

ENGINEERS AND GEOSCIENTISTS BRITISH COLUMBIA

MAY/JUNE 2020

INNOVATION

**CAPTURING CARBON
IN MINE WASTE**

**OPERATIONS CONTINUE
AMID COVID-19**

**BC ENGINEERS' CREATIONS
COMBAT VIRUS**

2019 | 2020 PROJECT HIGHLIGHTS

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COVER STORY



PROJECT HIGHLIGHTS 2019 | 2020

From the design of the new pier in White Rock and a new bridge across the Saint Lawrence River, to cable ferries near Nakusp, a long-range autonomous underwater vehicle, and a footbridge in eastern Uganda—registrants give us insight into their work here and around the world.

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ON THE COVER

This flower-shaped timber-steel retail structure on Great Northern Way in Vancouver is one of dozens of projects featured in our annual Project Highlights edition. PHOTO: EMA PETER PHOTOGRAPHY.



**ENGINEERS &
GEOLOGISTS**
BRITISH COLUMBIA



DIGGING DEEP FOR CARBON CAPTURE SOLUTION

Certain types of ultramafic rocks—relatively common in BC—turn out to have the capacity to capture threatening CO₂ emissions and safely stabilize them as long-term carbonate minerals. The process is about to undergo field trials, and geoscientists are preparing a Carbon Mineralization Potential Index—the combination of which could alter the carbon footprint of mining projects.

ENGINEERS RESPOND TO COVID-19

When COVID-19 shuttered engineering labs at SFU and UVic, the engineers running them could have waited it out at home. Instead, they asked themselves how they—and the local community—could help.



THIS DIGITAL EDITION OF *INNOVATION* INCLUDES VIDEO EXTRAS. LOOK FOR THIS PLAY ICON, AND CLICK ON IT TO VIEW VIDEO AND OTHER MULTIMEDIA CONTENT. AN INTERNET CONNECTION IS REQUIRED.



Lianna Mah,
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ENGINEERS AND GEOSCIENTISTS DELIVER ESSENTIAL SERVICES TO KEEP COMMUNITIES SAFE

COVID-19 has taken us to uncharted territories. Physical distancing imposed by the pandemic has challenged us all. The pandemic response has also demonstrated our resilience and capacity to adapt.

The Government of BC has declared engineering and geoscience as essential services. Engineers and geoscientists are providing important services while finding ways to maintain physical distancing. While engineers and geoscientists may not be on the frontlines, they are designing medical devices and equipment; developing software and technology; ensuring the safe supply of power, natural gas, and water; maintaining communications, transportation, and municipal infrastructure; and overseeing manufacturing of materials and food for the health and safety of the public.

Engineers and Geoscientists BC staff are now working remotely, but our work regulating and governing our professions to protect the public continues. A large component of our current efforts is working with government and stakeholders on implementing the new *Professional Governance Act*, which will replace the *Engineers and Geoscientists Act* and our current Bylaws this November. Staff are working on aligning our current Bylaws, policies, and procedures with this new legislation, as well as preparing for the implementation of regulation of firms by July 2021.

Engineers and Geoscientists BC's volunteers continue to contribute their knowledge and experience to branches and committees. We could not meet our mandate without our volunteers.

Council broke new ground, holding our first virtual Council meeting on May 1, 2020. It was a success: we approved our 2021 budget and Professional Practice Guidelines for highway infrastructure design and structural assessment of buildings, and we continued development of our new Code of Ethics based on feedback from registrants.

For engineers and geoscientists who are temporarily unemployed or underemployed because of COVID-19, I hope that you are finding support in the programs and funding available to you. You may also reach out to Engineers and Geoscientists BC's Benevolent Fund Society, which offers financial assistance for those in need.

This issue of *Innovation* showcases BC's engineers and geoscientists projects at home and abroad; these projects demonstrate the problem-solving, technical excellence, ingenuity, and innovation that form a crucial part of the services our registrants provide to shape a better world for all of us.

Thank you to our registrants, volunteers, Council, and Engineers and Geoscientists BC's staff for your adaptive capacity, your commitment to delivering on this association's mandate, and your ongoing service to protect the public interest, despite the challenges of this global pandemic.

INNOVATION

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FRIENDS PAY TRIBUTE TO TRICIA J. COOK, P.ENG.: ENGINEER, ATHLETE, MOTHER

On March 19, 2020, Tricia Cook, P.Eng., an Engineers and Geoscientists BC registrant since 1983, passed away peacefully at her home in Phoenix, Arizona, with her husband of 35 years by her side. She was just 60 years old, and had fought a courageous six-year battle with breast cancer. Tricia will be remembered as an accomplished engineer, an intense athlete, and a loving mother.

Tricia was born in 1959, in London, Ontario. During grade school, she developed a love for mathematics, a passion for understanding how things work, and a dream of becoming an engineer. She received her Bachelor of Science in Civil Engineering at Queens University in 1981. Her family moved from Streetsville to Vancouver in the summer of 1979. She followed and began her engineering career immediately after graduation working for two geotechnical consulting firms, first Golder Associates and then Stewart-EBA. In 1984, she found her true calling as an engineer when she was hired by David Nairne & Associates, where she worked for 15 years, while earning her MBA at UBC.

In 1999, at age 40 she moved to Phoenix. As an experienced Canadian civil engineer, she was immediately offered a position by Stantec Consulting, which she held for 21 years, until just before her passing. During this period, Tricia earned Professional Engineer (PE) registration in both Arizona and Washington State.

Her mentors, colleagues, friends, and proteges, who will all miss her, recognized that Tricia's commitment to her achievements was unprecedented, yet she was able to maintain an enviable work-life balance. Tricia is survived by her husband, Tony, her sons Adam and Sean—whom she guided in their outstanding academic performance in pursuit of university engineering programs—and her mother, Pat, and brother, Tay.

Anthony Rice, P.Eng./P.Geo.; Mike Miles, P.Geo.; Paul Turje, P.Eng.; Frank Huber, P.Eng.; Colin Wong, P.Eng.; Richard Butler, P.Eng.; Trevor Fitzell, P.Eng.; Selina Tribe, P.Geo.; Tonia Jurbin, P.Eng.

To donate to the Engineers and Geoscientists BC Foundation in Tricia Cook's memory, visit egbc.ca/foundation.

Letters to the editor containing your views on topics of interest are encouraged. Opinions expressed in letters are not necessarily endorsed by Engineers and Geoscientists BC. Letters should be 300 words or less and can be emailed to innovation@egbc.ca.

Find information at egbc.ca/Submitting-to-Innovation.

CORRECTION

In the last edition of *Innovation*, we incorrectly referred to Allegra Whistler's designation as "P.Geo."; in fact, her designation is "GIT". The error was the magazine's, not Ms. Whistler's.

OUR WORK AS A REGULATOR CONTINUES

COVID-19 has introduced sudden and exceptional changes to our businesses, operating environments, and lives over the past few months. Here are some important highlights about professional practice and Engineers and Geoscientists BC operations, events, discipline, and registration processes.

PRACTICE ADVICE AND GUIDANCE

Our webpage egbc.ca/COVID-19-practice-advice helps support registrants in understanding their professional obligations, and to address common questions we're receiving. Topics include engineering and geoscience as essential services; health and safety responsibilities for employers and professionals; signing, sealing, and submitting documents remotely; and conducting field reviews and other professional activities that may not support proper social distancing.

EVENTS AND ONLINE LEARNING

All in-person Engineers and Geoscientists BC events and seminars have been

cancelled through the end of June.

However, Engineers and Geoscientists BC continues to develop additional webinars, which are attended remotely. In addition, registrants can take advantage of dozens of online learning opportunities, which can be accessed remotely and at any time. For a complete list of webinars and online learning opportunities, visit egbc.ca/Events.

REGISTRATION

We are continuing to receive and assess applications, although timelines may be somewhat longer during this period. We have adjusted or delayed some of our documentation requirements. In many cases, interviews can be conducted remotely. And, at this time, applicants can defer their application fee until the end of their application process, or until October 1, 2020, whichever comes first. For more information about the current registration process, visit egbc.ca/COVID-19-registration-process.

DISCIPLINE

Our investigation, enforcement, and discipline processes continue to operate with minimal impact. Complaints are still being received and acted upon; investigation, enforcement, and discipline files are progressing using alternative and virtual processes. We recently successfully conducted a virtual disciplinary hearing—an increasingly common alternative among regulators in BC.

REMOTE OPERATIONS

While the Engineers and Geoscientists BC office is temporarily closed, our staff are working remotely and are available by email. Staff are monitoring voicemail, but responses may be delayed. We remain committed to maintaining our operations to meet our core mandate of public protection, and we appreciate your patience. Updated information on our operations is provided at egbc.ca/COVID-19.

THREE ONLINE SOURCES OF INFORMATION

We have developed three webpages to help our registrants navigate this unusual situation.

- egbc.ca/COVID-19 provides a general overview of topics related to the impact of COVID-19.
- egbc.ca/COVID-19-practice-advice is a list of key practice recommendations and reminders impacted by COVID-19.
- egbc.ca/COVID-19-registration-process provides insight into registration-related topics surrounding COVID-19.

All three web pages will be updated regularly in response to the changing impact of COVID-19.

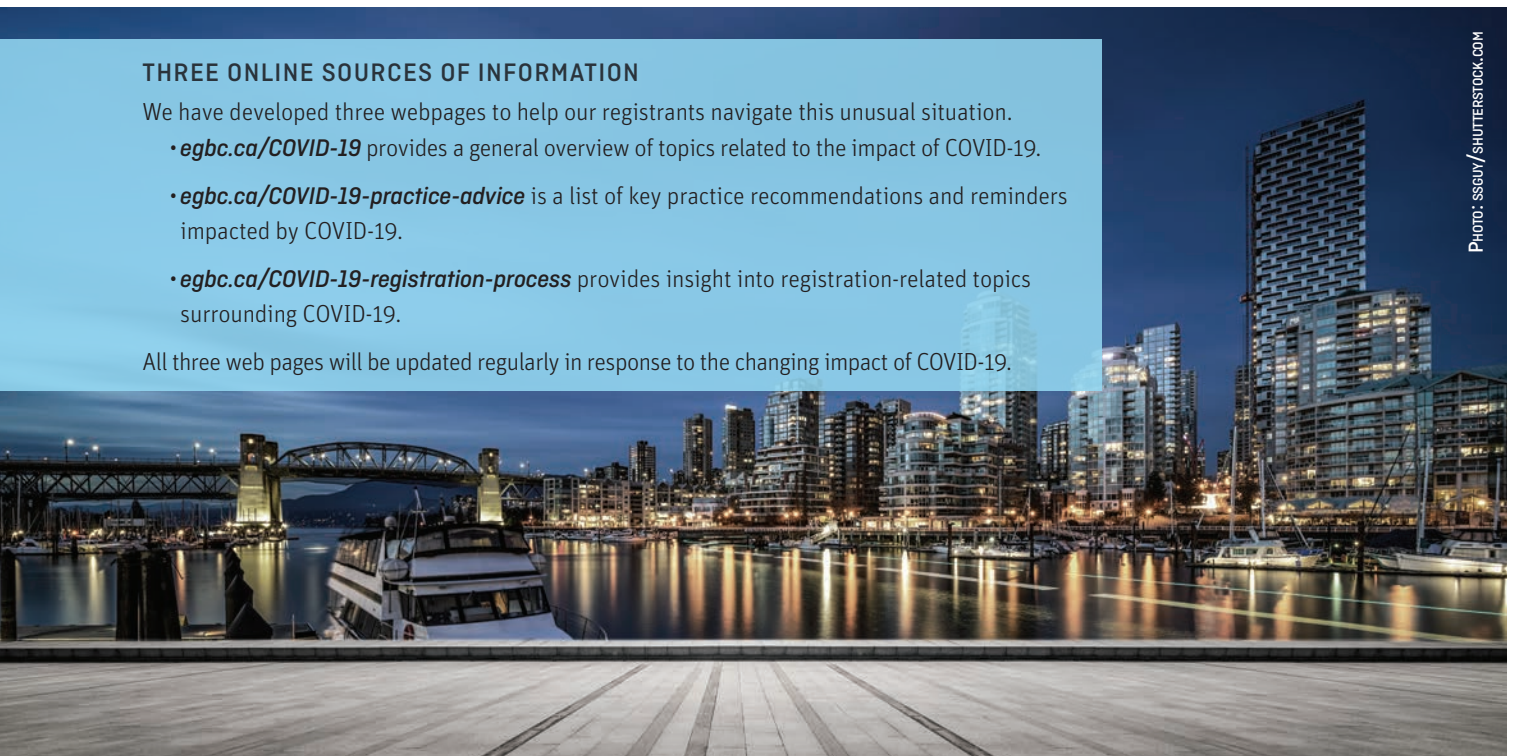


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REGISTRANTS PROVIDE FEEDBACK ON NEW CODE OF ETHICS OBLIGATIONS

Under the *Professional Governance Act*, each regulator under this legislation—including Engineers and Geoscientists BC—must include a minimum of 12 standardized mandatory principles within their Code of Ethics for their registrants. Engineers and Geoscientists BC recently drafted an updated version of its Code of Ethics to align with these requirements, and reached out to registrants for feedback on how well they understood their obligations under this new Code.

Overall, survey respondents indicated a strong understanding of the new Code of Ethics, with approximately 87 percent indicating they either “fully” or “mostly” understood their obligations. In terms of further information, registrants are seeking practical examples of how each principle is applied and clarification on the scope of each principle.

In particular, survey respondents identified five new principles and one existing (but expanded) principle as requiring the most clarification:

- 3. Follow the Law (*new*)
- 4. Follow the Standards of Government and Engineers and Geoscientists BC (*new*)
- 7. Distinguish Facts from Assumptions and Opinions (*new*)
- 9. Duty to Report
- 11. Each Professional is Responsible (*new*)

- 12. Work Diligently and Follow Standards of Documentation (*new*)

Furthermore, survey respondents provided feedback on what tools, guidance, and resources Engineers and Geoscientists BC could develop to help registrants better understand their new obligations, including training and coaching, examples of practical application in professional practice, and additional communications.

Engineers and Geoscientists BC will continue to ensure key questions raised through the survey are addressed through

the planned revision to the existing Guideline to the Code of Ethics, and other additional training resources.

The updated Code of Ethics will now be formalized through Bylaw and reviewed by Council in June. Subject to Council’s passing of the proposed bylaw, along with ministerial approval through the Office of the Superintendent of Professional Governance, the new Code of Ethics will come into effect in November 2020.

For more information on changes to the Code of Ethics, visit egbc.ca/Code-of-Ethics.

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PUBLIC REPRESENTATIVE VOLUNTEER OPPORTUNITIES

Engineers and Geoscientists BC is seeking BC residents to share their leadership skills and expertise by volunteering as a Public Representative on one of five statutory committees. Registrants are encouraged to share this opportunity with their network of professionals outside the engineering and geoscience industries.

Under the *Professional Governance Act*, Engineers and Geoscientists BC has five statutory committees established under the *Act* and Bylaws. Each committee comprises registrants (professional engineers and geoscientists) and at least one Public Representative, also known as a lay person. The new requirement for statutory committees to include Public Representatives will be introduced when the *Act* comes into force in November 2020.

Public Representatives are appointed to ensure independence,

and presence of the voice of the public, in support of Engineers and Geoscientists BC’s mandate to serve and protect the interests of the public. Individually and collectively, Public Representatives make an important contribution to the protection of the public and the integrity of the professions of engineering and geoscience in BC.

The five statutory committees with open volunteer opportunities are the Nominating Committee, the Credentials Committee (currently known as the Registration Committee), the Audit and Practice Review Committee, the Investigations Committee, and the Discipline Committee.

The benefits of volunteering as a Public Representative include the opportunity to share knowledge and experience obtained from other industries, consider and discuss interesting ethical and

practical challenges, hone existing skills and develop new ones, connect with a network of like-minded professionals, and be appreciated as a contributor to valued and dynamic professions.

Interested applicants must have strong communication and decision-making skills, and a desire to give back to the community by protecting the public interest. Only those who have no immediate family members in the professions are eligible to serve as Public Representatives.

Public Representatives should ideally possess a combination of skills and experience relevant to the committee’s oversight responsibilities. Preference will be given to candidates with previous experience as a volunteer with a similar organization; experience in professional regulation and knowledge of the standards of practice and standards of professional ethics; operational or technical expertise relevant to the responsibilities of the committee (e.g., legal, HR, governance, public sector administration, etc.); and an understanding and appreciation of the development of policy and decision-making in a large, complex system, to ensure that decisions are based on objective principles, and informed by evidence and best practices.

For more information about the opportunities, the roles of the statutory committees, and to view the full volunteer job description, visit egbc.ca/Public-Representative. Engineers and Geoscientists BC is always looking for qualified candidates and applicants are encouraged to apply at any time.

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WAYS REGISTRANTS CAN HELP FRONTLINE WORKERS

COVID-19 has led to a severe shortage of personal protective equipment (PPE) at healthcare facilities across British Columbia. There has been urgent need for this equipment to ensure front-line healthcare workers can protect themselves against injury or illness, and provide safe, quality care to those who need it most. Now, this need is about to become more severe. As economies across the country and around the world re-open, non-medical workers across a range of industries will need PPE as part of their day-to-day operations.

Two BC organizations—Operation Protect and the COVID-19 Supply Hub—that are accepting and streamlining PPE donations and supply offers, and routing them to BC health organizations and agencies.

OPERATION PROTECT

Engineers and geoscientists, and firms that have access to PPE—can donate to Operation Protect, an initiative of SafeCareBC, which is a non-profit association working to ensure injury free, safe working conditions for continuing care workers in BC. They are working directly with the Ministry of Health to manage the collection and distribution of this equipment.

Operation Protect is currently accepting donations in the Lower Mainland. However, they are expecting to soon expand this service to other areas of the province in the near future; for those outside of the Lower Mainland, Operation Protect can help route those donations to appropriate healthcare workers in other parts of BC.

WHAT SUPPLIES ARE OPERATION PROJECT COLLECTING?

- surgical masks (approved by the US Food and Drug Administration (FDA));
- exam gloves;
- hand sanitizer (60 percent alcohol or higher);
- medical-grade disinfection wipes;
- protective gowns;
- eye protection (glasses, goggles, and face shields);
- N-series masks (approved by the FDA, NIOSH, or CSA);
- R-series masks (approved by the FDA, NIOSH, or CSA);
- P-series masks (approved by the FDA, NIOSH, or CSA);
- elastomeric half- or full-face piece respirators (including filters); and
- powered air-purifying respirator (and accessories).

Expired masks have recently been cleared for use by the Government of Canada and will be accepted if they are unopened and unused.

Ken Donohue, Director, Communications and Member Services of SafeCareBC, said that Operation Protect is a tangible



way that British Columbians can recognize those working in healthcare industries. “Member organizations...are having challenges accessing PPE for their workers, because of a global shortage of PPE, an interruption in manufacturing and supply chains, and an increased demand,” he said.

“It’s inspiring when the public comes forward with their desire to help health workers stay safe,” he said. “It helps a lot to have that community support.”

Donohue said that, in seven weeks, Operation Protect acquired 765,000 items from 570 donors. “It ranges from individuals that say ‘All I have is a box of gloves’ to one donor that had 100,000 face masks,” he said. Despite this obvious success, Donohue said the challenge isn’t expected to relax soon. “As the

economy begins to open,” he said, “there will be [non-medical] sectors that will start to need this type of equipment, which will put a strain on supply.”

COVID-19 SUPPLY HUB

The COVID-19 crisis introduced an unusual problem: while individuals and business across BC were willing to help—sometimes with large-scale PPE procurement and manufacturing offers—the government and health authorities had no way to triage and manage the overwhelming number of proposals cascading in. So a group of technology and healthcare partners quickly developed the concept of the COVID-19 Supply Hub—an online tool that helps officials organize and triage offers for reinforcement supplies.

The Supply Hub was built by Traction on Demand, a Vancouver-based consulting and application development firm, in partnership with the Government of BC, the Digital Technology Supercluster, the Business Council of British Columbia, and Provincial Health Services Authority.



PHOTO COURTESY OF SAFECARE BC.

For Traction on Demand Regional Vice President Jason Etherington, work on the COVID-19 Supply Hub was a way for Traction on Demand staff to contribute to a solution.

The idea that the healthcare sector could be overrun without proper supplies “was like a movie, except it was real”, he said. The [COVID-19] Supply Hub was borne of a concern that PPE was going to run out. Is there a way that we can respond to this need? Is there a way we can get this happening rather than people just answering emails in a scramble?”

Etherington said that calls between partners began on Saturday, March 21. “Bill [Tam, co-founder of BC’s Technology Supercluster] called me on Saturday, [Traction on Demand staff] started on Monday, and we were done Friday,” he said.

Etherington said that although the Supply Hub was set up for business procurement offers, it can also accept donations of PPE. “Businesses can donate, they just put \$0 as their cost,” he said.

Accordingly to Etherington, the Supply Hub captured offers for over 2.7 billion units from across 3,400 companies within two weeks of its launch. The number has since ballooned to offers of 4.7 billion units across 6,000 companies. Etherington stresses that, while the numbers are impressive, all offers and companies must still undergo an assessment by authorities.

LEARN MORE

Visit Operation Protect, at www.safecarebc.ca/operationprotect, to learn more about making a donation. They can also be reached at info@safecarebc.ca, or at 1.877.955.6565.

For manufacturers and suppliers, visit the COVID-19 Supply Hub, at www.gov.bc.ca/supplyhub to learn more about how to provide supplies to government agencies.

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MAY 1, 2020

Engineers and Geoscientists BC's Council of elected members and government representatives meets throughout the year to conduct the business of association governance. The following are the highlights of the May 1, 2020 meeting.

CODE OF ETHICS UPDATED TO ALIGN WITH NEW LEGISLATION

The *Professional Governance Act* requires that each regulator under this legislation, including Engineers and Geoscientists BC, include a minimum of 12 standardized mandatory principles within their Code of Ethics for their registrants. In preparation for these changes, Engineers and Geoscientists BC updated its current Code of Ethics to align with these principles, and sought feedback from registrants on what information and resources they would need to better understand their ethical requirements under the new Code. (For more information on our consultation process, see page 7.) Council approved the updated Code of Ethics in principle, and directed that staff develop a supporting bylaw. Council will be reviewing this bylaw, as well as others required by the *Professional Governance Act*, in June.

DRAFT BUDGET APPROVED

Council reviewed and approved a draft budget for its 2020/2021 fiscal year, confirming there will be no increase to registrant fees. Staff are currently creating contingency plans to account for the significant uncertainty and change introduced by COVID-19, to ensure the organization will be financially equipped to manage a range of scenarios it may face over the coming months. These contingency plans will be brought back to Council for review in June.

REVISED CONTINUING EDUCATION PROGRAM APPROVED

Council reviewed updated recommendations from the Continuing Education Program Advisory Group (formerly the Continuing Professional Development Committee) on a revised model for Engineers and Geoscientists BC's continuing education program. The new model has been developed over the past two years through research and engagement with other jurisdictions, and consultation with registrants on how the current model could be adjusted to better enable members to maintain competency in their area of practice. The revised model includes new areas and avenues of learning and increased flexibility through exemptions for members on parental or medical leave.

Implementation details are now being determined and will be approved by Council in June. It is anticipated that the new model would become effective in 2021, with registrants being required to report under the new model beginning in 2022. Additional information will be provided in the July/August edition of *Innovation*.

UPDATE FROM THE FAIRNESS PANEL

Council received the annual report from the Fairness Panel, an independent, non-statutory body that examines the fairness of the process when the Registration Committee rejects an applicant's

appeal of a registration decision. This year, the Fairness Panel considered 16 referrals from the Registration Committee. It agreed with the Registration Committee's original decision in nine cases, recommended registration in three cases, and recommended further assessment of the application of the remaining four cases.

NEW PRACTICE GUIDELINES FOR CLIMATE-RESILIENT INFRASTRUCTURE AND STRUCTURAL ASSESSMENTS

Council approved two new guidelines for legal and editorial review: *The Professional Practice Guidelines – Developing Climate Change-Resilient Designs for Highway Infrastructure in British Columbia* will replace the current interim guidelines on this topic; the application of these guidelines is specific to Highway Infrastructure owned by the BC Ministry of Transportation and Infrastructure (MOTI). The guidelines contain MOTI's updated technical circular and updated case studies examples.

The Professional Practice Guidelines – Structural Condition Assessment of Existing Buildings was developed in partnership with the Structural Engineers Association of BC. These guidelines were requested after some BC professionals noted that structural design guidance documents had been issued by Professional Engineers Ontario, after the 2012 collapse of a mall in Elliott Lake, Ontario.

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THE DIVERSITY PATHFINDER

Innovation readers may recall the photo of Marianne Ingeborg Claus in our January/February 2020 Centennial Collector’s Edition. In the article “Diversity: A Story of Progress”, we explained that Mrs. Claus became the first registered female engineer in BC at a Vancouver branch event in September 1959. But aside from the photo on page 34 and her registration information, we knew very little about her.

Soon after *Innovation’s* Centennial Collector’s Edition was published, we received an unexpected email from Elke Sinclair of Yukon, asking if we could send her a copy of the edition. “That’s a picture of my mom on page 34,” she wrote. “I’ve never seen that picture before.”

Ms. Sinclair went on to explain that her brother—the first of Mrs. Claus’s children, Berni Claus, P.Eng.—is a BC professional engineer living on Bowen Island, BC. Berni subsequently sent us dozens of photos

of his mother, and loaned us the detailed autobiography that she completed in 2002.

Marianne Ingeborg (Inge) was born in August 1922, in the town of Falkenberg, about 120 kilometres south of Berlin, Germany. She experienced severe food shortages and constant threats of bombing during World War II, and hardships associated with the Soviet occupation of what became East Germany.

She started pursuing a career in engineering shortly after high school, first as a carpenter’s apprentice in her father’s construction firm, then at technical college in Erfurt and Berlin-Neukölln and eventually technical university in Vienna and Berlin. Ms. Sinclair reports that her mother was the only woman student among 200 men, and that one professor always called her “mister” because he couldn’t comprehend a woman engineer. She also met her future husband, Werner, a fellow engineering student, at technical college.

Inge completed her engineering studies in 1950, married in 1951, immigrated to Canada—first to Quebec and then Vancouver—in 1952. She soon obtained engineering work and became an EIT in 1954, and then BC’s first registered woman engineer in 1959.

Inge began her career as a draftsman, working on projects such as the Trans Mountain Pipeline. She also worked for Bechtel and H.A. Simons as a structural

engineer; she later worked with her husband in their consulting firm, Claus Engineering. She eventually left her engineering career in the 1970s to work with disabled adults. She passed away in 2014, at age 91.

Inge never boasted about or even mentioned her 1959 accomplishment. But she forged a path for women in engineering and science careers that has only recently started to widen. In 1990—more than thirty years after Inge became the first woman engineer in BC—women still comprised only 2.2 percent of Engineers and Geoscientists BC registrants.

Today, the number stands at about 15 percent—a marker that suggests slow progress. That’s why Engineers and Geoscientists BC signed on to Engineers Canada’s 30 by 30 initiative: a goal to raise the percentage of newly licensed engineers who are female to 30 percent by 2030. That’s also why events like International Women in Engineering Day (INWED), scheduled for June 23 this year, have gained prominence in Canada and around the world. These and many other initiatives will hopefully ensure that our professions are not only committed to public protection and world-class techniques, but also to the principles of diversity and inclusion.

To learn more about Engineers and Geoscientists BC’s diversity initiatives, visit egbc.ca/Diversity-and-Inclusion.



LEFT: Inge Claus in 2014. PHOTO COURTESY OF BERNI CLAUS, P.ENG.

Inge (PICTURED BELOW, LEFT) in 1940 first worked as a carpenter in Germany. PHOTO COURTESY OF BERNI CLAUS, P.ENG.
Inge Claus becomes the first registered female engineer in BC, on September 9, 1959. (BELOW, RIGHT)



NEW PRACTICE ADVISORIES AND GUIDELINES PROVIDE PROFESSIONAL GUIDANCE FOR REGISTRANTS

Engineers and Geoscientists BC recently issued two practice advisories, titled *Structural Assessments of Exterior Means of Egress* and *Engineering Modifications to Fire-Tested and Listed Assemblies*, and Joint Professional Practice Guidelines titled *Professional Design and Field Review by Supporting Registered Professionals*. All practice advisories and guidelines can be found at egbc.ca/guidelines.

PRACTICE ADVISORY: STRUCTURAL ASSESSMENTS OF EXTERIOR MEANS OF EGRESS

Effective June 25, 2020, all structures providing exterior means of egress for applicable buildings, as defined in the City of Vancouver Fire By-law, including their guards, handrails, and connection to the buildings, must be inspected for structural integrity by a registered professional with appropriate experience, at least every five years.

Property owners and managers must engage structural engineers to provide the inspection services. Registrants wishing to undertake such work must act in accordance with the standard of practice described in this practice advisory.

Full details and the current standard of practice, including professional experience requirements, assessment process, reporting and tagging requirements, and definitions of follow-up structural work, are described in the practice advisory.

PRACTICE ADVISORY: ENGINEERING MODIFICATIONS TO FIRE-TESTED AND LISTED ASSEMBLIES

For both new and existing construction, the *British Columbia Building Code* and the Vancouver Building By-law mandate that some structural elements be designed and constructed to a minimum fire-resistance rating. Similarly, fire-related separations or assemblies are also required between areas of different uses and occupancies. CAN/ULC-S101 Standard Methods of Fire Endurance Tests of Building Construction and Materials tests fire-related assemblies and assigns an hourly fire-resistant rating based on time to failure.

The preparation of technical documents relating to fire protection applications in buildings, dealing with modifications to fire-tested and listed assemblies, or dealing with the development of new assemblies not specifically listed, all fall under the practice of professional engineering as defined in the *Engineers and Geoscientists Act*. Therefore, those documents must be sealed by a professional engineer.

Full details, requirements, and the current standard of practice, are described in detail in the practice advisory.

JOINT PRACTICE GUIDELINES: PROFESSIONAL DESIGN AND FIELD REVIEW BY SUPPORTING REGISTERED PROFESSIONALS

Engineers and Geoscientists BC and the Architectural Institute of BC (AIBC) have jointly prepared the *Professional Practice Guidelines: Professional Design and Field Review by Supporting Registered Professionals*. These guidelines apply to architects and professional engineers providing professional services in a supporting role on a building project.

These guidelines are a guide to the recommended use of two intraprofessional forms to help appropriately record professional responsibility and assurance:


- Model Schedule S-B: Assurance of Professional Design and Commitment for Field Review by Supporting Registered Professional, and;
- Model Schedule S-C: Assurance of Professional Field Review and Compliance by Supporting Registered Professional.

These guidelines replace the document previously known as Practice Note 16: Professional Design and Field Review by Supporting Registered Professionals.

These and other practice advisories and resources are available at egbc.ca/guidelines. To contact an Engineers and Geoscientists BC practice advisor, email practiceadvisor@egbc.ca, or call 1.888.430.8035 or 604.430.8035.







UBC students Eric Wynands (LEFT) and Ethan Alban conduct a field pilot demonstration of CO₂ injection into tailings at the De Beers Gahcho Kué Mine in Northwest Territories, in July 2019. The test involved installing and testing CO₂ sensors on a pipeline filled with processed kimberlite, and then injected with CO₂. PHOTO COURTESY OF DE BEERS GROUP.

DIGGING DEEP FOR A CARBON CAPTURE SOLUTION

Mining and carbon reduction may make strange bedfellows. But BC researchers are field-testing how mine tailings can be used to safely capture and store carbon dioxide from the atmosphere, leading the way to carbon-neutral mines able to capture the greenhouse gases they produce.

KYLIE WILLIAMS

In central British Columbia this summer, researchers will begin field trials at what could become Canada's first carbon-neutral mine.

Tonnes of mine tailings (waste rock) is generated as a by-product of extracting valuable metals and minerals from the Earth. Moving, storing, and rehabilitating this waste material is a major challenge for mine planners and operators: it is costly and requires careful management to reduce any impact on the environment. But new research out of BC is developing a method to put this material to good use.

Researchers working on the Carbon Capture, Utilization, and Storage in Mine Tailings project are testing how a certain type of ultramafic rock found in tailings, when crushed and exposed to air, reacts naturally with carbon dioxide to form stable, inert carbonate minerals, providing safe, long-term storage for excess CO₂ from the atmosphere.

A UBC student tests a CO₂ sensor on a field pilot demonstration of CO₂ injection into tailings at the De Beers Gahcho Kué Mine in Northwest Territories, in July 2019. The six-metre-long pipeline was filled with tailings and used as a flow-through reactor, to assess the effectiveness of tailings for capture and mineralization of CO₂. PHOTO COURTESY OF DE BEERS GROUP.



“We estimate that reacting just 10 percent of a mine’s waste stream could be more than enough to offset the annual carbon emissions produced by a mining operation,” said UBC Professor Gregory Dipple, director of the Bradshaw Research Initiative for Minerals and Mining (BRIMM), who is leading the research.

ULTRAMAFIC ROCK: THE ULTIMATE SOLUTION

For more than a decade, researchers have been examining how a certain rock type—serpentinized ultramafic rocks—can sequester carbon in mine tailings. These magnesium-rich rocks originate in the Earth’s mantle, tens of kilometres below the surface. Over millions of years, the rock moves up through the crust, undergoing physical and chemical alterations.

Under specific conditions, when magnesium is present and carbon dioxide is absent, the magnesium hydroxide mineral brucite forms in these ultramafic rocks. This mineral plays a key role in sequestering carbon when the rock eventually makes it to the surface: brucite naturally consumes carbon dioxide from rainwater, groundwater, and air to form a solid, stable magnesium carbonate mineral.

Normally, this natural weathering reaction happens very slowly, but in mine waste where certain ultramafic rocks are crushed and exposed to the air, it becomes highly reactive. “Reactions that normally take tens to hundreds of thousands of years can happen very quickly,” said Dipple.

Ultramafic rocks are not all the same. When they first take shape, they contain only trace amounts of water and CO₂. As they move through the crust, they can be deformed and sheared. Water can flow through them and they get hydrated and altered.

“Water gets added to the rock in a process called serpentinization,” said Dipple. “The serpentinization generates the minerals that are highly reactive to CO₂. We need that serpentinization to have a good prospect.”

However, a second stage of alteration, called carbonate alteration, can destroy CO₂ reactivity. If the rock encounters fluids that contain carbon dioxide during deformation in the crust, the hunger for CO₂ is satisfied before they reach the surface.

“So, we have the little Goldilocks zone that needs to be serpentinized but not carbonated,” said Dipple.

In BC, the goals of the project are twofold: to find ways to maximize the carbon-consuming reaction in this type of ultramafic rock in a real-world setting, and to map the locations of serpentinized ultramafic rocks



Magnesium carbonate crust on tailings of the closed Clinton Creek chrysotile mine, western Yukon, taken in 2005. PHOTO COURTESY OF UBC/GREG DIPPLE.

so that mining projects can take advantage of this natural process to capture CO₂ from the atmosphere.

To accomplish this, researchers sought and received support from Geoscience BC, the British Columbia Geological Survey (BCGS), the Geological Survey of Canada, De Beers Canada, FPX Nickel Corp., and Giga Metals Corp. and netted \$2 million from the Government of Canada’s Clean Growth Program. Research collaborators come from the Universities of British Columbia and Alberta, Trent University, and the Institut national de la recherche scientifique.

BC FIELD TRIALS

The ability of serpentinized ultramafic rocks to sequester carbon has been convincingly demonstrated in laboratory settings. But this recent funding boost has meant that Dipple and his colleagues can set up field trials in Canada and South Africa in 2020.

One of these trials will take place at the Baptiste Deposit, an advanced exploration project near Prince George in central BC, operated by FPX Minerals. According to FPX’s Dr. Peter Bradshaw, P.Eng., the company’s Baptiste Deposit (part of the Decar Nickel District) is unique, because it is the first deposit in the world where the primary ore mineral is awaruite—a rare nickel iron alloy found in serpentinized rocks.

Brucite occurs in these same rocks, making it an excellent candidate for a carbon sequestration trial.

“If you grind up the host rock at Baptiste so it has a much bigger surface area, it will indeed sequester some CO₂ out of the atmosphere,” said Bradshaw. “We don’t need carbon sequestration for this mine to work. It’s a pure bonus.”



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UBC student and teaching assistant Katrin Steinhorsdottir examines ultramafic serpentinite rock of the Baptiste Deposit in July 2019.

PHOTO COURTESY OF UBC/GREG DIPPLE.

In mid-2020, researchers expect to set up a tailings pad near Baptiste, made of drill core and surface rocks, to measure how much and how quickly the rocks absorb CO₂. Using greenhouse gas flux measurement systems that are built for agriculture and soil samples, they will monitor the CO₂ in the air over the tailings pile.

Small, dome-shaped chambers will isolate sections of tailings, Dipple explains. The rate at which the CO₂ is pulled out of the air trapped in the chamber and into the tailings below will be measured and compared with the characteristics of the tailings, such as the amount of brucite in the crushed rock.

MAPPING BC'S CARBON MINERALIZATION POTENTIAL

Fortunately, the fresh, unaltered ultramafic rocks, the serpentinitized rocks, and the carbonate-altered rocks each have distinct physical characteristics. Using geophysical techniques, researchers can measure physical rock properties, such as density, magnetic properties or electrical conductivity, to help find rocks that have the highest carbon-sequestering potential.

Geoscience BC, an organization that promotes and funds public geoscience research in BC, is sponsoring

a specific portion of this project, investing \$260,000 over two years to create a world-first Carbon Mineralization Potential Index (CMPI) of BC.

“We know that ultramafic serpentinitized rocks occur throughout BC,” said Brady Clift, P.Geo., Manager, Minerals, at Geoscience BC. “The CMPI will use geophysical data and information about the chemistry and physical properties of these rocks to map their distribution across the province.”

Dianne Mitchinson, P.Geo., research associate at the Mineral Deposit Research Unit (MDRU), is assisting with this portion of the project. Mitchinson has experience interpreting geophysical data and integrating it with rock property data from mineral deposits. For this project, she is looking at geophysical data collected over the Baptiste site to determine the “geophysical fingerprint” of the brucite-bearing serpentinitized rocks.

“If we can identify that fingerprint at specific sites,” said Mitchinson, “then we may be able to go and look at the geophysical data over a larger area and find the best rocks for carbon sequestration.”

Mitchinson and her colleagues, Dominique Fournier, scientific programmer at Mira Geoscience, and Jamie



July 2019 field characterization of ultramafic serpentinite rock from the Baptiste Deposit, to assess reactivity to CO₂.

PHOTO COURTESY OF UBC/GREG DIPPLE.

Cutts, postdoctoral researcher at MDRU, are using public geophysical data collected by Geoscience BC and Natural Resources Canada over large swaths of the province to generate three-dimensional models of the serpentinized volumes within the ultramafic rock.

In parallel with this, other researchers on the team are conducting detailed field mapping around the Baptiste deposit and collecting rock samples for geochemical analysis. Dejan Milidragovic, P.Geol., a senior minerals geologist specializing in nickel with BCGS, has been working in the Decar area for several years, mapping and studying the evolution of the serpentinized rocks that host the awaruite and brucite.

“On this project, we’re trying to identify which ultramafic rocks have the greatest potential to produce brucite,” Milidragovic said. “Ideally, we’re not just going to apply this to BC, but we’ll be able to extract some knowledge that we can then apply globally, wherever we have ultramafic rocks.”

MINES OF THE FUTURE

In late 2020, FPX Nickel plans to release an updated Preliminary Economic Assessment (PEA) for the Baptiste Deposit. Although a PEA is a normal step in

mine development, this particular PEA will contain data that no other proposed mine in the world has.

“We will be able to produce a mine plan that will show the carbon sequestration potential for each mining block,” said Bradshaw.

Based on research so far, Dipple said the most reactive rocks will absorb one-tenth of their mass of carbon dioxide. In other words, ten tonnes of tailings can absorb one tonne of CO₂.

If a typical large nickel mine produces 20 million tonnes per year, the tailings could absorb up to two million tonnes of carbon dioxide per year. For a mine in BC that operates on hydroelectric power, this sequestration capacity far outweighs the roughly 200,000 tonnes of CO₂ it would produce.

The next challenge is to find methods to speed up the carbon sequestration reactions and maximize the reaction without increasing the physical footprint of the mine. These may include tilling the tailings every few months, in the same way a farmer tills a field.

This research will have a huge impact on the way geoscientists and engineers design future mines for orebodies hosted in ultramafic rocks. ♦

ENGINEERING PROFESSORS SEIZE OPPORTUNITIES AMID COVID-19 IMPACTS

The impact of COVID-19 on engineering and geoscience professionals, their businesses, and economies around the world has been abrupt and substantial. The virus has also had a major impact on engineering and geoscience students, who have experienced shifts in admissions, exams, approaches to instruction, and graduation events.

But while on-campus activity at colleges and universities in Canada and around the world has quieted to a hush, the work of at least two BC engineering professors and their students has quickly shifted—and even intensified—for the sake of public health.

UVic normally hosts one of Canada's top biomedical engineering labs, but COVID-related developments have prompted its program director, Dr. Stephanie Willerth, P.Eng., to repurpose it into a sort of community development hub that produces and assembles face shields for front-line health workers. Dr. Willerth and her team have partnered with Vancouver Island businesses, industries, and students to design and manufacture the shields for donation to health care workers, either through Vancouver Island Health Authority or directly to family doctors that need them.



UVic professor and director of its biomedical engineer program, Dr. Stephanie Willerth, P.Eng., shows a face shield with components from a range of sources in the local community. PHOTO: UVIC PHOTO SERVICES

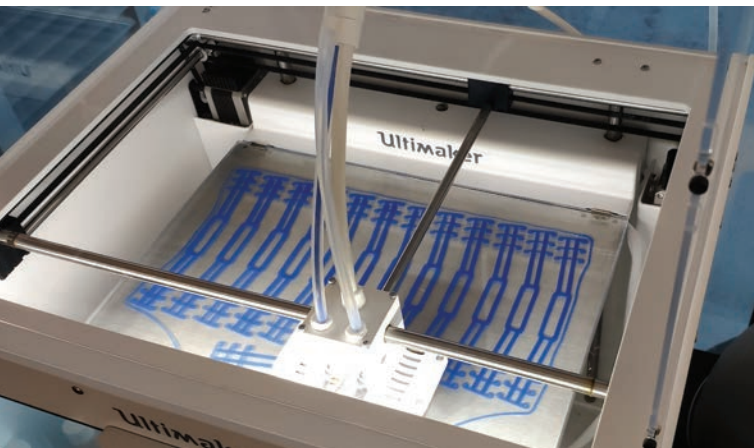
Ten UVic 3-D printers are being used to produce some of the face shield components; other components are being 3-D printed by students, alumni, and individuals, or manufactured by local businesses. When complete, the components are dropped in a bin outside Dr. Willerth's lab, after which they are assembled, and then sterilized using UVic's UV-emitting machine.

"We've made about 1,800 [face shields] and delivered them all over the island," said Willerth, adding that she and her team have enough supplies to complete 8,000 units. She said that a partnership with TECHNATION and Innovate BC will fund co-op students, including a chief engineer and an undergraduate engineering student, to continue work on COVID-19-related products. "We're looking into ultraviolet sterilization boxes, too," she said.

Dr. Woo Soo Kim, P.Eng., Associate Professor in Mechatronics at SFU and a leading expert on sustainable 3-D printing manufacturing design, has also rapidly pivoted his work to COVID-19 solutions. "The entire SFU community is working at home," he said. "Now I'm spending most of my time working on COVID-19." Dr. Kim is leading the "3-D Designed PPE Initiative," intended to focus the department's skills and resources to design and produce sorely needed PPE for health care workers.

Dr. Kim co-opted nearly 60 SFU engineering students, many of whom have 3-D printing units at home. One of the initiative's first jobs was to fulfill a request from Dr. Lillian Hung, Clinical Assistant Professor at UBC Nursing, for a comfortable mask strap for health care workers who need to wear masks for long periods. Dr. Kim and his team recently produced and delivered 500 "ear-saver" mask straps to Dr. Hung at Vancouver General Hospital.

CONTINUES ON PAGE 45...



A 3-D printer makes ear-saver straps, part of Dr. Kim's 3-D Designed PPE Initiative.



Dr. Woo Soo Kim, P.Eng., delivers 3-D printed ear-saver mask straps to Dr. Lillian Hung at Vancouver General Hospital.

PHOTO COURTESY OF DR. WOO SOO KIM, P.ENG.



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PROJECT HIGHLIGHTS 2019 | 2020

Each year, in our Project Highlights edition, *Innovation* showcases the engineering and geoscience work of our registrants both here in BC and around the world. *Innovation* and the Engineers and Geoscientists BC Editorial Advisory Committee thank all who submitted project photographs and descriptions.



GNW PAVILION AT 565 GREAT NORTHERN WAY

Adjacent to Emily Carr University of Art + Design in Vancouver's South Flatz neighbourhood, this artistic lotus flower-shaped retail pavilion provided an interesting structural design opportunity. Facilitated by digital modelling through Spearhead Inc., a unique yet simple hybrid timber-steel structure was developed to support this complex lotus shape. The principal structure consists of five inner petals constructed of curved glulam members and seven glazing columns that support a hybrid timber-steel dome. The five outer curved petals were sculpted from engineered wood and are supported on the lower dome and petals. The complete structure was fabricated from approximately 40 prefabricated sections comprising of over 7,000 individual pieces of wood and steel, all cut with tight tolerances from CNC machinery.

Owner: PCI Developments. Participants: RJC Engineers: Grant Newfield, P.Eng., Colin Gilbert, EIT.

Architect: Perkins + Will. Digital Modeller and Fabricator: Spearhead, Inc. PHOTO: EMA PETER PHOTOGRAPHY.



WATER MONITORING OF SMALL WATERSHEDS IN NORTHEAST BC

The BC Oil and Gas Commission is collaborating with three Treaty 8 First Nations communities over two years to establish hydrometric stations for the collection of streamflow data in small northeast BC watersheds. The Treaty 8 First Nations communities have indicated that water is their highest priority and concern—primarily water withdrawals from small watersheds, and the lack of data to support decision-making. Streamflow data will be integrated into the hydrometric network to inform future watershed management decisions in northeast BC. The increased collaboration with Treaty 8 First Nations also provides the opportunity to integrate traditional knowledge into the western science quantitative streamflow measurement.

The project began in 2019 with funding provided by the BC Oil and Gas Research and Innovation Society.

Participants: Suzan Lapp, P.Geo., Ryan Rolick, GIT (BC Oil and Gas Commission), Doig River First Nations, Prophet River First Nations, Saulteau First Nations.



WASTEWATER TREATMENT PLANT PROJECT

Situated at the entrance of Victoria Harbour, the McLoughlin Point Wastewater Treatment Plant is a 108 megalitre per day state-of-the-art facility being constructed to provide tertiary treatment for wastewater from seven municipalities and the Esquimalt and Songhees Nations in the Capital Regional District. Design features of the new plant include being built to post-disaster standards to remain operational following a major earthquake and the operations and maintenance building reaching LEED Gold level. This \$775 million wastewater treatment project also includes construction of the Residuals Treatment Facility, that will turn the residual solids into Class A biosolids and upgrades to the conveyance system, the network of pipes and pumps linking the treatment facilities.

Owner: Capital Regional District. Primary contractors: Harbour Resource Partners, Hartland Resource Management Group, Kenaidan Contracting Ltd., Windley Contracting Ltd., Don Mann Excavating, Knappett Projects Inc., NAC Constructors, and Jacob Bros Construction. Owner's Engineer: Stantec, Kerr Wood Leidal, and Parsons.



ICEBREAKER/ESCORT TUG “VILJA”

“Vilja” is a 36-metre Tundra 3600–Hybrid icebreaker/escort tug designed to Finnish-Swedish ice class 1A Super, capable of breaking one metre of ice at speed up to three knots and was delivered to the Port of Luleå, Sweden, in July 2019. The tug is designed as a compact icebreaker with a hull structure that exceeds Finnish-Swedish ice class strength requirements. The tug was designed by Robert Allan Ltd. and built by Gondan Shipbuilders of Spain. The new vessel is used for ice management, firefighting, and navigation aids, and will assist ships, and conduct coastal towing in the northern sector of the Gulf of Bothnia. The vessel is equipped with an innovative hybrid propulsion system featuring diesel main engines, in-line shaft electric motor/generators, and electric battery energy storage which allows effective power and fuel consumption management. The vessel is capable of performing transit and standby operations on electric battery power only, or operate in electric boost mode to maximize power.

Participants: Robert Allan Ltd.: Dr. Oscar Lisagor, P.Eng. (Project Director), Bilyana Ivanova, P.Eng. (Project Manager), Robin Stapleton, P.Eng. (Electro-Mechanical Engineer)

PHOTO COURTESY OF GONDAN SHIPBUILDERS.



“75” CUSTOM RESIDENTIAL PROJECT

This ornamental and minimalistic residence, known as “75”, sits on a hay farm in the Canadian Pacific Northwest. Characterized by emphatic curves and defined lines, this house is built on graceful hollow ribbed concrete “lily pads”. To achieve the fluid shape of these concrete columns, Fast + Epp designed a formwork system with the architect using conventional materials (plywood and form ties) to create an unconventional free form pattern. A slow, continuous pour schedule allowed the adjusted concrete formula to cure at the same rate as it was being poured. Discrete restraints were provided to the base structure for lateral stability. Also described as “chanterelle mushrooms”, the hollowness of these columns extends to the roof, allowing for trees to be planted in the roof and the house to blend in its surrounding landscape.

Participants: Fast + Epp: Paul Fast, P.Eng., Struct.Eng., Nick de Ridder, P.Eng., Thomas Duke, P.Eng. Architect: Omer Arbel Office.



SANZARA FOOTBRIDGE

For the residents of the communities surrounding the Sipi River in eastern Uganda, there is hardly a dry season. The more than 1,700 residents living near the build site of the Sanzara Footbridge must make the difficult decision daily whether or not they should attempt to cross, or let their children attempt to cross, in order to reach critical resources. While the Sipi River is always flowing, it becomes even more dangerous to cross when it flows faster and becomes wider after violent rains, especially during the rainy season. The Sanzara Suspended Bridge will provide safe, year-round access for members of the surrounding communities, provided enhanced access to opportunity to empower the communities out of poverty. A team of ten engineers and geologists from Canada, Australia, and the US was sent to Uganda to assist in the construction of the 60-metre bridge over a two-week period.

Participants: McMillen Jacobs Associates: Fred Marquis, P.Eng., Sarah Wilson, Jenny West, David Corkum, David Sullivan (in collaboration with Traylor Bros. Inc.).



ALEX FRASER BRIDGE IMPROVEMENT PROJECT

With more than 120,000 vehicles using the Alex Fraser Bridge each day, congestion was a growing problem. Motorists were experiencing excessive delays and queues more than three kilometres long during rush hour. The BC Ministry of Transportation and Infrastructure's Alex Fraser Bridge Improvement Project greatly improved conditions with the addition of a seventh lane, an innovative movable barrier counter-flow system, and 13 new dynamic message signs throughout the Lower Mainland. The project has resulted in a travel savings time of approximately 20 minutes during the southbound afternoon peak, and 10 minutes travel savings time during the northbound morning peak. Binnie's innovative design represents the first and only moveable barrier counter-flow system in western Canada.

Participants: Binnie: Edmund Lee, P.Eng., Dana Xu, P.Eng., Simon Church, P.Eng., Jhonathan Martinez, P.Eng., Amanda Rust, P.Eng., Jonathan Ho, P.Eng., Gerry Fleming. PBX Engineering: Cory Edgar, P.Eng. COWI: Terrence Davies, P.Eng., Donald Burkholder, P.Eng. Klohn Crippen Berger: Andrew Port, P.Eng.

FIBRE-REINFORCED GLULAM ALL-TIMBER BRIDGE ON MCGILLIVRAY FOREST SERVICE ROAD

The fibre-reinforced Glulam All-Timber Bridge on the McGillivray Forest Service Road is 21.2 metres long, with a 20.6-metre span and 5.5-metre-wide deck, is on a 2 percent grade, and has a 20-degree skew. This resource road bridge has been designed for a L100 vehicle loading, comprises five Douglas-Fir glulam girders reinforced with aramid fibres for shear and bending, and



overlain with a laminated subdeck and solid sawn running planks. The substructure and crash-tested curb system also consist of glulam timbers. This bridge, located seven kilometres east of Sun Peaks Resort, was designed, fabricated/pre-assembled off-site and reassembled on-site, as a demonstration of what is possible for timber bridges for BC, with durability by design concepts incorporated.

Project Owner: Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD). Participants: FLNRORD: Brian Chow, P.Eng., Martin Fennell, Drew Alway, P.Eng. (Coordinating Registered Professional). Wood Research and Development: Dan Tingley, P.Eng. (structural design). Timber Restoration Services: Jim Richard (contract representative). FPIinnovations: Conroy Lum, P.Eng. (quality assurance support).



VANCOUVER CONVENTION CENTRE LIGHTING REDESIGN

Built for the 2010 Olympics, the Vancouver Convention Centre is a premier event facility. Awarded LEED Platinum for New Construction in 2010 and again in their re-certification in 2018, it is the first double-LEED Platinum convention centre in the world. Prism Engineering designed an extensive lighting system upgrade throughout the exhibition halls and pre-function concourses. The new LED lighting and integrated controls have decreased lighting demand by over 40 percent, and are projected to save 841,000 kilowatt-hours annually. The integrated controls allow full customization of lighting to transform the centre for hosting everything from intimate weddings to international conferences. Controls are now accessible via host computer, local touchscreens, or tablet. The project was awarded a 2019 BC Hydro Power Smart Lighting Redesign Award from the Illuminating Engineering Society of BC.

Participants: BC Pavilion Corporation: Brent Franklin, Gary Muglich. Prism Engineering: Andrew Munro, Faisal Emami, EIT.

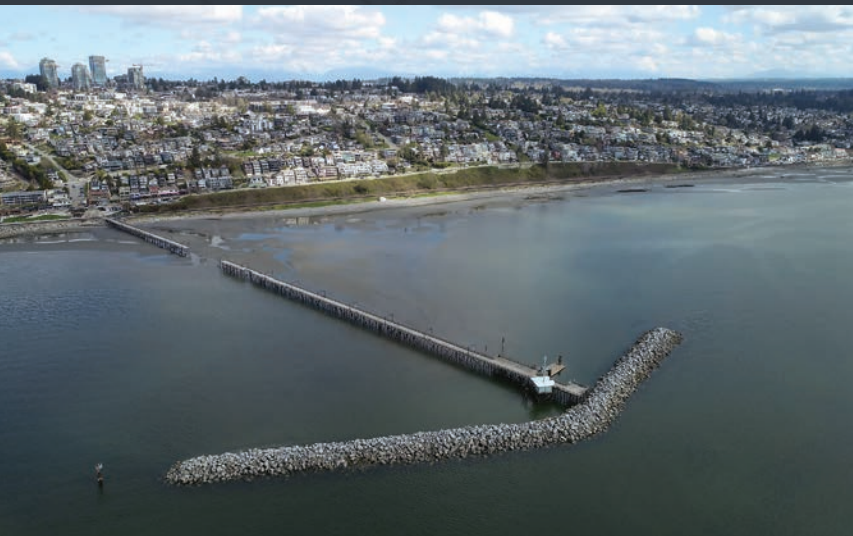
SAMUEL DE CHAMPLAIN BRIDGE

The new Samuel De Champlain Bridge across the Saint Lawrence River replaced the Champlain Bridge of 1962.

Construction on the new bridge began on June 16, 2015 by the joint-venture consortium “Signature on the St. Lawrence Group”, comprising of SNC-Lavalin, ACS Infrastructure, and Dragados Canada, with T.Y.Lin International as the lead designer for the cable-stayed bridge. The entire bridge length is 3.4 kilometres, including the 530-metre cable-stayed portion. The bridge opened to highway traffic on July 1, 2019. Construction continues on the corridor for the new Réseau express métropolitain light rail system, scheduled for completion in 2023.



Key participants: T.Y.Lin International: Marwan Nader, P.Eng. (Engineer of Record), George Baker, P.Eng., Alex Sanjines, P.Eng., Sam Shi, Christopher Taylor, Hayat Tazir, James Duxbury, P.Eng.



DESIGN OF THE WHITE ROCK PIER REPLACEMENT

In late December of 2018, the iconic White Rock pier was badly damaged by a powerful storm. The pier suffered extensive structural damage along its length; a 100-metre section was completely torn away. A replacement pier section was designed that was practical, innovative, and enabled rapid reconstruction. It was stronger than the original, economic, quick to install, and had minimal impact on nearby sensitive inter-tidal areas. It also featured a simple and efficient method to raise the pier for future anticipated sea level rise. Permits and construction were completed quickly so that the White Rock’s primary public attraction could be opened to the public as planned by August 2019.

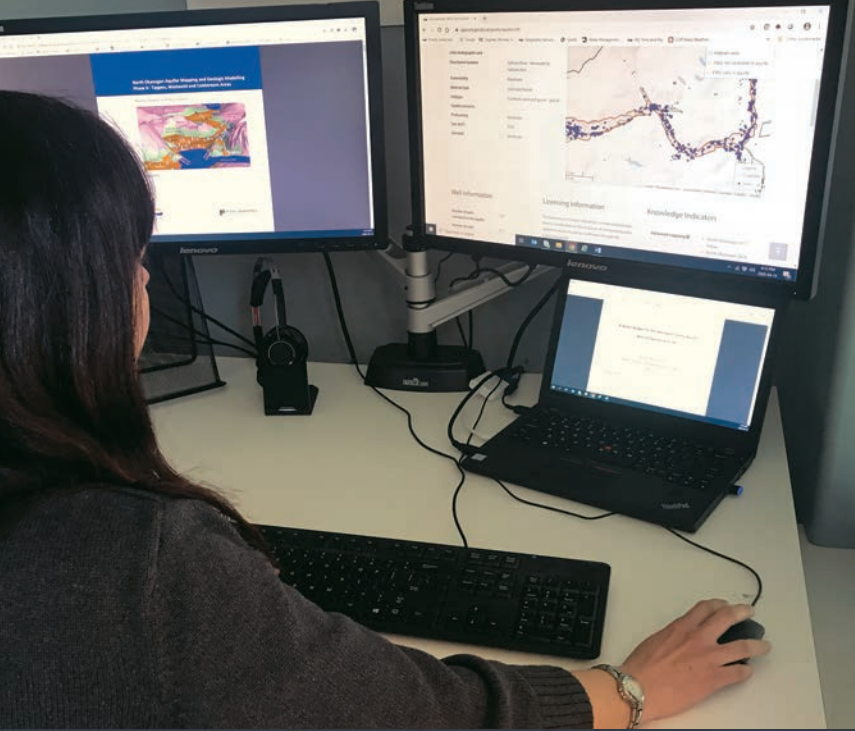
Participants: Daniel Leonard, P.Eng., Vignesh Ramadhas, P.Eng., Hong Liang, P.Eng., Robert Young, P.Eng., Kai-Sing Hui, P.Eng., Stewart Wright, Jim Gordon, P.Eng., Rosaline Choy, P.Eng.



COMOX VALLEY WATERMAIN LEAK EMERGENCY REPAIR

The Comox Valley’s source of water suffered a catastrophic leak, condemning 45,000 residents to severe water restrictions and a potential boil-water advisory. McElhanney discarded expensive, disruptive conventional solutions to innovate the previously unthinkable: mobilize divers to weld the pipe internally, while it was full of water. McElhanney overcame logistical and safety challenges to complete the repair before the start of peak water demand season.

Owner: Comox Valley Regional District. Participants: Bob Hudson, P.Eng., Chris Newcomb, P.Eng., Tijana Smiljanic, P.Eng.



NEW ONLINE ACCESS TO PROVINCIAL AQUIFER INFORMATION

A team of hydrogeologists for the Government of BC undertook an initiative to improve access to government groundwater and aquifer information. The project involved developing scripts to automate the retrieval, clean-up, analysis, and display of relevant groundwater data from several databases across multiple ministries. In the first phase of the project, aquifer fact sheets were autogenerated for almost all of the 1,230 provincially mapped aquifers. The second phase of the project focused on developing an interactive web-based tool to summarize information. The Aquifer Search tool was initially launched in the spring of 2019, within the Provincial Groundwater Wells and Aquifers (GWELLS) application (found at apps.nrs.gov.bc.ca/gwells/aquifers). Additional enhancements are currently underway. The streamlined access to groundwater information will help

government staff and consultants better assess and manage the groundwater resources of the province.

Participants: Andarge Baye, P.Geo., Amy Sloma, P.Eng., Jessica, Doyle, P.Geo., Shirley Wang, P.Geo., Michele Lepitre, P.Geo., Julie-Ann Ishikawa, P.Geo.



CENTERM EXPANSION PROJECT AND SOUTH SHORE ACCESS PROJECT

The Vancouver Fraser Port Authority, in partnership with DP World and design-build contractor Centennial Expansion Partners (a joint-venture partnership comprising Dragados, Fraser River Pile and Dredge, and Jacob Bros Construction), is making improvements to the Centerm marine container terminal and its associated roadways, to help meet anticipated near-term demand for container trade through the Port of Vancouver. The project involves infilling to expand the terminal footprint by 15 percent and reconfiguring the terminal to achieve 60 percent more throughput. Roadway upgrades include building an overpass over rail tracks and ensuring rail and port traffic is unimpeded during construction. The terminal will remain operational throughout construction. The project team is building for LEED and Envision Gold sustainability certification. For example, the team will reuse dredged materials from the seabed as infill for the expansion.

Owner: Vancouver Fraser Port Authority. Participants: Gilles Assier, Gord Ruffo, P. Eng., Neil Snowball, P. Eng., Jennifer Johnston, P. Eng., Shane Gilbertson, P. Eng., John Ma, P. Eng.



CABLE FERRIES REPLACEMENT PROJECT

Cable ferries have a long history providing vital lifelines for local inland communities of British Columbia. In 2019 alone, cable ferries carried about 1.2 million passengers and 750,000 vehicles. In February 2016, Waterbridge Steel Inc., a BC shipbuilder in Nakusp, was awarded the contract to design and build four new cable ferries to replace the existing aging fleet. Working in partnership with North Vancouver's Capilano Maritime Design Ltd., Waterbridge successfully delivered one new vessel per year: *Adams Lake II*, *Glade II*, *Harrop II*, and *Arrow Park III*. The project was complex, involving remote-site builds at different waterfront locations.

Owner: BC Ministry of Transportation. Owner's Engineer: 3GA Marine Ltd. Participants: Maryse Langevin, P.Eng., Callum Campbell, P.Eng., Chris Mulder, P.Eng., Richard Wagner, P.Eng., John Shaw, P.Eng., David Mietla, P.Eng.



LONG-RANGE HYDROGEN FUEL CELL POWERED AUTONOMOUS UNDERWATER VEHICLE

The Solus-LR Autonomous Underwater Vehicle was developed by Cellula Robotics for Defence Research and Development Canada's All Domain Situational Awareness program. The program is intended to provide Canada with persistent, long-range surface and subsurface surveillance assets for the Arctic. Solus-LR boasts a 2,000-kilometre submerged range through the use of a hydrogen fuel cell, and is able to hold station in a low-power state using a suction anchor. The range capability of Solus-LR enables autonomous "port-to-port" surveys, eliminating the need for vessel-based launch and recovery. This project will culminate in a month-long demonstration in 2020, where the vehicle will perform laps around two subsea nodes to cover over 2,000 kilometres.

Participants: Eric (James) Jackson, P. Eng., Don Clarke, P.Eng., Reuben Meikle, P.Eng., Sina Doroudgar, P.Eng., Charles van Aert, EIT, Elizabeth Hunter, EIT, Keira Lane, EIT, Peter Hampton, EIT, Tyler Wickett, EIT, Thomas Deaton, EIT, Drew Davison, EIT.

ANDERSON CREEK FISHWAY

Previous development had created a three-metre-high concrete fish passage barrier in Anderson Creek, adjacent to the LNG Canada project now under construction in Kitimat, BC. McElhanney's design created stable water flows through a series of box culvert steps, allowing pink and coho salmon to bypass the barrier and navigate upstream for the first time in 65 years, and in a range of conditions.

The project accommodated a smooth transition for fish between the creek and the fishway, while providing protection to previously eroded banks. The fishway will provide access to 3,500 square metres of new spawning habitat. After construction was substantially completed in June 2019, hundreds of salmon were counted upstream of the fishway. It is estimated the newly accessible spawning habitat will accommodate up to 600 mating pairs annually.



Owner: LNG Canada Development Inc. Participants: John Share, P.Eng. (McElhanney Ltd.), Leducor Haisla Limited Partnership, Northwest Hydraulics Consultants Ltd., Thurber Engineering Ltd.



FRIENDSHIP HOUSING DEVELOPMENT WASTEWATER TREATMENT PLANT

ECOfluid Systems Inc., a Vancouver company, was awarded a contract by a large Caribbean housing developer, West Indies Home Contractors Ltd., to design and build a wastewater treatment plant in Montego Bay, Jamaica. With Phase One in operation, and Phase Two and Phase Three in their final stages, the plant serves a development with an ultimate capacity of 2,200 residential one, two, and three-bedroom units. The plant utilizes ECOfluid's stainless steel Upflow Sludge Blanket Filtration (USBF) clarifiers, to ensure a long effective lifecycle. ECOfluid's scope of work included all mechanical work, and electrical and controls components supply and installation. The plant is the third wastewater treatment plant designed and supplied by ECOfluid to clients in Jamaica.

ECOfluid: Brian Chan, P. Eng., Zhidong Li, Karel Galland, P.Eng.



ENERGY EFFICIENT MODULAR HOUSING

As a part of the Government of BC's approach to addressing the provincial housing crisis, BC Housing has implemented a rapid response modular housing strategy, which uses modules from Horizon North Logistics of Kamloops. Modular construction is not only a rapid construction technique, it can also provide better quality control, has low on-site impact, and is reusable, reconfigurable and re-locatable. Focal Engineering provided energy modelling for over 30 of these projects to date, helping optimize energy performance while considering comfort and cost. Projects are modelled to higher steps of the BC Energy Step Code and work with unique site-specific considerations. Modeling includes exploring low-cost passive measures to address problems like overheating before costly energy intensive measures are implemented. The overall strategy is intended

to deliver a safe, comfortable, environmentally friendly and cost-effective solution to the housing crisis.

Participants: Focal Engineering: Riley Beise, P.Eng. BC Housing, Horizon North Logistics, and JRS Engineering.

MIDDLE HARBOUR FILL SITE REMEDIATION

Laurel Point Park in Victoria, BC, was previously the site of a paint factory until 1972 which left site soils with five different contamination classifications, ranging from commercial quality to heavy metals, hydrocarbons, and PCBs. Seventy thousand tons of contaminated soil were removed and disposed of at four separate disposal sites, and replaced with clean fill via barge. Two temporary berths were installed to provide access to load barges, saving 5,000 truck trips through



residential neighborhoods. Excavators fitted with RTK-GPS were used to selectively remove and survey lenses of contaminated material below the water table without visual confirmation. The project helped clean up the legacy of industrial activity in Victoria Harbour and will benefit the local community for years to come.

Owner: Transport Canada. Contractor: A JV between JJM Construction Ltd. and QM Environmental. Consultants: SLR Consulting, Hemmera. Participants: Gary Hamata, P.Eng., Craig Peddie, P.Eng., Will Morris, P.Eng.



TRIDENT HYBRID FLOATING STRUCTURE

Poseidon Ocean Systems delivered a new floating structure concept to Cermaq Canada's site at Fortune Channel, in Clayoquot Sound. The goal of the project was to create a stronger, safer floating structure for industrial applications, such as aquaculture. The design incorporated steel framing and HDPE pipe elements to create a novel hybrid structure. The result is a structure with significantly improved stability, load capacity, and dynamic responses for a fraction of the cost of conventional options. The design achieved a secondary goal of providing areas to recess electrical conduit and other systems typical on an ocean farm. The result is a floating structure technology that is well suited to a wide variety of marine projects. It is dramatically stronger and more stable than conventional systems and can also be made from recycled materials, lessening the overall environmental impact.

Participants: Tommy Yung, EIT, Jeff Fleming, EIT, Andrew Hartz, EIT, Nathan Hollenberg, EIT, Byron Sham, EIT.



ROGERS PASS MAINTENANCE COMPOUND INFRASTRUCTURE IMPROVEMENTS

This multi-year, multi-phase project included complete re-grading and re-surfacing of the Park's Canada maintenance compound at the summit of Roger's Pass. The compound was built in the 1960s and had numerous fill and paving projects completed since. Work included installation and replacement of stormwater mains and accessories, the addition of quality and quantity control facilities, and removal of some sanitary sewer mains in coordination with the demolition and restoration of the former lodge. Installation of snow fences around the compound was also included in the project. An overriding goal of the project was increased protection for the adjacent Rogers Creek.

Participants: Wedler Engineering LLP: Andrew Gower, P.Eng., Sam Rogers, P.Eng.



KOOTENAY LAKE WEST ARM DREDGING

The Kootenay Lake Ferry is the longest free ferry ride in the world. This year-round crossing between Balfour and Kootenay Bay, parallel to Highway 31, is a key component of the BC's inland ferry system. Dredging the west arm navigation channel into Balfour was required to maintain year-round ferry terminal access, due to Kootenay Lake's annual water level fluctuations. Advisian was retained for a navigation study, geotechnical assessment, and design. Vancouver Pile Driving Ltd. was awarded the dredging contract in August 2019, and carried out the dredging under tight environmental timelines, adverse weather conditions, and close to ferry passage. The project was successfully completed in November 2019. Site supervision was provided by RWM Engineering Ltd.

BC Ministry of Transportation and Infrastructure: Mike Hallas, Callum Campbell, P. Eng. Advisian: Atelka Turney, P.Eng., Jason Braun, P.Eng., Chris Slater, P.Geo. Vancouver Pile Driving Ltd: Ian Purvis, EIT. RWM Engineering Ltd.: Ron Mathieson, P.Eng., Bernie Jebson.

COMPACT O-FRAME SCANNER

This new product, designed at the Honeywell Centre of Excellence in North Vancouver, is used in the paper and plastics manufacturing industries to measure physical properties such as weight, moisture, or thickness of a moving sheet during production. The challenge was to design an environmentally robust and cost-competitive scanner that would support up to two sensors, depending on the sheet properties of interest. The scanner provides feedback to a supervisory Quality Control System, which ensures the sheet is manufactured to the proper specifications by controlling upstream actuators that manipulate the production process. Ethernet-based sensor communications allow the scanner to act as an Industrial Internet of Things edge device, providing both process and control system status data to remote monitoring systems.

Design Team: Jeffrey Austin, P.Eng., Michael Wardas, Mayank Kalra, EIT, Joyce Teodoro, Andrzej Nawrocki, Cris Andronic, Sudhir Thalore, Gertjan Hofman, Ian Baro.



SECRET BEACH MARINA DEVELOPMENT

The Secret Beach Marina was completed for the Toquaht Nation at Secret Beach on Toquaht Bay, Vancouver Island. The project was managed by Toquaht Nation Project Manager, Noah Plonka, and consultant, Rick Shafer, of Pipestem Enterprises Ltd. This development included new roads, a boat launch facility, a marina with a breakwater, and a boat trailer parking lot. Construction proceeded throughout Winter, Spring, and Summer of 2019, and was completed in June. The facility improves boater access to Toquaht Bay by allowing all-tide vessel launching, moorage, and dedicated trailer parking, giving boaters the option of extended trips into Toquaht Bay.

Participants: Cascara Consulting Engineers: Charles Ramos, P.Eng. CR Engineering: Jeff King, P.Eng. Chris Zamora, Aquaparian Environmental Consultants.



SECURE AUTOMATED BICYCLE PARKING SYSTEM

This automated bicycle parking, a leading-edge space efficient modular dynamic structure, with 34 bicycles capacity (plus an option to increase) was delivered by MAZDIS in the Minoru Recreation Center, Richmond, BC. Bicycle production exceeded car production more than two decades ago, and cycling became one of the main modes of transportation, even though bicycles remain vulnerable to theft and vandalism. The City of Richmond, in response to this problem, and to support commute cycling, took the initiative to resolve this issue. This parking station helps cycling to reach its full potential by substantially increasing the security of bicycles. The forthcoming app will allow cyclists to secure a spot, plan their commute ahead of time, and integrate cycling with other transportation modes.

Participants: MAZDIS Inc.: Nick Mani, P.Eng., Mark Delcourt, Dr. Anahita Mani, Mohsen Bagherpour, P.Eng. City of Richmond: Martin Younis, Mile Racic, Joan Caravan.



GOVERNMENT OF NUNAVUT: IQUALUIT MARINE INFRASTRUCTURE

The project provides a new deep-sea port to improve efficiency and safety of annual resupply of dry cargo and fuel, and improvements to existing small-craft harbour facilities that enhance water access for the community. The new deep-sea port infrastructure will include a wharf capable of handling dry cargo direct from ship to shore, through all tide cycles, and the ability to offload fuel without the use of floating hoses as well as a new laydown yard for cargo storage and distribution. Improvements to the small craft harbour infrastructure will include breakwater improvements, staging lanes and parking, boat ramps, and small-craft floats. Project challenges include a short open-water construction season, a significant tidal range exceeding of 11 metres, and the arctic climate.

Participants: Advisian: Harald Kullmann, P.Eng., Robert Crompton, P.Eng., Jason Braun, P.Eng., Andre Dratwa, EIT, Paige Crompton, EIT, Darren Beaumont, P.Eng., Jeffrey Gibson, Eng.L, Lauren Tagg, GIT, Ebrahim Manesh, P.Eng.



41ST AVENUE RAPIDBUS

As part of the 10-year Vision for transportation in the Metro Vancouver region, the City of Vancouver and TransLink partnered to facilitate a new RapidBus service along 41st Avenue from Joyce-Collingwood Station to UBC. 41st Avenue is a key east-west arterial and, at 11 million trips, is the second busiest transit corridor in the region. Launched in January 2020, the 41st Avenue portion of the RapidBus service has the capacity to move up to 4,400 people per hour during rush hour, connecting the Expo Line, the Canada Line, Oakridge Centre, Kerrisdale, and UBC. The project included implementing bus priority lanes, new corridor parking restrictions, turn bays at key intersections, and enhanced bus-stop amenities, such as real-time bus information.

Participants: City of Vancouver: Tim Barton, Eng.L., Michael Leong, P.Eng., Billy Dong, P.Eng., Donald Campbell, EIT. TransLink: Brian Philips, P.Eng., Amelia Trachsel, P.Eng.

WAC BENNETT DAM SPILLWAY HOIST EQUIPMENT UPGRADE

As part of upgrading the spillway gate hoist system, Pacific Rim Engineered Products (PREP) designed, assembled and installed hoist gearboxes for replacement of existing 1960s-era equipment. PREP engineered and assembled six gearbox assemblies (151:1 reduction), providing 155,000 foot-pounds of torque output. The new gearboxes have updated gear lubrication, modern controls interfaces (encoder, limit switches), and are of two-piece design to facilitate servicing. New gear geometry meets strict overload and seismic requirements, improving on the original powertrain. PREP removed the original equipment and installed new gearboxes and equipment, mounting to original hoist drums and frames, and aligned equipment with laser tooling. Partial opening tests of the 215-ton radial spillway gates were performed, with final commissioning scheduled for Spring 2020.



Owner: BC Hydro. Primary Contractor: HMI Construction Inc.—An Andritz Company. Engineering and installation by PREP: J. Deagle, P.Eng., P. Cave, P.Eng., R. Johal, P.Eng., M. Willms, P.Eng., P. Bose, M. Lapp.



STORMWATER DIVERSION FROM WASTEWATER TREATMENT SYSTEM

In recent years, increased storm intensities have resulted in higher volumes of stormwater at this Lower Mainland railyard. Road runoff and stormwater collected in the fuel tank farm containment (pictured) was treated through the on-site wastewater treatment plant prior to discharging to sanitary. A stormwater diversion system was designed/installed to separate clean stormwater from industrial inputs. Controls remain in place at the fuel tank farm, that in the event of a spill, that flow would still be diverted to the industrial wastewater plant for containment and treatment. A secondary pump was added to the tank farm containment and a new stormwater piping network and oil water separator were installed prior to surface water discharge, resulting in reduced emergency response, operations and maintenance costs, and permit discharge fees.

Owner: Canadian National Railway: Mike Linder, Seble Afework, P.Eng. (PEO). Primary consultant: Keystone Environmental: Christina Chan, P.Eng., Dr. Francisco Perelló, P.Eng., Antonia Gunardi, P.Eng., Mathew Barker, P.Eng. Primary contractor: Matcon Environmental.

YVR CORE PROGRAM: SITEWORKS AND MAJOR UTILITIES

Vancouver International Airport is undergoing major infrastructure project construction and requires sufficient power capacity for the duration. Status Electrical Corporation supplied power to a newly installed 15 kilovolt-ampere outdoor substation, through an overhead pole transmission line connected to the new 15 kilovolt circuit breaker and switchgear at Miller Substation, with consideration of minimizing interruption of existing site underground services. The substation provides uninterrupted power to the new Quick Turn-Around kiosk for the car rental tenant's area, and the sewage Pump Station No. 07, which processes waste continuously at a rate of six litres per second. In 11 months, 30 workplans and lockouts were prepared, submitted, approved, and executed under the direction of YVR Facilities Maintenance and Engineering Office without disruption to daily airport operations.

Owner: YVR. Participants: Status Electrical Corporation: Keith Falardeau, Yadvirender Rana, P.Eng., Gary Todd



DUET CITYHOMES

Near Como Lake Park in Coquitlam, B.C., Duet Cityhomes is a six-storey residential project that will encompass 7,300 square feet of indoor and amenity space (including 60 apartments and 11 townhouse units), and 47,500 square feet of underground parking and utility space. Developed by Adera Group, Duet showcases the capabilities of SmartWood technology—cross-laminated mass timber panel construction that matches the strength and durability of concrete and steel at a fraction of the weight. SmartWood is carbon-negative and uses wood from sustainably managed forests. Williams Engineering Canada supplied mechanical design services for this project, such as heating, ventilation, plumbing and fire protection, as well as energy

modelling services. Suites have an optional modular-split air conditioning system, and common areas include an occupancy-controlled mini-make-up air unit for ventilation.

Owner: Adera Group of Companies. Participants: Edwin Zander, Eng.L, Binghang Li, P.Eng., Katrina Wilson, EIT (APEGA).



HORSEFLY RIVER WATERSHED HYDROLOGIC MODEL

The Horsefly River watershed covers 2,800 square kilometres and provides valuable sockeye salmon habitat in BC. Within the watershed, the Government of BC has mandated that forest licensees operate in a manner that conserves the natural hydrology of the watershed and minimizes negative effects on fish and fish habitat. To better understand how snowmelt contributes to runoff and peak flows, Tolko Industries Ltd. supported the development of a hydrological model that simulates and traces water as it moves through the watershed. Novel tracer functionality was used to spatially track the origin of snowmelt-generated runoff and streamflow. Multiple simulations were used to identify contributing areas where forest harvesting could have a material adverse effect on peak flows. Enhanced

management in these areas during forest development is expected to minimize downstream risks to fish and fish habitat.

Participants: Polar Geoscience Ltd.: Lars Uunila, P.Geo., Stefan Gronsdahl, GIT.

ADIABATIC DRY COOLERS FOR MISSION-CRITICAL COOLING UPGRADES

TELUS is in the final phase of a construction project that completely upgrades the cooling tower plant at a main central office in Vancouver. With the site's existing open loop cooling tower plant approaching end of life conditions, TELUS was faced with the challenge of upgrading the plant, while maintaining cooling services to critical network spaces. The project incorporates the innovative use of adiabatic dry coolers, which provide: an expected 80 percent reduction in annual water usage, improved energy efficiency and a reduction in the risk of bacteria formation, associated with standing water. The adiabatic cooling process also provides increased cooling capacity for the footprint used, which allows for N+1 redundancy and 900 tons of initial chiller support, with space for expansion and an ultimate 1,500 tons of chiller support. Fully redundant (2N) heat exchangers and 200 horsepower condenser water pumps were also included in the build.

TELUS Project Manager: Matthew Walker, P.Eng. Primary consultant: H.H. Angus & Associates Ltd. Peter Formosi, P.Eng., Philip Chow, P.Eng.



RIVER ICE RESPONSE AND TRIGGER-ACTION-RESPONSE-PLAN

Prolonged frigid temperatures in February 2019 led to rapid Kananaskis River ice formation and overland flood risks; an urgent response to protect important public infrastructure was required. Alberta Environment and Parks retained SweetTech to manage the response. SweetTech developed a response plan, applied for and received regulatory approvals, and coordinated a contractor with specialty equipment to remove river ice of thickness over two metres. The ice removal was completed at critical locations, within 14 days of the initial call. Once the emergency response was completed, SweetTech conducted a post-incident analysis of the river ice process behavior along the golf course, and developed a Trigger-Action-Response-Plan to

monitor and respond to future winter ice and flood events. A practical operations and monitoring plan to prevent future winter flooding was designed by SweetTech with input from local stakeholders.

Participants: SweetTech Engineering Consultants: Eric Sweet, P.Eng., Deighen Blakely, P.Eng. (APEGA), Thomas Schaepsmeyer, EIT (APEGA).



MCGREGOR SUSPENSION BRIDGE DEMOLITION

The McGregor Suspension Bridge was an iconic structure crossing the McGregor River, west of Prince George. It was originally built in 1972 and was designed by Gower and Yeung of New Westminster. Keery Consulting Ltd. was engaged to design the demolition procedure; Platinum Stone Contracting conducted the demolition in the fall of 2019. Platinum Stone believed that the demolition should be conducted without a work bridge or large crane; Keery Consulting developed a 46-step demolition procedure accordingly. Associated Engineering assisted with the procedure, and modeled the structure for stages of the demolition. The procedure removed the deck and jump spans, then jacked up the main span girders, and

installed hillman rollers at each abutment and needle beam. The main span girder train, weighing 180,000 pounds, was then de-launched to the bank of the river.

Owner: Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD). Participants: FLNRORD: Colton Polsom, P.Eng. Keery Consulting Ltd.: Roy Keery, P.Eng., Alan Zhao, EIT. Associated Engineering Ltd.: Dale Harrison, P.Eng. Platinum Stone Contracting Ltd.: Scott Schols.

PATTULLO BRIDGE SEISMIC EARLY WARNING AND WIND MONITORING SYSTEM

The Pattullo Bridge is more than 80 years old and was not designed to meet current wind and seismic loading standards that would apply to a new bridge constructed today. To improve safety for bridge users, TransLink implemented an advance seismic warning and wind monitoring system. The wind warning system will monitor and measure wind speed, and a seismic warning system will sense an earthquake in progress and provide alerts up to one minute prior to damaging ground waves reaching the bridge. The system includes seismic activity and wind warning sensors; traffic control devices, including traffic gates, traffic signals, and warning signs for bridge users; and communication and monitoring devices to provide warnings and perform closures.



Participants: TransLink (Owner): Sany Zein, P.Eng., Susan Chu, P.Eng. PMY Consulting Ltd.: project management. PBX Engineering Ltd.: lead design. COWI North America Ltd.: structural design. Parsons Corporation: feasibility study. Weir-Jones Engineering Consultants Ltd.: seismic warning system. Archer CRM Partnership: archeology. Jemma Scoble and Associates Consulting Inc.: First Nations consultation. Hatfield Consultants: Environmental. ♦

**DISCIPLINARY NOTICE:
GINGER ADA ROGERS, CALGARY, ALBERTA**

Engineers and Geoscientists BC issued a Notice of Inquiry to Ginger Ada Rogers, in September 2019, regarding her conduct related to geoscience services she provided with respect to soil testing data submitted to Alberta Environment and Parks (AEP) in the 2015 Annual Industrial Wastewater, Industrial Runoff and Waste Management Report (the 2015 Report) submitted by Ms. Rogers on behalf of a meat processing company. A disciplinary inquiry was held on November 25, 2019.

On December 9, 2019, a panel of the Discipline Committee (the Panel) concluded that Ms. Rogers demonstrated unprofessional conduct by knowingly submitting falsified soil testing data to AEP and, more specifically, by knowingly using soil testing data from a prior report in the 2015 Report, making it appear as though parameters were not exceeded and that the meat processing company could continue to discharge wastewater on land through irrigation, when in fact the parameters had been exceeded, and the meat processing company would not have been permitted to discharge the wastewater had the accurate data been provided to AEP.

The Panel also found that Ms. Rogers pleaded guilty and was convicted in Alberta of violating section 227(a) of the *Environmental Protection and Enhancement Act, R.S.A. 2000, c. E-12* in relation to the same conduct at issue in the hearing. In addition, the Panel found that her conduct was contrary to Principle 1 of Engineers and Geoscientists BC's Code of Ethics, which requires that all members and licensees shall hold paramount the safety, health and welfare of the public, the protection of the environment and promote health and safety within the workplace. In making their determination, the Panel considered "the evidence presented by the Association, in which Ms. Rogers has admitted to and has pled guilty to providing falsified information in a report to Alberta Environment and Parks". The Panel found that "this is a marked departure from the standard to be expected of a competent professional".

In response to the allegation that Ms. Rogers' conduct was contrary to Principle 3 of the Code of Ethics, which requires that all members and licensees provide an opinion on a professional subject only when it is founded upon adequate knowledge and honest conviction, the Panel found that "no evidence or argument has been presented that [Ms. Rogers] provided an opinion based on [the falsified] data, nor that any such opinion was in contravention of Principle 3". Accordingly, the Panel found that this allegation had not been proven.

Ms. Rogers, although served, did not attend the disciplinary hearing and did not offer a defence.

On March 23, 2020, the Panel issued their Decision and Order on Penalty and Costs, and ordered the following penalties against Ms. Rogers:

Her membership with Engineers and Geoscientists BC is suspended from the date of this determination until March 29, 2022. The end of the suspension will coordinate with the suspension of membership imposed in March, 2019, by the Association of Professional Engineers and Geoscientists of Alberta (APEGA).

She is required to complete the Professional Engineering and Geoscience Practice in BC Online Seminar and pass the Professional Practice Exam prior to reinstatement of her membership.

Within 12 months of reinstatement of her membership, at her expense, she must undergo a general practice review and if required, a technical review.

Ms. Rogers was ordered to pay \$20,826.89 toward the legal costs incurred by Engineers and Geoscientists BC. In making this Order, the Panel took into consideration a fine imposed on Ms. Rogers by APEGA, the fact that she did not participate in Engineers and Geoscientists BC's disciplinary process, and the fact that she is no longer practising geoscience.

The full text of the Determination of the Discipline Committee and the Decision and Order of the Discipline Committee on Penalty and Costs can be found in the Discipline Notices section of our website, at egbc.ca/Discipline-Notices.

DISCIPLINARY NOTICE:

STEPHEN PETROVICH, P.ENG., CALGARY, ALBERTA

Engineers and Geoscientists BC issued a Notice of Inquiry to Stephen Petrovich, P.Eng., in January 2020, regarding his conduct related to engineering services he provided with respect to the design and installation of screw piles (the Piles) for new deck piles at a residential property in Edgewater, BC (the Property). Instead of proceeding to a disciplinary inquiry, Mr. Petrovich agreed to a Consent Order, dated April 6, 2020.

In the Consent Order, Mr. Petrovich admitted he demonstrated incompetence, negligence, or unprofessional conduct. He also agreed that his conduct was contrary to Principle 1 of Engineers and Geoscientists BC's Code of Ethics and Bylaw 14(b), by failing to design the Piles to the reasonable standard expected of a professional engineer. Mr. Petrovich admitted that he did so by failing to:

- adequately or at all assess on-site soil conditions at the Property;
- obtain sufficient information about the Property to conduct a proper analysis of factors that might have, and did, affect the Piles;
- sufficiently document the design for the Piles;
- provide the qualification for the design to the installer; and
- provide a design drawing to the installer.

Three additional conduct items were outlined in the Consent Order.

First, Mr. Petrovich signed and affixed his seal to a letter, dated April 14, 2016, regarding "Screw Pile Inspection/Compliance" for the Property. The letter states that "a detailed inspection was completed by a Professional Civil Engineer for the screw pile installed at [the Property]" on April 7, 2016, when he knew neither he nor a professional civil engineer under his supervision had conducted a site visit to inspect the Piles on that day, or at all. He knew, or ought to have known, that the wording of the letter was misleading. Mr. Petrovich admitted that his conduct relating to this letter

was contrary to s. 20(9) of the *Engineers and Geoscientists Act*, Bylaw 14(b), and Principle 1 and Principle 3 of the Code of Ethics.

Second, Mr. Petrovich failed to conduct a site visit at the Property in a reasonable amount of time after the owner of the Property made him aware of issues associated with the Piles on or around June 2017. Mr. Petrovich admitted that his conduct relating to this was contrary to Principle 7 of the Code of Ethics.

Third, Mr. Petrovich failed to make field review notes when making a site visit on or around December 26, 2017. He admitted his conduct in relation to this was contrary to Bylaw 14(b).

As part of the Consent Order, Mr. Petrovich agreed that his membership will be suspended for three months, beginning April 17, 2020, and that from April 6 to April 17, 2020, he will arrange for the transfer of his ongoing project files to other professional engineers. He also agreed that, during this period, he will limit his practice to those project files on which he was engaged, and not accept any new projects or engineering work. Further, Mr. Petrovich agreed that he will complete the Professional Practice Examination by October 6, 2020, and a Practice Review within six months of resuming practice following the suspension. Mr. Petrovich is required to bear the cost of the Practice Review, and pay \$2,000 towards the Engineers and Geoscientists BC's legal and investigation costs.

The full text of the Consent Order can be found in the Disciplinary Notices section of our website, at egbc.ca/Discipline-Notices.

Engineers and Geoscientists BC's website contains information on the complaint, investigation, and discipline processes. You can contact us at 604.558.6647 or toll-free at 1.888.430.8035 ext. 6647, or by email at complaints@egbc.ca.

HUMAN RIGHTS TRIBUNAL RULES THAT CANCELLATION OF REGISTRANT'S MEMBERSHIP FOR UNPROFESSIONAL CONDUCT WAS NOT DISCRIMINATORY

A recent ruling by the BC Human Rights Tribunal (the Tribunal) dismissed a discrimination complaint from a former professional engineer, and determined that the decision made by a discipline panel of Engineers and Geoscientists BC to cancel the registrant's membership for unprofessional conduct was not discriminatory under the *Human Rights Code* (the *Code*).

In August 2018, a discipline panel of Engineers and Geoscientists BC ordered the cancellation of Mr. Eric Chrysanthous' membership, when they determined he sent unprofessional communications to Engineers and Geoscientists BC and threatening communications to TransLink. He also failed to appear for an interview during the investigation process. The email communications sent by Mr. Chrysanthous included threats of violence, allegations of dishonesty, and professional impropriety that the discipline panel determined to be a significant departure from the standard of professional conduct.

Mr. Chrysanthous did not appeal the decision of the discipline panel in court, but instead filed a complaint of discrimination with the Tribunal on July 2, 2019. In the complaint he alleged that Engineers and Geoscientists BC was motivated to cancel his membership because of his perceived affiliation with groups opposed to TransLink and that he believed his communications constituted political expression. Mr. Chrysanthous further stated that he was discriminated against on the basis of his political beliefs, and that Engineers and Geoscientists BC was in violation of s.14 of the *Code*.

Engineers and Geoscientists BC applied in writing to request that the Tribunal dismiss the complaint on the basis that it had no reasonable prospect of success, it would not further the purposes of the *Code* to proceed, and that the substance of the complaint had been dealt with in another proceeding. Engineers and Geoscientists BC further argued that Mr. Chrysanthous should have appealed the decision of the discipline panel rather than apply to the Tribunal.

In its ruling *Chrysanthous v. Engineers and Geoscientists BC*, 2020 BCHRT 88 (April 1, 2020), Tribunal Member, Devyn Cousineau acknowledged that the emails contained content which set out Mr. Chrysanthous' views on the funding and governance of public transit, and that while some of the content was properly captured within the scope of political belief, it was not that content for which Mr. Chrysanthous was disciplined.

In reference to the violent and threatening emails, Cousineau states in the ruling, "At a hearing, Mr. Chrysanthous would have to prove that those excerpts are protected under the *Code* based on 'political belief'. In my view, there is no reasonable prospect that this argument could succeed." Cousineau continues: "To confer *Code* protection on such statements would, in my view, undermine both the purposes of the *Code* and the integrity of this Tribunal."

The ruling went on to clarify that the scope of "political belief" is not unlimited and does not encompass violence or threats of violence, as they undermine the rule of law and the social conditions necessary for freedom of expression.

The Tribunal ultimately determined that Mr. Chrysanthous has "no reasonable prospect" of proving at a hearing that Engineers and Geoscientists BC's decision to cancel his membership was connected to a "political belief" protected by the *Code*. His complaint was dismissed under s.27(1)(c) of the *Code*.

Registrants are reminded that unprofessional, violent, or threatening communications are not tolerated. Public safety is Engineers and Geoscientists BC's primary mandate and we expect registrants to uphold high standards of professional practice and conduct as required by law under the Code of Ethics and governing legislation.

The full text of the BC Human Rights Tribunal ruling is available on the Tribunal's website, on its list of April 2020 decisions found at www.bchrt.bc.ca/law-library/decisions/2020/apr.htm.




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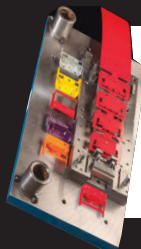


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CONTINUED FROM PAGE 21...

Dr. Kim and his team's next target was to develop a door handle that could be affixed to traditional doorknobs, allowing them to be opened with forearms instead of hands. Dr. Kim and his team recently delivered 20 of the door handles, with plans for up to 50, to the City of Surrey.

Despite these accomplishments, Dr. Kim tends to deflect praise. "The 3-D PPE initiative really comes from what we have heard from the field," he said. "Our motto is to give back to society and the community." Dr. Kim acknowledges that while he has led the initiative and brought collaborators to the table, the initiative is really fuelled by the enthusiasm and participation of the students. ♦



ABOVE AND LEFT: Twenty 3-D printed door handles were recently placed into service at City of Surrey offices. PHOTOS COURTESY OF DR. Woo Soo KIM, P.ENG.



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Email editor@egbc.ca with your idea.

IN MEMORIAM

The association announces with regret the passing of the following members:

- Terence Keith Anstey, P.Eng. (Retired)
- Noel George Armstrong, P.Eng. (Retired)
- Dennis Anthony Compton, P.Eng. (Retired)
- Tricia Jean Cook, P.Eng.
- Thomas Durham Doyle, P.Eng. (Non-Practising)
- Edward Leslie Faulkner, P.Geo. (Retired)
- Norman Allan Johnson, P.Eng., FEC
- John Sylvanus Kingdon, P.Eng.
- Daniel Cyril Lambert, P.Eng., FEC
- Arthur Lees, P.Eng. (Retired)
- Ruben Siriban Verzosa, P.Eng.
- Adam Zielinski, P.Eng. (Non-Practising) ♦

INNOVATION

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CONTINUING PROFESSIONAL DEVELOPMENT

PERSONAL INVESTMENT. PROFESSIONAL COMMITMENT.

The well-being and safety of our employees, speakers, volunteers, and members is our top priority. To meet the latest advice from public health officials, we have postponed or cancelled all in-person professional development events in June.

We encourage you to take advantage of the Online Learning Centre, at egbc.ca/online-offerings, which provides remote educational opportunities. The Centre now hosts more than 50 online learning opportunities in a variety of topics.

Engineers and Geoscientists BC have also developed a series of webinars to help support registrants during these unprecedented times. These sessions aim to provide relevant content on a variety of topics.

UPCOMING WEBINARS

REINVENTING LIFE BALANCE AND RESILIENCE THROUGH COVID-19 AND BEYOND

June 11, 2020 (Free)

As we all do our part to contain the spread of COVID-19 across the globe, the way we work and live has – for the time being – been disrupted. Whether you are now working from home or providing essential services outside of it, you are no doubt experiencing a new brand of business and stress, and wonder, like so many others, “What now, what next?” The roller-coaster unpredictability of our current situation makes it all the more important to prioritize life-balance and stress management as non-negotiables to strengthen your resilience for the journey.

ADAPTIVE LEADERSHIP IN THE FACE OF CRISIS

June 18, 2020 (Free)

In this time of unprecedented uncertainty, we want to make sure registrants can find answers to the most pressing questions facing their businesses. Adaptive Leadership provides leaders with insights and resilience to become more effective by engaging others in challenging work, particularly when facing complex organizational and/or interpersonal challenges. This webinar will explore adaptive leadership tools that can help individuals and organizations learn during this crisis period.

PROBLEM-SOLVING AND CREATIVITY IN ENGINEERING AND GEOSCIENCE PRACTICE

June 18, 2020

This webinar provides an introduction to problem solving and creativity in engineering and geoscience through real world examples. The topics include problem definition and idea generation techniques.

DRONE APPLICATIONS FOR ENGINEERING AND GEOSCIENCE PROJECTS

June 24, 2020

This webinar is designed for anyone who's involved in field data collection or data processing and wants to learn more about how drones are being used in engineering and geoscience.

PRO-DIO LEARNING OPPORTUNITIES

PLANNING BEYOND COVID-19

This free course intends to provide guidance for business leaders, owners, and planners, in thinking

and planning for short, medium, and long-term scenarios with respect to the implications of the COVID-19 Pandemic.

CONFLICTS OF INTEREST UNPACKED

This course will teach you about some of your key professional obligations regarding conflicts of interest. You'll also determine how to recognize situations that might pose conflicts of interest so that you can avoid them or deal with them effectively. You'll consider how to decide whether a conflict of interest should be eliminated outright, or whether the party owed a duty might be better served by managing and mitigating the conflict of interest. And finally, you'll review potential safeguards that can be used to properly manage and address conflicts of interest when they do arise.

A RISKY BUSINESS: RISK MANAGEMENT TOOLS FOR PROFESSIONALS

This course will teach you how to strengthen your business and investment risk knowledge so that you can successfully identify, assess, and manage those risks in your career and personal affairs. Experts will discuss business and investment risk and will provide tools that will allow you to better deal with risk.

AGING YOUR STRATEGY

This course reveals the essential issues involved in strategy and planning, most often people issues. Using real-world examples, case-studies and discussions with experts, this two-part audio course will provide an engaging and thought provoking look at why planning is so important and why most managers and leaders fail to plan effectively.

AVOIDING IDENTITY THEFT, FRAUD, AND CYBER CRIME

This course will teach you how to protect your client by identifying the latest scams, threats and trends. You'll learn the red flags along with real case stories and examples, so you and your clients can better spot current and future scams. This course will explore, in-depth, how to protect yourself from ID theft, how it starts, what the dark web is, how government and companies aren't safeguarding your info, (and neither are we at times), how to quickly laser in on cyber scams, stay safe online, and so much more.

LEADING THROUGH INFLUENCE

In this course, we talk to experts as we explore this concept of influence and why it is so important to long-term success in leadership. This course will expand your understanding of this word “Influence” and provide you with a practical understanding and tools to improve your ability to develop interpersonal influence in leadership.

PROMOTING EMPLOYEE ENGAGEMENT

Having committed and high-performing employees who freely give their discretionary effort is of critical importance; in fact, it is a competitive advantage that can set your organization apart from the competition. In this course, you will learn about employee engagement best practices that you can apply directly in the workplace to help raise engagement levels in your organization.

ONLINE LEARNING CENTRE

LEADING REMOTE TEAMS WITH EQUITY, DIVERSITY, AND INCLUSION: PART 1 COMMUNICATION AND STRUCTURE

This webinar will discuss what it means to consider equity, diversity, and inclusion while leading remote teams and why it is important. We will then explore strategies and approaches that bring EDI to remote work teams, discussing the topics of communication and structure.

LEADING REMOTE TEAMS WITH EQUITY, DIVERSITY, AND INCLUSION: PART 2 OWNERSHIP, ACCOUNTABILITY, PRODUCTIVITY, AND CONNECTION

This webinar will further explore strategies and approaches that bring equity, diversity, and inclusion to remote work teams, focusing on ownership, accountability, productivity, and connection.

THE VALUE OF INDIGENOUS ENGAGEMENT ON ENGINEERING AND GEOSCIENCE PROJECTS

This session will teach best practices for collaboration with Indigenous communities when working on engineering and geoscience projects on Indigenous land. The session will take a practical approach by assessing a hypothetical project from both the technical and First Nation's perspective, and finish with a panel of experts sharing their experiences.

For a complete listing of online learning opportunities, or for more information, visit egbc.ca/online-offerings, or contact us at 604.430.8035 or 1.888.430.8035.

CALL FOR PRESENTERS

Are you an expert in your field who would like to contribute to engineering and geoscience practice? Engineers and Geoscientists BC is actively seeking members to present on a variety of topics. For more information, please visit egbc.ca/Practice-Resources/Professional-development.




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