DISCUSSION

ON

"Numerical Computation of Soils Bearing Capacity Factors",

by Y. Ohsaki & A. Hara

(Trans. of A.I.J., No. 111, May 1965)

Discussion by D.R. Narahari* :

The authors have attempted at a numerical evaluation of N_c , N_q and N_γ in Terzaghi's formula using a computer. They compare the computed values with the values given by Terzaghi and find that, for small values of ϕ , Terzaghi's values are higher.

This difference in values is, according to the authors, due to the method of evaluation, graphical in one case and numerical in the other. I have a feeling that it is due to the location of the center of the spiral which, in the present case, is on an extension of the line ad in Fig. 1 of the paper. In Terzaghi's case it is at the edge of the footing, that is, at a because Terzaghi assumes the Prandtl failure zones.

There is ground for my belief because Meyerhof remarks that Terzaghi suggested that the pole of the spiral should be in a line with ad and proceeds to evaluate it. Meyerhof goes a little further and suggests that even such a restriction for the pole offers a restraint and does not minimize the bearing capacity.

I agree with the authors that for practical purposes the difference is insignificant but, at the same, that I would like the blame or praise placed on the right shoulders.

Closure by Y. Ohsaki**

The writers wish to thank Mr. D.R. Narahari for his critical review of their paper and for his interesting discussions.

As to the location of the center of logarithmic spiral in question, the writers have not been able to find any detailed description by Prof. K. Terzaghi himself, except that, as a procedure for evaluating one of the bearing capacity factors, N_γ , in Art. 45 of his Theoretical Soil Mechanics (1943), p. 124, he refers to Art. 39 in which he states the center is located on the line ad , p. 109.

He also states on p. 110 of the same book that the step consists in repeating the investigation for other spirals through b which intersect the plane ad at different points. This fact has lead the writers to an imagination that Prof. Terzaghi took the procedure of repetition for different spirals similarly in determining the bearing capacity factor N_γ given in his Fig. 38 and the writers have proceeded to imagine that he must have tried the case in which the center is located on the extension of the straight line, whereas he does not mention this matter anywhere explicitly.

This imagination, in turn, has created a feeling that Prof. Terzaghi and the writers made a completely same computation in different methods and the discrepancy of results, if any, may be due to the accuracy of evaluation.

However, this view-point is based on nothing more than an imagination which there is no means to confirm at the present time; therefore, Mr. Narahari's discussion on this subject is very instructive and highly appreciated.

In addition, the writers believe their standpoint will be understood that, under the assumption of the wedge angle equal to ϕ , the pole of spiral should be located not on the line ad but on its extension, with the point a inclusive, since the location on the line ad makes the spirals at both sides interwoven in the vicinity of point b as shown in the figure, which is inconceivable in reality.

As to Prof. G.G. Meyerhof's suggestion as referred to by Mr. Narahari that the location of pole should not be restricted on the line ad to minimize the bearing capacity, the writers have not adopted it in their analysis because the deviation of the pole from the straight line ad violates the tangential continuity of the sliding surface at the point d .

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