Authors' reply

We are grateful to Mr Howells for pointing out an inconsistency in the example. For the purposes of analysis indeed the scaling which was used gave an angle of 30.5° in the original paper of Whitman's which, on re-checking of the diagrams, should have been closer to 29.5° . The results of the analysis would probably have yielded an answer closer to that of Whitman if 29.5° was taken. In both cases the finite element analysis indicated what one would suspect indeed here, i.e. the surface type of failure.

We believe that perhaps the fact that the deep-seated failure which was investigated by Whitman and which gave the same factor of safety as that obtained by the surface failure was rather coincidental and it is rather surprising to see the wide variety of answers obtained with other approximations. We should have probably chosen an example in which the failure was deep-seated and it is our belief that here the finite element process would result in much more consistent answers than those involved in the approximate analysis.

Mr Howells' remarks about bounds and indeed the uniqueness of failure conditions allow us to repeat that these exist only in associative plasticity. If the flow rule is not associative it is possible to find situations which satisfy equilibrium conditions and also give a mechanism without providing the correct collapse load. It was indeed one of the objectives of our Paper to make such possibilities clear—and we hope that the message has been conveyed by the various examples.

The influence of the membrane restraint on the measured strength of a soil sample failing along a single shear plane in the triaxial test

PACHAKIS, M. D. (1976). *Géotechnique* **26**, No. 1, 226–230.
Discussion by Mirata (1976). *Géotechnique* **26**, No. 3, 539–540.

Author's reply to discussion by Mirata

Mirata suggests that the reaction P_r on the shear plane due to the membrane restraint should be taken inclined to the normal to that plane at the angle of shearing resistance ϕ , i.e. with a component on the shear plane resulting from the frictional resistance of the soil. As a result of this analysis Mirata proposes for the correction of the deviator stress an expression of σ_{1m} which, apart from the vertical component of the membrane restraint, includes also a vertical component of stress which is due to the shear strength of the soil that the test is intended to measure. This, in my opinion, is not correct because, by subtracting the so obtained value of σ_{1m} from the uncorrected deviator stress, one is obviously under-estimating the strength of the soil.

dust jacket indicate that the book is directed at a professional market but that it will also be relevant to students and lecturers seeking illustrative teaching material.

The brief opening chapter of the book presents an historical background to engineering geology, soil mechanics and rock mechanics together with sections on the present-day role of engineering geology and site investigation. The remaining seven chapters cover reservoirs and dams, underground works, bridges, communications, building foundations, coastal works, and tip failures in South Wales. Each case history, most of which have been published before and of which there are 112 examples, is treated in a similar manner, typically with short sections covering an introductory description of the scheme, the site investigation, construction history and a brief statement of 'significant aspects'. The style of writing is concise, units are generally given in both SI and imperial systems, and the authors have clearly been at some pains to ensure as consistent a level of approach as practicable; there are several line drawings and some photographs which have not reproduced well.

However, in such brief presentations, the authors must inevitably be selective, not only in the examples chosen, but also in the material drawn upon. It is perhaps most surprising that the failure of the Malpas dam is not described in view of the major developments in geo-technical engineering which arose as a direct consequence of this disaster. The distillation of experience gained from each case is presented in the summary of 'significant aspects' and it is possibly here that the book loses its opportunity for impact. One might have expected reference, in the relevant summaries, to shear zones at Mangla, swelling mudstones at the Orange-Fish Tunnel, debris-flow behaviour at Turtle Mountain, armouring stone for the Port Talbot Breakwater or stress relief at the Grand Coulee dam. However, these points are not referred to in the summaries, and only mentioned in a few of the case histories, despite the fact that they were important, if not primary, issues as far as the engineering geology of the relevant example is concerned. In view of the chronological order of presentation of the cases described and the inevitable problems of material selection, it is perhaps somewhat regrettable that the authors did not provide any associated text, drawing together the critical aspects of the cases reviewed into a logical whole. Such an addition would have both demonstrated the wisdom of their choice of material and highlighted the more important geological factors which influence the engineering behaviour of rock, soil and water.

Nevertheless, the book will be of value to those looking for an overview of the field, although it may be desirable in many cases to return to the primary source material.

J.L.K.

Corrigenda

Soil compaction by impact. *Géotechnique* 25, No. 1, 19–30.

The expression immediately following eqn (10) on page 25 should read:

$$F = \left[1 + \frac{2k\rho(V-v)}{m}t - \frac{k\rho\sigma^2}{m^2}t^2 \right]^{1/2}$$

Independent stress control and triaxial extension tests on sand. *Géotechnique* 26, No. 4, 551–576.

Pages 559 and 569: Figs 6 and 14 should be transposed; the captions are correct as they appear.