Item	Formula	Quantity
1. Girder CLASS "B"		

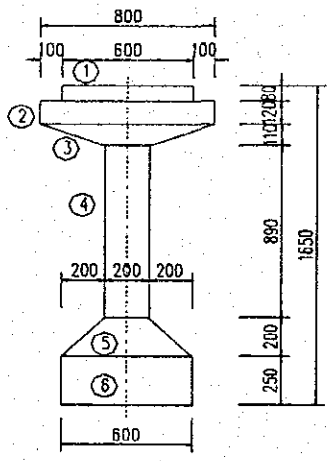
(1) Calculation of Sectional Area

[1] Middle Section

Summary of Sectional Area — For ONE GIRDER

No	Formula				(m2)
1	0.600 ×	0.080		=	0.048
2	0.800 ×	0.120		=	0.096
3	1/2 ×	1.000 ×	0.110	=	0.055
4	0.890 ×	0.200		=	0.178
5	1/2 ×	0.800 ×	0.200	=	0.080
6	0.250 ×	0.600		=	0.150

Total Area 0.607 m2

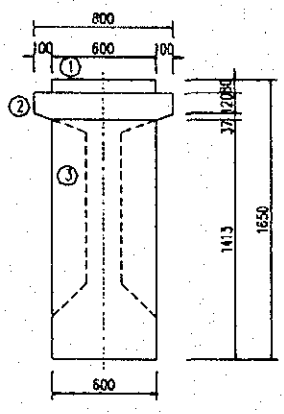


[2] End Section

Summary of Sectional Area — For ONE GIRDER

No	Formula					(m2)
1	0.600 ×	0.080			=	0.048
2	0.800 ×	0.120 +	0.034/2 ×	1.500	=	0.122
3	0.600 ×	1.413			=	0.848

Total Area 1.018 m2



Concrete P4-A2 No.

Item	Formula	Quantity

(2) Calculation of Concrete Volume

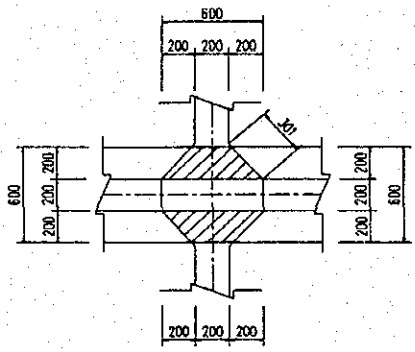
[1] P4-A2 Girder Length 25.000 m

Section No	Section Area	Average of Section Length	Length of Block	Concrete Volume	Remark
END	1.018	1.018	0.45	0.458	
MIDDLE	0.607	0.813	3.500	2.846	
MIDDLE	0.607	0.607	17.100	10.380	
END	1.018	0.813	3.500	2.846	
END	1.018	1.018	0.450	0.458	
Total			25.000	16.988	

No. of Girder 10 × 1 = 10

V1 = 16.988 × 10 = 169.880 m3

[2]. Diaphragm

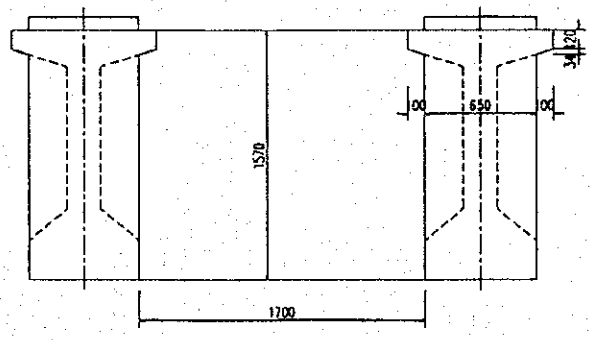


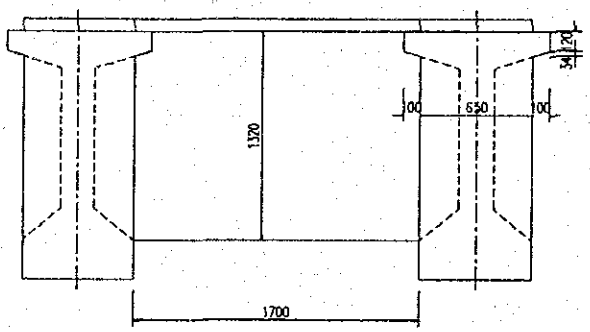
V2 = (0.200 × 0.963 + 0.6 × 0.690) × 1/2 × 0.2
× 2 × 2 × 10 × 1 = 2.426 m3

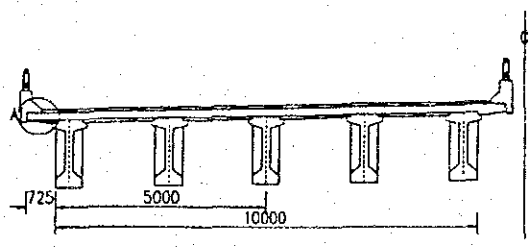
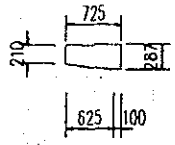
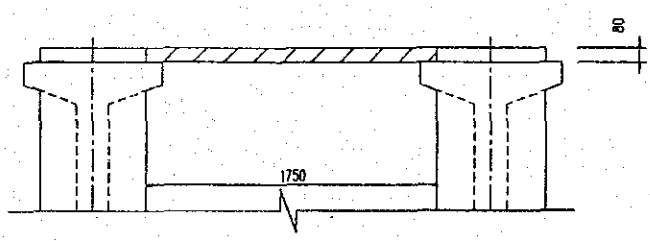
Total V = 169.880 + 2.426 = 172.31 m3 172.31 m3

2. Cross beam
CLASS "D"

(1) End Cross Beam



Item	Formula	Quantity
	V1 = { 1.570 × 1.700 - (0.120 + 0.154) × 2/2 × 0.100 } × 0.500 × 4 × 4 = 21.133 m3	
	(2) Intermediate Cross Beam 	
	V2 = [{ 1.700 × 1.320 - (0.120 + 0.154) × 2/2 × 0.100 } × 0.200 × 4 × 2 × 2 = 7.093 m3	
	Sub-total V = 21.133 + 7.093 = 28.23 m3	28.23 m3

Item	Formula	Quantity
3. Deck Slab CLASS "D"		
		
	DETAIL "A"	
	A = [(0.210 + 0.287) × 0.625 × 1/2 + 0.100 × 0.287)] × 2 + (5.000 × 0.210 × 2)] × 2 = 4.936 m2	
	V = 4.936 × 25.000 = 123.400 m3	123.40 m3
4.Panel concrete Class "D"		
	V = 1.750 × 0.08 × 25.000 × 1 × 8 =	28.00 m3

Form A1-P1 No.

Item	Formula	Quantity
1. Girder		

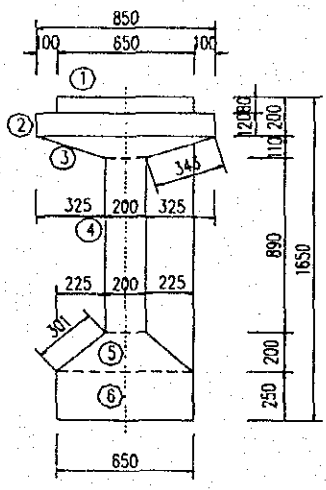
(1) Calculation of Sectional Area

[1] Middle Section

Summary of Sectional Length For ONE GIRDER

No	Formula				(m)
1	0.080	×	2	=	0.160
2	0.120	×	2	=	0.240
3	0.343	×	2	=	0.686
4	0.890	×	2	=	1.780
5	0.301	×	2	=	0.602
6	0.250	×	2 + 0.650	=	1.150

Total Length 4.618 m

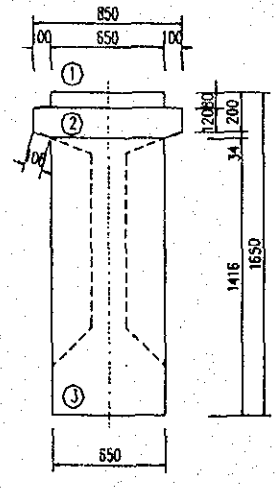


[2] End Section

Summary of Sectional Length For ONE GIRDER

No	Formula				(m)
1	0.080	×	2	=	0.160
2	0.120	×	2	=	0.240
2	0.106	×	2	=	0.212
3	1.416	×	2 + 0.650	=	3.482

Total Length 4.094 m



Form A1-P1 No.

Item	Formula	Quantity

(2) Calculation of Form Area

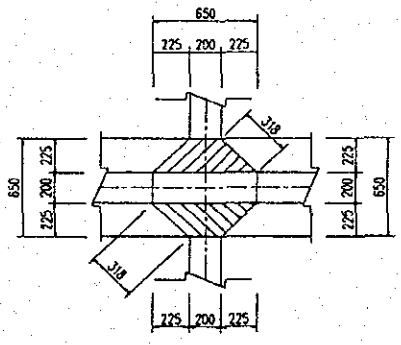
[1] A1-P1 Girder Length 28.000 m

Section No.	Section Length	Average of Section Length	Length of Block	Form Area	Remark
END	4.094	4.094	0.45	1.842	
MIDDLE	4.618	4.356	4.000	17.424	
MIDDLE	4.618	4.618	19.100	88.204	
END	4.094	4.356	4.000	17.424	
END	4.094	4.094	0.450	1.842	
Total			28.000	126.736	

No. of Girder 10 × 1 = 10

A1 = 126.736 × 10 = 1,267.36 m2

[2]. Diaphragm



A2 = (0.200 + 0.318 × 2) × 2 × (0.890 + 1.166)
× 1/2 × 2 × 10 × 1 = 68.753 m2

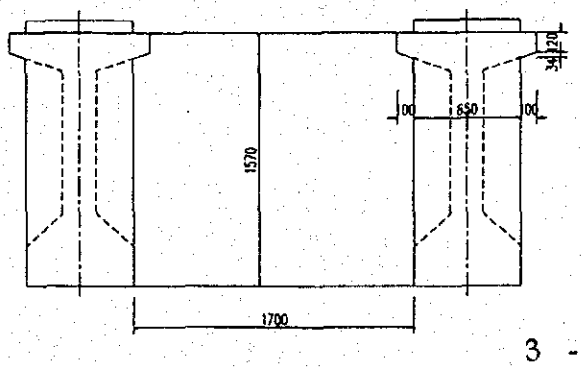
[3]. External form at girder ends

A3 = { 0.65 × 0.080 + 0.850 × 0.120 + (0.850 + 0.650)
× 0.034 × 1/2 + 0.650 × 1.416 } × 2 × 10
× 1.000 = 21.998 m2

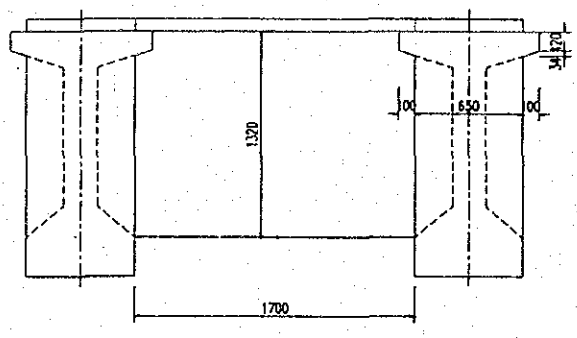
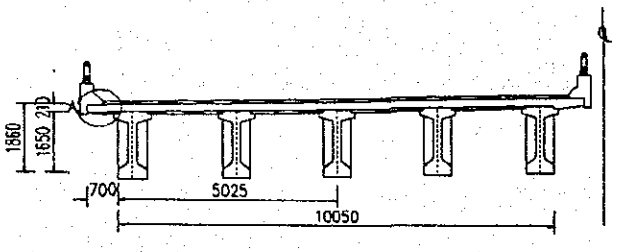
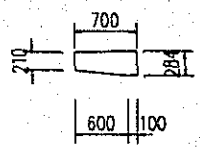
Total A = 1,267.4 + 68.753 + 21.998 = 1,358.11 m2 | 1,358.11 m2

2. Cross Beam

(1). End Cross Beam

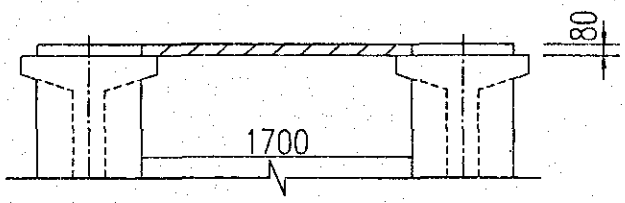


Form A1-P1 No.

Item	Formula	Quantity
	A1 = { (1.57 × 1.700 - (0.120 + 0.154) × 0.100 } × 2 + 1.7 × 0.500 } × 8 × 2 = 98.131 m2	
	(2). Intermediate Cross Beam	
		
	A2 = [{ 1.320 × 1.700 - (0.120 + 0.154) × 0.100 } × 2 + 1.7 × 0.200 } × 8 × 2 × 1 = 76.371 m2	
	Sub-total A = 98.131 + 76.371 = 174.50 m2	174.50 m2
3. Deck Slab		
		
	DETAIL "A"	

Form A1-P1 No.

Item	Formula							Quantity
	A - 2 =	(0.210 +	0.600) ×	2 ×	2	=	3.240 m	
	A =	3.240 ×	28.100			=	91.04 m2	91.04 m2
4. Platform for construction								
	A =	26.100 ×	26.150			=	682.52 m2	682.52 m2
5.Panel								
	A =	(1.700 +	0.080 ×	2.000) x	8 x	1 x	28	
						=	416.64 m2	



Item	Formula	Quantity
1. Girder		

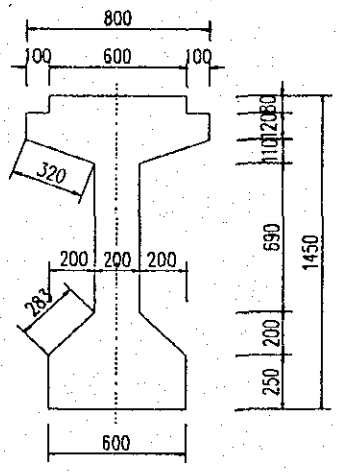
(1) Calculation of Sectional Area

[1] Middle Section

Summary of Sectional Length For ONE GIRDER

No	Formula				(m)
1	0.080 ×	2		=	0.160
2	0.120 ×	2		=	0.240
3	0.320 ×	2		=	0.640
4	0.690 ×	2		=	1.380
5	0.283 ×	2		=	0.566
6	0.250 ×	2 +	0.600	=	1.100

Total Length 4.086 m

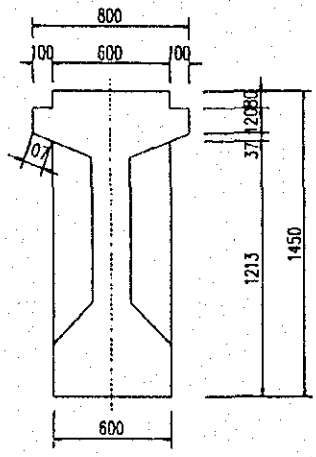


[2] End Section

Summary of Sectional Length For ONE GIRDER

No	Formula				(m)
1	0.080 ×	2		=	0.160
2	0.120 ×	2		=	0.240
2	0.107 ×	2		=	0.214
3	1.213 ×	2 +	0.600	=	3.026

Total Length 3.640 m



Item	Formula	Quantity

(2) Calculation of Form Area

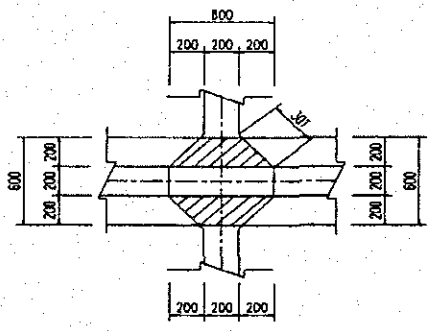
[1] P1-P2(P3-P4) Girder Length 25.000 m

Section No.	Section Length	Average of Section Length	Length of Block	Form Area	Remark
END	3.640	3.64	0.45	1.638	
MIDDLE	4.086	3.863	3.500	13.521	
MIDDLE	4.086	4.086	17.100	69.871	
END	3.640	3.863	3.500	13.521	
END	3.640	3.640	0.450	1.638	
Total			25.000	100.189	

No. of Girder 10 × 2 = 20

A1 = 100.189 × 20 = 2,003.78 m2

[2]. Diaphragm



A2 = (0.200 + 0.301 × 2) × 2 × (0.690 + 0.963)
× 1/2 × 2 × 10 × 2 = 106.056 m2

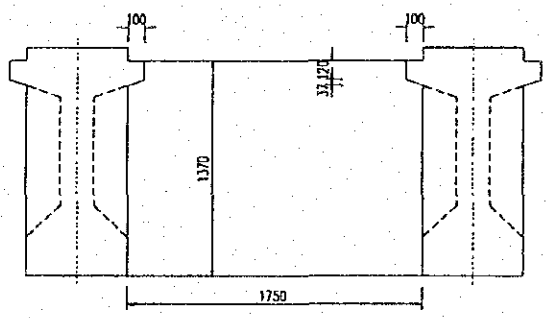
[3]. External form at girder ends

A3 = { 0.60 × 0.080 + 0.800 × 0.120 + (0.800 + 0.600)
× 0.034 × 1/2 + 0.600 × 1.213 } × 2 × 10
× 2.000 = 35.824 m2

Total A = 2,003.8 + 106.056 + 35.824 = 2,145.66 m2 2,145.66 m2

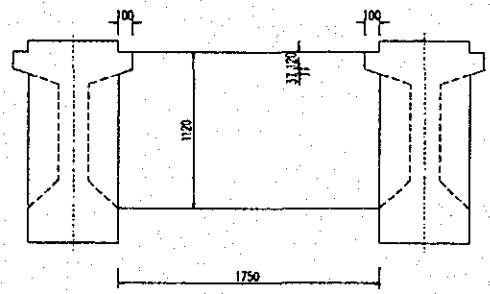
Form P1-P2(P3-P4) No.

Item	Formula	Quantity
2. Cross Beam		
	(1). End Cross Beam	



A1 = { { 1.37 × 1.700 - (0.120 + 0.154) × 0.100 } × 2
+ 1.7 × 0.500 } × 8 × 2 = 87.251 m2

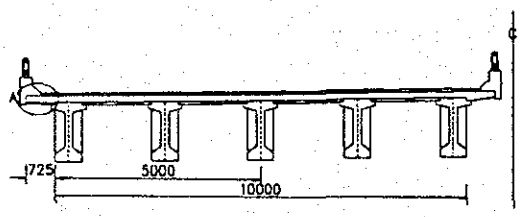
(2). Intermediate Cross Beam

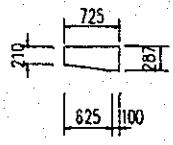


A2 = [{ 1.120 × 1.750 - (0.120 + 0.157) × 0.100 } × 2
+ 1.75 × 0.200 } × 8 × 2 × 2 = 134.867 m2

Sub-total A = 87.251 + 134.867 = 222.12 m2 222.12 m2

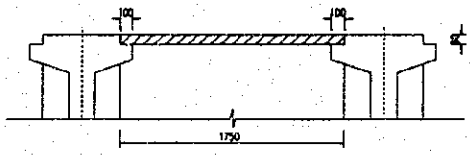
3. Deck Slab





DETAIL "A"

Item	Formula							Quantity
	A - 2 =	(0.210 +	0.625) ×	2	×	2	= 3.340 m	
	A =	3.340 ×		25.200 ×		2	= 168.34 m2	168.34 m2
4. Platform for construction								
	A =	26.100 ×	48.600				= 1,268.46 m2	1268.46 m2
5.Panel								
	A =	(1.750 +	0.080 ×	2.000) ×		8 ×	2 × 25 = 764 m2	



Form P2-P3 No.

Item	Formula	Quantity
1. Girder		

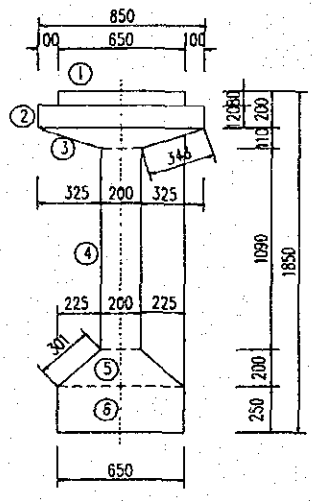
(1) Calculation of Sectional Area

[1] Middle Section

Summary of Sectional Length For ONE GIRDER

No	Formula				(m)
1	0.080	×	2	=	0.160
2	0.120	×	2	=	0.240
3	0.343	×	2	=	0.686
4	1.090	×	2	=	2.180
5	0.301	×	2	=	0.602
6	0.250	×	2 + 0.650	=	1.150

Total Length 5.018 m

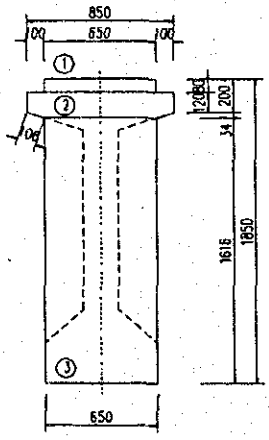


[2] End Section

Summary of Sectional Length For ONE GIRDER

No	Formula				(m)
1	0.080	×	2	=	0.160
2	0.120	×	2	=	0.240
2	0.106	×	2	=	0.212
3	1.616	×	2 + 0.650	=	3.882

Total Length 4.494 m



Form P2-P3 No.

Item	Formula	Quantity

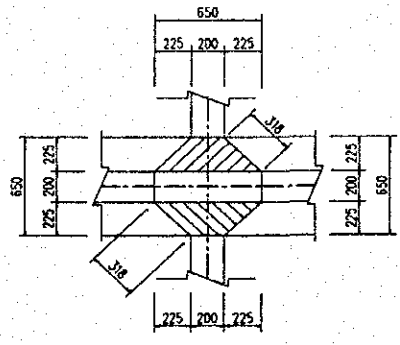
(2) Calculation of Form Area

[1] P2-P3 Girder Length 37.000 m

Section No.	Section Length	Average of Section Length	Length of Block	Form Area	Remark
END	4.494	4.494	0.5	2.247	
MIDDLE	5.018	4.756	5.300	25.207	
MIDDLE	5.018	5.018	25.400	127.457	
END	4.494	4.756	5.300	25.207	
END	4.494	4.494	0.500	2.247	
Total			37.000	182.365	

A1 = 182.365 × (No. of Girder 10 × 1) = 10 = 1,823.65 m2

[2]. Diaphragm



A2 = (0.200 + 0.318 × 2) × 2 × (1.090 + 1.366) × 1/2 × 3 × 10 × 1 = 123.193 m2

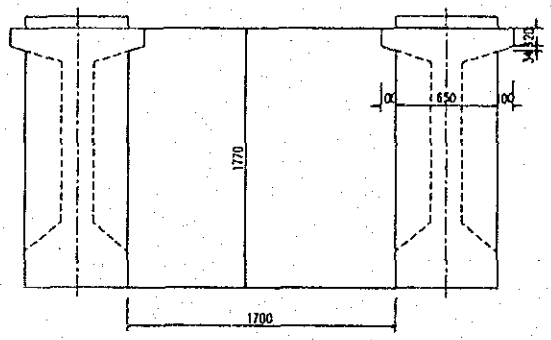
[3]. External form at girder ends

A3 = { 0.65 x 0.080 + 0.850 x 0.120 + (0.850 + 0.650) x 0.034 x 1/2 + 0.650 x 1.616 } x 2 x 10 x 1.000 = 24.598 m2

Total A = 1,823.7 + 123.193 + 24.598 = 1,971.44 m2 | 1,971.44 m2

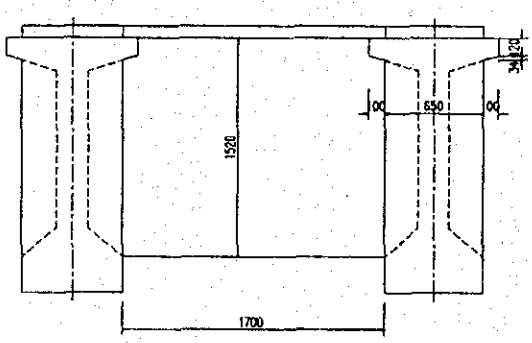
Form P2-P3 No.

Item	Formula	Quantity
2. Cross Beam		
	(1). End Cross Beam	



A1 = { { 1.77 × 1.700 - (0.120 + 0.154) × 0.100 } × 2
+ 1.7 × 0.500 } × 8 × 2 = 109.011 m2

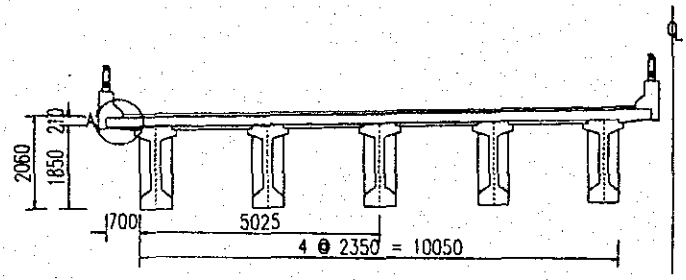
(2). Intermediate Cross Beam

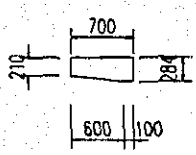


A2 = [{ 1.520 × 1.700 - (0.120 + 0.154) × 0.100 } × 2
+ 1.7 × 0.200 } × 8 × 3 x 1 = 130.877 m2

Sub-total A = 109.011 + 130.877 = 239.89 m2 239.89 m2

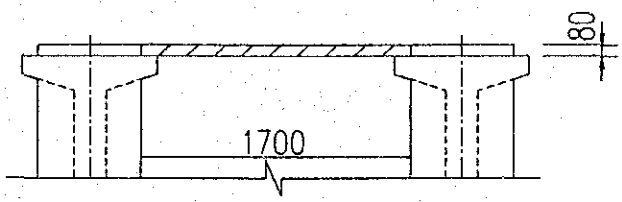
3. Deck Slab





DETAIL "A"

Item	Formula							Quantity
	A - 2 =	(0.210 +	0.600) ×	2	× 2	=	3.240 m	
	A =	3.240 ×		37.200		=	120.528 m2	120.53 m2
4. Platform for construction								
	A =	26.100 ×	35.400			=	923.94 m2	923.94 m2
5.Panel								
	A =	(1.700 +	0.080 ×	2.000) x	8 x	1 x	37	
						=	550.56 m2	



Form P4-A2 No.

Item	Formula	Quantity

1. Girder

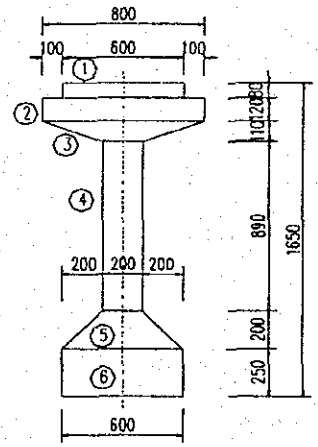
(1) Calculation of Sectional Area

[1] Middle Section

Summary of Sectional Length For ONE GIRDER

No	Formula				(m)
1	0.080	×	2	=	0.160
2	0.120	×	2	=	0.240
3	0.320	×	2	=	0.640
4	0.890	×	2	=	1.780
5	0.283	×	2	=	0.566
6	0.250	×	2 + 0.600	=	1.100

Total Length 4.486 m

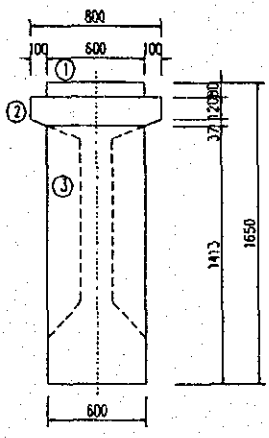


[2] End Section

Summary of Sectional Length For ONE GIRDER

No	Formula				(m)
1	0.080	×	2	=	0.160
2	0.120	×	2	=	0.240
2	0.107	×	2	=	0.214
3	1.413	×	2 + 0.600	=	3.426

Total Length 4.040 m



Item	Formula	Quantity

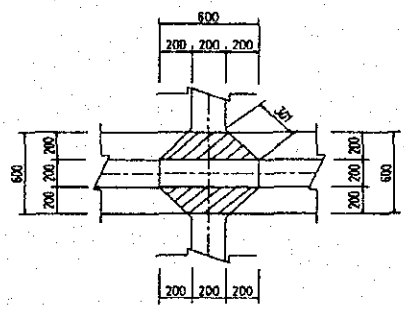
(2) Calculation of Form Area

[1] P4-A2 Girder Length 25.000 m

Section No.	Section Length	Average of Section Length	Length of Block	Form Area	Remark
END	4.040	4.04	0.45	1.818	
MIDDLE	4.486	4.263	3.500	14.921	
MIDDLE	4.486	4.486	17.100	76.711	
END	4.040	4.263	3.500	14.921	
END	4.040	4.040	0.450	1.818	
Total			25.000	110.189	

A1 = 110.189 × No. of Girder 10 × 1 = 10 = 1,101.89 m2

[2]. Diaphragm



A2 = (0.200 + 0.301 × 2) × 2 × (0.890 + 1.166) × 1/2 × 2 × 10 × 1 = 65.956 m2

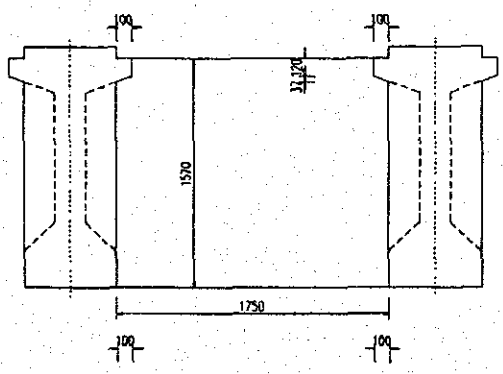
[3]. External form at girder ends

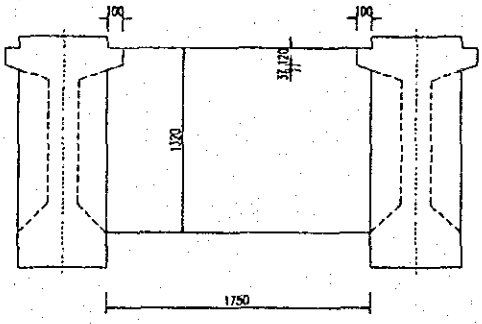
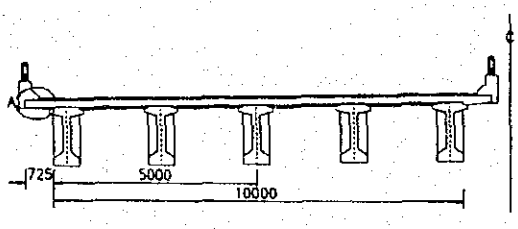
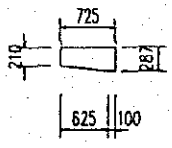
A3 = { 0.60 × 0.080 + 0.600 × 0.120 + (0.800 + 0.600) × 0.370 × 1/2 + 0.600 × 1.413 } × 2 × 10 × 1.000 = 24.536 m2

Total A = 1,101.9 + 65.956 + 24.536 = 1,192.38 m2 | 1,192.38 m2

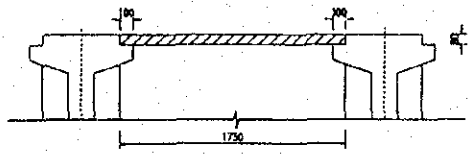
2. Cross Beam

(1). End Cross Beam



Item	Formula	Quantity
	A1 = { { 1.57 × 1.750 - (0.120 + 0.157) × 0.100 } x 2 + 1.75 × 0.450 } × 8 × 2 = 99.634 m2	
	(2). Intermediate Cross Beam	
		
	A2 = [{ 1.320 × 1.750 - (0.120 + 0.157) × 0.100 } x 2 + 1.75 × 0.200] × 8 × 2 x 1 = 78.634 m2	
	Sub-total A = 99.634 + 78.634 = 178.27 m2	178.27 m2
3. Deck Slab		
		
	DETAIL "A"	

Item	Formula							Quantity
	A - 2 =	(0.210 +	0.625) ×	2	× 2	=	3.340 m	
	A =	3.340 ×	25.100			=	83.83 m2	83.83 m2
4. Platform for construction								
	A =	26.100 ×	23.150			=	604.22 m2	604.22 m2
5.Panel								
	A =	(1.750 +	0.080 ×	2.000) x	8 x	1 x	25	
						=	382 m2	



Pc cables A1-P1 No.

Item	Formula	Quantity

PC CABLE

1) 12S12.7 (B)

1.A1-P1 For ONE GIRDER

CABLE VAR.	EACH LENGTH	CABLE NO.	EACH	TOTAL LENGTH	UNIT WEIGHT	WEIGHT
1	27.702	C1	1	27.702	9.290	257.352
2	27.746	C2	1	27.746	9.290	257.760
3	27.848	C3	1	27.848	9.290	258.708
TOTAL			3	83.296		773.820

SUB-TOTAL WEIGHT OF PC CABLES per BRIDGE (A1-P1)

Wp = 773.820 × 10 × 1 = 7,738.200 Kg

TENSION UNIT EACH

Ns = 3 × 2 × 10 × 1 = 60

2) 3S12.7

PC CABLE OF DIAPHRAGMS For A1-P1

LOCATION	EACH LENGTH	CABLE NO.	EACH	TOTAL LENGTH	UNIT WEIGHT	WEIGHT
Connection One	10.050		8	80.4	2.320	186.528
TOTAL			8	80.400		186.528

TOTAL WEIGHT OF PC CABLES per BRIDGE (A1-P1)

Wp = 186.528 = 186.528 kg

TENSION UNIT EACH

Ns = 8 x 2 = 16

SHEATHING Þ 80/85 83.296 x 10 x 1 = 832.96 m

SHEATHING Þ 50/55 80.400 x 2 = 160.80 m

STEEL SHEAR KEY 6 x 10 x 1 = 60 set

CEMENT GROUT IN SHEATHING

3.14 x 0.08 x 0.08 / 4 x 832.96 = 4.185 m3

3.14 x 0.05 x 0.05 / 4 x 160.80 = 0.316 m3

TOTAL = 4.500 m3

ANCHOR 12S12.7 6 x 5 x 2 60 set

ANCHOR 3S12.7 8 x 2 = 16 set

Pc cables P1-P2(P3-P4) No.

Item	Formula	Quantity

PC CABLE

1) 12S12.7 (B)

1.P1-P2(P3-P4) For ONE GIRDER

CABLE VAR.	EACH LENGTH	CABLE NO.	EACH	TOTAL LENGTH	UNIT WEIGHT	WEIGHT
1	24.702	C1	1	24.702	9.290	229.482
2	24.738	C2	1	24.738	9.290	229.816
3	24.818	C3	1	24.818	9.290	230.559
TOTAL			3	74.258		689.857

SUB-TOTAL WEIGHT OF PC CABLES per BRIDGE (P1-P2(P3-P4))

Wp = 689.857 × 10 × 2 = 13,797.140 Kg

TENSION UNIT EACH

Ns = 3 × 2 × 10 × 2 = 120

2) 3S12.7

PC CABLE OF DIAPHRAGMS For P1-P2(P3-P4)

LOCATION	EACH LENGTH	CABLE NO.	EACH	TOTAL LENGTH	UNIT WEIGHT	WEIGHT
Connection One	*10.050*		*10*	*100.5*	*2.320*	*233.160*
TOTAL			8	100.500		233.160

TOTAL WEIGHT OF PC CABLES per BRIDGE (P1-P2(P3-P4))

Wp = 233.160 x 2 = 466.320 kg

TENSION UNIT EACH

Ns = 8 x 2 x 2 = 32

SHEATHING Þ 80/85 74.258 x 10 x 2 = 1485.16 m

SHEATHING Þ 50/55 100.500 x 2 = 201.00 m

STEEL SHEAR KEY 6 x 10 x 2 = 120 set

CEMENT GROUT IN SHEATHING

3.14 x 0.08 x 0.08 / 4 x 1485.16 = 7.461 m3

3.14 x 0.05 x 0.05 / 4 x 201.00 = 0.394 m3

TOTAL = 7.856 m3

ANCHOR 12S12.7 6 x 10 x 2 120 set

ANCHOR 3S12.7 8 x 2 x 2 = 32 set

Pc cables P2-P3 No.

Item	Formula	Quantity
PC CABLE 1) 12S12.7 (B)		

1.P2-P3 For ONE GIRDER

CABLE VAR.	EACH LENGTH	CABLE NO.	EACH	TOTAL LENGTH	UNIT WEIGHT	WEIGHT
1	36.702	C1	1	36.702	9.290	340.962
2	36.714	C2	1	36.714	9.290	341.073
3	36.754	C3	1	36.754	9.290	341.445
4	36.784	C4	1	36.784	9.290	341.723
5	36.822	C5	1	36.822	9.290	342.076
TOTAL			5	183.776		1707.279

SUB-TOTAL WEIGHT OF PC CABLES per BRIDGE (P2-P3)

Wp = 1707.279 × 10 × 1 = 17,072.790 Kg

TENSION UNIT EACH

Ns = 5 × 2 × 10 × 1 = 100

2) 3S12.7

PC CABLE OF DIAPHRAGMS For P2-P3

LOCATION	EACH LENGTH	CABLE NO.	EACH	TOTAL LENGTH	UNIT WEIGHT	WEIGHT
Connection One	10.050		10	100.5	2.320	233.160
TOTAL			10	100.500		233.160

TOTAL WEIGHT OF PC CABLES per BRIDGE (P2-P3)

Wp = 233.160 x 2 = 466.320 kg

TENSION UNIT EACH

Ns = 10 x 2 = 20

SHEATHING Þ 80/85 183.776 x 10 x 1 = 1837.76 m

SHEATHING Þ 50/55 = 100.50 m

STEEL SHEAR KEY 12 x 10 x 1 = 120 set

CEMENT GROUT IN SHEATHING

3.14 x 0.08 x 0.08 / 4 x 1837.76 = 9.233 m3

3.14 x 0.05 x 0.05 / 4 x 100.50 = 0.197 m3

TOTAL = 9.430 m3

ANCHOR 12S12.7B 10 x 10 100 set

ANCHOR 3S12.7 10 x 2 = 20 set

Pc cables P4-A2 No.

Item	Formula	Quantity

PC CABLE

1) 12S12.7 (B)

1.P1-P2(P3-P4) For ONE GIRDER

CABLE VAR.	EACH LENGTH	CABLE NO.	EACH	TOTAL LENGTH	UNIT WEIGHT	WEIGHT
1	24.702	C1	1	24.702	9.290	229.482
2	24.738	C2	1	24.738	9.290	229.816
3	24.818	C3	1	24.818	9.290	230.559
TOTAL			3	74.258		689.857

SUB-TOTAL WEIGHT OF PC CABLES per BRIDGE (P1-P2(P3-P4))

Wp = 689.857 × 10 × 2 = 13,797.140 Kg

TENSION UNIT EACH

Ns = 3 × 2 × 10 × 2 = 120

2) 3S12.7

PC CABLE OF DIAPHRAGMS For P1-P2(P3-P4)

LOCATION	EACH LENGTH	CABLE NO.	EACH	TOTAL LENGTH	UNIT WEIGHT	WEIGHT
Connection One	10.050		10	100.5	2.320	233.160
TOTAL			8	100.500		233.160

TOTAL WEIGHT OF PC CABLES per BRIDGE (P1-P2(P3-P4))

Wp = 233.160 x 2 = 466.320 kg

TENSION UNIT EACH

Ns = 8 x 2 x 2 = 32

SHEATHING Þ 80/85 74.258 x 10 x 2 = 1485.16 m

SHEATHING Þ 50/55 100.500 x 2 = 201.00 m

STEEL SHEAR KEY 6 x 10 x 2 = 120 set

CEMENT GROUT IN SHEATHING

3.14 x 0.08 x 0.08 / 4 x 1485.16 = 7.461 m3

3.14 x 0.05 x 0.05 / 4 x 201.00 = 0.394 m3

TOTAL = 7.856 m3

ANCHOR 12S12.7 6 x 10 x 2 120 set

ANCHOR 3S12.7 8 x 2 x 2 = 32 set

Accessories A1-A2 No.

Item	Formula	Quantity
1. Joint		
	Each length L = 10.750	
	Each = 4	
	Total length	
	L = 10.750 × 4 =	43.000 m
2. Bearing pad	ELASTOMERIC 600x300x57	
	Each for one span	
	Each = 10	
	TOTAL EACH	
	Each = 10 × 1 × 2 =	EACH 20
	ELASTOMERIC 500x250x50	
	Each for one span	
	Each = 10	
	TOTAL EACH	
	Each = 10 × 4 × 2 =	EACH 80
3. Anchor bar		
	Each for one span	
	Each = 8	
	Total each (fix)	
	Each = 8 × 4 =	EACH 32
	Total each (move)	
	Each = 8 × 6 =	EACH 48
	TOTAL =	80
4. Pavement		
	a. Water proofing 5mm 10.75 x 140.90 x 2 = 3029 m2	3029 m2
	b. Asphalt concrete 70mm 10.75 x 140.90 x 2 = 3029 m2	3029 m2

Re-bar girder

No.

A1-P1 (P4-2)

For ONE GIRDER

SCHEDULE OF REINFORCEMENT FOR GIRDER L=28m, H=1.65m (OF GIRDER)													
BAR MARK	SIZE (mm)	DIMENSIONS (mm) a	b	c	d	e	f	g	LENGTH (mm)	UNIT WEIGHT (kgf/m)	NO. OF BARS	WEIGHT (kgf)	REMARKS
G1	14	190	1757	117	1757	190			4011	1.208	138	668.7	
G2	14	190	1757	342	1757	190			4236	1.208	56	286.6	Average
G3	14	190	1757	567	1757	190			4461	1.208	6	32.3	
G4	14	190	1757	567	1757	190			4461	1.208	4	21.6	
G5	14	200	238	154	567	154	238	200	1751	1.208	148	313.1	
G6	14	200	42	759	42	200			1243	1.208	148	222.2	
G7	14	200	301	183	567	183	301	200	1935	1.208	86	201.0	
G8	14	200	151	183	567	183	151	200	1635	1.208	56	110.6	Average
G9	14	389	567	389					1345	1.208	6	9.8	
G10	22	8695	10450	8695					27840	2.984	6	498.5	Average
G11	14	8695	10450	8695					27840	1.208	20	672.6	
G12	14	8700	10450	8700					27850	1.208	10	336.4	
G13	14	100	318	151	318	100			987	1.208	20	23.9	
G14	14	200	800						1000	1.208	12	14.5	
G15	16	1600							1600	1.578	52	131.3	Interior
G16	16	1100							1100	1.578	52	90.3	Exterior
G17	10	520							520	0.617	12	3.9	
G18	10	150							150	0.617	40	3.7	
G19	22	361	335	567	335	361			1959	2.984	148	865.2	
Total	Mid span	Interior grider										4415.6	
		Exterior girder										4374.6	

Total Weight

Span	Mid/Side	Int/Ext	Nos.	Weight/G	Total	Remark
A1-P1	Mid span	Interior Beam	6	4415.59	26493.54	
		Exterior Beam	4	4374.56	17498.24	
Total					43991.78	

Re-bar girder

No.

P1-P2(P3-P4)

For ONE GIRDER

SCHEDULE OF REINFORCEMENT FOR GIRDER L=25m, H=1.45m (OF GIRDER)													
BAR MARK	SIZE (mm)	DIMENSIONS (mm) a	b	c	d	e	f	g	LENGTH (mm)	UNIT WEIGHT (kgf/m)	NO. OF BARS	WEIGHT (kgf)	REMARKS
G1	14	190	1557	117	1557	190			3611	1.208	119	519.1	
G2	14	190	1557	317	1557	190			3811	1.208	48	221.0	Average
G3	14	190	1557	517	1557	190			4011	1.208	8	38.8	
G4	14	190	1557	517	1557	190			4011	1.208	4	19.4	
G5	14	200	209	159	509	159	209	200	1645	1.208	131	260.3	
G6	14	200	43	709	43	200			1195	1.208	131	189.1	
G7	14	200	283	189	517	189	283	200	1861	1.208	75	168.6	
G8	14	200	141	189	517	189	141	200	1577	1.208	48	91.4	Average
G9	14	389	517	389					1295	1.208	8	12.5	
G10	22	7445	9950	7445					24840	2.984	6	444.7	Average
G11	14	7445	9950	7445					24840	1.208	18	540.1	
G12	14	7455	9950	7455					24860	1.208	8	240.3	
G13	14	100	277	151	277	100			905	1.208	16	17.5	
G14	14	200	800						1000	1.208	12	14.5	
G15	16	1600							1600	1.578	44	111.1	Interior
G16	16	1100							1100	1.578	44	76.4	Exterior
G17	10	520							520	0.617	12	3.9	
G18	10	150							150	0.617	32	3.0	
G19	22	338	335	517	335	338			1863	2.984	131	728.3	
Total	Mid span		Interior grider									3623.5	
			Exterior girder									3588.7	

Total Weight

Span	Mid/Side	Int/Ext	Nos.	Weight/G	Total	Remark
P1-P2	Mid span	Interior Beam	12	3623.45	43481.40	
		Exterior Beam	8	3588.74	28709.92	
P3-P4						
Total					72191.32	

Re-bar girder

No.

P2-P3

For ONE GIRDER

SCHEDULE OF REINFORCEMENT FOR L=37m, H=1.85m (OF GIRDER)													
BAR MARK	SIZE (mm)	DIMENSIONS (mm) a	b	c	d	e	f	g	LENGTH (mm)	UNIT WEIGHT (kgf/m)	NO. OF BARS	WEIGHT (kgf)	REMARKS
G1	14	190	1957	117	1957	190			4411	1.208	184	980.4	
G2	14	190	1957	342	1957	190			4636	1.208	74	414.4	Average
G3	14	190	1957	567	1957	190			4861	1.208	6	35.2	
G4	14	190	1957	567	1957	190			4861	1.208	6	35.2	
G5	14	200	238	154	567	154	238	200	1751	1.208	196	414.6	
G6	14	200	42	759	42	200			1243	1.208	196	294.3	
G7	14	200	301	183	567	183	301	200	1935	1.208	122	285.2	
G8	14	200	151	183	567	183	151	200	1635	1.208	74	146.2	Average
G9	14	389	567	389					1345	1.208	6	9.8	
G10	22	6945	7450	7950	7450	6945			36740	2.984	6	657.8	Average
G11	14	6945	7450	7950	7450	6945			36740	1.208	22	976.4	
G12	14	6950	7450	7950	7450	6950			36750	1.208	12	532.7	
G13	14	100	318	151	318	100			987	1.208	30	35.8	
G14	14	200	800						1000	1.208	12	14.5	
G15	16	1600							1600	1.578	76	191.9	Interior
G16	16	1100							1100	1.578	76	131.9	Exterior
G17	10	570							570	0.617	24	8.4	
G18	10	150							150	0.617	104	9.6	
G19	22	361	335	567	335	361			1959	2.984	202	1180.8	
Total	Mid span		Interior grider									6223.2	
			Exterior girder									6163.3	

Total Weight

Span	Mid/Side	Int/Ext	Nos.	Weight/G	Total	Remark
P2-P3	Mid span	Interior Beam	6	6223.24	37339.44	
		Exterior Beam	4	6163.28	24653.12	
Total					61992.56	

Re-bar girder

No.

P4-A2, A1-P1

For ONE GIRDER

SCHEDULE OF REINFORCEMENT FOR GIRDER L=25m, H=1.65m (OF GIRDER)													
BAR MARK	SIZE (mm)	DIMENSIONS (mm)							LENGTH (mm)	UNIT WEIGHT (kgf/m)	NO. OF BARS	WEIGHT (kgf)	REMARKS
		a	b	c	d	e	f	g					
G1	14	190	1757	117	1757	190			4011	1.208	119	576.6	
G2	14	190	1757	317	1757	190			4211	1.208	48	244.2	Average
G3	14	190	1757	517	1757	190			4411	1.208	8	42.6	
G4	14	190	1757	517	1757	190			4411	1.208	4	21.3	
G5	14	200	209	159	509	159	209	200	1645	1.208	131	260.3	
G6	14	200	43	709	43	200			1195	1.208	131	189.1	
G7	14	200	283	189	517	189	283	200	1861	1.208	75	168.6	
G8	14	200	141	189	517	189	141	200	1577	1.208	48	91.4	Average
G9	14	389	517	389					1295	1.208	8	12.5	
G10	22	7445	9950	7445					24840	2.984	6	444.7	Average
G11	14	7445	9950	7445					24840	1.208	20	600.1	
G12	14	7455	9950	7455					24860	1.208	10	300.3	
G13	14	100	277	151	277	100			905	1.208	20	21.9	
G14	14	200	800						1000	1.208	12	14.5	
G15	16	1600							1600	1.578	56	141.4	Interior
G16	16	1100							1100	1.578	56	97.2	Exterior
G17	10	520							520	0.617	12	3.9	
G18	10	150							150	0.617	40	3.7	
G19	22	338	335	517	335	338			1863	2.984	131	728.3	
Total	Mid span		Interior grider									3865.4	
			Exterior girder									3821.2	

Total Weight

Span	Mid/Side	Int/Ext	Nos.	Weight/G	Total	Remark
P4-A2	Mid span	Interior Beam	6	3865.42	23192.52	
		Exterior Beam	4	3821.23	15284.92	
Total					38477.44	

Re-bar cross beam

No.

A1-P1,P4-A4

Per EACH

SCHEDULE OF REINFORCEMENT FOR DIAPHRAGM L=28m, H=1.65m

(1) END DIAPHRAGM

BAR MARK	SIZE (mm)	DIMENSIONS (mm) a	b	c	d	e	f	g	LENGTH (mm)	UNIT WEIGHT (kg/m)	NO. OF BARS	WEIGHT (kg)	REMARKS
G1	16	1700							1700	1.578	16	42.92	
G2	14	198	1759	410	1759	198			4324	1.208	28	146.25	
Sub-Total												189.17	

(2) INTERMEDIATE DIAPHRAGM

BAR MARK	SIZE (mm)	DIMENSIONS (mm) a	b	c	d	e	f	g	LENGTH (mm)	UNIT WEIGHT (kg/m)	NO. OF BARS	WEIGHT (kg)	REMARKS
H1	16	1700							1700	1.578	14	37.56	
H2	14	198	1509	110	1509	198			3524	1.208	28	119.20	
Sub-Total												156.76	

3) Total Weight

SECTION	Nos.	Weight/EACH	Weight
END DIAPHRAGM	8	189.17	1513.36
INTERMEDIATE DIAPHRAGM	8	156.76	1254.08
Total			2767.44

Re-bar cross beam

No.

P1-P2

Per EACH

SCHEDULE OF REINFORCEMENT FOR DIAPHRAGM L=25m, H=1.45m

(1) END DIAPHRAGM

BAR MARK	SIZE (mm)	DIMENSIONS (mm) a	b	c	d	e	f	g	LENGTH (mm)	UNIT WEIGHT (kg/m)	NO. OF BARS	WEIGHT (kg)	REMARKS
B1	16	1750							1750	1.578	16	44.18	
B2	14	198	1309	110	1309	198			3124	1.208	28	105.67	
Sub-Total												149.85	

(2) INTERMEDIATE DIAPHRAGM

BAR MARK	SIZE (mm)	DIMENSIONS (mm) a	b	c	d	e	f	g	LENGTH (mm)	UNIT WEIGHT (kg/m)	NO. OF BARS	WEIGHT (kg)	REMARKS
K1	16	1700							1700	1.578	16	42.92	
k2	14	198	1709	110	1709	198			3924	1.208	28	132.73	
												175.65	

3) Total Weight

SECTION	Nos.	Weight/EACH	Weight
END DIAPHRAGM	8	149.85	1198.80
INTERMEDIATE DIAPHRAGM	8	175.65	1405.20
Total			2604.00

Re-bar cross beam

No.

P2-P3

Per EACH

SCHEDULE OF REINFORCEMENT FOR DIAPHRAGM L=37m, H=1.85m

(1) END DIAPHRAGM

BAR MARK	SIZE (mm)	DIMENSIONS (mm) a	b	c	d	e	f	g	LENGTH (mm)	UNIT WEIGHT (kg/m)	NO. OF BARS	WEIGHT (kg)	REMARKS
I1	16	1700							1700	1.578	16	42.92	
I2	14	198	1959	110	1959	198			4424	1.208	28	149.64	
Sub-Total												192.56	

(2) INTERMEDIATE DIAPHRAGM

BAR MARK	SIZE (mm)	DIMENSIONS (mm) a	b	c	d	e	f	g	LENGTH (mm)	UNIT WEIGHT (kg/m)	NO. OF BARS	WEIGHT (kg)	REMARKS
J1	16	1700							1700	1.578	18	48.29	
J2	14	198	1709	110	1709	198			3924	1.208	28	132.73	
Sub-Total												181.02	

3) Total Weight

SECTION	Nos.	Weight/EACH	Weight
END DIAPHRAGM	4	192.56	770.24
INTERMEDIATE DIAPHRAGM	6	181.02	1086.12
Total			1856.36

A1-P1,P4-A4 Per EACH

SCHEDULE OF REINFORCEMENT FOR DIAPHRAGM L=28m, H=1.65m

(1) END DIAPHRAGM

BAR MARK	SIZE (mm)	DIMENSIONS (mm) a	b	c	d	e	f	g	LENGTH (mm)	UNIT WEIGHT (kg/m)	NO. OF BARS	WEIGHT (kg)	REMARKS
G1	16	1700							1700	1.578	16	42.92	
G2	14	198	1759	410	1759	198			4324	1.208	28	146.25	
Sub-Total												189.17	

(2) INTERMEDIATE DIAPHRAGM

BAR MARK	SIZE (mm)	DIMENSIONS (mm) a	b	c	d	e	f	g	LENGTH (mm)	UNIT WEIGHT (kg/m)	NO. OF BARS	WEIGHT (kg)	REMARKS
H1	16	1700							1700	1.578	14	37.56	
H2	14	198	1509	110	1509	198			3524	1.208	28	119.20	
Sub-Total												156.76	

3) Total Weight

SECTION	Nos.	Weight/EACH	Weight
END DIAPHRAGM	8	189.17	1513.36
INTERMEDIATE DIAPHRAGM	8	156.76	1254.08
Total			2767.44

Re-bar cross beam

No.

P1-P2,P4-P5

Per EACH

SCHEDULE OF REINFORCEMENT FOR DIAPHRAGM L=25m, H=1.45m

(1) END DIAPHRAGM

BAR MARK	SIZE (mm)	DIMENSIONS (mm) a	b	c	d	e	f	g	LENGTH (mm)	UNIT WEIGHT (kg/m)	NO. OF BARS	WEIGHT (kg)	REMARKS
B1	16	1750							1750	1.578	16	44.18	
B2	14	198	1309	110	1309	198			3124	1.208	28	105.67	
Sub-Total												149.85	

(2) INTERMEDIATE DIAPHRAGM

BAR MARK	SIZE (mm)	DIMENSIONS (mm) a	b	c	d	e	f	g	LENGTH (mm)	UNIT WEIGHT (kg/m)	NO. OF BARS	WEIGHT (kg)	REMARKS
K1	16	1700							1700	1.578	16	42.92	
k2	14	198	1709	110	1709	198			3924	1.208	28	132.73	
												175.65	

3) Total Weight

SECTION	Nos.	Weight/EACH	Weight
END DIAPHRAGM	8	149.85	1198.80
INTERMEDIATE DIAPHRAGM	8	175.65	1405.20
Total			2604.00

Re-bar cross beam

No.

P3-P4

Per EACH

SCHEDULE OF REINFORCEMENT FOR DIAPHRAGM L=37m, H=1.85m

(1) END DIAPHRAGM

BAR MARK	SIZE (mm)	DIMENSIONS (mm) a	b	c	d	e	f	g	LENGTH (mm)	UNIT WEIGHT (kg/m)	NO. OF BARS	WEIGHT (kg)	REMARKS
I1	16	1700							1700	1.578	16	42.92	
I2	14	198	1959	110	1959	198			4424	1.208	28	149.64	
Sub-Total												192.56	

(2) INTERMEDIATE DIAPHRAGM

BAR MARK	SIZE (mm)	DIMENSIONS (mm) a	b	c	d	e	f	g	LENGTH (mm)	UNIT WEIGHT (kg/m)	NO. OF BARS	WEIGHT (kg)	REMARKS
J1	16	1700							1700	1.578	18	48.29	
J2	14	198	1709	110	1709	198			3924	1.208	28	132.73	
Sub-Total												181.02	

3) Total Weight

SECTION	Nos.	Weight/EACH	Weight
END DIAPHRAGM	4	192.56	770.24
INTERMEDIATE DIAPHRAGM	6	181.02	1086.12
Total			1856.36

Re-bar deck slab A1-A2 No.

P1-P2,P3-P4 L=25m Per One Span

SCHEDULE OF REINFORCEMENT (OF DECK SLAB)													
BAR MARK	SIZE (mm)	DIMENSIONS (mm) a	b	c	d	e	f	g	LENGTH (mm)	UNIT WEIGHT (kg/m)	NO. OF BARS	WEIGHT (kg)	REMARKS
S1	20	11350							11350	2.466	157	4394.3	
S2	20	10850							10850	2.466	157	4200.7	
S3	14	133	623	207					963	1.208	1816	2112.6	
S4	14	12000	12000	1752					25752	1.208	200	6221.7	
S5	25	11350							11350	3.853	10	437.3	
S6	25	10800							10800	3.853	10	416.1	
S7	12	210	145	120					475	0.888	972	410.0	
Total												18192.7	

P1-P2,P3-P4 L=28m Per One Span

SCHEDULE OF REINFORCEMENT (OF DECK SLAB)													
BAR MARK	SIZE (mm)	DIMENSIONS (mm) a	b	c	d	e	f	g	LENGTH (mm)	UNIT WEIGHT (kg/m)	NO. OF BARS	WEIGHT (kg)	REMARKS
S1	20	11350							11350	2.466	177	4954.1	
S2	20	10850							10850	2.466	177	4735.8	
S3	14	133	623	207					963	1.208	374	435.1	
S4	14	12000	12000	4752					28752	1.208	200	6946.5	
S5	25	11350							11350	3.853	10	437.3	
S6	25	10800							10800	3.853	10	416.1	
S7	12	210	145	120					475	0.888	192	81.0	
Total												18005.9	

P1-P2,P3-P4 L=37m Per One Span

SCHEDULE OF REINFORCEMENT (OF DECK SLAB)													
BAR MARK	SIZE (mm)	DIMENSIONS (mm) a	b	c	d	e	f	g	LENGTH (mm)	UNIT WEIGHT (kg/m)	NO. OF BARS	WEIGHT (kg)	REMARKS
S1	20	11350							11350	2.466	232	6493.5	
S2	20	10850							10850	2.466	232	6207.4	
S3	14	133	623	207					963	1.208	494	574.7	
S4	14	12000	12000	12000	2178				38178	1.208	200	9223.8	
S5	25	11350							11350	3.853	15	656.0	
S6	25	10800							10800	3.853	15	624.2	
S7	12	210	145	120					475	0.888	1452	612.5	
Total												24392.1	

	one dir	one dir
D25	2987.0	5974.0
D20	30985.8	61971.6
D14	25514.4	51028.8
D12	1103.5	2207.0
Total	60590.7	121181.4

QUANTITY TABLE OF ABUTMENTS

ITEMS			UNIT	ABUTMENT A1	ABUTMENT A2	TOTAL
A- ABUTMENT						
PILE	NUMBER OF PILES		PILE	24.0	24.0	48
	TOTAL LENGTH OF RC PILES □450MM		M	960.0	960.0	1920
	CONCRETE CLASS "D "		M3	195.2	195.2	390
	REINFORCEMENT	D32	KG	122.4	122.4	245
		D28	KG			
		D25	KG	12412.8	12412.8	24826
		D22	KG	23865.6	23865.6	47731
		D16	KG	1596.0	1596.0	3192
		ϕ 6	KG	4413.6	4413.6	8827
		Total	KG	42410.4	42410.4	84821
ABUTMENT	CONCRETE CLASS "E "		M3	589.7	589.7	1179
	REINFORCEMENT	D25	KG	13137.7	13137.7	26275
		D22	KG	1365.6	1365.6	2731
		D20	KG	8755.4	8755.4	17511
		D18	KG	687.6	687.6	1375
		D16	KG	5642.0	5642.0	11284
		D14	KG	2135.6	2135.6	4271
		D10	KG	124.0	124.0	248
		TOTAL	KG	31847.9	31847.9	63696
	LEAN CONCRETE CLASS "G"		M3	16.6	16.6	33
	FORM		M2	618.6	618.6	1237.1
	BLINDING STONE		M3	33.2	33.2	66
	EXCAVATION FOR FOUNDATION		M3	823.0	823.0	1646.0
	BACK FILL		M3	413.8	405.4	819.2
	SCAFFOLDING WORK	H < 4m	M2	142.4	142.4	284.8
		4m ≤ H < 30m	M2	544.4	544.4	1088.9
	SUPPORT		M3	8.5	8.5	17.1
B- APPROACH SLAB						
	CONCRETE CLASS E		M3	43.2	43.2	86
	LEAN CONCRETE CLASS "G"		M3	13.3	13.3	27
	ASPHANTIC JOINT FILLER T=20MM		M3	0.4	0.4	0.8
	FORM		M2	24.2	24.2	48.3
	REINFORCEMENT	D20	KG	3421.6	3421.6	6843
		D16	KG	3402.3	3402.3	6805
		D10	KG	255.8	255.8	512
		TOTAL	KG	7079.7	7079.7	14159
C- SLOPE PROTECTION						
FOOTING	WOODEN PILE L=3M		M	8760.4	8760.4	17521
	BLINDING AGGREGATE T=100MM		M3	11.7	11.7	23
	STONE MASONRY T=300MM		M3	52.6	52.6	105
	EXCAVATION		M3	630.7	551.5	1182
	BACK FILL		M3	438.0	375.7	814
SIDE SLOPE	STONE MASONRY T=300MM		M3	766.8	766.8	1534
	BLINDING AGGREGATE T=100MM		M3	255.6	255.6	511
	GEOTEXTILE		M2	675.7	675.7	1351
	PVC PILE Φ50MM DIA., L=1000MM		M	73.0	73.0	146

QUANTITY SURVEYING ABUTMENT A1

No.

Item	Formula										Quantity
1) Concrete											
	* BackWall										
	v1 =	24.10	x	2.24	x	0.40	=		21.59	m3	
	* Frontwall										
	v2 =	24.10	x {(	4.74	+	4.98	) /		2		
	x	1.50	-	0.10	^2 /	2	}=		175.59	m3	
	* Corbel										
	v3 =	0.30	x(	0.30	+	0.60	) /		2		
					x	23.10	=		3.12	m3	
	* Haunch										
	v4 =	6.98	x	0.50	x	0.50	/	2 x 2			
							=		1.75	m3	
	*Wingwall										
	v5 =(	3.50	x(	6.98	+	6.92	) /		2		
	+	1.20	x(	1.05	+	2.56	) /		2	)	
			x	0.50	x	2	=		26.49	m3	
	* Parapet										
	v7 =(	0.50	x	0.30	+	0.20	^2				
	-	0.15	^2/	2	)x	5.10	x		2		
							=		1.82	m3	
	*Footing										
	v6 =	24.10	x	7.50	x	2.00					
	-	12	x	pi	x	0.75	^2 x		0.1		
							=		359.38	m3	
								Total			**589.7 m3**
2) Form											
	* BackWall										
	a1 =	2.00 x		2.24	x	24.10	-				
	-	2.24 x (		0.50	+	0.50	) x		2		
							=		103.49	m2	
	* Frontwall										
	a2 =	24.1 x(		4.74	+	4.981	)				
	- (	0.5 +		0.5	) x	4.981	x		2		
	+	4.86 x		1.5	x	2	=		238.90	m2	
	* Corbel										
	a3 = {	0.3 + (		0.3	^2+	0.3	^2)^	0.5}			
					x	23.1	=		16.73	m2	
	* Haunch										
	a4 =	+ (		0.5	^2+	0.5	^2)^	0.5			
		x		6.98	x	2	=		9.87		
	*Wingwall										
	a5 =	2 x {		3.5	x (	6.98	+		6.92)		
		+		1.2	x (	1.05	+		2.56)		
	+	0.5 x (		1.05	+	1.91	+		2.76)		
		-		0.5	x	6.98	}=		104.72	m2	
	* Parapet										
	a5 = {	5.1 x(		0.5	+	0.3	+		0.05		
		+		1.4142	x	0.15	+		0.05)		
		+		2	x	0.17875	} x		2		
							=		12.06	m2	
	*Footing										
	a 6 =	2 x(		24.100	+	7.500	)x		2.00		
									126.40	m2	
								Total			**612.2 m2**

QUANTITY SURVEYING ABUTMENT A1

No.

Item	Formula	Quantity
3) Scaffolding:	* H<=4m	
	A2 ={ 2 x(24.10 + 7.50) + 8 } x 2 =	142.4 m2
	* 4m< H<=30m	
	A2 = ((24.1+2) + (4.7+1.5+2) + (0.5+2) + (4.7+1-1) +(24.1-2 x 1.5) + (4.7-1+1) + (0.5+2) + (4.7+1.5+2)) x (2.24+4.74)	544.4 m2
4) Support	= (9.40 - 1.55 + 6.36) x 1.20 /2 x 0.50 x 2 =	8.5 m3
5) Lean Concrete	* Concrete class G	
	v = 0.1 x { (24.10 + 0.2) x (7.50 + 0.2) - 12 x 1/4 x pi x 1.50 ^2} =	16.6 m3
	* Form	
	A = 0.1 x { (24.10 + 0.2) + (7.50 + 0.20)}x 2 =	6.40 m2
6) Blinding Stone		
	v = 0.2 x { (24.10 + 0.2) x (7.50 + 0.2)- 12 x 1/4 x pi x 1.50 ^2} =	33.2 m3
7) RC Pile		
	* Concrete D	
	N = 24 =	24 nos
		per 40.0m
	V1 = (0.450 x 0.450 - 0.020 x 0.020 x 1/2 x 4) x 10.000 x 4 =	8.068 m3
	V2 = (0.450 x 0.450 - 0.020 x 0.020 x 1/2 x 4 + 0.090 x 0.090) x 1/2 x 0.62 =	0.065 m3
	Toral	8.133 m3
	V = 8.133 x 24 =	195.192 m3
FORM	A1 = 0.020 x 1.414 x 4 x 10.000 =	1.131 m2
	A2 0.410 x 3 x 10.000 =	12.300 m2
	A3 = 0.450 x 0.450 - 0.020 x 0.020 x 1/2 x 4 =	0.202 m2
	A4 = (0.450 + 0.090) x 1/2 x 0.620 x 3 =	0.502 m2
	A = A1 x 4 + A2 x 4 + A3 x 7 + A4 =	55.640 m2
8)Earthworks	* Excavation for foundation	
	= 2.41 / 6 x{ (9.50 x 26.10) + (14.32 x 30.92) + (9.50 + 14.32) x (26.10 + 30.92) = **823.0** m3	
	* Excess Soil = Lean Concrete + Blinding Stone + Footing Volume	
	Excess Soil =	409.15 m3
	* Back Fill =	**413.8** m3

QUANTITY SURVEYING ABUTMENT A1

No.

Item	Formula	Quantity
9) Approach Slab		
	* Concrete	
	= 23.04 x (6.00 x 0.30	
	+ (0.30 + 0.50) / 2 x 0.20)	
	- 0.50 x 0.50 / 2 x 0.3	
	x 2 = **43.24** m3	
	* Lean Concrete	
	= (0.30 + 0.28 + 5.20)	
	x 23.04 x 0.1 = **13.3** m3	
	* Asphaltic Joint Filler	
	= (0.30 x (0.02 + 0.06)/ 2	
	+ 0.30 x 0.02) x 23.04 = **0.41** m3	
	* Form = (2 x (6.00 x 0.30) + 11.52	
	x (0.30 + 0.50) + (0.50 + 0.30) x	
	0.50 x 0.20 x 2) x 2	
	- 6.00 x 0.30 = **24.15** m2	

QUANTITY SURVEYING ABUTMENT A2

No.

Item	Formula	Quantity
1) Concrete		
	* BackWall	
	v1 = 24.10 x 2.24 x 0.40 = 21.59 m3	
	* Frontwall	
	v2 = 24.10 x {(4.74 + 4.98) / 2	
	x 1.50 - 0.10 ^2 / 2 }= 175.59 m3	
	* Corbel	
	v3 = 0.30 x(0.30 + 0.60) / 2	
	x 23.10 = 3.12 m3	
	* Haunch	
	v4 = 6.98 x 0.50 x 0.50 / 2 x 2	
	= 1.75 m3	
	*Wingwall	
	v5 ={ 3.50 x(6.98 + 6.92) / 2	
	+ 1.20 x(1.05 + 2.56) / 2 }	
	x 0.50 x 2 = 26.49 m3	
	* Parapet	
	v7 =(0.50 x 0.30 + 0.20 ^2	
	- 0.15 ^2/ 2)x 5.10 x 2	
	= 1.82 m3	
	*Footing	
	v6 = 24.10 x 7.50 x 2.00	
	- 12 x pi x 0.75 ^2 x 0.1	
	= 359.38 m3	
	Total	**589.7 m3**
2) Form		
	* BackWall	
	a1 = 2.00 x 2.24 x 24.10 -	
	- 2.24 x (0.50 + 0.50) x 2	
	= 103.49 m2	
	* Frontwall	
	a2 = 24.1 x(4.74 + 4.981)	
	- (0.5 + 0.5) x 4.981 x 2	
	+ 4.86 x 1.5 x 2 = 238.90 m2	
	* Corbel	
	a3 = { 0.3 + (0.3 ^2+ 0.3 ^2)^ 0.5}	
	x 23.1 = 16.73 m2	
	* Haunch	
	a4 = + (0.5 ^2+ 0.5 ^2)^ 0.5	
	x 6.98 x 2 = 9.87	
	*Wingwall	
	a5 = 2 x { 3.5 x (6.98 + 6.92)	
	+ 1.2 x (1.05 + 2.56)	
	+ 0.5 x (1.05 + 1.91 + 2.76)	
	- 0.5 x 6.98 }= 104.72 m2	
	* Parapet	
	a5 = { 5.1 x(0.5 + 0.3 + 0.05	
	+ 1.4142 x 0.15 + 0.05)	
	+ 2 x 0.17875 } x 2	
	= 12.06 m2	
	*Footing	
	a 6 = 2 x(24.100 + 7.500)x 2.00	
	126.40 m2	
	Total	**612.2 m2**
3) Scaffolding:	* H<=4m	
	A2 ={ 2 x(24.10 + 7.50) + 8 }	
	x 2 =	**142.4 m2**
	* 4m< H<=30m	
	A2 = [(24.1+2) + (4.7+1.5+2) + (0.5+2) + (4.7+1-1) +(24.1-2 x 1.5) + (4.7-1+1) + (0.5+2) + (4.7+1.5+2)) x (2.24+4.74)	**544.4 m2**
4) Support	= (9.40 - 1.55 + 6.36) x 1.20 /2	
	x 0.50 x 2 =	**8.5 m3**

QUANTITY SURVEYING ABUTMENT A2

No.

Item	Formula	Quantity
5) Lean Concrete	* Concrete class G	
	v = 0.1 x { (24.10 + 0.2) x (7.50 +	
	+ 0.2) - 12 x 1/4 x pi x 1.50 ^2}	
	=	16.6 m3
	* Form	
	A = 0.1 x { (24.10 + 0.2) + (7.50	
	+ 0.20))x 2 =	6.40 m2
6) Blinding Stone		
	v = 0.2 x { (24.10 + 0.2) x (7.50 +	
	+ 0.2)- 12 x 1/4 x pi x 1.50 ^2}	
	=	33.2 m3
7) RC Pile	* Concrete D	
	N = 24 =	24 nos
		per 40.0m
	V1 = (0.450 x 0.450 - 0.020 x 0.020	
	x 1/2 x 4) x 10.000 x 4 =	8.068 m3
	V2 = (0.450 x 0.450 - 0.020 x 0.020	
	x 1/2 x 4 + 0.090 x 0.090)	
	x 1/2 x 0.62 =	0.065 m3
	Toral	8.133 m3
	V = 8.133 x 24 =	195.192 m3
FORM	A1 = 0.020 x 1.414 x 4 x 10.000 =	1.131 m2
	A2 0.410 x 3 x 10.000 =	12.300 m2
	A3 = 0.450 x 0.450 - 0.020 x 0.020	
	x 1/2 x 4 =	0.202 m2
	A4 = (0.450 + 0.090) x 1/2 x 0.620	
	x 3 =	0.502 m2
	A = A1 x 4 + A2 x 4	
	+ A3 x 7 + A4 =	55.640 m2
8)Earthworks	* Excavation for foundation	
	= 2.41 / 6 x{ (9.50 x 26.10)	
	+ (14.32 x 30.92) + (9.50 + 14.32)	
	x (26.10 + 30.92) = 823.0 m3	
	* Excess Soil = Lean Concrete + Blinding Stone + Footing Volume + Pile Occupied Volume	
	Pile Occupied Volume = 12 x pi /4 x 1.50	
	x 1.50 x 0.400 = 8.48 m3	
	Excess Soil = 417.63 m3	
	* Back Fill = 405.4 m3	
9) Approach Slab		
	* Concrete	
	= 23.04 x { 6.00 x 0.30	
	+ (0.30 + 0.50) / 2 x 0.20 }	
	- 0.50 x 0.50 / 2 x 0.3	
	x 2 = 43.24 m3	
	* Lean Concrete	
	= (0.30 + 0.28 + 5.20)	
	x 23.04 x 0.1 = 13.3 m3	
	* Asphaltic Joint Filler	
	= [0.30 x (0.02 + 0.06)/ 2	
	+ 0.30 x 0.02] x 23.04 = 0.41 m3	
	* Form = (2 x (6.00 x 0.30) + 11.52	
	x (0.30 + 0.50) + (0.50 + 0.30) x	
	0.50 x 0.20 x 2) x 2	
	- 6.00 x 0.30 = 24.15 m2	

Bridge **AP MY**
Abutment A1

h1	h2	h3	h4	h5	h6	d1	d2
7.96	3.5	2.9	0.96	1.46	0.26	24.1	12

Block	a	b	Dh	R	r	L	Sxq	W	**Masonry**	**Blinding**
	(m)	(m)	(m)	(m)	(m)	(m)	(m2)	(m)	(m3)	(m3)
1	9.420	6.075	4.460	7.748	0.000	8.940	54.368		16.31	5.44
2	12.000	12.000	0.600	19.748	7.748	12.015	259.326		77.80	25.93
3	3.880	2.425	1.940	22.900	19.748	3.702	123.923		37.18	12.39
4	24.100	12.000	0.600				289.561		86.87	28.96
5	24.100	2.425	1.940				74.843		22.45	7.48
6	9.420	6.075	4.460	7.748	0.000	8.940	54.368		16.31	5.44
7	12.000	12.000	0.600	19.748	7.748	12.015	259.326		77.80	25.93
8	3.880	2.425	1.940	22.900	19.748	3.702	123.923		37.18	12.39
9			1.200				4.320	96.006	34.56	7.68
Extra								86.107	**406**	**132**

Footing	Wood pile	(m)	5760.4	
	Binding	(m3)	7.7	
	Stone masonry	(m3)	34.6	
	Excavation	(m3)	414.7	
	Back fill	(m3)	288.0	
Side slope	Masonry	(m3)	371.9	
	Blinding	(m3)	124.0	
	Geotextile	(m2)	408.8	
	PVC Pipe	(m)	48.0	

Length of footing = (m) 96

Abutment A2

h1	h2	h3	h4	h5	h6	d1	d2
7.96	3.5	2.9	0.96	1.3	0.26	24.1	12

Block	a	b	Dh	R	r	L	Sxq	W	**Masonry**	**Blinding**
	(m)	(m)	(m)	(m)	(m)	(m)	(m2)	(m)	(m3)	(m3)
1	9.420	6.075	4.460	7.748	0.000	8.940	54.368		16.31	5.44
2	12.000	12.000	0.600	19.748	7.748	12.015	259.326		77.80	25.93
3	3.880	2.425	1.940	22.900	19.748	3.702	123.923		37.18	12.39
4	24.100	12.000	0.600				289.561		86.87	28.96
5	24.100	2.425	1.940				74.843		22.45	7.48
6	9.420	6.075	4.460	7.748	0.000	8.940	54.368		16.31	5.44
7	12.000	12.000	0.600	19.748	7.748	12.015	259.326		77.80	25.93
8	3.880	2.425	1.940	22.900	19.748	3.702	123.923		37.18	12.39
9			1.040				3.494	96.006	34.56	7.68
Extra								86.107	**406**	**132**

Footing	Wood pile	(m)	5760.4	
	Binding	(m3)	7.7	
	Stone masonry	(m3)	34.6	
	Excavation	(m3)	335.5	
	Back fill	(m3)	225.7	
Side slope	Masonry	(m3)	371.9	
	Blinding	(m3)	124.0	
	Geotextile	(m2)	408.8	
	PVC Pipe	(m)	48.0	

Length of footing = (m) 96

NOTES :

* INPUT VALUES : GRAY CELLS ; TOTAL VALUES : BOLD NUMBERS
* No. of Blocks : see drawing. Extra block used for calculation only.

h_i : Elevations (see drawing)
d_i : Distances (see drawing)
a_i : Long edge of ellipse (or rectangle) : $a_i = Dh_i * slope_i$
b_i : Short edge of ellipse (or rectangle) : $b_i = Dh_i * slope_i$
Dh_i : Height of cone (or truncated cone)
R_i : Average radius of lower ellipse : $R_i = (Sa_i + Sb_i)/2$
r_i : Average radius of upper ellipse : $r_i = (Sa_{i-1} + Sb_{i-1})/2$
L_i : Generatrix of cone : $L_i = sqrt(Dh_i^2 + (R_i - r_i)^2)$
Sxq_i : Area of cone's side (or plane before abutment) :
$Sxq_i = 3.14/4*(R_i + r_i)*L_i$ for block 1,2,3,6,7,8
$Sxq_i = a_i * sqrt(b_i^2 + Dh_i^2)$ for block 4,5
$Sxq_9 = (1.8 + 1.8 + Dh_9 + 2*Dh_9)*Dh_9/2$ for block 9

W : Length of masonry's footing : W_9
$W_9 = 2*3.14*R_9/4 + a_5 + 2*3.14*R_9/4$, and
$W_{Ex} = 2*3.14*R_7/4 + a_5 + 2*3.14*R_7/4$
Masonry$_i$ = $0.3*Sxq_i$
Blinding$_i$ = $0.1*Sxq_i$
Geotextile = $Sxq_3 + Sxq_5 + Sxq_6 + W_{Ex}*1$
PVC Pipe = $W_9/2$
Wood Pile = $W_9*0.8*25*3$
Excavation = W_9*Sxq_9
Filling = Excavation-$W_9*Dh_9*1.1$

AP MY BRIDGE : QUANTITIES OF EARTHWORKS SLOPE PROTECTION OF 25M BEHIND HEAD WALL

ABUTMENT A1 :

Block	B	L	S	Thick	Masonry	Blinding (T=0.1m)	
	m	m	m2	m	m3	m3	
10	9.97	25	249.32	0.30	74.80	24.93	**Wood pile (m)**
11	12.01	25	300.37	0.30	90.11	30.04	= 2 x L x B13 x 3 x 25 = **3000**
12	4.34	25	108.45	0.30	32.53	10.84	**Geotextile (m2)**
13	0.80	25	20.00	0.10		4.00	= 2 x (L + S12) = **267**
14	0.60	25	15.00	0.60	18.00		**PVC pipe (m)**
15	9.97	25	249.32	0.30	74.80	24.93	= 2 x L/2 x 1m = **25**
16	12.01	25	300.37	0.30	90.11	30.04	
17	4.34	25	108.45	0.30	32.53	10.84	
			1351.29		**412.89**	**135.63**	

FOOTING	Wood pile	(m)	=	3000	
	Blinding	(m3)	=	4	
	Stone masonry	(m3)	=	18	
	Excavation	(m3)	=	216	
	Back fill	(m3)	=	150	LENGTH OF FOOTING L= 50 M
SIDE SLOPE	Stone masonry	(m3)	=	395	
	Blinding	(m3)	=	132	
	Geotextle	(m2)	=	267	
	PVC pile	(m)	=	25	

No	h	Dh	S	L	Total (m3)		
	m	m	m2	m	Excavation	Filling	
5	1.46						Excavation = 2 x S x L
6	0.26	1.2	4.32	25	**216**	**150**	Filling = Excavation - 2 x 25 x Dh x 1.1

ABUTMENT A2 :

Block	B	L	S	Thick	Masonry	Blinding (T=0.1m)	
	m	m	m2	m	m3	m3	
10	9.97	25	249.32	0.30	74.80	24.93	**Wood pile (m)**
11	12.01	25	300.37	0.30	90.11	30.04	= 2 x L x B13 x 3 x 25 = **3000**
12	4.34	25	108.45	0.30	32.53	10.84	**Geotextile (m2)**
13	0.80	25	20.00	0.10		4.00	= 2 x (L + S12) = **267**
14	0.60	25	15.00	0.60	18.00		**PVC pipe (m)**
15	9.97	25	249.32	0.30	74.80	24.93	= 2 x L/2 x 1m = **25**
16	12.01	25	300.37	0.30	90.11	30.04	
17	4.34	25	108.45	0.30	32.53	10.84	
			1351.29		**412.89**	**135.63**	

FOOTING	Wood pile	(m)	=	3000	
	Blinding	(m3)	=	4	
	Stone masonry	(m3)	=	18	
	Excavation	(m3)	=	216	
	Back fill	(m3)	=	150	LENGTH OF FOOTING L= 50 M
SIDE SLOPE	Stone masonry	(m3)	=	395	
	Blinding	(m3)	=	132	
	Geotextle	(m2)	=	267	
	PVC pile	(m)	=	25	

No	h	Dh	S	L	Total (m3)		
	m	m	m2	m	Excavation	Filling	
5	1.46						Excavation = 2 x S x L
6	0.26	1.2	4.32	25	**216**	**150**	Filling = Excavation - 2 x 25 x Dh x 1.1

LIST OF REINFORCEMENT

pil-1

SIGN	DIACETER	LENGTH	NOS.	UNIT WEIGHT	PIECE WEIGHT	TOTAL WEIGHT	NOTE
1	D25	9,900	12	3.854	38.200	458.4	
2	D6	1,614	95	0.222	0.358	34.0	
3	D6	490	120	0.222	0.109	13.1	
4	D25	1,911	2	3.854	7.360	14.7	
5	D22	350	8	2.984	1.040	8.3	
8	D25	0	0	3.854	0.000	0.0	
9	D16	1,508	8	1.579	2.380	19.0	
					TOTAL	547.5	
					D32	0.0	
					D25	473.1	
					D22	8.3	
					D16	19.0	
					ϕ6	47.1	
						547.5	

LIST OF REINFORCEMENT

pile-2

SIGN	DIACETER	LENGTH	NOS.	UNIT WEIGHT	PIECE WEIGHT	TOTAL WEIGHT	NOTE
1	D22	9,900	12	2.984	29.500	354.0	
2	D6	1,614	95	0.222	0.358	34.0	
3	D6	490	120	0.222	0.109	13.1	
4	D25	1,911	2	3.854	7.360	14.7	
5	D22	350	8	2.984	1.040	8.3	
8	D25	0	0	3.854	0.000	0.0	
9	D16	1,508	8	1.579	2.380	19.0	
					TOTAL	443.1	
					D32	0.0	
					D25	14.7	
					D22	362.3	
					D16	19.0	
					ϕ6	47.1	
						443.1	

LIST OF REINFORCEMENT

pile-3

SIGN	DIACETER	LENGTH	NOS.	UNIT WEIGHT	PIECE WEIGHT	TOTAL WEIGHT	NOTE
1a	D22	10,589	4	2.984	31.600	126.4	
1b	D22	10,612	4	2.984	31.700	126.8	(AVE)
2	D6	1,614	95	0.222	0.358	34.0	
3	D6	490	60	0.222	0.109	6.5	
4	D25	1,911	2	3.854	7.360	14.7	
5	D22	350	8	2.984	1.040	8.3	
6	D6	9,460	1	0.222	2.100	2.1	
7	D32	810	1	6.313	5.110	5.1	(AVE)
8	D25	0	0	3.854	0.000	0.0	
9	D16	1,508	4	1.579	2.380	9.5	
					TOTAL	333.4	
					D32	5.1	
					D25	14.7	
					D22	261.5	
					D16	9.5	
					ϕ6	42.6	
						333.4	

TOTAL

	Pile-1	Pile-2	Pile-3	Total
nos	1	2	1	
D32	0.0	0.0	5.1	5.1
D25	473.1	29.4	14.7	517.2
D22	8.3	724.6	261.5	994.4
D16	19.0	38.0	9.5	66.5
ϕ6	47.1	94.2	42.6	183.9
	547.500	886.200	333.400	1767.1

QUANTITY TABLE OF PIERS

Items			Unit	Pier 1	Pier 2	Pier 3	Pier 4	Total (1 dir)	Total (2 dir)
pile	Number of piles		Pile	24	24	24	24	96	192
	Total length Rc piles 450mm .		m	960.0	960.0	960.0	960.0	3840	7680
	Concrete piles class "D"		m^3	195.2	195.2	195.2	195.2	781	1562
	Renforcement	ϕ 6	kg	4597.5	4597.5	4597.5	4597.5	18390	36780
		D16	kg	1662.5	1662.5	1662.5	1662.5	6650	13300
		D22	kg	33710.0	33710.0	33710.0	33710.0	134840	269680
		D25	kg	1470.0	1470.0	1470.0	1470.0	5880	11760
		D28	kg						
		D32	kg	127.5	127.5	127.5	127.5	510	1020
		Total	kg	41567.5	41567.5	41567.5	41567.5	166270	332540
Pier	Concrete class "E"		m^3	397.0	483.5	483.5	397.0	1761	3522
	Lean concrete class "G"		m^3	11.9	0.0	0.0	11.9	24	47
	Blinding stone		m^3	23.7	0.0	0.0	23.7	47	95
	Reinforcement	D10	kg	27.8	34.6	34.6	27.8	125	250
		D14	kg	1774.5	3245.0	3245.0	1774.5	10039	20078
		D16	kg	922.2	920.8	920.8	922.2	3686	7372
		D20	kg	722.0	722.0	722.0	722.0	2888	5776
		D22	kg	3842.9	3842.9	3842.9	3842.9	15372	30743
		D28	kg	1789.8	1786.0	1786.0	1789.8	7152	14303
		D32	kg	7428.8	15653.6	15653.6	7428.8	46165	92330
		Total	kg	16508.0	26204.9	26204.9	16508.0	85426	170852
	Form	Curve	m^2	110.3	152.5	152.5	110.3	526	1051
		Flat	m^2	256.0	352.4	352.4	256.0	1217	2434
	Scaffolding work	H < 4m	m^2	254.4	254.4	254.4	254.4	1018	2035
		4m ≤ H < 30m	m^2	229.7	455.8	455.8	229.7	1371	2742
	Support		m^3	120.4	224.1	224.1	120.4	689	1378
	Earth work	Excavation for foundation	m^3	985.5	1180.1	1643.9	967.5	4777	9554
		Blinding Concrete class "G"	m^3	0.0	59.4	59.4	0.0	119	237
		Rip rap	m^3	0.0	807.8	1256.0	0.0	2064	4128
		Back fill	m^3	650.6	0.0	0.0	633.0	1284	2567
	Cofferdams	Sheet pile Larsen IV	m	0.0	2328.0	2328.0	0.0	4656	9312
		Steel pile I 400	m	0.0	480.0	480.0	0.0	960	1920
		Brace C 300	m	0.0	299.1	299.1	0.0	598	1196

Item	Formula	Quantity
3.2.9) Concrete		
	3.2.9.1 Headstock	
	v1 =[(11.40 x 1.40 - 0.80 x 0.70) x 1.00	
	+ (11.40 x 1.60 - 0.80 x 0.70) x 1.00	
	} x 2 =	66.16 m3
	3.2.9.2 Column	
	v2 = 2 x 1/4 x pi x 1.40 ^2 x	
	x (4.10 + 4.18 + 4.26) = 38.61 m3	
	* Wall	
	v3 = 2 x 0.00 x (1/4 x pi x 1.40 ^2	
	+ 8.00 x 1.40) = 0.00 m3	
	3.2.9.3 Footing	
	v3 = 2 x 10.50 x 7.00 x 2.00	
	- 10 x pi x 0.75 ^2 x 0.1	
	=	292.23 m3
	Total	**397.00 m3**
3.2.10) Form		
	3.2.10.1 Headstock	
	a1 = { (11.40 x 1.40 - 0.80 x 0.70)	
	+ (1.06 + 0.70) x 1.00 x 2	
	+ (9.80 x 2.00 - 3 * pi /4 x 1.40 ^2)	
	+(11.40 x 1.60 - 0.80 x 0.70)	
	+ (1.06 + 0.90) x 1.00 x 2	
	} x 2 =	111.03 m2
	3.2.10.2 Column (Curve form)	
	a2 = 2 x pi x 1.40	
	x (4.10 + 4.18 + 4.26) =	110.31 m2
	* Wall (Curve form)	
	a3-1 = 2 x pi x 1.40 x 0.00 = 0.00 m2	
	* Wall (Flat form)	
	a3-2 = 2 x 2 x 8.00 x 0.00	
	= 0.00 m2	
	3.2.10.3 Footing	
	a3 = 2 x(10.500 + 7.000)x 2.00	
	x 2 =	140.00 m2
	Total Curve =	**110.31 m2**
	Flat =	**251.03 m2**
3.2.11) Scaffolding:	3.2.11.1 (H<=4m)	
	A1 = 2 x(24.85 + 9.00) x 2.00	
	+(2 x(4.00 + 25.75) x 2.00 =	**254.40 m2**
	3.2.11.2 (4m< H<=30m)	
	A2 = 2 x(4.00 + 25.75) x 3.86	
	=	**229.67 m2**
3.2.12) Support	=(11.40 - 3 x 1.40) x 2.00	
	x 4.18 x 2 =	**120.38 m3**
3.2.13) Lean Concrete	3.2.13.1 Concrete class G	
	v = 0.10 x { (10.50 + 0.2) x (7.00 +	
	+ 0.2) - 10 x 1/4 x pi x 1.50 ^2}	
	x 2 =	**11.87 m3**
	3.2.13.2 Form	
	A = 0.10 x { (10.50 + 0.2) + (7.00	
	+ 0.20)}x 2 x 2 =	**5.02 m2**
3.2.14) Blinding Stone		
	v = 0.20 x { (10.50 + 0.2) x (7.00 +	
	+ 0.2)- 10 x 1/4 x pi x 1.50 ^2}	
	x 2 =	**23.75 m3**

Item	Formula	Quantity
3.2.15) RC Pile		
	* Concrete D	
	N = 24 =	24 nos per 40.0m
	V1 = (0.450 x 0.450 - 0.020 x 0.020) x 1/2 x 4) x 10.000 x 4 =	8.068 m3
	V2 = (0.450 x 0.450 - 0.020 x 0.020) x 1/2 x 4 + 0.090 x 0.090) x 1/2 x 0.62 =	0.065 m3
	Toral	8.133 m3
	V = 8.133 x 24 =	195.192 m3
FORM	A1 = 0.020 x 1.414 x 4 x 10.000 =	1.131 m2
	A2 0.410 x 3 x 10.000 =	12.300 m2
	A3 = 0.450 x 0.450 - 0.020 x 0.020 x 1/2 x 4 =	0.202 m2
	A4 = (0.450 + 0.090) x 1/2 x 0.620 x 3 =	0.502 m2
	A = A1 x 4 + A2 x 4 + A3 x 7 + A4 =	55.640 m2
3.2.16) Earthwork	3.2.16.1 Excavation for footing (slope 1:1)	
	= 3.06 / 6 x{ (24.85 x 9.00)	
	+(24.85 + 30.97) x (9.00 + 15.12)	
	+ (30.97 x 15.12) }	
	- 10 x pi /4 x 1.50 ^2 x 3.06 =	**985.46 m3**
	3.2.16.2 Excess Soil	
	v1 = Lean Concrete =	11.87 m3
	v2 = Blinding Stone =	23.75 m3
	v3 = Footing Volume =	292.23 m3
	v4 = 2 x 1/4x pi x 1.40 ^2 x 3 x 0.76 =	7.02 m3
	Total =	334.87 m3
	3.2.16.3 Back Fill = Excavation for footing - Excess Soil	
	= 985.46 - 334.87 =	***650.58*** m3

QUANTITTY SURVEYING FOR PIER P3

No.

Item	Formula	Quantity
3.2.1) Concrete		
	3.2.1 Headstock	
	v1 = { (11.40 x 1.40 - 0.80 x 0.70)	
	x 1.00	
	+ (11.40 x 1.80 - 0.80 x 0.70)	
	x 1.00	
	) x 2 =	70.72 m3
	3.2.2 Column	
	v2 = 2 x 1/4 x pi x 1.40 ^2 x	
	x (4.70 + 4.78 + 4.86) =	44.15 m3
	3.2.3 Footing	
	v3 = 2 x 10.50 x 7.00 x 2.00	
	- 10 x pi x 0.75 ^2 x 0.1	
	=	292.23 m3
	Total	**483.54 m3**
3.2.2) Form		
	3.2.2.1 Headstock	
	a1 = { (11.40 x 1.40 - 0.80 x 0.70)	
	+ (1.06 + 0.70) x 1.00 x 2	
	+ (9.80 x 2.00 - 3 * pi /4 x 1.40 ^2)	
	+(11.40 x 1.80 - 0.80 x 0.70)	
	) x 2 =	116.39 m2
	3.2.2.2 Column (Curve form)	
	a2 = 2 x pi x 1.40	
	x (4.70 + 4.78 + 4.86) =	126.14 m2
	* Wall (Curve form)	
	a3-1 = 2 x pi x 1.40 x 3.00 = 26.39 m2	
	* Wall (Flat form)	
	a3-2 = 2 x 2 x 8.00 x 3.00	
	= 96.00 m2	
	3.2.2.3 Footing	
	a3 = 2 x(10.500 + 7.000)x 2.00	
	x 2 =	140.00 m2
	Total **Curve =**	**152.53 m2**
	Flat =	**352.39 m2**
3.2.3) Scaffolding:	3.2.3.1 (H<=4m)	
	A1 = 2 x(24.85 + 9.00) x 2.00	
	+(2 x(4.00 + 25.75) x 2.00 =	**254.40 m2**
	3.2.3.2 (4m< H<=30m)	
	A2 = 2 x(4.00 + 25.75) x 7.66	
	=	**455.77 m2**
3.2.4) Support	=(11.40 - 3 x 1.40) x 2.00	
	x 7.78 x 2 =	**224.06 m3**
3.2.5) RC Pile		
	* Concrete D	
	N = 24 =	24 nos
		per 40.0m
	V1 = (0.450 x 0.450 - 0.020 x 0.020	
	x 1/2 x 4) x 10.000 x 4 =	8.068 m3
	V2 = (0.450 x 0.450 - 0.020 x 0.020	
	x 1/2 x 4 + 0.090 x 0.090)	
	x 1/2 x 0.62 =	0.065 m3
	Toral	8.133 m3
	V = 8.133 x 24 =	195.192 m3

QUANTITY SURVEYING FOR PIER P3

No.

Item	Formula	Quantity
	FORM	
	A1 = 0.020 x 1.414 x 4 x 10.000 =	1.131 m2
	A2 0.410 x 3 x 10.000 =	12.300 m2
	A3 = 0.450 x 0.450 - 0.020 x 0.020	
	x 1/2 x 4 =	0.202 m2
	A4 = (0.450 + 0.090) x 1/2 x 0.620	
	x 3 =	0.502 m2
	A = A1 x 4 + A2 x 4	
	+ A3 x 7 + A4 =	55.640 m2
3.2.5) Bored Pile		
	3.2.5.1 Concrete	
	= 10 x 1/4 x pi x 1.50 x 1.50	
	x (45.00 + 0.10) =	796.98 m3
	3.2.5.2 Excavation Length	
	N<20: = 38.0 x 10 =	380.00 m
	20<N<40: 2.0 x 10 =	20.00 m
	40<N: 5.0 x 10 =	50.00 m
	3.2.5.3 Excavation Volume	
	= 10 x 1/4 x pi x 1.50 x 1.50	
	x 49.25	870.32 m3
3.2.6) Earthwork	3.2.6.1 Excavation for footing (inside cofferdam)	
	= 4.25 x (26.85 x 11.00)	
	- 10 x pi /4 x 1.50 ^2 x 4.25 =	1180.13 m3
	3.2.6.2 Concrete class G	
	v = 0.50 x [(10.50 + 0.2) x (7.00 +	
	+ 0.2) - 10 x 1/4 x pi x 1.50 ^2]	
	x 2 =	59.37 m3
	3.2.6.3 Excess Soil	
	v1 = Lean Concrete =	59.37 m3
	v2 = Blinding Stone =	0.00 m3
	v3 = Footing Volume =	292.23 m3
	v4 = 2 x pi /4 x 1.400 ^2 x 3 x	
	x 2.250 =	20.78 m3
	Total =	372.38 m3
	3.2.6.4 Rip Rap	
	= 1180.13 - 372.38 =	807.75 m3
	3.2.6.5 Back Fill = Excavation for footing - Excess Soil	
	= 1180.13 - 372.38 - 807.75 =	0.00 m3
3.2.7) Cofferdams		
	* Larsen IV 194.00 nos. L= 12 m =	2328.0 m
	* I400 40.00 nos. L= 12 m =	480.0 m
	*C300 = 142.80 + 156.30 =	299.1 m

Item	Formula															Quantity
3.2.1) Concrete																
	3.2.1 Headstock															
	v1 = { (	11.40	x	1.40	-	0.80	x	0.70)								
					x	1.00										
	+ (	11.40	x	1.80	-	0.80	x	0.70)								
					x	1.00										
					} x	2	=									70.72 m3
	3.2.2 Column															
	v2 =	2	x	1/4 x pi	x	1.40	^2 x									
	x (	4.70	+	4.78	+	4.86	) =									44.15 m3
	3.2.3 Footing															
	v3 =	2	x	10.50	x	7.00	x	2.00								
	-	10	x	pi	x	0.75	^2 x	0.1								
							=									292.23 m3
								Total								483.54 m3
3.2.2) Form																
	3.2.2.1 Headstock															
	a1 = { (	11.40	x	1.40	-	0.80	x	0.70)								
	+ (	1.06	+	0.70	) x	1.00	x	2								
	+ (	9.80	x	2.00	-	3 * pi / 4	x	1.40 ^2)								
	+ (	11.40	x	1.80	-	0.80	x	0.70)								
					} x	2	=									116.39 m2
	3.2.2.2 Column (Curve form)															
	a2 =	2 x pi	x	1.40												
	x (	4.70	+	4.78	+	4.86	) =									126.14 m2
	* Wall (Curve form)															
	a3-1 =	2 x pi	x	1.40	x	3.00	=	26.39 m2								
	* Wall (Flat form)															
	a3-2 =	2	x	2	x	8.00	x	3.00								
							=	96.00 m2								
	3.2.2.3 Footing															
	a3 =	2	x(	10.500	+	7.000	)x	2.00								
					x	2	=									140.00 m2
						Total		Curve	=							152.53 m2
								Flat	=							352.39 m2
3.2.3) Scaffolding:	3.2.3.1 (H<=4m)															
	A1 =	2	x(	24.85	+	9.00	) x	2.00								
	+(	2	x(	4.00	+	25.75	) x	2.00	=							254.40 m2
	3.2.3.2 (4m< H<=30m)															
	A2 =	2	x(	4.00	+	25.75	) x	7.66								
									=							455.77 m2
3.2.4) Support	=(	11.40	-	3	x	1.40	) x	2.00								
					x	7.78	x	2	=							224.06 m3
3.2.5) RC Pile																
	* Concrete D															
	N =	24							=							24 nos
																per 40.0m
	V1 = (	0.450	x	0.450	-	0.020	x	0.020								
	x	1/2	x	4	) x	10.000	x	4	=							8.068 m3
	V2 = (	0.450	x	0.450	-	0.020	x	0.020								
	x	1/2	x	4	+	0.090	x	0.090	)							
	x	1/2	x	0.62					=							0.065 m3
								Toral								8.133 m3
	V =	8.133	x	24					=							195.192 m3
	FORM															
	A1 =	0.020	x	1.414	x	4	x	10.000	=							1.131 m2
	A2	0.410	x	3	x	10.000			=							12.300 m2
	A3 =	0.450	x	0.450	-	0.020	x	0.020								
	x	1/2	x	4					=							0.202 m2
	A4 = (	0.450	+	0.090	) x	1/2	x	0.620								
	x	3							=							0.502 m2
	A =	A1	x	4	+	A2	x	4								
	+	A3	x	7	+	A4			=							55.640 m2

Item	Formula										Quantity
3.2.1) Concrete											
3.2.6) Earthwork	3.2.6.1 Excavation for footing (inside cofferdam)										
	=	5.92	x (	26.85	x	11.00)					
	-	10	x	pi /4	x	1.50	^2 x	5.92	=		1643.86 m3
	3.2.6.2 Concrete class G										
	v =	0.50	x { (	10.50	+	0.2	) x (	7.00	+		
	+	0.2) -		10	x	1/4 x pi	x	1.50	^2}		
							x	2	=		59.37 m3
	3.2.6.3 Excess Soil										
	v1 =	Lean Concrete					=				59.37 m3
	v2 =	Blinding Stone					=				0.00 m3
	v3 =	Footing Volume					=				292.23 m3
	v4 =	2 x	pi /4	x	1.400	^2 x	3	x			
				x	3.920	=					36.21 m3
					Total	=					387.81 m3
	3.2.6.4 Rip Rap										
	=	1643.86 -	387.81			=					1256.05 m3
	3.2.6.5 Back Fill =	Excavation for footing - Excess Soil									
	=	1643.86 -	387.81 -	1256.05	=						0.00 m3
3.2.7) Cofferdams											
	* Larsen IV	194.00	nos. L=	12	m	=	2328.0 m				
	* I400	40.00	nos. L=	12	m	=	480.0 m				
	*C300 =	142.80 +	156.30			=	299.1 m				

Item	Formula	Quantity
3.2.9) Concrete		
	3.2.9.1 Headstock	
	v1 = { (11.40 x 1.40 - 0.80 x 0.70)	
	x 1.00	
	+ (11.40 x 1.60 - 0.80 x 0.70)	
	x 1.00	
	) x 2 =	66.16 m3
	3.2.9.2 Column	
	v2 = 2 x 1/4 x pi x 1.40 ^2 x	
	x (4.10 + 4.18 + 4.26) = 38.61 m3	
	3.2.9.3 Footing	
	v3 = 2 x 10.50 x 7.00 x 2.00	
	- 10 x pi x 0.75 ^2 x 0.1	
	=	292.23 m3
	Total	**397.00 m3**
3.2.10) Form		
	3.2.10.1 Headstock	
	a1 = { (11.40 x 1.40 - 0.80 x 0.70)	
	+ (1.06 + 0.70) x 1.00 x 2	
	+ (9.80 x 2.00 - 3 * pi / 4 x 1.40 ^2)	
	+(11.40 x 1.60 - 0.80 x 0.70)	
	) x 2 =	111.03 m2
	3.2.10.2 Column (Curve form)	
	a2 = 2 x pi x 1.40	
	x (4.10 + 4.18 + 4.26) =	110.31 m2
	3.2.10.3 Footing	
	a3 = 2 x(10.500 + 7.000)x 2.00	
	x 2 =	140.00 m2
	Total Curve =	**110.31 m2**
	Flat =	**251.03 m2**
3.2.11) Scaffolding:	3.2.11.1 (H<=4m)	
	A1 = 2 x(24.85 + 9.00) x 2.00	
	+(2 x(4.00 + 25.75) x 2.00 =	**254.40 m2**
	3.2.11.2 (4m< H<=30m)	
	A2 = 2 x(4.00 + 25.75) x 3.86	
	=	**229.67 m2**
3.2.12) Support	=(11.40 - 3 x 1.40) x 2.00	
	x 4.18 x 2 =	**120.38 m3**
3.2.13) Lean Concrete	3.2.13.1 Concrete class G	
	v = 0.10 x { (10.50 + 0.2) x (7.00 +	
	+ 0.2) - 10 x 1/4 x pi x 1.50 ^2}	
	x 2 =	**11.87 m3**
	3.2.13.2 Form	
	A = 0.10 x { (10.50 + 0.2) + (7.00	
	+ 0.20)}x 2 x 2 =	**5.02 m2**
3.2.14) Blinding Stone		
	v = 0.20 x { (10.50 + 0.2) x (7.00 +	
	+ 0.2)- 10 x 1/4 x pi x 1.50 ^2}	
	x 2 =	**23.75 m3**

Item	Formula	Quantity
3.2.15) RC Pile		
	* Concrete D	
	N = 24 =	24 nos per 40.0m
	V1 = (0.450 x 0.450 - 0.020 x 0.020	
	x 1/2 x 4) x 10.000 x 4 =	8.068 m3
	V2 = (0.450 x 0.450 - 0.020 x 0.020	
	x 1/2 x 4 + 0.090 x 0.090)	
	x 1/2 x 0.62 =	0.065 m3
	Toral	8.133 m3
	V = 8.133 x 24 =	195.192 m3
	FORM	
	A1 = 0.020 x 1.414 x 4 x 10.000 =	1.131 m2
	A2 0.410 x 3 x 10.000 =	12.300 m2
	A3 = 0.450 x 0.450 - 0.020 x 0.020	
	x 1/2 x 4 =	0.202 m2
	A4 = (0.450 + 0.090) x 1/2 x 0.620	
	x 3 =	0.502 m2
	A = A1 x 4 + A2 x 4	
	+ A3 x 7 + A4 =	55.640 m2
3.2.15) Bored Pile		
	3.2.15.1 *Concrete*	
	= 10 x 1/4 x pi x 1.50 x 1.50	
	x (48.00 + 0.10) =	**850.00 m3**
	3.2.15.2 Excavation Length	
	N<20: = 41.0 x 10 =	**410.00 m**
	20<N<40: 2.0 x 10 =	**20.00 m**
	40<N: 5.0 x 10 =	**50.00 m**
	3.2.15.3 Excavation Volume	
	= 10 x 1/4 x pi x 1.50 x 1.50	
	x 50.72	**896.30 m3**
3.2.16) Earthwork	3.2.16.1 Excavation for footing (slope 1:1)	
	= 3.02 / 6 x{ (24.85 x 9.00)	
	+(24.85 + 30.89) x (9.00 + 15.04)	
	+ (30.89 x 15.04) }	
	- 10 x pi /4 x 1.50 ^2 x 3.02 =	**967.51 m3**
	3.2.16.2 Excess Soil	
	v1 = Lean Concrete =	11.87 m3
	v2 = Blinding Stone =	23.75 m3
	v3 = Footing Volume =	292.23 m3
	v4 = 2 x 1/4x pi x 1.40 ^2 x 3 x	
	x 0.72 =	6.65 m3
	Total =	334.50 m3
	3.2.16.3 Back Fill = Excavation for footing - Excess Soil	
	= 967.51 - 334.50 =	**633.00 m3**

REINFORCEMENT OF PIER 1 (For 1 Direction)

DETAIL	No	D (mm)	LENGTH (m)	QUANTITY (nos.)	UNIT WEIGH (kg/m)	TOTAL STEEL (kg)
BEAM	R1	10	4500	10	0.617	27.8
	B1	28	11200	14	4.834	758.0
	B2	28	9800	13	4.834	615.9
	B3	16	11200	9	1.578	159.1
	B3a	16	10490	4	1.578	66.2
	B4	14	4916	49	1.208	291.0
	B4a	14	4266	49	1.208	252.5
	B4b	14	1982	49	1.208	117.3
	B4c	14	3566	49	1.208	211.1
	B4d	14	2332	49	1.208	138.0
	B5	14	4151	8	1.208	40.1
	B5a	14	3501	8	1.208	33.8
	B5b	14	1600	6	1.208	11.6
	B5c	14	2801	6	1.208	20.3
	B5d	14	2332	14	1.208	39.4
	B6	28	3793	7	4.834	128.3
	B6a	28	3793	5	4.834	91.7
	B7	28	3377	7	4.834	114.3
	B7a	28	3377	5	4.834	81.6
COLUMN	C1	32	7510	84	6.313	3982.5
	C2	14	4498	114	1.208	619.4
FOOTING	F1	22	11070	25	2.984	825.8
	F2	22	14587	47	2.984	2045.8
	F3	32	10300	53	6.313	3446.3
	F4	22	7570	43	2.984	971.3
	F5	20	7500	16	2.466	295.9
	F6	20	10800	16	2.466	426.1
	F7	16	4698	94	1.578	696.9

TOTAL			
	D = 10	27.8	(kg)
	D = 14	1774.5	(kg)
	D = 16	922.2	(kg)
	D = 20	722.0	(kg)
	D = 22	3842.9	(kg)
	D = 28	1789.8	(kg)
	D = 32	7428.8	(kg)
	TOTAL	16508.0	(kg)

REINFORCEMENT OF PILE FOR PIER 1 (For 1 Direction)

PILE	N1	32	12000	30	6.313	2272.7
	N2	28	6520	15	4.834	617.8
	N3	25	12000	30	3.853	1387.1
	N3'	25	10000	15	3.853	578.0
	N4	22	4203	6	2.984	75.3
	N5	22	4229	3	2.984	37.9
	N6	22	4248	13	2.984	164.8
	N7	10	152053	1	0.617	93.8
	N8	10	323113	1	0.617	199.4
	N9	10	554994	1	0.617	342.4
	N10	10	4105	74	0.617	187.4
	N11	16	1322	16	1.578	33.4

TOTAL			
	D = 10	823.0	(kg)
	D = 16	33.4	(kg)
	D = 22	278.0	(kg)
	D = 25	1965.1	(kg)
	D = 28	617.8	(kg)
	D = 32	2272.7	(kg)
	TOTAL	5990.0	(kg)

REINFORCEMENT OF PIER 2 (For 1 Direction)

DETAIL	No	D (mm)	LENGTH (m)	QUANTITY (nos.)	UNIT WEIGH (kg/m)	TOTAL STEEL (kg)
BEAM	R1	10	5600	10	0.617	34.6
	B1	28	11200	14	4.834	758.0
	B2	28	9800	13	4.834	615.9
	B3	16	11200	9	1.578	159.1
	B3a	16	10490	4	1.578	66.2
	B4	14	4916	49	1.208	291.0
	B4a	14	4666	49	1.208	276.2
	B4b	14	2182	49	1.208	129.2
	B4c	14	3566	49	1.208	211.1
	B4d	14	2332	49	1.208	138.0
	B5	14	4151	8	1.208	40.1
	B5a	14	3901	8	1.208	37.7
	B5b	14	1800	6	1.208	13.0
	B5c	14	2801	6	1.208	20.3
	B5d	14	2332	14	1.208	39.4
	B6	28	3393	7	4.834	114.8
	B6a	28	3793	5	4.834	91.7
	B7	28	3377	7	4.834	114.3
	B7a	28	3777	5	4.834	91.3
COLUMN	C1	32	11510	168	6.313	12207.3
	C2	14	4498	177	1.208	961.7
	C3	14	4725	78	1.208	445.2
	C4	14	1758	78	1.208	165.6
	C4a	14	1322	12	1.208	19.2
	C5	14	9612	12	1.208	139.3
	C6	14	21934	12	1.208	318.0
FOOTING	F1	22	11070	25	2.984	825.8
	F2	22	14587	47	2.984	2045.8
	F3	32	10300	53	6.313	3446.3
	F4	22	7570	43	2.984	971.3
	F5	20	7500	16	2.466	295.9
	F6	20	10800	16	2.466	426.1
	F7	16	4689	94	1.578	695.5
TOTAL	D = 10		34.6	(kg)		
	D = 14		3245.0	(kg)		
	D = 16		920.8	(kg)		
	D = 20		722.0	(kg)		
	D = 22		3842.9	(kg)		
	D = 28		1786.0	(kg)		
	D = 32		15653.6	(kg)		
	TOTAL		26204.9	(kg)		

REINFORCEMENT OF PILE FOR PIER 2 (For 1 Direction)

PILE	N1	25	12000	56	3.853	2589.2
	N2	25	4875	14	3.853	263.0
	N3	22	4248	22	2.984	278.9
	N4	10	152053	1	0.617	93.8
	N5	10	182464	1	0.617	112.6
	N6	10	650027	1	0.617	401.1
	N7	10	4105	64	0.617	162.1
	N8	16	1322	16	1.578	33.4
TOTAL	D = 10		769.6	(kg)		
	D = 16		33.4	(kg)		
	D = 22		278.9	(kg)		
	D = 25		2852.2	(kg)		
	TOTAL		3934.1	(kg)		

26204.9

REINFORCEMENT OF PIER 3 (For 1 Direction)

DETAIL	No	D (mm)	LENGTH (m)	QUANTITY (nos.)	UNIT WEIGH (kg/m)	TOTAL STEEL (kg)
BEAM	R1	10	5600	10	0.617	34.6
	B1	28	11200	14	4.834	758.0
	B2	28	9800	13	4.834	615.9
	B3	16	11200	9	1.578	159.1
	B3a	16	10490	4	1.578	66.2
	B4	14	4916	49	1.208	291.0
	B4a	14	4666	49	1.208	276.2
	B4b	14	2182	49	1.208	129.2
	B4c	14	3566	49	1.208	211.1
	B4d	14	2332	49	1.208	138.0
	B5	14	4151	8	1.208	40.1
	B5a	14	3901	8	1.208	37.7
	B5b	14	1800	6	1.208	13.0
	B5c	14	2801	6	1.208	20.3
	B5d	14	2332	14	1.208	39.4
	B6	28	3393	7	4.834	114.8
	B6a	28	3793	5	4.834	91.7
	B7	28	3377	7	4.834	114.3
	B7a	28	3777	5	4.834	91.3
COLUMN	C1	32	11510	168	6.313	12207.3
	C2	14	4498	177	1.208	961.7
	C3	14	4725	78	1.208	445.2
	C4	14	1758	78	1.208	165.6
	C4a	14	1322	12	1.208	19.2
	C5	14	9612	12	1.208	139.3
	C6	14	21934	12	1.208	318.0
FOOTING	F1	22	11070	25	2.984	825.8
	F2	22	14587	47	2.984	2045.8
	F3	32	10300	53	6.313	3446.3
	F4	22	7570	43	2.984	971.3
	F5	20	7500	16	2.466	295.9
	F6	20	10800	16	2.466	426.1
	F7	16	4689	94	1.578	695.5
TOTAL	D = 10		34.6	(kg)		
	D = 14		3245.0	(kg)		
	D = 16		920.8	(kg)		
	D = 20		722.0	(kg)		
	D = 22		3842.9	(kg)		
	D = 28		1786.0	(kg)		
	D = 32		15653.6	(kg)		
	TOTAL		26204.9	(kg)		

REINFORCEMENT OF PILE FOR PIER 3 (For 1 Direction)

PILE	N1	25	12000	56	3.853	2589.2
	N2	25	4875	14	3.853	263.0
	N3	22	4248	22	2.984	278.9
	N4	10	152053	1	0.617	93.8
	N5	10	182464	1	0.617	112.6
	N6	10	650027	1	0.617	401.1
	N7	10	4105	64	0.617	162.1
	N8	16	1322	16	1.578	33.4
TOTAL	D = 10		769.6	(kg)		
	D = 16		33.4	(kg)		
	D = 22		278.9	(kg)		
	D = 25		2852.2	(kg)		
	TOTAL		3934.1	(kg)		

26204.9

REINFORCEMENT OF PIER 4 (For 1 Direction)

DETAIL	No	D (mm)	LENGTH (m)	QUANTITY (nos.)	UNIT WEIGH (kg/m)	TOTAL STEEL (kg)
BEAM	R1	10	4500	10	0.617	27.8
	B1	28	11200	14	4.834	758.0
	B2	28	9800	13	4.834	615.9
	B3	16	11200	9	1.578	159.1
	B3a	16	10490	4	1.578	66.2
	B4	14	4916	49	1.208	291.0
	B4a	14	4266	49	1.208	252.5
	B4b	14	1982	49	1.208	117.3
	B4c	14	3566	49	1.208	211.1
	B4d	14	2332	49	1.208	138.0
	B5	14	4151	8	1.208	40.1
	B5a	14	3501	8	1.208	33.8
	B5b	14	1600	6	1.208	11.6
	B5c	14	2801	6	1.208	20.3
	B5d	14	2332	14	1.208	39.4
	B6	28	3793	7	4.834	128.3
	B6a	28	3793	5	4.834	91.7
	B7	28	3377	7	4.834	114.3
	B7a	28	3377	5	4.834	81.6
COLUMN	C1	32	7510	84	6.313	3982.5
	C2	14	4498	114	1.208	619.4
FOOTING	F1	22	11070	25	2.984	825.8
	F2	22	14587	47	2.984	2045.8
	F3	32	10300	53	6.313	3446.3
	F4	22	7570	43	2.984	971.3
	F5	20	7500	16	2.466	295.9
	F6	20	10800	16	2.466	426.1
	F7	16	4698	94	1.578	696.9
TOTAL		D = 10	27.8		(kg)	
		D = 14	1774.5		(kg)	
		D = 16	922.2		(kg)	
		D = 20	722.0		(kg)	
		D = 22	3842.9		(kg)	
		D = 28	1789.8		(kg)	
		D = 32	7428.8		(kg)	
		TOTAL	16508.0		(kg)	

REINFORCEMENT OF PILE FOR PIER 4 (For 1 Direction)

PILE	N1	32	12000	30	6.313	2272.7
	N2	28	8520	15	4.834	617.8
	N3	25	12000	30	3.853	1387.1
	N3'	25	10000	15	3.853	578.0
	N4	22	4203	6	2.984	75.3
	N5	22	4229	3	2.984	37.9
	N6	22	4248	13	2.984	164.8
	N7	10	152053	1	0.617	93.8
	N8	10	323113	1	0.617	199.4
	N9	10	554994	1	0.617	342.4
	N10	10	4105	74	0.617	187.4
	N11	16	1322	16	1.578	33.4
TOTAL		D = 10	823.0		(kg)	
		D = 16	33.4		(kg)	
		D = 22	278.0		(kg)	
		D = 25	1965.1		(kg)	
		D = 28	617.8		(kg)	
		D = 32	2272.7		(kg)	
		TOTAL	5990.0		(kg)	

LIST OF REINFORCEMENT

pil-1

SIGN	DIACETER	LENGTH	NOS.	UNIT WEIGHT	PIECE WEIGHT	TOTAL WEIGHT	NOTE
1	D22	9,900	12	2.984	29.500	354.0	
2	D6	1,614	95	0.222	0.358	34.0	
3	D6	490	120	0.222	0.109	13.1	
4	D25	1,911	2	3.854	7.360	14.7	
5	D22	350	8	2.984	1.040	8.3	
8	D25	0	-	3.854	0.000	0.0	
9	D16	1,508	8	1.579	2.380	19.0	
					TOTAL	443.1	
					D32	0.0	
					D25	14.7	
					D22	362.3	
					D16	19.0	
					ϕ6	47.1	
						443.1	

LIST OF REINFORCEMENT

pile-2

SIGN	DIACETER	LENGTH	NOS.	UNIT WEIGHT	PIECE WEIGHT	TOTAL WEIGHT	NOTE
1a	D22	10,589	4	2.984	31.600	126.4	
1b	D22	10,612	4	2.984	31.700	126.8	(AVE)
2	D6	1,614	95	0.222	0.358	34.0	
3	D6	490	60	0.222	0.109	6.5	
4	D25	1,911	2	3.854	7.360	14.7	
5	D22	350	8	2.984	1.040	8.3	
6	D6	9,460	1	0.222	2.100	2.1	
7	D32	810	1	6.313	5.110	5.1	(AVE)
8	D25	0	0	3.854	0.000	0.0	
9	D16	1,508	4	1.579	2.380	9.5	
					TOTAL	333.4	
					D32	5.1	
					D25	14.7	
					D22	261.5	
					D16	9.5	
					ϕ6	42.6	
						333.4	

TOTAL

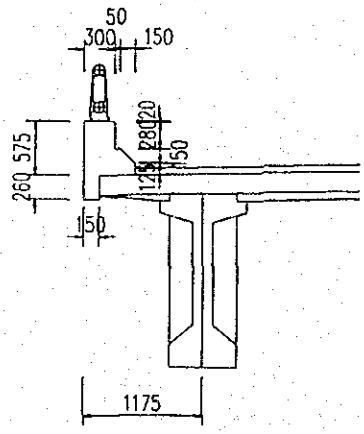
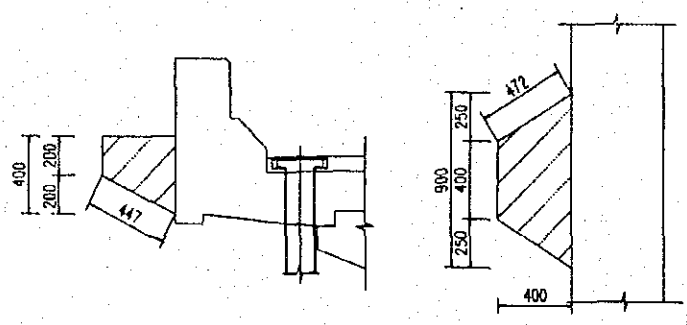
	Pile-1	Pile-2	Total
nos	3	1	
D32	0.0	5.1	5.1
D25	44.1	14.7	58.8
D22	1086.9	261.5	1348.4
D16	57.0	9.5	66.5
ϕ6	141.3	42.6	183.9
	1329.300	333.400	1662.7

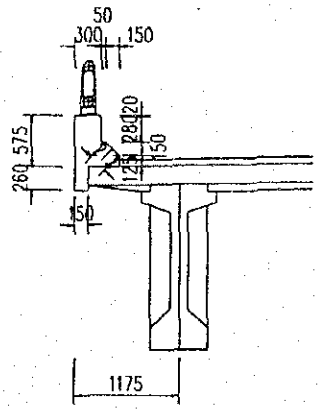
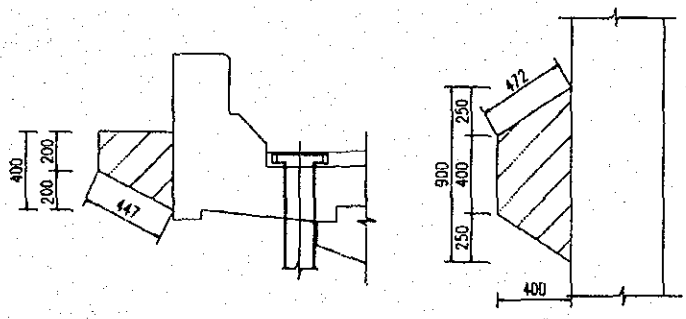
No.

QUANTITY OF MISCELLANEOUS

Item		Work Item	Unit	Quantity	Remarks
Concrete	CLASS E	Parapet	m3	143.66	
		Lighting pole base	m3	0.35	
Form		Parapet	m2	901.61	
		Lighting pole base	m2	2.44	
		Total		904.05	
Re-bar		Parapet	ton	22.286	
		Lighting pole base	ton	0.126	
		Total	ton	22.41	
Steel Railing			m	573.00	
Lighting	Pole		set	4	
	Pipe Φ100		m	573.00	
Drainage	Pot		set	20	
	Pipe Φ180		m	34.80	

Concrete No.

Item	Formula	Quantity
1. Parapet CLASS "E"		
	A = {(0.300 × 0.575 + 0.260 × 0.150 + (0.125 + 0.275) × 0.150 × 1/2 + 0.275 × 0.050} × 2 × 2 = 1.021 m2	
	V = 1.021 × (28.050 + 25.200 + 37.200 + 25.200 + 25.050) = 143.66 m3	143.66 m3
2. Lighting CLASS "E"		
	V = (0.200 × 0.400 + 0.400 × 0.900) × 1/2 × 0.4 × 4 = 0.352 m3	0.352 m3

Item	Formula	Quantity
1. Parapet		
	A = (0.575 + 0.260 + 0.15 + 0.125 + 0.212 + 0.280) × 2 × 2 × (28.050 + 25.200 + 37.200 + 25.200 + 25.050)	
	= 901.61 m2	901.61 m2
2. Lighting		
	A = { (0.900 + 0.400) × 0.447 × 1/2 + (0.400 + 0.200) × 0.4 × 1/2 × 2 + 0.2 × 0.400 } × 4	
	= 2.442 m2	2.442 m2

Accessories No.

Item	Formula	Quantity
1. Drainage		
	TOTAL EACH	
	EACH = 10 x 2 =	20 EACH
	PIPE = 1.74 x 20 =	34.80 m
2. Steel railing		
	Length for 5 span L = 140.700 m	
	Each = 5 span	
	Length for abutment L = 5.1 x 2 = 10.20 m	
	TOTAL LENGTH	
	L = 140.700 x 1 x 2 x 2 + 10.200 =	573.000 m
3. Lighting		
	Each for one span	
	Each = 4	
	Total lighting poles	
	4 x 1 =	4 pole
	PVC pipe Φ100mm =	573.000 m

Re-bar Parapet

No.

Per 10m

SCHEDULE OF REINFORCEMENT (OF RAILING)													
BAR MARK	SIZE (mm)	DIMENSIONS (mm)							LENGTH (mm)	UNIT WEIGHT (kg/m)	NO. OF BARS	WEIGHT (kg)	REMARKS
		a	b	c	d	e	f	g					
P1	14	250	701	212	747	70			1980	1.208	68	162.65	
P2	14	230	297	176	275	245			1223	1.208	68	100.46	
P3	14	10000							10000	1.208	11	132.88	
Total												395.99	

Total Weight

Total = 395.99 / 10 × 140.7 × 4 = 22,286.32 (kg)

Re-bar Lighting

No.

Per BRIDGE

SCHEDULE OF REINFORCEMENT (OF LIGHTING)													
BAR MARK	SIZE (mm)	DIMENSIONS (mm)							LENGTH (mm)	UNIT WEIGHT (kg/m)	NO. OF BARS	WEIGHT (kg)	REMARKS
		a	b	c	d	e	f	g					
P1	20	113	825	320					1258	2.466	3	9.31	
P2	16	113	380	488	280				1261	1.578	3	5.97	
P3	20	1000	300	1000					2300	2.466	2	11.34	
P4	16	282	285	282					849	1.578	2	2.68	
P5	16	208	285	208					701	1.578	2	2.21	
Total												31.51	

Total Weight

Total = 31.51 × 4 = 126.05 (kg)