



Harry G. Poulos, D.Sc.Eng., PE, Dist.M.ASCE, NAE

By Merve Gizem Bozkurt, EIT, S.M.ASCE, Jiannan Chen, S.M.ASCE, Hulya Salihoglu, S.M.ASCE, and Kuo Tian, S.M.ASCE



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Harry Poulos is recognized as a leading authority in foundation engineering. His other areas of expertise include soil behavior and piled foundations, marine geotechnics, and earthquake geotechnics. Poulos has held dual roles in academia and industry and specializes in tall building foundation design. The dual roles have allowed him to find practical problems, conduct research, and deliver the results back into industry practice. In recent years he has been involved with foundation design for the Burj Khalifa (currently the world's tallest building) in Dubai, the proposed Incheon 151 Tower in Incheon, South Korea, and the Diamond Tower in Jeddah, Saudi Arabia.

In 1961, Poulos earned a bachelor's degree in civil engineering from the University of Sydney, where he later obtained a PhD degree in 1965. Before transitioning into academia, he was an engineer at MacDonald Wagner & Priddle. Poulos joined the Department of Civil Engineering at Sydney University in 1965 and was appointed professor in 1982, a position that he held until his retirement in 2001. In 1989, he joined the consulting firm of Coffey Partners International, where he is currently a senior principal with Coffey Geotechnics. He is also an emeritus professor at the University of Sydney, and an adjunct professor at Hong Kong University of Science and Technology. He has published books and technical papers about foundation settlements, pile foundations, and offshore geotechnics, and has been involved in over 300 major projects in Australia and overseas.

Poulos has been internationally recognized by numerous awards and honors. In 1989, he delivered the 29th Rankine Lecture, "Pile behaviour - theory and application," organized by the British Geotechnical Association. In addition, in 2004 he was chosen to deliver the 40th Karl Terzaghi Lecture, "Pile

behaviour: consequences of geology and construction imperfections,” for his contributions to the geotechnical engineering field. In 1993, he was made a Member of the Order of Australia for his services to engineering, and in 2010, he was elected a Distinguished Member of the American Society of Civil Engineers, the first Australian to be so recognized. He was inducted as a Foreign Member of the U.S. National Academy of Engineering in 2014.

Q. How did you decide to go into geotechnical engineering, and why did you choose or end up working in foundation design?

I have to tell you that even before becoming a geotechnical engineer, my choice of civil engineering was something that I had not really planned to do. I actually wanted to be a chemist, but there are various reasons that I did not end up doing chemistry at university. My high school advisor said that I was not bad at mathematics and suggested I try civil engineering. Then he briefly explained civil engineering, and it sounded cool. So, I did my undergraduate studies in civil engineering with majors in structural and geotechnical engineering. I found structural engineering a little bit repetitive, while I found that geotechnical engineering had certain elements of challenge and novelty.

Additionally, part of the reason was that I had read Terzaghi’s textbook, *Theoretical Soil Mechanics*, when I was an undergraduate. I did not understand it all that well, but it stimulated me. I realized that projects involving soils and rocks are all different. You could not say the same thing for structures because you have control on what you do above ground. You have to contend with nature for underground structures. So, I decided to study for a PhD in soil mechanics.

Q. How important is the mentoring?



(l to r) Kuo Tian, Merve Gizem Bozkurt, Dr. Poulos, Hulya Salihoglu, and Jiannan Chen. (Photo courtesy G. Bozkurt.)

Professor Ted Davis taught me soil mechanics. He was a nice person and very stimulating in terms of soil mechanics and geotechnical engineering, so I studied under him. It was very fortunate for me because it is important to study with someone you respect, who has a deep knowledge of the subject and real concern for you when you are starting your career. Your mentor should have connections with other people outside the university so that you can grow your network with people who have experience.

Q. What was the most interesting project, or the project that you learned the most from, during your career?

I guess the most prominent project that I worked on was the Burj Khalifa, the tallest building in the world. It’s not very often that one gets the opportunity to

work on such a high-profile project like this. I learned a lot, but there were many other opportunities to learn as well. For example, in 1980, when I was still working full time at the university, we got involved in extensive research on offshore foundations, particularly offshore pile foundation in calcareous soil. At that time, we had a major problem with an offshore platform in Australia, and that led to a whole series of research projects that I supervised. We studied the mechanisms of piles in calcareous soil, along with compressible soils more generally. Calcareous soils are composed of small sea creatures, which, when they die, fall through water slowly and are deposited on the sea floor. So, they have a very high, natural void ratio. That’s the key reason why the capacity of foundations in the calcareous soil is so much lower than in normal onshore soils.



Major landslide in northern Greece on the Egnatia Odos motorway project in 2002. Poulos is third from left. (Photo by H. Poulos.)

Q. In 2010, you were recognized as the first Australian to become a distinguished member of ASCE. How do you feel about that?

I was obviously very pleased. I have had a long association with the ASCE. I think I joined in 1970 because it was a major source of geotechnical information at a time when we didn't have a vast number of journals. We had *Géotechnique* and ASCE journals, and that was pretty much it in terms of international literature. I was lucky enough to spend my first sabbatical at MIT, and I had a few papers published by ASCE. I also co-authored a few papers with Dr. T. William Lambe, and that was extremely helpful for my career. I have been associated with ASCE for many years and became a Fellow in 1984. This was something that I was extremely pleased about at that time, because it is one thing to be recognized in your own country, but it is another thing to be recognized internationally, particularly here in the U.S.

Q. Do you believe that today's universities place enough emphasis on both fundamental and practical ideas?

I'm a very strong believer in universities being places where we learn the

fundamentals. Unfortunately, some universities have reduced the amount of fundamental work they teach to introduce subjects like management. I'm not saying that management is not valuable; in fact it's critical. But that's the sort of thing that you can learn after graduation. I think learning the basic principles for our specialty — physics, mathematics, and now chemistry — is very important. Those are really critical issues, and I think some universities really need to reassess their curricula.

There are many things that can be learned afterwards, maybe as a postgraduate, but once you leave the university, if you haven't learned the fundamentals, it's going to be a difficult road ahead. I think, particularly in our discipline, understanding the fundamentals of soil mechanics is very important. I look back at some of the giants of our profession, for example Ralph Peck, who was an idol of mine. He never did a finite element analysis in his life, but he knew the mechanics of soils very well. He recognized when there was a problem because he had vast experience, and he understood how soil behaves. If you have an understanding from the fundamentals of what the possible causes of a problem

are, you can investigate them more carefully rather than just doing a blind numerical exploration which may or may not reveal the source of the problem.

Q. How has your consulting experience helped you as an educator and researcher? And does this experience help you better explain the concepts in the textbooks?

I feel strongly about this. When I stopped being a full-time academic, I was still a part-time academic, while working primarily with a consulting firm. That was over a 12-year period and probably the best 12 years of my professional career, simply because I worked on lots of interesting projects in the consulting firm that involved unsolved problems. For example, what happens if we drive a tunnel near an existing pile foundation? What should we do with the piles, recognizing that we are creating disturbance and possibly adversely affecting them?

I had a series of PhD students working on those problems, which had arisen directly from practice. The students were enthusiastic because they knew that they were working on a real problem. And from an academic point of view, we perfected certain techniques — and in some

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// Lessons Learned from GeoLegends



House settled over 1 m due to liquefaction from an earthquake in Christchurch, New Zealand. Poulos is fourth from the right, with his hand on the roof's gutter. (Photo by H. Poulos.)

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cases, design charts and methods — that we actually use routinely in practice today. And that's why I think that combining practice, academia, and research is really a good one; you will find a lot of successful research groups in universities having an attachment in some way to practice. They work on problems that are not only theoretical, but also practical. For example, in the 1960s and 1970s, the late Professor Harry Seed worked on liquefaction, which was a major problem at the time after the earthquakes in Japan in 1964. He and a series of his students worked on the problem, and they came up with the technique which is now widely used, and which remains the basis of common practice today. So that's a good way of getting research into practice, when there is a definite and urgent need for the research to be done.

Q. How do you balance your family life with overseas projects? What advice can you offer?

Have a very tolerant partner! I've been traveling overseas a lot the last

few years, and it's not easy. I've been away as much as three or four months a year, although not continuously, but you get to realize how much time you haven't been at home. You have to look at both sides of things and always try to appreciate the other person's view point. It's not easy; it's a balancing act. The other alternative, which some people are fortunate enough to do, is to take their partner with them. My wife doesn't like traveling very much, but she does come with me about once a year. She came with me to Paris for the ISSMGE conference in 2013, and she came again to the U.S. last October. For a traveling husband, one other thing that may be necessary is to be prepared to spend a lot of money for jewelry for your wife!

Q. We read that you have a personal library with a large book collection. Can you describe your favorite book and how it affects your life?

Ever since I was young, I've loved reading and read fiction and non-fiction. In particular, I enjoy reading philosophy



Site of large-capacity pile load test for the Emirates Towers in Dubai in 1997. Poulos is fourth from left in back row. (Photo by H. Poulos.)

and history. My favorite book probably is *Walden* by Henry David Thoreau. Written in 1854, this very influential book describes two years when Thoreau lived on his own at Walden Pond, a lake in Concord, MA. He wrote about his time there, and how he was able to live in a very healthy and simple way. There are two words from the book that are easy to remember: "Simplify, Simplify." He said there's too much complexity and unnecessary things in our lives. If you live a simple life, you can still be happy without needing a lot of material things, like an iPad, iPhone, and television (although maybe you still need books). I first read *Walden* way back when I was 19, and I probably have 10 versions of it. I still enjoy reading about this rather

unique person, who was able to put aside complex things in his life and focus on living each day.

Q. As a professor and GeoLegend, what's your advice to colleagues? And what's your expectation for young geoprofessionals?

For young geoprofessionals I think it's important to form a geotechnical network and try to positively influence each other. Initially, your mentor will have a major influence on your career. He or she hopefully introduces you to people at a conference who can help you grow your professional circle. That's one of the good reasons to attend geotechnical conferences. Obviously, there is a technical benefit in terms of learning what


is happening, and particularly you can hear good lectures from key persons in the profession, but also you get to know lots of people.

Sometimes these contacts can benefit your future career. Sometimes they can provide ideas for your research, and sometimes you might even be able to collaborate on research with them. As time goes on, there may be a trend for researchers to collaborate more, not so much on individual research, but as part of a research team. It has certainly happened in my country where I am part of a large, government-funded research project. It is very broad and has three or four different aspects, with 150 geotechnical researchers involved from three universities and four industry partners.



Lessons Learned from GeoLegends

Final Words...

I don't think of myself as a GeoLegend. I'm just somebody from a rather remote country who enjoys what he is doing. And I'm privileged to be able to travel and see the world as part of my profession. I really hope that you, in your professional life, will be able to get the same sense of satisfaction and pleasure that I have enjoyed in my professional career. 

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