

ENGINEERS AND GEOSCIENTISTS BRITISH COLUMBIA

NOVEMBER/DECEMBER 2019

INNOVATION

MEET THE PRESIDENT

**INSIDE THE SEA TO SKY
GONDOLA HAUL ROPE
FAILURE**

**UBC ENGINEERING
STUDENTS DESIGNING
WINNING ROCKETS**

**PAUL CRAVEN ON
THE PROFESSIONAL
GOVERNANCE ACT**

LIANNA MAH, P.ENG., FEC

Here today.
Here tomorrow.



*Nature Trust Salmon River estuary property, Vancouver Island,
photo by Graham Osborne*

We all want BC's natural treasures to be here forever. That's why, since 1971, we've saved over 175,000 acres of ecologically important land. Places like the Salmon River estuary with its abundance of fish, birds and elk. But protecting the province's critical habitats is an urgent task. If you have a passion for BC, you can help. As a non-profit organization, we will use your donation wisely to preserve these special places for future generations.

To learn more about us, or make a donation, please visit naturetrust.bc.ca
or call 1.866.288.7878



NATURE TRUST
BRITISH COLUMBIA

conserving land · protecting species



< COVER STORY

MEET THE PRESIDENT

Meet Lianna Mah, P.Eng., FEC,
Engineers and Geoscientists BC
2019/2020 president

INNOVATION

November/December 2019 | VOLUME 23 NUMBER 6

NEWS / DEPARTMENTS

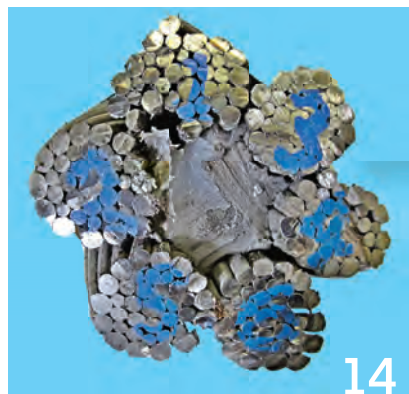
- 6 ASSOCIATION
- 7 ANNUAL GENERAL MEETING
REPORT
- 10 PROFESSIONAL PRACTICE
- 31 DISCIPLINE AND ENFORCEMENT
- 38 IN MEMORIAM
- 39 CONTINUING PROFESSIONAL
DEVELOPMENT

COMMENT

- 4 VIEWPOINT

OTHER

- 9 L'ÉCOLE POLYTECHNIQUE
DE MONTRÉAL
COMMEMORATION
- 24 PAUL CRAVEN ON THE
PROFESSIONAL GOVERNANCE
ACT
- 35 PROFESSIONAL SERVICES
- 37 DISPLAY ADVERTISERS INDEX
- 38 CLASSIFIED



ENGINEERING STUDENTS PUSH THE BOUNDARIES OF ROCKET DESIGN

A university education comes with
lots of challenges, but a group of UBC
engineering students somehow manage
their course load while building
competition-ready rockets that make
other student-led teams take note.



THE TECHNICAL STORY BEHIND A FAILED GONDOLA HAUL ROPE

When the Sea To Sky Gondola haul
rope was cut early one summer
morning, sending cabins crashing to
the forest floor, a group of BC
engineers set out to uncover all
the technical details about how
a weakened gondola haul rope
behaves in real-world conditions.

THE CITY OF ABBOTSFORD'S STRATEGIC PLAN

The City of Abbotsford recently
adopted a strategic plan that could
accommodate 200,000 residents.

City engineers and others explain
how they approached this extensive
and time-sensitive project.



ON THE COVER

Lianna Mah, P.Eng., FEC, was inducted as
president of Engineers and Geoscientists BC
on October 19, 2019.

PHOTO: WENDY D PHOTOGRAPHY.



**ENGINEERS &
GEOSCIENTISTS**
BRITISH COLUMBIA



Lianna Mah,
P.Eng., FEC
President
president@egbc.ca

THE SECRET BENEFITS OF VOLUNTEERING

Last month, at Engineers and Geoscientists BC's Annual General Meeting in Kelowna, I was sworn in as president of Engineers and Geoscientists BC, joining sixteen other new and returning Councillors on this organization's 100th Council. Throughout the coming year, we will donate our time to help guide our professions and to advance Engineers and Geoscientists BC's public interest mandate.

As your new president, I am humbled and privileged to serve in this role. For me, my role as president comes after many years of volunteering

at Engineers and Geoscientists BC. All of my volunteer work—first with the Women in Engineering and Geoscience Division, and later on various committees and task forces—was interesting, important and rewarding. While my volunteer work has changed over the years, the reasons for being a volunteer hasn't: I want to make a difference to our professions, professions that make a large and positive impact on the public.

Volunteerism is at the very core of Engineers and Geoscientists BC. Our more than 1,500 volunteers are the backbone that supports us, make self-regulation effective, and help us achieve our mandate to serve and protect the public. Volunteers help author our professional practice guidelines, and investigate complaints. They help evaluate the education and experience of applicants, and recognize deserving professionals through our awards program. All our committees, such as Professional Practice, Practice Review, Climate Change, Geoscience, and Software Engineering, comprise volunteers whose primary role is to apply their professional knowledge and experience to improve the professions and protect the public.

On a personal level, volunteering with Engineers and Geoscientists BC has provided me with many benefits. Volunteering helped me establish a broader network, form personal connections with other engineers and geoscientists, and build many lasting friendships. It helped me improve my public speaking, organization and leadership skills, and it built my confidence in my abilities as a leader. Volunteering helped me tap into ideas that were brewing, waiting for an opportunity to be put into practice. And it gave me the satisfaction of giving back to our professions, which play such a critical role for the public and our province.

Engineers and Geoscientists BC always has opportunities for professionals to contribute their time and expertise to guide the direction of our organization. It might be a good time for you to ask how Engineers and Geoscientists BC could benefit from your experience and expertise; and it also might be a great time to ask how *you* may benefit from volunteering.

To learn more about volunteer opportunities, visit egbc.ca/volunteer-ops.

INNOVATION

November/December 2019 | VOLUME 23 NUMBER 6

ENGINEERS AND GEOSCIENTISTS BRITISH COLUMBIA

Suite 200 - 4010 Regent Street, Burnaby, BC Canada V5C 6N2

Tel: 604.430.8035 Fax: 604.430.8085

Email: info@egbc.ca Web: egbc.ca

Toll free: 1.888.430.8035

COUNCIL 2019/2020

PRESIDENT L. MAH, P.Eng., FEC

VICE-PRESIDENT L. SPENCE, P.Eng.

IMMEDIATE PAST PRESIDENT K. TARNAI-LOKHORST, P.Eng., FEC, FGC (HON.)

COUNCILLORS

M. ADAMS, P.Eng.; A. ANDISON, BA, LLB; S. CHEEMA, CPA, CA;

A. B. DIXON-WARREN, P.GEO.; L. HILDEBRANDT, ICD.D, LLB;

S. MACDOUGALL, P.Eng.; B. NANSON, P.Eng.;

N. OZOG, P.Eng., FEC; C. PLANTE, P.GEO.; T. TIEJE, P.Eng.;

K.P. TURNER, P.Eng., FEC, FGC (HON.); J.D. VINCENT, P.GEO.;

B. WARD, P.GEO., FEC (HON.), FGC; D. WELLS, JD

ASSOCIATION STAFF

A.J. English, P.Eng., CHIEF EXECUTIVE OFFICER AND REGISTRAR

T.M.Y. Chong, P.Eng., CHIEF REGULATORY OFFICER AND DEPUTY REGISTRAR

J. Cho, CPA, CGA CHIEF FINANCIAL AND ADMINISTRATION OFFICER

M. Logan, CHIEF OF STRATEGIC OPERATIONS

M.L. Archibald, DIRECTOR, COMMUNICATIONS AND STAKEHOLDER ENGAGEMENT

D. Gamble, DIRECTOR, INFORMATION SYSTEMS

P.R. Mitchell, P.Eng., DIRECTOR, PROFESSIONAL PRACTICE,

STANDARDS AND DEVELOPMENT

D. Olychick, DIRECTOR, CORPORATE GOVERNANCE AND STRATEGY

G.M. Pichler, P.Eng., DIRECTOR, REGISTRATION

E. Swartz, LL.B., DIRECTOR, LEGISLATION, ETHICS AND COMPLIANCE

M.A. Rigolo, P.Eng., DIRECTOR, PROGRAMS AND PROFESSIONAL DEVELOPMENT

L. Steele, P.Geo., ASSOCIATE DIRECTOR, PROFESSIONAL PRACTICE

A. Tan, CPA, CMA ASSOCIATE DIRECTOR, FINANCE AND ADMINISTRATION

Chris Hawley, MANAGING EDITOR

EDITORIAL ADVISORY COMMITTEE

M.I.H. Bhuiyan, P.Eng.; E.A. Brown, P.Eng.; K.C. Chan, P.Eng., CPA;

T. George, P.Eng.; H. Ghalibafian, P.Eng.; G. Grill, P.Eng.;

R. Ord, P.Eng.; M.J. Zielemann, EIT

Advertising material must reach the publication by the first day of the first month (e.g., May 1 for the SEPTEMBER/OCTOBER issue), or by the first business day immediately preceding the first day of the first month.

Advertising Contact: Gillian Cobban Tel: 604.929.6733

Email: advertising@egbc.ca

Design/Production: Mary Montica Poole—re:fresh design

Printed in Canada by Mitchell Press Ltd on recycled paper 

Subscription rates per issue \$4.50; six issues yearly \$25.00. (Rates do not include tax.)

Innovation is published six times a year by Engineers and Geoscientists British Columbia. As the official publication of the association, *Innovation* is circulated to members of the engineering and geoscience professions, architects, contractors and industry executives. The views expressed in any article contained herein do not necessarily represent the views or opinions of the Council or membership of this association.

All material is copyright. Please contact the Managing Editor for reprint permission.

Submission Guidelines: *Innovation* encourages unsolicited articles and photos. By submitting material to *Innovation*, you grant Engineers and Geoscientists BC a royalty-free, worldwide licence to publish the material; and you warrant that you have the authority to grant such rights and have obtained waivers of all associated moral rights. *Innovation* reserves the right to edit material for length, clarity and conformity with our editorial guidelines (egbc.ca/innovation-editorial) and is under no obligation to publish any or all submissions or any portion thereof, including credits.

ISSN 1206-3622

Publications Mail Agreement No 40065271. Registration No 09799.

Return undeliverable Canadian addresses to *Innovation*, Suite 200 - 4010 Regent Street, Burnaby, BC V5C 6N2.

US Postmaster: *Innovation* (ISSN 1206-3622) is published bimonthly for \$25.00 per year by Engineers and Geoscientists British Columbia, c/o US Agent-Transborder Mail, 4708 Caldwell Rd E, Edgewood, WA 98372-9221. Periodicals postage paid at Puyallup, WA, and at additional mailing offices, US PO #007-927. POSTMASTER send address changes (covers only) to *Innovation*, c/o Transborder Mail, PO Box 6016, Federal Way, WA 98063-6016.

Your little voice knows there's
more to a mortgage than the rate.

**Save thousands
in interest with
Manulife One.**



Visit **manulifeone.ca/engineerscanada** or call **1-877-765-2265**
for more details on a special offer for Engineers and Geoscientists.



Manulife One is offered through Manulife Bank of Canada. Individual savings will vary and are not guaranteed. To see an explanation with detailed financial information, visit manulifeone.ca. Manulife, Manulife Bank & Stylized M Design, and Stylized M Design are trademarks of The Manufacturers Life Insurance Company and are used by it, and by its affiliates under licence. © 2019 The Manufacturers Life Insurance Company. All rights reserved. Manulife, PO Box 670, Stn Waterloo, Waterloo, ON N2J 4B8.

2019/2020 COUNCIL ELECTION RESULTS

Engineers and Geoscientists British Columbia's 2019/2020 Council election opened on September 4, 2019, and closed at noon on October 4, 2019.

This year, 15.7 percent of registered members and limited licensees returned ballots. The results of the election are as follows:

PRESIDENT (One-year term)

Lianna Mah, P.Eng., FEC

VICE PRESIDENT (One-year term)

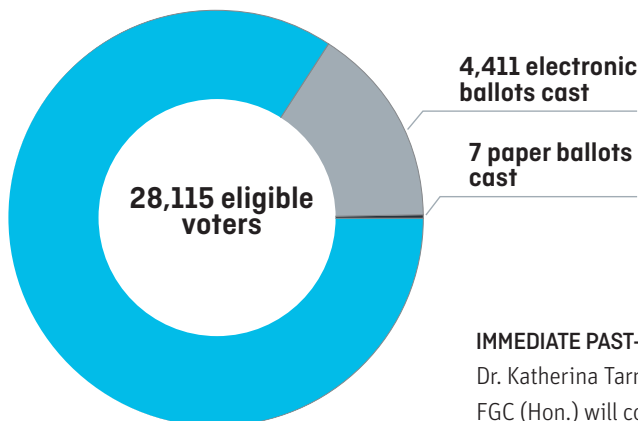
Larry Spence, P.Eng.

COUNCILLORS (Two-year terms)

Mark Adams, P.Eng.

Christine Plante, P.Geo.

Tom Tiedje, P.Eng.



Nathan Ozog, P.Eng., FEC

Jeremy Vincent, P.Geo.

COUNCILLORS (One-year terms)

Brent Ward, P.Geo., FGC, FEC (Hon.)*

**Councillor Spence was elected for the position of Vice President. The remainder of his term (one-year) on Council will be filled by Dr. Brent Ward, the candidate that received the next highest number of votes.*

4,411 electronic ballots cast

7 paper ballots cast

IMMEDIATE PAST-PRESIDENT (One-year term)

Dr. Katherina Tarnai-Lokhorst, P.Eng., FEC, FGC (Hon.) will continue for one additional year in the role of Immediate Past President.

RETURNING COUNCILLORS

Alan Andison, BA, LLB

Suky Cheema, CPA, CA

Antigone Dixon-Warren, P.Geo.

Leslie Hildebrandt, ICD.D, LLB

Susan MacDougall, P.Eng.

Brock Nanson, P.Eng.

Kevin Turner, P.Eng., FEC

David Wells, JD.

The online ballot was conducted using systems contracted from Simply Voting Inc., which operates under high-security, TLS 1.2, 256-bit encryption with anti-fraud controls and secure login for eligible voters. This third-party system protects the anonymity of a vote. Election results were not available to Engineers and Geoscientists BC until after the close of the election.

A total of 99.8 percent of ballots were received electronically. Paper ballots were provided to members at their request. Paper ballots will no longer be available after the 2020/2021 Council Election.

Three members of Engineers and Geoscientists BC—Frank Denton, P.Eng., FEC, FGC (Hon.), Kathleen Kompauer, P.Eng., FEC, FGC (Hon.) and Margaret Li, P.Eng., FEC, FGC (Hon.)—scrutinized the electronic and paper voting processes. The scrutineers confirmed the ballot results and that the election was conducted in a confidential, fair, and impartial manner.

For more information, visit egbc.ca/council-election-results.

EPIC

LEARN. GROW. SUCCEED.

EPIC courses cover a wide range of disciplines, provide CEUs/PDHs that will meet your Association's requirements, and are taught by experienced professionals.

REQUIRE TEAM TRAINING?

Consider EPIC's On-Site Training program.

FREE WEBINAR
Negotiate Your Way to Success
epictraining.ca/negotiate

Here are a few upcoming courses, visit our website for the full list.

- Asphalt Mix Design
- Roundabout Planning, Design and Implementation
- Electrical Hazardous Area Classifications and Hazardous Area Wiring
- Upgrading Bridge Inspection Skills

1.888.217.5910 // epictraining.ca/egbc

IACEE

100TH ANNUAL GENERAL MEETING OVERVIEW

Engineers and Geoscientists BC held its 100th annual general meeting on October 19, 2019, in Kelowna, BC. There were 126 members, 11 members-in-training, nine students, and 27 guests in attendance at the meeting, held at the Delta Grand Okanagan Resort. Katherina Tarnai-Lokhorst, P.Eng., FEC, FGC (Hon.), the organization's 2018/2019 president, chaired the meeting.

President Tarnai-Lokhorst opened the meeting, acknowledging the ancestral, traditional and unceded territory of the Syilx/Okanagan Peoples, and in particular, the Westbank First Nation. CEO and Registrar, Ann English, P.Eng., read greetings from Premier John Horgan on behalf of the Government of BC.

A motion to approve the agenda was carried and meeting rules were approved as circulated. The previous year's annual general meeting minutes were approved.

PRESENTATION ON NOMINATION PROCESS

Chair of the Nominating Committee, Caroline Andrewes, P.Eng., FEC, FGC (Hon.), CPA, CMA, presented an update on the introduction of a new merit-based selection process for candidates to be nominated for election to Council. The presentation highlighted changes that were introduced under the *Professional Governance Act* and outlined the newly-designed candidate selection framework, which supports a structured and comprehensive process for the review and selection of nominees.

ELECTION VOTE RESULTS

Kathleen Kompauer, P.Eng., Scrutineer for the 2019/2020 council election, announced the election results, which are provided at egbc.ca/council-election-results.

ANNUAL REPORT AND FINANCIAL STATEMENTS, GREETINGS, AND IN MEMORIAM

Reports on activities during the 2018/2019 year were provided by

President Tarnai-Lokhorst, and CEO and Registrar, Ann English, P.Eng. Councillor David Wells, JD, presented a report from the Government Appointees to Council. Councillor Suky Cheema, CPA, CA, provided a report on the association's audited Financial Statements.

More information is provided in the 2018/2019 Annual Report, at egbc.ca/Annual-Report.

Engineers Canada president David Lynch, P.Eng., FEC, FGC (Hon.), and Geoscientists Canada CEO Andrea Waldie, P.Geo., FGC, brought greetings to the assembly from their respective organizations.

The assembly observed a moment of respectful silence in acknowledgment and remembrance of members of the association who passed away during the previous year.

MOTIONS BROUGHT FORWARD BY MEMBERS

Members had the opportunity to present motions for the consideration of Council. No advance motions were submitted ahead of the AGM. One motion was presented on the floor at the meeting.

MOTION 1: *That Council consider reviewing and presenting to members on the pros and cons of establishing a sister body of members to focus on member advocacy, similar to Ontario where the Ontario Society of Professional Engineers was established, to allow Engineers and Geoscientists BC to focus on regulatory responsibilities.*

The motion was carried.

INTRODUCTION OF THE 2019/2020 COUNCIL

Outgoing president Tarnai-Lokhorst welcomed the association's president for 2019/2020, Lianna Mah, P.Eng. President Mah recited the oath of office and introduced the members of the

2019/2020 Council. Outgoing president Tarnai-Lokhorst announced the date of the 2020 conference and AGM in Victoria, BC, October 15-17, and adjourned the meeting.



THE UNIVERSITY
OF BRITISH COLUMBIA

MEL

Master of
Engineering
Leadership

**WHERE
ENGINEERING
LEADERS
ARE MADE.**

Expand your technical and business knowledge in engineering with a 12-month hybrid professional master's degree.



mel.ubc.ca/innovation

RENEWAL DEADLINE: JANUARY 1, 2020

MEMBERSHIP RENEWAL: HERE'S WHAT'S NEW FOR 2020

It is time to renew your membership or licence for 2020. Members must renew by January 1, 2020, after which late fees are applied. On March 1, 2020, members and licensees who have not yet renewed are struck off the register.

MEMBERSHIP RENEWAL

You can renew your membership by signing into your account on Engineers and Geoscientists BC's website (egbc.ca/account), or by mailing a copy of your invoice and your method of payment to:

Engineers and Geoscientists BC
200 – 4010 Regent Street
Burnaby, BC V5C 6N2

For 2020, the annual fee for professional registrants is \$472.50, plus a temporary special levy of \$15 to enable us to transition from our existing regulatory framework to the *Professional Governance Act*. For more information, and a complete list of 2020 fees, visit egbc.ca/fees.

If you wish to discontinue your membership with Engineers and Geoscientists BC, be sure to do so before, January 1, 2020, to avoid being liable for 2020 membership renewal fees. You can discontinue your registration through our website, or by contacting Engineers and Geoscientists BC directly.

CONTINUING PROFESSIONAL DEVELOPMENT REPORTING

During the membership renewal process, Engineers and Geoscientists BC asks members to indicate whether they have met the requirements of the Continuing Professional Development (CPD) Guideline for 2019. CPD is one of the ways that members stay current in their area of practice. Compliance with the CPD Guideline and reporting of CPD activities is highly recommended but not mandatory.

To report CPD activities for 2019, log into your account and select "Manage Professional Development" from the menu.

NON-PRACTISING MEMBERSHIP

Members who are not practicing professional engineering or professional geoscience may change to Non-Practising status. Non-practising members must use the qualifier "Non-Practising" or "Retired" after their designation. Fees for this category of registrant are 50 percent of the fee for practicing members. For more information about non-practising membership, visit egbc.ca/Become-a-Member/Non-Practising-Membership.

For more information about membership renewal, visit egbc.ca/Membership-Renewal-FAQ (login required).

Trip Cancellation and Interruption Coverage designed for professionals like you.



JOHNSON

Trip Cancellation / Trip Interruption & Delay

Up to \$12,000 per person, per trip for any number of trips within the policy year

Out of Pocket Expenses

Up to \$350 per day (maximum of \$3,500 per trip) for necessary meals, hotel accommodations, telephone calls and ground transportation

And More



**Enroll
Today!**

1.877.989.2600

Johnson Insurance is a tradename of Johnson Inc. ("JI"), a licensed insurance intermediary, and operates as Johnson Insurance Services in British Columbia. Travel insurance products are underwritten by Royal & Sun Alliance Insurance Company of Canada ("RSA"). Valid provincial or territorial health plan coverage required. The eligibility requirements, terms, conditions, limitations and exclusions which apply to the described coverage are as set out in the policy. Policy wordings prevail. JI and RSA share common ownership. *All amounts shown are in Canadian currency. Rates indicated are annual (September 1, 2019 through to August 30, 2020) and exclusive of applicable provincial taxes. If coverage is purchased mid-term, rates payable will be pro-rated according to the number of months remaining before the next policy year (September 1st of each year). Coverage for Trip Cancellation begins the day of booking your trip provided your insurance is in effect. If a trip is booked prior to Trip Cancellation insurance being in effect, coverage for that trip will begin the day that the insurance premium is paid and the policy is issued.

WEEK OF THE WHITE ROSE POLYTECHNIQUE MONTRÉAL



THE FUTURE BLOOMS IN OUR HANDS

NATIONAL DAY OF REMEMBRANCE AND ACTION ON VIOLENCE AGAINST WOMEN

This year marks 30 years since the tragic events on December 6, 1989, when 13 female students and a female administrator at l'École Polytechnique de Montréal were killed by a gunman who entered the school and targeted female students taking engineering classes.

"As we reflect on the horrific events at l'École Polytechnique de Montréal, and remember the 14 women who lost their lives on this day, it saddens me that violence is still a daily reality for women and girls around the world," said Ann English, P.Eng., FEC, FCSSE, CEO and Registrar of Engineers and Geoscientists BC. "On the 30th anniversary, we take time to remember these women and reflect on our commitment to fostering a culture of respect and inclusion in our communities, workplaces, classrooms, and the wider engineering profession," she said.

L'École Polytechnique de Montréal awards the Order of the White Rose Scholarship, which was created as a tribute to the victims. It is awarded annually to a Canadian woman engineering student continuing her engineering studies at the graduate level in Canada or elsewhere. To honour the victims, Engineers and Geoscientists BC has made a donation to the scholarship.

In Canada, December 6 now marks the National Day of Remembrance and Action on Violence Against Women. As the regulatory body for engineering and geoscience in BC,

we encourage members and licensees to honour the memory of the victims, and to recognize the value that diversity brings to work environments, the professions, and our society.

"We need to continue the conversation about the importance of diversity and inclusion," said Lianna Mah, P.Eng., FEC, president of Engineers and Geoscientists BC. "A diverse and inclusive workplace, team, or corporate board that includes people from a wide range of backgrounds and with a variety of skills and experience spawns creativity and out-of-the-box thinking that results in better outcomes and stronger organizations," she said.

WAYS TO GET INVOLVED

Engineers and Geoscientists BC's Women in Engineering and Geoscience Division is initiating a moment of silence on December 6 to acknowledge this incident. Members are encouraged to participate in this minute of reflection, to show respect to the young women who were killed, and all those who have worked hard to stand for equality and equity in engineering and geoscience.

To learn more, visit egbc.ca/Commemorating-December-6.

The Government of Canada is encouraging everyone to take action and commit to end gender-based violence, now and throughout the year. To learn more, visit cfc-swc.gc.ca/commemoration/vaw-vff/remembrance-commemoration-en.html.

Support the Week of the White Rose initiative by purchasing virtual white roses for colleagues and friends. The white rose has become a symbol of remembrance of the tragic events at l'École Polytechnique. All proceeds go to Folie Technique, Polytechnique's science camp, whose aim is to give girls from disadvantaged communities an opportunity to take part in science awareness activities. To learn more or to donate, visit roseblanche.org/en.

For more information on The Order of the White Rose Scholarship, visit www.polymtl.ca/ordreroseblanche/en.

INNOVATION'S PROJECT HIGHLIGHTS EDITION IS COMING SOON

Each year, *Innovation* invites BC's professional engineers and geoscientists to submit photographs and project descriptions of recent work, for consideration for the magazine's popular Project Highlights Edition, planned for the May/June 2020 edition.

Members, licensees, or companies may submit photographs of projects undertaken in 2019, within

or outside BC, involving Engineers and Geoscientists BC members and licensees. Members are encouraged to watch for an email announcement early in 2020 that will provide submission criteria, deadline dates, and other important information. The submission time frame is expected to launch in early January 2020, and close about eight weeks later. For more information, visit egbc.ca/Innovation.



GUIDELINES UNDER DEVELOPMENT FOR MASS TIMBER BUILDINGS TO 12 STOREYS

Engineers and Geoscientists BC, in partnership with the Government of BC and the Architectural Institute of British Columbia (AIBC), plans to develop professional practice guidelines in support of the expected legislative changes in BC that will allow construction of mass timber buildings up to 12 storeys.

The new guidelines will support the Government of BC's May 2019 announcement that it is proceeding with a regulation to allow construction of tall mass timber buildings up to 12 storeys. The new provisions are expected to be introduced in the National Building Code 2020, but will be adopted in BC in advance of the national changes.

Previously, when the transition from four-storey to five- and six-storey wood frame buildings was introduced in 2009, the BC Government, Engineers and Geoscientists BC, and AIBC felt that the provincial building code alone was not the appropriate document to effectively address a variety of design issues related to this change. Valuable

experience was gained in developing a coordinated approach to address a variety of significant design issues, and this coordinated approach was supported by professional practice guidelines.

On this basis, the Government of BC, AIBC, and Engineers and Geoscientists BC are building a team to prepare professional practice guidelines that will support professional engineers and architects in carrying out professional activities for mass timber buildings up to 12 storeys. These guidelines are expected to outline the professional's obligations under the relevant legislation. With the assistance of Building and Safety Standards Branch, Engineers and Geoscientists BC and AIBC were able to obtain significant funding to support the development of these guidelines.

Professional practice guidelines and other practice-related resources are provided at egbc.ca/Professional-Practice.

GUIDELINES FOR ELECTRICAL ENGINEERING SERVICES NOW AVAILABLE

Engineers and Geoscientists BC has released updated guidelines designed to assist professionals who might be involved in, or have an interest in, providing electrical engineering services for building projects in BC. These guidelines apply to the practice of electrical engineering for buildings governed by Part 3 of the BC Building Code, the City of Vancouver Building Bylaw, or the National Building Code of Canada.

First published in 1993, and updated in 2019 to reflect current industry standards and practices, the Professional Practice Guidelines – Electrical Engineering Services for Building Projects (Version 2.0) provide a common level of expectation for various stakeholders with respect to the level of effort, due diligence, and standard of practice to be followed when conducting these projects. This 2019 revision reflects current industry standards and practices.

The updated guidelines cover topics such as project roles and responsibilities, guidelines for professional practice, and quality management. Engineers and Geoscientists BC expects that these guidelines will be revised and updated

as required in the future, to reflect the developing state of practice.

These guidelines, and other professional practice guidelines and practice-related resources, are provided at egbc.ca/Professional-Practice.





Bryan Fitzpatrick



Joe Fitzpatrick

Celebrating 30 Years!

Our family has been
proudly serving
**Engineers and
Geoscientists BC**
since 1989. Thank You!

*"In 1989, my father Bryan Fitzpatrick, and my grandfather Joe Fitzpatrick, developed an exclusive insurance program for **Engineers and Geoscientists BC**.*

Since then we have insured thousands of engineers and geoscientists from around the province.

My father and I are very proud to be carrying on my grandfather's dream. We are proud to be celebrating 30 years as an Affinity Partner of the Association."

Thank you for your support!

Chelsea Fitzpatrick
Vice-President of Operations



Chelsea Fitzpatrick



PARK INSURANCE

Service You'll Love. Trust We'll Earn.

CALL US TODAY 1.800.663.3739

www.park.ca/egbc



LIANNA MAH, MENG P.ENG., FEC

PURSUING DIVERSITY AND INCLUSION THROUGHOUT HER CAREER

New Engineers and Geoscientists BC president Lianna Mah, P.Eng., FEC, grew up in East Vancouver, and completed both a bachelor's in civil engineering and a master's in environmental engineering at UBC. She intended on launching her engineering career here, too, until the economy intervened.

"I didn't want to leave," says Mah, "but there was a recession in BC when I graduated in the '80s and there wasn't a lot of work here in my field. A number of my classmates had moved east and found work, so I went too." Within weeks, she found "the perfect job" with a consulting firm in London, Ontario, doing environmental engineering, wastewater treatment, and solid waste management. She loved the work, but was curious about how she got the job, so one day she asked her boss what it was about

her résumé that first got her in the door: "Well," he said, "I'd never met a woman engineer before and I wanted to see what you looked like."

Not the answer she expected, to say the least, but he turned out to be a great boss. "He didn't let the fact that I was a woman stand in the way of the opportunities he gave me," says Mah, including a major international project. "As a young engineer, I couldn't have asked for more variety and challenge."

Mah's world was looking bright, when, in 1989, a lone gunman opened fire at l'École Polytechnique de Montréal, killing 14 female engineering students. "That was a catalyst for me," she says. It forced Mah to think beyond her own budding career and look at ways to both encourage more women to become engineers, ensure they are welcomed, accepted, and respected once they get into the workplace.

When Mah returned to BC in 1990 to work as a design engineer with Associated Engineering, where she is now Vice President of Business Development, she made advocating for women in engineering a primary focus. As a volunteer with APEGBC (now Engineers and Geoscientists BC), she and a small group of other women engineers got together to form what is now called the Women in Engineering and Geoscience Division. "I found the association very open to our ideas and it was very empowering to get involved, to see our ideas come to fruition, and then—even better—to have them become mainstream."

Mah's Engineers and Geoscientists BC volunteering did not end there, though. "I started to work on more committees and task forces in many different areas, including professional renewal and practice," she says, acquiring new skills and expertise along the way that helped her

PERSONALLY SPEAKING

HOW WOULD YOU DESCRIBE YOUR LEADERSHIP STYLE?

I believe in listening to the contributions of the entire team and in coming together through consensus. Together we create better ideas and better outcomes. It's our collective ideas that will make Engineers and Geoscientists BC even stronger.

WHAT IS YOUR WORKPLACE STYLE?

I am an engineer leading a marketing and communications team. We all share ideas, and sometimes someone will tell me they really believe their approach is the way to go. They're the experts and they have great ideas, so I take their advice.

DO YOU HAVE A PROFESSIONAL PHILOSOPHY?

I believe in working hard, but I also believe in having fun. If you're working hard without fun, it can lead to burnout. But if you're having fun along the way then there's a joy that comes with work. It's the same thing with volunteering. I have volunteered with Engineers and Geoscientists BC for a long time, because it's fun. I've gained so much, learned a lot, met some wonderful people, *and* had a lot of fun. Giving back to our profession is rewarding and kind of addictive.

WHAT DO YOU DO OUTSIDE OF WORK AND VOLUNTEERING?

My husband and I love to travel, and we also love to just stay at home and explore the city, including Vancouver's unique diners and dives. This is a great city for food and culture.

transform from a "born introvert" into the self-assured leader she is today.

DID YOU CHOOSE ENGINEERING OR DID IT CHOOSE YOU?

I grew up really liking math and sciences, and I found them very challenging. I thought very, very briefly about medicine, but I *really* don't like the sight of blood. In the end, I chose engineering because it applies both math and sciences.

DID ENGINEERING LIVE UP TO YOUR EXPECTATIONS?

I had no idea how male-dominated engineering was. It was a shock in first year at UBC, and it was a shock coming into the workplace. There was a feeling of isolation. There were so few people like me in the workplace.

I have been very fortunate in my career that I haven't actively felt discriminated against for being a woman, but I have many friends and

colleagues who have felt it. Even today, 30 years after I started in engineering, there are women engineers who go out into the field and are harassed because they are women. And there are still women who join firms and are the only woman engineer there, so they have that same feeling of isolation I had.

AS ENGINEERS AND GEOSCIENTISTS BC'S NEW PRESIDENT, WHAT DO YOU INTEND TO FOCUS ON OVER THE NEXT YEAR?

As president, I want of course to continue to promote women in engineering and geoscience.

But I think also, as engineers and geoscientists in BC, we have a duty of care to the public to help improve resilience in our communities, specifically resilience to the changing climate and resilience to earthquakes.

However, for me, the most important thing for Engineers and Geoscientists

BC is working with government and the Superintendent of Professional Governance to implement BC's new *Professional Governance Act*.

There are certain aspects of the *Act* that I believe are very good. For example, we will be able to move forward on regulation of firms, which will allow us to enhance protection of the public interest, improve regulatory oversight, and provide organizations with opportunities to improve their processes. But the *Professional Governance Act* also requires registrants to file a conflict of interest declaration and make a competency declaration on every project they work on. Many registrants work on a number of different projects every day. We want to work with the Superintendent to develop a process and risk-based thresholds for triggering declarations that will ensure that the public interest is protected without creating excessive bureaucracy.

WHAT DO YOU CONSIDER YOUR GREATEST PROFESSIONAL ACCOMPLISHMENTS?

One of the biggest projects I worked on with Associated Engineering was the design of secondary treatment upgrades to two wastewater treatment plants in Metro Vancouver. These two plants treat wastewater for over a million people, so their impact on increasing environmental protection was huge.

I'm also very proud of the fact that, at Associated Engineering, we've created a culture where smart, talented women engineers are attracted to the company and want to develop their careers with us. When I joined Associated in 1990, we had 200 people, but only three engineers—1.5 percent—were women. Now we have over 1,000 staff and 23 percent of our engineers are women.

Another highlight was joining Associated's senior Board of Directors. I believe that boards of all companies should be reflective of society, and that diversity sparks creativity and innovation. Having diverse outlooks on corporate boards make companies better. ♦

FEATURE

SEA TO SKY GONDOLA DOWN

The failure of the Sea To Sky Gondola haul rope in August 2019 was stunning news—but it also gave engineers a rare opportunity to thoroughly examine how the wire haul rope behaved while being cut under tension.

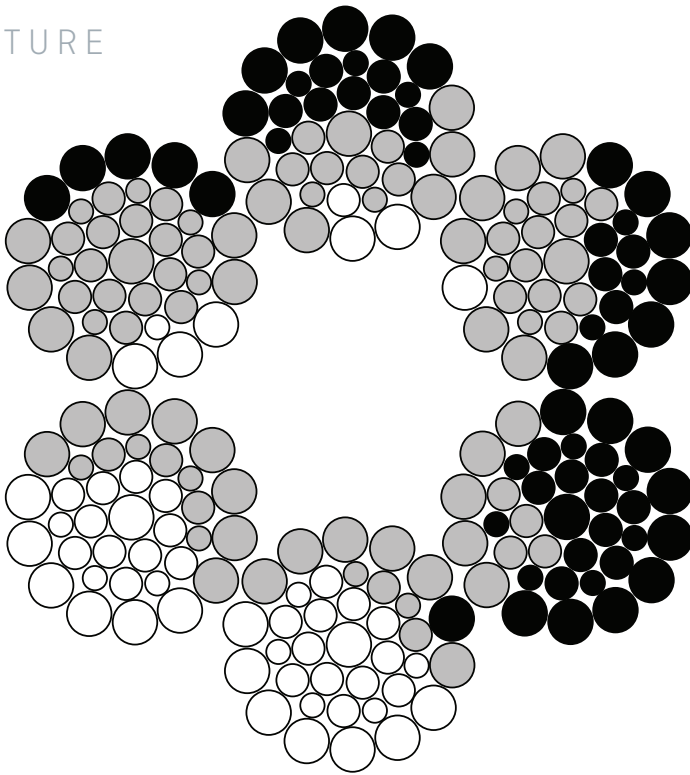
Kylie Williams





A helicopter removes a damaged gondola cabin after a portion of its haul rope was deliberately cut, causing the entire rope to fail.

PHOTO: HALEY LORRIANE PHOTOGRAPHY.



LEFT: This cross-section diagram of the haul rope estimates how each individual wire failed: black indicates cut-through wires, grey indicates partially cut wires, and white indicates wires that snapped without a cut from tension overload. DIAGRAM: TECHNICAL SAFETY BC. RIGHT TOP: This image is a cross-section photo of the Sea To Sky Gondola haul rope. The haul rope was organized in six bundles, each comprising 36 steel wires. Here, the bundles are labelled arbitrarily. PHOTO: TECHNICAL SAFETY BC. RIGHT BOTTOM: This wire was partially cut before it and remaining wires failed.

In the early morning hours of August 10, 2019, the haul rope of a gondola at a popular tourist attraction failed.

Security personnel working at the Sea to Sky Gondola near Squamish, halfway between Vancouver and Whistler in British Columbia's Lower Mainland, reported hearing loud noises. It was later confirmed that almost all 30 passenger cabins had crashed to the forest floor.

The event sent shock waves through the local community and the province. Early news reports suggested that it was a criminal act but, regardless of the cause, engineers took the chance to study the failure in detail and learn more about exactly what it takes to cause one of these thick steel cables to fail.

NO ORDINARY CABLE

The original cable used on the Sea to Sky Gondola measured 52 millimetres in diameter and was constructed of 216 strands of high-strength Extra Improved Plow Steel (EIPS), arranged in 6 bundles

of 36 steel wires each. The wire bundles were twisted around a solid plastic core for stability. The 4,755-metre-long haul rope was spliced at a single point to create a continuous loop, known as a monocable, under tension.

The minimum breaking load listed on the haul rope test certificate was 2,126 kilonewtons, or just under 480,000 pounds—much more than enough strength to carry the 30 gondola cabins and one maintenance cabin. With a maximum capacity of eight people per cabin, the gondola could whisk more than 600 people per hour, at 5 metres per second, from the sea-level base station to the lodge 885 metres above in a little over 10 minutes per journey.

Simple failures of haul ropes of this type are extremely rare. In the month following the event, engineers helped examine the failure and concluded that the cable was deliberately cut. In this case, some of the wires that formed the

strands in the cable were cut all the way through, others were partially cut, and the rest simply snapped under the tension. That moment of failure, while dangerous, provided a rare opportunity for engineers to examine the actual safety margin of the system design and haul rope.

SCENE OF THE CRIME

Jeff Coleman, P.Eng., director of risk and safety knowledge, Technical Safety BC, was out walking his dog that morning when he received the call that a failure had occurred on the Sea to Sky Gondola. He cut the walk short and went “into work mode.”

“My priority is to get the right people assembled and to get to the site,” said Coleman, “We want to make sure that evidence that could reveal what caused it, and what were the other contributing factors is preserved and collected.”

Technical Safety BC is the regulatory body that oversees BC's *Safety Standards Act*—

the legislation that applies to the design, installation, operation and maintenance of specific equipment in BC. Under the *Act*, owners and operators are required to notify Technical Safety BC of incidents, who will begin an incident investigation if required.

Coleman teamed up with David Looney, senior safety officer for passenger ropeways, amusement rides and elevating devices at Technical Safety BC, with 40 years' experience, to visit the site, collect evidence and define the scope of the investigation, including which aspects would require the involvement of professional engineers. The role of professional engineers in this case was to examine the condition of the cable to determine the modes of failure and to determine whether factors other than the cutting contributed to the cable's failure.

CHAIN OF EVIDENCE

Key questions were on everyone's mind: "Was it really cut? How was the cable cut? How much of the cable was cut before it failed? How long did it take to fail after being cut?" The role of the professional engineers was to examine the cable to answer these questions from the evidence, and identify if there were any defects or damage that could have caused or contributed to the failure. Was there any evidence that it failed for any reason other than a deliberate cut?

Coleman coordinated with the RCMP and Acuren Group Inc. laboratories in Richmond. There, professional materials engineers with experience examining steel cables were responsible for the detailed tests, analysis and interpretation of the results from the cable examination.

The laboratory team examined the wires and the frayed ends under electron microscopes and performed various metallurgical tests to measure the hardness, strength and integrity of the metal to validate that it conformed to its original certification standards.

Examination of the physical evidence preserved on the wire fracture surfaces showed that the haul rope was cut through most of its thickness until final overload occurred. The Acuren team labelled each of the cut, partially cut, and snapped wires, and examined them

under the microscope. The Acuren report concluded that "the rope suffered a catastrophic overload and fell to the ground when the remaining intact wires could no longer sustain the normal tension in the rope."

CONTINUES ON PAGE 33...

Smart. Choice.

Subgrade Stabilization

Stormwater Management

Pavement Preservation

Containment/Waterproofing

Geogrids
Geotextiles
Geomembranes
Stormwater Solutions
Fiber Reinforced Asphalt

NILEX
CIVIL ENVIRONMENTAL GROUP

800.663.0478
nilex.com

UBC ROCKET TEAM PUSHES BOUNDARIES OF DESIGN

A group of UBC engineering students juggle course workloads and limited budgets to build competition-level rockets, one of which they're expecting to reach the edge of space.

Lauren Lee





FEATURE

At the 2019 Intercollegiate Rocket Engineering Competition (IREC), held June 18 to 22, 2019, a thin, white rocket blasts up from the sandy horizon into the clear blue New Mexico sky, leaving a trail of smoke. Cheers erupt from the UBC Rocket team members grouped near the launch control office. Their most recent supersonic IREC rocket, named “Sky Pilot,” had just completed a successful launch after eight grueling months of design and manufacture. Sky Pilot earned the team a commendable third-place finish out of 20 teams in the 30,000-foot Commercial-Off-The-Shelf (COTS) solid motor category. All pieces of Sky Pilot were recovered using the on-board GPS electronics, which reported that Sky Pilot had achieved an altitude of 26,500 feet.

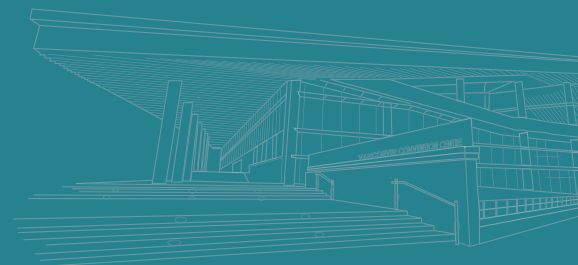
Since its inception in 2016, UBC Rocket—a UBC engineering design team—has been designing, building, and launching suborbital rockets and competing annually in IREC. In addition, the team also strongly supports student academic and professional development, and the field of rocketry in Canada. In 2017, the team achieved first place in their category at IREC, beating more established teams from the US. This accomplishment fueled their ambition to compete

UBC engineering students and IREC competitors (l-r) Benjamin Maquignaz, Sean Bounger, and Nicolas Jaeger, carry Sky Pilot to the flight-check tent prior to launch in June, 2019. PHOTO: UBC ROCKET



SHK IS
CONSTRUCTION LAW.

BUILD BETTER.
BUILD WITH SHK.



— TRUSTED LEGAL ADVICE —

SHK

604.684.0727

shk.ca

for the US\$1 million prize in the Base 11 Space Challenge. The goal of this competition is to become the first student-led team to design and build a rocket with a single-stage liquid engine that crosses the Kármán Line—or, the edge of space, about 100 kilometres up—by the end of 2021.

Several other Canadian student teams are also participating in the high-stakes Base 11 competition, including teams from McGill University and SFU. This increased involvement in student rocketry in Canada has caused an influx of engineering graduates into the growing Canadian aerospace industry. Graduates can use the skills gained through their rocketry design teams to continue innovating aerospace technology at Canadian companies—Canada’s main contribution to the international space community. Canada has maintained its position as a leading aerospace technology provider, with inventions such

as the robotic maintenance arm Canadarm, Canadarm2, and the forthcoming Canadarm3. The Government of Canada has committed \$150 million over five years to promote job growth and retain engineering talent in the Canadian aerospace industry.

With the increased interest in aerospace and bright career prospects, the UBC Rocket team hopes that its members will acquire skills, such as problem-solving and engineering design, that will prepare them to be skilled engineers and industry leaders.

The UBC Rocket team is divided into three smaller teams: the Base 11 team that hopes to launch to the edge of space with their rocket, called “Whistler Blackcomb”; the IREC team that competes at IREC every year; and the Frequent Flyers team, comprising rocketry beginners who conduct more frequent launches with smaller rockets. Each year the team recruits about 60 UBC students, from first-year to graduate students, from both inside and outside of the university’s engineering departments.

In the past, the UBC Rocket team primarily used COTS solid motors to launch its rockets, which feature solid fuel and oxidizers. Solid-fuel motors are fuel plus an oxidizer that are premixed into a solid form. Once a solid-fuel motor is ignited, there is no control over throttling or real-time fuel-to-oxidizer ratio control—both critical parameters that control how high the rocket can go. Teams competing in IREC can enter in a category against other COTS-type rocket motors.

The Base 11 team is the only team of the three working to develop their own reliable liquid engines, which would expand UBC Rocket’s repertoire of propulsion design. The major challenge with liquid engines is the small margin of error and the high likelihood that something will go wrong. Simon Bambey, a fourth-year UBC Engineering Physics student and the Base 11 Project Manager, said that liquid engine tests can result in unpredicted performance or even complete destruction. He and the Base 11 team spent two years ensuring that the first engine “hot fire” propulsion test would not result in this. “Preventing a chaotic performance begins with careful material selection, determining suitable manufacturing methods and conducting fluid analysis,” said Simon. In their first year, they completed research and sourced materials that would be used in the engine and its supporting test stand. Then, in the second year they began manufacturing the test stand, followed by the engine system. They are the first Canadian team to complete a successful hot fire test of their liquid engine, which has taught them a lot about how to navigate roadblocks and solve problems quickly.

The IREC team works hard to support the Base 11 team while constructing its own competition rocket. The team placed a lot of emphasis on improving manufacturing processes, implementing

designs that would inform the Base 11 team’s rocket design, and allow students to gain experiences with CAD and simulation software. Aside from the COTS solid motor, the entire IREC rocket was student-designed and manufactured. Everything—including the composite airframe, the on-board electronics, the largely composite internal structure, the payload, and the meticulously-sewn parachute—was custom-built by students.

The continued use of COTS solid motors by the IREC team is due to the motors’ reliability and ease of use. Pre-assembled COTS solid motors are easy to attach to the rest of the rocket, making it immediately ready for launch. Conversely, liquid engines are difficult to produce, requiring labour and time that extends beyond the usual 10-month timeline to complete an IREC rocket. Liquid engines cannot be purchased commercially so every component of the liquid propulsion system must be meticulously designed and built. These systems often feature fuel and oxidizer tanks, a manifold where the fuel and oxidizer will combine, a nozzle to guide the combustion force and launch the rocket, an electronic panel to control the system’s behaviour, and an adjacent cooling system that will prevent the engine from melting from the high combustion temperatures. It takes IREC teams from other institutions multiple attempts, often over a few years, to successfully launch one liquid engine rocket to a predicted altitude due to the complex and unpredictable nature of liquid propulsion systems.

The IREC team also implemented new features after learning from past rockets, such as a tapered fin to reduce drag, carbon-fibre set rings and supports for the recovery and avionics bay, a complex

CONTINUES ON PAGE 34...



Global Drilling Solutions

Sonic Track & Truck Drill Rigs

- Geotechnical Investigations
- Geotechnical Construction
- Marine Investigations
- Water Wells



www.Foundex.com
604-594-8333 • info@Foundex.com

CONFERENCE REPORT



For three days in October, in Kelowna BC, engineering and geoscience professionals, students, and industry stakeholders gathered at the Delta Grand Okanagan Resort for Engineers and Geoscientists BC's annual conference and AGM.

Delegates had the opportunity to network with colleagues, learn about the latest engineering and geoscience products and technologies through 38 exhibitors, and develop their skills and knowledge through 10 professional development streams.

Conference keynote speakers included Clarence Louie, Chief of the Osoyoos Indian Band who was recently inducted to the Canadian Business Hall of Fame, neuro-communications expert Gregor Jeffrey, storm-chaser and adventure television host George Kourounis, and Paul Craven, leader of the new Office of the Superintendent of Professional Governance.

On Saturday, October 19, Engineers and Geoscientists BC held its 100th Annual General Meeting (SEE AGM REPORT ON PAGE 7), which was immediately followed by a Centennial Reception—the kick-off celebration for Engineers and Geoscientists BC's upcoming 100th Anniversary year. At the Centennial Reception, over 150 guests viewed historical displays and milestones, networked with other guests, and saw UBC Okanagan's AERO Club's demonstration of its autonomous aerial vehicles.

For those that missed the kick-off event, all are welcome to attend Engineers and Geoscientists BC official celebration on March 5, 2020. To receive an email reminder when registration opens, visit egbc.ca/100.

Engineers and Geoscientists BC 2020 annual conference and AGM will be hosted at the Victoria Conference Centre in Victoria, BC, on October 15–17, 2020.



NETWORKING, EDUCATION, AND THE CENTENNIAL RECEPTION HIGHLIGHT 2019 CONFERENCE AND AGM

THANK YOU TO OUR SPONSORS:

PLATINUM

Marsh Insurance/Berkley Canada
Park Insurance/Northbridge Insurance

GOLD

Great-West Life
Johnson Insurance
Manulife
Norton Rose Fulbright
UBC Master of Engineering Leadership

SILVER

Aplin Martin
Applied Science Technologists and Technicians of BC
Metrix Professional Insurance Brokers Inc./AXA Insurance Company
Vancouver Airport Authority

BRONZE

Association of Consulting Engineering Companies British Columbia
BC Public Service Agency
Binnie
Hedgehog Technologies

COPPER

SFU Continuing Studies

PREVIOUS PAGE FROM TOP, COUNTERCLOCKWISE: Paul Tang, P.Eng., receives his award at the President's Awards Gala; a delegate visits the IECS Environmental Inc booth; keynote speaker George Kourounis; Councillors Jeremy Vincent, P.Geo., and Nathan Ozog, P.Eng.; Immediate Past President Dr. Katherina Tarnai-Lokhorst, P.Eng., FEC, FGC (Hon.). THIS PAGE, CLOCKWISE FROM LEFT: Megan Pate, P.Eng., receives her award at the President's Awards Gala; delegates network at the Centennial Reception.

“ Working together
I am confident we
will ensure that the
expectations of the
public, and their trust
in professionals,
is maintained and
strengthened. ”



Paul Craven,
Superintendent
of Professional
Governance.
PHOTO: MIKE CRANE
PHOTOGRAPHY

SUPERINTENDENT OF PROFESSIONAL GOVERNANCE: NEW LEGISLATION AIMS TO STRENGTHEN PUBLIC TRUST IN PROFESSIONALS

Paul Craven

The new *Professional Governance Act* (PGA) strengthens professional governance in British Columbia by establishing a consistent and modern framework and ensuring government oversight through the Office of the Superintendent of Professional Governance (OSPG). As Superintendent, it is my role to oversee all regulatory bodies under the PGA including Engineers and Geoscientists BC, with a focus on oversight of systemic or general matters relating to the governance of professions. As a “regulatory body,” Engineers and Geoscientists BC will focus on serving and protecting the public interest with respect to the professional practices of registered engineers and geoscientists in British Columbia.

At present, only certain sections of the PGA are operating, or “in force”. These include the provisions that establish the office and give the Superintendent specific powers. This first phase has also resulted in changes in the nomination and election process for council members that you may have noticed.

My first goal as Superintendent has been to get my office up and running so that we can make sure that the OSPG, Engineers and Geoscientists BC and the other regulatory bodies are ready when the professions are formally brought under the PGA. We are a lean office of eight staff within the Ministry of Attorney General focused on the implementation of the PGA and researching best practices in

professional governance. The OSPG vision is: Effective, trusted and supported professional governance that protects the interests of British Columbians.

While a specific date is not known, it is expected that registered Engineers and Geoscientists, and other professionals, will come under the full authority of the PGA sometime in fall 2020. When that takes place, the *Engineers and Geoscientists Act* will be repealed. Currently, the OSPG is working on policy to inform the initial regulations required for implementation of the PGA, and regulatory bodies are preparing bylaws to be filed with the Ministry when the PGA comes into force.

Changes you will see at that time include:

- Renewed bylaws including a renewed code of ethics focused on public safety and protection of the environment, a stronger duty to report with a clear process and triggers and, whistleblower protection.
- Engineers and Geoscientists BC will be required to have a mandatory continuing education program, including requirements that support Indigenous reconciliation.
- Standardization of processes of complaints and discipline including the triggers for investigations, increased transparency of discipline hearings, and the opportunity for alternative complaint resolution.

Some of the more involved aspects of implementing the PGA may take longer. These include issues such as scope of practice and reserved practice, competency and conflict of interest declarations, and regulation of firms. The OSPG will work with Engineers and Geoscientists BC on their target of summer 2021 to begin the regulating of firms.

Beyond fall 2020, the OSPG will transition from implementation to operations and enforcement. We will work to maintain a modern regulatory framework that is responsive to the needs of regulatory bodies and the rapidly changing professional environment, and we will communicate, and foster transparency, about matters of professional governance.

The OSPG continues to host regular meetings with the regulatory bodies. We welcome the opportunity to work alongside Engineers and

Geoscientists BC and others to enhance professional governance in British Columbia to ensure that our system surpasses expectations and becomes an example of excellence. Change will be required of all of us, from a shift in culture and attitudes, to our day-to-day work and planning required to be ready to function in a new governance framework.

Working together I am confident we will ensure that the expectations of the public, and their trust in professionals, is maintained and strengthened.

Paul Craven is the newly appointed Superintendent of Professional Governance in the province of British Columbia. More information about the OSPG is provided at professionalgovernancebc.ca. If you have questions, please do not hesitate to contact the OSPG at OSPGEnquiries@gov.bc.ca.

PROFESSIONAL GOVERNANCE ACT: ANSWERS TO YOUR QUESTIONS

Engineers and Geoscientists BC Staff

The introduction of the *Professional Governance Act* and the Office of the Superintendent of Professional Governance marks a significant governance change for Engineers and Geoscientists BC and its members. Here are some of the most common questions we receive about these changes.

WHAT TRIGGERED THIS?

The new legislation is a result of government's professional reliance review, which examined the current legislation governing qualified professionals in the natural resource sector, and the role their professional associations play in upholding the public interest. The review was a 2017 election commitment by both the NDP and the Green Party, and was included in the power-sharing agreement.

WHAT'S CHANGING UNDER THE PROFESSIONAL GOVERNANCE ACT?

The most significant change is new oversight for Engineers and Geoscientists BC—and the regulators of applied biology, forestry, agrology, and engineering technology—under the new Office of the Superintendent of Professional Governance. The new legislation also introduces consistent governance provisions between these bodies, and provides the ability to introduce modern regulatory tools, including the authority to regulate firms, and continuing education requirements for registrants.

ARE WE STILL SELF-REGULATED?

Yes. Engineers and Geoscientists BC, and our professions, are still fully self-regulated. Council and staff have worked with government to ensure that the critical elements of self-regulation—including elections—will be maintained within this new regulatory regime.

IS THE ENGINEERS AND GEOSCIENTISTS ACT STILL VALID?

Yes. However, as provisions in the *Professional Governance Act* are brought into force, they will override any current provisions

that exist in the *Engineers and Geoscientists Act*. For example, the *Professional Governance Act*'s merit-based nomination procedures for Council elections were brought into force earlier this year, and superseded the provisions in the *Engineers and Geoscientists Act*. By fall 2020, it is expected that the PGA will be fully in force and the *Engineers and Geoscientists Act* will be repealed.

WHEN WILL THE REGULATION OF FIRMS COME INTO EFFECT?

Timing is subject to receiving the required legislative authority; however, the association will continue to work with Government to take the necessary steps to advance corporate regulation in line with a target start date of July 2021.



Your **solid, technical,**
reliable patent counsel

**oyen
wiggs**

Oyen Wiggs Green & Mutala LLP

PROTECTING INNOVATION

patentable.com



IMPLEMENTING THE CITY OF ABBOTSFORD'S STRATEGIC PLAN FOR 200,000 RESIDENTS

Stella Chiu, P.Eng., Tyler Bowie, P.Eng., Mike Kelly, and Rob Isaac, Eng.L.

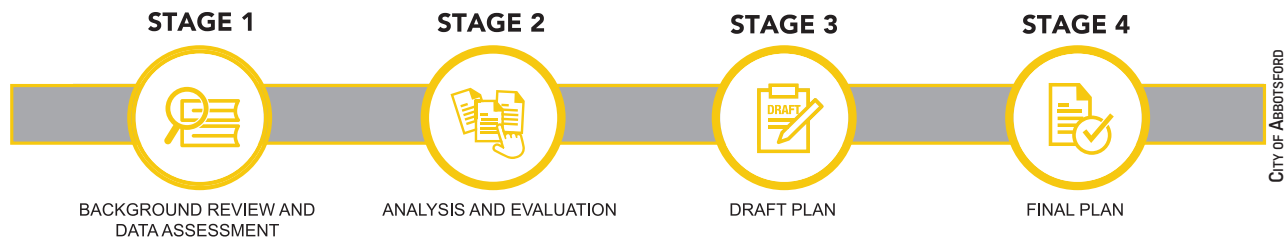


Montrose Avenue in Abbotsford, about 67 kilometres from Vancouver. PHOTO: CITY OF ABBOTSFORD

Staff at the City of Abbotsford were asked to implement a new strategic plan that could accommodate 200,000 residents. The project required City engineers to work closely with other City departments to update all master plans and studies on a very tight schedule.

Located along the south bank of the Fraser River in BC, the City of Abbotsford (with a population of about 152,000) borders Langley and Chilliwack in BC, and Sumas in Washington State. Abbotsford is a vibrant city in the heart of the Fraser Valley; it has an international airport, a regional hospital and cancer centre, provincial courthouse facility, and the main campus of the University of the Fraser Valley. It is the fifth-largest municipality in the province, and, at about 390 square kilometres, the largest by geographical area.

More than 60 percent of the City's population lives and works in Abbotsford. In addition to all the services a typical municipality provides, Abbotsford operates a regional utility (co-owned with the District of Mission) for water supply and wastewater treatment.



In 2015, Abbotsford Council approved a strategic plan, with an overarching goal/vision for the City to be the “hub of the Fraser Valley”. Council created four cornerstones to provide support and focus to the work of the City: vibrant economy, complete community, fiscal discipline, and organizational alignment.

OFFICIAL COMMUNITY PLAN

To achieve the goal, the City’s new Official Community Plan (OCP) was commissioned through a community-wide planning exercise, which provided a vision and a land-use framework for how Abbotsford will grow from a population of 140,000 to 200,000. Population growth brings with it many benefits; however, it also comes with challenges, such as infrastructure servicing like roads and

underground pipes. Proper planning is also required for police, fire stations, and other amenities like schools, libraries, parks and cultural facilities. In addition, all new and updated infrastructure must include post-construction maintenance plans.

As part of the new OCP, the City’s planning department, supported by the engineering department, developed three growth scenarios: building the previous OCP (“dispersed”); supporting neighbourhood centres (“balanced”); and creating a city centre (“focused”).

To assess the impact of growth against City infrastructure needs, staff analyzed four sectors—water, transportation, sewer, and stormwater systems—and provided Class D cost estimates. The

estimates for each scenario showed an approximate variance of \$100 million. The “dispersed” approach was more costly than “balanced”; the least costly was the “focused” scenario. This trend of cost differences was in line with similar studies from across Canada.

Council evaluated these scenarios, their cost estimates, a technical analysis of different growth options, and the input and ideas from nearly 8,000 interactions with residents. In 2016, Council adopted the new OCP that supports 75 percent of new growth in existing neighbourhoods, and 25 percent new growth in new neighbourhoods. The OCP promotes growth in areas where existing infrastructure and amenities make upgrades financially sustainable. The new OCP also supports new priorities, like walking, biking, and transit.

PLAN 200K PROJECT

After Council approved the new OCP, the Plan 200K Project (i.e., plan for 200,000 residents) was the next big move. The project ensured future operations, development, infrastructure, amenities, and programs aligned with the vision set out in the new OCP.

This project was unprecedented: it required an update to all master plans and studies, across multiple departments within 18 months. The project included 20 studies, comprising master plans, neighbourhood plans, and other studies.

A steering committee—which was led by the city manager’s office and included general managers of each department—was established to administer the project. The committee ensured

Just the *facts*

about Engineers Canada-sponsored insurance plans

Over **90,000** of your peers and their families enjoy these benefits. *You* can, too.

Here are more key facts about these valuable plans:

- + You have **exclusive access** to insurance plans created specifically for engineering professionals.
- + Engineers Canada and Manulife **continually assess the plan benefits and rates** to ensure they’re highly competitive.
- + They’re innovative, with recent enhancements like the **job loss waiver of premium** – the first of its kind in Canada.

Learn more about how these plans can benefit you.

manulife.com/egbc **1 877 598-2273**

- Term Life
- Health & Dental
- Major Accident
- Critical Illness
- Disability Income
- Manulife One

Manulife

Underwritten by **The Manufacturers Life Insurance Company**

Manulife, Manulife & Stylized M Design, and Stylized M Design are trademarks of The Manufacturers Life Insurance Company and are used by it, and by its affiliates under license. All rights reserved. © 2019 The Manufacturers Life Insurance Company, Manulife, P.O. Box 670, Stn Waterloo, ON N2J 4B8. Accessible formats and communication supports are available upon request. Visit manulife.ca/accessibility for more information.

alignment and integration of the plans/studies, and reviewed each Plan 200K Project presentation at each juncture of the four-stage process, before they were brought forward to the senior leadership team and Council, and for public input. For example, the departments of Parks, Recreation & Culture and Engineering & Regional Utilities worked closely to ensure that transportation and transit-enhanced networks complemented access to recreational areas.

ENGINEERING MASTER PLANS

Seven of the 20 master plans and studies were in engineering areas such as transportation, transit, sewer collection system, water distribution, drainage, wastewater treatment, and water supply. The purpose of the master plans was to review infrastructure needs to support growth in the next 25 years, and develop a capital growth program that was “phaseable, affordable, resilient, sustainable, incremental, flexible, and grantable” (PARSIF+G).

WASTEWATER TREATMENT

The Joint Abbotsford Mission Environmental System (JAMES) Wastewater Treatment Plant was the focus of one of the seven engineering master plans. The JAMES Plant currently provides secondary treatment services to the urban areas of Abbotsford, Mission, and Sumas, Washington State. The JAMES Plant serves a population equivalent to 275,000 (residential, institutional, commercial and industrial), with an average flow of 53,000 cubic metres per day. Treated effluent is discharged into a high current area of the Fraser River; Class A biosolids, as defined in the provincial Organic Matters Recycling Regulation, are produced as a result of the pre-pasteurization and digestion process. The plant meets or exceeds the applicable provincial and federal regulations.

The capacity of the JAMES Plant to accommodate future growth, as well



The plant for the JAMES Wastewater Treatment Plant is not only to increase its capacity, but to also review seismic and climate change resiliency and energy recovery opportunities.

PHOTO: CITY OF ABBOTSFORD

as the resiliency of plant infrastructure in the context of a changing climate, were reviewed. The plant is protected by the Matsqui Dyke; the master plan recommended raising a future site for flood-proofing and allowing treated effluent to flow by gravity from the plant to the river.

Another resiliency consideration was seismic. The plant is located on lands

with liquefaction potential. Current site constraints are such that it is not feasible to improve the existing infrastructure to meet current seismic and BC Building Code requirements. Plant expansion on a future site will need to be seismically prepared; a seismic dyke along the river side of the site and ground densification via stone

NORTON ROSE FULBRIGHT

When you need a team with deep industry understanding, we're there.

At Norton Rose Fulbright, we combine extensive local experience with global perspective. Our dedicated team provides highly pragmatic legal advice in construction, engineering and infrastructure. Wherever you are looking next, we have the in-depth knowledge to meet your needs.

Law around the world
nortonrosefulbright.com

columns below future structures would also be required.

The review also showed major opportunities to recover valuable resources. The plant already uses reclaimed effluent on-site to reduce City water consumption. Biogas, for example, comprises about 65 percent methane, and is a renewable energy source produced during the digestion process. The plant produces about 6,700 cubic metres of biogas per day, which is equivalent to an energy value of 150 gigajoules per day. The majority of biogas is used for process and space heating within the plant. The master plan recommends exploring the sale of excess biogas, to provide district heating to nearby industrial or agricultural buildings, or to pursue cogeneration

grant opportunities. Cogeneration was once used to convert plant biogas to electricity, but the equipment has reached the end of its useful life.

Another opportunity relates to Class A biosolids—stabilized organic matter that rich in essential plant nutrients. The provincial regulation allows for controlled application to maintain productive soil and stimulate plant growth on agricultural lands. The master plan recommends continuing this practice, and also recommends another future biosolids master plan to further review beneficial use options. A forthcoming high-heat, microwave-enhanced oxidation process has the potential to reduce biosolids, increase biogas production, and reduce biosolids management costs.

The final master plan recommends a new direction, comprising future expansion in nearby lands and raising and seismically preparing these lands. The existing assets must be well-maintained until new infrastructure is constructed in the medium term. The plan envisions a capital expenditure of approximately \$415 million over 25 years, including \$155 million for asset replacement.

PUBLIC CONSULTATION

During the 18-month project, the City conducted extensive public consultations, through its website, social media, open houses, community events, and stakeholder meetings. These efforts resulted in an engagement of 2,217 residents at events, 948 residents at open houses, and 432 residents at workshops. In addition, the City received 9,799 survey

CONTINUES ON PAGE 36...



marsh.com



ENGINEERS AND GEOSCIENTISTS BC PROFESSIONAL LIABILITY INSURANCE PROGRAM

Engineers and Geoscientists BC, in cooperation with Marsh Canada Ltd. has created a group affinity program for Professional Liability Insurance. Marsh Canada is pleased to provide advice and broker individual policies for the professional liability insurance needs of Engineers and Geoscientists BC members.

Key Factors for Choosing Marsh Canada Limited:

- Client base includes some of the most prominent Engineers & Geoscientists in the world. The knowledge and solutions involved in handling such clients are shared with new clients.
- We seek to develop longer term relationships and allow scope for terms designed around individual clients.
- Direct access to insurer's individual decision makers.
- Largest International network of any insurance broker.

- Superior Claims Handling and guidance in dealing with settlements.
- Program includes 60 minutes of free legal advice from one of BC's top law firms Dolden Wallace Folick LLP.
- A full range of insurance placement and consulting resources under one roof. Marsh's Vancouver office has over 150 employees and acts as a focal point for servicing Engineers and Geoscientists BC members with many capabilities—including an online delivery system. Vancouver is supported by Marsh offices in 13 cities across Canada and over 100 countries around the globe.

For more information, please contact Marsh Canada Limited

Brad Greening
(604) 443 - 3533
Brad.Greening@marsh.com

Madison Britz
(604) 443 - 3508
Madison.Britz@marsh.com

Ben Biddle
(604) 692 - 4866
Benjamin.Biddle@marsh.com

POLICY FEATURES INCLUDE:

Coverage Features:

- First dollar defense coverage
- Defense Costs in Addition to Limit Insured
- Broad definition of named insured
- Broad definition of professional services
- Joint ventures with other design professionals
- Data Protection Liability
- Disciplinary coverage
- Occupational Health and Safety Act defense coverage
- Loss of documents coverage
- Modified Hammer Clause
- Mediation / Trial Expense Reimbursement
- Claims Mediation Reimbursement.
- Non-cancellable coverage
- Policy Form – The insurance is written on a claims made basis
- Territory – Services rendered and claims made anywhere in the world with suits brought back in Canada and the United States

SOLUTIONS...DEFINED, DESIGNED, AND DELIVERED.



Copyright © 2019 Marsh Inc. All rights reserved.

DISCIPLINARY NOTICE: GERHARD TSCHEPPE, P.ENG., KAMLOOPS, BC

Engineers and Geoscientists BC issued a Notice of Inquiry to Gerhard Tscheppe, P.Eng., in April 2019, regarding his conduct related to engineering services he provided for an excavation at a residential property in Kamloops, BC. Instead of proceeding to a disciplinary inquiry, Mr. Tscheppe agreed to a Consent Order, dated September 4, 2019.

In the Consent Order, Mr. Tscheppe admitted that he demonstrated unprofessional conduct and that his conduct was contrary to Principle 1 of the Code of Ethics, which requires all members and licensees “hold paramount the safety, health and welfare of the public, the protection of the environment, and to promote health and safety in the workplace”.

Mr. Tscheppe agreed that he demonstrated unprofessional conduct and violated Principle 1 of the Code of Ethics when he signed and sealed two site instructions required under the Occupational Health and Safety Regulation, (B.C. Reg. 143/2017). Mr. Tscheppe agreed the site instructions, dated May 18 and 28, 2017, were inadequate because they:

1. failed to include drawings, sketches, plans, or sections and/or clearly written descriptions and instructions with respect to the embankments and the concrete lock blocks on the perimeter of the embankments;
2. failed to adequately describe the geology and soil conditions of the embankments;
3. failed to include the instructions and/or conditions to be followed by workers in proximity to the excavation;
4. failed to explain the consequences of a failure of the embankments or the concrete lock blocks on the perimeter of the embankments; and
5. failed to provide an adequate description of the influence of changing weather conditions and an adequate description of the precautions that should be taken as a result of weather conditions.

In addition to these inadequacies, the site instructions dated May 18, 2017 also failed to:

1. identify any limitations for machinery or equipment being used adjacent to the excavation; and
2. set out the time period for which the site instructions applied.

Mr. Tscheppe agreed that he also demonstrated unprofessional conduct and violated Principle 1 of the association’s Code of Ethics when he failed to adequately investigate and assess the stability of the embankments of the excavation and the concrete lock blocks on the perimeter of the excavation. He also agreed that he failed to perform or directly supervise calculations in

relation to the stability of the embankments of the excavation and concrete lock blocks on the perimeter of the excavation. As part of the Consent Order, Mr. Tscheppe agreed to the following provisions.

1. His membership in Engineers and Geoscientists BC is cancelled, effective October 15, 2019.
2. From September 4, 2019 to October 15, 2019, he will make reasonable arrangements for the orderly transfer of his professional engineering project files to other professional engineers and will limit his practice to projects he is currently engaged on, and not take on any new project files or other engineering work.
3. He will pay \$5,000 toward the association’s legal and investigative costs.
4. If he fails to comply with any of the terms of the Consent Order prior to the cancellation of his membership, then his membership will be suspended until every default has been remedied in accordance with the terms of the Consent Order.

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

DISCIPLINARY NOTICE: DAVID HOWARD DROVER, CASTLEGAR, BC

In June 2017, the Association of Professional Engineers and Geoscientists of Alberta (APEGA) cancelled Mr. Drover’s registration in Alberta due to “unprofessional conduct”, “abusive, harassing, and vulgar conduct”, and a finding that “Mr. Drover was ungovernable”. The APEGA decision is provided at apega.ca/enforcement/discipline-decisions.

When a member of Engineers and Geoscientists BC is disciplined by a regulatory body in another jurisdiction in Canada, section 33.1 of the *Engineers and Geoscientists Act*, (the *Act*) allows the Discipline Committee to impose equivalent discipline against the member in BC. The association applied to the Discipline Committee to cancel Mr. Drover’s registration pursuant to section 33.1 of the *Act*. Mr. Drover submitted written arguments in response.

On September 16, 2019, a panel of the Discipline Committee (the Panel) issued its determination. The Panel concluded that section 33.1 of the *Act* should be applied. The Panel ordered Mr. Drover’s membership with the association cancelled.

The full text of the Determination of the Discipline Committee can be found in the Discipline Notices section of our website, at egbc.ca/Complaints-Discipline/Discipline-Notices.

DISCIPLINARY NOTICE: AHMED RAZA SYED, P.ENG., SURREY, BC

In August 2018, Engineers and Geoscientists BC issued a Notice of Inquiry to Ahmed Raza Syed, P.Eng., regarding structural engineering services he performed for four residential buildings in Abbotsford, BC. A disciplinary inquiry was held on November 27, 2018.

On February 15, 2019, a panel of the Discipline Committee (the Panel) concluded that Mr. Syed demonstrated unprofessional conduct, incompetence, negligence, and breached Bylaw 14(b) of the Bylaws of the association, by failing to maintain adequate records of his work. The Panel found that “the absence of Project documentation produced by Mr. Syed in this matter suggests that he retained essentially no documentation for the Projects”, and that he “demonstrated unprofessional conduct by issuing field reviews reports that were incorrect and which he knew or ought to have known to be incorrect.”

The Panel determined that:

...Mr. Syed demonstrated unprofessional conduct by failing to adequately document changes to the structural engineering designs made during construction and failing to submit

a record of those changes to the City. The fact that Mr. Syed allowed this to occur at four different projects over time demonstrates incompetence (Allegation 1b).

Mr. Syed, although served, did not attend the disciplinary inquiry and did not offer a defence.

On June 18, 2019, the Panel ordered Mr. Syed’s membership suspended for six months, beginning after Mr. Syed’s current interim suspension was completed, and after any additional suspension arising from a separate disciplinary matter. The Panel also ordered that, once Mr. Syed’s suspension was complete, he will be subject to direct supervision for 12 months, and that he work full-time in the offices of the supervising professional for the first three 3 of the supervision period. The Panel ordered that this direct supervision period may be extended for an additional six-month period on the recommendation of the supervising professional.

Mr. Syed was also ordered to pay \$29,000 toward the Engineers and Geoscientists BC legal costs.

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.

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.



PETER B. GUSTAVSON
School of Business
Executive Programs
The world looks different from here.

The Masters Certificate in Project Management

Vancouver & Victoria Locations

Knowledge and tools from the very best trainers in Canada to deliver projects on time, on budget and within scope.

18 days over five months = minimal impact on your work schedule.

Enrolment Bonus: Receive an iPad “Go Green” and manage your learning materials paperlessly – yours to keep afterwards!

To receive a detailed brochure:

Call 250-721-6429 | Email: eisted@uvic.ca or Visit: execprograms.uvic.ca/ProjectManagement



Offered in partnership with:



Schulich
School of Business
Executive Education Centre

Harbour of Hope Refugee Assistance

Society, together with the refugees we support, would like to extend a huge and heartfelt thank you to **Tim Smith, P.Geo., Eng.L., and Westrek Geotechnical Services Ltd.** for their incredibly generous donation to our fundraising campaign in 2019.

Congratulations Westrek, for celebrating 20 excellent years in business and giving back in such a powerful and meaningful way.

THANK YOU!

HARBOUR of HOPE
REFUGEE ASSISTANCE SOCIETY



CONTINUES FROM PAGE 17...

Technical Safety BC subsequently produced a cross-section diagram of the haul rope to illustrate how the cutting progressed through the cable, and how the wires progressively failed in tension overload. The diagram illustrates the actual cable safety margin within the system.

The investigation concluded that the cut initiated on two of the six bundles of 36 steel wires that made up the cable. As the cutting progressed, more than four of the six strands were severed while the full line tension was momentarily supported by two partially intact strands.

“The cable failed while it was being cut. When it finally let go, it would have let go with a tremendous amount of force,” said Coleman. “Somebody could have died. There’s no way they could have seen the whole run and understood that there was nobody else nearby. So, it posed a

tremendous risk to the public, as well as those who cut it.”

REBUILD ON TRACK FOR 2020

Reconstruction is on schedule for a spring 2020 reopening, according to Sea to Sky Gondola’s blog post October 24. That day, 4,755 metres of new cable, weighing in at 54 tonnes, arrived at the base station of the Sea to Sky Gondola from the manufacturer, Fatzer Wire Ropes in Switzerland.

Within days, a 14-person splice team, led by Swiss rope-splicing expert Hannes Koller, had attached the new cable to the remaining original cable and threaded it into place. By October 28, the 70-metre-long splice was finished and the new loop complete.

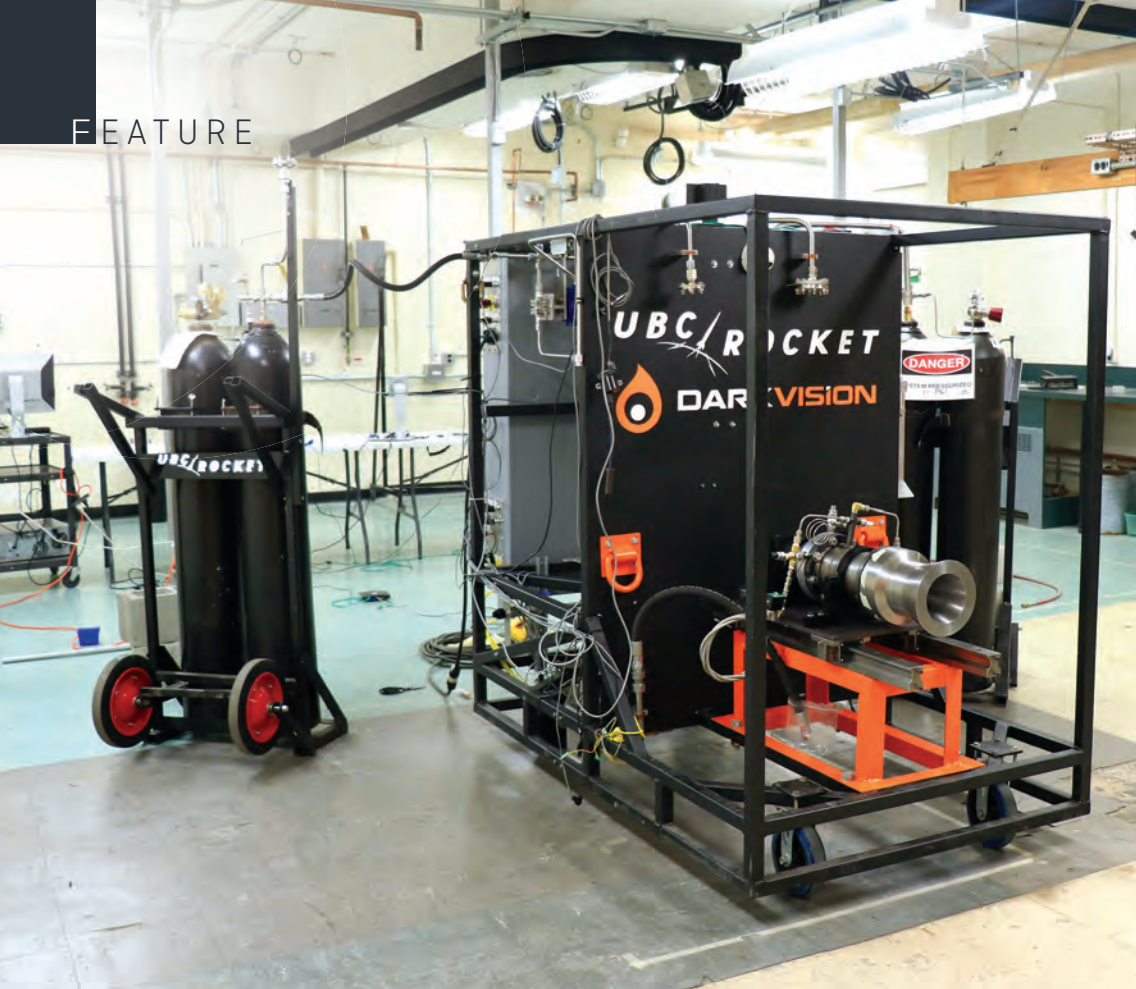
Although the previous cable had been manufactured in France, the new cable was made by the Swiss company because they were able to quickly source the raw materials for the galvanized wire

and committed to the tight fabrication schedule Sea to Sky requested. The newly installed and spliced cable measures 4335.5 metres, with an additional 400 metres stored on a reel in case it is needed. The new cable is similar to the old, with six bundles of 36 steel cables and a solid plastic core.

Another Swiss company, CWA Constructions, is responsible for building and shipping the 30 new passenger cabins, weighing 700 kilograms each. Delivery of the new cabins is on schedule and, according to the October 28 post, the Sea to Sky Gondola is “still anticipating an early spring reopening”. And the engineers who participated in the examination of the severed haul rope will walk away with new knowledge of exactly what it takes to cut through one of these cables, and how to make all gondola systems in BC as safe as possible for everyone. ♦



Workers examine a gondola cabin that fell to the forest floor after the failure of the haul rope. PHOTO: HALEY LORRIANE PHOTOGRAPHY



The test stand of the Whistler Blackhome liquid engine, showing the tanks of fuel and oxidizer (left), and the electronics system to control the reaction of the liquid fuel and oxidizer. Solid-fuel rockets have pre-mixed fuel and are therefore safer and more reliable—but they do not provide flexible, real-time fuel mixture. PHOTO: UBC ROCKET

CONTINUES FROM PAGE 21...

12-line annular parachute and improved recovery mechanism, and an innovative, deployable drone payload that collects data on landscape features while descending autonomously.

A key part of the design process was prototyping, said Nathaniel McCallum, a second-year Mechanical Engineering student. “Most of my time was spent designing and prototyping components for the internal structure of the rocket,” he said. “This included brainstorming designs and sketching up concepts, then progressing to designing them in CAD software and finally manufacturing them. Throughout the process, we would use a variety of prototypes to assist in the evolution of the design, from simple Popsicle-stick models to full scale 3-D printed versions of the final design.”

Bambey underscores that both money and time are always major challenges. UBC Rocket gets some funding from UBC, but must raise the remaining amount, which is often substantial. Complicating things is that the teams must design and fabricate everything themselves, on a “close enough” basis, using affordable found objects, without the usual commercial resources. And the students must do it all while balancing a heavy course load.

Newer members on the Frequent Flyer team within the wider UBC Rocket team design and launch their own smaller rockets; other members work on the Base 11 and IREC rockets. For

example, Alice, a first-year engineering student, designed and manufactured a new aluminum set-ring, threaded rods, and inter-subsystem plates, which allowed the entire upper assembly to be inserted into the upper body tube in proper alignment in a single step. Ivan, another first-year student, supported the IREC team’s composites subteam and helped with the final pieces of Sky Pilot.

With the manufacturing of the Base 11 rocket underway, UBC Rocket members are accelerating towards careers in engineering, both outside and within the aerospace industry. The team is also continuing its outreach and promotion of rocketry and aerospace, with plans to hold workshops and model rocket “build days” for the public in the upcoming year. What’s the main thing that keeps members coming back to build rockets? Nathaniel answers: “I enjoyed solving real-world engineering problems that aren’t presented in class. Being able to use creativity and critical thinking to design a component that solves a complex problem while working alongside close friends is extremely rewarding.” ♦

Lauren Lee is a third-year UBC Civil Engineering student and a student member of Engineers and Geoscientists BC. She has been a member of the UBC Rocket team for the past three years, previously serving as the team lead for the Sky Pilot airframe manufacturing sub team.



making sustainable communities a reality

SURREY | VANCOUVER | CALGARY
KELOWNA | EDMONTON | TORONTO | NANAIMO

www.aplinmartin.com

AVALANCHES | SNOW | WEATHER

- Avalanche risk assessment, hazard mapping, and planning
- Engineering protection: design and installation
- Snow loading & weather impact studies
- Avalanche safety programs: training, forecasting, and control

ALPINE SOLUTIONS
AVALANCHE SERVICES



Squamish, BC
Vancouver, BC
Canmore, AB

t. 604-892-9101

w. avalancheservices.ca

BINNIE
50 YEARS

THE PEOPLE BEHIND
YOUR INFRASTRUCTURE

CE CONTECH ENG INC
Connect • Strategize • Innovate • Deliver

CE offers comprehensive, affordable services in Land, Municipal and Building Development from procurement, permits, detailed design to construction supervision.

- Commercial, industrial and residential projects;
- Track record in city centre development and municipal housing

E: clame@contenginternational.com W: contenginternational.com
Tel: 604.649.2138 or 778.628.8816



Consulting Engineers

Electrical Power Systems & Distribution Specialists

AM Power Systems has been providing world-class consulting engineering services in the areas of Analysis & Studies, Design, Generation, Transmission, Substations and Commissioning to clients in all sectors since 1994, including Oil & Gas, Pulp & Paper, Mining, Municipal, Commercial, Renewables, Co-Generation, Utilities, and ports.

Tel: 604-572-3725 Website: www.ampowersystems.com Email: amps@ampowersystems.com



AUTOMATION SOLUTIONS

Process control, instrumentation, electrical and power engineering /
Competency-based operator training simulations / High-fidelity
dynamic process simulators / Autonomous and remote plants

ENGINEERED SUCCESS

ANDRITZ Automation Ltd. / Canada / andritz.com/automation-sales@andritz.com



- Foundations & Excavations
- Slope Stability
- Geotechnical Hazards
- Pavement Assessment & Design

604-513-4190 • www.braungeo.com



WORLDWIDE
INNOVATION



cwaengineers.com | info@cwaengineers.com | 604-637-2275



DYNAMIC Professional Snow
Avalanche Expertise

Hazard mapping • Risk assessment • Engineering design • Protection structures
Avalanche safety plans • Worker training • Avalanche forecasting • Risk control

Revelstoke, Whistler, and Kimberley BC

250.837.4466

www.dynamicavalanche.com



Advertising in INNOVATION

For more information call Gillian Cobban

Email: advertising@egbc.ca Phone: 604.929.6733

PROFESSIONAL SERVICES

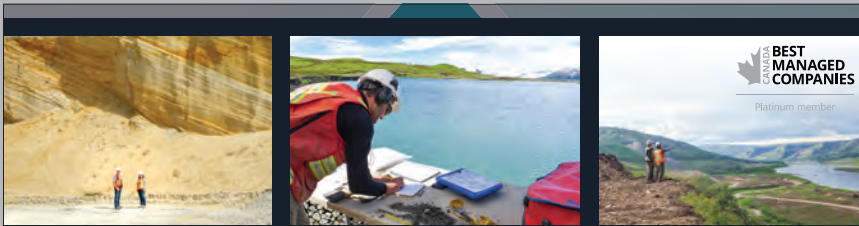


KERR WOOD LEIDAL
consulting engineers

*Engineering a Balance
between People
and the Environment*

Greater Vancouver • Okanagan • Vancouver Island
Calgary • Kootenays

kwl.ca

**BEST
MANAGED
COMPANIES**
Platinum member

Klohn Crippen Berger

For several decades, Klohn Crippen Berger has participated in some of the largest and most challenging engineering, geoscience and environmental projects across the world. We are proud of our legacy, and continue to build a better world through excellence, innovation and teamwork.

WWW.KLOHN.COM   



QUANTA SERVICES COMPANY
Power and Control Engineering

Lex Engineering Ltd.
110 - 4321 Still Creek Dr., Burnaby, BC, V5C 6S7
Phone: (604) 273-1758 • Fax: (604) 273-1759
Email: lex@lexeng.com • Web: www.lexeng.com

- 40 years of Quality Service
- OQM Certified
- High Voltage Substations & Transmission Lines
- Industrial Power Distribution & Control
- Dynamic Power Systems Analysis
- PP Interconnection & Power Generation
- Concepts, Detailed Design, Utility Liaison
- Contract Administration and Start-ups



northwest hydraulic consultants
Innovative Water Solutions

Vancouver | Nanaimo | Kamloops

nhcweb.com



PITEAU ASSOCIATES
GEOTECHNICAL AND WATER MANAGEMENT CONSULTANTS

ROCK MECHANICS • OPEN PIT SLOPES • WASTE ROCK DUMPS • ENGINEERING GEOLOGY • MINE CLOSURE
WATER MANAGEMENT • MINE DEWATERING • ENVIRONMENTAL GEOCHEMISTRY • CONTAMINATED SITES

Tel: (604) 986-8551 / Fax: (604) 985-7286 / Website: www.piteau.com

VANCOUVER - KELOWNA - RENO - ELKO - DENVER - TUCSON - SANTIAGO - LIMA - SHREWSBURY - JOHANNESBURG

ADS, BROCHURES, SIGNS, BANNERS?
CONFUSED ABOUT SIZE + FORMAT?

re:refresh design — Call for simple solutions

OFF-SITE GRAPHIC DESIGNER: SKILLED, RELIABLE, AFFORDABLE
416.838.3357 — info@refreshdesign.me

FEATURE

CONTINUES FROM PAGE 30...

responses and 76,000 social media impressions.

OUTCOME AND NEXT STEPS

In June 2018, the plans received final adoption from Council and currently, recommended short-term projects are being implemented. Throughout Plan 200K, the City identified various long-term infrastructure investments worth more than \$1.9 billion over 25 years. The City is now developing a long-term plan to create a financial strategy to effectively prioritize and fund these infrastructure projects. In addition, the Development Cost Charges bylaws are being updated.

With continuous developments and growth within the City of Abbotsford, the importance of strategic planning cannot be understated. The Plan 200K Project was an important part of the

LOW TO HIGH VOLUME PRECISION METAL STAMPING



HANSEN
INDUSTRIES LTD.
"Quality on Time" since 1975

**REQUEST YOUR
QUOTE TODAY!**
info@hanind.com

www.hanind.com | 1-877-278-3556



The Right Team for Your Project

Our diverse group of professionals share an enthusiasm for community infrastructure. From planning through to design and construction management, we create nimble teams to tackle the unique requirements of every project.

This integrated service offering gives you the experts you need, when you need them.

islengineering.com



EDMONTON | CALGARY | CANMORE | LETHBRIDGE | GRANDE PRAIRIE
HINTON | LANGLEY | BURNABY | SQUAMISH | WEST KOOTENAY
VANCOUVER ISLAND | EAST KOOTENAY | KAMLOOPS | SASKATOON

City's strategic planning and governance process, which establishes a positive relationship with the community and produces valuable deliverables to guide the City towards the vision—"hub of the Fraser Valley". By delivering key services for current and future generations, Abbotsford is continuing its mission to improve the quality of life within the community. ♦

Stella Chiu, P.Eng., is Senior Engineer, Drainage and Wastewater with the City of Abbotsford.

Tyler Bowie, P.Eng., is Director, Infrastructure Planning with the City.

Mike Kelly is Senior Manager, Transportation with the City.

Rob Isaac, Eng.L. is General Manager, Engineering and Regional Utilities with the City.

INNOVATION AD INDEX NOVEMBER/ DECEMBER 2019

Epic.....	6
Foundex	21
Great West Life.....	40
Harbour of Hope	32
Johnson Inc.....	8
Manulife	5
Manulife	28
Marsh	30
Nature Trust of BC	2
Nilex.....	17
Norton Rose Fulbright	29
Oyen Wiggs.....	25
Park Insurance.....	11
SHK Law Corporation	20
University of Victoria.....	32
University of British Columbia	7



prime engineering

- High Voltage Maintenance
- Testing and Commissioning
- Power System Studies
- MV Switchgear and Unit Substation Supply

PRIMEENG.CA T 250.590.8912 E INFO@PRIMEENG.CA



Tt TETRA TECH

Leading with Science®

Tetra Tech's scientists and engineers are developing sustainable solutions for the world's most complex projects. With over 3,500 employees in Canada and 20,000 associates worldwide, we have grown to become one of North America's largest engineering firms.

tetrattech.com/canada f t i n



THURBER ENGINEERING LTD. thurber.ca

GEOTECHNICAL
ENVIRONMENTAL
MATERIALS



Professional Engineers - Land Development Consultants

WEBSTER ENGINEERING LTD.

STEEP ROCKY TERRAIN SPECIALISTS

Tel: (604) 983-0458
Fax: (604) 983-0459
www.webstereng.net

3745 Delbrook Ave.
North Vancouver, B.C.
Canada V7N 3Z4

Advertising in INNOVATION

For more information call Gillian Cobban

Email: advertising@egbc.ca Phone: 604.929.6733

IN MEMORIAM

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

W.G. Bacon, P.Eng. (Non-Practising)	D.W. McSkimmings, P.Eng.
C.O. Brawner, P.Eng. (Non-Practising)	A. Mikkelsen, P.Eng. (Non-Practising)
K.M. Fichtner, P.Eng.	J.H. Montgomery, P.Eng.
G.C. Gibson, P.Eng. (Non-Practising)	E.D. Neale, P.Eng. (Non-Practising)
R. Gonzalez, P.Eng.	B. Pidlisecky, P.Eng. (Non-Practising)
A. Hanna, P.Eng. (Non-Practising)	D.J. Reid, P.Eng.
L.C. Hemsall, P.Eng.	W.G. Robinson, P.Eng., FEC (Non-Practising)
R.W. Irwin, P.Eng.	E.M. Rykaart, P.Eng.
R.W. Johnson, P.Eng. (Non-Practising)	M.E. Salcudean, P.Eng. (Retired)
H. Kettleson, P.Eng. (Non-Practising)	J.A. Stronach, P.Eng.
U. Kueffner, P.Eng. (Non-Practising)	R. Swan, P.Eng.
F.C. Leighton, P.Eng.	T.W. Taylor, P.Eng. (Non-Practising)
J. Ling, P.Eng. (Non-Practising)	M.D. Tkachuk, P.Eng. (Non-Practising)
D.B. Lovdahl, P.Eng.	W.R. Tracey, P.Eng. (Non-Practising)
T.K. McEwan, P.Eng.	H. Verwest, P.Eng. (Retired)
A.I. McKinnon, P.Eng.	A.M. White, P.Eng. (Non-Practising) ♦
J.A. McLeod, P.Eng. (Non-Practising)	

DRILLWELL Your Vancouver Island based specialists for Geotechnical and Environmental drilling services.

**Dual Rotary
Cable Tool
Sonic
Auger
ODEX
Coring**

Phone: (250) 746-5268
Toll Free: 1-(800) 746-7444
Email: drill@drillwell.com

Drilling 4" to 36" diameter holes across the province since 1965 www.drillwell.com



AT OUR CORE

SERVICES
Environmental Drilling / In-Situ Testing /
Geotechnical Drilling / Sonic Drilling / Exploration Drilling

MUDBAYDRILLING.COM
A MEMBER OF THE CONETEC GROUP OF COMPANIES.

CONETEC **MUD BAY DRILLING**



Quinella® Auto
The New Car Purchase Plan

www.quinellaauto.com

For your best possible price call:
Greg Huynh

Phone: **604-688-0455**
1-800-300-GREG (4734)
greg@quinellaauto.com
D8262

Serving BC Professional Associations since 1973




**ORGANIZATIONAL
QUALITY MANAGEMENT
PROGRAM**

The following organizations have recently received OQM certification.

To find out more, visit egbc.ca/oqm.

Airy Point Engineering Services Inc.
Allester Engineering Ltd.
Alverstone Structural Engineering Ltd.
Arvand Construction Consultant Limited
City of Courtenay - Engineering Services Group
Foremost Consulting Inc.
MineIt Consulting Inc.
PGL Environmental Consultants
Pham Structural Engineering Inc.
SES Consulting Inc.
Somerset Construction Engineering

Advertising in INNOVATION

For more information call Gillian Cobban
Email: advertising@egbc.ca Phone: 604.929.6733

CONTINUING PROFESSIONAL DEVELOPMENT

PERSONAL INVESTMENT. PROFESSIONAL COMMITMENT.

FUNDAMENTALS OF PROJECT MANAGEMENT

January 15 & 16, 2020 – Vancouver, BC

The purpose of this course is to introduce technical and non-technical individuals to the principles and techniques of effective project management, which can be usefully applied to technical and non-technical projects.

RELIABILITY ENGINEERING, MAINTENANCE OPTIMIZATION, AND ASSET MANAGEMENT

January 16 & 17, 2020 – Vancouver, BC

Participants will gain a comprehensive understanding of basic concepts, methods, and tools in the area of reliability engineering, maintenance optimization, and engineering asset management. They will learn the topics of reliability and maintenance concepts, component and system reliability analysis, preventive maintenance, condition-based maintenance, asset management programs, and various techniques and tools. The participants will also learn these topics through multiple examples and case studies.

PROJECT CLAIMS, DISPUTES, AND TEAM BUILDING ON ENGINEERING AND CONSTRUCTION PROJECTS

January 17, 2020 – Vancouver, BC

This session discusses the causes and types of claims, the procedures by owners and contractors to avoid claims, and methods to quantify and resolve claims. It attempts to create an environment where trust and teamwork prevent disputes, foster a cooperative bond to everyone's benefit, and facilitate the completion of a successful project.

HYDROTECHNICAL DESIGN OF COASTAL AND MARINE STRUCTURES

January 21-23, 2020 – Vancouver, BC

The course offers fundamentals of hydrotechnical design of coastal and offshore structures with the following objectives; to determine the type and nature of forces on coastal and offshore structures, characterise the structural behaviour of marine pipes, piles, piers, jetties, breakwaters, sea walls, and offshore platforms and introduce and apply simple computational aids, including open-source coastal engineering software

NATURAL GAS PROCESSING PRINCIPLES AND TECHNOLOGIES

January 29, 2020 – Vancouver, BC

This course is divided into two parts. Part 1 reviews the physical, chemical, and engineering principles used to understand the processing of natural gas and its by-products. Part 2 provides a detailed review of design and operations criteria encountered in the transportation and processing of natural gas; product specifications, three-phase separation, gas sweetening, dehydration and hydrocarbon dew point control, refrigeration and compression, LPG recovery, cryogenics, sulphur recovery, acid gas injection, plant utility systems, and LNG production.

LEAN SIX SIGMA IN MANUFACTURING

February 4, 2020 – Vancouver, BC

This course explains the two dominant approaches to process improvement in manufacturing. Lean cuts out wasteful activity in order to speed up a process and Six Sigma is an approach to solving difficult, quality problems.

TWO-DIMENSIONAL MODELLING USING HEC-RAS

February 5-7, 2020 – Vancouver, BC

This intensive, workshop-oriented, three-day seminar will prepare the engineer and water resource professional to use the HEC-RAS computer program for modelling 2-D unsteady flow applications. Led by an expert from WEST Consultants with practical experience in hydraulic modelling, participants will learn how to approach and construct a 2-D model for unsteady flow conditions, and to effectively view and analyze results.

EROSION AND SEDIMENT CONTROL: MASTER CLASS

February 11, 2020 – Vancouver, BC

The ESC Master Class is a comprehensive one-day seminar, which will challenge participants to leverage their understanding of ESC essentials, apply industry innovations to achieve compliance, and deploy best practices in a fiscally responsible and approvable manner for successful implementation.

FUNDAMENTALS OF DESIGN OF PRE-STRESSED CONCRETE MEMBERS

February 13 & 14, 2020 – Vancouver, BC

This course provides the essential basics to

design pre-stressed and post-tensioned concrete structures. After this seminar, the attendee will understand the advantages of using pre-stressed and post-tensioned concrete structures to reduce construction time and provide quality-assured members. The pre-stressing technique reduces the building weight, which reduces the lateral loads caused by earthquakes.

CONTRACT ADMINISTRATION AND CONTRACTUAL ISSUES FOR ENGINEERING AND CONSTRUCTION PROJECTS

February 26 & 27, 2020 – Vancouver, BC

This module will cover legal and contractual issues related to the effective management and administration of construction projects. It focuses on the roles and responsibilities of the project managers to contractors and suppliers. It provides project managers with a good understanding and the practical implications of the legal precedents and improves the ability to make better decisions.

LEADING MAJOR CAPITAL PROJECTS

February 28, 2020 – Vancouver, BC

This session provides an opportunity to discuss the relationship between the business and project sides of the organization.

ADVANCED PROJECT MANAGEMENT

April 1 & 2, 2020 – Vancouver, BC

This project management course is designed for project executives, directors, managers, and project managers who are involved directly or indirectly in managing projects. The purpose of this course is to build on the Fundamentals of Project Management background by analyzing current industry practices and introducing some value-improving practices to enhance the delivery of complex construction projects.

SEDIMENT ENGINEERING FOR RIVER AND COASTAL PROJECTS

May 25 & 26, 2020 – Richmond, BC

The course offers fundamentals of sediment engineering for river and coastal projects with the objectives to determine when and how erosion and sedimentation takes place in rivers and coastal regions, estimate the magnitude, and get familiar with applications of sediment transport engineering.

For a complete listing of events or for more information, visit egbc.ca/Events/Seminars 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/Events/Seminar.



ENGINEERS &
GEOSCIENTISTS
BRITISH COLUMBIA

ENGINEERS HAVE SPOKEN.

79.7%

FEEL WELL-PREPARED
FOR THE FUTURE BECAUSE
OF OUR FINANCIAL SECURITY
PROGRAM.*

WE CAN HELP YOU FEEL MORE CONFIDENT TOO.

TELL US ABOUT YOUR FINANCIAL GOALS.
GW3.CA/BUILD-CONFIDENCE

*Survey conducted by Great-West Life in June 2019 with participants of the Engineers Canada-sponsored Financial Security Program.



Sponsored by:

engineerscanada
ingénieurscanada

THE
Great-West Life
ASSURANCE  COMPANY

Great-West Life and key design are trademarks of The Great-West Life Assurance Company (Great-West Life), used under licence by its subsidiaries, London Life Insurance Company (London Life) and The Canada Life Assurance Company (Canada Life). As described in this document, group retirement, savings and income products are issued by London Life and payout annuity products are issued by Canada Life.