

Rate of settlement under two- and three-dimensional consolidation

DAVIS, E. H. and POULOS, H. G. (1972). *Géotechnique* **22**, No. 1, 95–114.

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The Authors note that the Writer applied the simple diffusion theory to sand drain consolidation theory (Barron, 1948) and that a method including the use of soil stress-strain properties would be a closer approximation. The Writer strongly agrees. When the Writer developed his ideas the diffusion theory was the only one known to him. The influence of stress-strain properties was recognized but not included.

The Writer has suggested that such conditions be included in sand drain theory and has indicated that this should be done (Barron, 1970). Radial seepage forces will tend to strain the soil which might result in a non-uniform water content in the soil mass at the completion of consolidation.

The mathematics of this more realistic approach may be difficult to accomplish and it may be necessary to resort to the finite element method.

REFERENCES

- Barron, R. A. (1948). Consolidation of fine-grained soils by drain wells. *Trans. Am. Soc. Civ. Engrs* **113**, 718.
 Barron, R. A. (1970). Discussion on Foundation precompression with vertical sand drains. *Jnl Soil Mech. Fdns Div. Am. Soc. Civ. Engrs* **96**, SM5, 1831.

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The Authors agree that a Biot type solution to the sand drain problem is desirable. A colleague of the Authors', Dr J. R. Booker, has developed numerical or semi-numerical methods of solving the Biot theory and it is hoped to use these methods for the sand drain and other problems shortly. There is a possibility that such an investigation may offer at least a partially alternative explanation to the effects previously attributed to smear with sand drains.

Anisotropic elastic parameters for soil

PICKERING, D. J. (1970). *Géotechnique* **20**, No. 3, 271–276. Discussion (1971) **21**, No. 2, 181–183; (1972) **22**, No. 1, 183–185.

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In the discussion by Chowdhury and King (1971), they stated that the necessary conditions for the volumetric strain having the same sign as the mean applied stress are

$$\mu_{yx} < 0.5 \quad \mu_{xx} < 1 - \frac{E_x}{E_y} \mu_{yx} \quad . \quad . \quad . \quad . \quad . \quad (1)$$

In Pickering's (1971) reply, he proved that these conditions are neither necessary nor sufficient for soils falling within the range of possible cross-anisotropic elastic materials. Further, in Chowdhury and King's (1972) discussion, they explained that their conditions were valid on the assumption that all stress components are of the same sign. In the technical note by