HERITAGE

Valérie Fréchette and Heinrich Heinz, Heritage Editors

Valérie Fréchette

*This interview of **Peter Robertson** for the Canadian Legends Series was conducted by **Xiaoyan Ou**, **Maggie Cramb**, and **Lijun Deng** (introduced at the end of the article). The interview took place in January 2022. The Canadian Legend Series profiles distinguished Canadian geotechnical professionals and highlights the wisdom gained from their lives and their professional careers. You can find profiles of nine other "Canadian Legends" in the CGS Virtual Archives at www.cgs.ca/virtual_archives_legends.php.*

Heinrich Heinz

INTERVIEW WITH CANADIAN LEGEND PETER K. ROBERTSON

Xiaoyan Ou, Maggie Cramb, and Lijun Deng

Peter K. Robertson is a Professor Emeritus of Civil & Environmental Engineering, University of Alberta. With over 40 years of experience as an educator, researcher, consultant and practitioner, he is recognized as an expert both nationally and internationally in the areas of in situ testing and soil liquefaction. From 1993 to 1997, Peter was the Principal Investigator of the Canadian Liquefaction Experiment (CANLEX), the largest geotechnical collaborative research project in Canada. He is a co-author of *Cone Penetration Testing in Geotechnical Practice* (1997 CRC Press), a primary reference book on this subject. A long-time Canadian Geotechnical Society member, he has served as local section chair for both Vancouver and Edmonton and chair of the Soil Mechanics and Foundations Division. Among other awards, Peter has been the recipient of ASCE's H. Bolton Seed Medal, CGS's R.M. Quigley Award, and the Stan Thompson Service Award of the Geotechnical Society of Edmonton. He is currently a geotechnical consultant (PK Robertson Inc.) and a Technical Advisor (Gregg Drilling & Testing Inc.), based in California.

Peter K. Robertson

Xiaoyan Ou and Maggie Cramb for CLS: How did you first get interested in geotechnical engineering?

Peter K. Robertson: I was born in England to working class parents who were smart, hardworking people but who never had the opportunity for advanced education. At the age of 10, I learned to swim and joined the local swim team and ultimately swam for Great Britain. Swimming gave me discipline and focus which led me to do much better in high school, and I was able to transfer to another school that allowed me to take exams to go to university.

Peter in his swimming days

First, I toyed with the idea of being an airline pilot. Talking with pilots, I was advised that getting a degree, particularly an engineering degree, would be useful and something to fall back on. I attended Nottingham University and selected civil engineering since it was a broad-based area of engineering. I did learn to fly, but soon realized that I enjoyed looking down at landforms more so than flying the airplane. I found landforms fascinating and this was my first inkling that I was interested in geology.

When I graduated in 1972, I got a job with a major civil engineering company in London, UK, and was put into their bridge design department. I quickly realized that I did not

like structural engineering. In that company I noticed a small group of people who were constantly leaving the office and disappearing for a few days at a time. This was my initial exposure to geotechnical engineers. Talking with these engineers, I learned about geotechnical site investigation which really sparked my interest. This is when I started to think that geotechnical engineering would be much more interesting for me.

CLS: Who were the major "influencers" on your career? Any mentors you would like to mention?

PKR: During my time at the University of British Columbia, completing both my master's and PhD degrees, there were excellent professors; **Liam Finn**, **Dick Campanella**, **Peter Bryne**, and **Yogi Vaid**. While finishing my PhD, there was a major change in my life. Unfortunately, my wife passed away when our daughter was only two-years old. I didn't think I could go back into industry as a single parent since the travel demands would be too difficult. My supervisor and mentor, **Dick Campanella**, suggested staying in academia, a career I had never thought about. He introduced me to an NSERC fellowship that funded recent PhD graduates for four years to eventually slot them into an academic position. I took this opportunity. By the third year of my fellowship, it was clear that there was no available academic position at UBC. Fortunately, the fellowship stated that I could spend up to a year at another institute. **Michele (Mike) Jamiolkowski** (Technical University of Torino) asked if I would be interested in spending a year in Italy. This was perfect timing.

Mike was a major influence in my life. I spent a year and a half working closely with him. Besides being a professor, he had his own geotechnical consulting company, a major company in Italy at the time. Through Mike, I got to visit other institutions in Europe, meet a lot of prominent and interesting people, as well as work on large geotechnical projects. When that period was ending, I was looking for a position back in North America and fortuitously Nordie Morgenstern mentioned a vacancy at the University of Alberta. After my first visit to UofA for an interview, they offered me a position. Nordie was the next big influence in my professional life. I stayed at UofA for 17 years and learned a great deal working with him, other professors in UofA's Geotechnical Group, plus many excellent graduate students.

Alex Sy, Peter Robertson, Nordie Morgenstern, Fred Matich and Bryan Watts, 2019

CLS: Throughout your career, which project have you found most challenging?

PKR: If I reflect, the most challenging was the recent project where I was asked to chair the expert panel for the Feijao tailings dam failure investigation in Brazil. These forensic investigations are always challenging. Because we had high quality video, we could see it was a liquefaction failure and the main issue was to determine what triggered the failure on that particular day. That was both challenging and rewarding.

CLS: Have you ever had a moment of professional failure in your career and how did you handle it?

PKR: Luckily, I don't think I've had any professional failures although, as I mentioned previously, I have had personal challenges. I've been very fortunate throughout my career. Some may say that I am very lucky. However, luck is when you are presented with opportunities, and you choose to take them.

CLS: What advice would you give young professionals about overcoming challenges/failures in their careers?

PKR: Occasionally people have asked me for recommendations for good books on leadership or advice on how to live your life. A good one is Stephen Covey's best-selling *Seven Habits of Highly Effective People* (1989, Free Press). One thing he says is "it is not what happens to you in life that defines you, it is how you choose to react." If you are faced with challenges or failures, react in a positive way rather than feel defeated and dejected. Pick yourself up and know that those experiences are to learn from, and continue with your goals and aspirations.

CLS: As someone who has worked in both industry and academia, how do you see the ideal relationship between both?

PKR: I was somewhat unusual as an academic because I had worked in industry before academia. Sadly, that is rare. Ideally most academics should get some industrial experience before becoming an academic. This way, they can relate theory to industry practice. When I was in academia, I was the lead on the Canadian Liquefaction Experiment, which was collaborative research between industry and several groups in academia. I think my time in both industry and academia helped me better lead something that was collaborative, because I understood both groups. Increasingly, research in university is collaborative in nature and often includes both industry and academia, as well as being multidisciplinary. So again, if academics have some industry experience, it can help enormously in both teaching and research.

CLS: As a world recognized expert in site investigations, what do you see as deficiencies in the current site investigation practices?

PKR: I've been in the industry long enough to see big changes. When I was a young engineer, site investigations were pretty basic. They were often composed of simple drilling with standard penetration tests (SPTs) and badly disturbed samples. We have come a long way. The cone penetration test (CPT) is now a major in-situ test and is used extensively. For instance, it has become the standard in-situ test for investigating mine tailings. It is common that CPTs includes the measurement of pore pressure, and we increasingly see the addition of seismic measurements. This has been a significant advancement.

A younger Peter "on the job". (Note lack of safety equipment in 1982)

I still see some deficiencies, particularly in North America and elsewhere, where engineers remain stuck in the past by doing SPTs and taking badly disturbed samples, then trying to do advanced engineering design based on poor quality data. It continues to be disappointing that some engineers are not using CPTs because they don't think they can push the cone into some soil conditions. CPTs can be pushed into much harder ground than many engineers realize. With the right equipment, they can be pushed into ground with an equivalent SPT count of 100 or more. Since SPTs are unreliable past 50 blows per foot, CPTs are something to be considered and tried.

Another area to improve is the integration of geophysics into site investigation. Many geotechnical engineers come from an engineering background and don't fully understand geophysics. With seismic CPTs and surface wave techniques, I see continued growth in the application of geophysics in geotechnical engineering applications.

CLS: What do you see as the future of geotechnical engineering in your fields of expertise? Specifically, with CPT testing and sampling.

PKR: One major change I see coming is in the area of "big data". Specifically, in the case of in-situ testing for site response to earthquakes. When I did my PhD, there was very little CPT data from sites that had experienced liquefaction, it was mainly SPT data. We now have an enormous database of CPT data especially from sites that have experienced earthquakes, such as New Zealand. We now have more than 30,000 CPTs from various sites that have experienced one or more earthquakes. Currently most liquefaction assessments are carried out by processing each CPT data point through algorithms and correlations to determine how the site may respond under a design earthquake. Research is increasingly showing that the response of the site is a function of the layering rather than each data point.

As another example of big data, as well as running either deterministic or probabilistic analyses with CPT data, we will be able to submit the CPT profile to a database that will search for similar profiles. In this way, a comparison can be made with sites with similar CPT profiles. This will allow us to compare our traditional analyses with the observed performance of similar sites. If they match up, we can feel confident in our results and if not, we can investigate why the database sites performed differently.

CLS: Looking back at your career path and decisions you made, if you had to do it all over again, what would you do differently or the same?

PKR: I think I have been very fortunate, and I wouldn't really change anything. I fortuitously followed a path that I think worked out very well for me. One thing I have noticed is that some younger engineers somewhat drift through their career, where they do things because that's what is happening at the time. What I did was to think about what I wanted to do in the next three-to-five-year period and then plan how I wanted to achieve those goals. The decisions I made were often made within the context of making conscious decisions rather than accidental decisions. I was fortunate that events happened at the right time relative to those conscious decisions. My advice is to establish goals and develop a three-to-five-year plan on what you would like to do to achieve those goals.

CLS: You have been active in the geotechnical profession for over 30 years; what keeps you going?

PKR: The geotechnical profession has been very good for me and in the past ten to fifteen years I have been trying to give back to the profession. Rather than retire, I am trying to share the knowledge and experiences I've gained. I have produced about 17 free, online webinars and have created a CPT Guide that is also freely available. I have also been involved in software development trying to make inexpensive, easy-to-use, CPT-based software available to engineers. I also try to share my knowledge and experience through both consulting activities and different forms of teaching. I give presentations at several universities, short courses, and numerous online presentations. Online presentations can reach much larger numbers than traditional university classes.

CLS: Closer to home, what do you think has been the most significant accomplishment of the UofA Geotechnical Group over the past few decades?

PKR: I was attracted to the UofA Geotechnical Group because it was a large, very successful group with a wide range of expertise. The accomplishment from the group that stands out the most is the work the group has done, led by Nordie Morgenstern and others, in oil sands tailings. The group has done a tremendous amount to aid the development of oilsands and the work it has done in tailings has spread worldwide. It's done many other things but the work on tailings is one of the biggest contributions.

CLS: What advice would you give to young geotechnical professionals?

PKR: Besides the various things I've already said, the one thing I often say to young geotechnical professionals is to use your powers of observation. Don't think of your training as only including your schooling and the projects you've worked on. In everyday life when you are walking past geotechnical features, use your powers of observation to look and try to understand what you see. For example, I used to like looking at landforms when I was flying. I find it fascinating trying to understand various landforms. With Google Earth we can now look at many landforms without having to be in an airplane. When I lived in Hong Kong, there was so much construction that there was always something I could look at and try to figure out what they were doing and why. Hence, use your powers of observation and try to piece together the theories you've been taught with the things you're observing.

CLS: Thank you very much for your time and very candid insights.

Top: Peter Robertson, Xiaoyan Ou; bottom: Lijun Deng, Maggie Cramb

The authors are all from the Department of Civil & Environmental Engineering at the University of Alberta. ***Xiaoyan Ou*** *(xo@ualberta.ca) is a graduate student. For her master's thesis topic, she is gravitating towards advancing upscaling techniques and scaling laws for soil/rock masses with discontinuities.* ***Maggie Cramb*** *is a fifth-year undergraduate specializing in geotechnical and water resource engineering. The field aspect of geotechnical projects was a main contributor for her interest in geotechnical engineering.* ***Lijun Deng*** *is an Associate Professor and is also a member of the CGS Heritage Committee. He coordinated the interview and this article.*