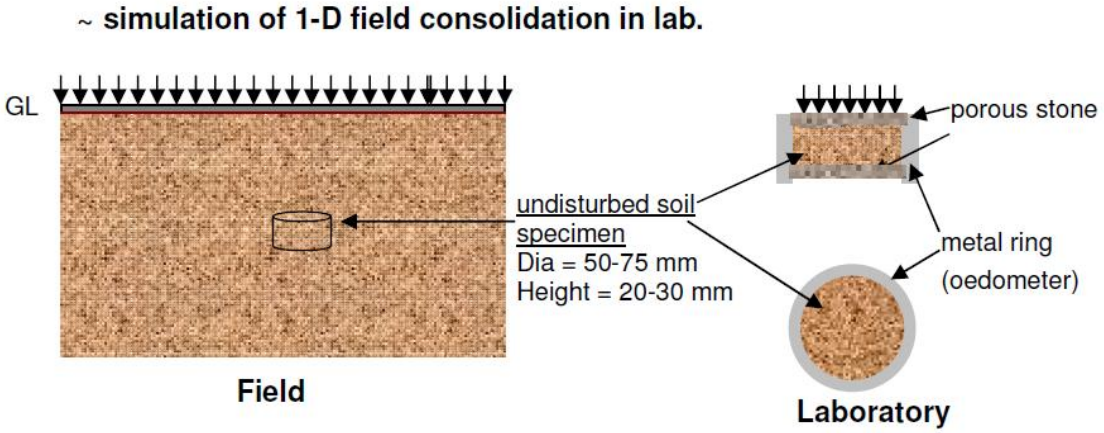
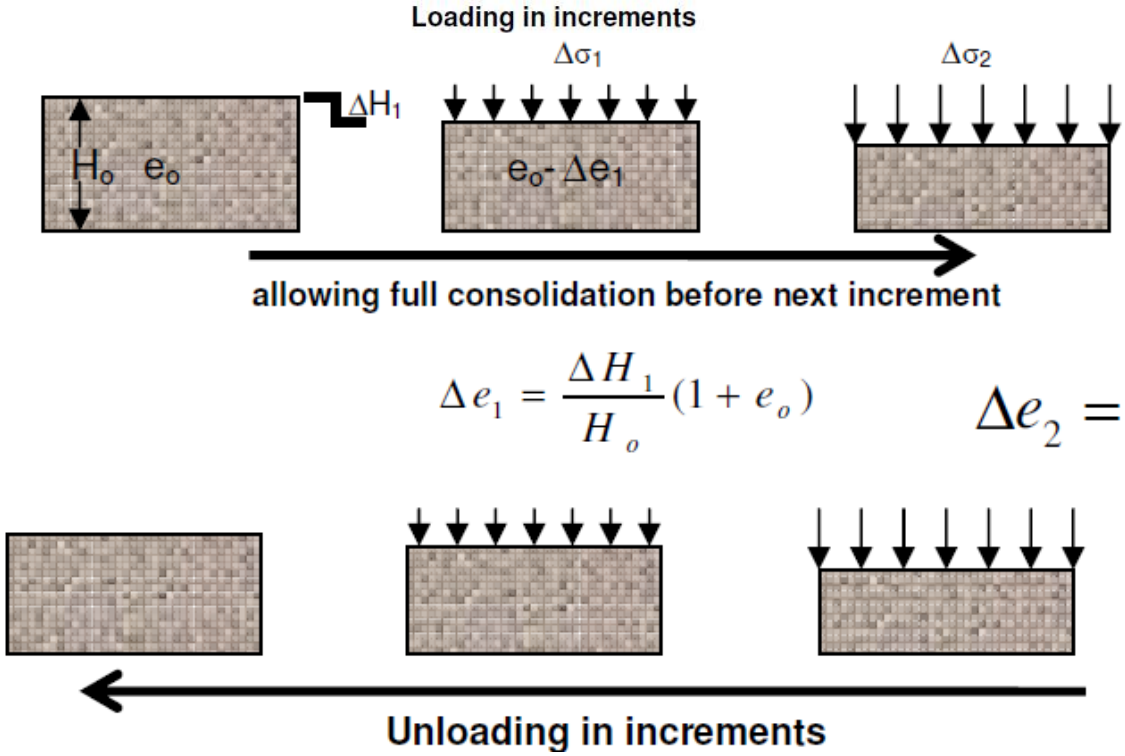
LECTURE 23

Compression of Fine Grained Soil

The compressibility of fine grained soils can be described in terms of voids ratio versus effective stress





$$\Delta e_1 = \frac{\Delta H_1}{H_o}(1 + e_o) \qquad \Delta e_2 =$$

A laboratory soil specimen of dia 60mm and height 20mm is extracted from the undisturbed soil sample obtained from the field. This sample is subjected to 1D consolidation in the lad under various pressure increments. Each pressure increment is maintained for 24 hrs and equilibrium void ratio is recorded before the application of the next pressure increment. Then a plot of void ratio versus effective stress is made as shown in above figure. When the sample is recompressed from point D it follows DE and beyond C it merges along BCF and it compresses as it

moves along BCF

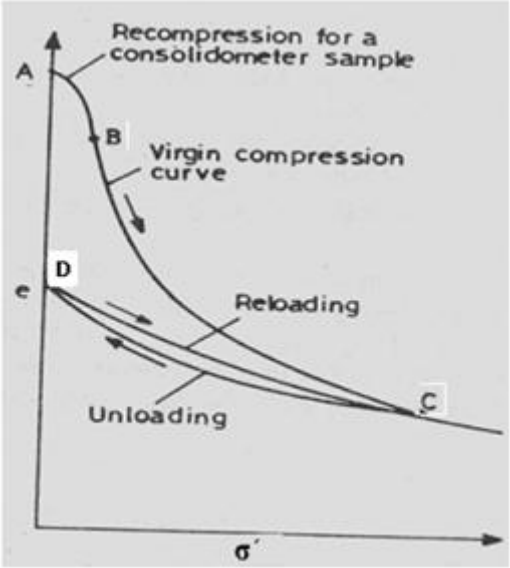


Figure Void ratio versus effective stress(on arithmetic plot)

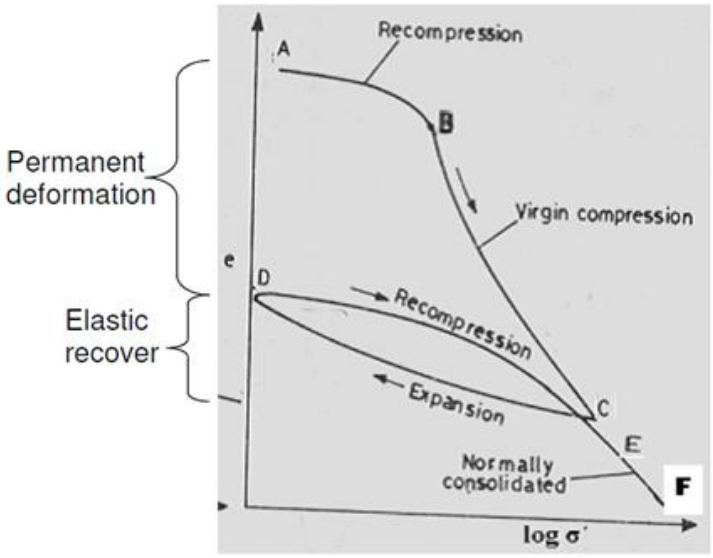


Figure Void ratio versus logarithm of effective stress (semi-log plot)

During the initial stages (at low effective stress) sample follows recompression path (portion AB) and undergoes less compression. Beyond this is the virgin compression line (portion BC) also called the normal compression line and the sample undergoes large compression.

1. BC – Virgin compression curve also called normal consolidation line
2. From ‘C’ when the sample is unloaded, sample expands and traces path CD (expansion curve unloading)
3. Sample undergoes Permanent strain due to irreversible soil structure and there is a small elastic recovery.
4. The deformation recovered is due to elastic rebound
5. When the sample is reloaded-reloading curve lies above the rebound curve and makes an hysteresis loop between

expansion and reloading curves.

6. The reloaded soils shows less compression.

7. Loading beyond ‘C’ makes the curve to merge smoothly into portion EF as if the soil is not unloaded.