

APPENDIX - - II

COST ANALYSIS OF CUT OFF TRENCH
V/S CONCRETE DIAPHRAGM WALLING

(1)

(i) Cost of 60 cm. thick single line concrete diaphragm wall for depth of 40 mts. per meter length.

Quantity	Item	Rate	Per	Amount
L. S.	1) Installation charges	L. S.	L. S.	5000.00
	2) Construction of Pretrench			
1.2 m ³	a) Excavation	2.50	CMT	3.00
0.60 m ³	b) Concreting (1:4:8)	1.50	CMT	90.00
0.02 M.T.	c) Reinforcement	2500	M.T.	50.00
39.0 Sq.Mt.	3) Boring of 0.60 m wide trench in soil	350	Sq.Mt.	13650.00
1.0 m ²	4) Boring of 0.60 m wide trench in Rock	600	Sq.mt.	600.00
0.528 m.T	5) Reinforcement	3000	m.T.	1584.00
28.8 m ³	6) Concreting of trench	300	CMT	8640.00
2.0 mts.	7) Removal of pretrench	100	mt.	200.00
26.4 mt.	8) Providing 75 mm dia. pipe for grouting rock below diaphragm	40	mt.	1056.00
Total				30873.00

(2)

(11) Cost of 60 cm. thick Single line concrete diaphragm wall for depth of 30 mts. per meter length.

Quantity	Item	Rate Rs.	Per	Amount Rs.
L. S.	1) Installation Charges	L. S.	L. S.	5000.00
	2) Construction of Pretrench			
1.2 m ³	a) Excavation	2.50	CMT	3.00
0.60 m ³	b) Concreting (1:4:8)	150	CMT	90.00
0.02 M.T.	c) Reinforcement	2500	m.T.	50.00
29.0 Sq.mt.	3) Boring of 0.60 m wide trench in soil	350	Sq.mt.	10150.00
1.0 m ²	4) Boring of 0.60 m. wide trench in Rock	600	Sq.mt.	600.00
0.396 M.T.	5) Reinforcement	3000	M.T.	1188.00
21.6 m ³	6) Concreting of trench	300	C.M.T.	6480.00
2.0 mts.	7) Removal of pretrench	100	mt.	200.00
19.8 mt.	8) Providing 45 75 mm. dia.pipe for grouting rock below diaphragm	40	mt.	792.00
Total				24553.00

(3)

(iii) Cost of 60 cm. thick single line concrete diaphragm wall for depth of 20 mts. per meter length.

Quantity	Item	Rates Rs.	Per	Amount Rs.
L. S.	1) Installation charges	L.S.	L.S.	5000.00
	2) Construction of Pretrench			
1.2 m ³	a) Excavation	2.50	CMT	3.00
0.60 m ³	b) Concreting (1:4:8)	150	CMT	90.00
0.02 M.T-	c) Reinforcement	2500	M.T.	50.00
19.0 Sq.mt.	3) Boring of .60 m. wide trench in soil	350	Sq.mt.	6650.00
1.0 m ²	4) Boring of 0.60 m. wide trench in rock.	600	Sq.mt.	600.00
0.264 M.T.	5) Reinforcement	3000	M.T.	792.00
14.4 m ³	6) concreting of trench	300	CMT	4320.00
2.0 mts.	7) Removal of pretrench	100	MT.	200.00
13.2 mt.	8) Providing 75 mm. dia. pipe for grouting rock below diaphragm	40	mt.	528.00
Total				18233.00

(5)

(iv) Cost of 60 cm. thick single line concrete diaphragm wall for depth of 10 mts. per meter length.

Quantity	Item	Rates Rs.	Per	Amount Rs.
L. S.	1) Installation charges	L. S.	L. S.	5000.00
	2) Construction of Pretrench.			
1.2 m ³	a) Excavation	2.50	CMT	3.00
0.60 m ³	b) Concreting (1:4:8)	150.00	CMT	90.00
0.02 M.T.	c) Reinforcement	2500.00	M.T.	50.00
9.0 m ²	3) Boring of .60 m. wide trench soil	350.	Sq.mt	3150.00
1.0 M ²	4) Boring of 0.60 m. wide trench in rock	600	Sq.mt.	600.00
0.132 M.T.	5) Reinforcement	3000	M.T.	396.00
7.20 m ³	6) Concreting of trench	300	CMT	2160.00
2.0 mts.	7) Removal of pretrench	100	mt.	200.00
6.6 mt.	8) Providing 75 mm.dia. pipe for grouting rock below diaphragm	40	mt.	264.00
	Total			11913.00

(6)

(v) Cost of 30 cm. thick single line concrete diaphragm wall for depth of 40 mts. per metre length.

Quantity	Item	Rate Rs.	Per	Amount Rs.
L. S.	1) Installation charges	L. S.	L.S.	5000.00
	2) Construction of pretrench			
0.60 m ³	a) Excavation	2.50	CMT	1.50
0.30 m ³	b) concreting (1:4:8)	150	CMT	45.00
0.01 Mt.	c) Reinforcement	2500	m.t.	25.00
39 Sq.mt.	3) Boring of 300 m. wide trench in soil	200	Sq.Mt.	7800.00
1.0 m ²	4) Boring of 30 cm.wide trench in rock	500	Sq.mt.	500.00
0.264 M.T.	5) Reinforcement	3000	M.T.	792.00
14.4 m ³	6) concreting of trench	300	CMT	4320.00
2.0 mts.	7) Removal of pretrench	75	mt.	150.00
26.4 mts.	8) Providing 75 mm.dia pipe for grouting rock below diaphragm	40	mt.	1056.00
	Total			19689.50

(6)

(vi) Cost of 30 cm. thick single line concrete diaphragm wall for depth of 30 mts. per meter length.

Quantity	Item	Rate Rs.	Per	Amount Rs.
L. S.	1) Installation charges	L.S.	L.S.	5000.00
	2) Construction of pretrench.			
0.60 m ³	a) Excavation	2.50	CMT	1.50
0.30 m ³	b) Concreting (1:4:8)	150	CMT	45.00
0.01 mT	c) Reinforcement	2500	m.t.	25.00
29.0 Sq.mt.	3) Boring of 30 cm. wide trench in soil	200	sq.mt.	5800.00
1.0 m ²	4) Boring of 30 cm. wide trench in rock.	500	"	500.00
0.198mt.	5) Reinforcement	3000	mt.	594.00
10.8 m ³	6) concreting of trench	300	CMT	3240.00
2.0 mts.	7) Removal of pretrench	175	mt.	150.00
19.8 mt	8) Providing ϕ 75 mm. dia. pipe for grouting rock below diaphragm.	40	mt.	792.00
Total				16147.50

(7)

(vii) Cost of 30 cm. thick single line concrete diaphragm wall for depth of 20 mts. per meter length.

Quantity	Item	Rate Rs.	Per	Amount Rs.
Quantity L.S.	1) Installation charges	L.S.	L.S.	5000.00
	2) Construction of pretrench.			
0.60 m ³	a) Excavation	2.50	CMT	1.50
0.30 m ³	b) concreting (1:4:8)	1.50	CMT	45.00
0.01 M.T.	c) Reinforcement	2500	M.T.	25.00
19.0 Sq.mt.	3) Boring of 30 cm. wide trench in soil.	200	Sq.Mt.	3800.00
1.0 Sq.mt.	4) Boring of 30 cm. wide trench in rock	500 500	Sq.Mt.	500.00
0.132 M.T.	5) Reinforcement	3000	M.T.	396.00
7.2 m ³	6) Concreting	300	CMT	2160.00
2.0 mts.	7) Removal of pretrench	75	mt.	150.00
13.2 mt.	8) Providing 75 mm. dia. pipe for grouting rock below diaphragm.	40	mt.	528.00
Total				12605.50

(8)

(viii) Cost of 30 cm. thick single line concrete diaphragm wall
for depth of 10.0 mts. per meter length.

Quantity	Item	Rate Rs.	Per	Amount Rs.
L.S.	1) Installation charges	L.S.	L.S.	5000.00
	2) Construction of pretrench			
0.60 m ³	a) Excavation	2.50	CMT	1.50
0.20 m ³	b) Concreting (1:4:8)	150	CMT	45.00
0.01 M.T.	c) Reinforcement	2500	M.T.	25.00
9.0 Sq.mt.	3) Boring of 30 cm. wide trench in soil	200	Sq.mt.	1800.00
1.0 Sq.mt.	4) Boring of 30 cm. wide trench in rock	500	Sq.mt.	500.00
0.066 M.T.	5) Reinforcement	3000	M.T.	198.00
3.6 m ³	6) Concreting	300	CMT	1080.00
2.0 mts.	7) Removal of pretrench	75	mt.	150.00
6.6 mt.	8) Providing 75 mm. dia. pipe for grouting rock below diaphragm.	40	mt.	264.00
Total				9063.50

(9)

(a) Quantities for concrete diaphragm wall 40 m. deep and of

(i) 0.6 m. width (ii) 0.30 m. width.

(1) Installation Charges - Lump sum.

(2) Concrete Pretrench

	L	B	D	Quantity
				³
(a) Excavation for wall of 60 cm.	1.0 m	1.2 m	1.0 m	1.20 m ³
30 cm.	1.0 m	0.6 m	1.0 m	0.60 m ³
(b) Concreting 60 cm.	1.0 m	0.6 m	1.0 m	0.6 m ³
30 cm.	1.0 m	0.30 m	1.0 m	0.30 m ³

(c) Reinforcement at 1.0% of total quantity of concreting.

∴ Quantity of Steel in M.T. = $0.60 \times 2.2 \times 0.01$

(i) for 60 cm. wide wall = 0.0132 0.02 M.T.

(ii) for 30 cm. wide wall = 0.01 M. T.

(3) (i) Boring of 0.6 meter wide trench in soil

Depth 39.0 m. Length 1.0 m.

Area = Depth X Length = 39.0 m^2

(ii) Boring of 30 meter wide trench = 39.0 m^2

(4) (i) Boring of 0.6 meter wide trench in rock.

Depth = 1.0 m. Length = 1.0 m.

Area = $1 \times 1 = 1.0 \text{ m}^2$

(ii) Boring of 0.30 meter wide trench in rock = 1.0 m^2

(5) Reinforcement at 1.0 % of total quantity of concrete

∴ Steel in M.T. = $(1.0 \times 0.60 \times 40) \times 2.2 \times .01$.

(i) for 0.60 mt. wall = 0.528 M.T.

(10)

(ii) for 0.60 mt. wall = $(1.0 \times 0.30 \times 40) \times 2.2 \times .01 = 0.264 \text{ M.T}$

(6) Concreting depth = 40.00 m. length ; 1.0 m.

(i) Width = 0.60 m. (ii) width 0.30 m.

Quantity = $L \times B \times D = 1.0 \times 0.60 \times 40 = 24.0 \text{ m}^3$

Let 20 % be overbreak and waste.

(i) Total Quantity of concrete for 0.60 m. wall

= $1.2 \times 24.0 = 28.8 \text{ m}^3$

(ii) Total quantity of concrete for 0.30 m wall = 14.4 m^3

(7) (i) Removal of Pretrench = 2.0 mt.

(ii) Removal of pretrench = 2.0 mt.

(8) Providing pipes of 75 mm. diameter for grouting rocks below diaphragm wall. Assuming general panel length 3.0 m. and let 2.0 pipes be per panel.

∴ for per meter length = $2/3 = 0.66$ pipe.

∴ Equivalent depth of pipe = Depth $\times .66$.

(i) for 0.60 cm. wall = $40 \times .66 = 26.4 \text{ mts.}$

(ii) for 0.30 cm wall = 26.4 mts.

(b) Quantities for Concrete diaphragm wall 30 m. deep and of (i) 0.6 m. width and (ii) 0.30 m width.

(1) Installation Charges - Lump Sum.

(2) Concrete Pretrench.

	L	B	D	Quantity
(a) Excavation for wall of (i) 60 cm.	1.0m	1.2m	1.0m	1.20 m^3
(ii) 30 cm.	1.0m	0.6m	1.0m	0.60 m^3

(11)

(b) Concreting (1) 600 cm. 1.0 m 0.6 m 1.0 m 0.60 m³

(11) 30 cm. 1.0 m 0.30m 1.0 m 0.3 m³

(c) Reinforcement at 1.0 % of total quantity of concreting C.

∴ Quantity of Steel in M.F. = $0.60 \times 2.2 \times 0.01$

(1) for 60 cm. wide wall = 0.0132 0.02 M.T.

(11) for 30 cm. wide wall = 0.01 M.T.

(3) (1) Boring of 0.6 meter wide trench in Soil

Depth 29.0 m. Length 1.0 m.

$$\text{Area} = \text{Depth} \times \text{length} = 829.0 \text{ m}^2$$

(ii) Boring of 0.30 meter wide trench = 29.0 m²

(4) (1) Boring of 0.6 meter wide trench in rock.

Depth = 1.0 m length 1.0 m.

$$\text{Area} = 1 \times 1 = 1.0 \text{ m}^2$$

(ii) Boring of 0.30 meter wide trench rock = 1.0 m^2

(5) Reinforcement $\bar{x}$ at 1.0 % of total quantity of concrete.

$$\therefore \text{Steel in M.T.} = (1.0 \times 0.60 \times 30) \times 2.2 \times .01$$

(i) for 60 cm. thick wall = 0.396 M.T.

(ii) for 30 cm. thick wall = 0.198 M.T.

(6) Concreting depth = 30 m. length = 1.0 m.

(i) width = 0.60 m. (ii) width = 0.30 m.

$$\text{Quantity} = L \times B \times D = 1.0 \times 0.60 \times 30 = 18.0 \text{ m}^3$$

Let 20 % be overbreak and waste.

(i) Total quantity of concrete = $1.2 \times 18.0 = 21.6 \text{ m}^3$

(12)

(ii) Total Quantity of concrete for 30 cm. thick wall = 10.8 m^3

(7) (i) Removal of Pretrench .60 cm = 2.0 mt.

(ii) Removal of pretrench 0.30 mm = 2.0 mt.

(8) Providing pipes for 75 mm diameter for grouting rocks below diaphragm wall. Assuming general Panel length = 3.0 m. and let 2.0 pipes be per panel.

∴ for per meter length = $2/3 = 0.66$ pipe.

∴ Equivalent depth of pipe = Depth x .66

(i) for 0.60 cm. thick wall = $.66 \times 30 = 19.8 \text{ m}$.

(ii) for 0.60 cm. thick wall = 19.8 m.

(C) Quantities for Concrete diaphragm wall 20 deep and of (i).60 m width (ii) 0.30 m width.

(1) Installation charges - Lump Sum

(2) Concrete Pretrench

	L	B	D	Quantity
(a) Excavation for wall of (i) 60 cm	1.0 m	1.20 m	1.0m	1.2 m^3
for (ii) 30cm.	1.0m	0.60 m	1.0m	0.6 m^3
(b) Concreting (i) 60 cm.	1.0m	0.6m	1.0m	0.6 m^3
(ii) 30 cm.	1.0m	0.30m	1.0m	0.30 m^3

(c) Reinforcement at 1.0% of total quantity of concreting.

Therefore Quantity of Steel in M.T. = $0.60 \times 2.2 \times 0.01$

(i) for 60 cm. wide wall = 0.0132 0.02 M.T.

(ii) for 30 cm. wide wall = 0.01 m.T.

(13)

- (3) (1) Boring of 0.60 meter wide trench in soil

Depth = 19.0 m Length = 1.0 m.

$$\text{Area} = \text{Depth} \times \text{length} = 19.0 \text{ m}^2$$

(ii) Boring of 0.30 mt. wide trench in soil = 19.0 m^2

- (4) (1) Boring of 0.60 meter wide trench in Rock.

Depth = 1.0 m. Length = 1.0 m.

$$\text{Area} = \text{Depth} \times \text{length} = 1.0 \times 1.9 = 1.0 \text{ m}^2$$

(ii) Boring of 0.30 m. wide trench in rock = 1.0 m^2

- (5) Reinforcement at 1.0 % of total quantity of concrete

Therefore Steel in M.T. = $(1 \times 0.60 \times 20) \times 2.2 \times 0.1$

(i) Steel for 60 cm. wall = 0.264 M.T.

(ii) Steel for 30 cm. wall = 0.132 M.T.

- (6) Concreting depth = 20 m. length = 1.0 m.

(i) width = 0.60 m. (ii) width = 0.30 m.

$$\begin{aligned} \text{Quantity} &= L \times B \times D = 1.0 \times 0.60 \times 20 \\ &= 12.0 \text{ m}^3 \end{aligned}$$

Let 20% be overbreak and waste.

(i) Total quantity of concrete for 0.6 m width

$$= 1.2 \times 12.0 = 14.4 \text{ m}^3$$

(ii) Total quantity of concrete for 0.3 m width = 7.2 m^3

- (7) (i) Removal of pretrench for 0.6 m. wall = 2.0 mt.

(ii) Removal of pretrench for 0.3 m. wall = 2.0 mt.

(14)

- (8) Providing pipes of 75 mm. diameter for grouting rock below diaphragm wall. Assuming general panel length = 3.0 m and let 2.0 pipes be per panel.

∴ for per meter length = $2/3 = 0.66$ m pipe

∴ Equivalent depth of pipe = depth $\times .66$.

(i) for 0.60 m. wide wall = $.66 \times 20 = 13.2$ mt.

(ii) for 0.30 m. wide wall = 13.2 m.

- (d) Quantities for concrete diaphragm wall 10 m. deep and of

(i) 0.60 m width (ii) 0.30 m width.

- (1) Installation Charges - Lump Sum

- (2) Concrete Pretrench.

	L	B	D	Qty.
(a) Excavation for wall of (i) 60 cm.	1.0 m	1.20 m	1.0m	1.2 m ³
(ii) 30 cm.	1.0 m	0.60 m	1.0m	0.6 m ³
(b) Concreting (i) 60 cm.	1.0 m	0.6 m	1.0m	0.6m ³
(ii) 30 cm.	1.0 m	0.30m	1.0m	0.3m ³

- (c) Reinforcement at 1.0% of total quantity of concreting.

Therefore Quantity of steel in M.T. = $0.60 \times 2.2 \times 0.01$

(i) for 0.60m wide wall = 0.0132 0.02 M.T.

(ii) for 0.30 m. wide wall = 0.01 M.T.

- (3) (i) Boring of 0.60 meter wide trench in soil

Depth = 9.0 m Length 1.0 m.

Area = Depth $\times$ length = 9.0 m²

(ii) Boring of 0.30 meter wide trench in soil = 9.0 m²

(15)

- (4) (1) Boring of 0.60 meter wide trench in Rock.

Depth = 1.0 m. Length = 1.0 m.

$$\text{area} = \text{Depth} \times \text{Length} = 1.0 \times 1.0 = 1.0 \text{ m}^2$$

- (ii) Boring of 0.30 meter wide trench in rock = 1.0 m^2

- (5) Reinforcement at 1.0 % of total quantity of concrete.

Therefore Steel in M.T. = $(1 \times 0.60 \times 10) \times 2.2 \times .01$

(i) Steel for 0.6 m wide wall = 0.132 M.T.

(ii) Steel for 0.2 m wide wall = 0.066 M.T.

- (6) Concreting = depth = 10 m. length = 1.0 m.

(i) width = 0.60 m. (ii) width = 0.30 m.

$$\begin{aligned} \text{Quantity} &= L \times B \times D = 1.0 \times 0.60 \times 10.0 \\ &= 6.0 \text{ m}^3 \end{aligned}$$

Let 20% be overbreak and waste.

- (1) Total quantity of concrete for 60 cm wide wall

$$= 1.2 \times 6.0 = 7.2 \text{ m}^3$$

- (ii) Total quantity of concrete for 30 cm wide wall = 3.6 m^3

- (7) (1) Removal of pretrench for 0.60 m. wide wall = 2.0 mt.

(ii) Removal of pretrench for 0.30 m. wide wall = 2.0 mt.

- (8) Providing pipes of 75 mm diameter for grouting rock below diaphragm wall. Assuming general panel length = 30 m and let 20 pipes be per panel.

Therefore for per meter length = $2/3 = 0.66$ pipe

Therefore Equivalent depth of pipe = depth $\times 6.6$

(1) for 60 cm wide wall = $10 \times .66 = 6.6 \text{ m}$

(ii) for 30 cm. wide wall = 6.6 m.