7th European Conference on Soil Mechanics and Foundation Engineering, Brighton (England), Sep.1979, vol.IV, pp.253.

and if, in fact, such values had been used in the first place for comparison with settlements it is doubtful if overburden corrections would ever have been introduced into settlement calculations. They are unnecessary, unless some changes in overburden stress take place after the site investigation and before construction.

*7.15 C.P. WROTH (UK)**
My remarks are fairly simple. Yesterday we had a most elegant demonstration from Professor Oveson on the very problem of settlement of a surface load on sand and the great importance of dimensional analysis. Could I make an appeal to all people thinking about settlements of sand to plot their information, if possible, in dimensionless variables.

7.16 J.D. NIEUWENHUIS (The Netherlands), General Reporter
Many of the points which have just been discussed are now established facts. However, it is good to hear them restated. One thing which was outside the mainstream of discussion was the contribution of Dr. Singh, in which he introduced a somewhat new way of looking into density by using the conductivity of a sand. There are other ways of doing this - for example by gamma radiation or by electrical conductivity etc. I have the impression that Dr. Singh's method is interesting but of course the presence of water will interfere with the method, and to interpret the results the degree of saturation would need to be known. In the second place, I think it will be very difficult to distinguish density variations with respect to depth because it is difficult to isolate these instruments to measure the conductivity of narrow bands say of 10 cm or 20 cm thickness. Apart from that I agree with him that he is measuring in some way a pretty disturbed density.

7.17 J. BUSBRIDGE (UK)+
In any discussion on the interpretation of test results, it is important to realise the range of potential errors associated with the test itself. Abrupt variations in geology in the United Kingdom and a high frequency of occurrence of dense gravels preclude the use of the static cone penetrometer in many cases. In most projects, design parameters for granular deposits are obtained from the standard or dynamic cone penetration test.

Figure 24 shows a plot of dynamic cone penetration test results obtained by the same site investigation contractor during two investigations at the site of a swing-span bridge. The first investigation was carried out in 1969, and the second in 1974. The tests were carried out in two layers of sand and gravel occurring between the levels - 12m and - 16m, and -21m and -27m O.D. Underlying the lower layer is chalk while the upper layer is overlain by soft alluvial deposits. 5m of boulder clay occurs between the granular layers. The river bed level is about -2m O.D.

The discrepancy between the two investigations is remarkable with the 1974 results about half of those obtained in 1969. A very careful check on the testing procedure being adopted indicated that the 1974 results were probably the more representative. This was later confirmed by static cone penetrometer tests which gave equivalent N values, in the sand and gravel, of between 15 and 25.

The bridge in question is sensitive to differential settlement because of tolerance requirements of the opening mechanism. The lower penetration resistance and hence relative density of the sand and gravel meant that piles had to be adopted for the pier foundations.

Similar discrepancies in the results of dynamic penetration testing have been reported previously (e.g. Escario 1976) and the test obviously requires very careful attention to be paid to the equipment and procedures adopted.

Current practice of adjusting the 'N' value to take account of overburden pressure or merely dividing the Terzaghi and Peck settlement value by a factor, as suggested by Dr. Parry, lead to more realistic predictions of settlement. While this must be considered an improvement it places greater significance on the reliability of the test results.

*7.18 V.F.B. DE MELLO (Brazil)**
With regard to Mr. Jorden's statement and Dr. Parry's discussion I feel impelled to submit the interjection that so very much additional data exists regarding efforts to correlate footing settlements with SPT values (e.g. Conference on Settlement of Structures, Cambridge 1974) that one might, with due respect, set aside the well-intentioned and gratefully received early recommendations of Terzaghi-Peck as "prescriptions" (which they were, cf. Peck, (1971) and not as correlations. Indeed, the pricipal troubles arose when the intent shifted towards correlating SPT directly with relative densities and overburden stress. Since there is no theorizable justification for such a correlation to be general, indeed Dr. Parry's proposal to correlate directly the lumped parameters of SPT and settlement, may well prove more fruitful on an average, without any corrections; and such an agreement need not imply any interpretation (viz. Parry's 1978) inserted into the Terzaghi-Peck data or presumed correlations. However, many a pitfall will still interfere in individual cases of predictions by such a direct correctionless correlation procedure, principally because in preloading and OCR conditions, settlements are significantly annulled whereas SPT values, predominantly related to lateral stresses and friction, do not change preceptibly (cf. de Mello (1975)).

B: THE BEHAVIOUR OF FILTERS

7.19 L. WITTMANN (FRG)
In the case of extreme hydraulic boundary conditions (cyclic loading) the hydraulic judgement of filter design is reducing the well-known filter ratios to geometrical safe values, which can be determined, following the concept of paper b42. As for this comparison no measurements of pore-size-distribution have been performed, the mean pore-size-diameter $\overline{d}_p$