



SUSTAINABLE MUNICIPALITIES MUNICIPALITÉS DURABLES

2014 CSCE Annual General Meeting and Conference

Assemblée générale annuelle et congrès SCGC 2014

13th International Environmental Specialty Conference

13ème Conférence internationale spécialisée sur l'environnement

4th International Structural Specialty Conference

4ème Conférence internationale spécialisée sur les structures

10th International Transportation Specialty Conference

10ème Conférence internationale spécialisée sur les transports



FINAL PROGRAM PROGRAMME FINAL

www.CSCE2014.ca

A warm welcome

from Nova Scotia to the
Canadian Society of Civil Engineering

NOVA SCOTIA

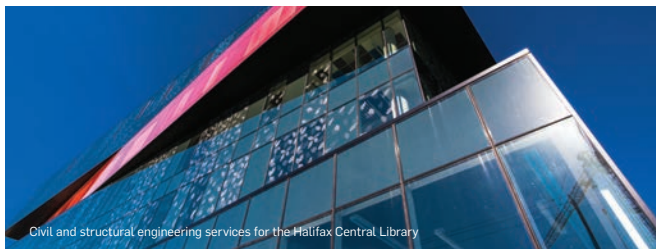


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SUSTAINABLE MUNICIPALITIES



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Premier's Message

On behalf of the Province of Nova Scotia, it is my pleasure to welcome delegates of the Canadian Society for Civil Engineering Annual Conference to Halifax, May 28th – 31st, 2014.

I understand that three Specialty Conferences will be hosted concurrent with the General Conference; the 4th International Structural Specialty Conference, the 10th International Transportation Specialty Conference and the 13th International Environmental Specialty Conference. Thank you for choosing Nova Scotia to host these prestigious events.

Nova Scotia is home to stunning natural beauty, an exciting and diverse culture, a rich heritage, and warm and friendly people. Whether you're looking for outdoor adventures, beautiful scenery, fresh seafood, local cuisine and wine, an urban experience or something off the beaten path, Nova Scotia offers lots to do, see and experience.

I encourage you to take some time during your stay to experience all that Nova Scotia has to offer and please come visit us again soon.

Sincerely,

A handwritten signature in black ink that reads "Stephen McNeil". The signature is written in a cursive, flowing style.

Honourable Stephen McNeil, M.L.A.
Premier





Greetings from the Mayor



As Mayor of Halifax Regional Municipality, I am delighted to extend warm greetings and a special welcome to all attending the Canadian Society for Civil Engineering Conference.

Halifax Regional Municipality is the place to be with its dynamic and intriguing mix of heritage and culture. A marquee destination embracing a diversity of people, communities, shops, restaurants and nightlife, our city will present you with a truly original experience.

Our culturally rich and historic port city has been entertaining guests for over 250 years and we take pride in our reputation as one of the world's most hospitable and welcoming destinations.

I want to acknowledge, with gratitude, the Local Organizing Committee, the Canadian Society for Civil Engineering and Sponsors for hosting CSCE 2014 Annual General Conference here in our region. The theme "*Sustainable Municipalities*" is one that certainly resonates with us in Halifax Regional Municipality.

I wish you much success and trust your visit will be a truly memorable experience.

Kindest regards,

Mike Savage
Mayor

WELCOME MESSAGE



On behalf of the Local Organizing Committee, I would like to welcome everyone to the CSCE 2014 Annual Conference in Halifax. The conference theme is “Sustainable Municipalities,” which reflects our own enthusiasm for engineering sustainably in our dynamic maritime city. The conference program promotes and celebrates the central role of civil engineering systems in municipalities and the increasing importance of innovative solutions to create sustainable practices that can be implemented locally, nationally and internationally.

Concurrent with the General Conference, we are pleased to also host three Specialty Conferences which bring leading experts from across Canada and around the globe in one venue: the 4th International Structural Specialty Conference, the 10th International Transportation Specialty Conference and the 13th International Environmental Specialty Conference.

The variety of papers included in the proceedings will showcase presentations on discovery, innovation, implementation of research, decision making, project management, and lessons learned from the application of new techniques in major projects. We have arranged technical tours of key municipal infrastructure and will be recognizing three important civil engineering sites that have played key roles in the history and development of Halifax. In addition, we are pleased to have an exciting Young Professional Program as part of the conference experience for recent engineering graduates and students.

On behalf of the Local Organizing Committee I wish to express sincere appreciation for the incredible support we have received from many civil engineering suppliers, consultants, contractors and infrastructure owners.

Halifax and Nova Scotia are known for our warm hospitality and we invite you to experience it as part of the social program or simply explore on your own.

Have a wonderful conference, enjoy the city, reconnect with colleagues and make new friendships!

John Newhook

Chair, Local Organizing Committee

NOTE FROM THE TECHNICAL COMMITTEE

On behalf of the Technical program committee, it is my pleasure to welcome you to CSCE's 2014 Annual Conference in Halifax. In keeping with the general theme, "SUSTAINABLE MUNICIPALITIES", the General Conference and the three Specialty Conferences are bringing together academics, researchers and practitioners in the various sub-disciplines of civil engineering to present and discuss recent advancements and innovative solutions. Present and future engineering challenges and solutions will be identified and discussed in the more than 250 technical presentations over the next four days.

The local civil engineering community has worked together to plan a strong and memorable technical program; one which showcases civil engineering talent and achievements across the profession. A warm welcome is extended to practicing engineers, academics and researchers; thank you for being here to share your latest innovations with your civil engineering colleagues.

And, lastly, as a proud Maritimer, I encourage you to relax, breathe in the salty air and enjoy the local hospitality; trusting that it will leave a lasting impression that you will take away as part of your CSCE experience in Halifax.

Jane Thorburn

Chair, Technical Program Committee
CSCE 2014 Halifax

ORGANIZING COMMITTEE

John Newhook	Chair
Carl Yates	Honorary Chair
Michel Comeau	Treasurer
Kent Lane	Secretary
Vic Perry	Sponsorship Chair
Doug Salloum	CSCE Executive Director
Lois Arkwright	CSCE Office/Events Manager
Colin Dickson	Sponsorship/Industry Coordinator
Eva Cheung	Conference Coordinator
Jane Thorburn	Technical Program Chair
Christopher Davis	Technical Program Assistant
Richard Stephenson	Publicity Coordinator
Graham Gagnon	Local Arrangement Coordinator
Jonathan MacDonald	Registration Coordinator
Bruce Higgins	History Liaison
Kevin Bezanson	History Coordinator
Amie Therrien	Student Program Coordinator
Katelyn Freçon	Young Professionals Program Coordinator
Sherry Sparks	Student Participation Coordinator
Brittany McCallum	Volunteer Coordinator

TECHNICAL COMMITTEE

General Conference

National/Local Chair – Jane Thorburn

Environmental Specialty Conference

National Co-chair – Gopal Achari

Local Co-chair – Mike Chaulk

Structural Specialty Conference

National Co-chair – Khaled Sennah

Local Co-chair – Eileen McEwen

Transportation Specialty Conference

National Co-chair – Ming Zhong

Local Co-chair – Christopher Davis

GENERAL INFORMATION

The registration and information desk is in the Annapolis Room on the Ground Floor and will be open at the following times:

<i>Wednesday, May 28th</i>	<i>12:00PM – 8:00PM</i>
<i>Thursday, May 29th</i>	<i>7:30AM – 6:00PM</i>
<i>Friday, May 30th</i>	<i>7:30AM – 6:00PM</i>
<i>Saturday, May 31st</i>	<i>7:30AM – 12:00PM</i>

Registration badges **MUST** be worn for admission to all conference activities. Tickets will also be available for purchase for specific functions and activities.

Refreshment breaks will be served in the Second Floor Foyer or Nova Scotia Ballroom. Breakfasts, lunches, and the awards gala will be held in the Nova Scotia Ballroom on the Second Floor. Please consult the conference schedule for times.

Speaker Preparation

A space is reserved next to Registration in the Annapolis Room to allow the speakers to finalize and view their Power Point presentations.

Volunteers will assist authors in downloading their presentations in each of the conference rooms. Speakers must be in their presentation rooms 20 minutes in advance, to verify or upload their presentations.



Social Media

Connect with us and with each other online. Share your favourite conference moments, ask questions, and let's start a conversation! **Use the hashtag #csce2014.**

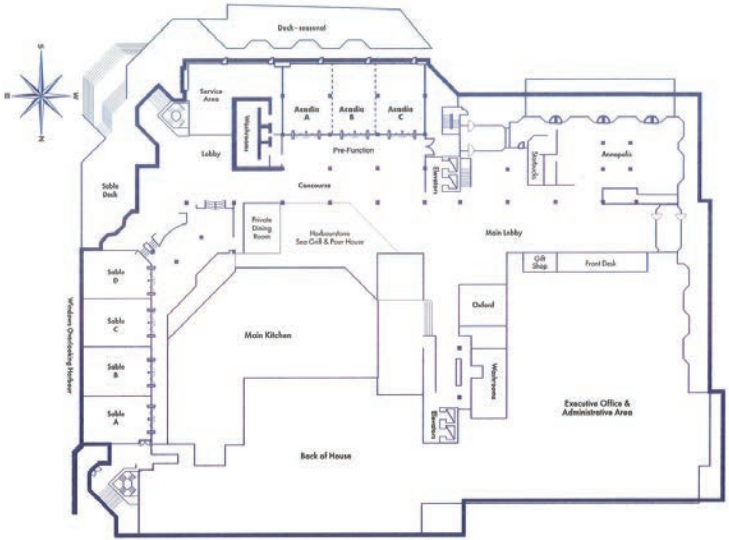
 [csceyp and csce.ca](#)

 [@csce2](#)

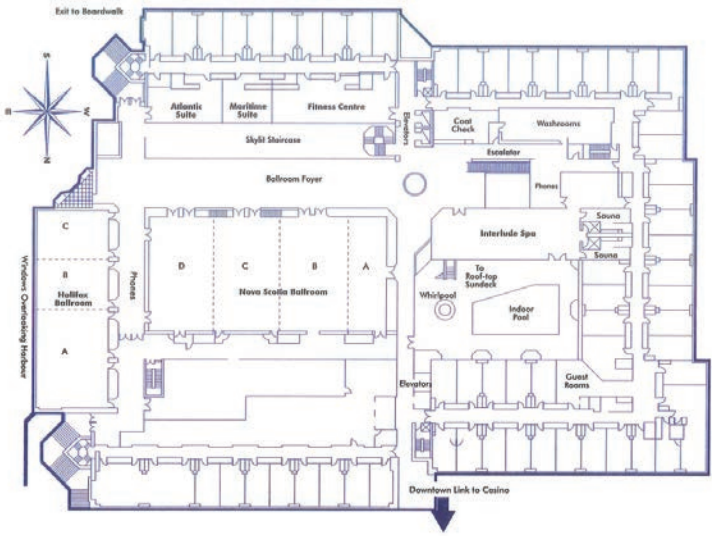
 [CSCE The Canadian Society for Civil Engineering](#)

ROOM LOCATIONS

GROUND FLOOR



SECOND FLOOR



TRADE SHOW EXHIBITS

Second Floor Foyer

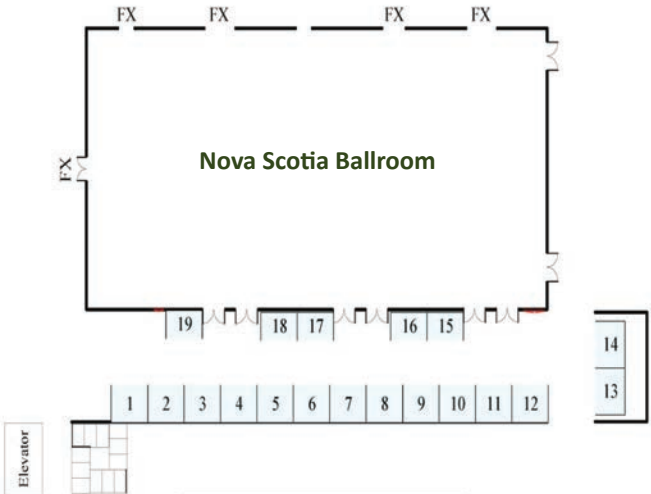
Thursday, May 29

7:00AM – 5:00PM

Friday, May 30

7:00AM – 2:00PM

Come and meet our sponsors and exhibitors during two full days as well as at the welcome reception. Take a tour of the booths, discuss with the exhibitors, and get to know their products, know-how, and services.



List of Exhibitors

1 V-ROD	9 Servant Dunbrack MacKenzie & MacDonald
2 SNC Lavalin	10 T2 Utility Engineers
3 S-Frame Software	13 Regina 2015
4 AECOM	14 CSCE National Office & YP Committee
5 Fibrwrap Construction Services	16 Simpson Strong-Tie Canada Ltd.
6 Hatch Mott MacDonald	17 Canadian Institute of Steel Construction
7 Lafarge Canada Inc.	18 MSi3D
8 EnviroSystems Inc.	19 Reinforced Earth

HISTORIC SITES

Dedication Ceremony – Friday, May 30th

Those who wish to be present at the unveiling of the commemorative plaques must sign up at the Registration Desk and take pre-approved transportation to and from site on Friday, May 30. More information will be available at the Registration Desk.

Robie Street Reservoir



The 48 m diameter x 7.5 m deep concrete reservoir was originally built in 1913. It was one of the few structures in the area to survive the Halifax explosion in 1917, less than 1 km away. Deterioration to the walls and roof required extensive

rehabilitation in 1946. The method chosen was to use gunite construction with a prestressed concrete ring beam to replace the roof, together with extensive repairs on the walls. The prestressed dome replacement was the largest of its kind in the world. The creative design-build engineering solution was one of the earliest uses of prestressed concrete in Canada and used specialized construction techniques and materials. The reservoir was designated a landmark by the American Water Works Association in 1983.

The second roof replacement in 1999 required delicate concrete demolition using controlled blasting. The aluminum geodesic dome used for the lightweight roof was the largest dome replacement project in Canada.

The reservoir remains in full service today, due to successive innovative engineering repairs.

Halifax Graving Dock



The graving dock was opened in 1889. It was then the largest dry dock on the eastern seaboard and could accommodate the largest vessels of the day. It is 173 m long x 24 m wide x 9 m high. The graving dock was built completely in the dry, using an earthen

cofferdam which extended into the harbour. The graving dock floor employs granite keel blocks founded on bedrock. The lower sections of the walls are in rock excavation, while the upper portion is a concrete retaining structure up to 1 m thick.

While buildings in the shipyard were completely destroyed during the Halifax explosion in 1917, the dock survived. While the graving dock has been upgraded and repaired, the basic construction of the dock and the dewatering and filling culverts is largely unchanged. The graving dock remains in active service today and continues to play a key role in the Canadian shipbuilding industry.

Angus L. Macdonald Bridge



The Angus L. Macdonald Bridge is a suspension bridge crossing Halifax Harbour which was completed in 1955. The structure has come to be an iconic symbol of the Halifax-Dartmouth area. The bridge was designed by Philip Pratley, who had also been responsible for the Lions Gate Bridge in Vancouver. The bridges have a similar design, which is most notable in

the towers. The total length of the Angus L. Macdonald Bridge is 1.3 km, including a 441 m main span which is 47 m above the harbour. At the time of its construction, it was the second longest suspension bridge in Canada.

The bridge was originally constructed with two vehicle lanes and two sidewalks. The superstructure was converted to a three lane structure with a pedestrian walkway and bicycle lane in 1999; it features a reversible centre lane that optimizes the bridge's traffic capacity. The bridge carries nearly 50,000 vehicles per weekday across Halifax Harbour. Plans are presently underway for a complete replacement of the bridge deck system.

STUDENTS AND YOUNG PROFESSIONALS PROGRAM

Professional Development Opportunities (Open to All)

This year we bring you three discussion panels on topics of interest to the Young Professional demographic. Audience participation is encouraged, so please come prepared with your questions for these specialists.

“Career Planning” - Wed, May 28

9:00 am to 10:30 am - Halifax “C”

This panel is comprised of representatives of both public and private sectors, as well as both large and small corporations. The focus is on such items as how to improve a student or young professional’s likelihood of getting a job in each sector, what to consider when choosing which sector to work in, and how to make the most of one’s years as a Young Professional.

“Designing for Sustainability” - Thurs, May 29

2:00 pm to 3:30 pm - Halifax “C”

This panel will discuss what our role as Civil Engineers should be in designing for durability, while considering our environmental responsibility to the public and our fiscal responsibility to the client.

“Bridging the Gap” - Fri, May 30

9:00 am to 10:30 am - Halifax “C”

This panel will address the growing division between the retiring generation and the younger generation. It will address both direct and indirect implications on students, young professionals, and society.

STUDENT PROGRAM

Capstone Competition - Friday, May 30

9:00 am to 5:00 pm - Atlantic Suite

Teams from engineering programs across Canada present their final year project and are evaluated based on their report as well as a short poster presentation. The presentations happen behind closed doors in the morning but the posters will be available for all to view in the afternoon.

Student Awards Luncheon - Friday, May 30

12:00 pm to 1:50 pm - Nova Scotia Ballroom

Awards for student competitions held throughout the year and at the conference will be presented during the conference lunch. All conference delegates are encouraged to attend.

Student Leaders Workshop - Friday, May 30

2:00 pm to 3:30 pm - Halifax 'C'

This session is for incoming CSCE student chapter executives to share their challenges and successes in running a dynamic student chapter. Others interested in getting involved as a chapter exec are welcome to attend.

Best Student Paper Competition

Throughout the conference

This is an annual competition that recognizes the best student papers presented at the conference. Make sure to check the technical program and watch some of these student presentations.

SOCIAL AND NETWORKING OPPORTUNITIES

There will also be social events each day of the conference. Events are listed below, but please consult the Young Professionals hand-out for more details including times, locations, and any cost associated with the events. We hope to see you there!

WEDNESDAY, MAY 28

President's Reception 6:00pm to 7:00pm

Amazing Race: Halifax 8:30pm to 9:30pm Hotel Lobby

Pub Night 9:30pm The Split Crow

THURSDAY, MAY 29

Supper 5:00 pm Salty's Lower Bar & Grill (RSVP Required)

Halifax Ghost Walk 7:30pm Cost: \$10 cash

Pub Night 9:30pm The Old Triangle Irish Alehouse

FRIDAY, MAY 30

Supper 5:00pm Your Father's Moustache (RSVP Required)

Alexander Keith's Brewery Tour 7:00pm Cost: \$40.19 (tax inc)

Pub Night 10:30pm Lower Deck Bar & Grill

SATURDAY, MAY 31

Supper 7:00pm The Wooden Monkey (RSVP Required)

TECHNICAL VISITS

Thursday, May 29th

3:30PM – 5:00PM

We have 2 exciting technical tours planned for you! The tours run concurrently, so please choose which you would like to attend and sign up at the Registration Desk. Space is limited, so be sure to sign up early on. Buses will leave for the sites from the hotel lobby.

Halifax Water Treatment



Construction of the Halifax Wastewater Treatment facility was completed in December, 2008 as part of the \$330 million Halifax Harbour Solutions project. The facility serves a population base of 200,000 and is the wastewater flag ship owned and operated by

Halifax Water. The plant has the capability of treating up to 340,000 m³/day with an average daily output of 134,000 m³/day. The plant has a storied history after experiencing a flood of its wet well in January, 2009 after which Halifax Water played the leadership role in its recovery. The tour will highlight the unique construction aspects of the facility [the wet well extends 25 m below grade] as well as the remedial action taken to restore the facility after the flood event.

Macdonald Bridge



Participants in the technical tour of the Macdonald Bridge will get a first-hand look at how Halifax Harbour Bridges' fulfills its mission.

Beginning in mid-2015, the suspended structure of the Macdonald Bridge will be replaced while keeping the bridge open to traffic. Participants will learn about the redecking project and about other capital projects fundamental to the integrity of Halifax's bridges.

Participants will also learn about the purpose of anchorages for suspension bridges, the make-up of the cables and about the plan to wrap and dehumidify them.

State-of-the-art command and control centres exist at both the Macdonald and MacKay bridges. Participants will tour the Macdonald Bridge command and control centre to learn about technology vital to the operation of the bridges.

SOCIAL PROGRAM AND COMPANION TOUR

Companion Tour

We are happy to offer a Companion Tour for the Halifax 2014 Conference. We have put together 3 exciting days of local touring for your enjoyment including a tour of Halifax and the surrounding area and an English style tea.

The visits are as follows:

High Tea at The Arms – May 28th

Visit to Peggy's Cove – May 29th

Explore Halifax – May 30th

Event specific information available at www.csce2014.ca.

Social Evening



The social event this year will be at the Pier 21 Immigration Museum, one of Canada's 7 Wonders. Join us for a pre-dinner cocktail and an all you can eat Halifax style lobster dinner in the famous Heritage room. This promises to be an unforgettable evening and a highlight of your conference experience.

Buses will be available at the Hotel Lobby area between 6:00pm and 6:30pm to take you to and back from the event. Dress is casual.

Buses will leave Pier 21 to bring attendees back to the hotel between 10:00pm and 11:00pm.



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SPONSORS

Technical Tours



Awards Evening



Welcome Reception



Breakfast



Lunch



Social Evening



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