



# CGS Deep Foundation Workshop

Feb. 13, 2020 - Pearson Convention Centre

2638 Steeles Ave E.  
Brampton, ON

## AGENDA

<b>7:00 - 8:00 am</b>	<b>Breakfast</b>
<b>8:00 - 9:00 am</b>	<p><b>Presentation 1 : Dan Brown</b> <i>Drilled Foundation Construction in the 21st Century (The Art &amp; Science of Hole Digging)</i></p> <p>This presentation will describe modern techniques for construction of both drilled shafts and continuous flight auger piles, with an emphasis on a fundamental understanding of stability through the process of excavation and concrete placement. The discussion will also describe some factors affecting the influence of construction techniques on the axial resistance of the completed drilled foundation.</p>
<b>9:00 - 9:15 am</b>	<b>Break</b>
<b>9:15 - 10:30 am</b>	<p><b>Presentation 2 : Dan Brown</b> <i>Management of Risks in Foundation Construction and Design for Transportation Infrastructure Projects</i></p> <p>This presentation will discuss some of the risk components that must be considered in the planning, design, and construction of foundations for complex transportation infrastructure projects, including an overview of several case histories. It is important that these risks be recognized and mitigated to the extent possible by all parties who have a stake in the success of the project, and that all parties work cooperatively to minimize impacts of unexpected difficulties during construction.</p>
<b>10:30 - 10:45 am</b>	<b>Break</b>
<b>10:45 - 11:30 am</b>	<p><b>Case Study/Local Expert: Panos Andonyadis (Geosyntec Consultants)</b> <i>The Port Lands Flood Protection and Enabling Infrastructure Project (PLFP)</i></p> <p>The PLFP includes the construction of an over 1 km long naturalized river valley that extends from the mouth of the Don River through a formal industrial area as part of a comprehensive plan to protect the city's downtown from flooding during a regulatory storm event and facilitate redevelopment of historically industrial area with new parklands</p> <p><b>Q &amp; A</b></p>
<b>11:30 - 12:30 pm</b>	<b>Lunch</b>
<b>12:30 - 1:30 pm</b>	<p><b>Presentation 3: Dan Brown</b> <i>A Foundation Engineering Trip Down the Mississippi</i></p> <p>This presentation will describe the foundation engineering works for some of the recent crossings with an occasional glance back at the work of our predecessors.</p>
<b>1:30 - 2:30 pm</b>	<p><b>Case Study/Local Expert: Billy Singh (Terraprobe Inc.)</b> <i>Transit City East Block</i></p> <p><b>Jason Crowder &amp; Mike Porco (Grounded Engineering)</b></p> <p>Transit City East Block is the second development phase at Vaughan Metropolitan Centre by Centrecourt &amp; SmartCentres, consisting of three 35 to 50-storey towers collectively sitting on top of a 3-level below-grade parkade. The presentation will focus on the geotechnical and geostructural engineering for the project. Billy Singh of Terraprobe will provide an introduction to the project as well as an overview of the geotechnical conditions. Mike Porco and Jason Crowder of Grounded Engineering will then discuss the Diaphragm Wall design implemented to act the building's temporary shoring system as well as permanent perimeter foundation wall as well as the Osterberg Cell load test conducted on the site to optimize the building's caisson foundations.</p> <p><b>Q &amp; A</b></p>
<b>2:30 - 2:45 pm</b>	<b>Break</b>
<b>2:45 - 3:30 pm</b>	<p><b>Case Study/Local Expert: Charlie Huynh (Keller Foundations)</b> <i>Installation of Drilled Shafts using Polymer Slurry</i></p> <p>The presentation will provide an overview of the polymer slurry drilling process, technical considerations and case histories. Slurry properties and appropriate methods for testing the slurry to ensure quality control is maintained will also be discussed.</p> <p><b>Q &amp; A</b></p>
<b>3:30 - 3:55 pm</b>	<p><b>Case Study/Local Expert: Dave Wiley (GFL Infrastructure Group Inc.)</b> <i>Constructability Challenges for Secant Walls and Deep Caissons</i></p> <p>The presentation will touch on some of the main issues to be addressed to ensure a quality drilled hole and some of the ways these items can be monitored onsite.</p>
<b>3:55 - 4:30 pm</b>	<b>Panel Discussion and Q &amp; A</b>



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## Feature Presentations

### ***Drilled Foundation Construction in the 21st Century (The Art & Science of Hole Digging)***

Since the pioneering work of Dr. Lymon Reese in the early 1970's, the equipment and techniques used to construct drilled shafts and other types of drilled foundations have made substantial advancements and opened new opportunities for engineers to employ these types of foundations. Machines for construction of drilled foundations provide capabilities to extend these foundations to depths and diameters never before considered. It is critical to understand construction techniques and soil behavior during construction in order to facilitate continued advancements in construction and to effectively and reliably design and employ drilled foundations. This presentation will describe modern techniques for construction of both drilled shafts and continuous flight auger piles, with an emphasis on a fundamental understanding of stability through the process of excavation and concrete placement. The discussion will also describe some factors affecting the influence of construction techniques on the axial resistance of the completed drilled foundation.

### ***Management of Risks in Foundation Construction and Design for Transportation Infrastructure Projects***

**Abstract:** Transportation infrastructure projects inherently include substantial risks associated with foundation construction and performance. Factors which can affect construction operations include uncertainties associated with ground conditions, nearby structures, quality assurance, overly prescriptive construction specifications or design requirements, and the required sequence of construction operations. These factors can have an enormous impact on schedule and costs, and may even result in costly litigation. Such impacts can threaten the execution of successful projects and undermine the public's confidence in our ability to get things done. This presentation will discuss some of these risk components that must be considered in the planning, design, and construction of foundations for complex transportation infrastructure projects, including an overview of several case histories. It is important that these risks be recognized and mitigated to the extent possible by all parties who have a stake in the success of the project, and that all parties work cooperatively to minimize impacts of unexpected difficulties during construction. Both design-build and conventional bid-build projects are improved when the contractual allocation of foundation construction risks is well defined and equitably distributed.

### ***A Foundation Engineering Trip Down the Mississippi***

Huckleberry Finn had his adventure, but this float trip down the Mississippi will be an adventure in foundation engineering regarding the many bridges spanning America's waterway from Minnesota to Louisiana. From the earliest major crossing built by James Eads in 1874 to the new Stan Musial Veterans Memorial Bridge nearby, foundation engineers have struggled for 150 years with the challenges of crossing America's waterway. This article will describe the foundation engineering works for some of the recent crossings with an occasional glance back at the work of our predecessors.

## Speaker Bio

Dr. Dan Brown is recognized as one of America's leading authorities on the construction and design of deep foundations. After completing his education and his early engineering career in Louisiana, he spent 22 years on the faculty at Auburn University, where he taught and conducted research on deep foundations. Dr. Brown remains active in deep foundation practice through his consulting firm, Dan Brown and Associates. His consulting work includes the foundation design of numerous large bridge projects as well as commercial structures. He remains active in teaching through short courses, including the National Highway Institute course on Drilled Shafts, and in organizing the ADSC Professor Training Workshops in Chattanooga, TN.

Dr. Brown has authored numerous technical papers and was lead author of the just released 2018 FHWA manual on design and construction of drilled shafts. He has been recognized with the Golden Beaver Award from the Beavers, the ASCE Huber Prize for research, the ASCE Martin Kapp Foundation Engineering Award, the Deep Foundations Institute Distinguished Service Award and the ADSC Outstanding Service Award. He is current Past-President of the Deep Foundations Institute, a member of the Moles, honorary member of the Beavers, past chair of the Geo-Institute Deep Foundations Committee, and an honorary technical affiliate of both the ADSC: The International Association of Foundation Drilling and the Pile Driving Contractors Association.

Dan and his wife Barbara entertain their grandchildren and occasional wayward motorcyclists at their home in the Tennessee Mountains near Chattanooga.



**Dr. Dan Brown P. Eng.**



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## Local Experts



**Panos Andonyadis**  
(Geosyntec Consultants)

Mr. Andonyadis is a Senior Geotechnical Engineer based in Chicago, Illinois, with more than nine years of experience in geotechnical and geotechnical engineering, design, analysis and construction of large scale civil engineering projects. Panos' technical expertise developed through his career as he has worked on wide variety of projects for public and private clients including heavy-civil contractors, utilities, and Departments of Transportation. His projects have included designing deep foundations, micropile foundations, landslide stabilization, dam remediation, support of excavations, retaining walls, coal combustion residual landfills, deep soil mixing, ground improvement, and marine bulkheads. Panos' recent projects include the design of a nearly one mile long deep soil mix retaining wall structure for a public energy utility. On another project, he led the qualitative evaluation of 20,000 ft of bulkhead along a canal as part sediment remediation project. He also designed and reviewed temporary bulkhead support systems proposed for the project.



**Billy Singh**  
(Terraprobe Inc.)

Billy Singh, M.A.Sc., P. Eng. is President of Terraprobe Inc. and a registered Professional Engineer in Ontario. Billy has over 25 years of engineering experience in the field of geotechnical engineering and construction inspection & testing. Billy completed his Master of Applied Science (M.A.Sc.) at University of Waterloo in 1996. During his professional career, Billy has worked on a variety of projects in Canada and abroad, and has been involved as an expert in policy/guideline development and interpretation, and provides guest lectures at local universities. Billy has served as a Chair of the Canadian Geotechnical Society (SOS); and currently is a Regional Director and serves on the National Executive Committee of the Canadian Geotechnical Society.



**Jason Crowder & Mike Porco**  
(Grounded Engineering)

Jason Crowder, Ph.D., PEng., has over 14 years of experience as a Geotechnical Engineer. Jason is one of the Founding Principals of Grounded Engineering. At Grounded, Jason is responsible for the management of the firm's Geotechnical and Hydrogeological projects. Jason received his Bachelor of Science in Geological Engineering at Queen's (1997) and completed a Ph.D at the University of Toronto (2004). Jason taught geotechnical engineering at U of T. Jason is a registered Professional Engineer in the Province of Ontario and is on the organizing committee for the 74th Canadian Geotechnical Conference in Niagara Falls (2021).

Mike Porco, PEng, has 10 years of experience as a Geotechnical Engineer. Mike is one of the Founding Principals of Grounded Engineering. At Grounded, Mike is responsible for the management of the firm's Geotechnical Engineering group. Mike received his Bachelor of Applied Science in Civil Engineering at the University of Toronto (2010). Mike actively provides technical presentations at various universities in Southern Ontario. Mike is a registered Professional Engineer in the Provinces of Ontario, Alberta, and British Columbia and is on the executive committee of the Association of Drilled Shaft Contractors, Eastern Canada Chapter.



**Charlie Huynh**  
(Keller Foundations)

Charlie joined Case Foundation, previously a Keller Company, in June of 2002 as a project engineer. Over the years, he has worked on various projects as an estimator and project manager. Typical early projects included the installation of drilled shafts for Pennsneck Bridge, Bass River Bridge, and Mullica River Bridge Projects. More recently, Charlie estimated and managed the Vogtle Power Plant Deep Foundation Project (Cooling tower drilled shafts for two new nuclear reactors for Southern Power in Waynesboro Georgia) and the Tappan Zee Bridge Piers 41-43, East Abutment drilled shaft foundations for the New York State Thruway Authority in White Plains NY.

Charlie worked for Sunoco from 1998-2002.

Charlie graduated from Lehigh University with a bachelor of science in Civil Engineering and from Temple University with a masters in Business Administration.



**Dave Wiley**  
(GFL Infrastructure Group Inc.)

Dave is the Chief Estimator of the Shoring and Foundations Group of GFL Infrastructure. He has over 13 years of experience in deep foundations, shoring and piling. Dave manages the estimating and sales for shoring and deep foundation systems for GFL across Canada. He graduated from the University of Toronto with Bachelor's of Applied Science in Civil Engineering, and completed the Executive Management Certificate program at the Smith School of Business at Queen's University. He is a professional engineer in Canada.

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