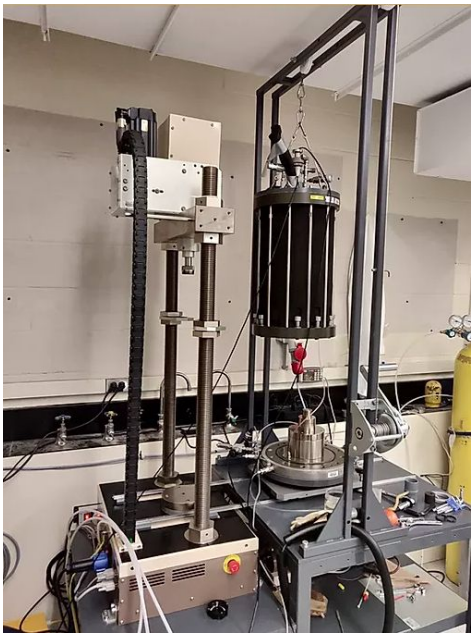
Sustainable Geotechniques Laboratory



Thermo-Hydro-Dynamic Triaxial System

The GDS Thermo-Hydro-Dynamic Triaxial Testing System is a dynamic triaxial system, based on an axially-stiff load frame with a beam mounted electro-mechanical actuator with the capacity of exerting force up to 10kN and a dynamic force with a frequency of 5Hz or less with multiple waveforms.

The system is capable of applying temperature ranging from -20°C to 100°C, due to the use of oil as confining fluid instead of water. The cell is thermally insulated and can withhold a pressure of 2.0 MPa.

The instrument was acquired through the Defense University Research Instrumentation Program (DURIP).

ThermoGravimetric Analysis (TGA)

ThermoGravimetric Analysis or TGA is an analytical instrument used to measure thermal stability of specimens.

TGA Q500 has a resistance wound heating quartz lined furnace which can reach to 1000°C with accuracy of 0.1°C. It is equipped with ultra sensitive mass balance with sensitivity of 1 micro gram and low draft nitrogen input along with option to analyze output gas to determine the product of decomposition. It comes with an autosampler which can load up to 16 samples per tray.

X-ray characterization and analysis

X-ray diffraction (XRD) pattern gives valuable information about the composition and structure of the material. It is a non-destructive, non-intrusive characterization method.

XRD gives us information about the elements present, minerals found, different phases of the minerals as well as crystallinity of the sample as well as crystal structure. It gives a great insight in studying about the microstructures of the specimen.

Quantachrome NOVA 2200

NOVA is a surface area and pore size analyzing instrument. It features 2 degassing chambers with heating jackets capable of reaching > 300 °C and 2 analyzing chamber. It is capable of analyzing BET surface area and pore size of specimen.

It uses nitrogen as adsorbate to measure pore sizes up to 4 nm small and liquid nitrogen as coolant. Nitrogen can be replaced with carbon dioxide to detect even smaller pores in 0.4-4 nm range. It detects micro and mesopores, is a non-intrusive, non-destructive method

Humidity and temperature control

A temperature & humidity control chamber is used to maintain moisture content in saturated samples for storage over a long period of time.

A Freeze/thaw chamber is used to dry samples at a constant temperature to reduce the impact of ambient temperature on the results.