

85 GDS Helpsheet



World Leaders in Computer Controlled Testing
Systems for Geotechnical Engineers and Geologists

Hardware

Continuous Surface Wave System

Interpretation of Results

1. Introduction

1. The system measures maximum shear modulus, G_{max} . The method of measurement averages the value of G_{max} over a depth of about one wavelength. The value of G_{max} is assigned to a depth of 1/3rd wavelength where the energy of the Rayleigh wave is a maximum - this is called the factored wavelength method of assigning a stiffness value to depth. This has been shown to be a good approach where stiffness increases uniformly with depth.
2. The value of G_{max} is known to be close to the operational stiffness, G_{op} , as shown in Fig.1. The ratio of G_{op}/G_{max} is in the range 0.5 to 0.8 for soils and near unity for sands and soft rocks.

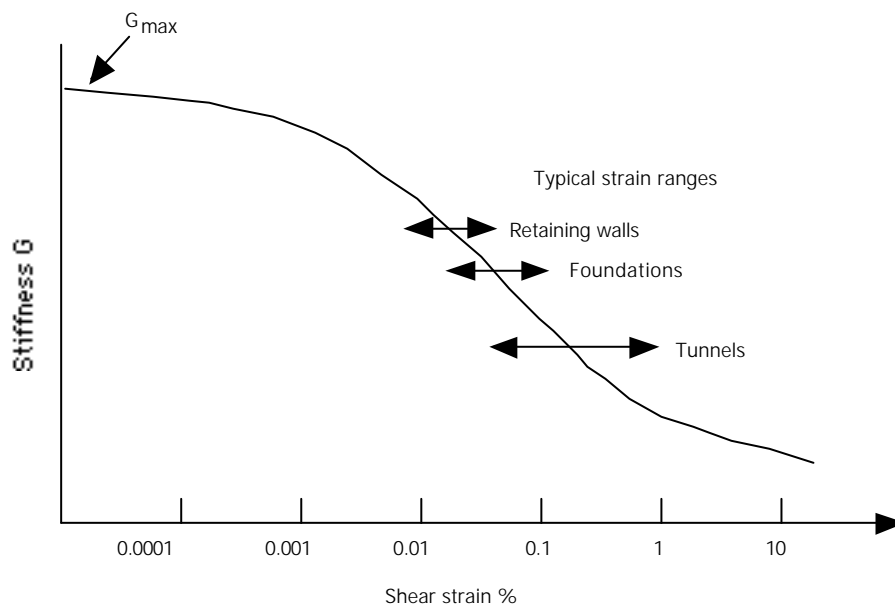


Fig 1. Approximate strain limits for reliable measurement of soil stiffness

3. Because of the inherent averaging of G_{max} , detailed interpretation of complex layered ground requires further analysis. We are developing an interpretative software package which will be available later this year.
4. For good quality results it is necessary for the ground to be horizontally layered to at least five times the distance of the furthest geophone from the source. Where vertical barriers (e.g.

retaining walls, cuts) exist the results can be effected by reflections from these discontinuities - this can often be noted by a discontinuity or sinusoidal variation in the phase shift v. frequency plot..

5. Where a large amount of site noise is present this can cause scatter in the results. This can best be seen from the plot of phase shift v. frequency. If this data does not form a smooth curve you will see scatter in the stiffness v. depth plot.
6. The CSWS system does not replace all other site investigation techniques. It can be used in addition to these techniques to improve speed and cost effectiveness of site surveys. In some cases the CSWS system is the most accurate method of in-situ measurement of stiffness. The system is also particularly useful for before and after surveys to monitor changes in ground condition with time or with some ground improvement process.