

Section 4 – Field tests

IX Background to field testing

Compared with other branches of engineering, the key material properties in geotechnical engineering need to be measured, instead of being specified or specially fabricated; they vary much more widely and are known with much less accuracy. (Wroth and Houlsby, 1985)

It is not possible to take soil from the ground and prepare a sample for testing in the laboratory without changing the stress. In general, testing in situ, or “field testing”, reduces the disturbance and frequently allows larger samples to be tested.

The downside of field testing is that the results are less easy to interpret than laboratory tests in which the loading is nearly uniform across the whole sample. Figure 11 illustrates this difficulty for a simple penetration test in which a rod is pushed into the ground. Each of the four soil elements, labelled A–D, contributes to the resistance that is measured during the test. However, the strain in each element is different, making it difficult to relate the measured resistance to either the peak shear strength (around point C on the graph) or the post-peak strength (around point A on the graph). There are other difficulties related to the direction of the principal stresses.

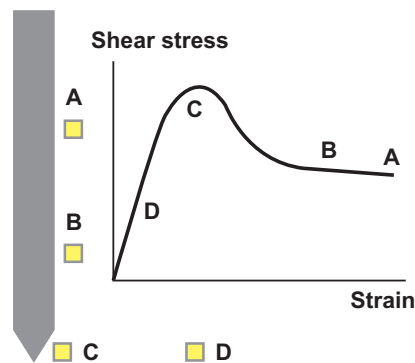
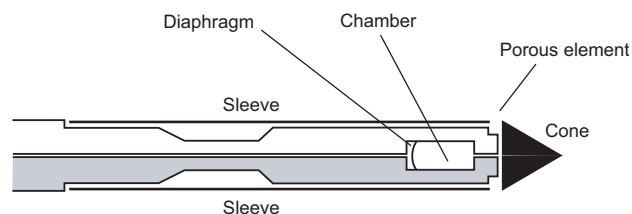


Figure 11 – Simple penetration test

Activity fifteen

a) How might this simple penetration test equipment (discussed further on page 27) be modified to obtain separate measurements for elements A+B and C+D as shown in Figure 11?



b) Is it possible to measure effective stress as well as total stress?

Types of field tests

There are a number of different field tests available; some are routine and some are very specialized. To pick the most appropriate test it is necessary to know the nature of the ground and the nature and quality of the data required. The best test for a particular project is the one that gives the required information with an acceptable degree of accuracy at the lowest cost.