GeoTesting EXPRESS

Technologies to manage risk for infrastructure

Resonant Column and Torsional Shear Test

Capabilities of GeoTesting Express' RC/TS System

The resonant column test is used to measure shear modulus (G) and the damping ratio (D) at small shear strains. These values are a function of strain level. In the test, the strain level is increased step-by-step and the shear modulus and damping ratio are measured. The result of the test is a relationship between shear modulus and shear strain and between damping ratio and shear strain over a shear strain magnitude of 10^{-4} to 10^{-1} percent.

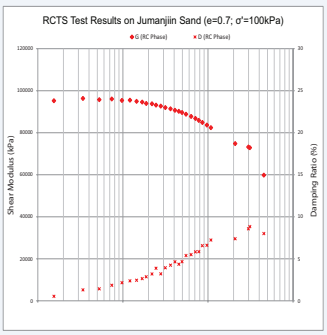
The strain levels of the RC/TS tests are typical of those for normal operations of constructed facilities. Higher strain levels associated with extreme loads such as earthquakes and wave loading cannot be achieved by resonant column testing. GTX's device switches to torsional shear for higher shear strains. The torsional shear phase can be run to obtain shear modulus and damping up to shear strains of 10%.

GTX can also subsequently shear the specimen to failure, in torsional shear or in normal triaxial compression. The device also permits GTX to run cyclic torsional shear to measure the liquefaction characteristics of a soil. Specimens can be consolidated isotropically or anisotropically.

A typical RC/TS test on a specimen involves the following steps:

- Consolidate to the first stress condition
- Measure of G & D versus shear strain at end of primary consolidation and at 3 times during secondary consolidation
- Run torsional shear or triaxial compression test to measure shear strength of the specimen
- Consolidate to the second stress condition
- Repeat above to final stress condition
- Run torsional shear test to 10% strain to measure G & D for higher shear strain levels

Typical data for G vs. log shear strain



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Typical Data Results from GeoTesting Express' RC/TS System

Our devices are updated versions of the Drnevich test apparatus. We have increased the torque that can be applied to achieve shear strains up to 0.5% in resonance.

Pricing for the test depends on the number of times during secondary compression at which G and D are to be measured, the number of consolidation stages to be run, the time it takes for the specimen to consolidate and whether a torsional shear or triaxial compression test is run at the end of resonant column testing.

Typical data for Damping ratio vs. log shear strain