HUGH QUENTIN GOLDER (1911-1990)

With edited comments from Victor Milligan, John Seychuk, and Dennis Becker.

Dr. Hugh Golder was born in England in 1911. He graduated in Civil Engineering from Liverpool University in 1932 and then studied the causes of deterioration of concrete for a master's degree. He was awarded a D.Eng. by Liverpool University in 1950.

After a short period with the Forest Products Research Station in England examining mechanical properties of timber, his geotechnical career began in May 1937, when he joined the Soil Mechanics Section of the Building Research Station and engaged in developing testing techniques for earthworks and foundation engineering. One of the first projects he investigated was the failure of the Chingford embankment dam near London in 1937. Golder was involved in the investigation from the start, introducing a composite slip surface approach for analysing the failure and for checking a redesign proposed by Terzaghi. In 1942, he joined the contracting company John Mowlem Ltd., where he worked on the construction of airfields, and later, Mulberry Harbours for the war effort. He transferred to Soil Mechanics Ltd. as a Director when the firm was formed in 1944.

With others in the Institution of Civil Engineers in London, Dr. Golder founded Géotechnique, one of the earliest international journals for practice and research in soils engineering. In 1958, he left Soil Mechanics Ltd. on an issue of principle and formed his own consulting practice, specializing in soil mechanics and foundations. Shortly after, he emigrated to North America, where Arthur Casagrande offered him a teaching post in Engineering Geology at Harvard University as a stand-in for Karl Terzaghi, who was on sabbatical leave. He formed a deep and lasting friendship with Arthur Casagrande, and frequently used him as a consultant thereafter. During his time at Harvard, he was invited to head a team of engineering consultants on a feasibility study of a bridge from the Canadian mainland to Prince Edward Island.

He came to Canada in 1959, and in 1960, joined Victor Milligan and Larry Soderman in forming the firm now known as Golder Associates.

The late Victor Milligan used to tell how the the firm carrying Golder's name was formed. While advising the Department of Highways of Ontario, Golder met Larry Soderman. One

evening in 1960 at Larry's home eating goose shot near Hudson's Bay, and drinking copious wine, Larry suggested to Hugh Golder and Victor Milligan that Hugh should form a partnership company. In this way, he would cease to be an individual practitioner who only advised, but would create a company with Golder and Milligan as shareholders that could undertake design and implementation of projects.

At the time, soil mechanics was simply an offshoot of civil engineering - there was no such thing as a discipline of geotechnical engineering – and specialized firms simply concentrated on drilling and sampling in the field, and laboratory testing of retrieved samples. Engineering implications were left to prime consultants in the broader fields of civil and structural engineering. Hugh Golder decided that the company would be an engineering company, not just a testing company.

The new company wanted to offer high quality service and not simply be cheaper or better organized. Initially, there was no intention of becoming a large firm, but this did not last long. As Victor Milligan said, "To get quality work in Ottawa, we had to be in Ottawa. To get quality work in Vancouver, we had to be in Vancouver. We never went after jobs; we went after clients who would give us jobs."

Golder Associates was structured as a limited liability company but run as a partnership with emphasis on collegiality and building consensus. Hugh told Victor that, in essence, they would be partners. In Victor's words, "From then on, he never did anything just because he owned most of the company. He always consulted me. He was extremely fair. He elevated me and brought me up to his level. He never lowered himself to anybody. He treated me as equal - so very considerate." This reflects the collegiality model that Golder Associates used as a fundamental basis in its growth and development.

Hugh Golder sometimes carried his search for difficult and challenging jobs to extremes. On a number of occasions, when he and others would be wooing a client with a nice lunch, Hugh would say, "We're not interested in your trivial work, we just want your difficult jobs. We'll take trivial jobs because we have to eat, but we would love to do your other jobs." John Seychuk, who was more focused on the bottom line, would flinch and then hasten to say, "Let's not compare one or the other, we want both."

Victor Milligan commented "Hugh was a man of great honesty with very strong feelings and very strong principles. I would say the honesty was not just financial but also intellectual. He was honest with himself and honest with other people, He said what he thought and this was sometimes seen as rudeness."

There is an interesting footnote to the Prince Edward Island project that first brought Golder to Canada. Although shelved for many years, the Confederation Bridge was opened in May 1997, with Golder Associates acting as geotechnical consultants throughout its design and construction.

A man of considerable intellectual capacity and achievement, Dr. Golder was a pioneer and authority in the field of geotechnical engineering. He authored over fifty technical papers and earned respect and many awards from the engineering profession in Canada, the United States and Europe. His diverse talents are well illustrated by the accompanying poem published in the Journal of the American Society of Civil Engineers, Soil Mechanics Division in January 1996 as part of a discussion on "The role of the calculated risk in earthwork and

foundation engineering", (A. Casagrande July 1965). The discussion centred on the many engineering decisions that are intuitively based on experience and not on scientific theory. In Dr. Golder's opinion, these cannot readily be explained in prose, though they might be in poetry.

Engineering Intuition

To state my problem unequivocally
My task is. Experience. wisdom, deep humility
My mask is. How my subjective intuition,
Heaven-sent insight, God's ambition.
Translate to simple terms Objective factors,
Include those unseen unfelt charms That turn a problem
Through a dream at night To lucid truth -
That vision clearly seen that might
Provide a basis for your program
And let your electronic brain Say yes or no.
There are no other answers.
So the gross sum Of all my rights and errors,
My judgement offer Oil your binary alter.
Let the machines absorb my terrors;
Mortal we men; they never falter.

Hugh Quintin (H.Q.) Golder was seen by many as:

- A man of vision, he stimulated others to excel through his leadership and guidance, and created the company which today bears his name.
- A man of wit, poetry and discernment, he sought the high road for himself and others to follow.
- A man of honesty and compassion, he helped both client and competitor with equal grace.
- A man with few peers whom his colleagues were proud to call friend.

By Victor Milligan
From *Proceedings* of the 50th CGS Annual Conference, Ottawa 1997, pp. 3-15.

Dr. Golder was born in England in 1911 and graduated from Liverpool University in 1932. He was awarded a DEng by the same university in 1950. He entered the Building Research Station in England in 1937 as a Scientific Officer, engaged in the development of testing techniques for earthworks and foundation engineering. In 1942, during World War II, Dr. Golder joined John Mowlem Ltd., a contracting company in civil engineering in England, where he worked on the construction of aerodromes and later the Mulberry Harbour for the Normandy landing. He was transferred to Soil Mechanics Ltd. when that firm was formed in 1944, and became its Director. Dr. Golder was also a co-founder of the international journal *Geotechnique.* In 1958, he resigned from Soil Mechanics Ltd. to form his own consulting practice in civil engineering, specializing in soil mechanics and foundations. Dr. Golder immigrated to Canada in 1959 and in 1960 joined with Victor Milligan to form the consulting engineering firm that is now known as Golder Associates, with offices throughout the world.

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His diverse talents are well illustrated by the following verse published in the *Journal of the American Society of Civil Engineers,* Soil Mechanics Division (January 1996) as part of the Discussion on “The role of the calculated risk in earthwork and foundation engineering” by A. Casagrande (July 1965). The discussion stated that many engineering decisions were intuitively based on experience and not on scientific theory and therefore could not be explained in prose, though might be in poetry.

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OBITUARY

Hugh Quentin Golder
1911–90

Dr Hugh Golder, eminent consulting engineer, died in Vancouver, British Columbia, on 15 January 1990 in his 79th year. He will be remembered for his contribution to the early development of soil mechanics in the United Kingdom, the important part he played in the formation of the Geotechnical Society and the birth of *Géotechnique*, and the founding in Canada of an eponymous firm of consulting engineers.

Hugh Quentin Golder was born in England on 14 September 1911. He studied civil engineering at Liverpool University, graduating there in 1932, and then carried out research on concrete for which he obtained his master's degree. He was awarded the DEng by the same university in 1950 and, in 1981, this same degree *honoris causa* by the University of Waterloo, Ontario. After a spell at the Forest Products Research Station at Princes Risborough, Golder joined the Soil Mechanics Section of the Building Research Station in May 1937, taking the place of D. B. Smith who had been with L. F. Cooling from the start in September 1933.

In July 1937 the earthen embankment of a large reservoir under construction at Chingford, Essex, failed. The contractors approached the Building Research Station for advice and thus it came about that Cooling, Skempton and Golder undertook the first major soil mechanics investigation in England. Golder was involved from the start and he introduced composite slip surfaces in stability analysis, probably for the first time (Cooling & Golder, 1942b), and used them intensively in examining the failure and in checking redesigns of the dam with which Karl Terzaghi was also involved.

Towards the end of 1937 the Metropolitan Water Board asked the Building Research Station to check the stability of Staines No. 2 reservoir embankment. The brickearth at Staines, overlying terrace gravels and beneath the gravel bank fill, was about 1 m thick. Samples of the brickearth were sent for testing and from 'equilibrium' shear box tests it was found that $c' = 5$ kPa, $\phi' = 25°$ and that the coefficient of consolidation was quite high at 8 m^2/year. In contrast to the alluvial clay at Chingford full consolidation of the brickearth would occur during construction, and Golder's analysis indicated a factor of safety of 1·6 using a puddle pressure from Bell's equation (i.e. with no arching): these calculations were carried out in April 1938.

Soil mechanics was getting into its stride and requests for help and advice continued to arrive. One of the most notable jobs was the Huntspill River cut (Somerset Levels); here again Golder carried out the stability analysis (assisted by S. G. Samuels) in mid-1940. This was followed by fieldwork and calculations on Belfast Graving Dock for the Admiralty, and this occupied the first half of 1941. Next Golder investigated a slip in a road embankment crossing the Tame Valley near Stockport (November 1941) and immediately afterwards (December 1941) the slip in a London Clay bank at an Ordnance Factory at Waltham Abbey (Skempton & Golder, 1948c). Meanwhile, also at the end of 1941, he commenced the strut load observations at the Park Village East retaining wall, which continued until June 1942 (Golder, 1948b).

In addition to his work on stability analysis and his developing experience of practical engineering problems, Golder made significant contributions linking these two, namely laboratory and

field testing of soils. With A. W. Skempton he published the results of triaxial tests on a variety of soils, several of which had been carried out during his time at the Building Research Station (Golder & Skempton, 1948a). He also designed the portable compression apparatus used at Huntspill and on almost every job subsequently (Cooling & Golder, 1940).

In October 1942, Golder left the Building Research Station and joined John Mowlem Ltd, civil engineering contractors. They had been the contractors at Chingford Reservoir, and when the failed embankment was being rebuilt to Terzaghi's design a small soils laboratory was set up on site by Rudolph Glossop who was deputy agent there. After the embankment work stopped this laboratory remained, until the end of 1942, at Chingford under Glossop's control with T. G. Clarke in charge, engaged on site investigation and testing in connection with airfield runway construction. When Glossop moved as agent to Leiston in Suffolk, to build runways for RAF Leiston, the laboratory moved there, and it was there that Golder joined him.

During the winter of 1942–43 the runways of many aerodromes, all situated on clay, started to break up shortly after they were put to use, in some cases so badly they were no longer safe and had to be closed for flying. At Leiston the pilot strips were already cracking under the construction traffic: a very serious matter indeed. Golder and Glossop formulated a working hypothesis and a programme for testing on site which was put in hand under the supervision of A. C. Longsdon, an enthusiastic young engineer who contributed some useful suggestions. This work lasted for several weeks and showed that the concrete base should be underlain by a sub-base of from 9 to 15 inches of sandy gravel stabilized by a small addition of cement. This was accepted and the runways completed to that specification. The American Airforce took over late in 1943 and for over a year Flying Fortresses made constant use of Leiston, the traffic being very heavy indeed. The runways stood up to it and gave no more trouble.

Later that year the laboratory moved back to London, occupying a floor at 123 Victoria Street with Golder and Clarke in charge. By the end of the war it had grown considerably in turnover and staff and Soil Mechanics Ltd had been formed with Golder, Glossop and Harding joint managers and later directors. Shortly after this in 1946–47, Golder collaborated with Glossop in the formation of the Geotechnical Society and the publication of *Géotechnique*, the history of which is recorded in the journal both by Golder (1969) in his inimitable style and by Glossop (*Géotechnique* **25,** 650–653).

Golder had a keen interest in the English language and in French and German. He maintained contact with many European geotechnical engineers—Professors Geuze, de Beer, Brinch Hansen and others—and enjoyed entertaining them on their visits to London. In his role as a director of Soil Mechanics Ltd he upheld high standards, insisting that reports should be clear in their presentation and free from irrelevant material.

In 1958 he resigned from Soil Mechanics Ltd to form his own consulting practice in civil engineering, specializing in soil mechanics and foundations. He emigrated in 1959 and, after a spell at Harvard University as Visiting Professor of Engineering Geology, he set up in Canada in 1960 the firm now known as Golder Associates, Consulting Engineers, with offices throughout the world.

A man of great intellectual capacity, Dr Golder was a pioneer and authority in the field of geotechnical engineering. In his work he was inventive and prepared to look at first principles. He was the author of over 50 papers and earned the respect of and many awards from the profession in Europe, Canada and the United States.

A man of honesty and compassion, he helped both client and competitor with equal grace; a man of vision, he stimulated others to excel through his leadership and guidance.

R. E. Gibson

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