# Catherine N. Mulligan, Ph.D., ing, FCSCE, FEIC, FCAE

Concordia University

Townhall # 2, June 8, 2021

Canadian Society for Civil Engineering

Société canadienne de génie civil

# CSCE STRATEGIC PLAN 2030

# 1 – **Growing the changing Civil Engineering Community in Canada together**

**CSCE supports and promotes equitable and inclusive initiatives within all areas of civil engineering activity across all cultures, needs, ages, genders and geographic regions**.

- Inclusivity of all engineers from young to senior engineers
- EDI- Increasing females and diversity in civil engineering
- Mentorship, learning and collaboration between engineers of different levels of experience
- Increasing cross-disciplinary collaborations
- Increasing accessibility of civil engineering to all including those with disabilities and First Nation communities

# 2 – **Promotion of Civil Engineering to all**

**CSCE is a learned society actively engaged in enhancing the profile of civil engineering.**

- Continuing to provide opportunities and promote civil engineering to students and associates to gain access to experience to help them succeed
- Bringing civil engineering to the masses (public, other organizations, government).
- Providing basic information about what civil engineering is all about, the process of becoming a civil engineer, etc. and how civil engineers benefit society to all, particularly the young
- Promotion of engineering education and research internationally

# 3 – **Leadership in Sustainability Practices for Civil Engineering**

**CSCE will influence civil engineering practices in Canada through the entire lifecycle of a process.**

- Providing guidance on resilience and adaptation to climate change in infrastructure.
- Providing updates and developments about sustainability methods, materials, tools across all disciplines of civil engineering
- Sharing what our partners (Affiliate, Corporate & Sustaining) are doing about sustainability and leveraging these networks to do more under the CSCE name.
- International activities and learning from others in regards to innovation & sustainability and how we can introduce these concepts to Canada.

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CSCE National Tech Talk – 20/21 Edition

# Young Professionals Panel

*Matt Glynn EIT, ENV SP*

*AJ Darras MEng, EIT*

*Sarah Faithful EIT*

*Rami Mansour MASc, P.Eng.*

# Annual conference May 26-29, 2021

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VIRTUAL CONFERENCE 2021

INSPIRED BY NATURE
INSPIRÉ PAR LA NATURE

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Conference Chair
**Dr. Susan Tighe**

Technical Chair
**Dr. Scott Walbridge**

Sponsorships Chair
**Vimy Henderson, PhD, P.Eng.**

# Annual conference, May 26-29, 2021

- Conference focus: Civil Engineering Innovations
- **Construction, Environmental, Hydrotechnical, Materials, Structures and Transportation Engineering Specialty Tracks**
- Virtual Annual Conference largest virtual gathering of Canada's civil engineering community!
- More that 520 papers presented
- Organizations participating across Canada and internationally
- Close to 600 people registered
- Thanks to conference organizers  and sponsors and all participants.

## 2021 National Civil Engineering Historic Site:
# THE NIAGARA POWER-GENERATING STATIONS

Ali Mahmood, MCSCE, Advanced Studies Research Centre, Drummondville, Quebec
Mike Bartlett, FCSCE, Chair, CSCE National History Committee

The Niagara Power-Generating Stations represent formidable historic Canadian and American milestones in the generation of hydroelectric power. Fuelled by the technical challenge of efficiently and reliably generating large quantities of hydroelectricity, these stations are the product of innovative design and construction practices.

Figure 1 shows the locations of the various Canadian and American installations, constructed to take advantage of the 57m (187 ft) drop of Niagara Falls. The early generators produced direct current (DC) that powered arc and incandescent lighting and subsequently electric motors, triggering intense economic activity in the area. At the turn of the 20th Century, stations on both sides of the border produced alternating current (AC), which is more readily transmitted, and so, eventually became standard worldwide.

A 1.4 km "hydraulic canal" (Feature 7 on Fig. 1), completed in 1861, transported water from the Niagara River above the Falls to the mill sites below the Falls. An 1871 plant in the gorge, used water turbines to power shafts and belts connected to adjacent mills. The canal later fed Schoellkopf Stations 3a, 3b, and 3c (Feature 6), constructed between 1914 and 1924, that together produced 338 MW of 25 Hz AC power. On June 7, 1956, water seepage against the back wall flooded and collapsed Stations 3b and 3c into the river, causing US$100 million damage.

The Niagara Falls & River Railway Power House (Feature 2), was the first on the Canadian side, producing 2 MW DC to power an electric railway linking Queenston and Chippewa, between 1892 and 1932.

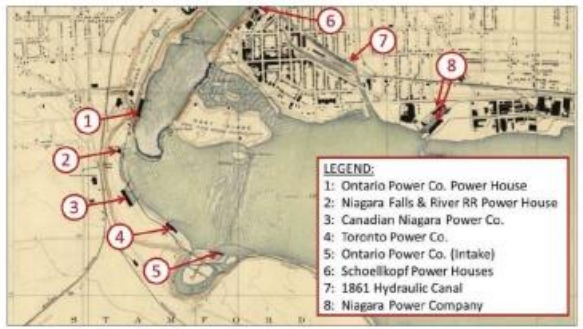


Figure 1: 1913 topographic map showing Canadian and American power installations.

The Niagara Falls Power Company generated the first AC power in 1895 at a plant located 2.4 km upstream of the Falls (Feature 8). Long vertical shafts connected turbines, located at the bottom of deep pits beneath the powerhouse, to generators at grade level. A 2.4 km tunnel facilitated water discharge in the gorge below the Falls. This facility was the prototype for the Canadian Niagara Power Company (Feature 3) and the Toronto Power Company (Feature 4) powerhouses.

The Ontario Power Company built the only Niagara Falls powerhouse on the Canadian side located below the Falls (Feature 1), using 5.5 m diameter riveted steel tubes (Figure 2) to deliver water from its intake at Dufferin Island (Feature 5).

The Province of Ontario established the Niagara Parks Commission in 1885 to preserve the natural scenery around Niagara Falls during a time of intense industrial development. The first Chairman was Colonel Casimir Gzowski, CSCE President in 1889-1891, for whom the CSCE Gzowski Medal is named. Given the tremendous tourist potential of the area – it is said that the words "Niagara Falls" are better known internationally than the word "Canada" – it is not surprising that the aesthetics of the power-generating stations have been carefully managed.

The CSCE designated the Niagara Power-Generating Stations as a National Civil Engineering Historic Site in 2005. It is intended to unveil a commemorative plaque during the CSCE 2021 Annual Conference, with the following wording:



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VIRTUAL ANNUAL CONFERENCE CONGRÈS ANNUELLE VIRTUELLE
MAY 26 - 29, 2021 DU 26 AU 29 MAI 2021

## 2021 National Civil Engineering Historic Site:
# THE MIDDLE ROAD BRIDGE

Mike Bartlett, FCSCE, Chair, CSCE National History Committee

The Middle Road Bridge (Figure 1) is a reinforced-concrete tied-arch-truss bridge that opened in November 1909 on present-day Sherway Drive, between Mississauga and Toronto. The clear span over Etobicoke Creek is 24.4 m, and the roadway width is 4.9 m. It cost $3,190, carried vehicular traffic until 1932, and remains in service today for pedestrians and cyclists.

It is the first reinforced-concrete tied-arch-truss bridge built in Canada. Its designers, the Toronto-based partnership of James Franklin Barber (1875-1935) and Clarence Richard Young (1869-1964) were proponents of the principle that "mathematics and aesthetics go hand-in-hand" (Barber and Young, 1909). In a 1911 lecture, Young identified the three causes of "un-aesthetic" bridges to be: adverse locations, parsimoniousness on the part of the purchasing municipality; and, the general lack of good taste in the people, and to some extent in engineers themselves.

The parabolic arch of the Middle Road Bridge represents an advance in bridge aesthetics: typical bridges with similar spans of the day were metal parallel-chord through trusses "on which tons of iron finials, rosettes and stars have been lavished" (Walton, 1995).

Octavius Laing Hicks (1873-1930) of Humber Bay (Etobicoke), eulogized as "the most active and widely known bridge contractor... ...around Toronto", constructed the bridge (Figure 2). He employed "an ingenious device" to pretension the reinforcing steel rods in the tension chord before the concrete was placed to limit "hair" cracking under the full-service load. This early application of prestressing was probably not particularly durable given what we now recognize to be long-term prestress losses. To prevent newly placed concrete from setting at joint locations, bags of cracked ice were laid on the last concrete placed at night, and "this was found to be perfectly plastic the next morning, as if it had just been poured."

The CSCE Board of Directors approved the designation of the Middle Road Bridge as a Civil Engineering Historic Site in 2009. A CSCE plaque will be unveiled at the 2021 Annual Conference, and erected on site, with the following text:

The Middle Road Bridge was the first reinforced-concrete arch-truss bridge in both Canada and North America when it opened in November 1909. The Toronto-based firm of Barber & Young designed the structure, following the principle that "mathematics and aesthetics go hand-in-hand". James Franklin Barber (1875-1935) was a very prominent bridge designer in Ontario. Clarence Richard Young (1869-1964) joined the Civil Engineering Department of the University of Toronto in 1907 and became the fourth Dean of Engineering there from 1941 to 1949. General Contractor Octavius Laing Hicks (1873-1930), was the most active and widely known bridge contractor around Toronto.

Figure 1: Middle Road Bridge, ca. 1909 (Wikipedia)

Figure 2: Contractor O. L. Hicks is second from left in this 1909 photograph (University of Toronto Archives, C. R. Young, B78-0001/007(14))

**References**


- Barber and Young. 1909. Canada's first concrete truss bridge. Reprinted from Canadian Cement & Concrete Review., November, 8 pp. *https://historicbridges.org/ontario/middleroadsherwaydrive/article.pdf*, accessed 22 Dec. 2020.
- Bartlett, F. M. 2021. A brief history of the Middle Road Bridge. *Proceedings*, CSCE 2021 Annual Conference. 8 pp.
- Walton, S. A. 1995. Canadian aesthetics of early reinforced-concrete bridges. *Journal for the Society of Industrial Archaeology*, 21 (1): 5-14. ■




Unveiling of CSCE historic site plaques

# World Engineering Day for Sustainable Development —March 4, 2021

World Engineers Day for Sustainable Development.  Created by UNESCO, the day promotes the important role engineers play in creating a better world.

Joined  other engineering organization in the press release:

Engineers United: Declaration of Climate Emergency and the Importance of Climate Resilient and Sustainable Infrastructure

# 2021 CNCCC & CNSBC

- **100% Online**
  **May 15, 2021**
- Participation of the Canadian teams for the concrete canoe competition
- Canadian and international teams from Mexico, Costa Rica and China for steel bridge competition .
- Great efforts of those in the CSCE such as Jeremie Aube and the members of the student competitions committee


# TRIENNIAL

CONFERENCE

**Triennial2021.ca**

# Background

- Jointly organized every three years by the  American Society of Civil Engineers (ASCE), Institute of Civil Engineers (ICE) and Canadian Society for Civil Engineering (CSCE).
- Last held in the UK in 2018 with the inaugural Global Engineering Congress.
- The summit will address the challenges of resilience of infrastructure subjected to climate change.
- Organizing committee chairs

[William E. Kelly, Ph.D., P.E]

[Michael (Mike) Sanio]

[Davide Stronati]

[David Balmforth]

**Triennial Chair**
Catherine N. Mulligan

# Keynote speakers

- Keynote – Climate Change Adaptation and Resiliency of Critical Infrastructure
- **SPEAKER**
- Rosa Galvez Senator and Professor, Canada

- Keynote – A theory improving resilience of infrastructures under climate change – Nature Enriched and Attributes Coordinated Watershed
- Speakers:
  **Bin Peng** – Deputy Secretary General of the Chinese Society for Environmental Sciences

  **Denghua Yan** – Director and Professor, Department of Water Resources in China Institute of Water Resources and Hydropower Research

# Features: Panels and Statement

Opening Plenary – Discussions

Question Time panel debate “Can we deliver Net Zero Carbon?”

Adequacy of standards used in practice in the three countries:  Are there gaps?

First Nations Climate Change Risk Assessment - Asset Management tool

Roadmap to the 2030 UN Sustainable Development Goals – Advancing Sustainable and Climate Resilient Infrastructure

Methods and tools for infrastructure resilience

Closing Remarks

A statement of intent for three organizations will be signed  by Presidents to work together on solving problems related to the Sustainable Development Goals (SDGs).

Declaration May 2021
Triennial
ASCE - CSCE - ICE

## Context

- We have long recognized the key role that the civil engineer has to play in addressing our planet's grand challenge to deliver sustainable and climate resilient infrastructure
- The United Nations Sustainable Development Goals (SDGs) were developed to address humankind's grand challenges to meet the demands and needs of a growing, global population.
- The Paris Agreement that world leaders have endorsed has set a profoundly new course to find solutions to climate change disruptions.

# Commitment

## Endorsement of the WFEO Climate Code of Practice

- We will provide leadership to build climate resilient, sustainable infrastructure, lifting the standard of performance to withstand the rising threats of climate change and other convergent risks that might emerge over the life cycle of the project.
- We support the establishment, creation and dissemination of standards, rating systems and credentialing programs.
- Civil engineers must guide project development and validate the application of these principles by using metrics and rating tools.
- We intend to bring about transformative change in the way infrastructure is conceived, planned, financed, designed, built, and maintained.
- We will provide leadership and advocacy, nurture collaboration; build capacities, knowledge, and skills; build for vulnerable communities and ecosystem protection; and share our stories.

TRIENNIAL CONFERENCE

# Triennial Declaration May 2021

Niagara Falls, Canada

ASCE - CSCE - ICE

The three global engineering institutions namely, the Institution of Civil Engineers, the American Society of Civil Engineers and the Canadian Society for Civil Engineering have long recognized the key role that the civil engineer has to play in addressing our planet's grand challenges to deliver sustainable and climate resilient infrastructure. Every three years we share progress, knowledge, experience, and renew our commitment.

Infrastructure and nature-based solutions - including "no build" - are planned, designed and constructed by our members to ensure human well-being. It dictates the patterns and flows through which we live our daily lives and affects our long-term prosperity. As the infrastructure becomes more interconnected and demands more resources, we will ensure that its development is socially, economically and environmentally sustainable. In short, we commit to "meet the needs of the present without compromising the capability of future generations to meet their own needs".

The United Nations Sustainable Development Goals (SDGs) were developed to address humankind's grand challenges to meet the demands and needs of a growing, global population. They set out a "bold and transformative plan of action to move us on a more sustainable and resilient path, consistent with environmental stewardship of the planet, and leaving no one behind."

The Paris Agreement that world leaders have endorsed has set a profoundly new course to find solutions to climate change disruptions. We as the members of the Triennial intend to integrate the Paris Agreement on mitigation and resilience with the SDGs. We see our role to not only build back better, but to act with foresight and innovation to build better, fairer and more equitably before disasters strike and rebuild to a higher standard after disasters occur.

## Endorse the WFEO Climate Code of Practice

We will provide leadership to build climate resilient, sustainable infrastructure, lifting the standard of performance to withstand the rising threats of climate change and other convergent risks that might emerge over the life cycle of the project. Specifically, we support the establishment, creation and dissemination of standards, rating systems and credentialing programs. Civil engineers must guide project development and validate the application of these principles by using metrics and rating tools.

Using the SDGs as our framework, we intend to bring about transformative change in the way infrastructure is conceived, planned, financed, designed, built, and maintained. We will provide leadership and advocacy, nurture collaboration; build capacities, knowledge, and skills; and share our stories.

ASCE AMERICAN SOCIETY OF CIVIL ENGINEERS

Canadian Society for Civil Engineering

ice

We will transform our combined knowledge into actions leading to outcomes.

## Leadership, Advocacy and Collaboration

We will display leadership by requiring that our members demonstrate a sound knowledge of sustainable development, the SDGs and the 2030 Agenda. We will advocate the benefits of taking a sustainable approach through our public voice and policy work. We will collaborate with other engineering institutions as well as engage with those outside of engineering to deliver the multi-discipline solutions required to achieve the SDGs. We will work with our partners to ensure that the engineering standards needed to support achievement of the SDGs are available and fit for purpose.

## Knowledge, Skills and Capacity Building

We will continue to raise the standards of Civil Engineering at the individual and institutional levels. We will share knowledge on how to engage with the challenges outlined in the SDGs, how individuals can tackle these in their daily practice, how schools and universities can foster related content into their curricula, and how institutions can develop frameworks to enable sustainable development.

## Building for Vulnerable Communities and Ecosystem Protection

Infrastructure is more than the structures and built assets, it also includes the essential goods and services that move our economies. Vulnerable, marginalized, and poor communities are especially dependent on quality infrastructure for mobility and basic products and services. We will work to ensure that the engineering standards for climate resilient, sustainable infrastructure include all appropriate considerations to help these vulnerable communities and ensure that the affected ecosystems are not degraded but improved for future generations.

## Telling the Story

We will celebrate our success and share our setbacks with political and social constituencies and other stakeholders. We will tell the story of the lives that have been improved through civil engineering and raise awareness around the challenges that still need to be addressed.

Jean-Louis Briaud
Ph.D., PE, D.GE, DIST.M.ASCE
President
American Society of Civil Engineers

Catherine Mulligan
Eng., Ph.D., FCSCE, FEIC, FCAE
President
Canadian Society for Civil Engineering

Rachel Skinner
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President
Institution of Civil Engineers

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# Task forces

These task forces established at June 2020 Board meeting included:

- Revenue generation
- Establishment of continued education certificates
- Envision steering committee.
- Another task force on accessibility reported a very interesting case study at the last board meeting on the Innes House and subsequent article of design for accessibility
- The formation of a new task force on cost and revenue sharing among the sections and regions was approved and is starting work this year.
- Task force to be established on by-law update

# Acting Executive Director

- Task force for evaluation of the potential of hiring an executive director in Sept.
- Recommendation to the board in November 2020
- Selection committee formed for selection of candidates
- 2 candidates interviewed and both retained
- David Innes has been engaged for a period of 6 months to provide a review of CSCE to be followed by Glenn Hewes after that period.
- David has served on its Board of Directors for over a decade and was President in 2003-2004
- Civil Engineer and was a professor of Civil Engineering at the University of New Brunswick for 25 years and more recently served as the Fredericton International Airport Authority's first President and CEO.
- He has also served on a variety of boards and committees

# Upcoming events

- Outgoing board meeting-June 15
- AGM-June 16
- Incoming board meeting-June 19
- **The 8th International Conference on Advanced Composite Materials in Bridges and Structures, ACMBS-VIII, will be held in Sherbrooke, Quebec, Canada from 5-7 August 2021**
- CSCE 2022 Annual Conference, May 25-28, 2022, Whistler, BC Canada

- Hope to see you at all of these events

# Thank you

- Thank you to all of our volunteers in the Society, including all CSCE committees and divisions.
- Particular mention to the National Management Committee (NMC) through our numerous meetings
- I would like to acknowledge our head office staff (Lois and Patricia) for their time and tireless dedication to the Society.

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# Let’s continue working together

QUESTIONS?

Please contact me: president@csce.ca