UJI LAPANGAN UNTUK KUAT GESER & KOMPRESIBILITAS TANAH

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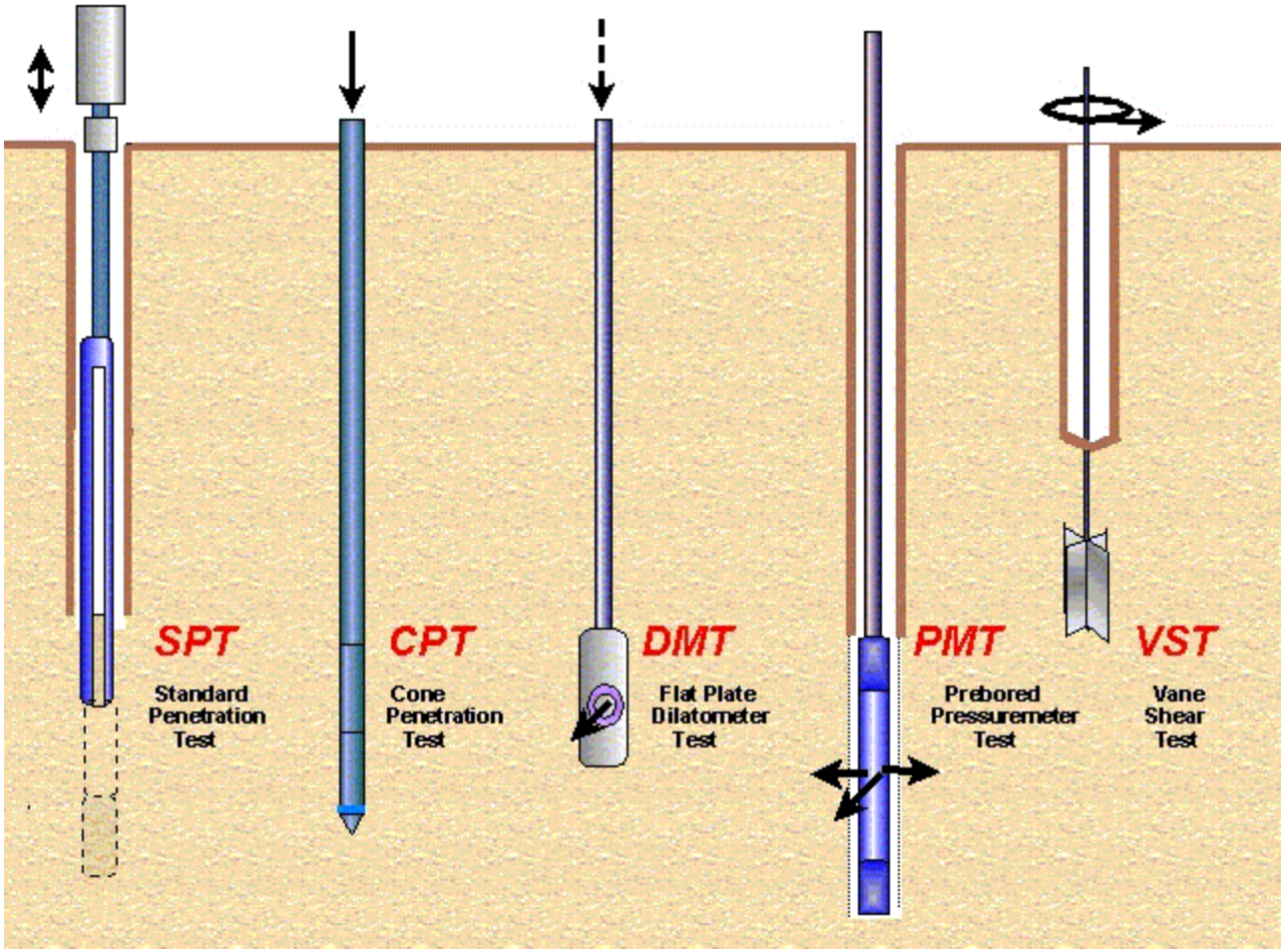
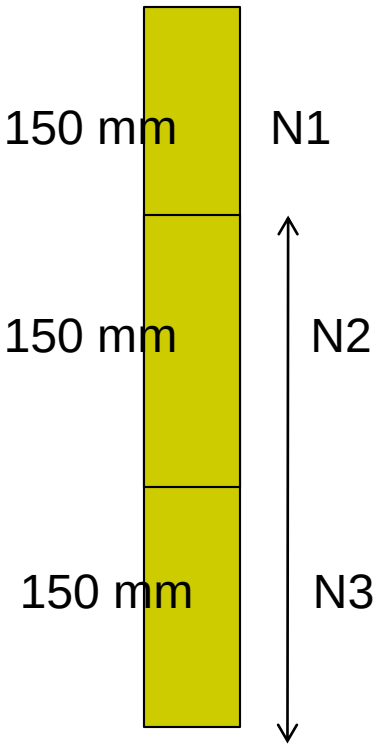
Metoda Pengujian Lapangan

- Standard Penetration Test (SPT)
- Cone Penetration Test (CPT, Sondir)
- Field Vane Shear Test (Uji Baling-Baling Lapangan)
- Pressuremeter Test
- Dilatometer Test
- Plate Bearing Test
- California Bearing Ratio (CBR) Test


SPT
Standard Penetration Test
CPT
Cone Penetration Test
DMT
Flat Plate Dilatometer Test
PMT
Prebored Pressuremeter Test
VST
Vane Shear Test

SPT

- The Standard Penetration Test utilizes a split spoon sample
- As the sampler is driven into the soil, the number of blows required to penetrate each of the three 150 mm increments is recorded separately
- The N-value is the number of blows required to penetrate the last 300 mm
- After the blow counts have been obtained, the sampler can be removed & opened to obtain a disturbed sample for subsequent testing

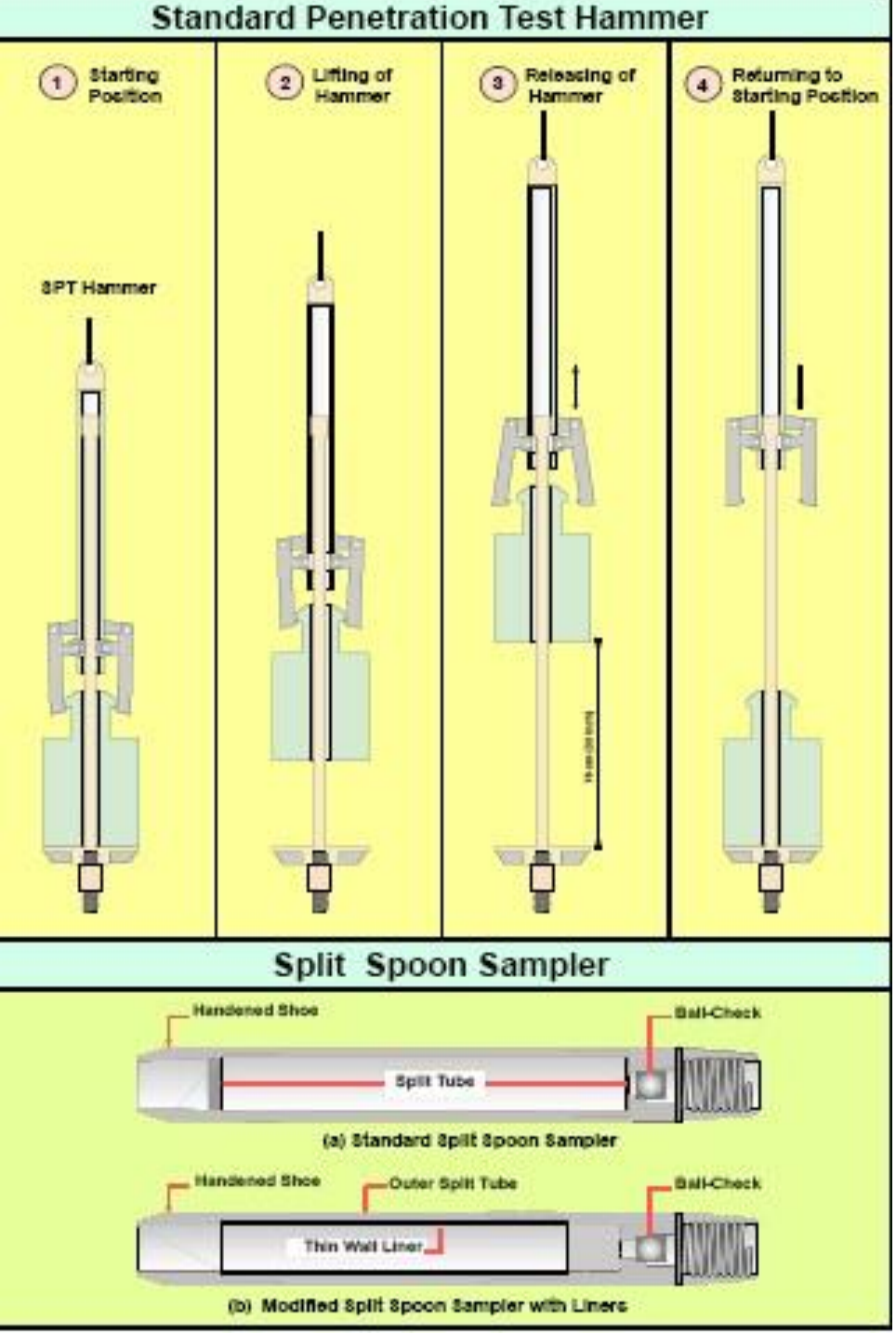


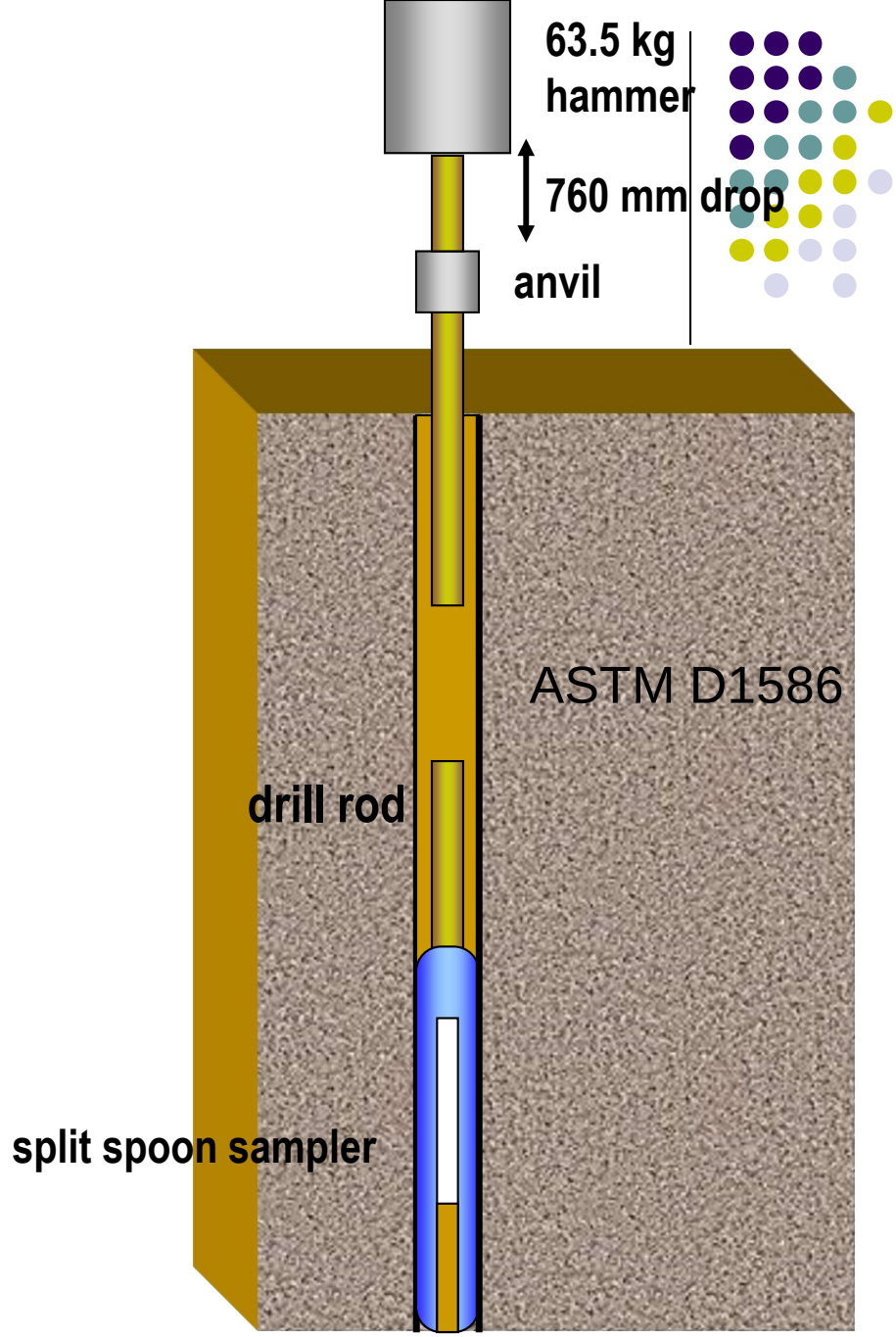
Uji Standard Penetration Test (SPT)

SPT Hammer (63.5 kg)

Split Spoon Sampler

Stang Penghantar Palu SPT


Standard Penetration Test Hammer
1 Starting Position
2 Lifting of Hammer
3 Releasing of Hammer
4 Returning to Starting Position
SPT Hammer
Split Spoon Sampler
Hardened Shoe
Ball-Check
Split Tube
(a) Standard Split Spoon Sampler
Hardened Shoe
Outer Split Tube
Ball-Check
Thin Wall Liner
(b) Modified Split Spoon Sampler with Liners


63.5 kg hammer
760 mm drop
anvil
ASTM D1586
drill rod
split spoon sampler

SPT

The *N*-values can be affected by the following:

- Drill rod lengths
- Presence of liners in sampler
- Borehole diameter

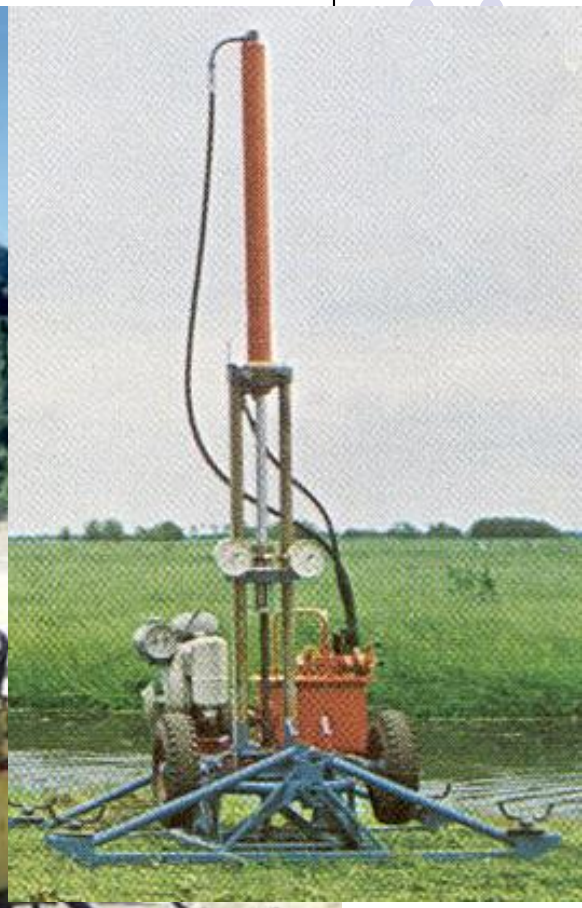
$$N_{60} = \frac{E_m \, C_B \, C_S \, C_R}{0.60} N$$

SPT results are also influenced by overburden pressure (σ_0') at locations where blow counts are made

$$N_{60}' = N_{60} \times (100/\sigma_0)^{1/2}$$

The SPT test should be halted when soil shows some refusal i.e. when more than 50 blows are required to penetrate any 150 mm increment or 100 blows are obtained for 300 mm penetration or if 10 successive blow produce no advance in the penetration.

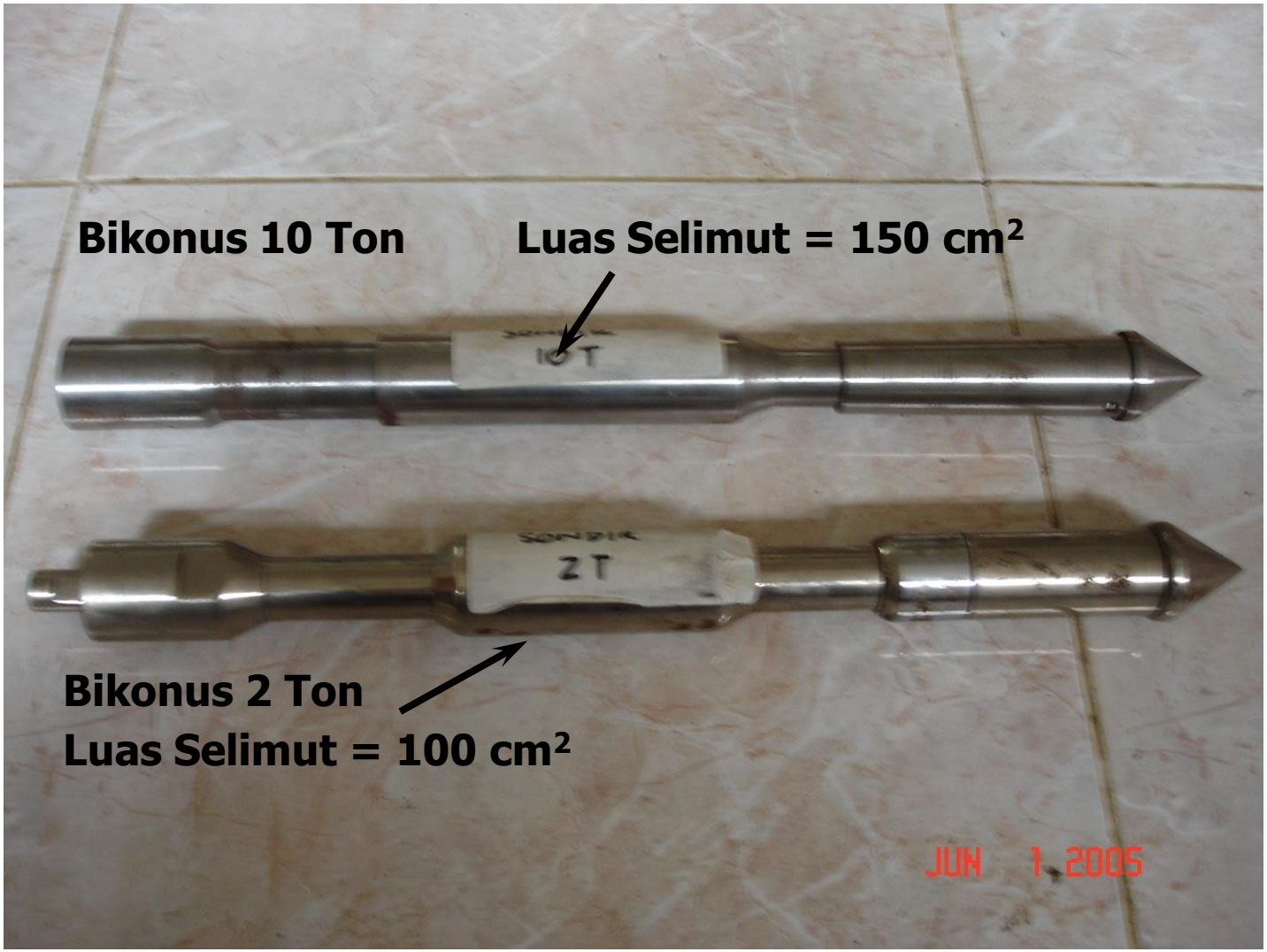
Cone Penetration Test (CPT/Sondir)



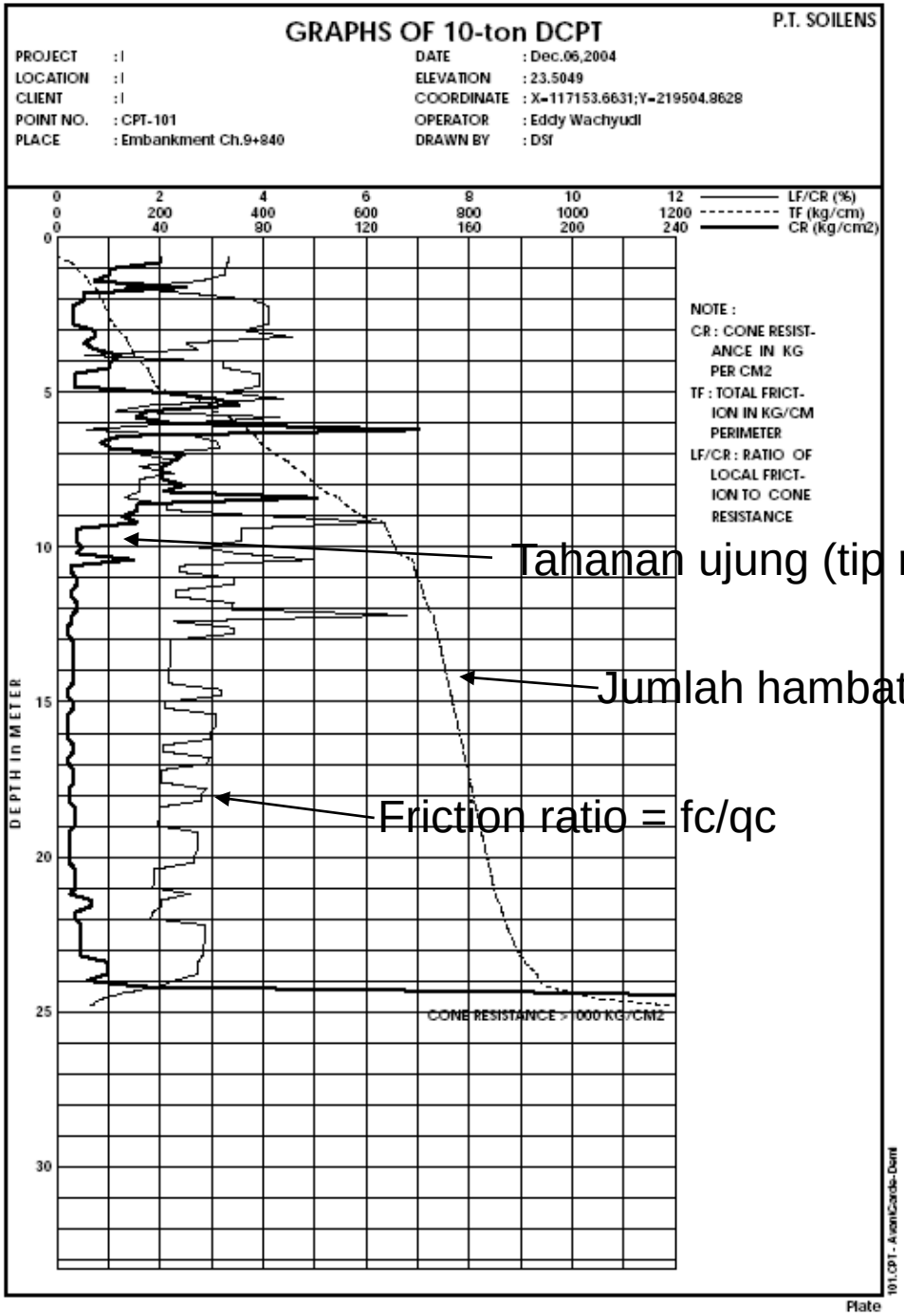
Cone Penetration Test (CPT/Sondir)

- Pada awalnya ditemukan untuk mempredikisi kekuatan tanah Lempung berdasarkan tahanan ujung (tip resistance) dan jumlah hambatan pelekat (JHP)
- Ada 2 jenis: sondir ringan & sondir berat
- Paling banyak dikembangkan untuk pengujian yang lebih advanced seperti pengukuran tekanan pori, seismic, electrical resistivity dll.

Cone Penetration Test (CPT/Sondir)



Grafik Bacaan Sondir



Cone Penetration Test

(ASTM D 3441 and D 5778)

The most advanced and developed in-situ testing currently available is the cone penetration test.

Device:

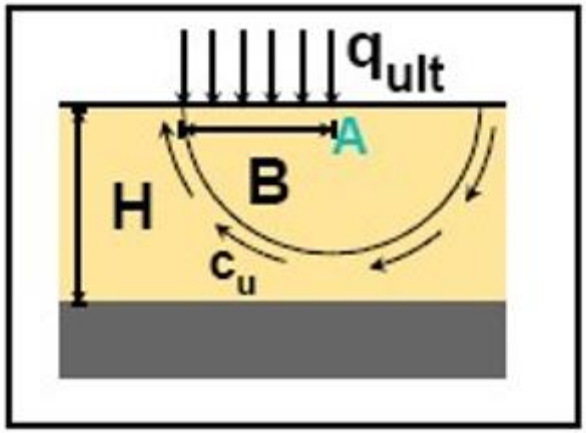
- cone, friction sleeve, piezometer
- some rods
- measuring devices.

Two types of cone

- mechanical
- electrical

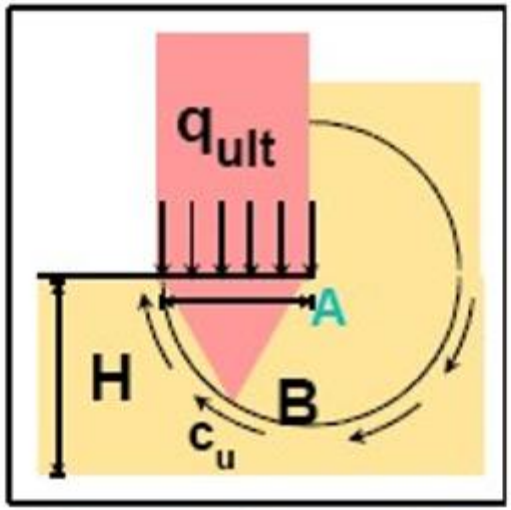
Correlation between resistance & soil types can give valuable information regarding soil type as a function of depth

Cone Penetration Test (Mechanical)

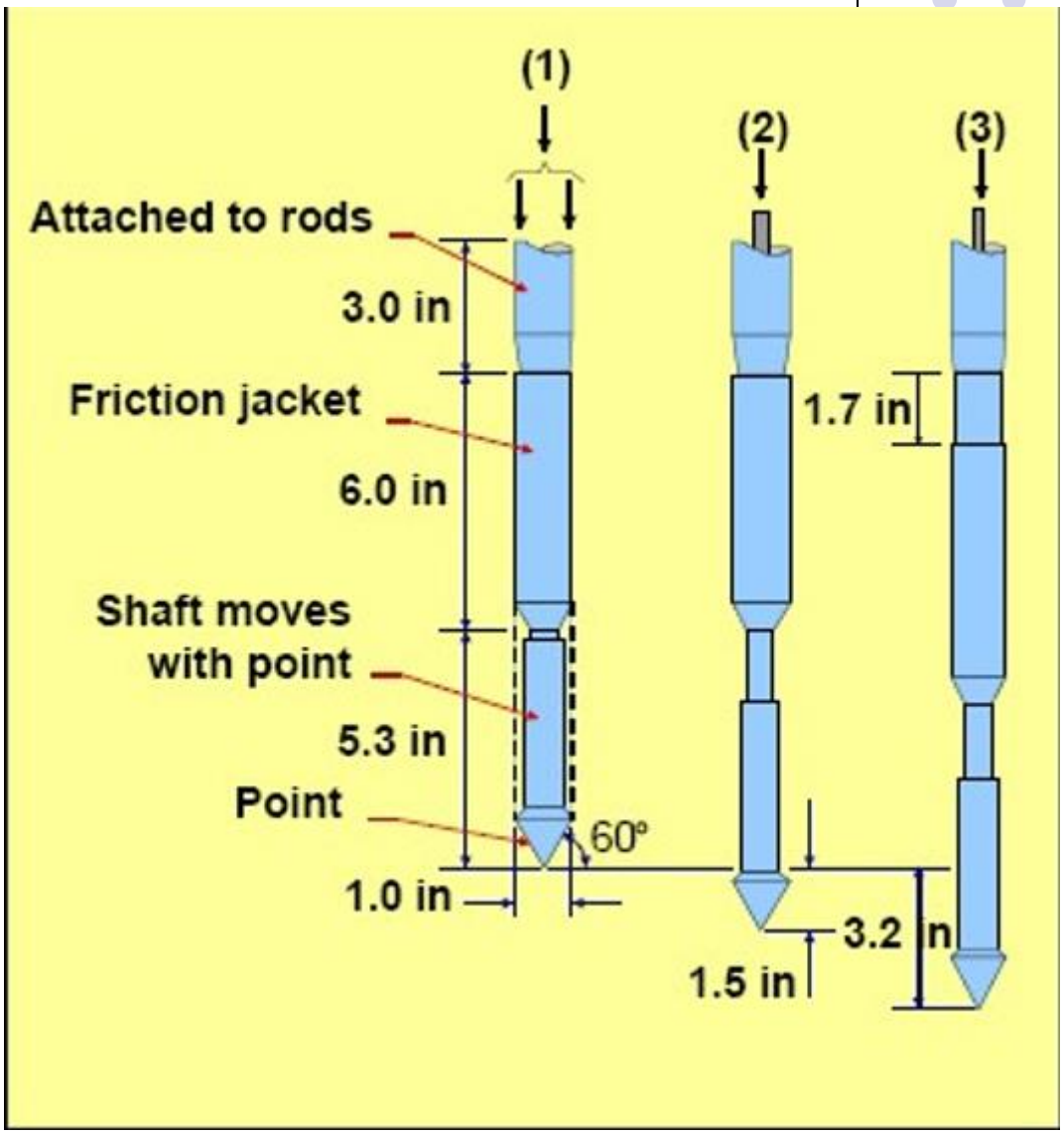


Taking moment at Point A:

Driving Moment, $M_{driving} = q_{ult} \times B \times B/2$
Resisting Moment, $M_{resisting} = c_u \times B\ \pi \times B$
Equating, Resisting Moment = Driving Moment,
Giving, $q_{ult} = 2\ \pi\ c_u \approx 6\ c_u$



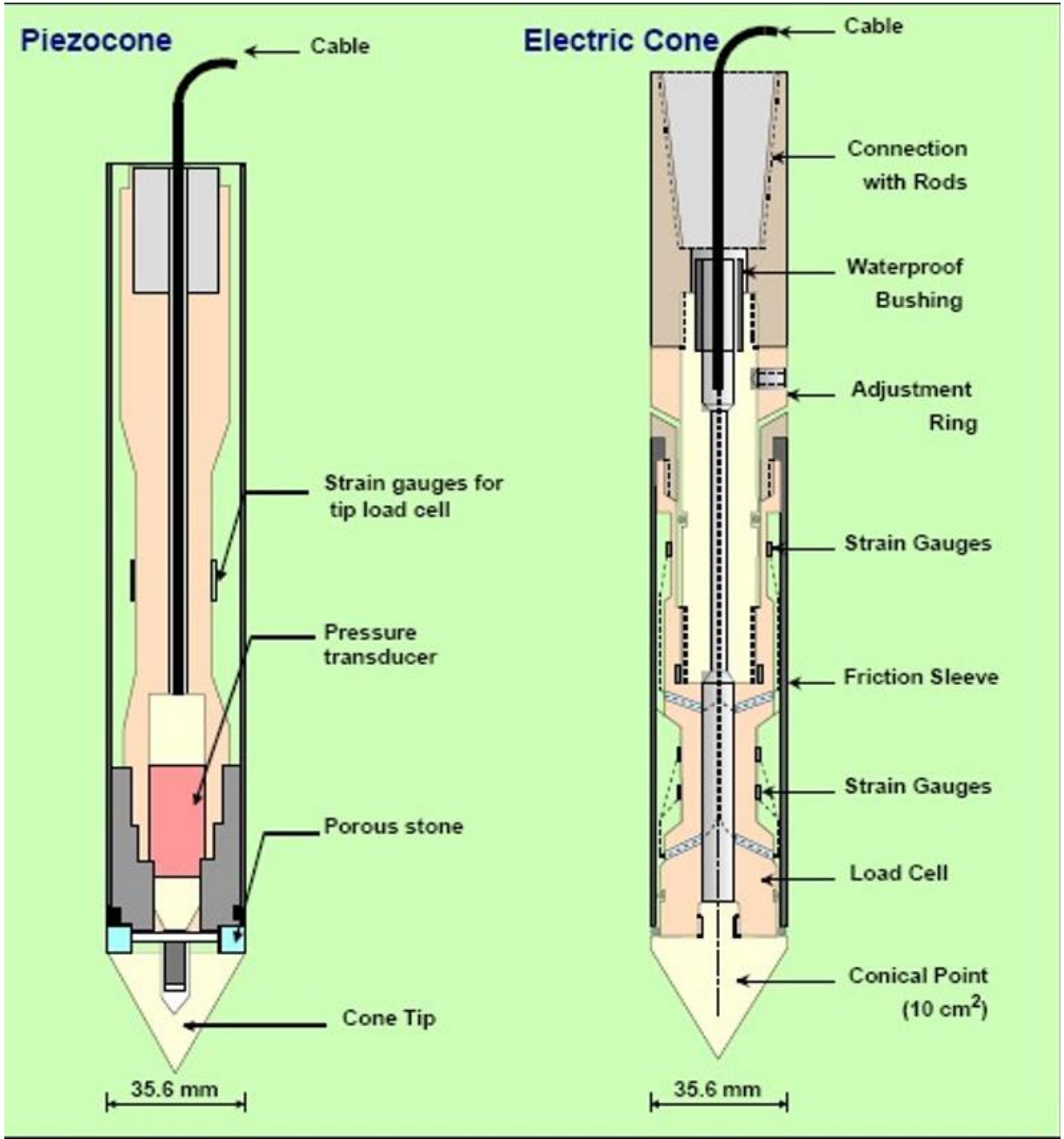
Giving, $q_{ult} = 3\ \pi\ c_u \approx 9\ c_u$



Cone Penetration Test (Electrical)

- Direct measurement at tip
- More accurate
- Can measure pore water pressure

- Other type
- Can measure seismicity



Cone Penetration Test

- Cone resistance:

$$q_c = \frac{\text{total force acting on penetrometer}}{\text{projected area}}$$

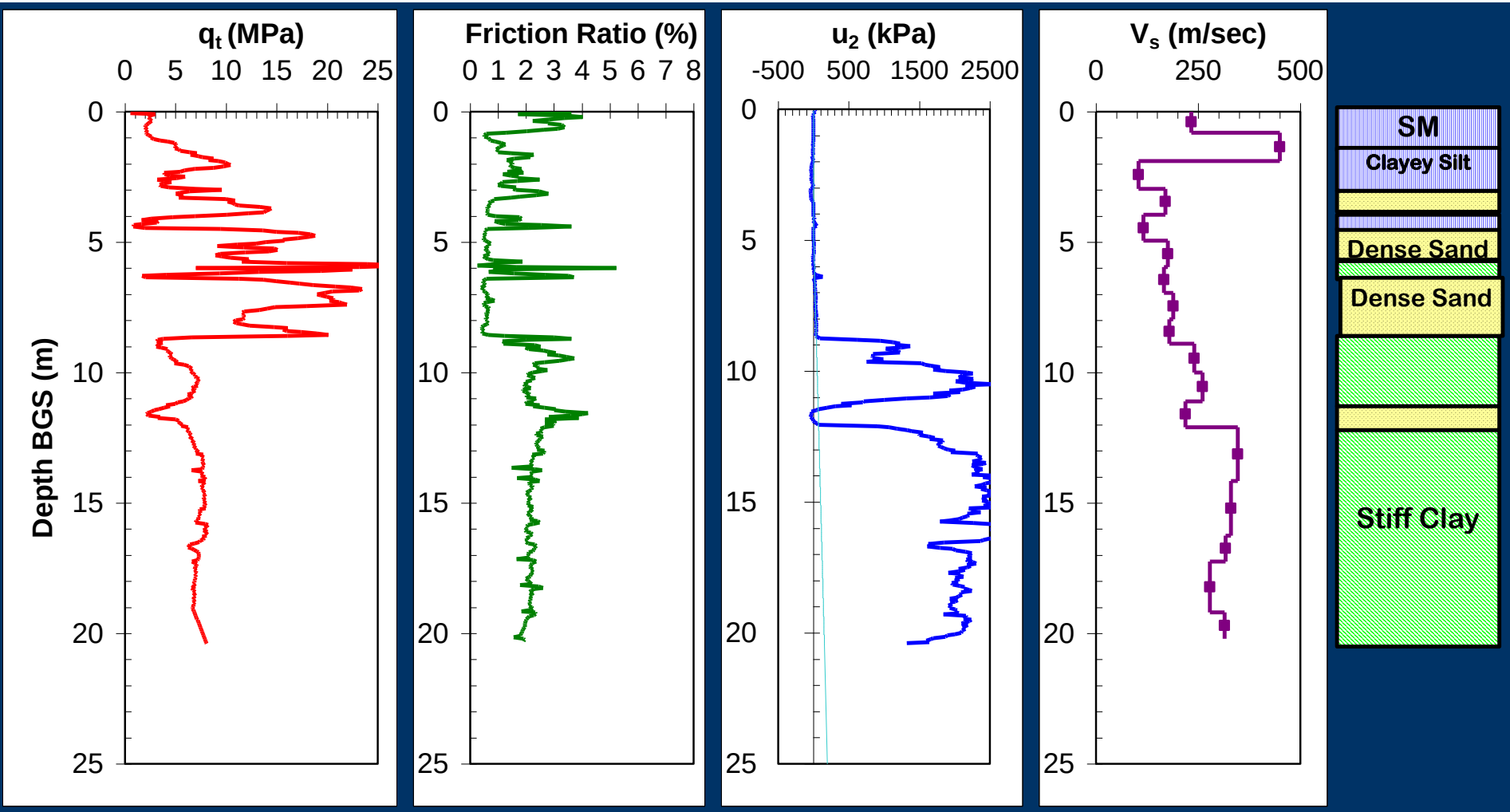
- Friction resistance:

$$f_s = \frac{\text{total friction force acting on friction sleeve}}{\text{surface area}}$$

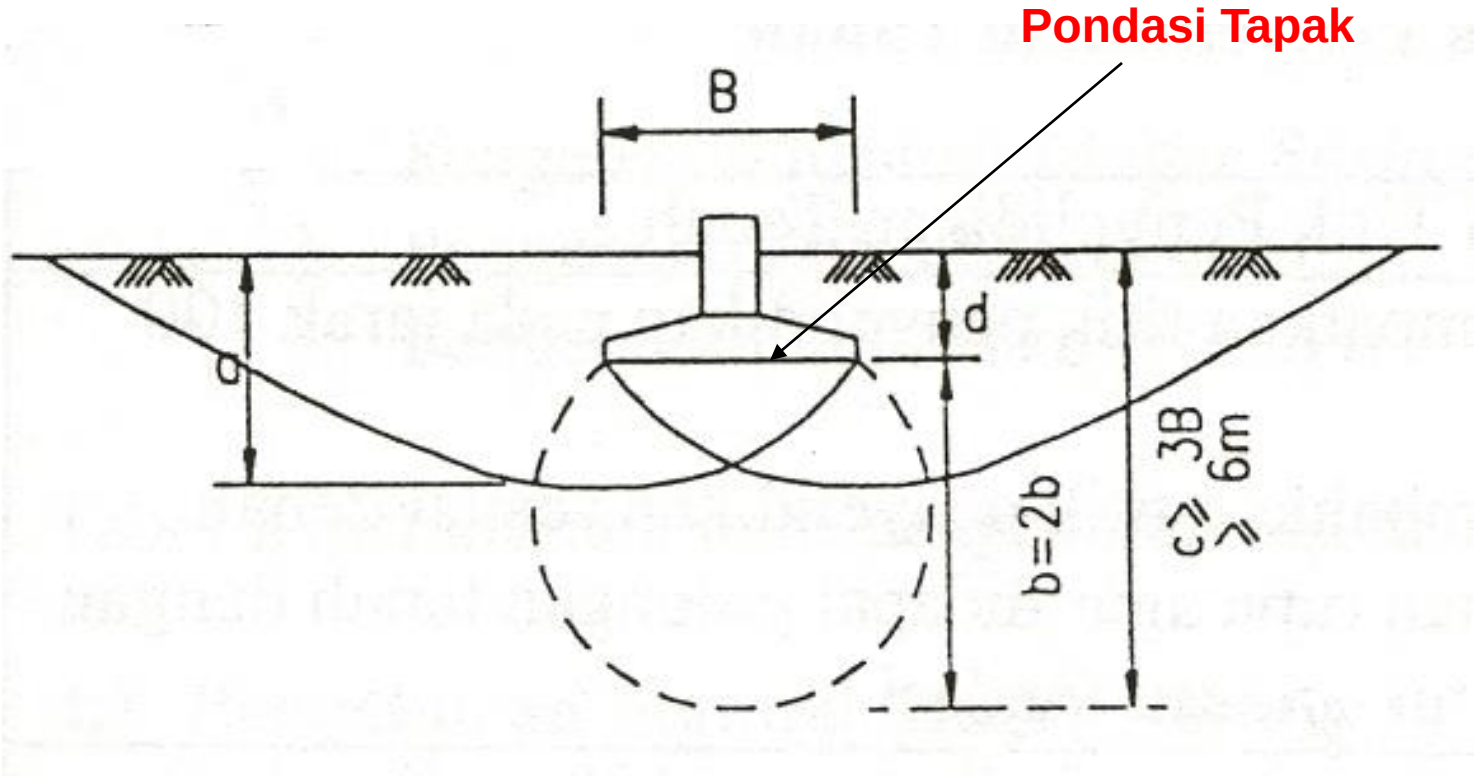
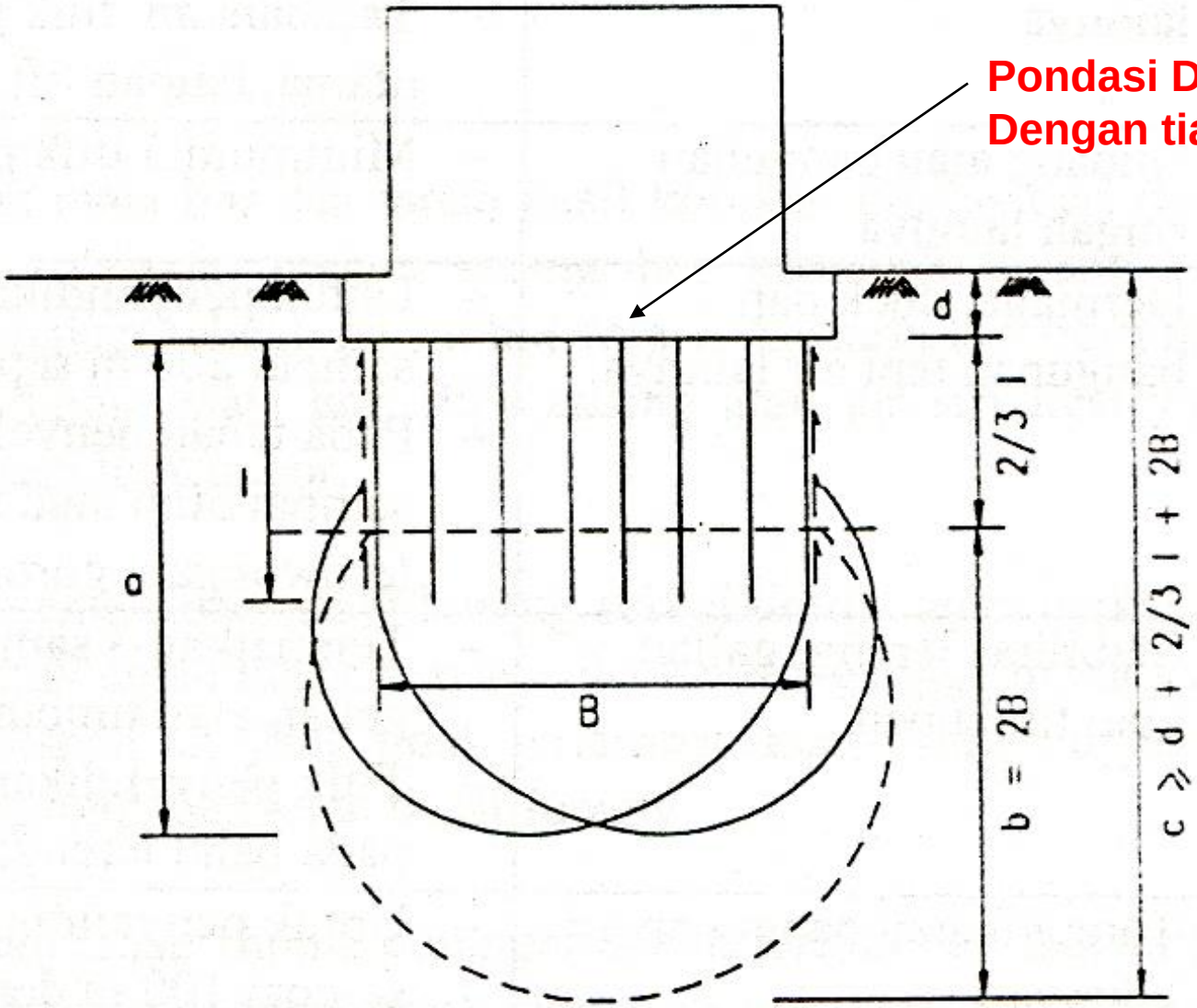
- Friction ratio:

$$F_r = \frac{f_s}{q_c}$$

Cone Penetration Test



Kedalaman Uji Lapangan



Kedalaman Uji Lapangan