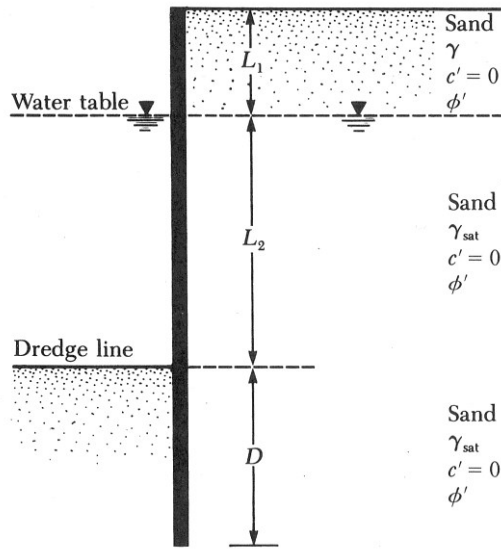# TASK #1
Rekayasa Pondasi 2

Cantilever Sheet Pile Walls
(duration of task : 2 weeks)

Problem No 1
a) What are the used of sheet pile walls?
b) Several types of sheet pile are commonly used in construction. What are they? Please, explain your answer!

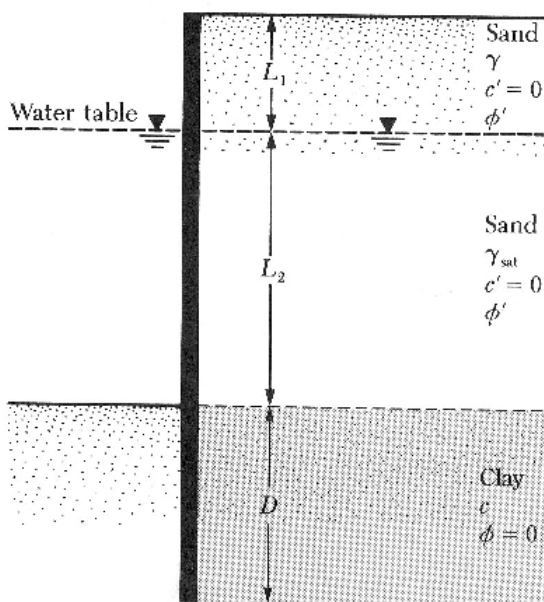### Problem No 2 Cantilever Sheet Pile Walls (Penetrating on Sand)

In **Figure 1**, let L_1 = 2,75, 3.00, 3.25 m,
L_2 = 7.75, 8.00, 8.25 m,
γ = 16, 16.5 kN/m³, γ_{sat} = 18, 18.5 kN/m³,
γ_w = 9.81 kN/m³ and ϕ'= 30°, 32°

Questions:
a) Find the theoretical depth of penetration, D.
b) Increase of D by 30%. What length of sheet piles is needed?
c) Determine the theoretical maximum moment in the sheet pile.

Figure 1 Cantilever Sheet Piles Walls
(Penetrating on Sand)

Problem No 3 Cantilever Sheet Pile Walls (Penetrating on Clay)

In **Figure 2**, let L_1 = 2,75, 3.00, 3.25 m,
L_2 = 4.75, 5.00, 5.25 m,
γ = 16, 16.5 kN/m³, γ_{sat} = 18, 18.5 kN/m³,
γ_w = 9.81 kN/m³, c = 30, 35 kN/m² and ϕ'= 30°, 32 °

Questions:
a) Find the theoretical depth of penetration, D.
b) Increase of D by 40%. What length of sheet piles is needed?
c) Determine the theoretical maximum moment in the sheet pile.

Figure 2 Cantilever Sheet Piles Walls
(Penetrating on Clay)

Kritieria Tugas (Program Kuliah Online)

1. Tugas dibuat dalam laporan yang rapi dan dalam format 1 File PDF
2. Tugas yang ditulis tangan harap foto/scan yang jelas. Jika lebih dari 1 Lembar maka buatkan dalam format 1 File PDF
3. Tugas diperbolehkan diketik. Harap menggunakan rangkaian kalimat sendiri. Jika mengambil dari sumber lain perlu dicantumkan juga sumbernya di halaman terkahir tugas. Tugas juga dikirimkan dalam 1 file PDF
4. Tugas diperbolehkan dibuat dalam excel khusus untuk tugas dalam hitungan. Namun tugas tetap di buat dalam file pdf dalam format laporan yang baik
5. Format laporan tugas :
   - Mata Kuliah
   - Nama & NIM
   - Soal
   - Jawaban Soal
   - Kesimpulan (Untuk soal perhitungan)
   - Sumber (jika diperlukan)
6. Tugas bisa di Upload di Website UNIKOM sesuai jadwal yang sudah disepakati sebelumnya

Jadwal Upload TUGAS dari mahasiswa		
2019	Pengantar Geologi teknik	Jumat 20.00-21.00
2018	Mekanika Tanah II	Selasa 20.00-21.00
2017	Rekayasa Pondasi II	Senin 20.00-21.00
2016	Mekanika Tanah Lanjut	Kamis 20.00-21.00

7. Tugas harap dikerjakan sendiri-sendiri. Originalitas Tugas sangat diperhitungkan
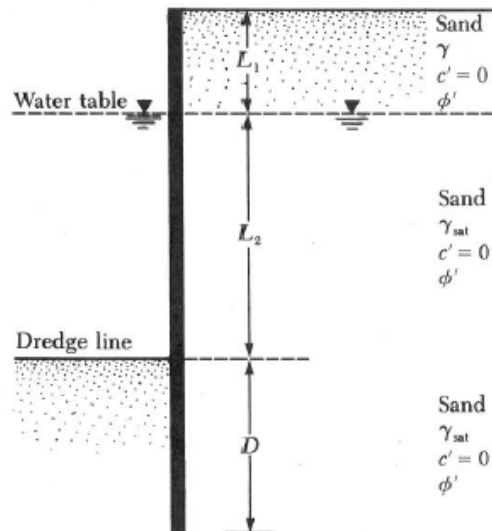8. Tugas **MINIMAL 3 Lembar**

Berikut ini adalah contoh tugas yang mana perhitungannya menggunakan bantuan program excel :

Mata Kuliah : Rekayasa Pondasi II
Nama & NIM : Syifa Z (13015032)
Nama Tugas : Tugas 1 Cantilever Sheet Pile Walls on Sand

Problem No 2 Cantilever Sheet Pile Walls (Penetrating on Sand)

Figure 1 Cantilever Sheet Piles Walls
(Penetrating on Sand)

In **Figure 1**, let L_1 = 2,75, 3.00, 3.25 m,
L_2 = 7.75, 8.00, 8.25 m,
γ = 16, 16.5 kN/m³, γ_{sat} = 18, 18.5 kN/m³,
γ_w = 9.81 kN/m³ and ϕ'= 30°, 32°

Questions:
a) Find the theoretical depth of penetration, D.
b) Increase of D by 30%. What length of sheet piles is needed?
c) Determine the theoretical maximum moment in the sheet pile.

Berdasarkan soal tugas tersebut maka parameter tanah dan sheet pile yang digunakan adalah sebagai berikut :

Parameter		
L_1	=	2 m
L_2	=	3 m
γ	=	15.9 kN/m³
γ_{sat}	=	19.33 kN/m³
γ_w	=	9.81 kN/m³
ϕ_2	=	32 °
γ'	=	9.52

A. FIND THE THEORETICAL OF PENETRATION

Step 1 Calculate K_a and K_p

K_a = 0.307259

K_p = 3.254588

K_p-K_a = 2.94733

$$K_a = tan^2\left(45 - \frac{\emptyset'}{2}\right)$$

Step 2 Calculate σ_1 and σ_2

σ'_1 = 9.77 kN/m² $\sigma'_1 = \gamma L_1 K_a$

σ'_2 = 18.54612 kN/m² $\sigma'_2 = (\gamma L_1 + \gamma' L_2)K_a$

Step 3 Calculate L_3

L_3 = 0.660979 m

$$(z - L) = L_3 = \frac{\sigma'_2}{\gamma'(K_p - K_a)}$$

Step 4 Calculate P

P1	= 1/2*σ1*L1	=	9.77 kN/m
P2	= σ1*L2	=	29.31 kN/m
P3	= 1/2*(σ2−σ1)*L2	=	13.16 kN/m
P4	= 1/2*σ2*L3	=	6.13 kN/m
	Ptotal	=	58.38 kN/m

$$P \quad \tfrac{1}{2}\sigma'_1 L_1 + \sigma'_1 L_2 + \tfrac{1}{2}(\sigma'_2 - \sigma'_1)L_2 + \tfrac{1}{2}\sigma'_2 L_3$$

Step 5 Calculate $\hat{z}$

P = 58.38 kN/m

ΣM_E = 130.19 kN

$\hat{z}$ = 2.230 m

$$\bar{z} \qquad \frac{\Sigma M_E}{P}$$

Step 6 Calculate σ_5

σ'_5 = 214.9931 kN/m²   215

$$\sigma'_5 = (\gamma L_1 + \gamma' L_2)K_p + \gamma' L_3(K_p - K_a)$$

Step 7 Calculate A_{1-4}

A_1 = 7.662294

A_2 = 16.6439

A_3 = 151.3282

A_4 = 230.6332

$$A_1 = \frac{\sigma'_5}{\gamma'(K_p - K_a)}$$

$$A_2 = \frac{8P}{\gamma'(K_p - K_a)}$$

$$A_3 = \frac{6P[2\bar{z}\gamma'(K_p - K_a) + \sigma'_5]}{\gamma'^2(K_p - K_a)^2}$$

$$A_4 = \frac{P(6\bar{z}\sigma'_5 + 4P)}{\gamma'^2(K_p - K_a)^2}$$

Step 8 With Try and error solution Calculate L_4

L4 = 4.7417 m   margin

0.00

$$D_{theory} = L_3 + L_4 = 0.66 + 4.8 = 5.46 \text{ m}$$

Thus D $_{theory}$ will be $L_3 + L_4$ = 5.403 m

$$L_4^4 + A_1 L_4^3 - A_2 L_4^2 - A_3 L_4 - A_4 = 0$$

B. FIND LENGTH OF SHEETPILE IF d INCREAASE 30%

Total Length   = $L_1 + L_2 + 1.3D$

Total Length will be :   **12 m**

C. Determine theoretical maximum moment on sheet pile

z'   =   2.04 m

Mmax   =   209.6 kN.m/m

$$z' = \sqrt{\frac{2P}{(K_p - K_a)\gamma'}}$$

$$M_{max} = P(\bar{z} + z') - [\tfrac{1}{2}\gamma' z'^2 (K_p - K_a)](\tfrac{1}{3})z'$$

Good luck

"Your future depends on how you spend your time"

Salam, SM