

ESTIMATION OF AN UNDERGROUND WATER RESERVOIR

01. Worked Out Problem.

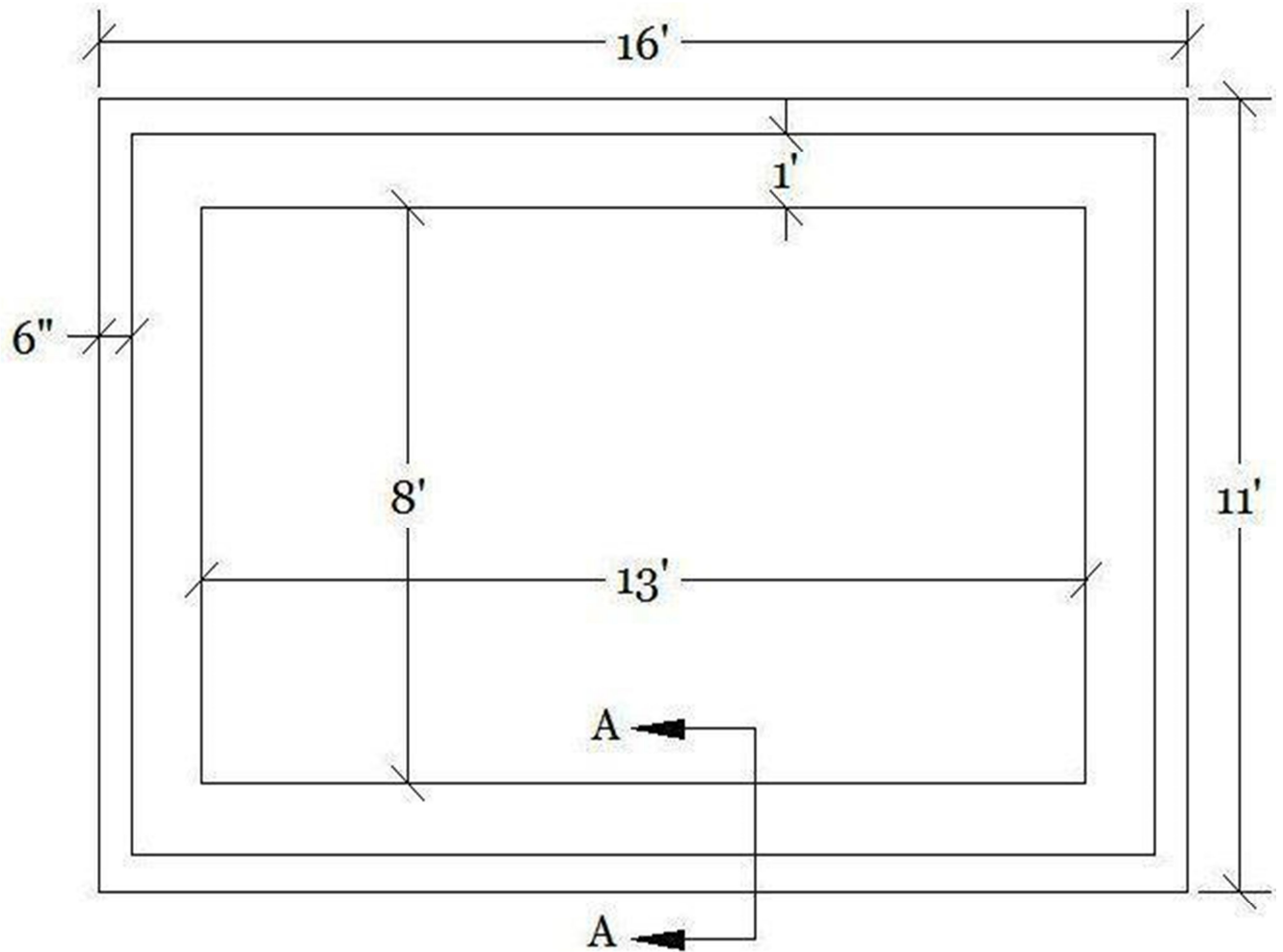


Figure 1: Plan of the Underground Water Reservoir

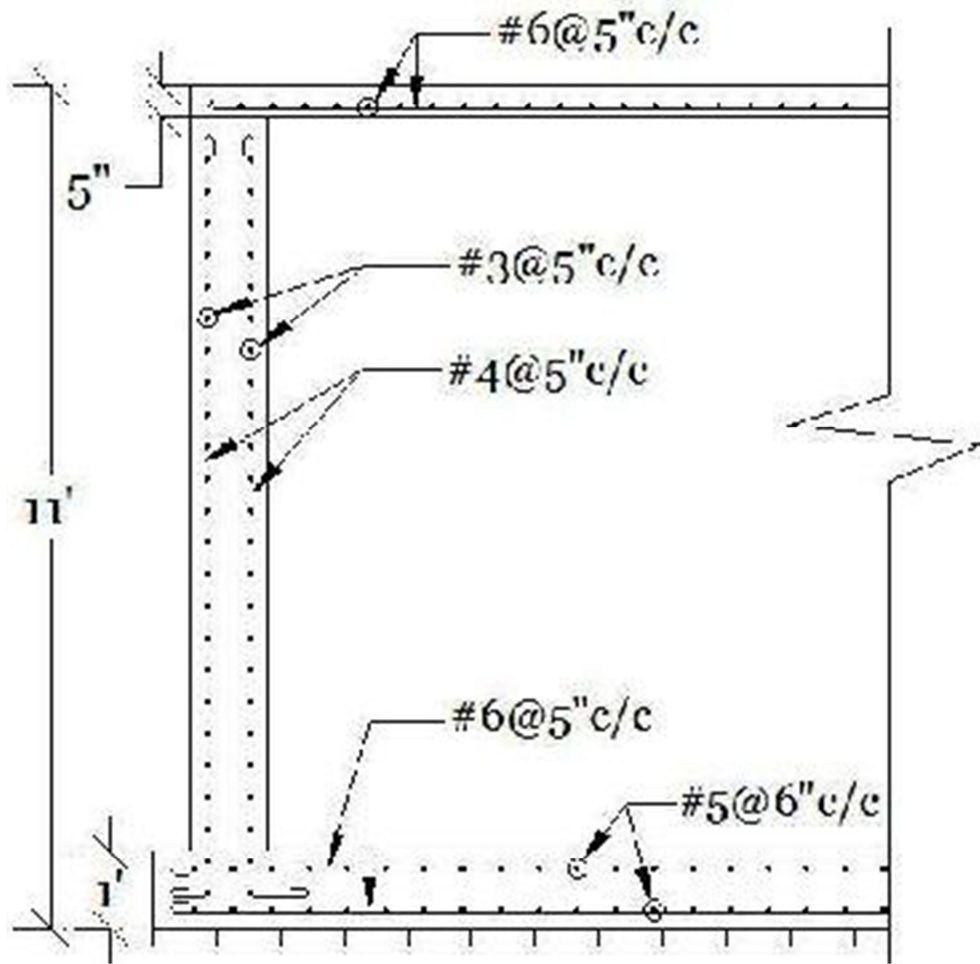


Figure 3-2: Section A-A

Concrete Estimation:

Table 1-1: Calculation of Concrete Estimation for the Workout Problem on Retaining Wall

Item	Length (ft)	Width (ft)	Height/ Thickness (ft)	Area (ft ²)	Volume (ft ³)
3" BFS	16	11	-	176	-
Base Slab	16	11	1	-	176
Wall	2x(9+14)	1	10-(5/12) = 9.583	-	440.83
Cover Slab	15	10	5/12= 0.4167	-	62.5

Quantity of materials:

1. BFS

Size of one brick= 10"x5"x3"

Area of one brick= 50 in²

No. of brick required= 176x144/50= 507 Nos.

Sand per 10m² = 0.10 m³

Volume of sand= (0.10x176x0.3048²)/10= 0.1635 m³ = 5.77 ft³

2. RCC (1:2:4)

Final volume (hard concrete) = 176 + 440.83 + 62.5= 679.33

ft³ Initial volume (before mixing) = 679.33 x 1.5= 1018.995 ft³

Cement= (1018.995 x 1)/7= 145.57 ft³ = 117 bags

[One bag cement = 50kg = 112 lb= 1.25

ft³] Sand= (1018.995 x 2) /7= 291.14 ft³

Brick chips= (1018.995 x 4)/7= 582.28 ft³

No. of brick= 582.28 x 0.3048³ x 300= 4947 Nos.

[1m³ = 35.315 ft³ brick chips required 300 Nos. of full size brick]

Table 2: Summary of Materials

Material	Quantity
Cement	117 bags
Sand	297 ft ³
Brick	5314 Nos.

Reinforcement estimation:**Table 3: Calculation for Reinforcement Estimation**

Item	Bar designation	No.	Length (ft)	Total length (ft)
Base slab	#6@5" c/c	$2x[(16x12-2x3)/5+1]=77$	$(11x12-2x3+2x10.5x6/8)/12=11.813$	909.601
	#5@6" c/c	$2x[(11x12-2x3)/6+1]=44$	$(16x12-2x3+2x10.5x5/8)/12=16.594$	730.136
Wall	#3@5" c/c	$2x[(11x12-5-2-3)/5+1]=52$	46	2392
	#4@5" c/c (outside)	$46x12/5+1=112$	$(11x12-5-2-3+4+2x10.5x4/8)/12=11.375$	1274
	#4@5" c/c (inside)	$46x12/5+1=112$	$(11x12-5-2-3+6+2x10.5x4/8)/12=11.542$	1292.704
Cover slab	#6@5" c/c (bottom)	$(15x12-2x3)/5+1=36$	$(10x12-2x3+2x10.5x6/8)/12=10.813$	389.268
	#6@5" c/c (top)	$(10x12-2x3)/5+1=24$	$(15x12-2x3+2x10.5x6/8)/12=15.813$	379.512

Table 4: Calculation for Weight of Reinforcement

Bar	Length (ft)	Additional (2%)	Final Length (ft)	Weight/length (lb/ft)	Total weight (lb)
#3	2392	47.84	2440	0.376	918
#4	2566.704	51.32	1619	0.668	1082
#5	730.136	14.603	745	1.043	778
#6	1678.381	33.568	1712	1.502	2572