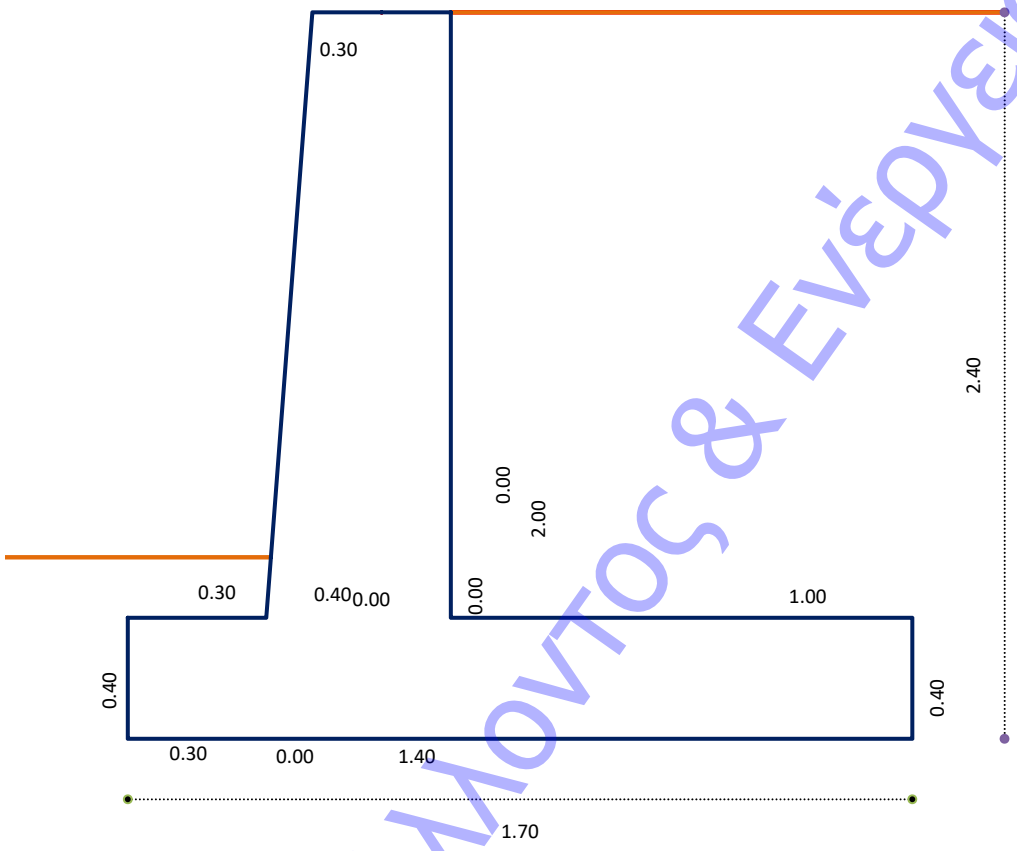
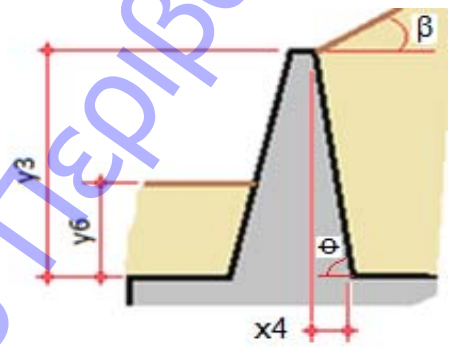
WALL DRAWING

Length
m.
Force
kN
Surcharge
kN/m2

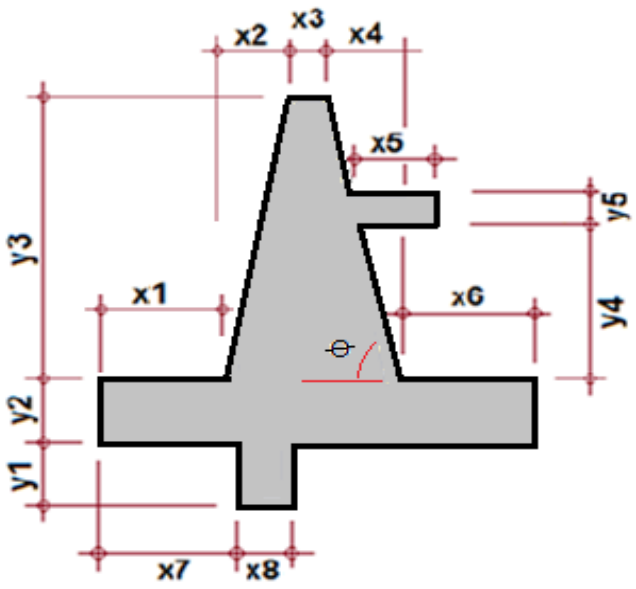


SOIL DATA



DIMENSIONS			MATERIAL		
y3 =	2.00	m	ϒs =	18.00	kN/m³
y6 =	0.20	m	σs =	250.00	kN/m²
x4 =	0.00	m	Cu =	8.00	kN/m²
δ =	10.00	Deg	ϕ =	30.00	Deg
β =	0.00	Deg	θ =	90.00	Deg

WALL DIMENSIONS



x1 =	0.30	m
x2 =	0.10	m
x3 =	0.30	m
x6 =	1.00	m
y2 =	0.40	m
x7 =	0.30	m
x8 =	0.00	m
y1 =	0.00	m
x5 =	0.00	m
y4 =	0.00	m
y5 =	0.00	m

WALL MATERIAL

ϒc =	24	kN/m³
Ec =	29000000	kN/m²
f'c =	16700	kN/m²
fy =	420000	kN/m²

ACTIVE PRESSURE

$$K_A = \frac{\sin^2(\theta + \phi)\cos\delta}{\sin\theta\sin(\theta - \delta)\left[1 + \sqrt{\frac{\sin(\phi + \delta)\sin(\phi - \beta)}{\sin(\theta - \delta)\sin(\theta + \beta)}}\right]^2}$$

Ka = 0.3084658

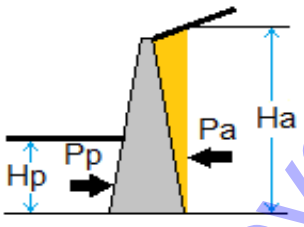
Ha = 2.4 m

$$P_{AH} = \left(\frac{1}{2}\right) K_A \gamma' h^2 - 2c\sqrt{K_A}\, h + \frac{2c^2}{\gamma'}$$

Pa = 1.7747341 kN

PASSIVE PRESSURE

$$K_P = \frac{1 + \sin \phi}{1 - \sin \phi}$$



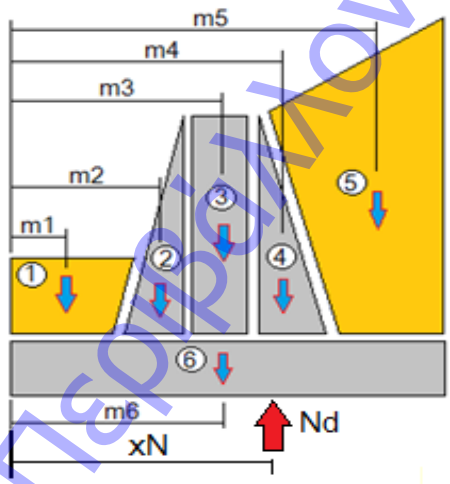
Kp = 3.00

Hp = 0.60 m

$$P_{PH} = \frac{1}{2} K_P \gamma' h^2 + 2c\sqrt{K_P}\, h$$

Pp = 26.35 kN

WALL WEIGHT CALCULATION



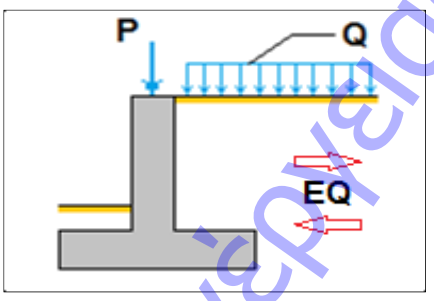
	Weight			Length	
G1 =	1.08	kN	m1 =	0.15	m
G2 =	2.40	kN	m2 =	0.37	m
G3 =	14.40	kN	m3 =	0.55	m
G4 =	0.00	kN	m4 =	0.70	m
G5 =	36.00	kN	m5 =	1.20	m
G6 =	16.32	kN	m6 =	0.85	m
Nd =	70.20	kN	xN =	0.95	m

LOADS

Earthquake :

Io = 1.20

Ao = 0.20



Point Load :

P = 0.00 kN

Surcharge :

Qo = 0.00 kN/m²

Kh = 0.09 0.2(Io+1) Ao

Kv = 0.06 2.Kh / 3

Ψ = 4.75 Deg Atan(Kh/ 1+Kv)

$$K_{AE} = \frac{\cos^2(\phi - \Psi)}{\cos^2\Psi\left[1 + \sqrt{\frac{\sin\phi \sin(\phi - \Psi - \beta)}{\cos\beta \cos\Psi}}\right]^2}$$

$$K_{PE} = \frac{\cos^2(\phi - \Psi)}{\cos^2\Psi\left[1 - \sqrt{\frac{\sin\phi \sin(\phi - \Psi + \beta)}{\cos\beta \cos\Psi}}\right]^2}$$

Kae = 0.38

Kpe = 2.95

Kas = 0.07

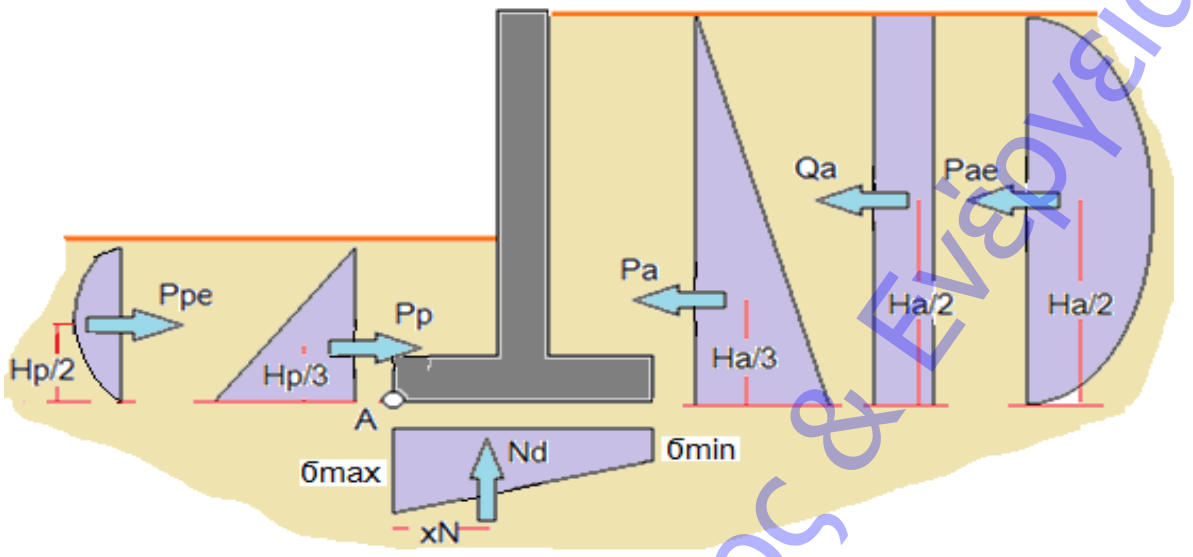
Kps = -0.05

Pae = 3.73 kN

Ppe = -0.17 kN

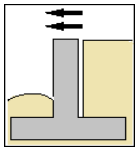
Qae = 0.00 kN

STABILITY CONTROLS



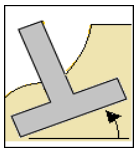
Qa =	0.00	kN
Qae =	0.00	kN
Pa =	1.77	kN
Pae =	3.73	kN
Ha =	2.40	m
Pp =	26.35	kN
Ppe =	-0.17	kN
Hp =	0.60	m
Nd =	70.20	kN
Ndx =	0.00	kN
xN =	0.95	m
B =	1.70	m
e =	0.10	m

Check 1 ; Slipping



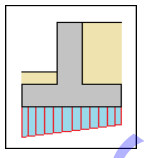
	SF1		
	1.50		
[P+] =	26.18	kN	
[P-] =	5.51	kN	
[P+] / [P-] =	4.75		
4.75	>	1.50	TRUE

Check 2 ; Overturning



	SF2		
	1.55		
[M+] =	72.23	kN.m	
[M-] =	5.90	kN.m	
[M+] / [M-] =	12.25		
12.25	>	1.55	TRUE

Check 3 ; Base Pressure



	SF3		
	250.00	kN/m²	
	0	kN/m²	
σmax =	56.53	kN/m²	
σmin =	26.06	kN/m²	
56.53	<	250.00	
26.06	>	0.00	TRUE

Check 4 ; Displacement

	SF4		
	300.00	m	
	0.0066667	m	
Ec =	29000000	kN/m²	
Ic =	0.01	m⁴	
Δ =	0.00	m	
0.00	<	0.01	TRUE

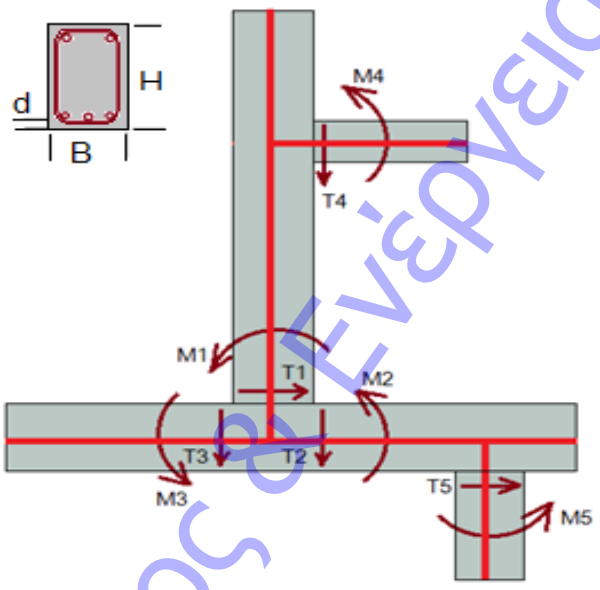
REINFORCED CONCRETE DESIGN
ACI 318

ø = 0.9

Load Factor 1.9

ρmin = 0.0008095

ρmax = 0.0268481



$$k_u = 1 - \sqrt{1 - \frac{\frac{M_u}{\phi}}{0.425 f'_c b d^2}}$$

$$T_u = 0.85 f'_c k_u b d$$

$$A_s = \frac{T_u}{f_y}$$

$$\rho_{max} = \lambda \rho_b \ , \quad \lambda = 0.25$$

$$\rho_{min} = 200/f_y$$

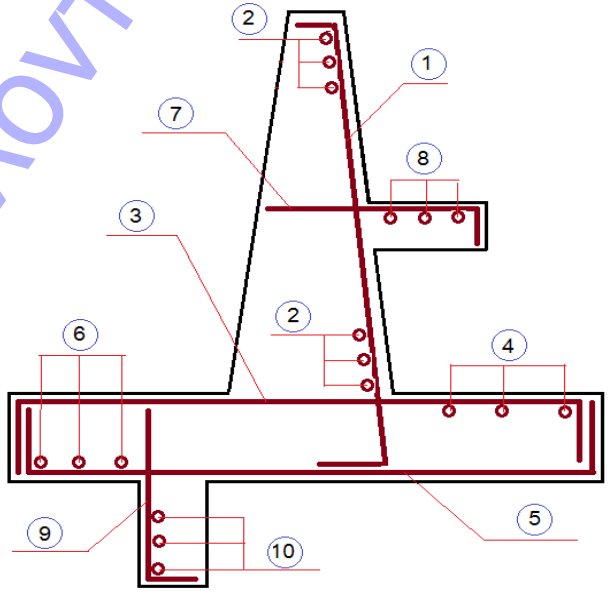
	section 1	section 2	section 3	section 4	section 5	units
d	0.03	0.03	0.03	0.03	0.03	m
B	1.00	1.00	1.00	1.00	1.00	m
H	0.40	0.40	0.40	0.00	0.00	m
M	4.92	8.16	2.54	0.00	0.00	kN.m
Mu	9.34	15.50	4.83	0.00	0.00	kN.m
Ku	0.01	0.01	0.00	0.00	0.00	
Tu	28.12	46.77	14.54	0.00	0.00	kN
ρ'	0.0002	0.0003	0.0001	0.0000	0.0000	
ρ	#ΑΝΑΦ!	0.0008	0.0008	0.0008	0.0008	
As	323.81	323.81	323.81	0.00	0.00	mm²

BAR TABLE

		As mm²	Number _	Dia. mm [ø]	Distance mm
❶	Longitudinal (As1) :	323.81	2	16	500.00
❷	Transverse (As/5) :	64.76	1	12	1000.00
❸	Longitudinal (As2) :	323.81	2	16	500.00
❹	Transverse (As/5) :	64.76	2	8	500.00
❺	Longitudinal (As3) :	323.81	3	14	333.00
❻	Transverse (As/5) :	64.76	2	8	500.00
❼	Longitudinal (As4) :	0.00	1	10	1000.00
❽	Transverse (As/5) :	0.00	1	8	1000.00
❾	Longitudinal (As5) :	0.00	1	10	1000.00
❿	Transverse (As/5) :	0.00	1	8	1000.00

❶
0.24
1.94
2ø16/500
L= 2.42 m
0.24

❾
0.34
1ø10/1000
L= 0.28 m
-0.06



❼
0.29
-0.06
1ø10/1000 L= 0.23 m

❺
3ø14/333 L= 2.32 m
0.34
0.34
1.64

❸
1.64
0.34
0.34
2ø16/500 L= 2.32 m

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