

6. THE COMPRESSIBILITY OF SOILS

The compressibility of soils can be determined performing the so-called Proctor test. Two tests (with different specific compression work) are applied usually ([Figure 1.24](#) and [Video 1.5](#)). Hungarian practice used the standard test earlier but more recently, uses the modified Proctor test.

VIDEO 1.5

Video 1.5: The Proctor test

Performing the modified Proctor test, the prepared soil sample with constant water content is compacted into a standard (1000 cm^3) pot applying standard compression work in 5 equal layers. After compaction the wet density (ρ_w), the water content (w) and the dry density (ρ_d) of the sample are determined. This action is repeated at least 5 or 6 times by increasing water contents and the results of the tests are graphed as seen in [Figure 1.25](#), resulting in the so-called Proctor curve. The results are "good" if the values of the wet and dry densities form a concave curve as a function of the water content. The "top" of the curve is the maximum dry density ($\rho_{d\max}$) determined by the Proctor test.

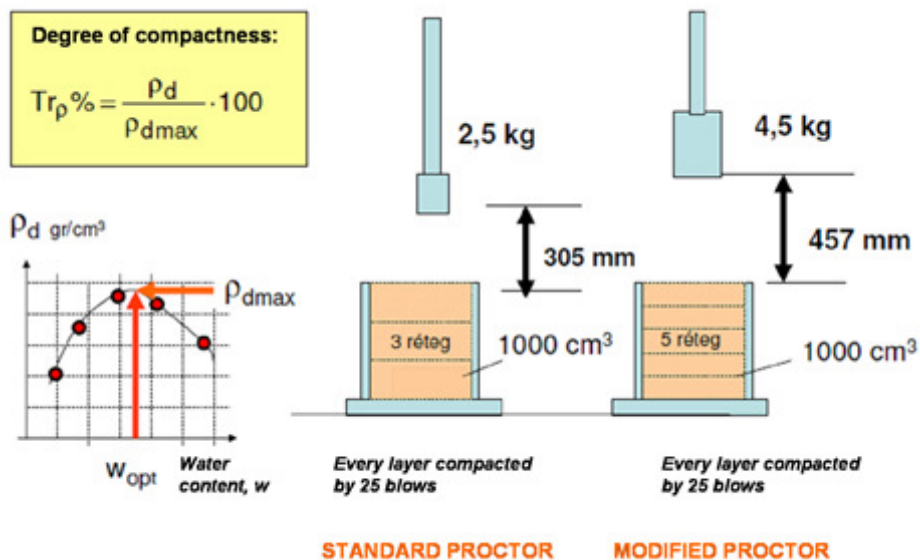


Figure 1.24: The Proctor test and the processing of the results

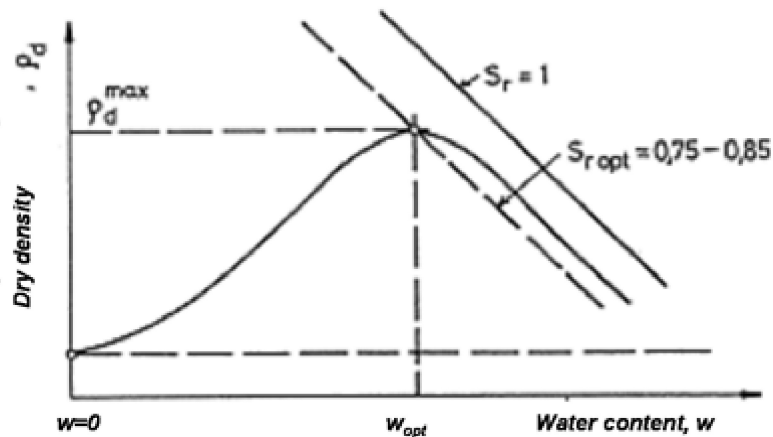


Figure 1.25: The Proctor curve

This method is suitable for the examination of both coarse and fine-grained soils (gravel, sand, silt, clay).

The compressibility of soils depends on the size, the shape of the particles, the quality of their surface, the value of the water content, the rate of compression work, the method of compaction, physical and chemical effects, etc.

It is very important in environmental aspects (by the building in of liner layers) that the compacted soil structure on the dry side ($w \leq w_{opt}$) is different from the soil structure on the wet side ($w \geq w_{opt}$), and this phenomenon affects the sealing capacity of the built liner layer. The optimal lining capacity can be achieved at the wet side, by water contents 3–5% larger than the optimal water content (Figure 1.26).

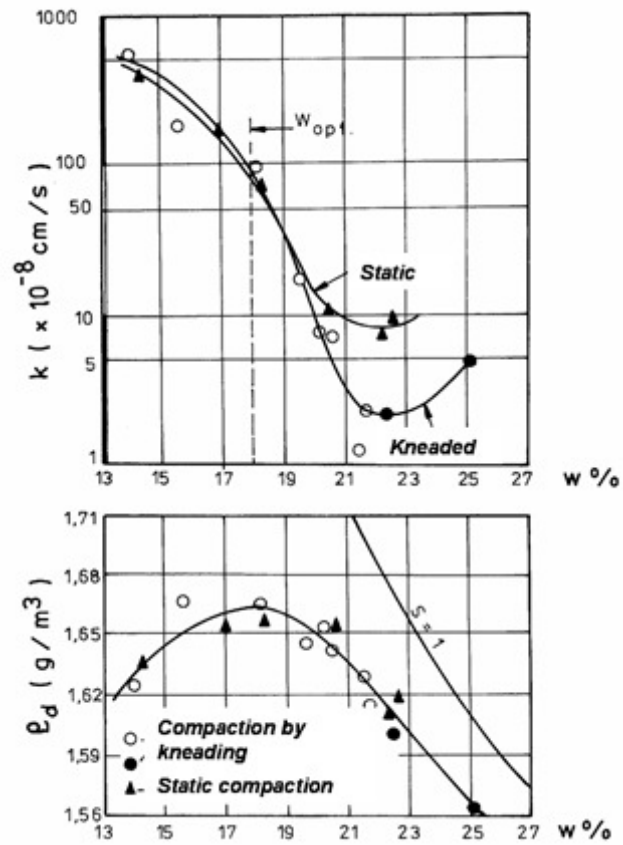


Figure 1.26: The affect of the compaction method and the water content during installation on the hydraulic conductivity of clays (Mitchell et al., 1965)