3.5. Cai Nai bridge

No.

1.Quantity of Superstructure
(Approach Bridge)

Item		Work Item	Unit	Quantity	Remarks
Concrete	CLASS B	Girder	m3	703.6	σ ck=400kg/c
	CLASS D	Panel	m3	101.2	
		Deck Slab	m3	458.2	
		Cross beam	m3	92.6	
		Total	m3	652.0	
Formworks		Girder	m2	5,220.4	
		Cross beam	m2	588.9	
		Deck Slab	m2	301.3	
		Panel	m2	477.6	
		Total	m2	6,588.2	
Plattform of construction			m2	2,323.0	
Re-bar		Cross beam	ton	7.797	
		Deck Slab	ton	102.315	
		Girder	ton	131.986	added
		Panel	ton	12.142	added
		Total	ton	254.241	
PC Cable	12S12.7B		ton	32.549	SWPR7B
	3S12.7B	Transverse Tendons	ton	1.679	
Anchorage	12S12.7B		set	220.000	
	3S12.7B		set	144.000	
Steel shear key			set	240.000	
Sheathing	ϕ 80/85		m	3503.680	
	ϕ 50/55		m	522.600	
Cement grout in sheathing			m3	19.243	
Expansion Joint			m	86.000	
Bearing	600x300x57		set	20.000	
	500x250x50		set	40.000	
Anchorage Bar			set	48.000	
Pavement	Water Proofing t = 5 mm		m2	2010.250	
	Asphalt Concrete t = 70 mm		m2	2010.250	

A1-P1 No.

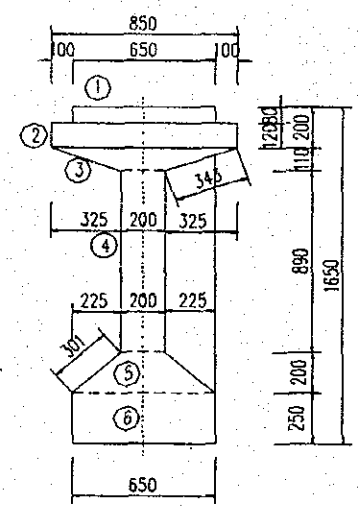
Item	Formula	Quantity
1. Girder CLASS "B" 1) Girder	(1) Calculation of Sectional Area	

[1] Middle Section

Summary of Sectional Area — For ONE GIRDER

No	Formula	(m2)
1	0.650 × 0.080	= 0.052
2	0.850 × 0.120	= 0.102
3	1/2 × 1.050 × 0.110	= 0.058
4	0.890 × 0.200	= 0.178
5	1/2 × 0.850 × 0.200	= 0.085
6	0.250 × 0.650	= 0.163

Total Area 0.638 m2

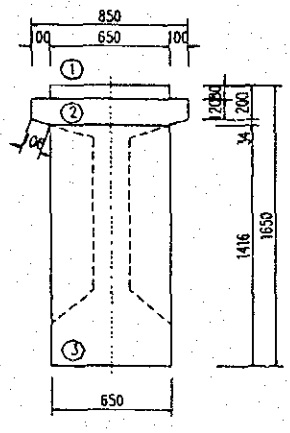


[2] End Section

Summary of Sectional Area — For ONE GIRDER

No	Formula	(m2)
1	0.650 × 0.080	= 0.052
2	0.850 × 0.120 + 0.034¥2 × 1.500	= 0.128
3	0.650 × 1.416	= 0.920

Total Area 1.100 m2



Item	Formula	Quantity

(2) Calculation of Concrete Volume

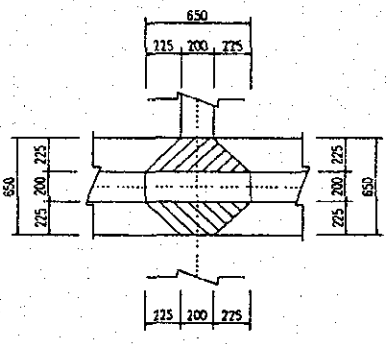
[1] A1-P1 Girder Length 28.000 m

Section No	Section Area (m2)	Average of Section (m2)	Length of Block (m)	Concrete Volume (m3)	Remark
END	1.1				
END	1.1	1.1	0.450	0.495	
MIDDLE	0.638	0.869	4.000	3.476	
MIDDLE	0.638	0.638	19.100	12.186	
END	1.1	0.869	4.000	3.476	
END	1.1	1.1	0.450	0.495	
Total			28	20.128	

No. of Girder 10 × 1 = 10

V1= 20.128 × 10 = 201.280 m3

2)Diaphragm



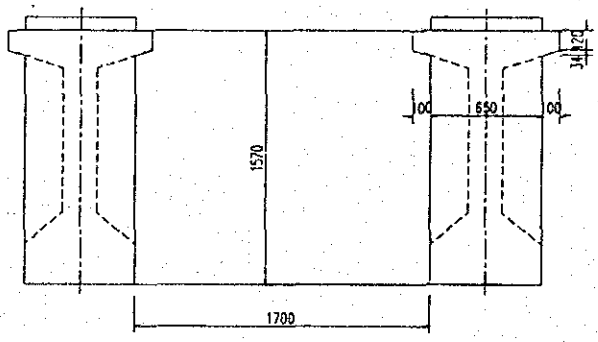
V2= 1/2 × (0.200 × 1.196 + 0.65 × 0.890)
× 0.255 × 2 × 2 × 10 × 1 = 4.170 m3

Total V = 201.280 + 4.170 = 205.450 205.450 m3

A1-P1 No.

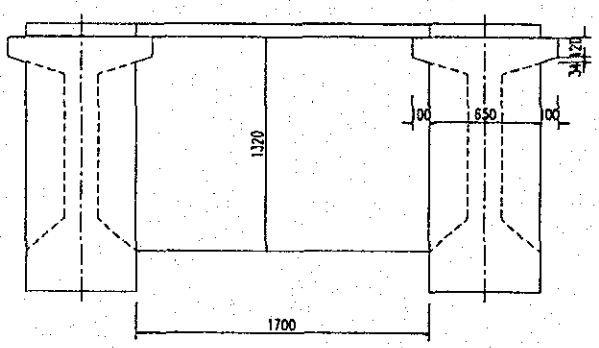
Item	Formula	Quantity
2. Diaphragm CLASS "D"		

(1) End Cross Beam



V1= { 1.570 × 1.700 - (0.120 + 0.154) × 2/2 × 0.100 }
× 0.500 × 1 × 16 = 21.133 m3

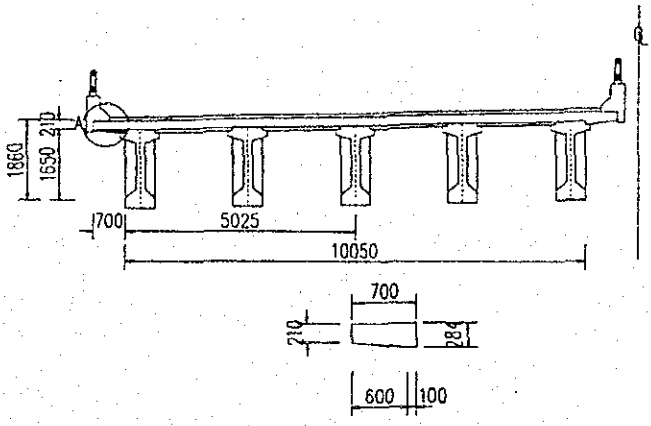
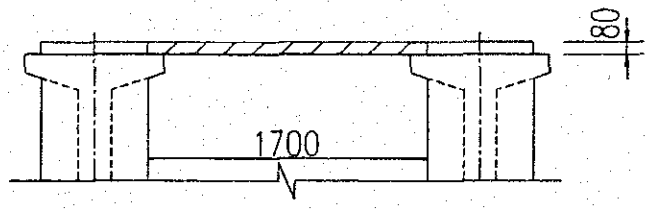
(2) Intermediate Cross Beam



V2= [{ 1.700 × 1.320 - (0.120 + 0.154) × 2/2 × 0.100 }
× 0.200 × 1 × 2 × 8 = 7.093 m3

Sub-tota V = 21.133 + 7.093 = 28.226 m3 | 28.226 m3

A1-P1 No.

Item	Formula	Quantity
3. Deck Slab CLASS "D"	 DETAIL "A"	
	A = [{(0.210 + 0.284) × 0.600 × 1/2 + 0.100 × 0.284)} × 2 + (5.025 × 0.210 × 2)] × 2 = 4.927 m2	
	V = 4.927 × 28.000 = 137.956 m3	137.956 m3
4.Panel concrete Class "D"	V = 1.700 × 0.08 × 8 × 28.000 × 1 =	30.464 m3
		

P1-P2 No.

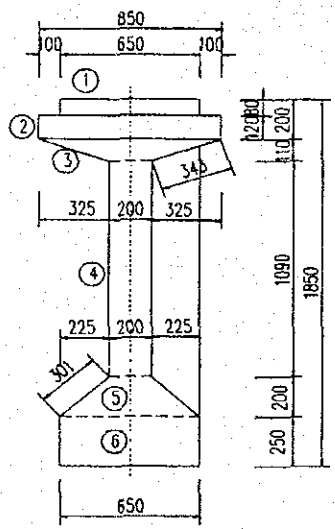
Item	Formula	Quantity
1. Girder CLASS "B" 1) Girder	(1) Calculation of Sectional Area	

[1] Middle Section

Summary of Sectional Area For ONE GIRDER

No	Formula				(m2)
1	0.650 ×	0.080		=	0.052
2	0.850 ×	0.120		=	0.102
3	1¥2 ×	1.050 ×	0.110	=	0.058
4	1.090 ×	0.200		=	0.218
5	1¥2 ×	0.850 ×	0.200	=	0.085
6	0.250 ×	0.650		=	0.163

Total Area 0.678 m2

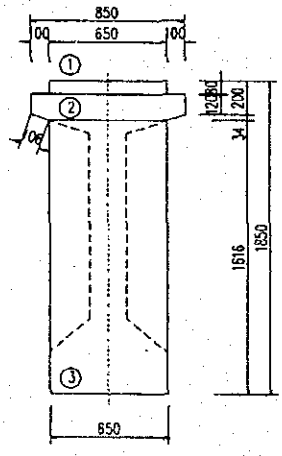


[2] End Section

Summary of Sectional Area For ONE GIRDER

No	Formula					(m2)
1	0.650 ×	0.080			=	0.052
2	0.850 ×	0.120 +	0.034¥2 ×	1.500	=	0.128
3	0.650 ×	1.616			=	1.050

Total Area 1.230 m2



P1-P2 No.

Item	Formula	Quantity

(2) Calculation of Concrete Volume

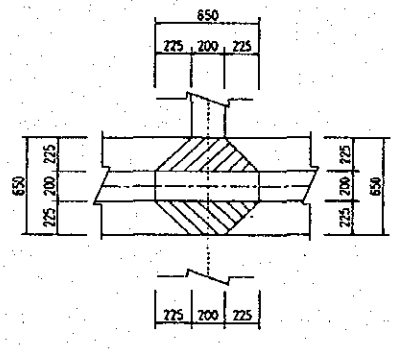
[1] A1-A2 Girder Length 37.000 m

Section No	Section Area (m2)	Average of Section (m2)	Length of Block (m)	Concrete Volume (m3)	Remark
END	1.23				
END	1.23	1.23	0.500	0.615	
MIDDLE	0.678	0.954	5.300	5.056	
MIDDLE	0.678	0.678	25.400	17.221	
END	1.23	0.954	5.300	5.056	
END	1.23	1.23	0.500	0.615	
Total			37	28.563	

No. of Girder 10 × 1 = 10

V1= 28.563 × 10 = 285.630 m3

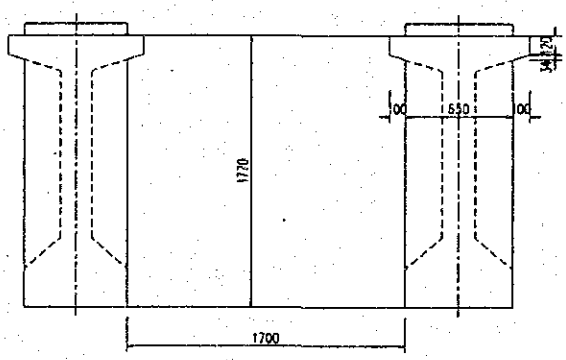
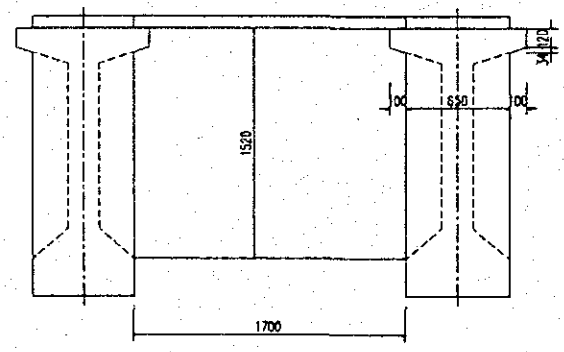
2)Diaphragm



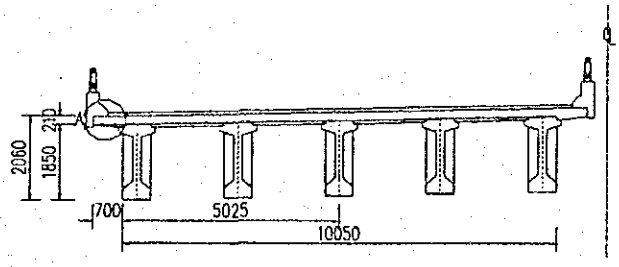
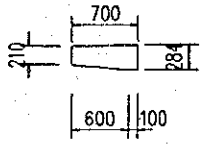
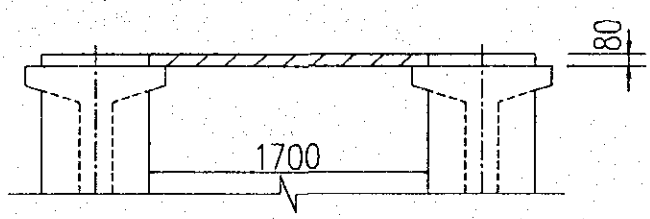
V2= 0.225 × (0.200 + 0.650) × 1/2 × (1.090 + 1.366) × 2/2 × 10 × 3 × 1 = 7.046 m3

Total V = 285.630 + 7.046 = 292.676 292.676 m3

P1-P2 No.

Item	Formula	Quantity
2. Diaphragm CLASS "D"		
	(1) End Cross Beam	
		
	V1= { 1.770 × 1.700 - (0.120 + 0.154) × 2/2 × 0.100 } × 0.500 × 1 × 16 = 23.853 m3	
		
	V2= [{ 1.700 × 1.520 - (0.120 + 0.154) × 2/2 × 0.100 } × 0.200 × 1 × 3 × 8 = 12.272 m3	
	Sub-tota V = 23.853 + 12.272 = 36.125 m3	36.125 m3

P1-P2 No.

Item	Formula	Quantity
3. Deck Slab CLASS "D"	  DETAIL "A" A = [{(0.210 + 0.284) × 0.600 × 1/2 + 0.100 × 0.284)} × 2 + (5.025 × 0.210 × 2)] × 2 = 4.927 m2 V = 4.927 × 37.000 = 182.299 m3	182.299 m3
4.Panel concrete Class "D"	V = 1.700 × 0.08 × 8.000 × 37.000 × 1 =	40.256 m3
		

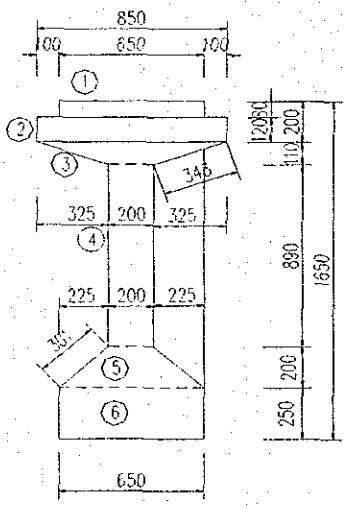
Item	Formula	Quantity
1. Girder CLASS "B" 1) Girder	(1) Calculation of Sectional Area	

[1] Middle Section

Summary of Sectional Area — For ONE GIRDER

No	Formula				(m2)
1	0.650 ×	0.080		=	0.052
2	0.850 ×	0.120		=	0.102
3	1/2 ×	1.050 ×	0.110	=	0.058
4	0.890 ×	0.200		=	0.178
5	1/2 ×	0.850 ×	0.200	=	0.085
6	0.250 ×	0.650		=	0.163

Total Area 0.638 m2

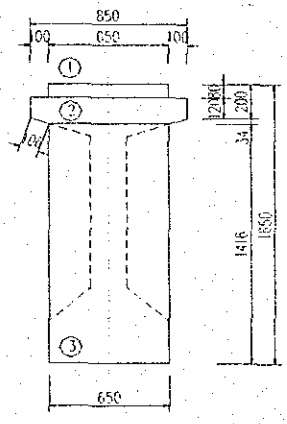


[2] End Section

Summary of Sectional Area — For ONE GIRDER

No	Formula				(m2)
1	0.650 ×	0.080		=	0.052
2	0.850 ×	0.120 + 0.034/2	× 1.500	=	0.128
3	0.650 ×	1.416		=	0.920

Total Area 1.100 m2



Item	Formula	Quantity

(2) Calculation of Concrete Volume

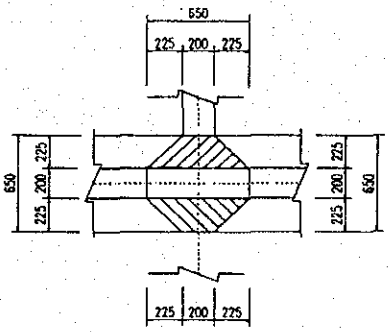
[1] A1-P1 Girder Length 28.000 m

Section No	Section Area (m2)	Average of Section (m2)	Length of Block (m)	Concrete Volume (m3)	Remark
END	1.1				
END	1.1	1.1	0.450	0.495	
MIDDLE	0.638	0.869	4.000	3.476	
MIDDLE	0.638	0.638	19.100	12.186	
END	1.1	0.869	4.000	3.476	
END	1.1	1.1	0.450	0.495	
Total			28	20.128	

No. of Girder 10 × 1 = 10

V1= 20.128 × 10 = 201.280 m3

2)Diaphragm



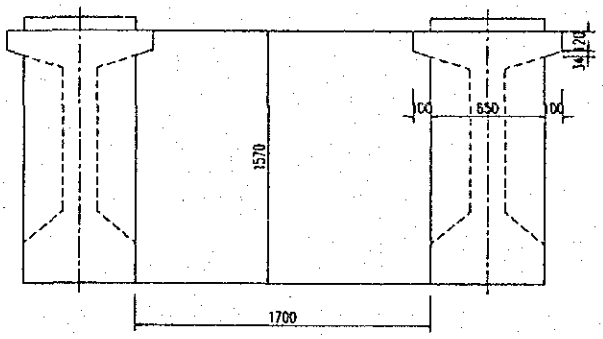
V2= 1/2 × (0.200 × 1.196 + 0.65 × 0.890)
× 0.255 × 2 × 2 × 10 × 1 = 4.170 m3

Total V = 201.280 + 4.170 = 205.450 205.450 m3

P2-A2 No.

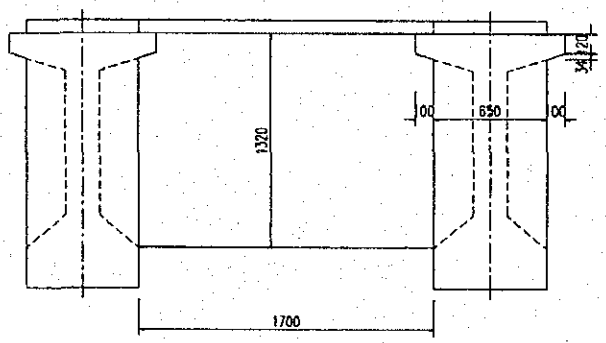
Item	Formula	Quantity
2. Diaphragm CLASS "D"		

(1) End Cross Beam



V1= { 1.570 × 1.700 - (0.120 + 0.154) × 2/2 × 0.100 }
× 0.500 × 1 × 16 = 21.133 m3

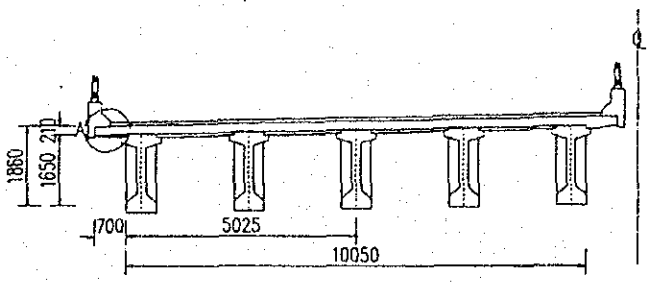
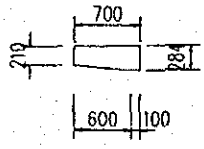
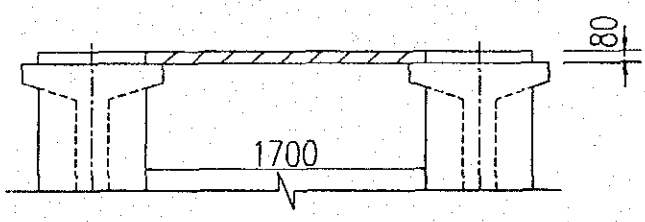
(2) Intermediate Cross Beam



V2= [{ 1.700 × 1.320 - (0.120 + 0.154) × 2/2 × 0.100 }
× 0.200 × 1 × 2 × 8 = 7.093 m3

Sub-tota V = 21.133 + 7.093 = 28.226 m3 28.226 m3

P2-A2 No.

Item	Formula	Quantity
3. Deck Slab CLASS "D"		
		
	DETAIL "A"	
	A = [((0.210 + 0.284) × 0.600 × 1/2 + 0.100 × 0.284)] × 2 + (5.025 × 0.210 × 2)] × 2 = 4.927 m2	
	V = 4.927 × 28.000 = 137.956 m3	137.956 m3
4.Panel concrete Class "D"	V = 1.700 × 0.08 × 8.000 × 28.000 × 1 =	30.464 m3
		

A1-P1 No.

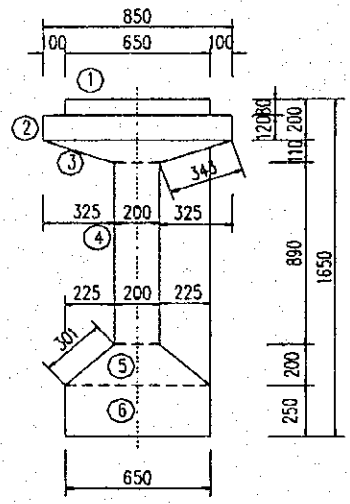
Item	Formula	Quantity
1. Girder CLASS "B" 1) Girder	(1) Calculation of Sectional Area	

[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

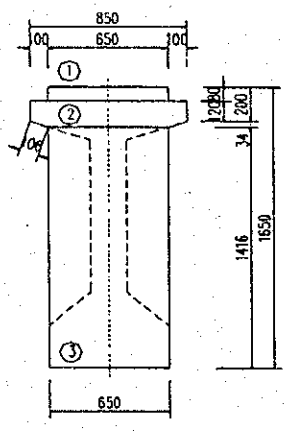


[2] End Section

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



Item	Formula	Quantity

(2) Calculation of Form Area

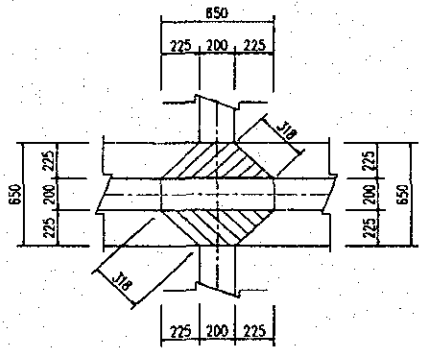
[1] A1-A2 Girder Length 37.000 m

Section No.	Section Length (m)	Average of Section (m)	Length of Block (m)	Form Area (m2)	Remark
END	4.094				
END	4.094	4.094	0.500	2.047	
MIDDLE	4.618	4.356	5.300	23.087	
MIDDLE	4.618	4.618	25.400	117.297	
END	4.094	4.356	5.300	23.087	
END	4.094	4.094	0.500	2.047	
Total			37	167.565	

No. of Girder 10 × 1 = 10

A1= 167.565 × 10 = 1,675.650 m2

2) Diaphragm



A2= 0.318 × 2 × (0.890 + 1.166) × 1/2 × 2
× 10 × 2 × 1
+ 0.2 × 1.166 × 2 × 10 × 2 × 1
- 0.65 × 0.890 × 2 × 10 × 2 × 1
= 12.340 m2

Total A = 1,675.650 + 12.340 = 1,687.990 1,687.990 m2

P1-P2 No.

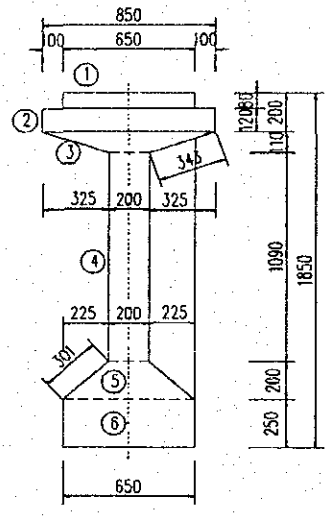
Item	Formula	Quantity
1. Girder CLASS "B" 1) Girder	(1) Calculation of Sectional Area	

[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

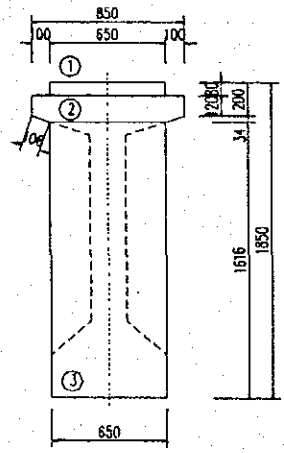


[2] End Section

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



Item	Formula	Quantity

(2) Calculation of Form Area

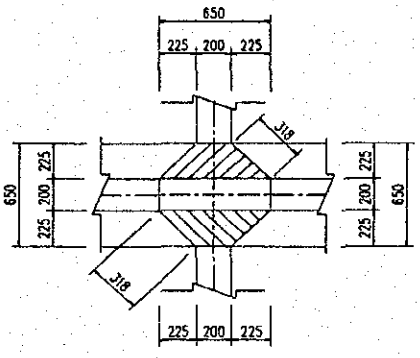
[1] A1-A2 Girder Length 37.000 m

Section No.	Section Length (m)	Average of Section (m)	Length of Block (m)	Form Area (m2)	Remark
END	4.494				
END	4.494	4.494	0.500	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	182.365	

No. of Girder 10 × 1 = 10

A1= 182.365 × 10 = 1,823.650 m2

2) Diaphragm



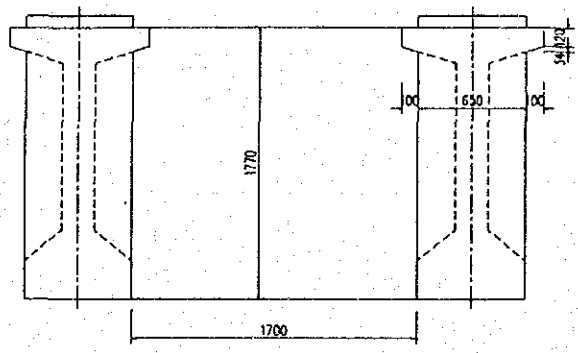
A3= 0.318 × 2 × (1.090 + 1.366) × 1/2 × 2
× 10 × 3 × 1
+ 0.2 × 1.366 × 2 × 10 × 3 × 1
- 0.65 × 1.090 × 2 × 10 × 3 × 1
= 20.742 m2

Total A = 1,823.650 + 20.742 = 1,844.392 1,844.392 m2

P1-P2 No.

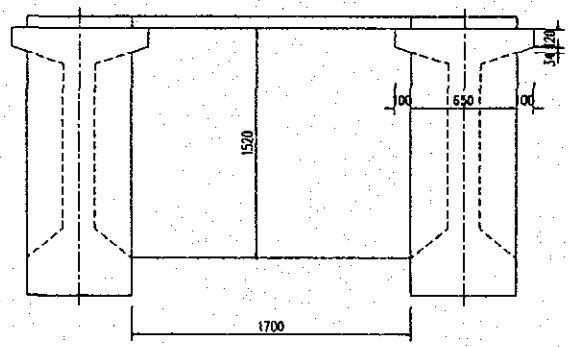
Item	Formula	Quantity
2. Diaphragm CLASS "C"		

(1) End Cross Beam



A1= [{ 1.770 × 1.700 - (0.120 + 0.154) × 2/2 × 0.100 }
× 2 + 0.500 × 1.700] × 8 × 2 = 109.011 m2

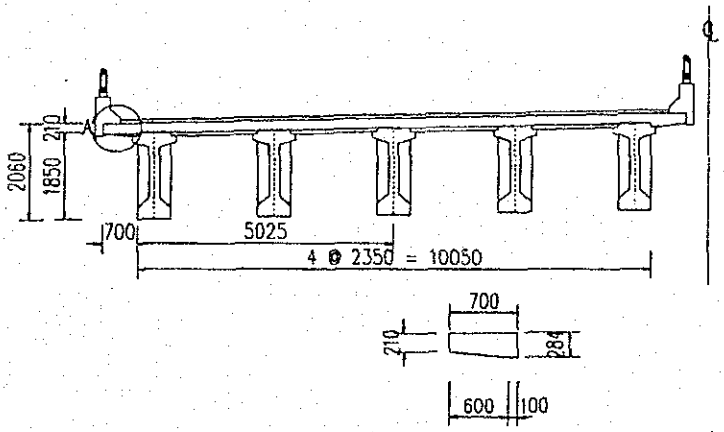
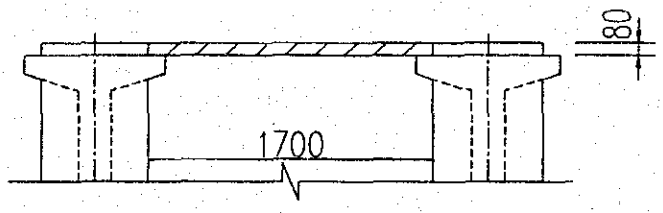
(2) Intermediate Cross Beam



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

Sub-total A = 109.011 + 130.877 = 239.888 m2 239.888 m2

P1-P2

Item	Formula									Quantity
3. Deck Slab CLASS " "	 DETAIL "A"									
	A-1 =	(0.210 +	0.600) ×	2	×	2		=	3.240 m	
	A =	3.240 ×	37.000					=	119.88 m2	119.88 m2
5. Platform for construction										
	A =	26.100 ×	35.800					=	934.380 m2	934.380 m2
6.Panel concrete Class "D"	A =	(1.700 +	1.000) ×	0.080	×	2	+ 1.700) ×		8	
	×	37 ×	1					=	631.072 m2	
										

P2-A2 No.

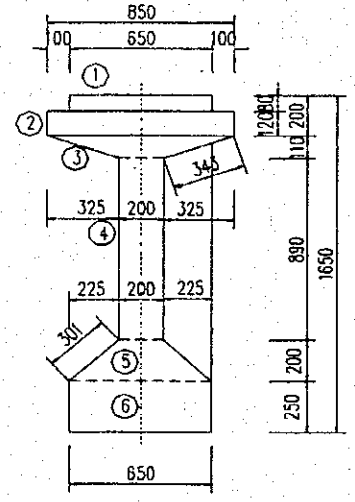
Item	Formula	Quantity
1. Girder CLASS "B" 1) Girder	(1) Calculation of Sectional Area	

[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

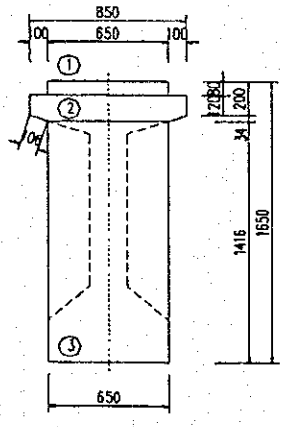


[2] End Section

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



Item	Formula	Quantity

(2) Calculation of Form Area

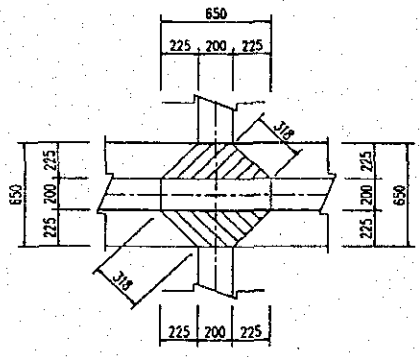
[1] A1-A2 Girder Length 37.000 m

Section No.	Section Length (m)	Average of Section (m)	Length of Block (m)	Form Area (m2)	Remark
END	4.094				
END	4.094	4.094	0.500	2.047	
MIDDLE	4.618	4.356	5.300	23.087	
MIDDLE	4.618	4.618	25.400	117.297	
END	4.094	4.356	5.300	23.087	
END	4.094	4.094	0.500	2.047	
Total			37	167.565	

No. of Girder 10 × 1 = 10

A1= 167.565 × 10 = 1,675.650 m2

2) Diaphragm



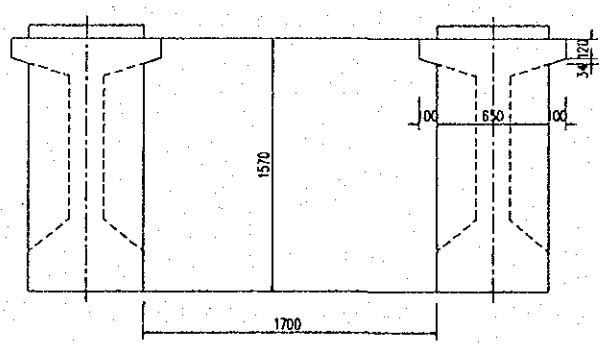
A2= 0.318 × 2 × (0.890 + 1.166) × 1/2 × 2
× 10 × 2 × 1
+ 0.2 × 1.166 × 2 × 10 × 2 × 1
- 0.65 × 0.890 × 2 × 10 × 2 × 1
= 12.340 m2

Total A = 1,675.650 + 12.340 = 1,687.990 1,687.990 m2

P2-A2 No.

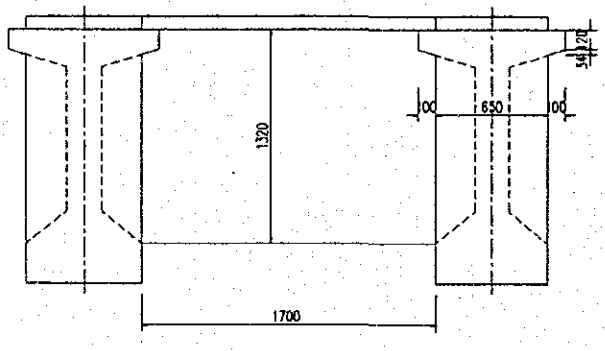
Item	Formula	Quantity
2. Diaphragm CLASS "C"		

(1) End Cross Beam



A1= [{ 1.570 × 1.700 - (0.120 + 0.154) × 2/2 × 0.100 }
× 2 + 0.500 × 1.700] × 8 × 2 = 98.131 m2

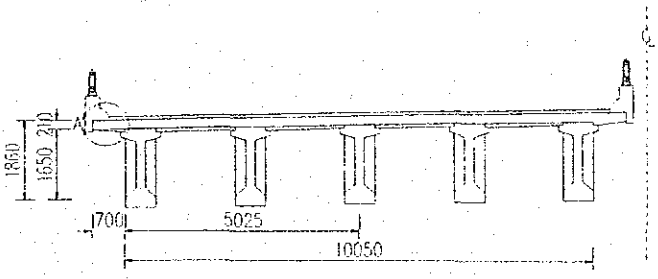
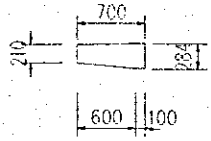
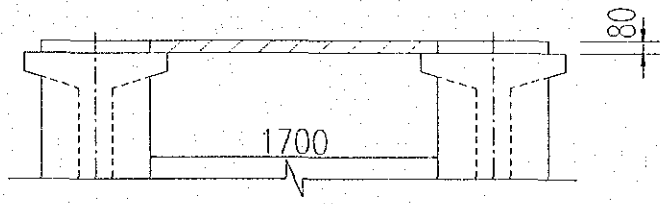
(2) Intermediate Cross Beam



A2= [{ 1.700 × 1.320 - (0.120 + 0.154) × 2/2 × 0.100 }
× 2 + 0.200 × 1.700] × 8 × 2 × 1
× = 76.371 m2

Sub-total A = 98.131 + 76.371 = 174.502 m2 174.502 m2

P2-A2

Item	Formula	Quantity
3. Deck Slab CLASS " D "	  DETAIL "A"	
	A-1 = (0.210 + 0.600) × 2 × 2 = 3.240 m A = 3.240 × 28.000 = 90.72 m2	90.72 m2
5. Platform for construction	A = 26.350 × 26.350 = 694.323 m2	694.323 m2
6.Panel concrete Class "D"	A = (1.700 + 1.000) × 0.080 × 2 + 1.700) × 8 × 28 × 1 = 477.568 m2 	

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-A2) kg

Wp= 773.820 × 10 × 1 = 7,738.200

TENSION UNIT EACH

Ns= 3 × 2 × 10 × 1 = 60

2) 3S12.7

PC CABLE OF DIAPHRAGMS For A1-A2

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) kg

Wp= 186.528 x 1 x 2 = 373.056

TENSION UNIT EACH

Ns= 8 * 2 = 16

SHEATING F 80/85MM 83.296 x 5 x 2 = 832.960 m

SHEATING F 50/55MM 80.400 x 1 x 2 = 160.800 m

STEEL SHEAR KEY 6 x 5 x 2 = 60 set

CEMENT GROUT IN SHEATING

3.14 x 0.08 x 0.080 / 4 x 832.960 = 4.185 m3

3.14 x 0.05 x 0.080 / 4 x 160.800 = 0.505 m3

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

CABLES 3S12.7 18 x 1 x 2 = 36 set

Item	Formula	Quantity

PC CABLE

1) 12S12.7(B)

1.P1-P2 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(A1-A2) kg

Wp= 1707.279 × 10 × 1 = 17,072.790

TENSION UNIT EACH

Ns= 5 × 2 × 10 × 1 = 100

2) 3S12.7

PC CABLE OF DIAPHRAGMS For A1-A2

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(A1-P4) kg

Wp= 233.160 x 1 x 4 = 932.640

TENSION UNIT EACH

Ns= 10 * 4 = 40

SHEATING F 80/85MM 183.776 x 5 x 2 = 1837.760 m

SHEATING F 50/55MM 100.500 x 1 x 4 = 402.000 m

STEEL SHEAR KEY 12 x 5 x 2 = 120 set

CEMENT GROUT IN SHEATING

3.14 x 0.08 x 0.080 / 4 x 1837.760 = 9.233 m3

3.14 x 0.05 x 0.080 / 4 x 402.000 = 1.262 m3

ANCHOR CABLES 12S12.7 10 x 5 x 2 = 100 set

CABLES 3S12.7 18 x 2 x 2 = 72 set

Item	Formula	Quantity

PC CABLE

1) 12S12.7(B)

1.P2-A2 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-A2) kg

Wp= 773.820 × 10 × 1 = 7,738.200

TENSION UNIT EACH

Ns= 3 × 2 × 10 × 1 = 60

2) 3S12.7

PC CABLE OF DIAPHRAGMS For A1-A2

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) kg

Wp= 186.528 x 1 x 2 = 373.056

TENSION UNIT EACH

Ns= 8 * 2 = 16

SHEATING F 80/85MM 83.296 x 5 x 2 = 832.960 m

SHEATING F 50/55MM 80.400 x 1 x 2 = 160.800 m

STEEL SHEAR KEY 6 x 5 x 2 = 60 set

CEMENT GROUT IN SHEATING

3.14 x 0.08 x 0.080 / 4 x 832.960 = 4.185 m3

3.14 x 0.05 x 0.080 / 4 x 160.800 = 0.505 m3

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

CABLES 3S12.7 18 x 1 x 2 = 36 set

A1-A2 No.

Item	Formula	Quantity
1. Joint		
	EACH LENGTH L = 10.750	
	EACH = 4 × 2 = 8	
	TOTAL LENGTH	
	L = 10.750 × 8 =	86.000 m
3. Bearing pad	ELASTOMERIC 600x300x57	
	EACH for One SPAN	
	EACH = 10	
	TOTAL EACH	
	EACH = 10 × 2 =	EACH 20
	ELASTOMERIC 500x250x50	
	EACH for One SPAN	
	EACH = 10	
	TOTAL EACH	
	EACH = 10 × 4 =	EACH 40
4. Anchor bar		
	EACH for One SPAN	
	EACH = 48 =	EACH 48.000
	TOTAL EACH (FIX)	
	EACH = 8 × 4 = 32	
	TOTAL EACH (MOVE)	
	EACH = 8 × 2 = 16	
5.Pavament		
	a . WATER PROOFING 5MM 10.75 X 93.5 X 2 = 2010 m2	2010 m2
	b . ALPHALT CONCRETE 70MM 10.75 X 93.5 X 2 = 2010 m2	2010 m2

No.

1) A1-P1

For ONE GIRDER

SCHEDULE OF REINFORCEMENT (OF GIRDER)													
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	14	190	1757	117	1757	190			4011	1.208	138	668.9	
G2	14	190	1757	342	1757	190			4236	1.208	56	286.7	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	313.2	
G6	14	200	42	759	42	200			1243	1.208	148	222.3	
G7	14	200	301	183	567	183	301	200	1935	1.208	86	201.1	
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	
G11	14	8695	10450	8695					27840	1.208	20	672.8	
G12	14	8700	10450	8700					27850	1.208	10	336.5	
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	50	126.3	Interior
G16	16	1100							1100	1.578	50	86.8	Exterior
G17	10	570							570	0.617	12	4.2	
G18	10	150							150	0.617	40	3.7	
G19	14	364	567	364	361	361			2017	1.208	138	336.4	
Total	Span	Interior grider										3883.1	
		Exterior girder										3843.7	

3) Total Weight

Span	Int/Ext	Nos.	Weight/G	Total	Remark
A1-A2	Interior Beam	6	3883.11	23298.66	
	Exterior Beam	4	3843.65	15374.60	
Total				38673.26	

No.

2) P1-P2

For ONE GIRDER

SCHEDULE OF REINFORCEMENT (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	980.8	
G2	14	190	1957	342	1957	190			4636	1.208	74	414.6	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	414.7	
G6	14	200	42	759	42	200			1243	1.208	196	294.4	
G7	14	200	301	183	567	183	301	200	1935	1.208	122	285.3	
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	
G11	14	6945	7450	7950	7450	6945			36740	1.208	22	976.7	
G12	14	6950	7450	7950	7450	6950			36750	1.208	12	532.9	
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	74	186.9	Interior
G16	16	1100							1100	1.578	74	128.5	Exterior
G17	10	570							570	0.617	24	8.4	
G18	10	150							150	0.617	104	9.6	
G19	14	364	567	364	361	361			2017	1.208	184	448.5	
Total	Span	Interior grider										5487.3	
		Exterior girder										5428.9	

3) Total Weight

Span	Mid/Side	Int/Ext	Nos.	Weight/G	Total	Remark
A1-A2	Side Span	Interior Beam	6	5487.31	32923.86	
		Exterior Beam	4	5428.91	21715.64	
Total					54639.50	

No.

3) P2-A2

For ONE GIRDER

SCHEDULE OF REINFORCEMENT (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	668.9	
G2	14	190	1757	342	1757	190			4236	1.208	56	286.7	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	313.2	
G6	14	200	42	759	42	200			1243	1.208	148	222.3	
G7	14	200	301	183	567	183	301	200	1935	1.208	86	201.1	
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	
G11	14	8695	10450	8695					27840	1.208	20	672.8	
G12	14	8700	10450	8700					27850	1.208	10	336.5	
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	50	126.3	Interior
G16	16	1100							1100	1.578	50	86.8	Exterior
G17	10	570							570	0.617	12	4.2	
G18	10	150							150	0.617	40	3.7	
G19	14	364	567	364	361	361			2017	1.208	138	336.4	
Total	Span	Interior grider										3883.1	
		Exterior girder										3843.7	

3) Total Weight

Span	Int/Ext	Nos.	Weight/G	Total	Remark
A1-A2	Interior Beam	6	3883.11	23298.66	
	Exterior Beam	4	3843.65	15374.60	
Total				38673.26	

No.

Par EACH

SCHEDULE OF REINFORCEMENT (OF DIAPHRAGM)													
(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	64	171.69	
G2	14	198	1759	410	1759	198			4324	1.208	28	146.25	
Sub-Total												317.94	
(2) INTERMEDIATE DIAPHRAGM													
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
(+) INTERMEDIATE DIAPHRAGM (OF GIRDER L=28M)													
H1	16	1700							1700	1.578	56	150.23	
H2	14	198	1509	110	1509	198			3524	1.208	28	119.20	
												269.43	
(+) INTERMEDIATE DIAPHRAGM (OF GIRDER L=37M)													
K1	16	1700							1700	1.578	64	171.69	
K2	14	198	1709	110	1709	198			3924	1.208	28	132.73	
												304.4	
Sub-Total												573.85	

3) Total Weight

SECTION		Nos.	Weight/EACH	Weight
END DIAPHRAGM		12	317.94	3815.3
(+) INTERMEDIATE DIAPHRAGM (OF GIRDER L=28M)		8	269.43	2155.4
(+) INTERMEDIATE DIAPHRAGM (OF GIRDER L=37M)		6	304.42	1826.5
Total				7797.2

No.

Par EACH

SCHEDULE OF REINFORCEMENT (OF DIAPHRAGM)													
(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	64	171.69	
G2	14	198	1759	410	1759	198			4324	1.208	28	146.25	
Sub-Total												317.94	
(2) INTERMEDIATE DIAPHRAGM													
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
(+) INTERMEDIATE DIAPHRAGM (OF GIRDER L=28M)													
H1	16	1700							1700	1.578	56	150.23	
H2	14	198	1509	110	1509	198			3524	1.208	28	119.20	
												269.43	
(+) INTERMEDIATE DIAPHRAGM (OF GIRDER L=37M)													
K1	16	1700							1700	1.578	64	171.69	
K2	14	198	1709	110	1709	198			3924	1.208	28	132.73	
												304.4	
Sub-Total												573.85	

3) Total Weight

SECTION		Nos.	Weight/EACH	Weight
END DIAPHRAGM		12	317.94	3815.3
(+) INTERMEDIATE DIAPHRAGM (OF GIRDER L=28M)		8	269.43	2155.4
(+) INTERMEDIATE DIAPHRAGM (OF GIRDER L=37M)		6	304.42	1826.5
Total				7797.2

No.

A1-P1,P2-A2

L=28.0m

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	234	6549.4	
S2	20	10850							10850	2.466	234	6260.9	
S3	14	133	623	207					963	1.208	374	435.1	
S4	14	28752							28752	1.208	400	13893.0	
S5	14	11350							11350	1.208	10	137.1	
S6	14	10850							10850	1.208	10	131.1	
S7	12	210	145	21					376	0.888	1092	364.6	
Total												27771.20	

P1-P2

L=37.0m

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	38178							38178	1.208	200	9223.8	
S5	14	11350							11350	1.208	15	205.7	
S6	14	10850							10850	1.208	15	196.6	
S7	12	210	145	21					376	0.888	1452	484.8	
Total												23386.50	

D20	25511.2
D14	24797.1
D12	849.4
Total	51157.7

No.

A1-P1,P2-A2

L=28.0m

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	234	6549.4	
S2	20	10850							10850	2.466	234	6260.9	
S3	14	133	623	207					963	1.208	374	435.1	
S4	14	28752							28752	1.208	400	13893.0	
S5	14	11350							11350	1.208	10	137.1	
S6	14	10850							10850	1.208	10	131.1	
S7	12	210	145	21					376	0.888	1092	364.6	
Total												27771.20	

P1-P2

L=37.0m

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	38178							38178	1.208	200	9223.8	
S5	14	11350							11350	1.208	15	205.7	
S6	14	10850							10850	1.208	15	196.6	
S7	12	210	145	21					376	0.888	1452	484.8	
Total												23386.50	

	per one side	per one side
D20	25511.2	51022.4
D14	24797.1	49594.2
D12	849.4	1698.8
Total	51157.7	102315.4

QUANTITY TABLE OF ABUTMENTS

ITEMS		UNIT	ABUTMENT A1	ABUTMENT A2	TOTAL
A- ABUTMENT					
PILE	NUMBER OF PILES	PILE	78	78	28
TOTAL LENGTH RC PILES□ 450MM		M	3120	3120	1834.0
CONCRETE	CLASS D	M3	634.37	634.37	3240.9
REINFORCEMENT	D32	KG	397.8	397.8	92086.4
	D28	KG	40341.6	40341.6	89966.8
	D25	KG	77563.2	77563.2	10098.2
	D22	KG	5187	5187	812.0
	D16	KG	14344.2	14344.2	29460.2
	.ϕ 6	KG	137833.8	137833.8	222423.6
	Total	KG	275667.6	275667.6	444847.2
ABUTMENT					
CONCRETE	CLASS E	M3	604.50	604.50	1209.0
REINFORCEMENT	D32	KG	9405.4	9405.4	18810.8
	D25	KG	5989.1	5989.1	11978.2
	D22	KG	1275.6	1275.6	2551.2
	D20	KG	9980.2	9980.2	19960.4
	D18	KG	594.1	594.1	1188.2
	D16	KG	5242.7	5242.7	10485.4
	D14	KG	1835.3	1835.3	3670.6
	D10	KG	165.9	165.9	331.8
	TOTAL	KG	34644.7	34644.7	69289.4
LEAN CONCRETE	CLASS G	M3	18.67	18.67	37.3
	FORM	M2	6.6	6.6	13.2
BLINDING STONE		M3	37.3	37.3	74.7
EXCAVATION FOR FOUNDATION		M3	1198.4	1251.3	2449.7
EXCESS SOIL		M3	620.2	640.4	1260.6
BACK FILL		M3	578.2	610.9	1189.1
FORM		M2	459.99	459.99	919.98
SCAFFOLDING WORK		M2	451.72	451.72	903.44
B- APPROACH SLAB					
CONCRETE CLASS E	CLASS E	M3	43.35	43.35	86.7
LEAN CONCRETE	CLASS G	M3	13.35	13.35	26.7
ASPHANTIC JOINT FILLER T=20MM		M3	0.60	0.60	1.2
FORM		M2	144.20	144.20	288.4
REINFORCEMENT	D20	KG	3421.6	3421.6	6843.2
	D16	KG	3402.3	3402.3	6804.6
	D10	KG	255.8	255.8	511.6
	TOTAL	KG	7079.7	7079.7	14159.4
C- SLOPE PROTECTION					
STONE MASONRY T=300MM		M3	613.86	621.88	1235.7
BLINDING AGGREGATE		M3	198.95	202.29	401.2
GEOTEXTILE		M2	594	597	1191.0
PVC PILE Φ50MM DIA., L=1000MM		M	66	66	132.0
WOODEN PILE L=3M		M	7900	7937	15837
EXCAVATION		M3	569	571	1140
FILLING		M3	395	397	792

Abutment A1 No.

Item	Formula	Quantity
1) Concrete		
	* BackWall	
	v1 = 24.10 x 2.04 x 0.40 =	19.62 m3
	* Frontwall	
	v2 = 24.10 x {(3.94 + 4.18) / 2	
	x 1.50 - 0.10 ^2 / 2 }=	146.67 m3
	* Corbel	
	v3 = 0.30 x(0.30 + 0.60) / 2	
	x 23.10 =	3.12 m3
	* Haunch	
	v4 = 5.98 x 0.50 x 0.50 / 2 x 2	
	=	1.49 m3
	*Wingwall	
	v5 ={ 3.50 x(5.98 + 5.97) / 2	
	+ 1.00 x(1.05 + 2.30) / 2 }	
	x 2 =	45.16 m3
	* Parapet	
	v7 =(0.50 x 0.30 + 0.20 ^2	
	- 0.15 ^2/ 2)x 4.90 x 2	
	=	1.75 m3
	*Footing	
	v6 = 24.10 x 7.50 x 2.00	
	- 10 x pi x 0.75 ^2 x 0.1	
	=	359.73 m3
	Total	577.5 m3
2) Form		
	* BackWall	
	a1 = 2.00 x 2.04 x 24.10 -	
	- 2.04 x (0.50 + 0.50) x 2	
	=	94.02 m2
	* Frontwall	
	a2 = 24.1 x(3.94 + 4.181)	
	- (0.5 + 0.5) x 4.181 x 2	
	+ 4.06 x 1.5 x 2 =	199.54 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 5.975 x 2 =	8.45 m2
	*Wingwall	
	a5 = 2 x{ 3.5 x(5.975 + 5.97)x1/2	
	+ 1 x(1.05 + 2.30)x1/2	
	+ 0.5 x(1.05 + 1.60 + 3.68)	
	- 0.5 x 5.98 } =	45.51 m2
	* Parapet	
	a5 = { 4.9 x(0.5 + 0.3 + 0.05	
	+ 1.4142 x 0.15 + 0.05)	
	+ 2 x 0.17875 } x 2	
	=	11.61 m2
	*Footing	
	a 6 = 2 x(24.100 + 7.500) x 2.00	
	=	126.40 m2
	Total	502.3 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) + (4.50+1.5+2) + (0.5+2) + (4.50+1.1)	
	+(24.1-2 x 1.5) + (4.50-1+1) + (0.5+2) + (4.50+1.5+2)} x (2.04+4.94)	461.3 m2
4) Support	V = (8.48 - 1.55 + 5.68) x 1.00 /2	
	x 0.50 x 2 =	6.3 m3

Abutment A1 No.

Item	Formula	Quantity
5) Lean Concrete	* Concrete class G	
	V = 0.1 x { (24.10 + 0.2) x (7.50 + 0.2) - 10 x 1/4 x pi x 1.50 ^2)	
	=	16.9 m3
	* Form	
	A = 0.1 x { (24.10 + 0.2) } x 2 + (7.50	
	=	6.40 m2
6) Blinding Stone		
	v = 0.2 x { (24.10 + 0.2) x (7.50 + 0.2) - 10 x 1/4 x pi x 1.50 ^2)	
	=	33.9 m3
7) Rc Pile	* Concrete D	
	N = 78 =	78 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 78 =	634.374 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 (per one)
8)Earthworks	* Excavation for foundation	
	= 3.22 / 6 x { (9.50 x 26.10) + (15.94 x 32.54) + (9.50 + 15.94) x (26.10 + 32.54) =	1212.0 m3
	* Excess Soil = Lean Concrete + Blinding Stone + Footing Volume	
	Excess Soil =	628.37 m3
	* Back Fill =	583.7 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

Abutment A2 No.

Item	Formula	Quantity
1) Concrete		
	* BackWall	
	v1 = 24.10 x 2.04 x 0.40 =	19.62 m3
	* Frontwall	
	v2 = 24.10 x {(3.94 + 4.18) / 2	
	x 1.50 - 0.10 ^2 / 2 }=	146.67 m3
	* Corbel	
	v3 = 0.30 x(0.30 + 0.60) / 2	
	x 23.10 =	3.12 m3
	* Haunch	
	v4 = 5.98 x 0.50 x 0.50 / 2 x 2	
	=	1.49 m3
	*Wingwall	
	v5 ={ 3.50 x(5.98 + 5.97) / 2	
	+ 1.00 x(1.05 + 2.30) / 2 }	
	x 2 =	45.16 m3
	* Parapet	
	v7 =(0.50 x 0.30 + 0.20 ^2	
	- 0.15 ^2/ 2)x 4.90 x 2	
	=	1.75 m3
	*Footing	
	v6 = 24.10 x 7.50 x 2.00	
	- 10 x pi x 0.75 ^2 x 0.1	
	=	359.73 m3
	Total	577.5 m3
2) Form		
	* BackWall	
	a1 = 2.00 x 2.04 x 24.10 -	
	- 2.04 x (0.50 + 0.50) x 2	
	=	94.02 m2
	* Frontwall	
	a2 = 24.1 x(3.94 + 4.181)	
	- (0.5 + 0.5) x 4.181 x 2	
	+ 4.06 x 1.5 x 2 =	199.54 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 5.975 x 2 =	8.45 m2
	*Wingwall	
	a5 = 2 x { 3.5 x (5.975 + 5.97)x1/2	
	+ 1 x (1.05 + 2.30)x1/2	
	+ 0.5 x (1.05 + 1.60 + 3.68)	
	- 0.5 x 5.98 } =	45.51 m2
	* Parapet	
	a5 = { 4.9 x(0.5 + 0.3 + 0.05	
	+ 1.4142 x 0.15 + 0.05)	
	+ 2 x 0.17875 } x 2	
	=	11.61 m2
	*Footing	
	a 6 = 2 x(24.100 + 7.500) x 2.00	
	=	126.40 m2
	Total	502.3 m2

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) + (4.50+1.5+2) + (0.5+2) + (4.50+1+1)	
	+ (24.1-2 x 1.5) + (4.50-1+1) + (0.5+2) + (4.50+1.5+2)} x (2.04+4.94)	461.3 m2
4) Support	V = (8.48 - 1.55 + 5.68) x 1.00 /2	
	x 0.50 x 2 =	6.3 m3
5) Lean Concrete	* Concrete class G	
	V = 0.1 x { (24.10 + 0.2) x (7.50 +	
	+ 0.2) - 10 x 1/4 x pi x 1.50 ^2}	
	=	16.9 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)- 10 x 1/4 x pi x 1.50 ^2}	
	=	33.9 m3
7) Bored Pile	* Concrete D	
	N = 78 =	78 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 78 =	634.374 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
		(per one)
8)Earthworks	* Excavation for foundation	
	= 3.13 / 6 x{ (9.50 x 26.10)	
	+ (15.76 x 32.36) + (9.50 + 15.76)	
	x (26.10 + 32.36) =	1165.7 m3
	* Excess Soil = Lean Concrete + Blinding Stone + Footing Volume	
	Excess Soil =	628.37 m3
	* Back Fill =	537.4 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

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

CAI NAI 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	6.57	25	164.35	0.30	49.31	16.44	
11	10.01	25	250.31	0.30	75.09	25.03	
12	4.20	25	105.10	0.30	31.53	10.51	**Geotextile (m2)**
15	6.57	25	164.35	0.30	49.31	16.44	= 2 x (L + S12) = 260
16	10.01	25	250.31	0.30	75.09	25.03	**PVC pipe (m)**
17	4.20	25	105.10	0.30	31.53	10.51	= 2 x L/2 x 1m = 25

FOOTING	Wood pile	(m)		3000	
	Blinding	(m3)		4	
	Stone masonry	(m3)		18.00	LENGTH OF FOOTING L = 50 (m)
	Excavation	(m3)		216.00	
	Back fill	(m3)		150.00	
SIDE SLOPE	Stone masonry	(m3)		311.86	
	Blinding	(m3)		103.95	
	Geotextle	(m2)		260	
	PVC pile	(m)		25	

No	h	Dh	S	L	Total (m3)		
	m	m	m2	m	Excavation	Filling	
5	1.62						Excavation = 2 x S x L
6	0.42	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	6.84	25	171.06	0.30	51.32	17.11	
11	10.01	25	250.31	0.30	75.09	25.03	
12	4.20	25	105.10	0.30	31.53	10.51	**Geotextile (m2)**
15	6.84	25	171.06	0.30	51.32	17.11	= 2 x (L + S12) = 260
16	10.01	25	250.31	0.30	75.09	25.03	**PVC pipe (m)**
17	4.20	25	105.10	0.30	31.53	10.51	= 2 x L/2 x 1m = 25

FOOTING	Wood pile	(m)		3000	
	Blinding	(m3)		4	
	Stone masonry	(m3)		18.00	LENGTH OF FOOTING L = 50 (m)
	Excavation	(m3)		216.00	
	Back fill	(m3)		150.00	
SIDE SLOPE	Stone masonry	(m3)		315.88	
	Blinding	(m3)		105.29	
	Geotextle	(m2)		260	
	PVC pile	(m)		25	

No	h	Dh	S	L	Total (m3)		
	m	m	m2	m	Excavation	Filling	
5	1.62						Excavation = 2 x S x L
6	0.42	1.2	4.32	25	216	150	Filling = Excavation - 2 x 25 x Dh x 1.1

Bridge CAI NAI
Abutment A1

h1	h2	h3	h4	h5	h6	d1	d2
6.44	3.5	3	1.12	1.62	0.42	24.1	8.875

Block	a	b	Dh	R	r	L	Sxq	W	Masonry	Blinding
	(m)	(m)	(m)	(m)	(m)	(m)	(m2)	(m)	(m3)	(m3)
1	6.380	4.175	2.940	5.278	0.000	6.041	25.028		7.51	2.50
2	10.000	10.000	0.500	15.278	5.278	10.012	161.558		48.47	16.16
3	3.760	2.350	1.880	18.333	15.278	3.587	94.642		28.39	9.46
4	24.100	8.875	0.500				214.227		64.27	21.42
5	24.100	2.350	1.880				72.528		21.76	7.25
6	6.380	4.175	2.940	5.278	0.000	6.041	25.028		7.51	2.50
7	10.000	10.000	0.500	15.278	5.278	10.012	161.558		48.47	16.16
8	3.760	2.350	1.880	18.333	15.278	3.587	94.642		28.39	9.46
9			1.200				4.320	81.664		
Extra								72.071	255	85

FOOTING	Wood pile	(m)	4900	LENGTH OF FOOTING : L = 81.66 (m)
	Binding	(m3)	6.5	
	Stone masonry	(m3)	29.4	
	Excavation	(m3)	352.8	
	Back fill	(m3)	245	
SIDE SLOPE	Masonry	(m3)	255	
	Blinding	(m3)	85	
	Geotextile	(m2)	334	
	PVC Pipe	(m)	41	

Abutment A2

h1	h2	h3	h4	h5	h6	d1	d2
6.56	3.5	3	1.12	1.62	0.42	24.1	8.875

Block	a	b	Dh	R	r	L	Sxq	W	Masonry	Blinding
	(m)	(m)	(m)	(m)	(m)	(m)	(m2)	(m)	(m3)	(m3)
1	6.620	4.325	3.060	5.473	0.000	6.270	26.935		8.08	2.69
2	10.000	10.000	0.500	15.473	5.473	10.012	164.624		49.39	16.46
3	3.760	2.350	1.880	18.528	15.473	3.587	95.740		28.72	9.57
4	24.100	8.875	0.500				214.227		64.27	21.42
5	24.100	2.350	1.880				72.528		21.76	7.25
6	6.620	4.325	3.060	5.473	0.000	6.270	26.935		8.08	2.69
7	10.000	10.000	0.500	15.473	5.473	10.012	164.624		49.39	16.46
8	3.760	2.350	1.880	18.528	15.473	3.587	95.740		28.72	9.57
9			1.200				4.320	82.276		
Extra								72.684	258	86

FOOTING	Wood pile	(m)	4937	LENGTH OF FOOTING : L = 82.28 (m)
	Binding	(m3)	6.6	
	Stone masonry	(m3)	29.6	
	Excavation	(m3)	355	
	Back fill	(m3)	247	
SIDE SLOPE	Masonry	(m3)	258	
	Blinding	(m3)	86	
	Geotextile	(m2)	337	
	PVC Pipe	(m)	41	

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_g
$W_g = 2 * 3.14 * R_9/4 + a_9 + 2 * 3.14 * R_9/4$, and
$W_{gx} = 2 * 3.14 * R_9/4 + a_9 + 2 * 3.14 * R_7/4$

$Masonry_i$ = $0.3 * Sxq_i$
$Blinding_i$ = $0.1 * Sxq_i$
Geotextile = $Sxq_3 + Sxq_9 + Sxq_8 + W_{gx} * 1$
PVC Pipe = $W_g/2$
Wood Pile = $W_g * 0.8 * 25 * 3$
Excavation = $W_g * Sxq_8$
Filling = Excavation - $W_g * Dh_9 * 1.1$

Quantity table of pier

Items			Unit	Pier 1	Pier 2	Total (1dir)	Total (2dir)
Pile	Number of piles		Pile	24	24	48	96
	Total length Rc piles [] 450mm		m	960.0	960.0	1920	3840
	Concrete piles class D		m^3	195.2	195.2	390	780.768
	Renforcement	Φ 6	kg	4413.6	4413.6	8827	17654.4
		D16	kg	1596.0	1596.0	3192	6384
		D22	kg	26697.6	26697.6	53395	106790.4
		D25	kg	1411.2	1411.2	2822	5644.8
		D32	kg	122.4	122.4	245	489.6
		Total	kg	29827.2	29827.2	59654	119308.8
Pier	Concrete class E		m^3	473.7	473.7	947	1894.93471
	Reinforcement	D10	kg	69.2	69.2	138	276.8
		D14	kg	6082.2	6082.2	12164	24328.8
		D16	kg	1841.6	1841.6	3683	7366.4
		D20	kg	1404.6	1404.6	2809	5618.4
		D22	kg	7414.8	7414.8	14830	29659.2
		D28	kg	3645.0	3645.0	7290	14580
		D32	kg	18218.8	18218.8	36438	72875.2
		Total	kg	38676.2	38676.2	77352	154704.8
	Form	Curve	m^2	144.6	144.6	289	578.4551721
		Flat	m^2	347.0	347.0	694	1388.111337
	Scaffolding work	H < 4m	m^2	254.4	254.4	509	1017.6
		4m ≤ H < 30m	m^2	426.0	426.0	852	1704.08
	Support		m^3	215.4	215.4	431	861.696
	Earth work	Excavation for foundation	m^3	1973.1	1720.1	3693	7386.416378
		Blinding Concrete class G	m^3	55.8	55.8	112	223.3369984
		Rip rap	m^3	1523.0	1287.9	2811	5621.862568
	Cofferdams	Sheet pile Larsen IV	m	13290.8	13290.8	26582	53163
		Steel pile I 400	m	720.0	720.0	1440	2880
		Brace C 300	m	543.0	543.0	1086	2172

Item	Formula	Quantity
3.2.31) Concrete		
	3.2.31.1 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
	3.2.31.2 Column	
	v2 = 2 x 1/4 x pi x 1.40 ^2 x	
	x (4.40 + 4.48 + 4.56) =	41.38 m3
	* Wall	
	v3 = 2 x 3.00 x (1/4 x pi x 1.40 ^2	
	+ 8.00 x 1.40) = 76.44 m3	
	3.2.31.3 Footing	
	v3 = 2 x 10.50 x 7.00 x 2.00	
	- 24 x pi x 0.75 ^2 x 0.1 =	289.76 m3
	Total	473.73 m3
3.2.32) Form		
	3.2.32.1 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
	3.2.32.2 Column (Curve form)	
	a2 = 2 x pi x 1.40	
	x (4.40 + 4.48 + 4.56) =	118.22 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	
	3.2.32.3 Footing	
	a3 = 2 x(10.500 + 7.000)x 2.00	
	x 2 =	140.00 m2
	Total Curve =	144.61 m2
	Flat =	347.03 m2
3.2.33) Scaffolding:	3.2.33.1 (H<=4m)	
	A1 = 2 x(24.85 + 9.00) x 2.00	
	+(2 x(4.00 + 25.75) x 2.00 =	254.40 m2
	3.2.33.2 (4m< H<=30m)	
	A2 = 2 x(4.00 + 25.75) x 7.16	
	=	426.02 m2
3.2.34) Support	=(11.40 - 3 x 1.40) x 2.00	
	x 7.48 x 2 =	215.42 m3
3.2.35) Blinding Concrete	3.2.35.1 Concrete class G	
	v = 0.50 x { (10.50 + 0.2) x (7.00 +	
	+ 0.2) - 12 x 1/4 x pi x 1.50 ^2}	
	x 2 =	55.83 m3
	3.2.35.2 Form	
	A = 0.10 x { (10.50 + 0.2) + (7.00	
	+ 0.20)}x 2 x 2 =	55.83 m2

Item	Formula	Quantity
3.2.37) RC Pile [] 450		
	3.2.37.1 Concrete	
	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
	Total	8.133 m3
	3.2.37.2 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
3.2.38) Earthwork	3.2.38.1 Excavation for footing (inside cofferdam)	
	= 7.70 x (26.85 x 11.00)	
	- 24 x pi /4 x 1.50 ^2 x 7.10 =	1973.07 m3
	3.2.38.2 Excess Soil	
	v1 = Blinding Concrete =	55.83 m3
	v2 = Footing Volume =	289.76 m3
	v3 = Occupied volume of wall	
	= (pi/4 x 1.400 ^2 + 1.40 x 8.00)	
	x 4.100 x 2 =	104.46 m3
	Total =	450.06 m3
	3.2.14.3 Riprap = Excavation for footing - Excess Soil	
	= 1973.07 - 450.06 =	1523 m3
	3.2.15.1 Larsen IV = 738 nos L= 18 m =	13290.75 m
	3.2.15.2 I 400 = 40.00 nos L= 18 m =	720.00 m
	3.2.15.3 C 300 = =	543.00 m

Item	Formula	Quantity
3.2.31) Concrete		
	3.2.31.1 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
	3.2.31.2 Column	
	v2 = 2 x 1/4 x pi x 1.40 ^2 x	
	x (4.40 + 4.48 + 4.56) =	41.38 m3
	* Wall	
	v3 = 2 x 3.00 x (1/4 x pi x 1.40 ^2	
	+ 8.00 x 1.40) = 76.44 m3	
	3.2.31.3 Footing	
	v3 = 2 x 10.50 x 7.00 x 2.00	
	- 24 x pi x 0.75 ^2 x 0.1	
	=	289.76 m3
	Total	473.73 m3
3.2.32) Form		
	3.2.32.1 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
	3.2.32.2 Column (Curve form)	
	a2 = 2 x pi x 1.40	
	x (4.40 + 4.48 + 4.56) =	118.22 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	
	3.2.32.3 Footing	
	a3 = 2 x(10.500 + 7.000)x 2.00	
	x 2 =	140.00 m2
	Total Curve =	144.61 m2
	Flat =	347.03 m2
3.2.33) Scaffolding:	3.2.33.1 (H<=4m)	
	A1 = 2 x(24.85 + 9.00) x 2.00	
	+(2 x(4.00 + 25.75) x 2.00 =	254.40 m2
	3.2.33.2 (4m< H<=30m)	
	A2 = 2 x(4.00 + 25.75) x 7.16	
	=	426.02 m2
3.2.34) Support	=(11.40 - 3 x 1.40) x 2.00	
	x 7.48 x 2 =	215.42 m3
3.2.35) Blinding Concrete	3.2.35.1 Concrete class G	
	v = 0.50 x { (10.50 + 0.2) x (7.00 +	
	+ 0.2) - 12 x 1/4 x pi x 1.50 ^2}	
	x 2 =	55.83 m3
	3.2.35.2 Form	
	A = 0.10 x { (10.50 + 0.2) + (7.00	
	+ 0.20)}x 2 x 2 =	55.83 m2

Item	Formula	Quantity
3.2.37) RC Pile [] 450		
	3.2.37.1 Concrete	
	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
	Total	8.133 m3
	3.2.37.2 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
3.2.38) Earthwork	3.2.38.1 Excavation for footing (inside cofferdam)	
	= 6.70 x (26.85 x 11.00)	
	- 24 x pi /4 x 1.50 ^2 x 6.10 =	1720.13 m3
	3.2.38.2 Excess Soil	
	v1 = Lean Concrete =	55.83 m3
	v2 = Footing Volume =	289.76 m3
	v3 = Occupied volume of wall	
	= (pi/4 x 1.400 ^2 + 1.40 x 8.00)	
	x 3.400 x 2 =	86.63 m3
	Total =	432.22 m3
	3.2.14.3 Riprap = Excavation for footing - Excess Soil	
	= 1720.13 - 432.22 =	1288 m3
	3.2.15.1 Larsen IV = 738 nos L= 18 m =	13290.75 m
	3.2.15.2 I 400 = 40.00 nos L= 18 m =	720.00 m
	3.2.15.3 C 300 = =	543.00 m

STEEL OF PIER 1&2 (for one direction)

DETAIL	No	D (mm)	LENGTH (m)	QUANTITY (nos.)	UNIT WEIGH (kg/m)	TOTAL STEEL (kg)
PIER CAP	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	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	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	7	4.834	127.8
COLUMN	C1	32	10434	84	6.313	5533.1
	C2	14	4498	147	1.208	798.7
	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	55	6.313	3576.3
	F4	22	7570	37	2.984	835.8
	F5	20	7500	16	2.466	295.9
	F6	20	10300	16	2.466	406.4
	F7	16	4689	94	1.578	695.5
TOTAL	D = 10		34.6	(kg)		
	D = 14		3041.1	(kg)		
	D = 16		920.8	(kg)		
	D = 20		702.3	(kg)		
	D = 22		3707.4	(kg)		
	D = 28		1822.5	(kg)		
	D = 32		9109.4	(kg)		
	TOTAL		19338.1	(kg)		

LIST OF REINFORCEMENT RC-PILE 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	0	3.854	0.000	0.0	
9	D16	1,508	8	1.579	2.380	19.0	
					TOTAL	443.1	
					D25	14.7	
					D22	362.3	
					D16	19.0	
					ϕ6	47.1	
						443.1	

LIST OF REINFORCEMENT RC-PILE 2

SIGN	DIACETER	LENGTH	NOS.	UNIT WEIGHT	PIECE WEIGHT	TOTAL WEIGHT	NOTE
1	D22	9,900	8	2.984	29.500	236.0	
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	325.1	
					nos		
			D25	14.7	2	29.4	
			D22	244.3	2	488.6	
			D16	19.0	2	38.0	
			ϕ6	47.1	2	94.2	
						650.2	

LIST OF REINFORCEMENT RC-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	

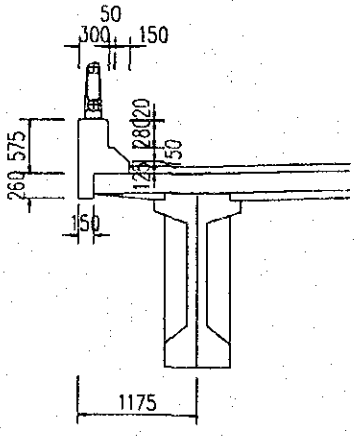
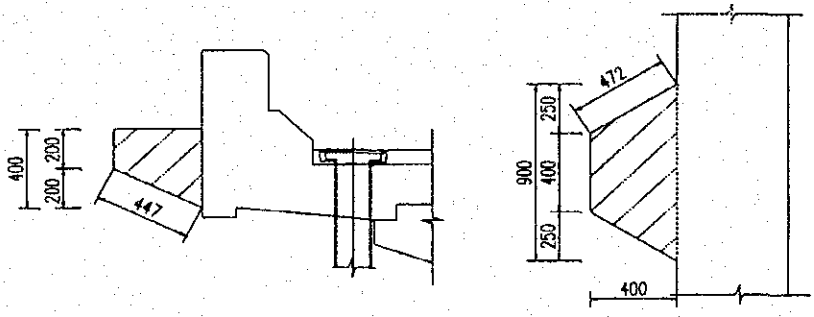
D32	5.1
D25	58.8
D22	1112.4
D16	66.5
ϕ6	183.9
Total	1426.7

No.

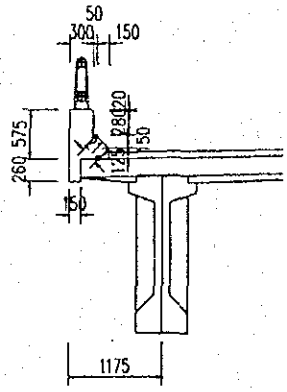
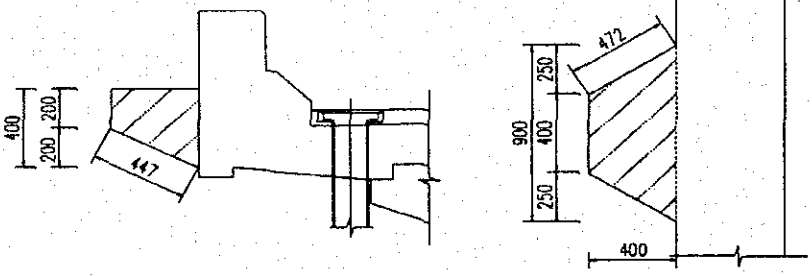
QUANTITY OF MISCELLANEOUS

Item		Work Item	Unit	Quantity	Remarks
Concrete	CLASS E	Parapet	m3	95.36	
		Lighting pole base	m3	0.18	
Form		Parapet	m2	598.51	
		Lighting pole base	m2	1.22	
		Total		599.73	
Re-bar		Parapet	ton	14.815	
		Lighting pole base	ton	0.063	
		Total	ton	14.88	
Steel Railing			m	394.00	
Lighting	Pole		set	2	
	Pipe Φ100		m	374.00	
Drainage	Pot		set	14	
	Pipe Φ180		m	24.36	

A1-A2 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 × (28.100 + 37.200 + 28.100) = 95.36 m3	95.36 m3
2.Lighting Class "E"		
	V = (0.200 x 0.400 + 0.400 × 0.900) × 1/2 x 0.4 x 2 = 0.176 m3	0.176 m3

A1-A2

Item	Formula	Quantity
1.Parapet		
	A = (0.575 + 0.260 + 0.15 + 0.125 + 0.212 + 0.280) × 2 × 2 × (28.100 + 37.200 + 28.100)	
	= 598.51 m2	598.51 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] × 2	
	= 1.221 m2	1.221 m2

A1-A2 No.

Item	Formula		Quantity
1.Drainage			
	TOTAL EACH		
	EACH = 7 × 2	=	14 EACH
	PIPE = 1.74 × 14	=	24 m
2. Steel railing			
	EACH LENGTH for SPAN		
	L = 28.150 + 37.200 + 28.150		
	EACH = 3 SPAN		
	Length for abutment		
	L = 5.0 × 4 = 20.00 m		
	TOTAL LENGTH		
	L = 93.500 × 2 × 2 + 20.00	=	394.000 m
3.Lighting			
	EACH for One SPAN		
	EACH = 2	=	2.000 pole
	PVC Φ 100 MM	=	374.000 m

No.

Re-Bar Parapet

Par BRIDGE

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	162.7	
P2	14	230	297	176	275	245			1223	1.208	68	100.5	
P3	14	10000							10000	1.208	11	132.9	
Total												396.1	

Total Weight

Total = 396.1 / 10 × 93.5 × 4 = 14,815.26 (kg)

No.

Re-Bar Lighting

Par 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												31.52	

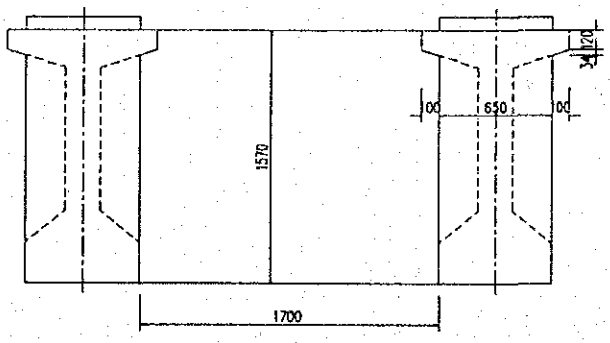
Total Weight

Total = 31.52 × 2 = 63.04 (kg)

A1-P1 No.

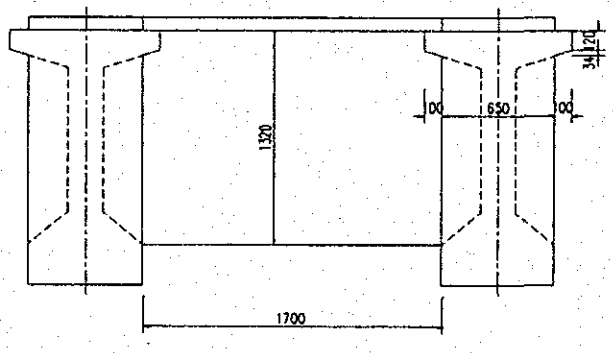
Item	Formula	Quantity
2. Diaphragm CLASS "C"		

(1) End Cross Beam



A1= [{ 1.570 × 1.700 - (0.120 + 0.154) × 2/2 × 0.100 }
× 2 + 0.500 × 1.700] × 8 × 2 = 98.131 m2

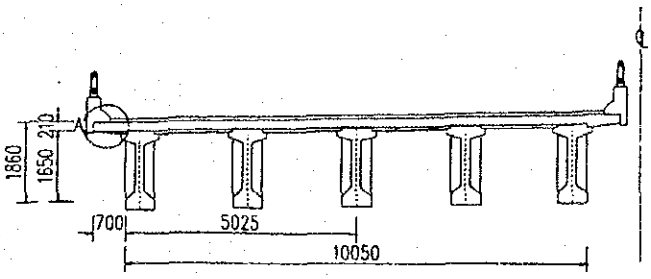
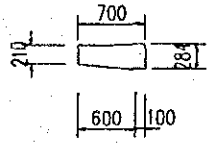
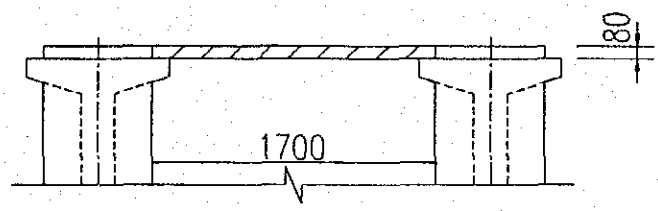
(2) Intermediate Cross Beam



A2= [{ 1.700 × 1.320 - (0.120 + 0.154) × 2/2 × 0.100 }
× 2 + 0.200 × 1.700] × 8 × 2 × 1
× = 76.371 m2

Sub-total A = 98.131 + 76.371 = 174.502 m2 | 174.502 m2

A1-P1

Item	Formula									Quantity
3. Deck Slab CLASS " "										
										
	DETAIL "A"									
	A-1 =	(0.210 +	0.600) ×	2	×	2		=	3.240 m	
	A =	3.240 ×	28.000					=	90.72 m2	90.72 m2
5. Platform for construction										
	A =	26.350 ×	26.350					=	694.323 m2	694.323 m2
6.Panel concrete Class "D"	A =	(1.700 +	1.000) ×	0.080	×	2	+ 1.700) ×		8	
	×	28 ×	1					=	477.568 m2	
										

3.6. Ap My bridge

No.

QUANTITY OF SUPERSTRUCTURE

Item		Work Item	Unit	Quantity	Remarks
Concrete	CLASS B	Girder	m3	987.07	σ ck=400kgf/cm2
	CLASS D	Panel	m3	154.72	
		Deck Slab	m3	690.46	
		Cross beam	m3	117.56	
		Total	m3	962.73	
	Total		m3	1,949.80	
Formworks		Girder	m2	6,667.59	
		Cross beam	m2	7,227.80	
		Deck Slab	m2	121,181.40	
		Panel	m2	2,113.20	
		Total	m2	137,189.99	
Scaffolding		Platform of construction	m2	3,479.13	
Reinforcement		Girder	ton	216.65	
		Cross beam	ton	7.23	
		Deck Slab	ton	18.19	
		Panel	ton	18.57	
		Total	ton	260.64	
PC Cable	12S12.7(B)	Longitudinal Tendons	ton	52.41	SWPR7B
	3S12.7	Transverse Tendons	ton	1.59	
Anchor	12S12.7(B)		set	400	
	3S12.7		set	100	
Steel shear key			set	420	
Sheathing	Φ80/85		m	5,641.04	
	Φ50/55		m	663.30	
Cement grout in sheathing		Φ80/85	m3	28.34	
		Φ50/55	m3	1.30	
		Total	m3	29.64	
Expansion Joint	50mm		m	43	
Bearing	600x300x57		set	20	
	500x250x50		set	80	
Anchorage Bar			set	80	
Pavement	Water Proofing t = 5mm		m2	3,029.35	
	Asphalt Concrete t = 70mm		m2	3,029.35	

Concrete A1-P1 No.

Item	Formula	Quantity
1. Girder CLASS "B"		

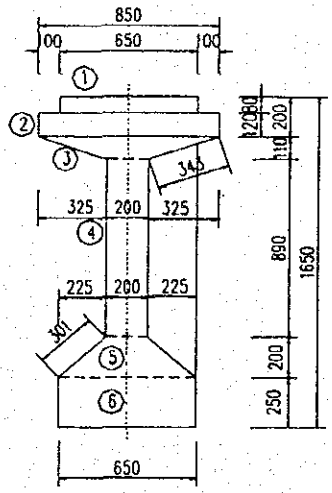
(1) Calculation of Sectional Area

[1] Middle Section

Summary of Sectional Area For ONE GIRDER

No	Formula				(m2)
1	0.650 ×	0.080		=	0.052
2	0.850 ×	0.120		=	0.102
3	1/2 ×	1.050 ×	0.110	=	0.058
4	0.890 ×	0.200		=	0.178
5	1/2 ×	0.850 ×	0.200	=	0.085
6	0.250 ×	0.650		=	0.163

Total Area 0.638 m2

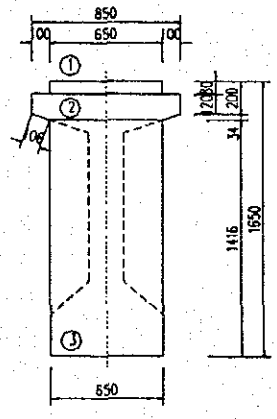


[2] End Section

Summary of Sectional Area For ONE GIRDER

No	Formula					(m2)
1	0.650 ×	0.080			=	0.052
2	0.850 ×	0.120 +	0.034/2 ×	1.500	=	0.128
3	0.650 ×	1.416			=	0.920

Total Area 1.100 m2



Item	Formula	Quantity

(2) Calculation of Concrete Volume

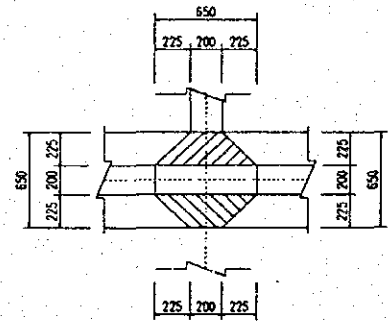
[1] A1-P1 Girder Length 28.000 m

Section No	Section Area	Average of Section Length	Length of Block	Concrete Volume	Remark
END	1.100	1.1	0.45	0.495	
MIDDLE	0.638	0.869	4.000	3.476	
MIDDLE	0.638	0.638	19.100	12.186	
END	1.100	0.869	4.000	3.476	
END	1.100	1.100	0.450	0.495	
Total			28.000	20.128	

No. of Girder 10 × 1 = 10

V1 = 20.128 × 10 = 201.280 m3

[2]. Diaphragm



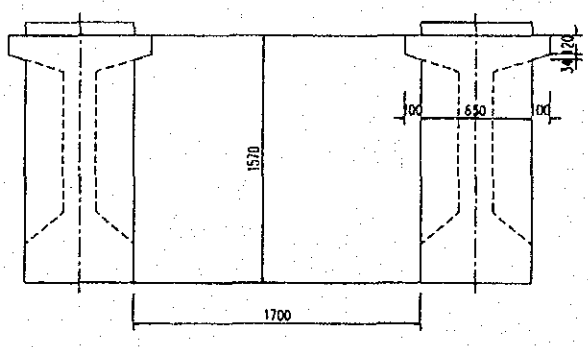
V2 = (0.200 × 1.166 + 0.65 × 0.890) × 1/2 × 0.225
× 2 × 2 × 10 × 1 = 3.653 m3

Total V = 201.280 + 3.653 = 204.933 m3 204.93 m3

Concrete A1-P1 No.

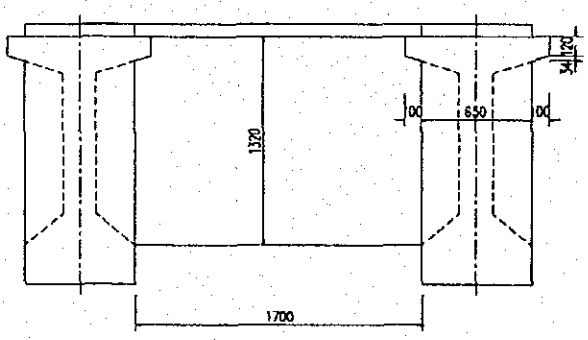
Item	Formula	Quantity
2. Cross beam CLASS "D"		

(1) End Cross Beam



V1 = { 1.570 × 1.700 - (0.120 + 0.154) × 2/2 × 0.100 }
× 0.500 × 4 × 4 = 21.133 m3

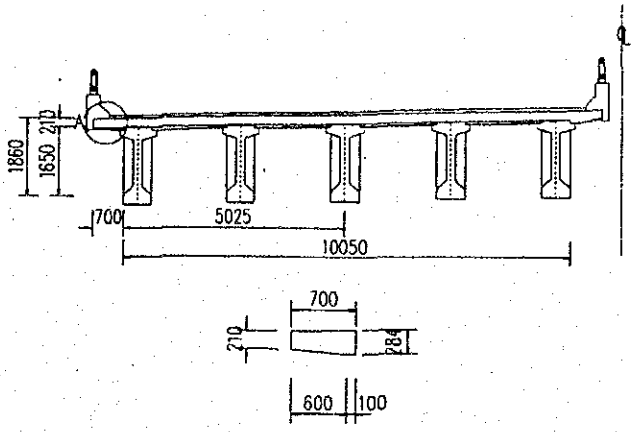
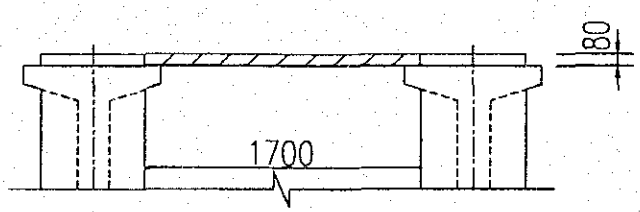
(2) Intermediate Cross Beam



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

Concrete A1-P1 No.

Item	Formula	Quantity
3. Deck Slab CLASS "D"	 DETAIL "A"	
	A = [((0.210 + 0.284) × 0.600 × 1/2 + 0.100 × 0.284)] × 2 + (5.025 × 0.210 × 2)] × 2 = 4.927 m2	
	V = 4.927 × 28.000 = 137.956 m3	137.96 m3
4.Panel concrete Class "D"		
	V = 1.700 × 0.08 × 28.000 × 8 =	30.46 m3

Item	Formula	Quantity
1. Girder CLASS "B"		

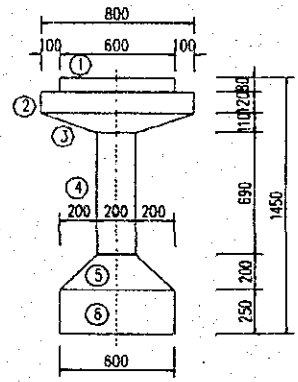
(1) Calculation of Sectional Area

[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	0.690 ×	0.200		=	0.138
5	1/2 ×	0.800 ×	0.200	=	0.080
6	0.250 ×	0.600		=	0.150

Total Area 0.567 m2

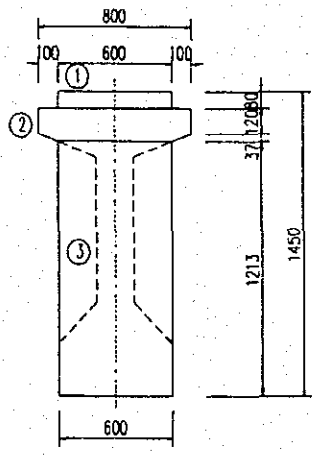


[2] End Section

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 ×	1.213			=	0.728

Total Area 0.898 m2



Item	Formula	Quantity

(2) Calculation of Concrete Volume

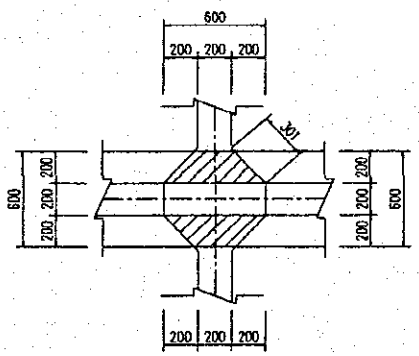
[1] P1-P2(P3-P4) Girder Length 25.000 m

Section No	Section Area	Average of Section Length	Length of Block	Concrete Volume	Remark
END	0.898	0.898	0.45	0.404	
MIDDLE	0.567	0.733	3.500	2.566	
MIDDLE	0.567	0.567	17.100	9.696	
END	0.898	0.733	3.500	2.566	
END	0.898	0.898	0.450	0.404	
Total			25.000	15.636	

No. of Girder 10 × 2 = 20

V1 = 15.636 × 20 = 312.720 m3

[2]. Diaphragm

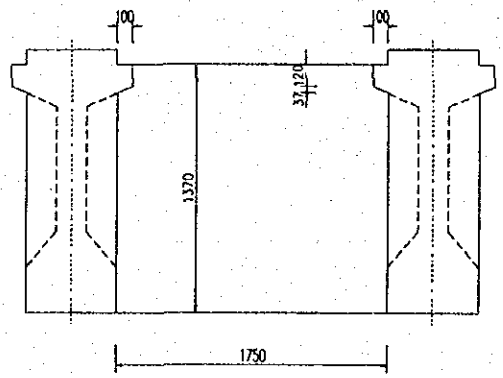


V2 = (0.200 x 0.963 + 0.6 × 0.690) × 1/2 × 0.2
× 2 × 2 × 10 × 2 = 4.853 m3

Total V = 312.720 + 4.853 = 317.573 m3 317.57 m3

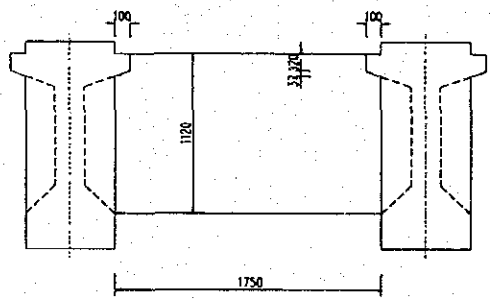
Item	Formula	Quantity
2. Cross beam CLASS "D"		

(1) End Cross Beam



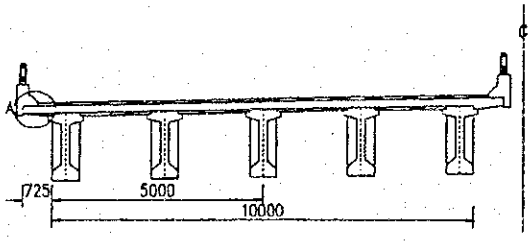
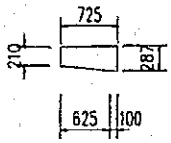
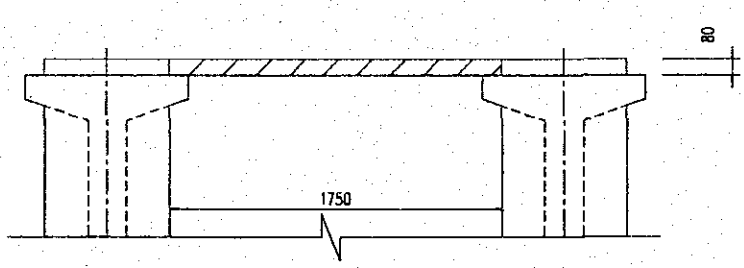
V1 = (1.370 × 1.700 - (0.120 + 0.154) × 2/2 × 0.100)
× 0.500 × 4 × 4 = 18.413 m3

(2) Intermediate Cross Beam



V2 = [(1.700 × 1.120 - (0.120 + 0.157) × 2/2 × 0.100)
× 0.200 × 4 × 2 × 2 × 2 = 12.008 m3

Sub-total V = 18.413 + 12.008 = 30.421 m3 30.42 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 × 2.000 = 246.800 m3	246.80 m3
4.Panel concrete Class "D"		
	V = 1.750 × 0.08 × 25.000 × 2 × 8 =	56.00 m3

Item	Formula	Quantity
1. Girder CLASS "B"		

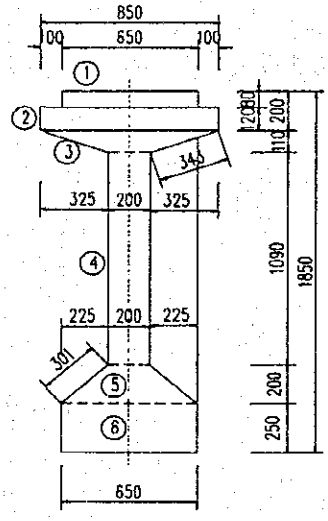
(1) Calculation of Sectional Area

[1] Middle Section

Summary of Sectional Area For ONE GIRDER

No	Formula				(m2)
1	0.650 ×	0.080		=	0.052
2	0.850 ×	0.120		=	0.102
3	1/2 ×	1.050 ×	0.110	=	0.058
4	1.090 ×	0.200		=	0.218
5	1/2 ×	0.850 ×	0.200	=	0.085
6	0.250 ×	0.650		=	0.163

Total Area 0.678 m2

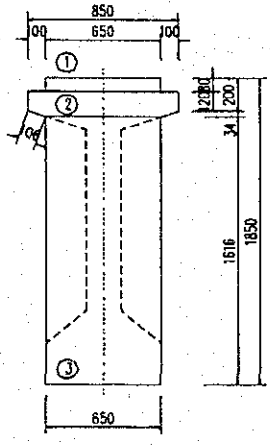


[2] End Section

Summary of Sectional Area For ONE GIRDER

No	Formula					(m2)
1	0.650 ×	0.080			=	0.052
2	0.850 ×	0.120 +	0.034/2 ×	1.500	=	0.128
3	0.650 ×	1.616			=	1.050

Total Area 1.230 m2



Item	Formula	Quantity

(2) Calculation of Concrete Volume

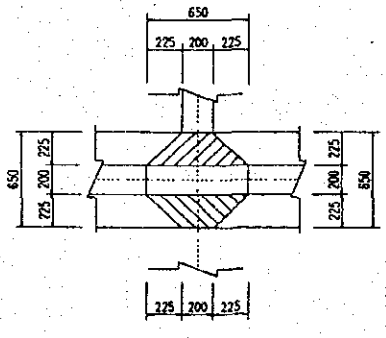
[1] P2-P3 Girder Length 37.000 m

Section No	Section Area	Average of Section Length	Length of Block	Concrete Volume	Remark
END	1.230	1.23	0.5	0.615	
MIDDLE	0.678	0.954	5.300	5.056	
MIDDLE	0.678	0.678	25.400	17.221	
END	1.230	0.954	5.300	5.056	
END	1.230	1.230	0.500	0.615	
Total			37.000	28.563	

No. of Girder 10 × 1 = 10

V1 = 28.563 × 10 = 285.630 m3

[2]. Diaphragm



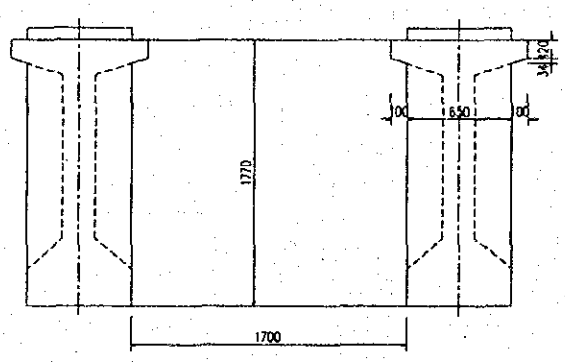
V2 = (0.200 × 1.366 + 0.65 × 1.090) × 1/2 × 0.225
× 2 × 3 × 10 × 1 = 6.626 m3

Total V = 285.630 + 6.626 = 292.256 m3 292.26 m3

Concrete P2-P3 No.

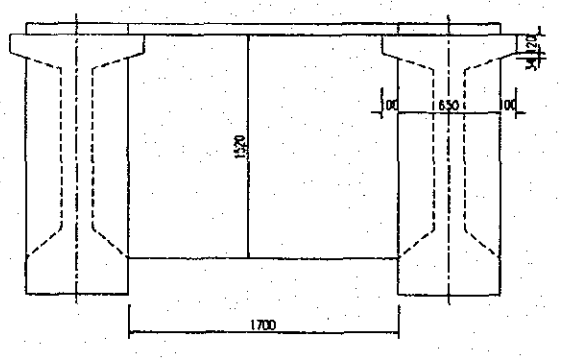
Item	Formula	Quantity
2. Cross beam CLASS "D"		

(1) End Cross Beam



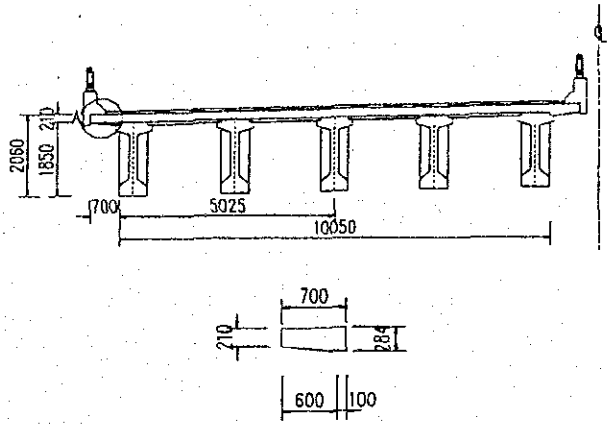
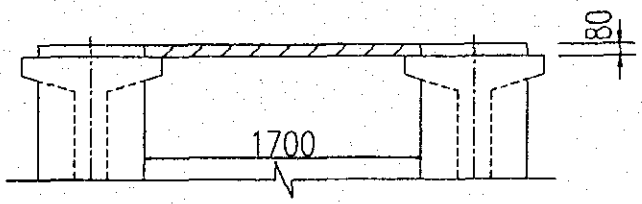
V1 = { 1.370 × 1.700 - (0.120 + 0.154) × 2/2 × 0.100 }
× 0.500 × 4 × 4 = 18.413 m3

(2) Intermediate Cross Beam



V2 = [{ 1.700 × 1.520 - (0.120 + 0.154) × 2/2 × 0.100 }
× 0.200 × 4 × 3 × 2 = 12.272 m3

Sub-total V = 18.413 + 12.272 = 30.685 m3 30.69 m3

Item	Formula	Quantity
3. Deck Slab CLASS "D"	 DETAIL "A"	
	A = [{(0.210 + 0.284) × 0.600 × 1/2 + 0.100 × 0.284)} × 2 + (5.025 × 0.210 × 2)] × 2 = 4.927 m2	
	V = 4.927 × 37 = 182.299 m3	182.30 m3
4.Panel concrete Class "D"		
	V = 1.700 × 0.08 × 37.000 × 1 × 8 =	40.26 m3