www.rcenggstudios.com	**Design of Thrust block (TB-1)**	Rev	
		Date	

1.1 Weight of anchor block

Length of anchor block	=	**2.5**	m
Width of anchor block	=	**1.5**	m
Depth of anchor block	=	**2.5**	m
Gross volume of concrete	=	2.5*1.5*2.5	
	=	9.375	m^3

1.2 Deduction for pipe penetrations

Dia of pipe	=	1.2	m
Area of pipe	=	PI()/4*1.2^2	
	=	1.13	
Length of pipe	=	**2.5**	
Volume occupied by pipe	=	1.13*2.5	
	=	2.825	m^3
Total volume of concrete	=	9.375-(2.825)	
excluding pipe	=	6.55	m^3
Weight of concrete (submerged)	=	6.55*(25-10)	
excluding pipe	=	98.25	kN
Weight of water in pipe	=	132	kN
Weight of bottom encasement	=	20*3.8*0.7*15	
	=	0	
Total weight of anchor block	=	98.25+132	
	=	230.25	kN

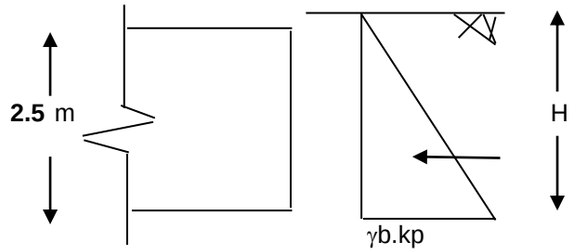
1.3 Check for sliding in X direction

Maximum lateral force in x direction	=	**23.0**	kN	(10% of Total Load)
Maximum possible friction	=	μ*W		
	=	0.3*230.25		
	=	69.075	kN	
Factor of safety against sliding in x direction	=	69.075/23.025		
	=	3.00	>	1.5
		Hence O.K		

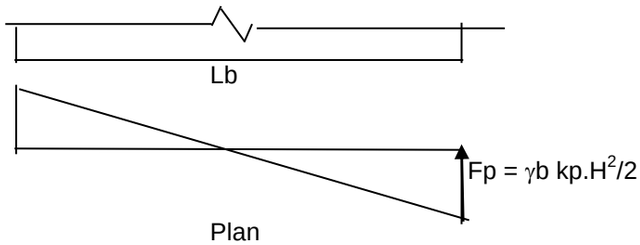
1.4 Check for sliding in Z direction

Maximum lateral force in z direction	=	**23.0**	kN	(10% of Total Load)
Maximum possible friction	=	μ*W		
	=	69.075	kN	
Factor of safety against sliding in z direction	=	69.075/23.025		
	=	3.000	>	1.5
		Hence O.K		

1.5 Check for twisting moment



Elevation



Plan

Passive resisting moment	=	(Fp/2)*(Lb/2)*(2/3*Lb/2)*2
Passive resisting moment	=	$Fp*Lb^2/6$ kNm
Fp	=	$\gamma b*kp*H^2/2$
Angle of repose	=	**20** degree
Kp	=	**2**
gb (bouyant density)	=	**10** kN/m^3
H	=	**2.5** m
Lb	=	2.5 m
Fp	=	10*2*2.5^2/2
	=	62.5 kN/m
Passive resisting moment	=	62.5*2.5^2/6
	=	65.10 kNm
Maximum twisting moment	=	28.78 kNm
Factor of safety against twisting	=	65.1041666666667/28.78125
	=	2.26 > 1.5
		Hence O.K

1.6 Check for overturning in X direction

Resisting moment in x direction	=	230.25*2.5/2
	=	287.81 kNm
actual moment Mx	=	28.78 kNm
Factor of safety against overturning in x direction	=	10.00 > 1.5
		Hence O.K

1.7 Check for overturning in Z direction

Resisting moment in z direction	=	230.25*1.5/2			
	=	172.69	kNm		
Actual moment Mz	=	17.27	kNm		
Factor of safety against overturning in z direction	=	10.00	>	1.5	
		Hence O.K			

1.8 Reinforcement details

Provide 12 mm diameter bars @ 250 mm c/c at 75 mm distance from the surface all around.