

Chapter 4

Cost Study

4.1 General

The cost study was carried out to determine the cost effectiveness of the proposed structural arrangements. The cost will be a better indicator since the alternative structural forms suggested involve different materials than only reinforced concrete.

4.2 Basic Rates for the main structure.

The basic rates of the construction materials and workmanship are as given below.

Excavation	-	Rs. 350.00 per m ³
Rubble work	-	Rs .2,400.00 per m ³
Grade 30 concrete	-	Rs. 9,000.00 per m ³
Reinforcement	-	Rs.75,000.00 per MT
Shuttering	-	Rs. 750.00 per m ²
Screed	-	Rs. 350.00 per m ²



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4.3 Cost of construction of reinforced concrete pool structure without a deep end.

Appendix C shows the dimensions and details of the reinforced concrete pool structure without a deep end and Table 4.1 shows the cost calculation of the reinforced concrete pool structure without a deep end.

Item	Sub Items	Unit	Quantity(Rs)	Rate(Rs)	Amount(Rs)
1. Excavation	-	m ³	848	350	296,800
2. Blinding concrete	-	m ²	354	350	123,900
3. Form work	a. Stop board around base	m ²	24		
	b. External Formwork	m ²	106		
	c. Internal Formwork	m ²	103		
	Total	m ²	233	750	174,750
4. Reinforcement	a. Base slab	kg	6223		
	b. 1.6m high wall	kg	482		
	c. 1.0m high wall	kg	341		
	d. Side walls	kg	1634		
	Total with 7% lps & wastage	kg	9,288	75	696,600
5. Concrete	a. Base slab	m ³	106		
	b. 1.6m high wall	m ³	6		
	c. 1.0m high wall	m ³	3		
	d. Side Walls	m ³	21		
	Total	m ³	136	9000	1,224,000
TOTAL COST					2,516,050

Table 4.1: Cost calculation of reinforced concrete pool structure without a deep end

4.4 Cost of construction of Proposed pool structure without a deep end.

Appendix D shows the dimensions and details of the proposed pool structure without a deep end.

Table 4.2 shows the cost calculation of the proposed pool structure without a deep end.

Item	Sub Items	Unit	Quantity	Rate	Amount
1. Excavation	-	m ³	788	350	275,800
2. Blinding concrete	-	m ²	394	350	137,900
3. Random Rubble masonry	a. For 1.0 m high wall	m ³	8		
	b. For 1.6 m high wall	m ³	15		
	c. For side walls	m ³	50		
	Total Random Rubble masonry quantity	m ³	73	2400	175,200
4. Form work	a. Stop board around base	m ²	13		
	b. Internal formwork	m ²	103		
	c. Stop board of top slab	m ²	12		
	Total Formwork Area	m ²	128	750	96,000
5. Reinforcement	a. Base slab	kg	3272		
	b. 1.6m high wall	kg	180		
	c. 1.0m high wall	kg	133		
	d. Side Walls	kg	685		
	e. Top Slab	kg	531		
	Total with 7% for wastage	kg	4801	75	360,075

Item	Sub Items	Unit	Quantity	Rate	Amount
6. Concrete	a. Base slab	m ³	59		
	b. Top Slab	m ²	9		
	c. Side Walls	m ³	14		
	Total	m ³	82	9000	738,000
	TOTAL COST	-	-		1,782,975

Table 4.2 : Cost calculation of proposed pool structure without a deep end

4.5 Cost of Construction of reinforced concrete pool structure with a deep end.

Appendix E shows the dimensions and details of the reinforced concrete pool structure with a deep end. Table 4.3 shows the cost calculation of the reinforced concrete pool structure with a deep end.



Item	Sub Items	Unit	Quantity	Rate	Amount
1. Excavation	-	m ³	1131	350	395,850
2. Blinding concrete	-	m ²	364	350	127,400
3. Form work	a. Stop board	m ²	24		
	b. 1.0m high wall external	m ²	13		
	c. 1.0m high wall external	m ²	12		
	d. 3.1m high wall external	m ²	41		
	e. 3.1m high wall internal	m ²	39		
	f. Side walls external	m ²	96		
	g. Side walls internal	m ²	93		
	Total		m ²	318	750
4. Reinforcement	a. Base slab	kg	6223		
	b. Deep end wall	kg	1490		
	c. Shallow end wall	kg	341		
	d. Side walls	kg	2307		
	e. Tie bars	kg	333		
	Total with 7% as wastage	kg	10,694	75	802,050

Item	Sub Items	Unit	Quantity	Rate	Amount
5. Concrete	a. Base	m ³	106		
	b. Shallow end wall	m ³	3		
	c. Deep end wall	m ³	12		
	d. Side walls	m ³	28		
	Total concrete Volume	m ³	149	9000	1,341,000
	TOTAL COST				2,904,800

Table 4.3 : Cost calculation of reinforced concrete pool structure with a deep end

4.6 Cost of construction of proposed pool structure with a deep end.

Appendix F shows the dimensions and details of the pool structure with a deep end. Table 4.4 shows the cost of proposed pool structure with a deep end.

Item	Sub Items	Unit	Quantity	Rate	Amount
1. Excavation	-	m ³	1102	350	385,700
2. Blinding concrete	-	m ²	404	350	141,400
3. R.R. masonry	-	m ³	35	2,400	84,000
4. Formwork	a. Stop boards	m ²	28		
	b. 3.1m high walls	m ²	162		
	c. Counter forts	m ²	64		
	d. Side walls	m ²	62		
	e. 1.0m high walls	m ²	13		
	f. Walkway slab	m ²	19		
	Total		m ²	348	750

Item	Sub Items	Unit	Quantity	Rate	Amount
5. Reinforcement	a. Base slab	kg	4685		
	b. Deep end wall	kg	506		
	c. Shallow end wall	kg	133		
	d. Side walls	kg	1138		
	e. Top slab	kg	340		
	f. Counter forts	kg	249		
	Total with 7% wastage	kg	7,534	75	565,800
6. Concrete	a. Base concrete	m ³	69		
	b. Walls	m ³	16		
	c. Top Slab	m ³	9		
	d. Counter forts	m ³	5		
	Total	m ³	99	9,000	891,000
	TOTAL COST				2,328,900

Table 4.4 : Cost calculation of proposed pool structure with a deep end

4.7 Cost Comparison

Table 4.5 shows the cost comparison among the four cases discussed above.

		Cost for conventional swimming pool without a deep end	Cost for proposed swimming pool without a deep end	Cost for conventional swimming pool with a deep end	Cost for proposed swimming pool with a deep end
a)	Excavation	296,800.00	275,800.00	395,850.00	385,700.00
b)	Blinding concrete	123,900.00	137,900.00	127,400.00	141,400.00
c)	Random rubble masonry		175,200.00		84,000.00
d)	Formwork	174,750.00	96,000.00	238,500.00	261,000.00
e)	Reinforcement	696,600.00	360,075.00	802,050.00	565,800.00
f)	Concrete	1,224,000.00	738,000.00	1,341,000.00	891,000.00
TOTAL		2,516,050.00	1,782,975.00	2,904,800.00	2,328,900.00

Fig:4.5: Cost comparison of different swimming pools

4.8 Conclusions

From the cost comparison, it can be seen that the alternative structural forms suggested could give a cost saving in the range of 30% for one without a deep end and 21% for one with deep end. This indicates that it is worthwhile adopting these alternative structural systems in future swimming pools constructed on firm ground with low water table.