

Aleksandar Sedmak Vesić
(8.8.1924-3.5.1982)

Aleksandar Sedmak Vesić was born on August 8, 1924 in Resen, Kingdom of Yugoslavia, to Nica Jančić and Božidar from Kruševac. He finished high school, the so-called Realka, in Belgrade. He graduated in 1952 from the Faculty of Civil Engineering at the University of Belgrade with an average grade of 9.71. In the final year of his studies, he received an award as one of the best students in Yugoslavia and was employed as an assistant at the Faculty of Civil Engineering of the University of Belgrade (GRF). He received his doctorate at GRF in 1956 with the topic "Basic problems of the theory and calculation of pile systems". Shortly thereafter, he went to Ghent, Belgium, where he did research and taught at the Geotechnical Institute. In 1958, he emigrated to the USA, where he became a professor at the famous Georgia Tech University. He transferred to the Duke University School of Engineering in 1964, where he became J.A. Jones Distinguished Professor in 1971 and Dean of the School of Engineering since 1974.

He was married to Milena Sedmak Vesić (1926-2007), a native of Donja Lastva, Kingdom of Yugoslavia, a woman of exceptional education and great social influence. Died 5/3/1982 in Durham, North Carolina, USA. He grew up in a stable family, originally from Kosovo, which gave him love and support for his great works that remain recorded in Serbian and world heritage.

The beginning of Vesić's career is related to the Old Stone Bridge in Mostar, in the rehabilitation of which he participated as a member of the state commission. Although the job was basically engineering, Vesić also made two researches. In the first of them, he showed with a static load-bearing calculation that the mass of the bridge does not correspond to the volume, that is, that some stone blocks are hollow, which turned out to be correct. The second research was related to the restoration of foundations, which directed Vesić's interests to pile problems and practically defined the topic of his doctoral dissertation and the main direction of scientific research.

In his doctorate, Vesić presented the principles of the general theory of pile systems, and then presented the theory of flat pile systems and introduced a method for their calculation. For the application of the method, Vesić defined three quantities that must be determined: the quotient of the lateral and longitudinal pile reaction coefficients, the first characteristic length of the pile and the ratio of characteristic lengths. The paper also provides theoretical principles for calculating the mentioned quantities, on the basis of which it is possible to obtain approximate and sufficiently accurate data, although it cannot completely replace the experiment. The method itself has led to a procedure that can be easily applied to the calculation of pile systems. In particular, it was shown that the influence of the lateral stiffness of the piles on the distribution of forces and deformations in the system is large and that it is necessary to take it into account, which is the most important contribution of Vesić's research and his doctoral dissertation.

Vesić made significant contributions in soil mechanics, in which he published a large number of papers and books on piles as foundations, loading of shallow foundations, soil cohesion, and marine soil. There are many citations and references to his works in the later works of other researchers. His research showed that the existing calculations of the relationship between the bearing capacity and the soil friction angle are not correct for higher values of the friction angle, and that the actual failure angle is lower than the one predicted by the models of the time.

Many of Vesić's researches were aimed at applying them to real materials. Vesić continuously researched rigid road surfaces (concrete) as well as flexible surfaces (asphalt). Those studies were focused on the load transfer from the road surface through the base layers to the ground. Based on this, he developed ideas on how the existing soil could carry the load. Many of his works have been used by the designers of the American Interstate Highway System for their construction and maintenance.

Among the most interesting researches is the use of explosives for excavation. Vesić developed theories and essentially introduced science into predicting the behavior of explosive charges if certain soil parameters of the country were known. Later, he expanded his work to the development of suitable devices, which enabled better impact control, increased their accuracy and reduced size. Based on his research, explosions were used in new areas where this was impossible.

Vesić's key scientific contributions are presented in papers, and can be formulated concisely as follows:

- Significantly increased the knowledge about the behavior of foundations with piles, especially about the bearing capacity of individual piles and piles in a group, and about the role of shearing.
- He gave the theoretical foundations of soil behavior and was the first to take into account the influence of compressibility on the bearing capacity and occurrence of fracture, and introduced the soil stiffness index.
- Comprehensive analysis of the behavior of a beam on an elastic foundation.
- His clear thinking about the occurrence of fractures made a great contribution to the understanding of the formation of craters from underground nuclear explosions.

The importance of Vesić's works is best explained by the fact that, for example, the paper on the analysis of the limit load of shallow foundations from 1973 was cited 939 times, and the relevance of Vesić's research is best expressed by 27 citations of the same paper in 2024.

