Prof. Dr William Selim Hanna (1896–1980), Egypt

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Fig. 1: Prof. Dr William Selim Hanna

Prof. Dr William Selim Hanna (*Fig. 1*) was born in Assiut (south Egypt) in 1896. He completed his education in Alexandria and received his civil engineering diploma from the School of El-Mohandeskhana (now Faculty of Engineering at Cairo University) in 1920. He studied further and completed a civil engineering degree with Honours at Birmingham University, UK in 1923. In 1926, he received a PhD from the same university; after which he returned to Cairo.

Academic/Research Work

Since 1926, he worked as a lecturer in the department of Structural Engineering, at Fouad El-Awal University (now Cairo University). In 1932, he was nominated Chairman of the new research laboratory of reinforced concrete (RC) structures. In 1933, he founded the first laboratory of Soil Mechanics in Egypt and the region at Cairo University, which made him well known as the founder of soil mechanics in Egypt. Prof. M. Kamal Khalifa and Prof. ThciboTariof, who later became professor at Princeton University, were his colleagues during that period. Also, amongst his colleagues at the Cairo University were Prof. Dr Ibrahim A. El-Demredash, and Prof. Dr Sayed Mortada. Both were veteran members of IABSE, and both received a special medal during the 50th year celebration of IABSE in the year 1979. It is noted that the Soil Mechanics Laboratory at Cairo University was one of the first to be established in the whole world. This was possible due to Prof. Dr W. S. Hanna's initiative. In 1938, he was the first Egyptian to teach reinforced concrete at an Egyptian university. In 1941, he was nominated Chair professor for reinforced concrete structures and construction of buildings. He continued teaching both subjects and directing both laboratories until the end of his career at Cairo University in 1952.

During 1952–1954, Dr Hanna was Minister of public works at a very important period in modern Egyptian History. He also carried out and supervised several research works in the field of reinforced and prestressed concrete structures and soil mechanics. He represented Egypt in different international conferences. In Stockholm, 1930, he published a research work on applied soil mechanics and presented an approach for design of bridge frames. In the second International Conference in Liege, Belgium, 1931, he published his research work on structural behaviour of reinforced concrete structures under different loading conditions. He was the first Egyptian, who took part in the international conference for soil mechanics and foundations in USA in 1936. In the first Arabic engineering conference, Dr Hanna introduced the results of his research on the influence of the Mediterranean Sea water on coastal plain and reinforced concrete structures. In 1937, structural problems were observed in many RC bridges near Port-Said and other north coastal structures. This prompted him to lay the foundation for two research stations: one in Glym in Alexandria and the second one in Bashtoom El-Gamil near Port-Said, where he tested concrete elements under real and direct exposure of seawater, for a period of about ten years. The results from his research had a huge impact on the development of concrete technology, especially those applied in coastal regions, which had notable economic advantages for the structures in Egypt and the surrounding Middle East region. In 1949, he promoted the science of prestressed concrete in theory and in practice, in Egypt.

He was a member of the International Association for Building Research since 1951. In 1953, he was nominated President of the International Association of Soil Mechanics and Foundation Engineering. In 1955–1959, he was selected Vice-President of the International Association of Prestressed Concrete (FIP).

Structural Excellence

Dr Hanna's works exhibited excellence and creativity as a structural engineer. He designed several projects including bridges, buildings, factories and industrial facilities. In 1935, he designed Kasr E-Nile Bridge, a five span steel bridge over the river Nile, which until today is one of the most elegant bridges connecting the river Nile Island with the Mid-town.

With reference to building projects, he designed the Nile Hilton Hotel, which was the tallest building in Egypt during that time (*Fig. 2*). Some years later, he did the structural design for the Ramsis Hilton Hotel with a height of more than 100 m, which was the second tallest building in Egypt (*Fig. 3*), (second to the Cairo tower).

His great contribution in building several industrial buildings from the 1930's to 1960's can be briefly summarized

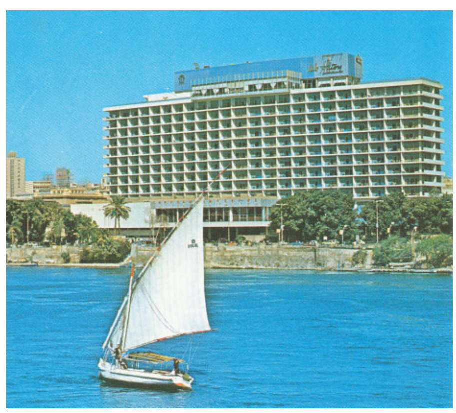

Fig. 2: Nile Hilton Hotel (1958)

Fig. 3: Ramsis Hilton Hotel (1976)

as: the design of the Paper National Company in Alexandria, where his research results on the behaviour of RC in Marine Environments facilitated the design of the foundation for this factory; his design for the Egyptian Company for Industrial Silk was one of the biggest projects in Egypt at that time, which had several halls with dimensions of 100 x 80 m.

Additionally, he was the designer for several concrete factories, such as the Rakta Paper Company, Egyptian Company for Chemicals, New Amiria Printing House in Embaba and others. In 1949, he designed a Nylon Factory, in which prestressed concrete was used for the first time in Egypt. He was the first Egyptian to take part in designing power stations, for example: Talkha Power Station, Lybon Power station, Damanhoor and Kafr-El-Dawar Power Stations in the Nile delta.

Dr W. S. Hanna had a long-term vision; he foresaw the looming major traffic problem in Cairo and prepared plans for two underground Metro lines in Mid-town, one of which passed in a tunnel under the Nile. Thirty years later, a similar project was eventually built in Egypt.

Salvage of the Philae Monuments

In 1966, the UNESCO made an international call for saving the Philae Monuments that were submerged in water for some years. Dr W. S. Hanna created a consultant consortium with Prof. A. H. El-Ramely and Architect M. Shawky for saving the Island Philae's Monuments and his proposal won the competition and they embarked on the monument restoring project. His concept for the civil work was feasible and simple. This huge project started in the late sixties and was completed in 1980.

The concept proposed by Dr W. S. Hanna and his team was divided into the following stages:

Stage I: Drying of the Philae Monuments

In this stage, a retaining steel cofferdam was constructed surrounding the monuments in Philae Island (*Fig. 4*). Different proposals for the cofferdam were studied, for example, steel pipes with a diameter of 14,7 m and a parallel wall cofferdam with a width of 12 m. In both cases, the cofferdam had a height of about 10 m and was driven in the soil up to 8,0 m. The cofferdam was constructed and water was pumped out from the excavation to dry the Monument. Later the different elements of the Monuments were marked and numbered to enable reconstruction of the original structure.

Stage II: Foundation Work in the new Location (Eglila Island)

The foundation work for the Philae monument temple was the most important task for the structural engineer.

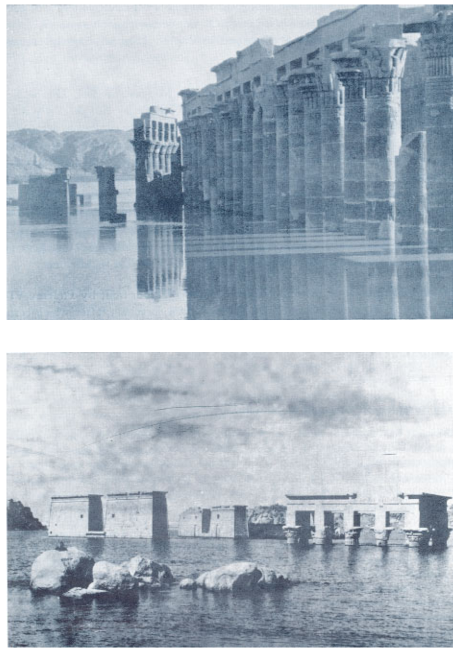

Fig. 4: Philae Monuments (Trajan Temple and Pylons) under water

Fig. 5 shows a typical cross section of the temple bed, which consists of rock fill, precast concrete blocks, lightly reinforced concrete slabs, coating system and reinforced concrete slabs. This construction represented a safe solution against the side scour of the river Nile and simultaneously a rigid foundation for carrying the vertical loads of the monuments.

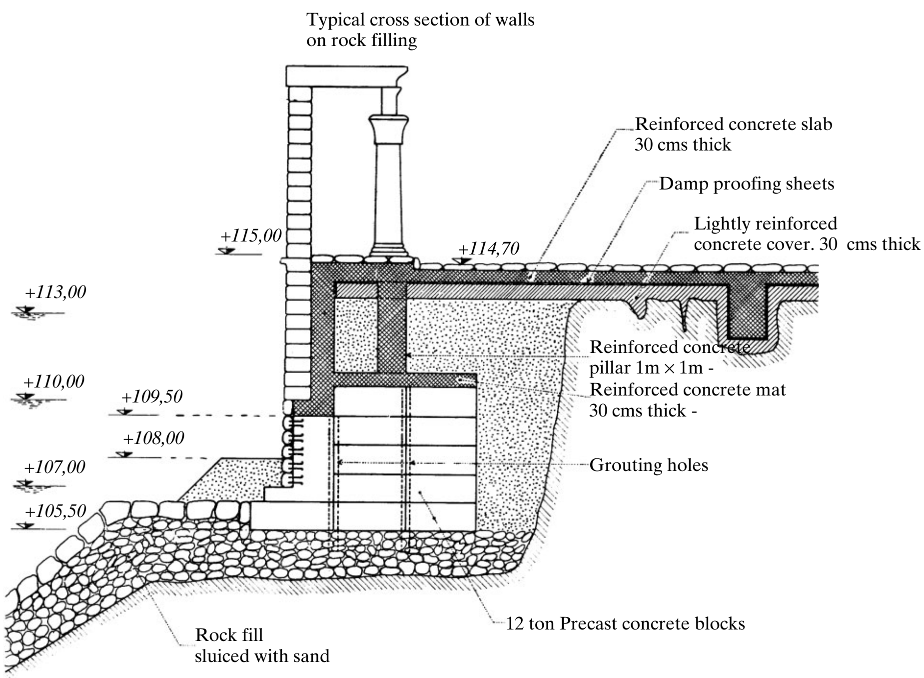

Fig. 5: Cross section for the proposed foundation of the new temple

Stage III: Transportation/ Re-construction and Restoration Work

The dismantled elements of the old Philae temple were transported to the new location on the Eglila Island and were re-constructed based on their allocated numbers. Restoration work for the monuments was carried out for some years to obtain the original state of the temple, see *Fig. 6*. This project was officially opened to the public in 1980. In the same year it was awarded the "Best Engineering Project in the World" by the International Italian Association. This project emphasized Dr Hanna's brilliant career as a structural engineer. In 1979, Dr Hanna was awarded the First Class National

Fig. 6: Philae Monuments after Reconstruction (old photograph)

Award, the highest official award in Egypt.

Indeed, Dr Prof. William Selim Hanna was not only a pioneer professor and a brilliant scientist but also a creative, powerful, and highly motivated structural engineer. His students, who are currently the leading engineers in Egypt, still remember him as an eminent, leading, dynamic, and highly respected person.

Acknowledgement

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