



# ***Vancouver Geotechnical Society***

*A Local Section of the Canadian Geotechnical Society*

[www.v-g-s.ca](http://www.v-g-s.ca)

## ***26<sup>th</sup> Vancouver Geotechnical Society Symposium***

# **Site Characterization**

Friday, May 31, 2019 – Pinnacle Hotel Harbourfront  
1133 West Hastings Street, Vancouver, B.C.



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## Papers and Presentations

**The Use of Cone Penetration Testing for Integrated Site Characterization;**  
*Keynote Presentation by Dr. Jason DeJong, University of California, Davis, CA*

**The Investigation for, and Design of, Working Platforms;**  
*Brian Wilson, Keller Foundations Limited*

**Site Characterization for Cutter Soil Mixing of a Vertical Barrier Wall;**  
*Ben Holzman, Keith MacKay, David Siddle, Roberto Olivera, Golder Associates*

**Detailed Site Characterizations of Karst Terrain Focusing on Sinkholes and Geohazard Risk – A Case History from the United Arab Emirates;**  
*Mike McCormick, Parkland Geo-Environmental Ltd.; Mahmoud Mahmoud, GES Geotech Inc.*

**Applications of Mixed and Virtual Reality Techniques in Site Characterization;**  
*I. Emre Onsel, Omar Chang, Jesse Mysiorek, Davide Donati, Doug Stead, Simon Fraser University; Wayne Barnett, Luca Zorzi, SRK Consulting*

**Augmented Reality and Applied Earth Science: a new tool for Site Characterization;**  
*Ivy Li, Matt Lato, Gerald Magnusson, Joan Roca, Elliot Reid, BGC Engineering Inc.*

**Site investigation methodology for the Interior Plateau of BC to characterize thin clay layers within glacial deposits;** *Chris Kowalchuk, Prabeen Joshi, Jason Braund-Read, Darryl Pongracz, Klohn Crippen Berger*

**Clinton Creek Site Investigation;**  
*Karen Hincks, Wood*

**Application of GB-InSAR on Civil Projects in British Columbia;**  
*Adam Woods, University of Alberta and Kontur Geotechnical Consultants Inc.  
 Michael Hendry, Renato Macciotta, University of Alberta*

### Panel Discussion

*Featuring panelists Jason DeJong, Karen Hincks, Chris Kowalchuk, Roberto Olivera, Brian Wilson  
 Moderated by John Howie*

## Site Characterization – Preface

Shane Magnusson, Symposium Co-Chair  
Olga Kosarewicz, Symposium Co-Chair

On behalf of the Vancouver Geotechnical Society (VGS) and members of the Symposium organizing committee, we would like to thank the authors and keynote speaker for the dedication of their time and labours towards this event. Without the voluntary commitment of individuals, the sharing of experience and knowledge at events like this would not be possible. We are also grateful for the generous financial support of our sponsors, and the exhibitors who help make this event a success. Most importantly, we are very grateful for the ongoing participation of the community of geotechnical practitioners, who through their collective participation help make the Vancouver Geotechnical Society, and its Symposium, possible.

The organization of the 2019 VGS Symposium relied on the dedication of many who volunteered their time to assist with the planning and execution of the Symposium. We would like to extend our thanks to Marc Bossé for his 6 years chairing the Symposium; building networks and laying the ground work for this year's Symposium. We would like to extend our thanks and gratitude to Yoshi Tanaka for his assistance with registration. The contribution of other volunteers during the event is also greatly appreciated.

## Symposium Program

07:30 - 08:40	<b>Registration</b>
08:40 - 08:50	<b>Opening Remarks</b>
08:50 - 09:20	The Investigation for, and Design of, Working Platforms; Brian Wilson
09:20 - 09:40	Site Characterization for Cutter Soil Mixing of a Vertical Barrier Wall; Ben Holzman, Keith MacKay
09:40 - 10:10	Detailed Site Characterizations of Karst Terrain Focusing on Sinkholes and Geohazard Risk – A Case History from the United Arab Emirates; Mike McCormick
10:10 - 10:45	<b>Coffee Break</b>
10:45 - 11:15	Applications of Mixed and Virtual Reality Techniques in Site Characterization; Emre Onsel
11:15 - 11:45	Augmented Reality and Applied Earth Science: a new tool for Site Characterization; Ivy Li
11:45 - 12:00	<b>VGS Award</b>
<b>12:00 - 13:00 Lunch</b>	
13:00 - 14:00	The Use of Cone Penetration Testing for Integrated Site Characterization; Keynote Presentation by Jason DeJong
14:00 - 14:30	Site investigation methodology for the Interior Plateau of BC to characterize thin clay layers within glacial deposits; Prabeen Joshi
14:30 - 15:00	<b>Coffee Break</b>
15:00 - 15:20	Clinton Creek Site Investigation; Karen Hincks
15:20 - 15:40	Application of GB-InSAR on Civil Projects in British Columbia; Adam Woods
15:40 - 16:40	<b>Panel Discussion</b>
16:40 - 16:45	<b>Closing Remarks</b>

## Keynote and Gold Sponsors

### Keynote Sponsor



ConeTec is a full-service geotechnical and geo-environmental contractor providing site investigation solutions across all industries; including infrastructure, mining, and various development sectors. We specialize in offering complete site characterization services such as geophysical testing, CPTu, in-situ testing, drilling and sampling and instrumentation installation.

ConeTec operates a large fleet of modern, purpose-built, innovative deployment equipment combined with specialized in-situ testing and sampling systems. All projects are performed by highly trained personnel and supported by experienced site investigation professionals, delivering safe, productive, high quality site investigation programs. ConeTec provides detailed final data reporting on every project, customized to our client's requirements.

**Safely** solving site investigation problems by generating **high quality** information, collected by **expert personnel**, using the **best equipment**. This is the ConeTec difference - Better Information, **Better Decisions**.

### Gold Sponsors



BGC is an international consulting firm providing engineering and geoscience services to the mining, energy, and transportation industries. With a team of over 400 staff operating out of North and South America, we offer a full range of global services and take pride in maintaining personal contact between our senior consultants and our clients.

BGC was founded in 1990 and has since established a unique culture that emphasizes leadership at all levels. Our culture attracts industry-leading professionals who are passionate about BGC's purpose and values.

BGC has built a strong reputation for technical excellence. We provide specialized engineering and geoscience services for all phases of projects, from conceptual, through to design, construction, operation, and closure. Our practice,

founded on an appreciation for the impacts of geology on projects and engineered structures, addresses a broad spectrum of engineering and environmental issues related to development and risk reduction in challenging terrain.

We work with private and public companies, government agencies, and as sub-consultants to prime contractors. BGC has successfully completed projects throughout the world. Our highly-qualified staff, unique company culture, and strong work ethic have helped us develop a reputation for innovative, yet common sense solutions, as well as timely, cost-effective delivery of services to our clients.

## Gold Sponsors



Tetra Tech was established in 1966 and is a full-service

engineering and science firm with substantial Canadian and global presence. With 18,000 staff in 412 offices across 120 countries on 7 continents, Tetra Tech's technical knowledge and hands-on site experience is broad and extensive. No matter how straightforward or complex the problem, we help our clients conceptualize, design, and execute innovative, cost-effective, and practical solutions for the entire project life-cycle.

With hundreds of geotechnical engineers, rock engineers, technicians, and drillers on our team, Tetra Tech is a leader in geotechnical engineering across North America. We use state-of-practice techniques and test procedures to investigate, analyze, and develop geotechnical engineering recommendations and designs for simple and complex soil, rock, and groundwater challenges.

In Vancouver, our team has a well-earned reputation for innovation and excellence related to our geotechnical engineering services, including site exploration, analysis, geohazard assessments, and design services for projects such as private building developments, industrial facilities, and municipal, provincial and federal infrastructure. Our rock engineers have worked on a variety of projects in shallow and deep, low and high stress rock environments, and are experienced in a variety of rock engineering problems such as underground tunnelling, rock slope remediation, and deep rock cut design.

Tetra Tech features extensive in-house support, including a full suite of geophysical equipment, comprehensive geotechnical laboratories (located in Richmond, Nanaimo, Kelowna, Calgary, and Edmonton), and advanced computer software for complex engineering analyses.



Thurber Engineering Ltd. is a private Canadian company wholly-owned by the senior practicing professionals. Thurber was established in 1957 in Victoria, BC and presently has a staff of about 320, operating out of nine permanent offices in British Columbia, Alberta and Ontario. The company has a wide base of professional experience in geotechnical, geological, environmental sciences, hydrogeological, pavement engineering, concrete and asphalt technologies, forensic investigations, as well as construction materials monitoring, inspection and testing.

The company has a strong base of operations in British Columbia, with offices in Victoria, Vancouver, and Kamloops. The Vancouver operations of the company presently have a total staff of about 40 and serve a variety of clients, including government agencies, municipalities, airports, commercial businesses, mining and industrial clients.

Thurber's team of professionals and technical staff are well supported by laboratory facilities, specialized field-testing equipment, and state-of-the-art computer analysis techniques. Our mission includes a strong desire to help our clients meet their objectives by providing high-quality professional services within our areas of technical expertise. Our staff members are led by a core group of senior professionals who have many years of practical experience in a variety of technical specialities. Our project teams are structured so that principals and senior specialists assigned to a project maintain a significant involvement at every level and stage of the project. This ensures high technical quality, consistency and supports our Client's best interests with respect to the limitation of liability and overall project compliance. Additionally, our BC offices are OQM certified with APEGBC.

Additional information about our company can be obtained from our website at [www.thurber.ca](http://www.thurber.ca).

Silver / Bronze Sponsors

Silver Sponsor



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## Past VGS Symposia

<b>Year</b>	<b>Theme</b>
1986	Transportation Geotechnique
1987	Earthquake Engineering
1988	Risk and Liability in Geotechnical Engineering
1989	Geotechnical Aspects of Tailings Disposal and Acid Mine Drainage
1990	Geotechnical Aspects of Contaminated Sites
1991	Geosynthetics: Design and Performance
1992	No Symposium (1 <sup>st</sup> Canadian Symposium on Geotechnique and Natural Hazards)
1993	Ground Improvement
1994	Deep Foundations
1995	Construction on Peat and Soft Soils
1996	Earth Retention Systems
1997	Forestry Geotechnique
1998	Site Characterization
1999	Slope Stability and Landslides
2000	Lifeline Geotechnical Engineering
2001	Land Reclamation Geotechnique
2002	Foundation Engineering
2003	Geotechnical Engineering for Geoenvironmental Application
2004	No Symposium (13 <sup>th</sup> World Conf. On Landslide Risk Management)
2005	No Symposium (Int'l Conf. On Landslide Risk Management)
2006	No Symposium (CGS/IAH Conference)
2007	No Symposium (1 <sup>st</sup> US-Canada Rock Mechanics Symposium)
2008	Risk and Liability in Geotechnical Engineering
2009	No Symposium
2010	Geosynthetic Reinforced Walls, Slopes and Earthworks
2011	No Symposium
2012	Soft Ground Engineering
2013	Foundation and Lifeline Engineering
2014	Foreshore Engineering
2015	Soil Structure Interaction
2016	No Symposium (CGS Conference)
2017	Engineered and Natural Slopes
2018	Ground Improvement
2019	Site Characterization