

OBITUARY

WOLMAR FELLENIUS

Emeritus Professor Wolmar Fellenius, internationally known as harbour designer and constructor, hydraulic research engineer, and pioneer of soil mechanics, died on 2 September, 1957, in his 81st year, and with his death Swedish civil engineering lost one of its outstanding personalities. Being for more than three decades also a teacher, Professor Fellenius founded for many engineers careers which he always followed with great interest. Through those varied positions, his widespread travels, and his activities in technical societies, he made many friends who now mourn his death.

Wolmar Fellenius, after gaining his degree in 1898 at the Royal Institute of Technology (KTH) in Stockholm, began his long civil engineering career on the construction of a railway line in the far north of Sweden. From 1899 to 1905 he was employed first at the Norrköping and subsequently at the Härnösand Office of Works. During that time he visited Germany, France, and the United States of America in order to study civil engineering works in those countries.

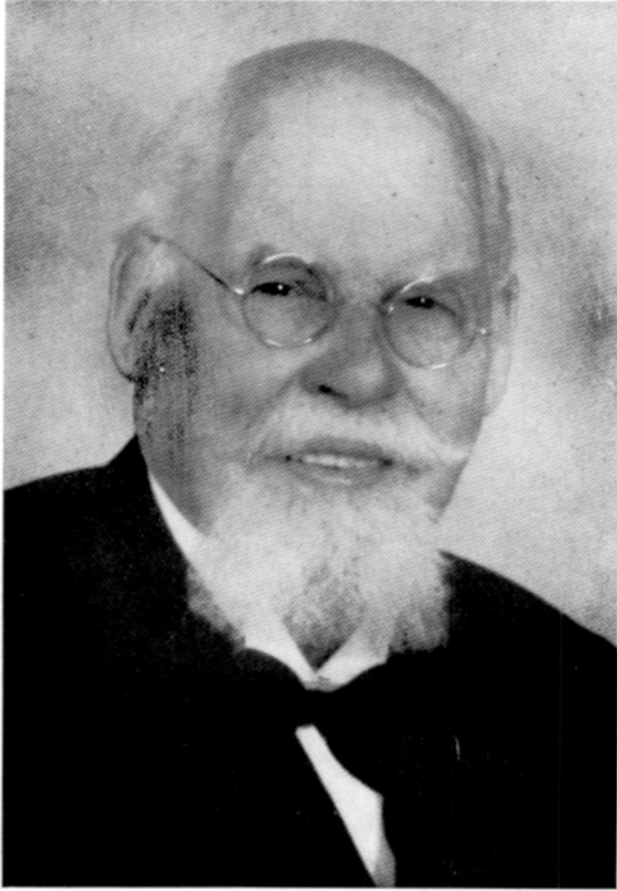
In the years 1905 to 1911 he was head of the Design Department of the Gothenburg Harbour Board, where he became one of the first to introduce into Swedish civil engineering works the technique of reinforced concrete, having been deeply impressed by its development on his American visit. In connexion with his designing and construction works in Gothenburg he journeyed to Germany, Holland, France, and England in order to study the fishing harbours of those countries. He became lecturer at Chalmers School (now University) of Technology from 1906 to 1911, and later extended his harbour activities to many other towns in Sweden and in Norway, where he became recognized as an authority on marine works.

In 1911 he moved to Stockholm to take up the professorship in hydraulic engineering at the Royal Institute of Technology, a position which he held until his retirement in 1942 and where, under his leadership, the internationally known hydraulic laboratory was founded and developed. This was a most fruitful period of his life when, besides his university works—he was also head of the Civil Engineering Department of the KTH from 1915 to 1928 and again from 1940 to 1942—he did much consulting work and served on several technical commissions.

In the field of consulting engineering, apart from his harbour works, he designed in 1913, in conjunction with Professor O. Linton, the Traneberg pontoon bridge, Stockholm. Earlier, in 1911, Fellenius had been a member of a railway commission for a double-tracked line a little south of Stockholm, including the Södertälje Railway Bridge, in the troublesome stability design of which he took an active part.

From the point of view of soil mechanics, Professor Fellenius's name is perhaps best known in connexion with the important work done by the Swedish State Railways Geotechnical Commission from 1914 to 1922, whose chairman he was from 1919 to 1922. This Commission was set up following a great railway landslide at Lake Aspen in south-west Sweden. The Final Report of this commission is regarded as a milestone in the history of soil mechanics and was prepared under the chairmanship of Fellenius.

The Report, a result of many contributors, mainly John Olsson, Secretary of the Commission, was notable for its systematic analyses—by the then newly introduced circular slip method by K. E. Petterson and S. Hultin—of a large number of severe landslides, its development of an effective quantitative soil classification system, and its wide application of laboratory technique in conjunction with improved methods of sampling and strength determination. The latter was first made by the fall-cone test to obtain a measure of the consistency, in "undisturbed" as well as in remoulded state, thus introducing what is now



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called the sensitivity, but was later improved leading to measurement of the shear strength. The Swedish weight-sounding method, in which the penetration of a 19-mm rod with a screw point into the soil is measured with a small applied load, originates also from this Commission and is an improvement of a method used by Fellenius in Gothenburg as far back as 1908.

Then in 1916 occurred the (now classical) slide of the Stigberg Quay in Gothenburg. Here, too, a commission was set up, with Fellenius as one of its members. It had the task of discovering the reasons for the slide and of making recommendations for the design of the new quay. It was while working with that commission he realized the great importance of the method of circular slip surfaces and the concept of cohesion. Thus, he was already introducing the circular slip idea to his students in the autumn of 1916, and followed that a year later with lectures on pure cohesion. He worked further on those subjects and published several Papers between 1916 and 1927, the best known of which is his "Erdstatische Berechnungen" 1927, now published in four editions. (This Paper was an enlarged translation of his original Paper in Swedish in 1926.) The last-mentioned Paper set forth what has since become known as the "Fellenius method", widely adopted, in which the most dangerous slip surface is determined by combined analytical and graphical method. Fellenius's conclusions have been supported by later research and experience, especially his suggestions that cohesion should increase with depth.

As was natural with such an active and distinguished career, Wolmar Fellenius was awarded many honours both by his brother engineers and by his own country, as well as places abroad. Thus, in 1947, he was made (after having been on its board for many years as vice-chairman or chairman of the Civil Engineering Department) honorary member of the Swedish Association of Engineers and Architects. The Swedish Association of Municipal Engineers made him honorary member in 1933. Being one of the initiators of the International Society of Hydraulic Research, he acted as President from its foundation until after the second world war. He was awarded the Swedish orders RVO, in 1918, and RNO, in 1921; also the Scandinavian orders KDDO and RNS:tOO. In Germany, in 1921, he was made a freeman of the Technical University of Karlsruhe, and designated Dr-Ing. *honoris causa* at the Technical University, Darmstadt, in 1936. For his military-technical contributions towards the fortified defence of the Stockholm district during the 1939-45 war he was made a member of the Royal Academy of Military Science. After having begun as a lieutenant of the Swedish Royal Corps of Civil Engineers in 1904 he was made colonel in 1948.

To those who knew him perhaps the strongest memory of Wolmar Fellenius will be not his technical achievements, great as they were, but his vivid interest, the warmth of his character, and his abiding energy. His qualities were nowhere better shown than in his long and rich years in his beloved Association of Engineers and Architects. International soil mechanics have lost a Grand Old Man, and Swedish engineers a father.

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ROLF H. GRAN OLSSON

It is with the deepest regret that we record the death on 3 August, 1957, of Dr-Ing. Rolf Gran Olsson of Norway.

Dr Gran Olsson was born in Vinger, near Oslo, on 9 August, 1903. He completed his studies in civil engineering in 1926 at the Technical University Charlottenburg, Berlin, where in 1932 he also obtained his doctorate. During those 6 years, he received practical experience