Hochschule RheinMain
University of Applied Sciences
Wiesbaden Rüsselsheim

Geotechnical Laboratory of RheinMain University of Applied Sciences

Overview

The Geotechnical Laboratory of the RheinMain University of Applied Sciences is equipped with state-of-the-art, fully automated geotechnical equipment. With these facilities we are able to carry out standard and advanced soil testing in the laboratory as well as in the field, for private, industrial and public clients. Besides the geotechnical equipment there are many items available such as journals, pictures, geological maps and a lot of geotechnical films.

The laboratory is open to students, who are doing their geotechnical laboratory course, working on their bachelor's/master's thesis, or other tasks associated with geotechnics.

Geotechnical laboratory course

The main tasks in the laboratory are geotechnical laboratory courses. The geotechnical laboratory course imitates the real conditions in the working world. The students have to write a Geotechnical Report on a construction project. In the first phase they are requested to plan the geotechnical field investigation on their own: This includes the evaluation of the geological map and a site survey. This is followed by field explorations, where they perform a small-scale drilling (7 m) and a Dynamic Probing Heavy DPH in a group of 4 to 5 people. Still on site they identify and describe the soil samples. The samples will be taken into the laboratory and examined at the next appointment.

Typical tests performed by students in this laboratory are:

- determination of particle size distribution (sieving and sedimentation)
- natural water contents
- determination of Atterberg limits
- Proctor test
- water permeability
- incremental loading oedometer test
- direct shear tests

Projects

Additionally we are also running some more projects here, such as bachelor's theses, master's theses and other research projects.

Research

We are currently researching tropical soils from Nigeria with respect to compressibility and shear strength.

25.09.2018

Equipment

1

Universal Testing Machine - Geomation

- ELS25 precision electro-mechanical drive for closed-loop load-, displacement-, speed- and stiffness-controlled testing, max. 25 kN
- Shear facility SSD5 max. 5 kN
- serial interface for PC-controlled testing with data logging using a standard-PC with the software GeoDESC

For tests:

- Unconfined compression test (DIN EN ISO 17892-7)
- Incremental loading oedometer test (DIN EN ISO 17892-5)
- Direct shear tests (DIN EN ISO 17892-10)

2

Direct shear device - Moser

- Shear frame with shear load max. 5 kN, distance measurement and controlbox
- vertical loading via lever system up to max. 15 kN

Tests:

- Incremental loading oedometer test (DIN EN ISO 17892-5)
- Direct shear tests (DIN EN ISO 17892-10)

3

Oedometer with water permeability measurement

- 2 Compression cells
- mechanical loading via lever system up to max. 15 kN; electronic data collection; Water tank with burettes for measuring the hydraulic pressure

tests:

- Incremental loading oedometer test (DIN EN ISO 17892-5)
- Determination of permeability by constant and falling head (DIN EN ISO 17892-12:03-2018)

4

Determination of permeability

- Test bench with a 5 m long plexiglas tube to generate the hydraulic pressure.
- Water pump for maintaining a constant water level;
- cylinder with drainable cover plates

test:

- Determination of permeability by constant head (DIN EN ISO 17892-12:03-2018

5

Automatic Proctor device

- Proctor device for performing Proctor tests DIN 18127
  with Proctor molds:
  100mm, 150mm, 250mm diameter

6

Liquid Limit Device

- Consistency (Atterberg) limits - Part 1: Determination of liquid limit and plastic limits DIN EN ISO/TS 17892-12

7

Sieve analysis (mechanical shaker)

- Sieving machine with 12 Analysis Sieves with Diameter D = 20 cm
- Ultrasonic device for cleaning the test sieves

test:

– Determination of particle size distribution (ISO 17892-4:2016);

8

Areometer und sieve set for hand sieving

Areometer equipment: electric suspension mixer, glass cylinder D = 6 cm, plastic stoppers, electronic thermometer;
6 sieves D = 12 cm, mash from 0,06 mm to 2 mm for the hand sieving

test:

Determination of particle size distribution EN ISO 17892-4

9

Enslin-Neff device

Test: DIN 18132
Determination of water absorption

10

Scheibler-Gasometer

Test: DIN 18129
Determination of lime content

11

Equipment for determination of maximum and minimum density

DIN 18126 Determination of density of non-cohesive soils for maximum and minimum compactness

12

Gas pycnometer

DIN EN ISO 17892-3: Determination of particle density

13

Muffle furnace

DIN 18128 Determination of ignition loss

14

Pycnometer

DIN EN ISO 17892-3: Determination of particle density

15

Automatic press out device

For press soil samples and asphalt bodies D = 96 mm and D = 150 mm out with equipment for undisturbed sampling

16

Retsch – Centrifugal mill

For dry and wet grinding organic and inorganic substances
Grinding fineness approx. 1 µm

17

Test pit with electronically controlled traverse

With this device, tensile and compressive loads (up to 160 kN) can be applied statically and cyclically via control electronics. In our test pit (4 x 4 m²), which is up to 6 m deep, model tests can also be carried out

18

Tension meter

A tension meter is a device used to measure soil water tension or matrix potential.
Measuring range:
+ 1000 hPa (backwater area)
to
-850 hPa (suction pore water

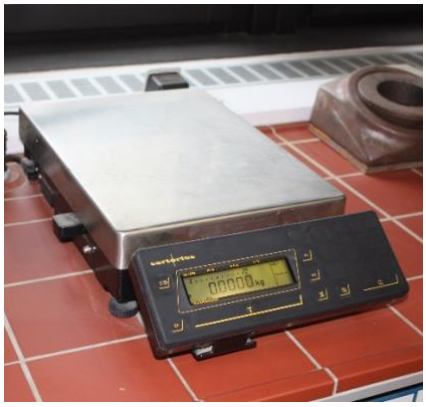
19

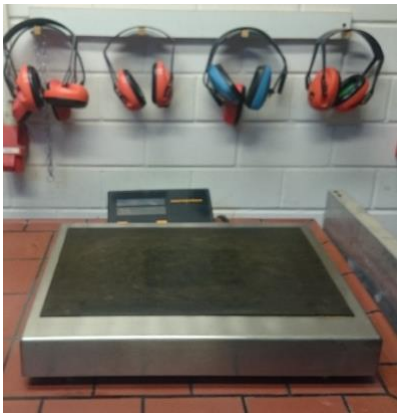
CM – Device; old model

Determining Water Content in Soil within Calcium Carbide Method

19

Scales





Electronic scales with a resolution of:
0,0005 g
0,01 g
0,1 g
1,0 g

20

Drying ovens

Convection drying ovens with electronic temperature control
Temperature range: room temperature up to 300 °C