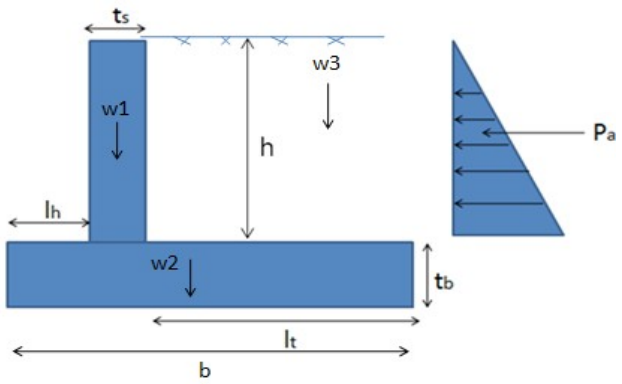
Design of Retaining Wall

Given



ϕ		=	30º
γ_s	kN/m^3	=	19.5
h	m	=	5
l_t	m	=	2.1
l_h	m	=	0.5
t_s	m	=	0.4
t_b	m	=	0.9
γ_c	kN	=	25
μ		=	0.5

Step1

K_a = $(1-\sin\phi)/(1+\sin\phi)$

$\sin\phi$ = 0.5

K_a = 0.333

Step2

P_a = $0.5\times\gamma\times h^2\times Ka$

P_a kN = 81.2

kN ~ 82

Step3

Friction of coefficient assumed

b m = lt+ts+lh 3

S.no.	Formula	Description	Vertical Moment	Hor. Moment	Lever Arm	Clockwise Moment	Counter Clockwise Moment
1	w1=ts*h*ɣc	w1=0.4*5*25	50		0.7	35	
2	w2=tb*b*ɣc	w1=0.9**25	67.5		1.5	101.25	
3	w3=ɣ*h*lt	w1=19.5*5*2.1	204.75		1.95	399.263	
4	w4=0.5*h^2*ɣs*Ka	3		81.2	1.967		161.29
		Total	322.25	82		535.51	161.29

ΣM = 535.51-161.29

ΣM = 374.22

Check1 For sliding

FoS		=	μ*322.25 / 82
FoS		=	1.965
			Safe .

Check2 For Overturning

FoS		=	535.51/161.29
FoS		=	3.32
			Safe

Check3 For tension

$\bar{x}$		=	ΣM/ΣV
$\bar{x}$	m	=	1.161
e		=	$0.5b-\bar{x}$
e	m	=	0.339
b/6		=	0.5
	e<b/6		Safe (no tension).

Base pressure

p_{max}		=	$\frac{\Sigma V}{b}\times\left(1+\frac{6\times e}{b}\right)$
p_{max}	kN	=	180.25
p_{min}		=	$\frac{\Sigma V}{b}\times\left(1-\frac{6\times e}{b}\right)$
p_{min}	kN	=	34.6