pavilion to accommodate 50 people. Cedar was chosen as a building material, since it was natural, of the land, and naturally rot and insect resistant.

With approval from the community to continue with the chosen design, students ordered materials and worked at the Alternative Village on the U of M campus to pre-cut and pre-fab materials and problem solve issues that may delay construction on-site. In the meantime, Clint Swan, a member of the Indigenous community of Dog Creek, poured the concrete foundation slab for the pavilion.

A full week of on-site building at Shoal Lake took place in late June, with long days and an increasing sense of comradery between students and community members. At the end of that week, the main structural members were erected, leaving Aaron Balan, a member of Shoal Lake 40, and his crew to finish installing the roof. In the future, students from the community will be building picnic tables for the pavilion.

At the end of the course, students were asked to reflect on their experience. Below are excerpts from an interview with Sean Vandekerkhove, a 4th year environmental design student in the Faculty of Architecture and Chelsea Dubiel, a 5th year biosystems engineering student.

What was an important thing you learned about the Indigenous culture and the community of Shoal Lake 40?

Sean: During the tobacco ceremony when we were asked to offer some tobacco back to the land, we were reminded to always think about the land. In architecture and design, we don't think about the land as much as we should. Architecture tends to be inconsiderate of its surrounding and context, instead of healing, preserving and connecting to the land. In designing our structure, we wanted it to touch the land as lightly as possible and be as open as possible, so you remember that you're connected to the forest, lake, and sky.

What were other important design choices for the pavilion?

Chelsea: The structure was built with many features in mind to connect the users with the space around them. Aspects of the orientation of the building provide a connection between the road and the water. The building is oriented east to west acknowledging traditional Indigenous beliefs. The three-piece columns contribute to creating a space open to the land and the exterior rafters that point upwards create a connection to the sky.

What is this project's significance to reconciliation?

Sean: This project was a good step towards reconciliation and working with the community; because only in working together with each other can we even hope to help heal the wounds to bring our communities together.

Chelsea: As someone who has been living in Winnipeg all my life, it is my responsibility and honour to be a part of this project. I was born on stolen land and have grown up on stolen water. Shoal Lake 40's story is a unique one, but all too common story for many Indigenous communities. Colonization and the development of Canada, and Winnipeg in this case, has led to devastating results for Indigenous

Sunset on the 4th day of construction at Shoal Lake. *Photography by Shawn Bailey*

peoples. This project is one small step towards reconciliation. Being able to incorporate the youth, both from U of M and from the community has established roots, roots that we hope will grow. Reconciliation can be seen in small-scale projects, such as this, long term legislation, and so much more. We hope this project will ignite a fire of realised appreciation and obligation towards reconciliation.

What was it like partnering and working with Shoal Lake 40?

Sean: It was good having the community there with us, working alongside us, because we could all learn together. There were things that the community knew how to do better and some things we knew how to do better. We were able to learn from each other and share knowledge. Having the community build with us, we hope gives them a greater sense of ownership. Without them, the project wouldn't have as much significance.

Chelsea: It was a great experience! Getting to work so close and for an extended period with community members was an honour. Getting to know the people of the community, learn about their people's history, and their personal histories I believe is critical for any successful project. Being able to have empathy, understand the needs of the client, and be able to interpret that into a useful design is at the heart of any project.

What was it like to have engineering and architecture students working together?

Sean: The collaboration was very important to the success of the project. Having the chance to work with engineers was a great benefit, especially having engineers from the different

Feasting Pavilion on the 4th day of construction at Shoal Lake.
Photography by Braden Goodall

Model of feasting pavilion presented to Shoal Lake 40 community.
Photography by Braden Goodall

disciplines. They all have their views and competencies, so you have the opportunity to learn from everyone. The collaboration reflects the reality of a real working environment, where you need a variety of people to get projects done.

Chelsea: I learnt many things about the architecture process, which has some similarities but many differences to the engineering design process. It was very fun working with architecture students because we were able to apply our creative minds and remove (sometimes) our engineering minds that may restrict us from moving forward with a design. The things I learned from the architecture students will assist me in becoming more creative and open-minded to certain design features. As an engineer, I will now always consider how users are interacting with the design and how the aspects of light, openings, material used, etc. will make the users feel.

What did you most enjoy about the project?

Sean: The final build week in Shoal Lake and seeing the project come into reality. That's the most exciting part of the project, when the project comes to completion and everyone's hard work is finally realised.

Chelsea: Everything! Getting to design, learn, take part in community events, and build a large portion of the structure was so enjoyable. Getting to spend time in the community was no doubt the most valuable portion of this class. The site itself is very special to me. We spent so much time there, building, swimming, relaxing by the fire that now I feel like I am connected to that space. One other thing that made me so happy was to hear that the community reached out to the family members of the last people who lived traditionally on that site and have given them the right of naming the site. This is exemplary of Indigenous world views and the respect they have for their people and the land.

Want to hear more about this collaborative endeavor? Add their session to your 2019 Ingenium schedule and/or check out the project on Instagram at *@shoallake40designbuild*.

Special thanks to Dr. Jillian Seniuk Cicek, Dr. Kris Dick, Nishant Balakrishnan, Marcel Lehmann from the Faculty of Engineering, Elder Norman Meade and Carl Stone from Migizii Agamik, Ted Geddert from Holz Constructors, Roxanne Greene, and the community of Shoal Lake 40 for their hospitality.

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Engineers Geoscientists Manitoba's annual conference, *Ingenium*, is a premier professional development and networking opportunities for the engineering and geoscience community in Manitoba.

This year's Professional Development Seminars offer two stimulating keynote speakers as well as a broad range of breakout session topics under five themed tracks.

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2019 Highlights

Professional Development Seminars

Attendees will have the choice of 20 breakout sessions, offering a wide variety of professional development topics suited to all interests and experience levels. Additionally, our keynote speakers will maximize your professional development with engaging topics such as exponential technologies and adoption of engineering innovation.

Want even more?

Registered attendees also receive exclusive post-conference access to Professional Development Seminar recordings. Listen to the sessions you couldn't attend on the day, log additional ProDev hours, and expand your knowledge even further!

Looking to log ProDev hours?

Did you know… that attending the Annual General Business Meeting counts as hours towards your 'Participation' category for ProDev? So if you stay all day, you'll be earning hours for both 'Informal Activity' and 'Participation', while gaining valuable knowledge and being an active member of the Association.

Friends of Engineering Networking Reception

After the Annual General Business Meeting, join students from the University of Manitoba and Association members for a relaxed networking event. Enjoy a complimentary drink and some appetizers while mingling with representatives from a variety of student engineering groups, who will be showcasing their recent work.

Awards Gala Dinner

Don't miss the grand finale of Ingenium 2019! This annual black tie event highlights exceptional member achievements through the Engineers Geoscientists Manitoba Awards and showcases some of the best local entertainment. This year, we've collaborated with performers who will dazzle you around the ballroom.

Sponsorship Opportunities

There are multiple sponsorship opportunities available for Ingenium, offering companies a variety of in-person and media-based marketing benefits. From a booth at the Professional Development Seminars to the naming rights of one of the conference's high-profile events, there is a sponsor package to suit your company's needs and objectives.

For sponsorship information, please email *DWawryk@EngGeoMB.ca* or visit *www.EngGeoMB.ca/Ingenium*.

Professional Development Seminars

Thursday, October 17, 2019

7:30-8:25	**Registration & Continental Breakfast**				
8:25-9:30	**Welcome and Keynote** 2050: A Brave New World – *Nikolas Badminton*				
	Professional Practice	***Better Business***	***Environment & Climate***	***Technical Innovations***	***Workplace Skills***
9:35-10:25	Indigenous Perspectives: Historical and Present *– Linda Murphy, P.Geo.*	Your Assets are Speaking, Can You Afford Not to Listen? *– Suzane Greeman, Greeman Asset Management Solutions*	University of Manitoba's Design Build Collaboration with Shoal Lake 40 *– Architecture and Engineering students from U of M*	Making Space for Innovation: Ongoing Space Systems Research at the U of M STARLab *– Dr. Philip A. Ferguson, Ph.D., P.Eng.*	Discovering the Leader Within *– Ann Christoffersen, RGI Learning*
10:25-10:40	**Coffee Break & Booths**				
10:40-11:30	Development of Online Professionalism Modules *– Michael Gregoire, P.Eng., FEC*	Alternative Solutions *– Norman Garcia, P.Eng.*	A First Nation Leads the Way to Clean, Renewable, Local Energy in Canada's North *– Bruce Duggan, Boke Consultants and Members of Chief and Council of Northlands Dënesųłiné First Nations*	3D Scanning in Construction *– Eric Guoyt, EIT*	PANEL DISCUSSION: Enterprising Women: A Company of One's Own
11:40-12:25	PRESENTATION AND PANEL DISCUSSION: Incorporating Climate Change Adaptation and Resiliency into Infrastructure Design	Community Engagement – What is Involved and Why Does It Matter? *– Linda Murphy, P.Geo.*	Making Manitoba Green Again – From Myth to Reality *– Dr. Asia Shvarzman, EIT*	Innovation Partnerships: The Technology Access Centre (TAC) Model and Success Stories *– Dele Ola, Ph.D., P.Eng.*	Your Money, Your Retirement, Simplifying the Complex. *– Eliott Einarson*
12:25-1:35	**Lunch and Keynote** Building Bridges over the Valley of Death – A Road to Industrial Adoption of Engineering Innovation *– Dr. Philip A. Ferguson, Ph.D., P.Eng.*				
1:45-2:35	Addressing Microaggressions in Professional and Educational Settings *– Lisa Stepnuk*	VR for Business: Immersive Technology Isn't Just for Gamers *– Daniel Blair and Kevin Carbotte, Bit Space*	UM-agBOT: Engineering for the Future Farmer *– George Dyck and Franklin Ogidi*	Aircraft Engine Research and Development in Manitoba at GE TRDC *– Richard Lawrence, P.Eng.*	Who are you? Understanding Yours (and others') Distinct Personality *– Lisa Moretto, RGI Learning*
3:00	**Annual General Business Meeting**				
	Friends of Engineering Networking Reception				

For details of each session, visit *www.EngGeoMB.ca/Ingenium*.

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Opening Keynote

2050: A Brave New World

What will the future bring? This is a question posed to every traditional, and modern businesses. The future is being created today. Nikolas will look at who are the disruptors and what true innovation is. He will also highlight the exponential technologies that will change the world and show the 'signals of change' across industries where engineers and geoscientists have a big impact.

Nikolas Badminton

Nikolas is a world-respected futurist speaker, author, and researcher. He wows audiences with keynote speeches on the impact of exponential technologies including: Virtual, Augmented and Mixed Reality; Work Productivity; Hospitality and Travel; The Sharing Economy; Autonomous Transportation; Smart Cities; Education; The Future of AI integrated with Life and Business; and Predictions for humanity from 2019 to 2030, and beyond.

Nikolas regularly appears on the BBC, CBC, CTV, Global News, Fast Company, VICE, The Atlantic, and writes for the Techcrunch, Huffington Post, Forbes, Venturebeat, and other media.

Lunch Keynote

Building Bridges over the Valley of Death – A Road to Industrial Adoption of Engineering Innovation

As engineers, we continually strive to improve society with responsible technology implementations that promise to improve our daily lives. From automated controllers to electric vehicles, new medical devices to 3D-printing, the possibilities for modern innovation are endless. Some industries, such as the consumer electronics and automotive industries, have embraced new technology pathways. Other industries, such as the aerospace industry, have traditionally been reluctant innovators. While this reluctance often stems from an abundance of caution and conservatism, it points to a more fundamental gap between engineering research and industrial technology adoption or commercialization. Commonly referred to as the "Valley of Death", this talk will explore the disconnect between the engineering research being published in peer-reviewed journals and what eventually benefits industry and the public. We will discuss examples of technologies that successfully found their way into industrial applications, and other notable ones that did not. Most importantly, this talk will suggest strategies for bridging the Valley of Death through responsible research collaborations.

Philip A. Ferguson, Ph.D., P.Eng.

Dr. Ferguson holds a master's and Ph.D. from MIT in aerospace engineering. After graduation, he developed attitude control systems for small space telescopes at Microsat Systems Canada, eventually becoming the Engineering Manager. Dr. Ferguson then worked on the RADARSat Constellation Mission at Magellan Aerospace, eventually becoming the Engineering Manager for the electrical and software engineering teams. Later, Dr. Ferguson became the Vice President of Product Development at PrecisionHawk, where he led the drone engineering team. Dr. Ferguson currently holds the NSERC/Magellan Aerospace Industrial Research Chair in Satellite Engineering at the University of Manitoba. His research focuses on new spacecraft manufacturing and control technologies that can improve satellite reliability while reducing the cost and design times, thereby improving the accessibility of space.

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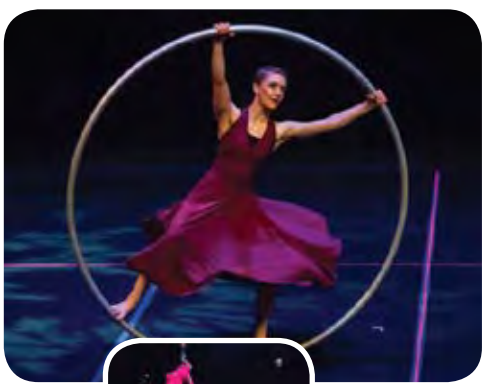
Awards Gala Dinner

Friday, October 18, 2019

The grand finale of Ingenium 2019 is the Awards Gala Dinner. Fine cuisine and highly enjoyable entertainment set the stage for a first-class evening honouring member achievements and corporate contributions to the professions. Guests are joined by representatives from government and industry on this special annual black tie event, featuring classic musical renditions by the Armadillo String Quartet, an exhilarating aerial show by the Momentum Aerial and Acrobatic Troupe, and an elegant performance by the Royal Winnipeg Ballet.

Tickets are available for $100 each, or $900 for a table of 10. For further information and to purchase tickets, visit *www.EngGeoMB.ca/Ingenium*.

Royal Winnipeg Ballet



Momentum Aerial and Acrobatic Troupe

Armadillo String Quartet

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October 16-18
2019

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SCHEDULE

16	**WEDNESDAY**	Recognition Wine and Cheese
17	**THURSDAY**	Professional Development Seminars
		Annual General Business Meeting
		Friends of Engineering Networking Reception
18	**FRIDAY**	Awards Gala Dinner

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ENGINEERS GEOSCIENTISTS MANITOBA

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Do you want to improve the performance of your asset portfolio? Learn how to identify and treat asset risks? Make financially optimized asset management decisions? If so, this course is for you. Come learn the skills you need to implement holistic and sustainable asset management practices in your organization.

Course Overview:

Over the last few years, the challenges of managing physical assets have grown. Asset-intensive companies are faced with aging assets, hyper-competitive markets, change-resistive culture, unpreparedness for digital-ready world, climate change, and ever-tightening constraints on funding.

This course focuses on global best-in-class practices to holistically manage assets and optimize levels of service over their life cycles. The course is anchored on three pillars, asset performance, asset risk management and business/ financial management. The course content is mapped to the ISO 5500x family of standards and the GFMAM Asset Management Landscape. The course is designed to be multi-disciplinary, in order to foster effective cross-functional collaboration when participants return to their workplaces.

Participants will receive a **Certificate of Completion** on successful completion of the course.

Who Should Attend:

This course is aimed at middle to senior management professionals in the public and private sectors including: Asset Managers, Asset Management Specialists, Maintenance Managers, Supply Chain Managers, Plant Managers, CIOs, IT Business Partners, Finance Business Partners, Internal Auditors, Operations Managers, Asset Integrity Engineers, Reliability Managers, Capital Program Managers, City Planners and all aspiring asset managers.

Registration:

Course Length: January 21 – 23, 2020, 8:30 am – 4:30 pm
Venue: Viscount Gort Hotel, 1670 Portage Ave, Winnipeg, MB R3J 0C9
Cost: $1,800 per person. Early bird pricing: $1,600 until **September 30, 2019**. Lunch and coffee breaks will be provided each day.
Registration: Please click the Registration Link or email us at: *info@greemanassetmanagementsolutions.com*

For group rates, please email us at: *info@greemanassetmanagementsolutions.com*

For more information on this and other course offerings, please go to:
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GAMSINC
Greeman Asset Management Solutions Inc

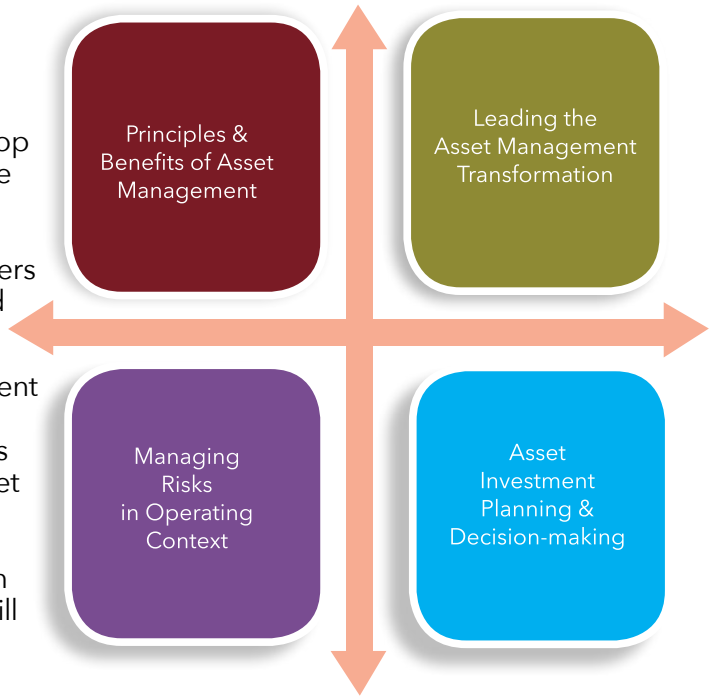
www.greemanassetmanagementsolutions.com

EXECUTIVE LEADERSHIP IN ASSET MANAGEMENT SEMINAR

Executives, do you want to a deeper understanding of asset management? Do you want to better understand the role of senior management in developing an asset management system for the organization? Then this course by Greeman Asset Management Solutions Inc is for you. The course will prepare C-Suite executives to lead their organizations through the asset management transformation.

Course Overview:

Top management is ultimately responsible for the performance of the assets entrusted to their organizations. Within this dynamic operating context, top management needs to proactively address risks, ensure that decisions can be funded over the long term, that assets are optimized and initiatives are appropriately scaled to the organization. This course will enable leaders to create and sustain the organizational culture needed to overcome the challenges in the operating context.



This executive master class will enable senior management to understand the benefits of asset management; how to develop an asset management program that achieves organizational objectives; and how to resource their asset management program with the right mix of internal and external stakeholders. The course will provide guidance on what the organization requires of top management in an asset management transition. Senior management will learn how to open the asset management dialogue with colleagues, middle management and consultants.

Participants will receive a **Certificate of Completion** on successful completion of the course.

Who Should Attend:

This course is aimed at C-suite management and other executives who manage infrastructure and manufacturing assets including: Board Members, Councilors, Elected Officials, Presidents, CEOs, CAOs, CFOs, Business and Finance Managers, General Managers, Managing Directors, Managing Partners.

Registration:

Course Length: February 26, 2020, 8:30 am – 4:30 pm
Venue: Asper Executive Education Centre – Great West Life Boardroom, 177 Lombard Avenue, Winnipeg, MB R3B 0W5.
Cost: $999 per person. Breakfast, lunch and coffee breaks are included.
Host: Greeman Asset Management Solutions Inc.
Registration: Please click the Registration Link or email us at: *info@greemanassetmanagementsolutions.com*

For group rates, please email us at: *info@greemanassetmanagementsolutions.com*

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Ethio-Eritrean Members Chapter

By G. Muluye, Ph.D., P.Eng.

On March 14, 2019, Engineers Geoscientists Manitoba approved the creation of the Ethio-Eritrean Members Chapter. While its only been five months since its establishment as a formal members chapter with Engineers Geoscientists Manitoba, the Chapter already has over 50 active members and several more affiliates. However, the history of the Chapter goes back to 2009, when six water resources engineering professionals began a bi-annual gathering to discuss how to foster networking and forge friendship amongst their Ethio-Eritrean peers.

Several years later, in March 2016, over thirty engineering professionals held another get-together with the intent to create a formal and more inclusive association. At the social gathering, an ad hoc committee was formed with the mandate to prepare a framework for discussion at a general meeting to be held in August 2016. The framework set forth a couple of directions: to establish a formal association, which led to the formation of Ethio-Eritrean Engineers Geoscientists Manitoba (EEEGM), and to work towards becoming a chapter of Engineers Geoscientists Manitoba.

The Chapter primarily focuses on supporting and encouraging individuals with Ethiopian or Eritrean heritage in the fields of engineering and geoscience, which include engineers, geoscientists, internationally-educated engineers and geoscientists, post-secondary work placements, and students.

The Chapter's main objectives are:

- To assist the Association in matters of engineering and geoscience as authorized by Council;
- To assist, support, and provide mentorship for members to become registered professional engineers and geoscientists with the Association;
- To support the educational aspirations of future members by granting financial support for academic endeavours;
- To promote, undertake or engage in programs, functions or activities that will contribute to the professional growth and career development of its members;
- To undertake and/or engage in community-based projects, and/or collaborate with community-based service oriented groups, or entities in their projects, programs and activities.

The Chapter is comprised of the following:

Executive Committee:

- Getnet Muluye, Ph.D., P.Eng. (Chair)
- Desalegn Edossa, Ph.D., EIT (Vice-Chair)
- Migbar Eressa, EIT (Secretary & Treasurer)
- Efrem Teklemariam, M.Sc., PMP, P.Eng., FEC (Councillor)
- Aryam Misgina, M.Sc., EIT (Councillor)

Advisory Board:

- Bereket Assefa, Ph.D., P.Eng.
- Daniel Asrat, Ph.D., P.Eng.
- Fisaha Unducha, Ph.D., P.Eng.
- Seifu Guangul, Ph.D., P.Eng.
- Sisay Asaminew, P.Eng.

To show your support and to learn more about the Ethio-Eritrean Members Chapter, the members encourage everyone who's interested to attend their Annual General Meeting and Professional Development Session on September 21, 2019.

For further information and to find out how you can participate, please visit: *www.enggeomb.ca/EthioEritreanChapter.html*.

Tissue Donation and Processing

By K. Dodds, P.Eng., MBA, CTBS

Most people are familiar with organ donation however have you ever wondered about tissue donation? Here's some insight into *How It Works!* Governed by the *Human Tissue Gift Act of Manitoba*,[1] Tissue Bank Manitoba seeks an informed consent for tissue donation when an individual has died. Should an informed consent be obtained, and the deceased fits the suitability criteria, a specialized team of Tissue Recovery Technicians will recover the tissues aseptically in a dedicated recovery suite or operating room. In contrast to donated organs which are often transplanted within a matter of hours after retrieval, tissue is processed and can take years to reach the recipient; generally speaking, processed tissue also has a minimum immunological response.[2] To date 869 generous Manitobans have chosen to donate their tissue for transplant. After developing a greater understanding of tissue donation and processing, it is my hope that more people consider the gift of donation.

Donated tissues can include skin, tendons, bones, ligaments, hearts for valves, and costal cartilage. Recovery of the tissue must be initiated within 24 hours from time of death if the body has been cooled or less than 15 hours if the body has not been cooled.[3] Once recovered, this tissue is transported to a processing facility where it is converted from the recovered tissue to what are known as allografts. An allograft is defined as "tissue intended for transplantation into a genetically different person".[3] Allografts are used for a variety of neuro, orthopedic, cardiac, and reconstructive surgeries. Surgeons can choose to use an autograft in lieu of an allograft for reconstruction or repair, the difference being that an autograft comes from oneself, for example the use of your own hamstrings (gracilis or semitendinosis) for an ACL repair.[4] Autografts are not processed in the same manner as allografts.

> To date 869 generous Manitobans have chosen to donate their tissue for transplant. After developing a greater understanding of tissue donation and processing it is my hope that more people consider the gift of donation.

While processing techniques for allografts vary between agencies and types of tissue, all processing done at registered and accredited facilities must follow a standard set of regulations as prescribed and inspected by Health Canada,[5] the US Food & Drug Administration,[6] and the American Association of Tissue Banks.[3] Prior to final disposition, the tissue will be stored in a deep frozen state (-70°C) or lyophilized for up to five years. In the case of a small number of allografts, the tissue is stored fresh for several weeks.[2] Once the tissue has met the requirements for suitability, it will be released from quarantine and transferred into a processing suite. In this microbe free cleanroom environment, only a single donor will be processed at one time. Tissue may be processed aseptically or terminally sterilized with gamma irradiation, x-ray beam, ethylene oxide, etc.[3] Processing not only converts the tissue to a more usable format but creates an extended preservation state which increases the likelihood of transplant, thereby allowing the donor's gift to be honored.

Commonly transplanted tissue in Manitoba includes skin and musculoskeletal tissue (tendon, ligaments, and bone).[7] Skin allografts are frequently used as a biological dressing for burn victims, breast reconstruction following a mastectomy, and other wound care. Skin can be recovered in full or split thickness. Split thickness skin (epidermis and part of dermis only) is recovered with the use of a dermatome or amalgatome, while full thickness (epidermis, dermis and part of hypodermis) is recovered with the use of a scalpel. Prior to recovery the donor site is prepped through the shaving of excess hair and application of antiseptic solution. The skin is selectively recovered from areas of the donor to maintain normal body appearance and facilitate open casket viewing. Once recovered, the skin is immediately placed in a sterile solution. Prior to processing, a method of pre-sterilization/pre-culturing is used to verify bioburden rates/microbiological contamination. This is to detect the presence of highly virulent organisms such as clostridium or streptococcus pyogenes. Bioburden is defined as, "population of viable microorganisms on or in tissue and/or the sterile barrier system (packaging)".[3] The processing of skin involves rinsing in disinfecting solutions followed by meshing and shaping to stretch the graft and maximize the amount available for surgical use. The cells that cause antigenic rejection can also be removed from donor skin, producing an acellular dermal matrix which can be transplanted without being rejected as a foreign material.[8]

Bone is the most frequently transplanted tissue in Manitoba.[7] Generally speaking, bone is soaked in sterile water, cleaned and shaped; the

bone marrow, lipids, and periosteum are all removed. With the donor cells removed, the bone then provides a scaffold for the recipient's own cells to grow into and through; the tissue then slowly regenerates transforming to match the recipient's own.[9] This process of osteogenesis is performed through osteoconduction or osteoinduction dependent on the properties of the allograft. For example, demineralized bone matrix and cancellous chips (bone formatted from small cube sized to powder preparations) has been shown to be osteoinductive – it can induce primitive host mesenchymal cells to initiate autologous bone formation.[2] Bone may also be shaped with the use of a Computer Numerical Control (CNC) machine to prepare highly specialized spinal and orthopedic grafts or alternatively transplanted whole.

Tissue transplantation has incredible potential because of the versatility of human tissue; advances due to processing of new tissue forms as well as expansion of surgical applications leave much unexplored opportunity. The convergence of nonprofit eleemosynary tissue banks with increasing demand for the specialized grafts is an ever-evolving conversation. It goes without question however, that allograft tissue continues to enhance the lives of patients who could not have otherwise been helped without access to these highly specialized materials. The generosity and selflessness of the donors and donor families is inspiring, and it is their desire to help others which enables these lifesaving and life enhancing technologies.

We'd love to hear about the interesting work you do. Send your *How It Works!* article to *DWawryk@EngGeoMB.ca*.

[1] The Human Tissue Gift Act, CCSM c H180, < *https://web2.gov.mb.ca/laws/statutes/ccsm/h180e.php*> Accessed 16 July 2019.

[2] Youngner, Stuart J., et al. *Transplanting Human Tissue: Ethics, Policy, and Practice.* Oxford University Press, 2004.

[3] *Standards for Tissue Banking.* 14th ed., American Association of Tissue Banks, 2016.

[4] Pietrzak, William S. *Musculoskeletal Tissue Regeneration: Biological Materials and Methods.* Totowa, Nj, Humana Press, 2008.

[5] Legislative Services Branch, SOR/2007-118. "Consolidated Federal Laws of Canada, Safety of Human Cells, Tissues and Organs for Transplantation Regulations." *Safety of Human Cells, Tissues and Organs for Transplantation Regulations*, Health Canada, 26 June 2019, laws.justice.gc.ca/eng/regulations/SOR-2007-118/FullText.html. Accessed 16 July 2019.

[6] Title 21: Food and Drugs. "Code of Federal Regulations." *ECFR*, United States, Food and Drug Administration, *www.ecfr.gov/cgi-bin/text-idx?SID=35490b41c66673c1a27db43cf23362e3&mc=true&node=pt21.8.1270&rgn=div5*. Accessed 16 July 2019.

[7] "Tissue Bank Manitoba | Shared Health." *Sharedhealthmb.ca*, 2019, *sharedhealthmb.ca/services/tissue-bank-manitoba*. Accessed 16 July 2019.

[8] Livesey, Stephen A., et al. "Transplanted Acellular Allograft Dermal Matrix." *Transplantation*, vol. 60, no. 1, 1995, pp. 1–9.

[9] Stevenson, Sharon, et al. "Factors Affecting Bone Graft Incorporation." *Clinical Orthopaedics and Related Research*, vol. 324, 1996, pp. 66–74.

Outstanding Year at the **16th Annual Making Links Engineering Classic**

The 16th Annual Making Links Engineering Classic (MLEC) was held on June 20, 2019. Our sold-out tournament hosted 216 golfers who played a challenging round of golf at the Quarry Oaks Golf Course in Steinbach, MB. Everyone thoroughly enjoyed the competitions and festivities, and the beautiful weather including a short rain shower to cool the golfers off, made it the perfect day to be out on the course.

This year's MLEC raised **$21,098** to go towards the benefit of Manitoba's future engineers at the University of Manitoba. To date, a total of over **$238,000** has been raised since 2004.

The Making Links Engineering Classic organizing committee would like to thank all players and sponsors for their generous contribution to the 2019 MLEC tournament, and for the support of the Faculty of Engineering.

Mark your calendars for next year's 17th Annual Making Links Engineering Classic Tournament on Thursday, June 18, 2020. We are hoping to break the $250,000 mark as we celebrate our centennial anniversary in 2020.

First Place Team: Sison Blackburn Consulting Inc.
L-R: Reynold Cabigting, P.Eng., Rich Sison, Silvestre Urbano, P.Eng., and Kurt Chekosky, P.Eng.

Second Place Team: Tri-Core Projects Ltd.
L-R: Ron Duncan, P.Eng., Mariya Duncan, EIT, Paul Finnbogason, and Clark Hryhoruk, P.Eng.

Third Place Team: Dillon Consulting Limited
L-R: Cam Ward, P.Eng., Caitlin Knight, P.Eng., Drew Monnier, P.Eng., and Robert Taylor, P.Eng.

Our 54 teams ready to get out on the course.

Michelle Stainton, P.Eng. and Rebecca Hewett, P.Eng. enjoying their day on the course.

It's always great to have the University of Manitoba Student Chapter of SAE International (UMSAE) join us.

Cheque presented to the Dean of Faculty of Engineering at the University of Manitoba, Jonathan Beddoes, P.Eng., Great-West Life representative, David Devine (Great-West Life), and Sports Committee Chair, Cam Mazurek, P.Eng.

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Making Links engineering Classic

Computer Benefits

By J. W. Bogan, P.Eng.

There are several ways that you, as an engineer might be able to use a computer. There are the obvious tasks such as spreadsheets and word processing which would normally be done by hand, which by using a computer may save a few dollars or some time. In these cases the savings would be marginal.

The real advantage of a computer lies in its ability to perform functions which you would like to do, but cannot. These jobs might include making significant reductions in the weight of a structure by considering several options, being able to produce estimates at three times your existing rate or by doubling your productivity. Clearly, the rate of return on computerization would be significant and gains could be realized immediately.

Recognizing that your funds are probably limited, you wouldn't want to hire more people to write programs or pay more than $5,000.00 for the hardware. However, you should also recognize that there are limits. Programming can be a difficult task and is best left to programmers. Programmers will be pleased to leave engineering to engineers. You should not underestimate the amount of work required to come up with a decent program.

Considering your budget limitations, don't expect full design features on the screen, rotating and zooming with drafting accuracy and automatic structural design to be available. Programs for this are available, but they have not advanced to the point where they are fast enough or easy enough to use to make them valuable.

The most useful applications include quotations and budgets. A spreadsheet program with data base retrieval capabilities can be used to organize materials and labour, evaluate alternatives and provide a fast print-out. You will have to spend time to learn the package, but the returns are immediate once past the learning stage.

Word processing can aid in preparing your own reports; take this one for example. How many times have you had to change what you think is the final typewritten copy which someone has laboured over. With a word processor you can easily make changes and make it perfect. It's easy to do paperwork when you don't have to backspace and lift off an incorrectly typed letter. If you don't type, it would be worthwhile to learn..Those who believe in the two finger hunt-and-peck method soon discover it is not an efficient method for using a newly acquired computer. Your attention will be diverted to finding the correct key rather than what the information it is being used for. Experienced users can type faster than they can write and the word processor allows changes to be easily made. Copies can then be quickly produced.

The computer can be made to play a real part in an engineer's life without getting too fancy.

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Easton L. Lexier

By K. Woychyshyn

Six out of seven days per week, Easton L. Lexier walks the grounds of the Asper Jewish Community Campus in Tuxedo. There, he goes to the gym, where he does rowing, biking, and free weights, and meets friends at the Starbucks for coffee. He knows the campus well; he's been going since the first day it opened, and though his presence may be a familiar one, many won't know why the buildings hold so much meaning to the 94-year-old man. They won't know that the Asper Jewish Community Campus was the last engineering project he worked on before he retired in 1997.

Easton Lexier was born in 1926. He graduated from civil engineering at the University of Manitoba in 1948 and found his way into Green Blankstein Russell and Associates (GBR) as one of their first three engineers. Starting in the position of Design Engineer, he worked his way to Structural Engineer, Chief Structural Engineer, and finally Principal Engineer. He worked in the industry for 50 years, before retiring in late 1997.

When asked what made him choose engineering, Lexier was quick to respond. "Well, I'm Jewish, and at that time professors were not always welcoming to Jewish men or women," he says, "I knew that medicine was not right for me, and though I looked into accounting, I decided to pursue engineering – and I'm not sorry I did."

Photos courtesy of the Winnipeg Architecture Foundation.

On a leisurely stroll around the city, one will see at least one building that Easton Lexier was involved with in his career, including the Winnipeg City Hall Complex, St. Boniface General Hospital, Grace Hospital, Engineering Building at the University of Manitoba, Polo Park Shopping Centre, and Centennial Concert Hall.

He doesn't have a favourite but there are a few that stand out in his mind, in particular, the former Winnipeg International Airport terminal building.

"I'm so proud of all of the projects," he recounts, "but the first Winnipeg Airport – that was my number one. I want to cry whenever I go and there's nothing there."

The former Winnipeg International Airport Terminal Building was closed in October 2011 and demolished shortly after.

With hundreds of buildings in his career history, Lexier also says that working on the Coolidge International Airport and Air Terminal in Antigua (in the West Indies) was a standout experience.

"When I undertook a job, I undertook it to do it." Lexier commented, though he observed that things used to be

different, with less bureaucracy. "Back in the day, people would meet – man to man – and agree on a project, no lawyers or anything like that."

One major change that Lexier noted was the invention and advancement of technology, like the computer.

"I wanted nothing to do with it." Lexier stated, "To this day, I still prefer pen and paper – and I have for over 70-odd years." Before the computer or the advancement of calculators, he and the other engineers at GBR also used slide rules and abacuses.

Other changes included the use of new materials and adherence of new codes.

Lexier looks back at his career fondly, even parts of it where he took on more responsibility at GBR. "I was an easy manager; respected by my employees," he says, "maybe I wasn't the greatest manager, but I enjoyed the role and was generally easy on people. If I wasn't, then they weren't there (on the team)."

Lexier retired from GBR in 1997. He chuckles when people ask him if he feels he retired too early. "It wasn't too early – 50 years was enough," he says, "it was probably too late. There were other people who wanted to keep going, to move forward, so I decided to go. I worked with the association until it was time and then left."

He admits that he had no idea what he would be doing when he retired, feeling as if he'd had no serious hobbies. He served on the Canadian Commission on Building and Fire Codes from 1996 to 2004 and was a chair on the Winnipeg Building Commission.

In addition to spending his time at the Asper Jewish Community Campus, he visits his wife Debby in an assisted living facility, maintains the garden behind the house (with her consultation), and spends time with his family – three of whom are engineers themselves.

Lexier has been retired for 22 years. "My advice to new retirees is to keep moving," he says, "don't stop doing things and keep active."

We hope you enjoyed our first *Lasting Legacy* piece, whom else would you like to learn more about? Send your suggestions to *DWawryk@EngGeoMB.ca*.

The Water in **Winnipeg's Basement**

By R. Reichelt, P. Geo., FGC

No, we're not talking about the sewer backups that people occasionally suffer in Winnipeg. Rather, let's talk about the geology and hydrogeology below the city of Winnipeg. The water in Winnipeg's basement is in a bedrock aquifer confined by overlying glacial sediments. Among other things, it affects how building foundations are constructed in this city. The water in the basement is on the rise.

This subject was previously discussed in the Spring 2011 Edition of *The Keystone Professional* in an article by Ganpat Lodha.[1] However, the subject is worth re-examining if only because the situation remains of concern.

Winnipeg Geology

The geology of Winnipeg is best described from the point of view of drilling a borehole from the surface to the underlying bedrock. Once you drill past the engineered and landscaped surface materials, you will get into brown silty clay that is sometimes called the Complex Zone.[2] This zone is generally two to three metres thick and was deposited by periodic floods of the Red, Assiniboine, and Seine Rivers.

Beneath the Complex Zone is the glaciolacustrine clay deposited in Lake Agassiz, a glacial meltwater lake that covered much of Manitoba at the end of the Pleistocene. The glaciolacustrine deposits range in thickness from 10 to 20 metres and are sometimes called blue clay or gumbo.

Beneath the clay deposits lie three to four metres of glacial till. This till is made up of ground up bedrock; the upper part of the till is somewhat softer, and the deeper part of the till is very dense. This denser till is where auger drills will stop penetration, usually referred to as auger refusal.

Under the glacial deposits is dolomitic limestone of the Red River Formation, Ordovician in age. The upper 15 metres or so the bedrock is fractured, and these fractures host the Upper Carbonate Aquifer.[3] This is the water in Winnipeg's basement. Figure 1 shows a three-dimensional geological model of southeastern Manitoba, including the Winnipeg region.[4]

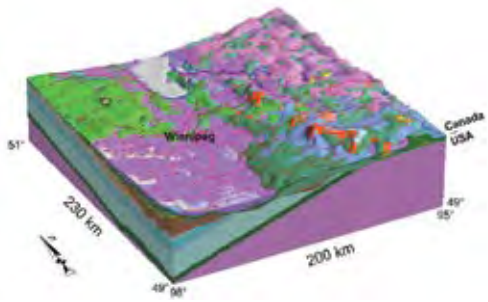

Figure 1[4]

The Upper Carbonate Aquifer

Groundwater flow in all aquifers has a horizontal component and a vertical component. The vertical component of groundwater flow in Winnipeg is upwards. If you install nested piezometers in the clay, till, and bedrock, the different hydraulic head readings will show an upward flow direction. Take a moment and think about that. The horizontal component of the Upper Carbonate Aquifer is shown in Figure 2,[5] below.

Groundwater flows towards Winnipeg in three major regimes. From the west comes continental basin flow. Originating

Figure 2

in Montana, the water flows down through the Williston Basin and acquires a heavy load of dissolved solids. The continental flow discharges west of Lake Manitoba in a series of saline seeps. Under Winnipeg, this salty water is found under the southwest part of the city.

A groundwater high north of Winnipeg drives groundwater towards Winnipeg. This water is fairly fresh and probably originates in the fresh meltwater that was forced into the aquifer under the continental glacier. Finally, there is a groundwater high east of Winnipeg that drives fresh water towards the city.

Changes in the Aquifer

In the past, groundwater withdrawals from the Upper Carbonate Aquifer for industrial processes created a marked groundwater depression cone.[2] However, as industrial activity has changed in Winnipeg, groundwater withdrawals have decreased, resulting an average increase in hydraulic head of approximately ranging from one to seven metres in the period from 1979 to 2009.[6] The effect of this rise in the hydraulic head has been an average increase in hydraulic pressure from the aquifer of approximately 28 kilopascals (4psi).[6] Figure 3 illustrates the changes in hydraulic head (also called potentiometric surface) in the aquifer.

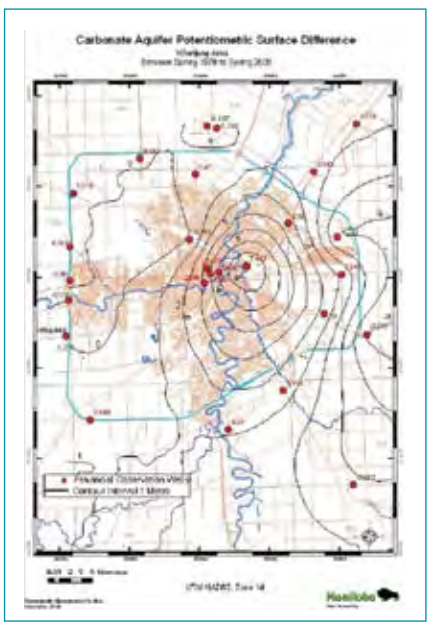

Figure 3[6]

Implications

The changes in groundwater pressure beneath Winnipeg have two main effects: how future foundations are designed in Winnipeg and how existing foundations react to changing groundwater pressures.

When designing foundations, geotechnical engineers must take into account the various forces involved, including the pressure of groundwater. If groundwater pressure is changing, then the designs will have to account for those changes. The standard reference in Winnipeg for geotechnical information, Baracos *et al*,[2] shows the hydraulic head for groundwater in the Upper Carbonate Aquifer from 1973. If foundation designers assume that the conditions measured in 1973 are still valid, they could make a grave mistake.

For example, excavations to install foundations will encounter groundwater seepage; the cost of de-watering the

> Assumptions about the hydraulic pressures must include current information and account for possible changes if a safe foundation design is to be accomplished.

excavations may be much higher if the hydraulic head of the groundwater is greater than what was calculated for. Consequently, assumptions about the hydraulic pressures must include current information and account for possible changes if a safe foundation design is to be accomplished. While Frank Render was of the opinion in 2011 that the groundwater regime in Winnipeg had stabilised,[6] given the possible cost and safety implications, perhaps we will need further research to be sure. A more extensive discussion of the implications of groundwater changes is found in a paper by Jeffrey J. Bell and Justin E. Neufeld presented to the Canadian Geotechnical Society in 2017.[7]

The changes in the groundwater regime in Winnipeg are having an effect on existing structures in the city. One example is the Norwood Pool that will need to be closed due to increasing groundwater seepage.[8] We can expect more examples as time goes on.

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Strategic Plan Implementation 2019-2020 and **Strategic Plan Development** for 2020-2025

The Government Relations Department manages the Association's relationships with government officials at the federal, provincial, and municipal levels so that the Association's role and mandate, and the professional knowledge, expertise and advice of engineers and geoscientists, are well-understood and valued by public policy makers. The Department monitors proposed legislation, regulations, new and changed government programs to evaluate their potential impacts on the professions, membership, and the public interest. It also informs government about potential risks and concerns. The Department also provides information and advice to the Association about government operations and engagement strategies. One of the most important stakeholder relationships is with the provincial government department that is responsible for the Association's legislation; currently, Manitoba Growth, Enterprise and Trade.

Each year the annual MLA Reception provides an opportunity for informal discussions between the membership, as represented by Council, past presidents, committee members, and government officials, in a relaxed atmosphere. The fifth annual MLA Reception was held on Thursday, May 16, 2019, at the Manitoba Club with 78 attendees.

New Initiatives 2019

Revisions to *The Engineering and Geoscientific Professions Act* and *The Limitation of Actions Act*

In 2019, it was a priority of the Government Relations Department, along with the Professional Standards and Admissions Departments, to seek an update to *The Engineering and Geoscientific Professions Act.* After determining that the Minister of Growth, Enterprise and Trade was open to the introduction of legislative changes, the Government Relations Department worked with the Professional Development and Admissions Departments and their committees, as well as the By-law Task Group of Council, to identify the most important changes to undertake at this time. The membership was also informed and consulted at several member engagement sessions and through the website.

Some of the objectives of the proposed changes are to ensure congruence with past by-law changes, consistency with other jurisdictions in Canada, and greater administrative efficiency. One proposed change that had previously been identified as a priority of the Association's membership is to align the limitation period in Manitoba for professional engineering and geoscientific services with the limitation periods in other provinces. A ten-year limitation period would be specified in *The Engineering and Geoscientific Professions Act*, with an exemption from the 30-year limitation period set out in *The Limitation of Actions Act.*

The Association will request that a bill to amend *The Engineering and Geoscientific Professions Act* will be introduced by the incoming government when the Legislature reconvenes following the election. Whatever the results of the provincial election, the Association plans to continue advocating for changes to these two Acts in the coming year.

Sustainable Development for Manitoba – BRACE Program

Natural Resources Canada's Building Regional Adaption Capacity and Expertise (BRACE) program aims to build capacity within and across targeted sectors and regions in Canada to understand, assess, and reduce the risks of a changing climate. Manitoba Sustainable Development and Natural Resources Canada negotiated a BRACE program within Manitoba and Engineers Geoscientists Manitoba was one of the successful grant recipients for the January to March 2019 period. Association leadership for the project came from the Sustainable Development Task Group.

Engineers Geoscientists Manitoba's BRACE project scoped the current capacity of professional engineers and other parties engaged in public and private infrastructure design and maintenance, to integrate climate change risks into decision making and planning. The project included assessing options and recommending future training and capacity-building initiatives, including professional certification options that will guide engineers and other professionals in proactively manage the impacts of a changing climate on engineered systems.

The Sustainable Development Task Group was reinforced with a BRACE Task 2 Working Group consisting of Association volunteers with experience in developing

infrastructure and knowledge of climate change resiliency and adaptation. A Scoping and Recommended Action Plan report was submitted to Manitoba Sustainable Development in April 2019. Manitoba Sustainable Development has indicated that it plans to issue a Request for Proposal for the next phase of the project.

From January to April 2019, members of the Sustainable Development Task Group provided advice to Manitoba Sustainable Development's groups relating to carbon reduction in the residential and commercial building sectors.

Members of the Task Group are working with Engineers Canada and Engineers Geoscientists New Brunswick to develop and promote a national survey of engineers regarding their knowledge and opinions on climate change related to engineering practice. This will be a follow-on to surveys conducted in 2007 and 2012.

At the Sustainable Development Task Group's professional development session at Ingenium 2019 members will be given an overview of the work of the task group, the sustainable development issues of concern to engineers and geoscientists, the BRACE program and what has been accomplished so far, and how sustainable development principles and the BRACE program are intended to be implemented in Manitoba.

Advice and Support to Other Organizations and Task Groups

It is important for the Association to identify and work in partnership with other groups to address issues of common interest that advance the Engineers Geoscientists Manitoba's public policy agenda.

Government Relations continues to work with the Association of Consulting Engineering Companies Manitoba (ACEC Manitoba) Government Relations Committee on various public policies, codes, standards, and integrated regulatory frameworks. On June 12, 2019, the Director of Government Relations and the CEO/Registrar made a presentation to ACEC Manitoba on how Engineers Geoscientists Manitoba approaches government relations.

Government Relations also continues to provide advice and support to the following committees and task groups:

- Engineering Changes Lives Provincial Steering Committee
- Indigenous Professional Initiative Committee
- Manitoba 2030 Coalition

Strategic Plan 2020-2025

Government Relations generates ideas for new initiatives with the assistance of its committees over the summer months. These ideas are then prioritized and assessed for fit with the team, then proposed to the Association's management team and/or Council in the fall. The Government Relations Department appreciates feedback on its priorities and strategies as it develops its 2020-2025 Strategic Plan. If you would like further information about the Government Relations strategic plan or would like to provide recommendations, please send an email to *SSarna@EngGeoMB.ca.*

Welcome New Members

A. Abedini
M. Alkiki
S.A. Alvi
D.K. Anderson
P. Arseneault
L.A. Baez
N.C. Bathan
D.J. Bauer
F. Beauchemin
M.J. Bellamy
A. Bellmont
M.J. Blair
T. Brassard
M.T. Bunda
B.C.W. Bush
E.R. Chadwick
F. Charbonneau
J.E. Chouinard
C.W. Clark
A. Cossette-Dube
P.R. Cripps
L.P. Daniel
M.F. Davidson
D.W. Deal
D.V. Demers
J.D. Deminchuk
G. Desclaux
E.C. Dudson
G.A. Epp
E.L. Ericson
A. Fahmy
C.J. Faucher
T.S. Fekete
S.R. Fields
D.M. Fox
L.P. Graceffo
J.A. Green
L.J.D. Gregory
R.C.R. Gritzfeldt
M.A. Guerin
W. Hu
O.O. Jamal
L. Jing
K.S. Kalenchuk
D.J. Kenway
J.M. Keranen
S.M. Kufley
N.A. Larrere
B.M. Lavers
J. Leung
Y. Liu
D.R. Mach
A.J. Machan
I.D. Mackay
K.D. Macleod
S. Marquis
N. Martin
A.R. Meads
D.J. Mihial
L. Milius
S. Morin
J.D. Mosquera
D.P. Mozel
M.A. Muller
J.S. Nguyen
H.A. Oceu
H.D.T. Odiaz
R.G. Ofstie
R.T. Olson
A.A. Owoade
D. Parker
V.J.J. Pascua
S.W. Pflantz
M.M.J. Poirier
J. Potvin
M.M. Price
K. Provencher
Chiasson
J.A. Rabel
B. Rancourt
M. Riddoch
K.G. Riha
D.L. Rinas
O. Ristic
P.J. Robalino
M. Rostami
A. Saghir
R.M.A. Said
H. Salem
K.B. Schram
H.A. Schweitzer
I.S. Sekhon
F.R. Shah
D.A. Shewfelt
J.D. Simpson
A.H. Simundsson
B.D. Stewart
V.J. Stewart
C.B. Sturdivant
H.S. Toor
R. Vaid
R.J. Van Der Wel
K.R. Vishwakarma
T.M. Wagner
M. Wang
B.A.H. Wickremasuriya
B.A. Woods
B.J. Yakimishen
N.J. Zimmer

Interns

M. Abdelrehim
T.L.I. Adelakun
K.D. Adriano
J.B. Akom
S.S. Aleyasin
M.S. Ali
M. Amiri
B. Azam
N. Bhatt
D.E. Burtniak
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A. Gumulia
S.H. Hassan
M. Heggadadevanapura Thammaiah
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A. Maddahi
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NEWS+NOTES

NOTICE

Under the Engineering and Geoscientific Professions Act and the Association's Discipline By-law

This is notice that on June 12, 2019, Mr. B.S. Ellis, P.Eng., consented to the registration of a conviction and issuance of a reprimand on a charge of professional misconduct or unskilled practice in accordance with section 35(1)(f) of *The Engineering and Geoscientific Professions Act*. The conviction arises out of Mr. Ellis' structural design of a roof-mounted solar photovoltaic system for a private residence in Winnipeg. In the course of his involvement in this project Mr. Ellis:

- Issued a sealed report without having performed an assessment and structural analysis of the existing roof, and despite having stated in the report that such an analysis had been completed;
- Failed to inspect the installation of the solar system despite the fact that the owner had contacted him to express concerns about the design and implementation of it;
- Demonstrated a lack of competency to undertake the work with regard to structural engineering principles and Manitoba Building Code requirements.

In addition to the reprimand, Mr. Ellis consented to a restriction from practising structural engineering, and being subject to a practice review to determine the existence of similar projects to determine if safety to the public has been compromised.

Grant Koropatnick, P.Eng., FEC
CEO & Registrar

Annual Volunteer Appreciation Event

On Monday, June 24, the Association held its Annual Volunteer Appreciation event, with this year's event taking place at Fort Gibraltar. Guests enjoyed an evening of historical interpretations, with demonstrations in the blacksmith's shop, trading post, and wood workshop. Attendees were also able to try their hand at axe throwing, which looks easier than it actually is! Light bites were served, with food stations such as poutine with tourtière meat, assorted meat and cheese platters, and for dessert guests roasted marshmallows for s'mores by the campfire.

The Association once again thanks all of its members and volunteers who volunteer their time on the numerous committees, task groups, chapters, and special events throughout the year.

Bike to Work Day

In support of Bike Week Winnipeg, Engineers Geoscientists Manitoba and Dillon Consulting once again co-hosted a pit stop for Bike to Work Day. Despite a bit of rain, we saw over 80 cyclists biking to work on Monday, June 17. Many cyclists stopped to say hi, enjoy treats, water, and giveaways donated by Brazen Hall Kitchen & Brewery, ALS Environmental, Cora Breakfast and Lunch, Red River Co-op, and Zeng Massage Clinic.

Paul Boge Brings Home Three Awards

Engineers Geoscientists Manitoba member Paul Boge, P.Eng., recently won three awards including Word Guild's Best Book of the Year award for a true story he wrote on human trafficking in Canada. To learn more go to *https://www.paulboge.com/index.php/gallery*.

Engineers Canada President

Congratulations to David T. Lynch, Ph.D., DSc(Hon.), P.Eng., FCAE, FEC, FEIC, FCIC, FGC (Hon.) on his new role as President of the Engineers Canada Board for 2019-2020.

CITE Robert Burton Distinguished Service Award

Congratulations to Jeannette Montufar, P.Eng., FEC, who was awarded the prestigious H. Robert Burton Distinguished Service Award at the annual Canadian Institute of Transportation Engineers (CITE) awards luncheon in Ottawa on June 5. The award, which is the highest honour that CITE bestows on any one of its members, is named after a man who dedicated much of his life to the traffic engineering profession.

New Members Luncheon

New members in attendance at the New Members Luncheon on June 11, where they received their official licence certificate.

Ray Hoemsen appointed to National Research Council (NRC) Council

Retrieved from *https://www.rrc.ca*

Ray Hoemsen, P.Eng., FEC, President and Managing Director of NEXUS Manitoba and Executive Director, Research Partnerships and Innovation at Red River College, recently became one of the six new appointments to the National Research Council (NRC). The Honourable Navdeep Bains, Minister of Innovation, Science and Economic Development, and the Honourable Kirsty Duncan, Minister of Science and Sport, announced the new appointments on Thursday, June 6, 2019. Hoemsen is the second Manitoban to be on the NRC Council in the last 11 years.

The NRC is the Government of Canada's largest science and research organization, supporting Canadian industrial innovation, the advancement of knowledge and the development of technology.

I²Face Summer Picnic

On Saturday, August 17, more than 150 members, families, and friends joined together for an afternoon of food, fun, and games at St. Vital Park. The third annual picnic provided an opportunity to network with other chapter members, both professionally and culturally. Originally organised by the Arab, Chinese, Filipino, and India chapters, the organising committee led by Roy San Buenaventura, P.Eng., has now expanded to also include the Ethio-Eritrean and Indigenous chapters.

L-R: India Members Chapter Vice Chair, Dushyant Saraswat, P.Eng., Arab Members Chapter Chair, Mike Toma, P.Eng., Ethio-Eritrean Chapter Chair, Getnet Muluye, P.Eng., Filipino Chapter Chair, Jun Tapia, P.Eng., Chinese Chapter Past Chair, Wayne Wong, P.Eng., Indigenous Chapter Chair, Gregory Page, P.Eng., FEC

By M. Gregoire, P.Eng., FEC

By-law Re-write – Final Phase

In 2016, Council decided to undertake a full re-write of Engineers Geoscientists Manitoba's by-laws. Given the scope of the project, it was first determined that this undertaking should be performed in three phases, where each phase would end with a vote on that phase's changes in conjunction with the Annual General Business Meeting (AGM). During 2019 the third and final phase of the project was undertaken, culminating in the final proposal approved by Council on July 16.

The primary goal of the by-law re-write project was to review and update the entirety of the document so that it could be made clear, concise, and consistent with applicable legislation. To that end, the final product was drafted by legal counsel based on a list of principles developed by Council's By-law Committee.

For the most part, the principles developed by Council follow the principles within the previous version of the by-laws. However, since the by-laws were under review, certain components were reviewed to determine whether or not the timing was appropriate for some changes in principle. To that end, the following principles incorporated into the 2019 by-law proposal represent a change from previous versions:

Good Standing: In the current by-laws, it is a requirement that the President of the Association be 'in good standing'. However, this term was not defined. In the proposed by-laws, a definition of 'good standing' has been added. In addition, practitioners will be required to be in good standing to nominate councillors, vote at Annual General Business Meetings and in elections, and serve on Council or Council committees.

> The primary goal of the by-law re-write project was to review and update the entirety of the document so that it could be made clear, concise, and consistent with applicable legislation.

Attending Meetings of Council: At present, only practitioners are entitled to observe meetings of Council. In the proposed by-laws, any resident of Manitoba may attend meetings of Council.

Length of Voting Periods: The proposed by-laws ensure that the length of time for voting on by-law proposals matches the length of time for Council elections.

Report of Executive Committee: The Executive Committee has always had the power to attend to time-sensitive matters between regular meetings of Council. It is proposed that the Executive Committee must report to Council on such actions taken between meetings and that these decisions be ratified by Council.

Executive Committee Member: The proposed by-laws require that the councillor elected to serve on the Executive Committee be a professional member. This contrasts with the current by-laws in that Interns elected to Council could be elected to serve on the Executive Committee.

Provisional Member: The current by-laws provide a category of membership known as the 'Provisional Member' category. This category was intended to be used by Interns with many years of international experience who are completing their registration process by acquiring 12 months of Canadian experience. The category was not used and will therefore be eliminated.

Identification of Non-Practising Status: In accordance with the national trend, Engineers Geoscientists Manitoba's Council

is proposing that non-practising members identify themselves as such when they use their title. This ensures clarity to the public regarding the status of the individual. Retired members and members on leave will therefore be required to use a designation such as P.Eng. (Ret.) or P.Geo. (On Leave).

Membership Categories: The Life Membership category will be merged with the Retired Member category while still allowing those who qualify (including existing Life Members) to have their dues waived in recognition of their years of service. Similarly, the Honourary Life category is being transformed into a designation, instead of a category of membership, which will help to clarify which practitioners are practising and which ones are not.

ProDev: Under the proposed by-laws, any future changes to the ProDev program that are required will be approved by Council.

Execution of Instruments: As recommended by legal counsel, a new by-law was created to define the requirements for the execution of instruments. Under the proposal, contracts over a certain limit, for example, will require approval by two persons designated by Council.

Indemnification of Councillors: Legal also recommended the addition of a section devoted to the indemnification of councillors. To that end, definition of the duty of care for councillors has also been added.

The above changes in principle were made after careful consideration by Council and are based on consultation with members through various channels, including engagement sessions open to all as well as third-party focus groups. Having the by-laws written entirely by legal counsel helped to ensure that the proposal is clear, concise, and consistent with relevant legislation. The end product is robust and will serve well as the new platform for the on-going evolution of the by-laws.

Do any of the change in principle described above reflect thoughts you've had on the topic? Do you have any questions about these changes? Do you have any by-law changes that you'd like to recommend in future years?

As always, I appreciate comments and discussion about standards issues. If you'd like to talk about the above topic or any other area of concern, please do not hesitate to contact me at *MGregoire@EngGeoMB.ca*.

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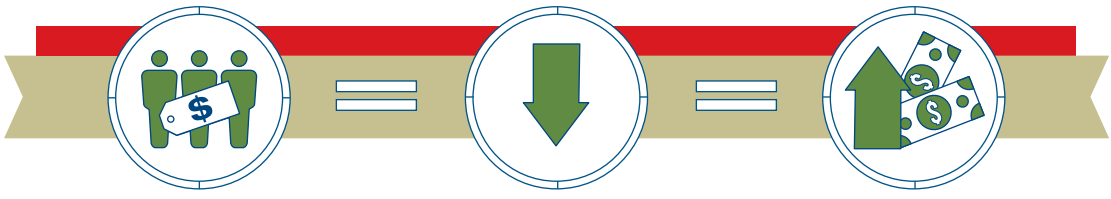

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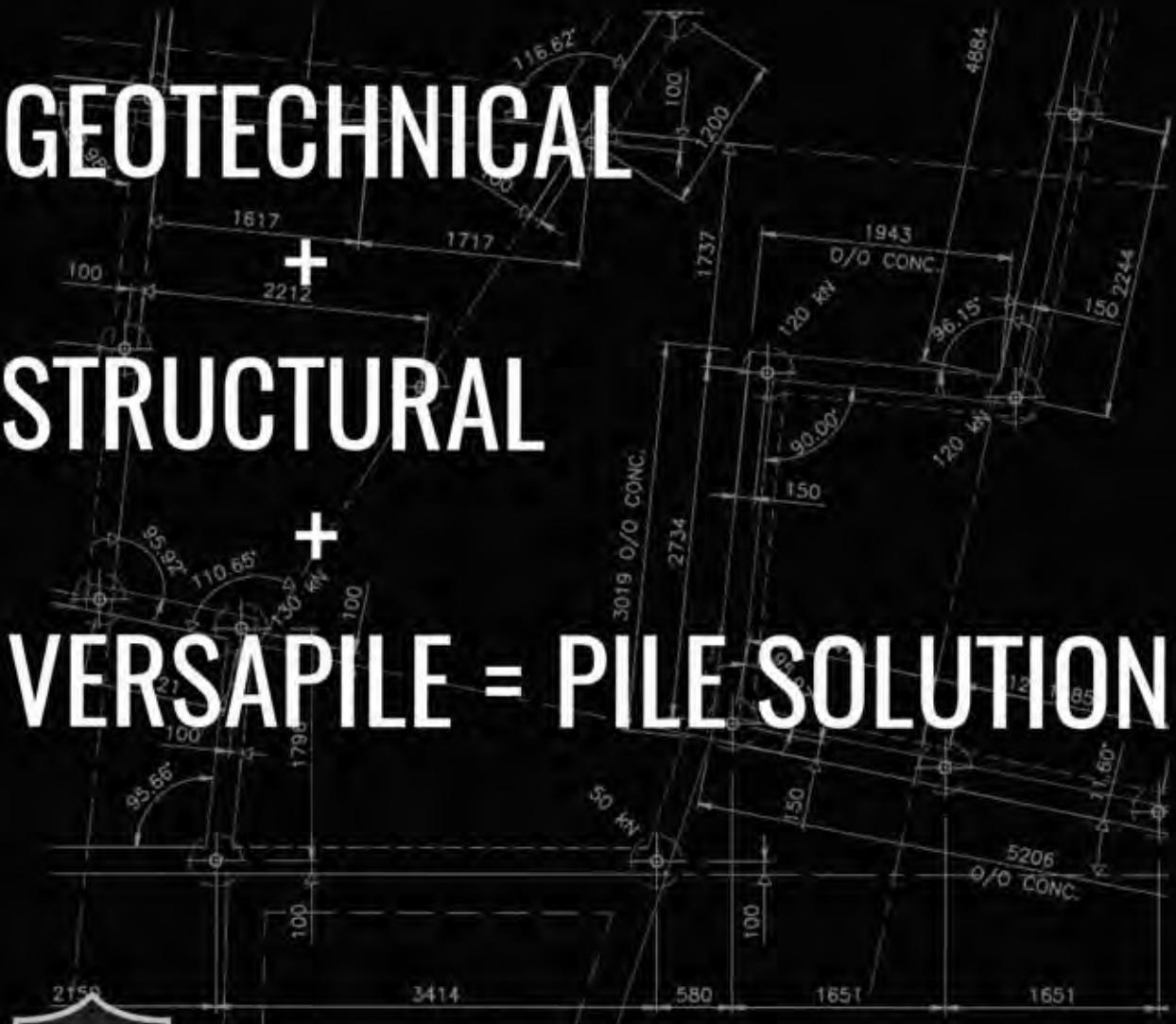

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