

LATE CORRESPONDENCE
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“Remodelling of the Assiut Barrage, Egypt.”

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Mr. I. G. Evans observed that, in relation to the injection of bituminous emulsion into the sand under the old barrage floor, **Mr. W. J. E. Binnie**, in the Discussion ¹ on the Paper, had asked whether any mechanical analyses of the sand had been made, and the Author had replied that such analyses had been made, although the results were not then available. As he had also stated in his further reply ² to the Discussion, that circumstances would probably render it impossible to obtain information from Egypt, **Mr. Evans** thought that it might be of interest to discuss an analysis of one sample of the sand from the barrage site which had been given ³ by **Dr. J. P. Pfeiffer**, of the Royal Dutch Shell Group, the inventors of the Shell impermeabilization process.

From the results of that analysis *Fig. 6* had been plotted, indicating that the effective size of the sand (the Hazen 10-per-cent. effective size) was 0.12 millimetre and that the coefficient of uniformity was 3.7. Those values indicated a medium-sized and moderately well graded sand, the porosity of which might be taken to be at least 25–30 per cent. The Author described the sand as fine and dense, with voids largely filled with the fine Nile silt, and it was therefore apparent that a considerable variation occurred over the site, and that the sample analysed was probably coarser than the average.

Dr. Pfeiffer had also given the mechanical analysis of a sand into which bituminous emulsion had been successfully injected in order to seal the bottom of a leaking foundation-pit in the Netherlands. That sand had an effective size of 0.12 millimetre and a coefficient of uniformity equal to 2.2, and was thus very similar to the Assiut sand.

¹ Journal Inst. C.E., vol. 14 (1939–40), p. 337 (June 1940).

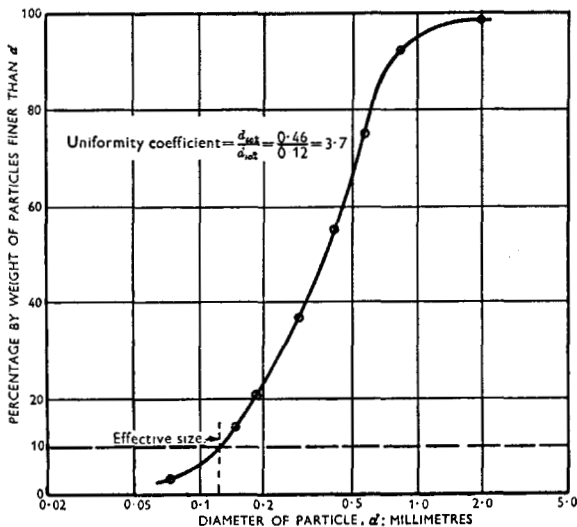
² Journal Inst. C.E., vol. 14 (1939–40), p. 578 (October 1940).

³ “A New Method of Impermeabilizing and Improving the Physical Properties of Pervious Subsoils by injecting Bituminous Emulsions.” Proc. Int. Conf. on Soil Mechanics and Foundation Engineering, 1936, vol. i, Paper M–1, p. 263.

Mr. Evans considered that the failure of the cement grout to permeate the sand in the original experiments at the barrage confirmed Professor Terzaghi's observations¹ that cement grouting could not be successfully used in compact sands with an effective size of less than 1.4 millimetre, or in loose sands with an effective size of 0.5 millimetre. The sand at Assiut was considerably finer than either of those limits given by Terzaghi, even for the loose sand.

The Author, in reply, said that the remarks of Mr. I. G. Evans were

Fig. 6.



of interest. No details could be given of the mechanical analyses of the sand. In any case the nature of the sand altered entirely from place to place and from season to season. The collection and examination of samples would entail more time and work than could be given by a limited staff which was more than fully occupied during a condensed and busy construction season. Generally, however, Mr. Evans's remarks bore out the results found in actual practice.

¹ Proc. Int. Conf. on Soil Mechanics and Foundation Engineering, Cambridge, Mass., 1936, vol. iii, Paper M-6, p. 180.