3.2. Cai Tac 2 bridge

No.

QUANTITY OF SUPERSTRUCTURE

Item		Work Item	Unit	Quantity	Remarks
Concrete	CLASS B	Girder	m3	379.93	σck=400kgf/cm2
	CLASS D	Panel	m3	55.35	
		Deck Slab	m3	237.10	
		Cross beam	m3	49.67	
		Total	m3	342.12	
	Total		m3	722.05	
Formworks		Girder	m2	2,562.87	
		Cross beam	m2	329.85	
		Deck Slab	m2	119.88	
		Panel	m2	867.72	
		Total	m2	3,880.32	
Platform of construction			m2	910.89	
Reinforcement		Gider	ton	71.38	
		Cross beam	ton	4.45	
		Deck Slab	ton	54.70	
		Panel	ton	6.64	
		Total	ton	137.18	
PC Cable	12S12.7(B)	Longitudinal Tendons	ton	22.19	SWPR7B
Anchor	12S12.7(B)		set	130	
Steel shear key			set	156	
Sheathing	Φ80/85		m	2,389.09	
Cement grout in sheathing		Φ80/85	m3	12.00	
Expansion Joint	50mm		m	57	
Bearing 600x300x57			set	26	
Anchorage Bar	Φ75, L=1500		set	22	
Pavement	Water Proofing t = 5mm		m2	1,031.70	
	Asphalt Concrete t = 70mm		m2	1,031.70	

Concrete A1-A2 No.

Item	Formula	Quantity
1. Girder CLASS "B"		

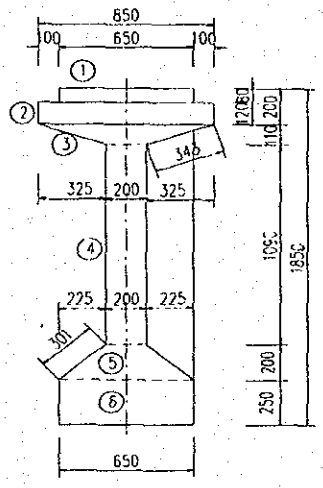
(1) Calculation of Sectional Area

[1] Middle Section

Summary of Sectional Length 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

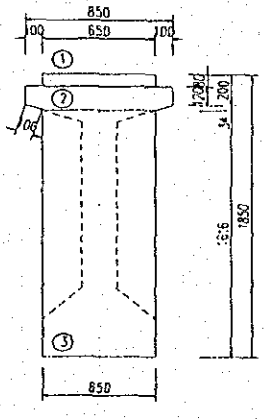


[2] End Section

Summary of Sectional Length 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



Concrete A1-A2 No.

Item	Formula	Quantity

(2) Calculation of Form Area

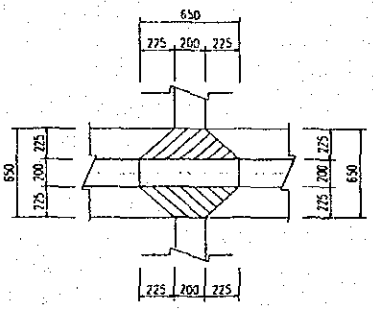
[1] A1-A2 Girder Length 37.000 m

Section №	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 13 × 1 = 13

V1 = 28.563 × 13 = 371.319 m3

[2]. Diaphragm

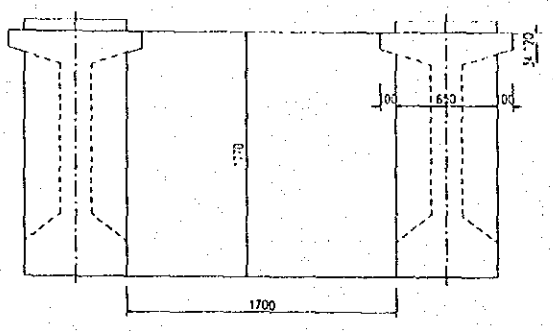


V2 = (0.200 x 1.366 + 0.65 × 1.090) × 1/2 × 0.225
× 2 × 3 × 13 × 1 = 8.614 m3

Total V = 371.319 + 8.614 = 379.933 379.933 m3

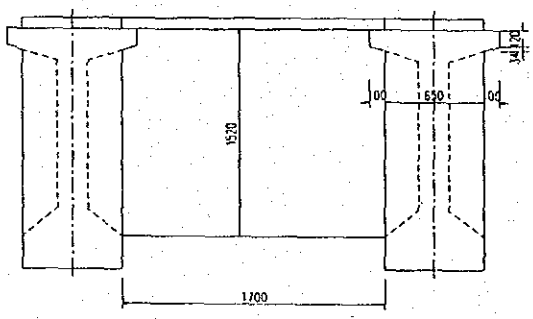
Concrete A1-A2 No.

Item	Formula	Quantity
2. Cross Beam CLASS "D"		
	(1) End Cross Beam	



V1 = { 1.770 × 1.700 - (0.120 + 0.154) × 2/2 × 0.100 }
× 0.500 × 11 × 2 = 32.798 m3

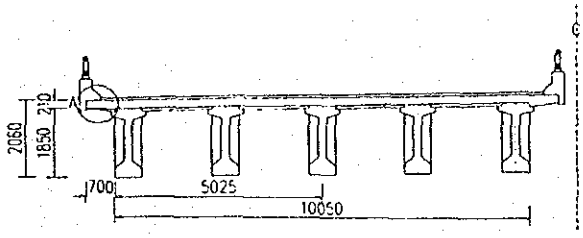
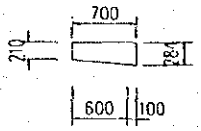
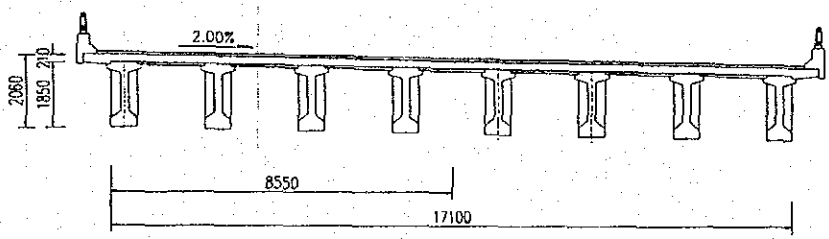
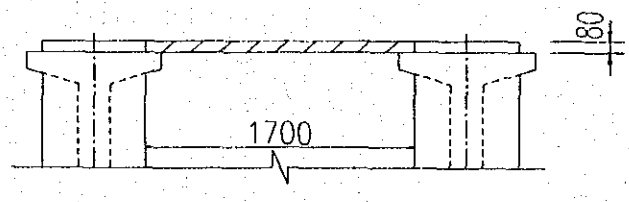
(2) Intermediate Cross Beam



V2 = [{ 1.700 × 1.520 - (0.120 + 0.154) × 2/2 × 0.100 }
× 0.200 × 11 × 3 × 1 = 16.874 m3

Sub-total V = 32.798 + 16.874 = 49.672 m3 49.672 m3

Concrete A1-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)] × 4 + (5.025 + 8.550) × 0.210 × 2 = 6.408 m2	
	V = 6.408 × 37.000 = 237.096 m3	237.096 m3
4.Panel concrete Class "D"		
	V = 1.700 × 0.08 × 11 × 37.000 × 1 =	55.352 m3
		

Form A1-A2 No.

Item	Formula	Quantity
1. Girder		

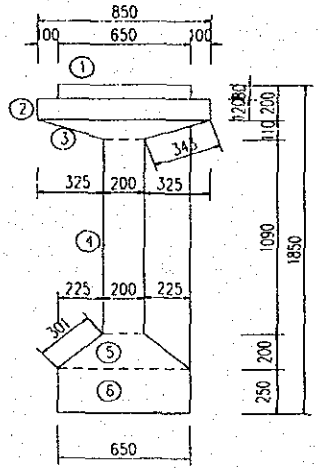
(1) Calculation of Sectional Area

[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	0.343	×	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

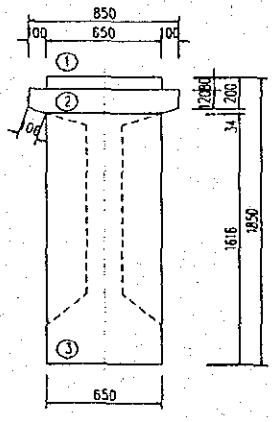


[2] End Section

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 A1-A2 No.

Item	Formula	Quantity

(2) Calculation of Form Area

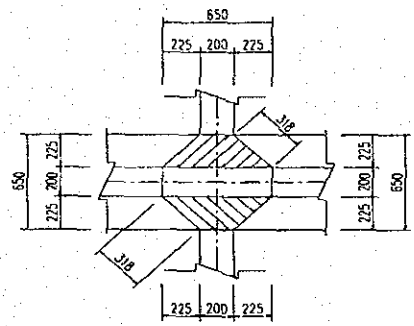
[1] A1-A2 *Girder Length* 37.000 m

Section №	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	

No. of Girder 13 × 1 = 13

A1 = 182.365 × 13 = 2,370.745 m2

[2]. Diaphragm



A2 = (0.200 + 0.318 × 2)x 2 x (1.090 + 1.366)
× 1/2 × 3 × 13 × 1 = 160.15 m2

[3]. External form at girder ends

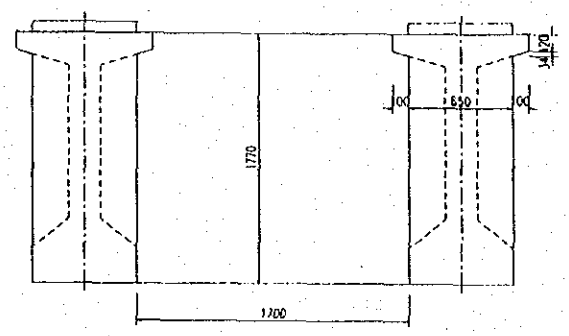
A3 = { 0.65 x 0.080 + 0.850 x 0.120 + (0.850 + 0.650)
x 0.034 x 1/2 + 0.650 x 1.616 } x 2 x 13
x 1.000 = 31.98 m2

Total A = 2,370.745 + 160.151 + 31.98 = 2,562.873 m2 | 2,562.873 m2

Form A1-A2 No.

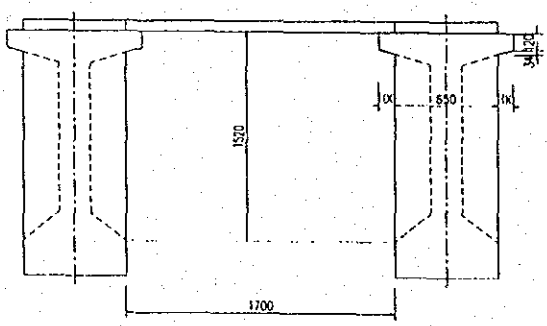
Item	Formula	Quantity
2. Cross beam		

(1) End Cross Beam



A1 = { { 1.77 × 1.700 - (0.120 + 0.154) × 0.100 } × 2
+ 1.7 × 0.500 } × 11 × 2 = 149.89 m2

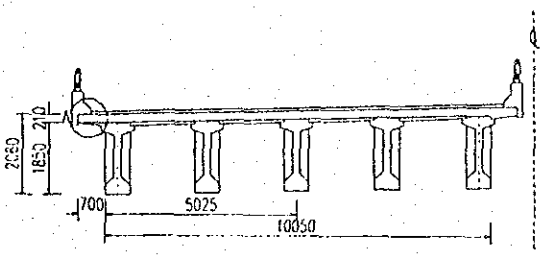
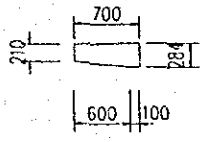
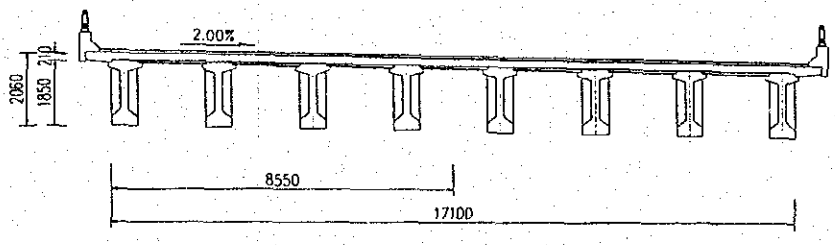
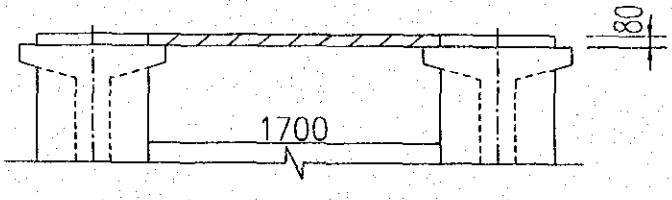
(2) Intermediate Cross Beam



A2 = [{ 1.520 × 1.700 - (0.120 + 0.154) × 0.100 } × 2
+ 1.7 × 0.200 } × 11 × 3 x 1 = 179.96 m2

Sub-total A = 149.890 + 179.956 = 329.846 m2 329.846 m2

Form A1-A2 No.

Item	Formula	Quantity
3. Deck Slab	  DETAIL "A" 	
	A-1 = (0.210 + 0.600) × 2 × 2 = 3.240 m A = 3.240 × 37.000 = 119.88 m2	119.88 m2
4. Platform for construction	A = 26.100 × 34.900 = 910.890 m2	910.890 m2
5.Panel	A = (1.700 + 1.000) × 0.080) × 2 + 1.7 × 11 × 37 × 1 = 867.724 m2 	867.724 m2

PC cable A1-A2 No.

Item	Formula	Quantity

PC CABLE 12S12.7

A1-A2 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)

Wp = 1707.279 × 13 × 1 = 22,194.627 kg

TENSION UNIT EACH

Ns = 5 × 2 × 13 × 1 = 130

SHEATHING Φ80/85 183.776 x 13 = 2389.088 m

STEEL SHEAR KEY 12 x 13 = 156 set

CEMENT GROUT IN SHEATHING

3.14 x 0.08 x 0.08 / 4 x 2389.09 = 12.003 m3

ANCHOR 10 x 13 = 130 set

Per EACH

SCHEDULE OF REINFORCEMENT FOR DIAPHRAGM

(1) END DIAPHRAGM

BAR MARK	SIZE (mm)	DIMENSIONS (mm) a	b	c	d	e	f	g	LENGTH (mm)	UNIT WEIGH (kg/m)	NO. OF BARS	WEIGH (kg)	REMARKS
I1	16	1700							1700	1.578	72	193.15	
I2	14	198	1959	410	1959	198			4724	1.208	28	159.78	
I3	16	1700							1700	1.578	126	338.01	
I4	14	198	1959	410	1959	198			4724	1.208	49	279.62	
Sub-Total												970.56	

(2) INTERMEDIATE DIAPHRAGM

BAR MARK	SIZE (mm)	DIMENSIONS (mm) a	b	c	d	e	f	g	LENGTH (mm)	UNIT WEIGH (kg/m)	NO. OF BARS	WEIGH (kg)	REMARKS
J1	16	1700							1700	1.578	64	171.69	
J2	14	198	1709	110	1709	198			3924	1.208	28	132.73	
J3	16	1700							1700	1.578	112	300.45	
J4	14	198	1709	110	1709	198			3924	1.208	49	232.27	
Sub-Total												837.14	

3) Total Weight

SECTION	Nos.	Weight/EACH	Weight
END DIAPHRAGM	2	970.56	1941.12
INTERMEDIATE DIAPHRA	3	837.14	2511.42
Total			4452.5

Re-bar Girder A1-A2 No.

For ONE GIRDER

SCHEDULE OF REINFORCEMENT FOR 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	
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	84	212.1	Interior
G16	16	1100							1100	1.578	84	145.8	Exterior
G17	10	570							570	0.617	24	8.4	
G18	10	150							150	0.617	104	9.6	
G19	14	361	364	567	364	361			2017	1.208	184	448.3	
Total			Interior grider									5510.9	
			Exterior girder									5444.7	

Total Weight

Span	Mid/Side	Int/Ext	Nos.	Weight/G	Total	Remark
A1-A2		Interior Bea	9	5510.94	49598.46	
		xterior Bea	4	5444.67	21778.68	
Total					71377.14	

No.

Re-bar Deck slab A1-A2

Per BRIDGE

SCHEDULE OF REINFORCEMENT FOR DECK SLAB													
BAR MARK	SIZE (mm)	DIMENSIONS (mm) a	b	c	d	e	f	g	LENGTH (mm)	UNIT WEIGH (kg/m)	NO. OF BARS	WEIGH (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	260	11990.9	
S5	25	11350							11350	3.853	15	656.0	
S6	25	10850							10850	3.853	15	627.1	
S7	20	18938							18938	2.466	232	10834.7	
S8	20	18458							18458	2.466	232	10560.0	
S9	25	19239							19239	3.853	15	1111.9	
S10	25	18759							18759	3.853	15	1084.2	
S11	14	207	585	133					925	1.208	494	552.0	
S12	12	210	145	210					565	0.888	7995	4011.3	
Total												54703.7	

Accessories A1-A2 No.

Item	Formula				Quantity
1. Joint					
	Each length				
	L = 10.750 + 17.750 = 28.500				
	Each = 2				
	Total length				
	L = 28.500 × 2			=	57.000 m
2. Bearing pad					
	ELASTOMERIC 600x300x57				
	Each for one span				
	Each = 13				
	TOTAL EACH				
	Each = 13 × 2			=	EACH 26
3. Anchor bar					
	Each for one span				
	Each = 22				EACH 22.000
	Total each (fix)				
	Each = 11 × 1			=	11 set
	Total each (move)				
	Each = 11 × 1			=	11 set
	TOTAL			=	22 set
4. Pavement					
	a. Water proofing 5mm	(17.75+10.75)	× 36.2	=	1031.70 m2
	b. Asphalt concrete 70mm	(17.75+10.75)	× 36.2	=	1031.70 m2

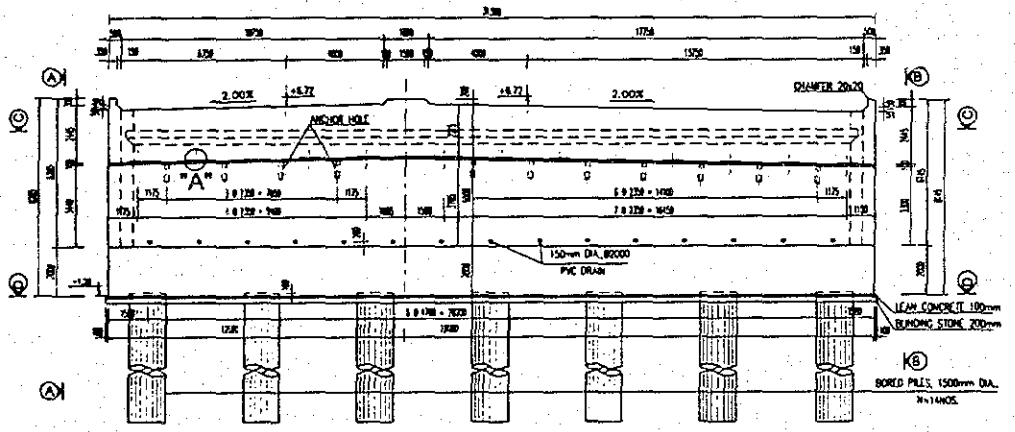
QUANTITY TABLE OF ABUTMENTS

ITEMS			UNIT	ABUTMENT A1	ABUTMENT A2	TOTAL
A- ABUTMENT						
PILE	NUMBER OF PILES		PILE	14.0	12.0	26
	TOTAL LENGTH OF BORED PILES Ø1500MM		M	770.0	660.0	1430
	CONCRETE CLASS "D "		M3	1363.2	1168.4	2532
	EXCAVATION MATERIALS		M3	1360.7	1166.3	2527.0
	REINFORCEMENT	D32	KG	33938.8	27272.4	61211
		D28	KG	0.0	0.0	0
		D25	KG	44361.8	34261.2	78623
		D22	KG	4425.4	3642.0	8067
		D16	KG	0.0	400.8	401
		D10	KG	12766.6	10660.8	23427
		TOTAL	KG	95492.6	76237.2	171730
ABUTMENT	CONCRETE CLASS "E "		M3	669.6	700.0	1370
	REINFORCEMENT	D25	KG	15037.8	15037.8	30076
		D22	KG	4406.3	4406.3	8813
		D20	KG	8018.9	8018.9	16038
		D18	KG	0.0	0.0	0
		D16	KG	5058.7	5058.7	10117
		D14	KG	3650.7	3650.7	7301
		D10	KG	101.3	101.3	203
		TOTAL	KG	36273.7	36273.7	72547
	LEAN CONCRETE CLASS "G"		M3	21.8	22.2	44
	FORM		M2	669.2	670.7	1339.9
	BLINDING STONE		M3	43.7	44.5	88
	EXCAVATION FOR FOUNDATION		M3	1171.4	921.2	2092.5
	BACK FILL		M3	628.1	376.3	1004.4
	SCAFFOLDING WORK	H < 4m	M2	171.4	171.8	343.2
		4m ≤ H < 30m	M2	546.1	547.1	1093.2
	SUPPORT		M3	11.7	11.7	23.4
B- APPROACH SLAB						
	CONCRETE CLASS "E"		M3	56.9	57.0	114
	LEAN CONCRETE CLASS "G"		M3	17.5	17.6	35
	ASPHALTIC JOINT FILLER T=20MM		M3	0.5	0.5	1.1
	FORM		M2	29.9	30.0	60.0
	REINFORCEMENT	D20	KG	4476.9	4476.9	8954
		D16	KG	4487.0	4487.0	8974
		D10	KG	329.6	329.6	659
		TOTAL	KG	9293.5	9293.5	18587
C- SLOPE PROTECTION						
FOOTING	WOODEN PILE L=3M		M	6090.3	6090.3	12181
	BLINDING AGGREGATE T=100MM		M3	8.1	8.1	16
	STONE MASONRY T=300MM		M3	36.5	36.5	73
	EXCAVATION		M3	750.6	750.6	1501
	BACK FILL		M3	363.8	363.8	728
SIDE SLOPE	STONE MASONRY T=300MM		M3	476.2	476.2	952
	BLINDING AGGREGATE T=100MM		M3	162.9	162.9	326
	GEOTEXTILE		M2	583.5	583.5	1167
	PVC PILE Φ50MM DIA., L=1000MM		M	50.8	50.8	102

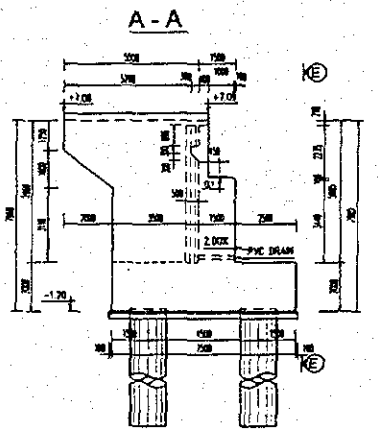
DETAIL OF ABUTMENT A1

(SCALE 1:200)

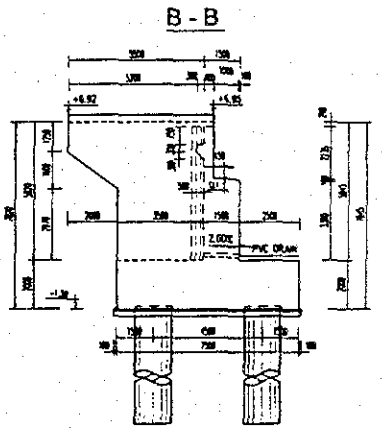
E - E



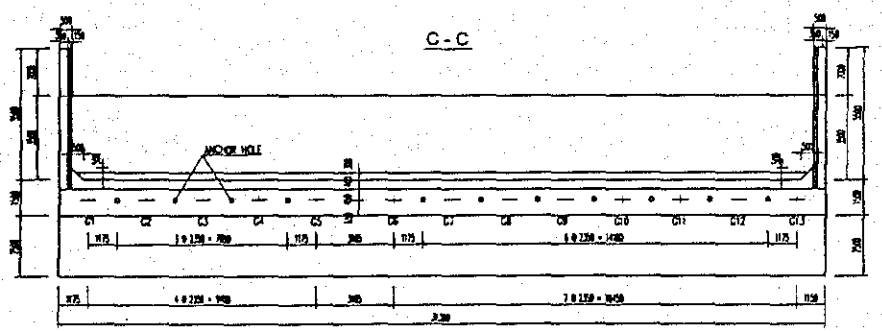
A - A



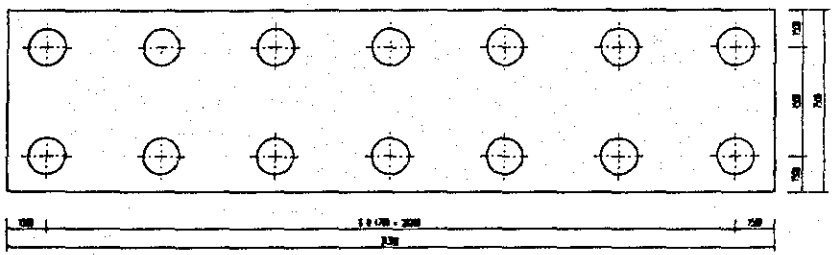
B - B



C - C



D - D



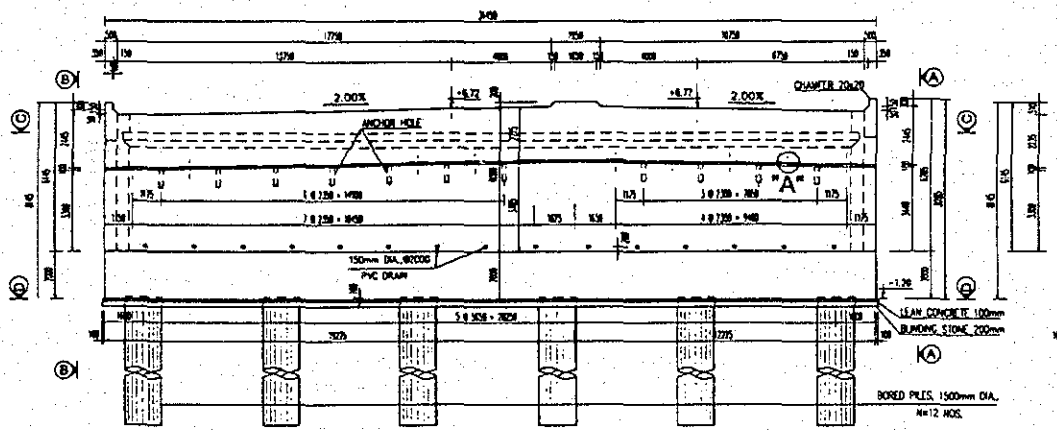
GIRDER BEARING SEAT ELEVATION OF EL1

GIRDER PAD / ABUTMENT	G1,G10	G2,G9	G3,G8	G4,G7	G5	G6	G11	G12	G13
A1	+4.36	+4.41	+4.48	+4.50	+4.55	+4.55	+4.32	+4.27	+4.22

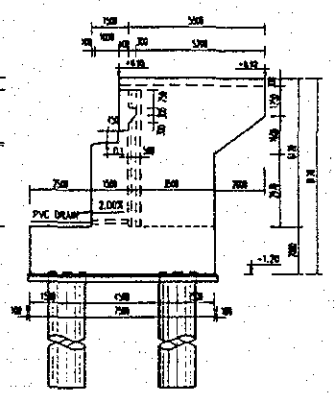
DETAIL OF ABUTMENT A2

(SCALE 1:200)

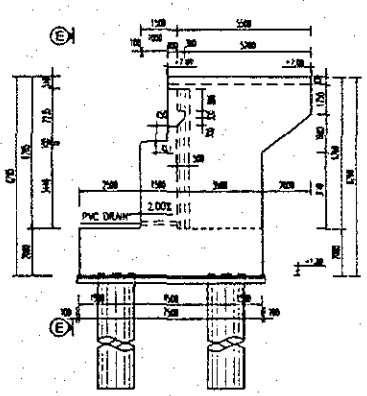
E - E



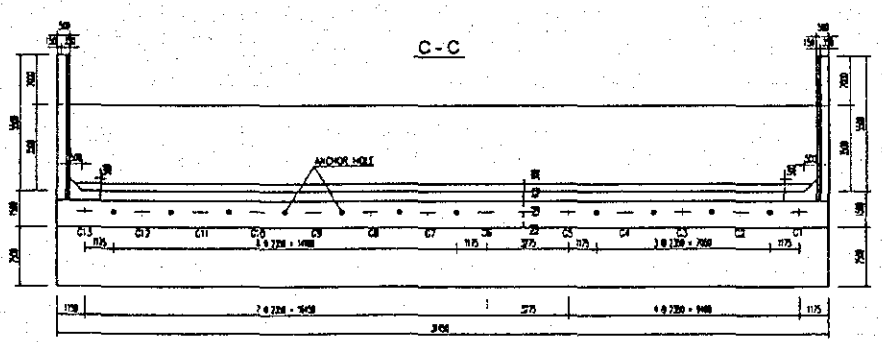
B - B



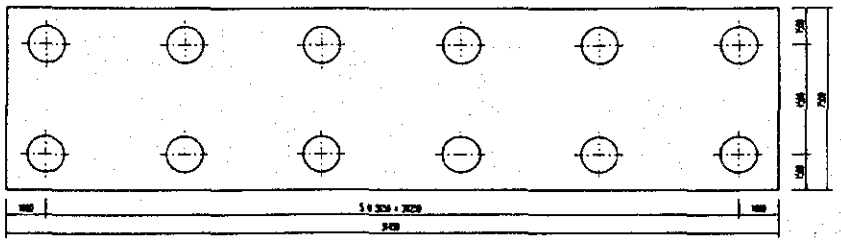
A - A



C - C



D - D



GIRDER BEARING SEAT ELEVATION OF EL1

ABUTMENT \ GROUT PAD	G1,G10	G2,G9	G3,G8	G4,G7	G5	G6	G11	G12	G13
A2	+4.36	+4.41	+4.46	+4.50	+4.55	+4.55	+4.32	+4.27	+4.22

QUANTITY SURVEYING ABUTMENT A1

No.

Item	Formula	Quantity
1) Concrete		
	* BackWall	
	v1 = 12.18 x 2.24 x 0.40 +	
	+ 19.18 x 2.24 x 0.40 = 28.04 m3	
	* Frontwall	
	v2 = 31.36 x {(3.47 + 3.78) / 2	
	x 1.50 - 0.10 ^2 / 2 }= 170.45 m3	
	* Corbel	
	v3 = 0.30 x(0.30 + 0.60) / 2	
	x 30.36 = 4.10 m3	
	* Haunch	
	v4 = 5.71 x 0.50 x 0.50 / 2 x 2	
	= 1.43 m3	
	*Wingwall	
	v5 =[3.50 x(5.71 + 5.68) / 2	
	+ 2.00 x(1.05 + 2.67) / 2]	
	x 0.50 x 2 = 23.63 m3	
	* Parapet	
	v7 =(0.50 x 0.30 + 0.20 ^2	
	- 0.15 ^2/ 2)x 5.90 x 2	
	= 2.11 m3	
	*Footing	
	v6 = 31.36 x 7.50 x 2.00	
	- 14 x pi x 0.75 ^2 x 0.1	
	= 467.93 m3	
	Total	669.6 m3
2) Form		
	* BackWall	
	a1 = 2.00 x 2.24 x 31.36 -	
	- 2.24 x (0.50 + 0.50) x 2	
	= 135.71 m2	
	* Frontwall	
	a2 = 31.36 x(3.47 + 3.7836)	
	- (0.5 + 0.5) x 3.7836 x 2	
	+ 3.63 x 1.5 x 2 = 230.79 m2	
	* Corbel	
	a3 = [0.3 + (0.3 ^2+ 0.3 ^2)^ 0.5]	
	x 30.36 = 21.99 m2	
	* Haunch	
	a4 = + (0.5 ^2+ 0.5 ^2)^ 0.5	
	x 5.705 x 2 = 8.07	
	*Wingwall	
	a5 = 2 x [3.5 x (5.705 + 5.68)	
	+ 2 x (1.05 + 2.67)	
	+ 0.5 x (1.05 + 2.56 + 3.04)	
	- 0.5 x 5.71 }= 95.49 m2	
	* Parapet	
	a5 = [5.9 x(0.5 + 0.3 + 0.05	
	+ 1.4142 x 0.15 + 0.05)	
	+ 2 x 0.17875] x 2	
	= 13.84 m2	
	*Footing	
	a 6 = 2 x(31.360 + 7.500)x 2.00	
	155.44 m2	
	Total	661.3 m2

QUANTITY SURVEYING ABUTMENT A1

No.

Item	Formula	Quantity
3) Scaffolding:	* H<=4m	
	A2 ={ 2 x(31.36 + 7.50) + 8 }	
	x 2 =	171.4 m2
	* 4m< H<=30m	
	A2 = {(24.1+2) + (5.35+1.5+2) + (0.5+2) + (5.35+1-1)	
	+(24.1-2 x 1.5) + (5.35-1+1) + (0.5+2) + (5.35+1.5+2)} x (2.04+4.94	546.1 m2
4) Support	= (8.19 - 1.55 + 5.04) x 2.00 /2	
	x 0.50 x 2 =	11.7 m3
5) Lean Concrete	* Concrete class G	
	v = 0.1 x { (31.36 + 0.2) x (7.50 +	
	+ 0.2) - 14 x 1/4 x pi x 1.50 ^2}	
	=	21.8 m3
	* Form	
	A = 0.1 x { (31.36 + 0.2) + (7.50	
	+ 0.20)}x 2 =	7.85 m2
6) Blinding Stone		
	v = 0.2 x { (31.36 + 0.2) x (7.50 +	
	+ 0.2)- 14 x 1/4 x pi x 1.50 ^2}	
	=	43.7 m3
7) Bored Pile		
	* Concrete	
	= 14 x 1/4 x pi x 1.50 x 1.50	
	x (55.00 + 0.10) =	1363.2 m3
	* Excavation Length	
	N<20: = 23.0 x 14 =	322.0 m
	20<N<40: 21.0 x 14 =	294.0 m
	40<N: 11.0 x 14 =	154.0 m
	Total =	770.0 m
	* Excavation Volume	
	= 14 x 1/4 x pi x 1.50 x 1.50	
	x 55.00	1360.7 m3
8)Earthworks	* Excavation for foundation	
	= 2.66 / 6 x{ (9.50 x 33.36)	
	+ (14.82 x 38.68) + (9.50 + 14.82)	
	x (33.36 + 38.68) = 1171.4 m3	
	* Excess Soil = Lean Concrete + Blinding Stone + Footing Volume + Pile Occupied Volume	
	Pile Occupied Volum = 14 x pi /4 x 1.50	
	x 1.50 x 0.400 = 9.90 m3	
	Excess Soil = 543.30 m3	
	* Back Fill =	628.1 m3
9) Approach Slab		
	* Concrete	
	= 30.28 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 = 56.85 m3	
	* Lean Concrete	
	= (0.30 + 0.28 + 5.20)	
	x 30.28 x 0.1 = 17.5 m3	
	* Asphaltic Joint Filler	
	= { 0.30 x (0.02 + 0.06)/ 2	
	+ 0.30 x 0.02 } x 30.28 = 0.53 m3	
	* Form = (2 x (6.00 x 0.30) + 15.14	
	x (0.30 + 0.50) + (0.50 + 0.30) x	
	0.50 x 0.20 x 2) x 2	
	- 6.00 x 0.30 = 29.94 m2	

QUANTITY SURVEYING ABUTMENT A2

No.

Item	Formula								Quantity
1) Concrete									
* BackWall									
v1 =	31.45	x	2.24	x	0.40	=	28.12	m3	
* Frontwall									
v2 =	31.45	x {(	3.47	+	3.78	) /	2		
x	1.50	-	0.10	^2 /	2	}=	170.96	m3	
* Corbel									
v3 =	0.30	x(	0.30	+	0.60	) /	2		
				x	30.45	=	4.11	m3	
* Haunch									
v4 =	5.71	x	0.50	x	0.50	/ 2 x 2			
						=	1.43	m3	
*Wingwall									
v5 =(	3.50	x(	5.71	+	5.68	) /	2		
+	2.00	x(	1.05	+	2.67	) /	2	)	
		x	0.50	x	2	=	23.63	m3	
* Parapet									
v7 =(	0.50	x	0.30	+	0.20	^2			
-	0.15	^2/	2	)x	5.90	x	2		
						=	2.11	m3	
*Footing									
v6 =	31.45	x	7.50	x	2.00				
-	12	x	pi	x	0.75	^2 x	0.1		
						=	469.63	m3	
						Total			700.0 m3
2) Form									
* BackWall									
a1 =	2.00 x		2.24	x	31.45	-			
-	2.24 x (		0.50	+	0.50	) x	2		
						=	136.11	m2	
* Frontwall									
a2 =	31.45 x(		3.47	+	3.7845	)			
- (	0.5 +		0.5	) x	3.7845	x	2		
+	3.63 x		1.5	x	2	=	231.47	m2	
* Corbel									
a3 = (	0.3 + (		0.3	^2+	0.3	^2)^ 0.5)			
				x	30.45	=	22.05	m2	
* Haunch									
a4 =	+ (		0.5	^2+	0.5	^2)^ 0.5			
	x		5.705	x	2	=	8.07		
*Wingwall									
a5 =	2 x (		3.5	x (	5.705	+	5.68)		
	+		2	x (	1.05	+	2.67)		
+	0.5 x (		1.05	+	2.56	+	3.04)		
	-		0.5	x	5.71	}=	95.48	m2	
* Parapet									
a5 = (	5.9 x(		0.5	+	0.3	+	0.05		
	+		1.4142	x	0.15	+	0.05)		
	+		2	x	0.17875	) x	2		
						=	13.84	m2	
*Footing									
a 6 =	2 x(		31.450	+	7.500	)x	2.00		
							155.80	m2	
						Total			662.8 m2

QUANTITY SURVEYING ABUTMENT A2

No.

Item	Formula	Quantity
3) Scaffolding:	* H<=4m	
	A2 =(2 x(31.45 + 7.50) + 8) x 2 =	171.8 m2
	* 4m< H<=30m	
	A2 = {(24.1+2) + (5.35+1.5+2) + (0.5+2) + (5.35+1-1) +(24.1-2 x 1.5) + (5.35-1+1) + (0.5+2) + (5.35+1.5+2)} x (2.04+4.94	547.1 m2
4) Support	= (8.19 - 1.55 + 5.04) x 2.00 /2 x 0.50 x 2 =	11.7 m3
5) Lean Concrete	* Concrete class G	
	v = 0.1 x { (31.45 + 0.2) x (7.50 + + 0.2) - 12 x 1/4 x pi x 1.50 ^2} =	22.2 m3
	* Form	
	A = 0.1 x { (31.45 + 0.2) + (7.50 + 0.20)}x 2 =	7.87 m2
6) Blinding Stone		
	v = 0.2 x { (31.45 + 0.2) x (7.50 + + 0.2)- 12 x 1/4 x pi x 1.50 ^2} =	44.5 m3
7) Bored Pile		
	* Concrete	
	= 12 x 1/4 x pi x 1.50 x 1.50 x (55.00 + 0.10) =	1168.4 m3
	* Excavation Length	
	N<20: = 23.0 x 12 =	276.0 m
	20<N<40: 21.0 x 12 =	252.0 m
	40<N: 11.0 x 12 =	132.0 m
	Total =	660.0 m
	* Excavation Volume	
	= 12 x 1/4 x pi x 1.50 x 1.50 x 55.00	1166.3 m3
8)Earthworks	* Excavation for foundation	
	= 2.20 / 6 x{ (9.50 x 33.45) + (13.9 x 37.85) + (9.50 + 13.9) x (33.45 + 37.85) = 921.2 m3	
	* Excess Soil = Lean Concrete + Blinding Stone + Footing Volume + Pile Occupied Volume	
	Pile Occupied Volum = 12 x pi /4 x 1.50 x 1.50 x 0.400 = 8.48 m3	
	Excess Soil = 544.86 m3	
	* Back Fill = 376.3 m3	
9) Approach Slab		
	* Concrete	
	= 30.37 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 = 57.02 m3	
	* Lean Concrete	
	= (0.30 + 0.28 + 5.20) x 30.37 x 0.1 = 17.6 m3	
	* Asphaltic Joint Filler	
	= { 0.30 x (0.02 + 0.06)/ 2 + 0.30 x 0.02 } x 30.37 = 0.54 m3	
	* Form = (2 x (6.00 x 0.30) + 15.19 x (0.30 + 0.50) + (0.50 + 0.30) x 0.50 x 0.20 x 2) x 2 - 6.00 x 0.30 = 30.02 m2	

REINFORECEMENT OF ABUTMENT A1

(For 1 Abument)

No	D (mm)	LENGTH (m)	QUANTITY (nos.)	UNIT WEIGH (kg/m)	TOTAL STEEL (kg)
A1	14	2805	376	1.208	1274.1
A2	14	32134	18	1.208	698.7
A3	14	720	248	1.208	215.7
A4	16	1837	122	1.578	353.7
A5	14	30734	4	1.208	148.5
A6	14	690	126	1.208	105.0
F1	25	10795	126	3.853	5240.7
F2	25	7300	124	3.853	3487.7
F3	25	8174	126	3.853	3968.3
F4	25	4900	124	3.853	2341.1
F5	20	8000	16	2.466	315.6
F6	20	32460	16	2.466	1280.7
F7	16	4828	189	1.578	1439.9
F8	20	35912	30	2.466	2656.8
F9	20	33160	30	2.466	2453.2
W1	22	4285	124	2.984	1585.5
W2	22	4348	126	2.984	1634.8
W3	16	4243	126	1.578	843.6
W4	14	1822	214	1.208	471.0
W5	16	32134	15	1.578	760.6
W6	14	32012	19	1.208	734.7
W7	16	1860	126	1.578	369.8
K1	20	7870	12	2.466	232.9
K2	20	2300	16	2.466	90.7
K3	20	3400	14	2.466	117.4
K4	22	8145	28	2.984	680.5
K5	22	4485	16	2.984	214.1
K6	20	5170	27	2.466	344.2
K7	16	6920	14	1.578	152.9
K8	16	5560	5	1.578	43.9
K8a	16	5420	5	1.578	42.8
K9	16	1285	48	1.578	97.3
K9a	22	6105	8	2.984	145.7
K9b	16	2294	48	1.578	173.8
K9c	14	626	4	1.208	3.0
K10	16	2520	2	1.578	8.0
K11	20	2250	22	2.466	122.1
K12	16	8040	14	1.578	177.6
K12a	16	7900	14	1.578	174.5
K13	16	4820	27	1.578	205.4
K14	10	719	156	0.617	69.2
K15	20	5159	10	2.466	127.2
K16	16	5089	10	1.578	80.3
K17	22	2337	14	2.984	97.6
K18	16	2232	14	1.578	49.3
K19	20	4971	2	2.466	24.5
K20	16	4971	2	1.578	15.7
K21	22	4030	4	2.984	48.1
K22	16	900	49	1.578	69.6
K23	20	3809	27	2.466	253.6
R1	10	300~700	80~40	0.617	32.1

D25	15038	(kg)
D22	4406	(kg)
D20	8019	(kg)
D18	0	(kg)
D16	5059	(kg)
D14	3651	(kg)
D10	101	(kg)
TOTAL	36274	(kg)

REINFORCEMENT OF PILE (L=51M) FOR ABUMENT 1

(For 1 Direction)

No	D (mm)	LENGTH (m)	QUANTITY (nos.)	UNIT WEIGH (kg/m)	TOTAL STEEL (kg)
N1	32	12000	32	6.313	2424.2
N2	25	12000	48	3.853	2219.3
N3	25	8000	16	3.853	493.2
N4	25	7400	16	3.853	456.2
N5	22	4203	6	2.984	75.3
N6	22	4248	19	2.984	240.8
N7	10	152053	1	0.617	93.8
N8	10	167258	1	0.617	103.2
N9	10	809683	1	0.617	499.6
N10	10	4105	85	0.617	215.3
N11	16	1322	16	1.578	33.4
TOTAL	D = 32		2424.2		(kg)
	D = 28		0.0		(kg)
	D = 25		3168.7		(kg)
	D = 22		316.1		(kg)
	D = 16		0.0		(kg)
	D = 10		911.9		(kg)
	TOTAL		6820.9		(kg)

REINFORCEMENT OF APPROACH SLAB FOR ABUMENT 1

(For 1 Direction)

No	D (mm)	LENGTH (m)	QUANTITY (nos.)	UNIT WEIGH (kg/m)	TOTAL STEEL (kg)
AS1	20	5850	301	2.466	4342.3
AS2	16	9465	110	1.578	1642.9
AS3	16	6320	153	1.578	1525.9
AS4	16	11850	55	1.578	1028.5
AS5	16	1200	153	1.578	289.7
AS6	20	700	78	2.466	134.6
AS7	10	1580	78	0.617	76.0
AS8	10	519	792	0.617	253.6
TOTAL	D = 20		4476.9		(kg)
	D = 16		4487.0		(kg)
	D = 10		329.6		(kg)
	TOTAL		9293.5		(kg)

REINFORECEMENT OF ABUTMENT A2

(For 1 Abument)

No	D (mm)	LENGTH (m)	QUANTITY (nos.)	UNIT WEIGH (kg/m)	TOTAL STEEL (kg)
A1	14	2805	376	1.208	1274.1
A2	14	32134	18	1.208	698.7
A3	14	720	248	1.208	215.7
A4	16	1837	122	1.578	353.7
A5	14	30734	4	1.208	148.5
A6	14	690	126	1.208	105.0
F1	25	10795	126	3.853	5240.7
F2	25	7300	124	3.853	3487.7
F3	25	8174	126	3.853	3968.3
F4	25	4900	124	3.853	2341.1
F5	20	8000	16	2.466	315.6
F6	20	32460	16	2.466	1280.7
F7	16	4828	189	1.578	1439.9
F8	20	35912	30	2.466	2656.8
F9	20	33160	30	2.466	2453.2
W1	22	4285	124	2.984	1585.5
W2	22	4348	126	2.984	1634.8
W3	16	4243	126	1.578	843.6
W4	14	1822	214	1.208	471.0
W5	16	32134	15	1.578	760.6
W6	14	32012	19	1.208	734.7
W7	16	1860	126	1.578	369.8
K1	20	7870	12	2.466	232.9
K2	20	2300	16	2.466	90.7
K3	20	3400	14	2.466	117.4
K4	22	8145	28	2.984	680.5
K5	22	4485	16	2.984	214.1
K6	20	5170	27	2.466	344.2
K7	16	6920	14	1.578	152.9
K8	16	5560	5	1.578	43.9
K8a	16	5420	5	1.578	42.8
K9	16	1285	48	1.578	97.3
K9a	22	6105	8	2.984	145.7
K9b	16	2294	48	1.578	173.8
K9c	14	626	4	1.208	3.0
K10	16	2520	2	1.578	8.0
K11	20	2250	22	2.466	122.1
K12	16	8040	14	1.578	177.6
K12a	16	7900	14	1.578	174.5
K13	16	4820	27	1.578	205.4
K14	10	719	156	0.617	69.2
K15	20	5159	10	2.466	127.2
K16	16	5089	10	1.578	80.3
K17	22	2337	14	2.984	97.6
K18	16	2232	14	1.578	49.3
K19	20	4971	2	2.466	24.5
K20	16	4971	2	1.578	15.7
K21	22	4030	4	2.984	48.1
K22	16	900	49	1.578	69.6
K23	20	3809	27	2.466	253.6
R1	10	300~700	80~40	0.617	32.1

D25	15038	(kg)
D22	4406	(kg)
D20	8019	(kg)
~~D18~~	~~0~~	~~(kg)~~
D16	5059	(kg)
D14	3651	(kg)
D10	101	(kg)
TOTAL	36274	(kg)

REINFORCEMENT OF PILE (L=55M) FOR ABUMENT 2

(For 1 Direction)

No	D (mm)	LENGTH (m)	QUANTITY (nos.)	UNIT WEIGH (kg/m)	TOTAL STEEL (kg)
N1	32	12000	30	6.313	2272.7
N2	25	12000	45	3.853	2080.6
N3	25	8000	15	3.853	462.4
N4	25	5400	15	3.853	312.1
N5	22	4203	6	2.984	75.3
N6	22	4248	18	2.984	228.2
N7	10	152053	1	0.617	93.8
N8	10	167258	1	0.617	103.2
N9	10	771669	1	0.617	476.1
N10	10	4105	85	0.617	215.3
N11	16	1322	16	1.578	33.4
TOTAL	D = 32		2272.7		(kg)
	D = 28		0.0		(kg)
	D = 25		2855.1		(kg)
	D = 22		303.5		(kg)
	D = 16		33.4		(kg)
	D = 10		888.4		
	TOTAL		6353.1		(kg)

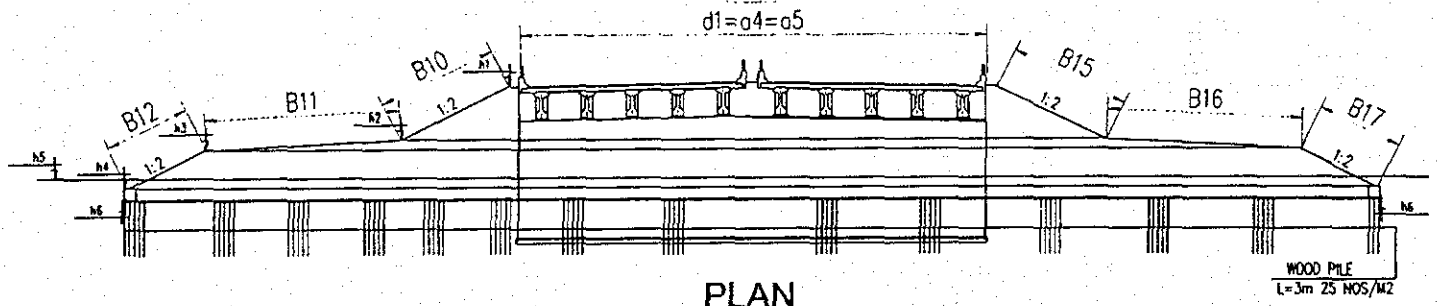
REINFORCEMENT OF APPROACH SLAB FOR ABUMENT

(For 1 Direction)

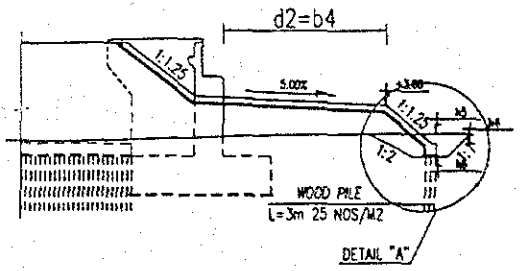
No	D (mm)	LENGTH (m)	QUANTITY (nos.)	UNIT WEIGH (kg/m)	TOTAL STEEL (kg)
AS1	20	5850	301	2.466	4342.3
AS2	16	9465	110	1.578	1642.9
AS3	16	6320	153	1.578	1525.9
AS4	16	11850	55	1.578	1028.5
AS5	16	1200	153	1.578	289.7
AS6	20	700	78	2.466	134.6
AS7	10	1580	78	0.617	76.0
AS8	10	519	792	0.617	253.6
TOTAL	D = 20		4476.9		(kg)
	D = 16		4487.0		(kg)
	D = 10		329.6		(kg)
	TOTAL		9293.5		(kg)

EARTHWORKS SLOPE PROTECTION

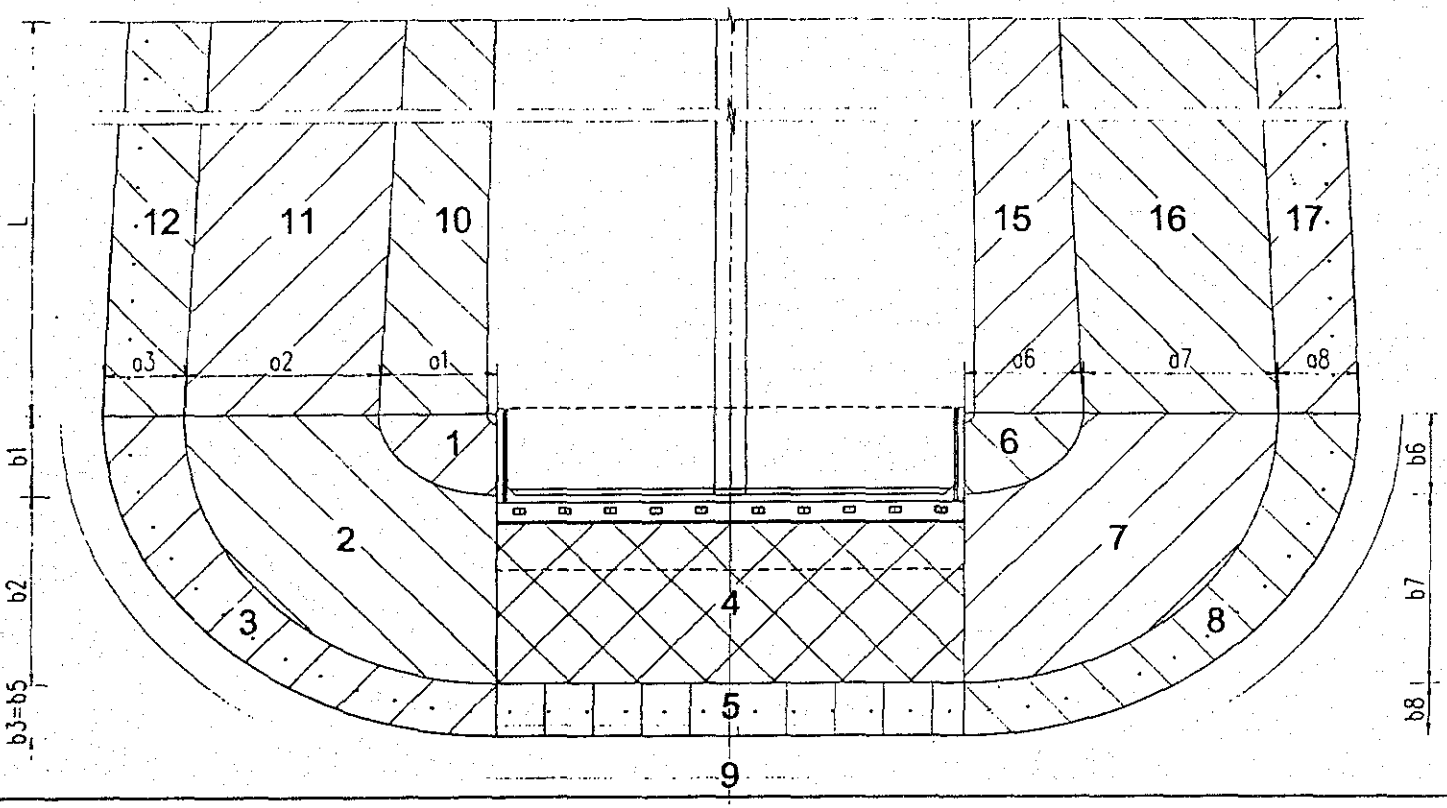
A-A



SIDE ELEVATION



PLAN



Bridge **CAI TAC 2**
Abutment A1

h1	h2	h3	h4	h5	h6	d1	d2
6.59	3.5	3	0.5	1.5	-0.2	31.36	

Block	a	b	Dh	R	r	L	Sxq	W	Masonry	Blinding
	(m)	(m)	(m)	(m)	(m)	(m)	(m2)	(m)	(m3)	(m3)
1	6.680	4.363	3.090	5.521	0.000	6.327	27.423		8.23	2.74
2	10.000	3.638	0.500	12.340	5.521	6.837	95.868		28.76	9.59
3	5.000	3.125	2.500	16.403	12.340	4.770	107.629		32.29	10.76
4	0.000	0.000	0.500				0.000		0.00	0.00
5	0.000	0.000	2.500				0.000		0.00	0.00
6	6.680	4.363	3.090	5.521	0.000	6.327	27.423		8.23	2.74
7	10.000	3.638	0.500	12.340	5.521	6.837	95.868		28.76	9.59
8	5.000	3.125	2.500	16.403	12.340	4.770	107.629		32.29	10.76
9			1.700				7.395	51.505	18.54	4.12
Extra								38.748	**157**	**50**

Footing	Wood pile	(m)	3090
	Excavation	(m3)	381
	Binding	(m3)	4.1
	Stone masonry	(m3)	18.5
	Back fill	(m3)	87.6
Side slope	Geotextile	(m2)	254
	PVC Pipe	(m)	26
	Blinding	(m3)	50
	Masonry	(m3)	139

Length of footing = 52 m

Abutment A2

h1	h2	h3	h4	h5	h6	d1	d2
6.59	3.5	3	0.5	1.5	-0.2	31.45	

Block	a	b	Dh	R	r	L	Sxq	W	Masonry	Blinding
	(m)	(m)	(m)	(m)	(m)	(m)	(m2)	(m)	(m3)	(m3)
1	6.680	4.363	3.090	5.521	0.000	6.327	27.423		8.23	2.74
2	10.000	3.638	0.500	12.340	5.521	6.837	95.868		28.76	9.59
3	5.000	3.125	2.500	16.403	12.340	4.770	107.629		32.29	10.76
4	0.000	0.000	0.500				0.000		0.00	0.00
5	0.000	0.000	2.500				0.000		0.00	0.00
6	6.680	4.363	3.090	5.521	0.000	6.327	27.423		8.23	2.74
7	10.000	3.638	0.500	12.340	5.521	6.837	95.868		28.76	9.59
8	5.000	3.125	2.500	16.403	12.340	4.770	107.629		32.29	10.76
9			1.700				7.395	51.505	18.54	4.12
Extra								38.748	157	50

Footing	Wood pile	(m)	3090
	Excavation	(m3)	381
	Binding	(m3)	4.1
	Stone masonry	(m3)	18.5
	Back fill	(m3)	87.6
Side slope	Geotextile	(m2)	254
	PVC Pipe	(m)	26
	Blinding	(m3)	50
	Masonry	(m3)	139

Length of footing = 52 m

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

$W_9 = 2 * 3.14 * R_3/4 + a_5 + 2 * 3.14 * R_8/4$, and

$W_{Ex} = 2 * 3.14 * R_2/4 + a_5 + 2 * 3.14 * R_7/4$

$Masonry_i = 0.3 * Sxq_i$

$Blinding_i = 0.1 * Sxq_i$

Geotextile = $Sxq_3 + Sxq_5 + Sxq_8 + W_{Ex} * 1$

PVC Pipe = $W_9/2$

Wood Pile = $W_9 * 0.8 * 25 * 3$

Excavation = $W_9 * Sxq_9$

Filling = Excavation - $W_9 * Dh_9 * 1.1$

CAI TAC 2 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	6.91	25	172.74	0.30	51.82	17.27	Geotextile (m2)
11	10.01	25	250.31	0.30	75.09	25.03	= 2 x (L + S12) = 330
12	5.59	25	139.75	0.30	41.93	13.98	PVC pipe (m)
15	6.91	25	172.74	0.30	51.82	17.27	= 2 x L/2 x 1m = 25
16	10.01	25	250.31	0.30	75.09	25.03	
17	5.59	25	139.75	0.30	41.93	13.98	

FOOTING	Wood pile	(m)	=	3000.00	
	Blinding	(m3)	=	4.00	
	Stone masonry	(m3)	=	18.00	
	Excavation	(m3)	=	369.75	LENGTH OF FOOTING L= 50 M
	Back fill	(m3)	=	276.25	
SIDE SLOPE	Stone masonry	(m3)	=	337.68	
	Blinding	(m3)	=	112.56	
	Geotextle	(m2)	=	329.51	
	PVC pile	(m)	=	25.00	

No	h	Dh	S	L	Total (m3)		
	m	m	m2	m	Excavation	Filling	
5	1.5						Excavation = 2 x S x L
6	-0.2	1.7	7.395	25	370	276	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	6.91	25	172.74	0.30	51.82	17.27	Geotextile (m2)
11	10.01	25	250.31	0.30	75.09	25.03	= 2 x (L + S12) = 330
12	5.59	25	139.75	0.30	41.93	13.98	PVC pipe (m)
15	6.91	25	172.74	0.30	51.82	17.27	= 2 x L/2 x 1m = 25
16	10.01	25	250.31	0.30	75.09	25.03	
17	5.59	25	139.75	0.30	41.93	13.98	

FOOTING	Wood pile	(m)	=	3000.00	
	Blinding	(m3)	=	4.00	
	Stone masonry	(m3)	=	18.00	
	Excavation	(m3)	=	369.75	LENGTH OF FOOTING L= 50 M
	Back fill	(m3)	=	276.25	
SIDE SLOPE	Stone masonry	(m3)	=	337.68	
	Blinding	(m3)	=	112.56	
	Geotextle	(m2)	=	329.51	
	PVC pile	(m)	=	25.00	

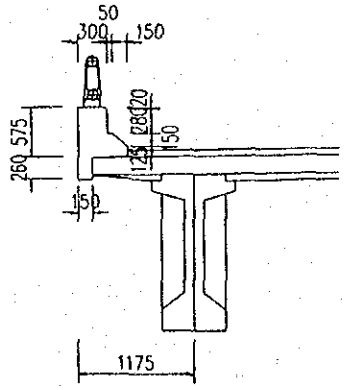
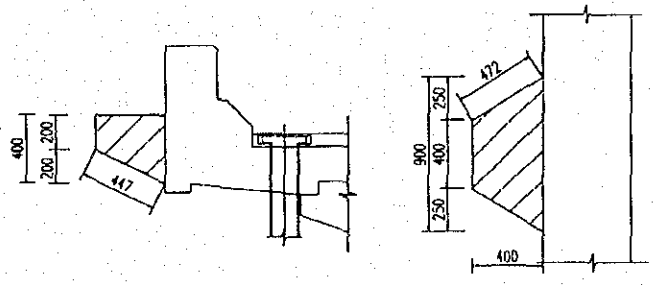
No	h	Dh	S	L	Total (m3)		
	m	m	m2	m	Excavation	Filling	
5	1.5						Excavation = 2 x S x L
6	-0.2	1.7	7.395	25	370	276	Filling = Excavation - 2 x 25 x Dh x 1.1

No.

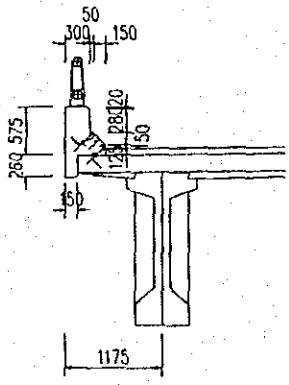
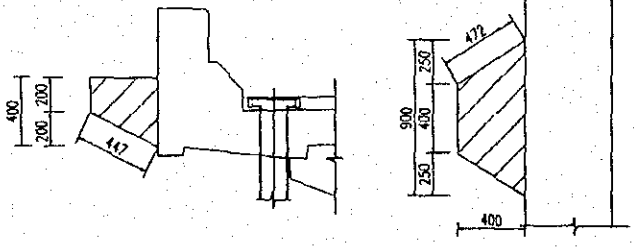
QUANTITY OF MISCELLANEOUS

Item		Work Item	Unit	Quantity	Remarks
Concrete	CLASS E	Parapet	m3	37.78	
		Lighting pole base	m3	0.18	
Form		Parapet	m2	237.10	
		Lighting pole base	m2	1.22	
		Total	m2	238.32	
Re-bar		Parapet	ton	5.862	
		Lighting pole base	ton	0.063	
		Total	ton	5.92	
Steel Railing			m	171.60	
Lighting	Pole		set	2	
	Pipe Φ100		m	148.00	
Drainage	Pot		set	3	
	Pipe Φ180		m	5.22	

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 × 37.000 = 37.78 m3	37.78 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

Formworks A1-A2 No.

Item	Formula	Quantity
1. Parapet		
	A = (0.575 + 0.260 + 0.15 + 0.125 + 0.212 + 0.280) × 2 × 2 × 37.000 = 237.10 m2	237.10 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

Re-bar Parapet

No.

Per 10m

SCHEDULE OF REINFORCEMENT (OF PARAPET)													
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	100.50	
P3	14	10000							10000	1.208	11	132.90	
Total												396.1	

Total Weight

Total = 396.1 / 10 × 37 × 4 = 5,861.54 (kg)

Re-bar Lighting

No.

Per BRIDGE

SCHEDULE OF REINFORCEMENT (OF LIGHTING)

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
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 × 2 = 63.02 (kg)

Accessories No.

Item	Formula	Quantity
1. Drainage		
	TOTAL EACH	
	EACH = 3 =	3 each
	PIPE = 1.74 x 3 =	5.22 m
2. Steel railing		
	Length for one span	
	L = 37.000 m	
	Each = 1 span	
	Length for abutment	
	L = 5.9 x 4 = 23.60 m	
	TOTAL LENGTH	
	L = 37.000 x 1 x 2 x 2 + 23.600 =	171.600 m
3. Lighting		
	Each for one span	
	Each = 2	
	Total lighting poles	
	2 x 1 =	2 pole
	PVC pipe Φ100mm =	148.000 m

QUANTITY TABLE OF CAI TAC 2 BRIDGE

ITEMS			UNIT	ABUTMENTS	SUPERSTRUCTURE	MISCELLANEOUS WORKS			TOTAL
						DRAINAGE	LIGHTING	RAILING	
CONCRETE	CLASS B		M3		379.9				379.9
	CLASS D		M3	2531.6	342.1				2873.7
	CLASS E		M3	1483.5			0.18	38	1521.5
	CLASS G		M3	157.9					157.9
PC - CABLE	12 S12.7		TON		22.2				22.2
SHEATHING	Φ80/85		M		2389.1				2389.1
	CEMENT GROUT IN SHEATHING		M3		12.0				12.0
ANCHORAGE	CABLES 12S12.7	DEAD	SET						
		LIVE	SET		130				130.0
STEEL SHEAR KEY			SET		156				156.0
REINFORCEMENT	D32		KG	61211					61211.2
	D28		KG						
	D25		KG	108699	3479				112177.8
	D22		KG	16880	8551				25431.3
	D20		KG	24992	34096		41		59128.5
	D18		KG						
	D16		KG	19492	4971		22		24484.6
	D14		KG	7301	75190			5862	88353.3
	D12		KG		4011				4011.3
	D10		KG	24289	235				24524.1
	D8		KG						
	D6		KG		6642				6642.2
	TOTAL		KG	262864	137176		63	5862	405964.4
EXPANSION JOINT	50MM		M		57.00				57.0
BEARING	600x300x57		SET		26				26.0
ANCHORAGE BAR	Φ75, L=1500		SET		22				22.0
STEEL RAILING			M					171.60	171.6
LIGHTING POLE	POLE		SET				2		2.0
	PIPE Φ100		M				148.00		148.0
DRAINAGE	POT		SET			3			3.0
	PIPE Φ180		M			5.22			5.2
PAVEMENT	WATER PROOFING 5MM		M2		1031.70				1031.7
	ASPHALT CONCRETE 70 MM		M2		1031.70				1031.7
GEOTEXTILE			M2	1167.03					1167.0
STONE MANSORY			M3	1025.55					1025.6
BLINDING AGGREGATE			M3	341.97					342.0
RIP RAP			M3						
BLINDING STONE			M3	88.15					88.2
WOODEN PILE L = 3M			M	12180.56					12180.6
EXCAVATION			M3	6120.81					6120.8
BACK FILL			M3	1004.38					1004.4
BORED PILE Φ1500MM			M	1430.00					1430.0
PVC PIPE	Φ50MM		M	101.50					101.5
FORM	FLAT		M2	1399.82	3880.32				5280.1
	CURVE		M2						
SCAFFOLDING WORK	H < 4M		M2	343.24					343.2
	4M <= 11 <=30M		M2	1093.19					1093.2
PLATFORM FOR CONSTRUCTION			M2		910.89				910.9
SUPPORTING FORM			M3	23.36					23.4

3.3. Cai Da bridge

No.

1.Quantity of Superstructure
(Approach Bridge)

Item		Work Item	Unit	Quantity	Remarks
Concrete	CLASS B	Girder	m3	703.6	σck=400kg/c
	CLASS D	Panel	m3	101.2	
		Deck Slab	m3	458.2	
		Cross beam	m3	137.0	
		Total	m3	696.4	
Formworks		Girder	m2	5,220.4	
		Cross beam	m2	578.1	
		Deck Slab	m2	301.3	
		Panel	m2	477.6	
		Total	m2	6,577.3	
Plattform of construction			m2	2,323.0	
Re-bar		Cross beam	ton	10.090	
		Deck Slab	ton	113.342	
		Girder	ton	131.986	added
		Panel	ton	12.142	added
		Total	ton	267.560	
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	723.600	
Cement grout in sheathing			m3	19.875	
Expansion Joint			m	43.000	
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	

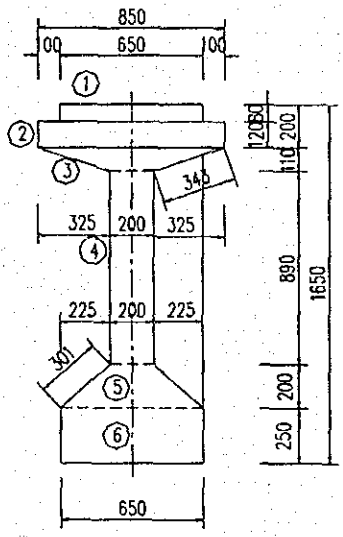
Item	Formula	Quantity
1. Girder CLASS "B" 1) Girder	(1) Calculation of Sectional Area	

[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

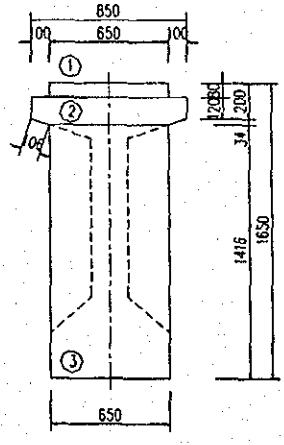


[2] End Section

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

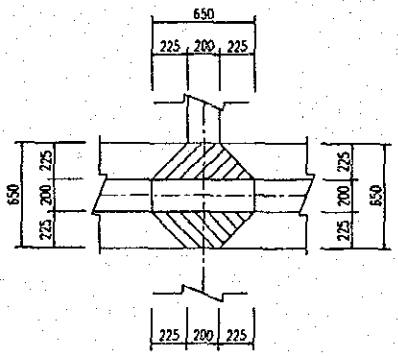
[1] A1-P1 Girder Length 28.000 m

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



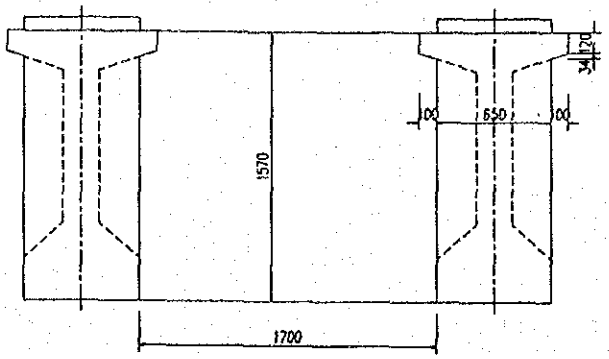
V2= 1/2 × (0.200 × 1.196 + 0.65 × 0.890)
× 0.255 × 2 × 2 × 10 × 1 = 4.170 m3

Total V = 201.280 + 4.170 = 205.450 205.450 m3

A1-P1 No.

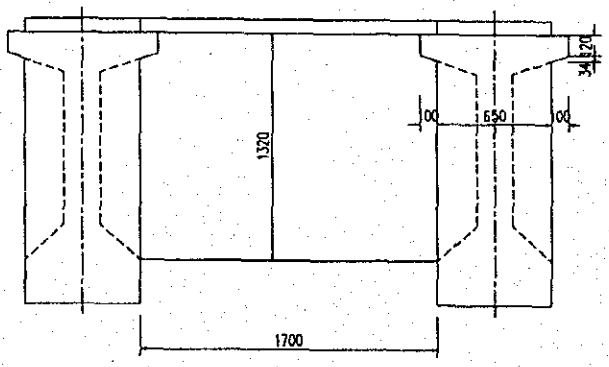
Item	Formula	Quantity
2. Diaphragm CLASS "D"		

(1) End Cross Beam



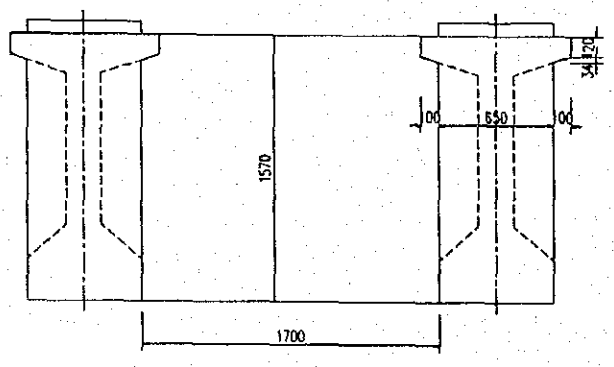
V1= { 1.570 × 1.700 - (0.120 + 0.154) × 2/2 × 0.100 }
× 0.500 × 1 × 8 = 10.566 m3

(2) Intermediate Cross Beam



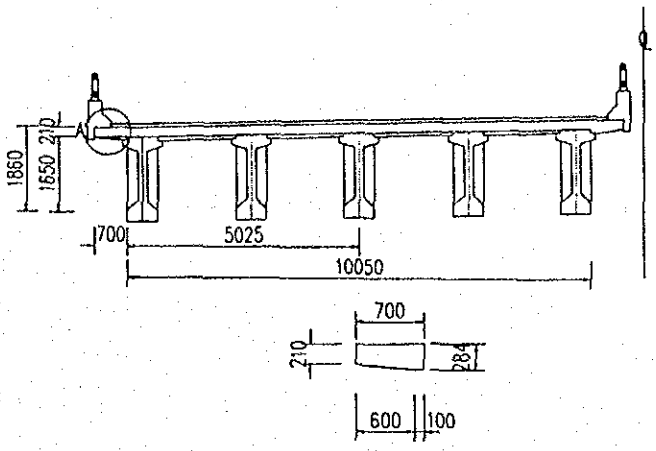
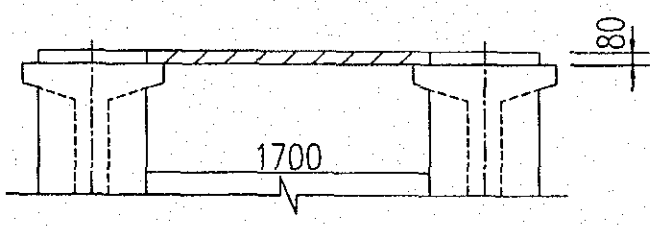
V2= [{ 1.700 × 1.320 - (0.120 + 0.154) × 2/2 × 0.100 }
× 0.200 × 1 × 2 × 8 = 7.093 m3

(3) Connection Cross Beam



V3= { 1.570 × 1.700 - (0.120 + 0.154) × 2/2 × 0.100 }
× 1.100 × 1 × 8 = 23.246 m3

Sub-tota V = 10.566 + 7.093 + 23.246 = 40.905 m3 40.905 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 × 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
		

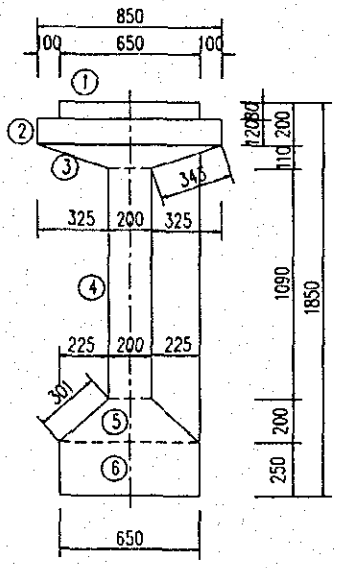
Item	Formula	Quantity
1. Girder CLASS "B" 1) Girder	(1) Calculation of Sectional Area	

[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

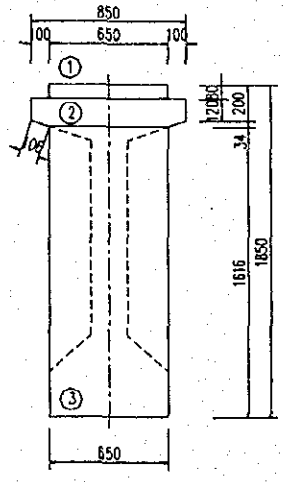


[2] End Section

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



Item	Formula	Quantity

(2) Calculation of Concrete Volume

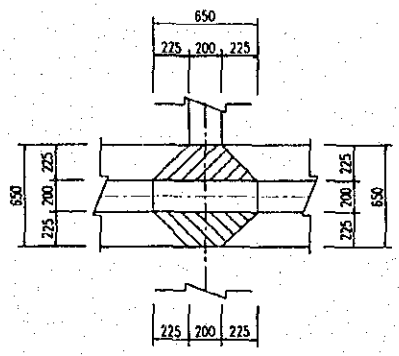
[1] A1-A2 Girder Length 37.000 m

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

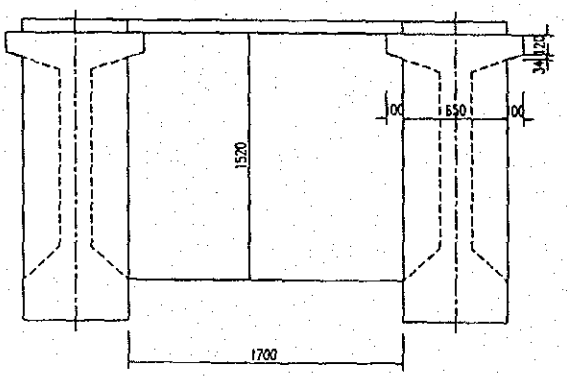


V2= 0.225 × (0.200 + 0.650) × 1/2 × (1.090
+ 1.366) × 2/2 × 10 × 3 × 1 = 7.046 m3

Total V = 285.630 + 7.046 = 292.676 292.676 m3

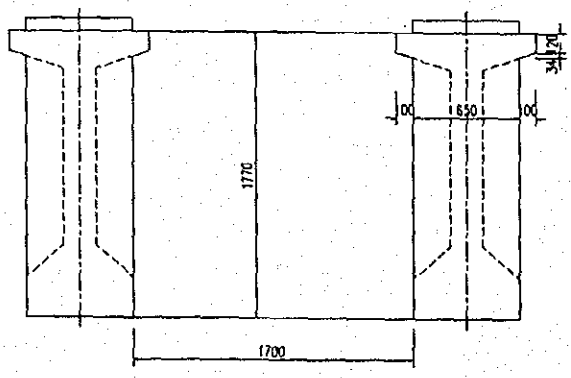
Item	Formula	Quantity
2. Diaphragm CLASS "D"		

(1) Intermediate Cross Beam



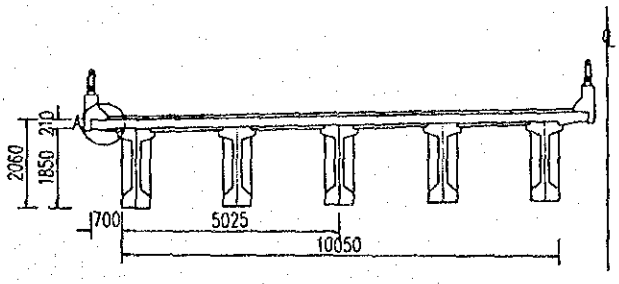
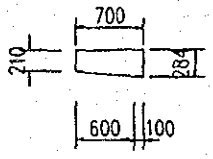
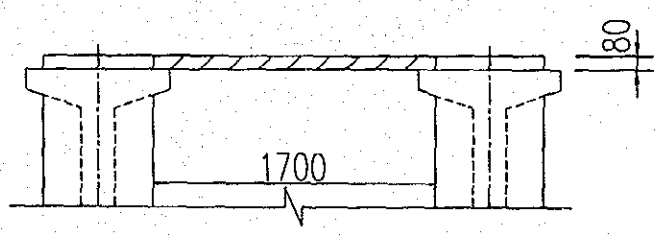
V2= [(1.700 × 1.520 - (0.120 + 0.154) × 2/2 × 0.100)
× 0.200 × 1 × 3 × 8 = 12.272 m3

(2) Connection Cross Beam



V3= (1.770 × 1.700 - (0.120 + 0.154) × 2/2 × 0.100)
× 0.900 × 2 × 8 = 42.935 m3

Sub-tota V = 12.272 + 42.935 = 55.207 m3 55.207 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 × 37.000 = 182.299 m3	182.299 m3
4.Panel concrete Class "D"	V = 1.700 × 0.08 × 8.000 × 37.000 × 1 =	40.256 m3
		

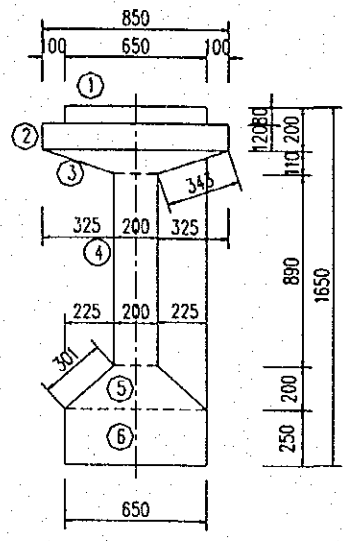
Item	Formula	Quantity
1. Girder CLASS "B" 1) Girder	(1) Calculation of Sectional Area	

[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

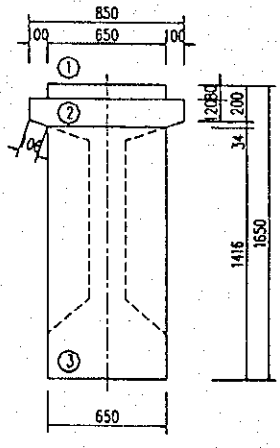


[2] End Section

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

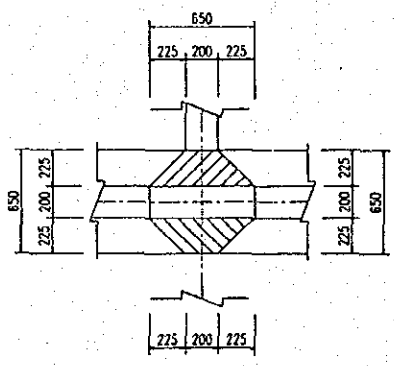
[1] A1-P1 Girder Length 28.000 m

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



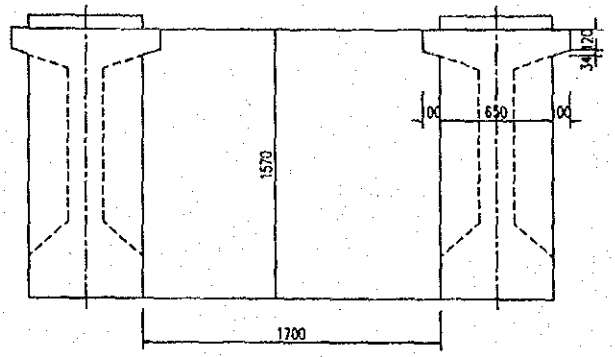
V2= 1/2 × (0.200 × 1.196 + 0.65 × 0.890)
× 0.255 × 2 × 2 × 10 × 1 = 4.170 m3

Total V = 201.280 + 4.170 = 205.450 205.450 m3

P2-A2 No.

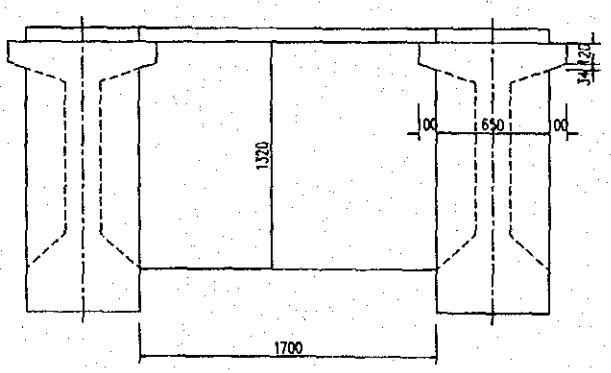
Item	Formula	Quantity
2. Diaphragm *CLASS "D"*		

(1) End Cross Beam



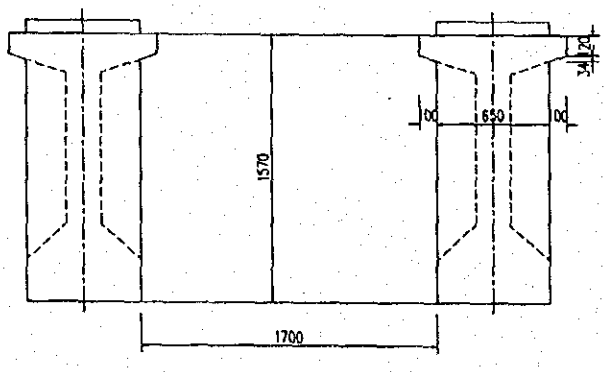
V1= { 1.570 × 1.700 - (0.120 + 0.154) × 2/2 × 0.100 }
× 0.500 × 1 × 8 = 10.566 m3

(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

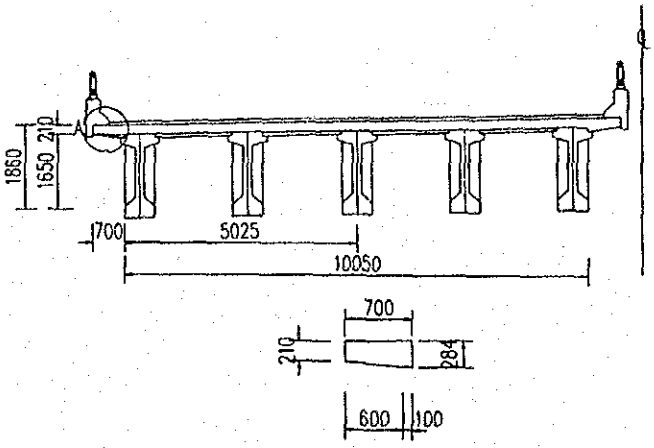
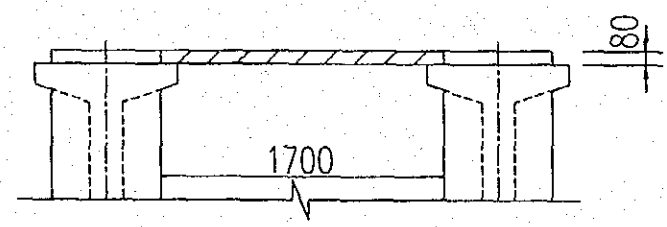
(3) Connection Cross Beam



V3= { 1.570 × 1.700 - (0.120 + 0.154) × 2/2 × 0.100 }
× 1.100 × 1 × 8 = 23.246 m3

Sub-tota V = 10.566 + 7.093 + 23.246 = 40.905 m3 | 40.905 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
		

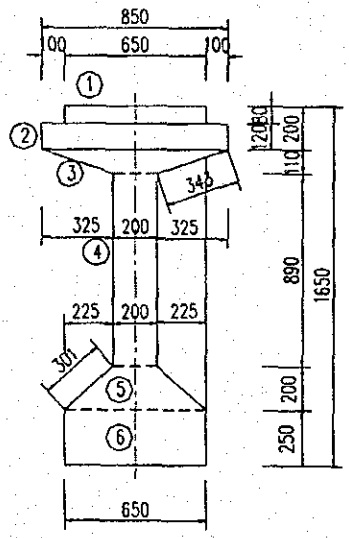
Item	Formula	Quantity
1. Girder CLASS "B" 1) Girder	(1) Calculation of Sectional Area	

[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

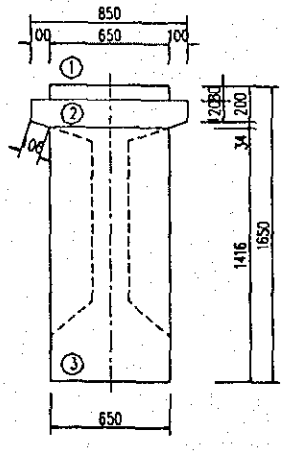


[2] End Section

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

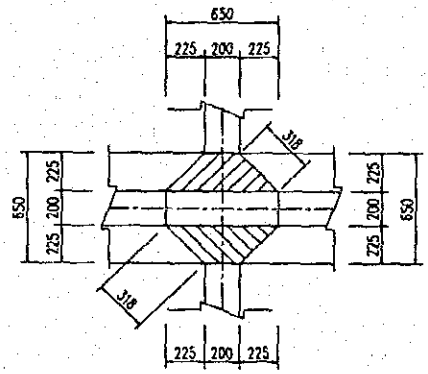
[1] A1-A2 Girder Length 37.000 m

Section №	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

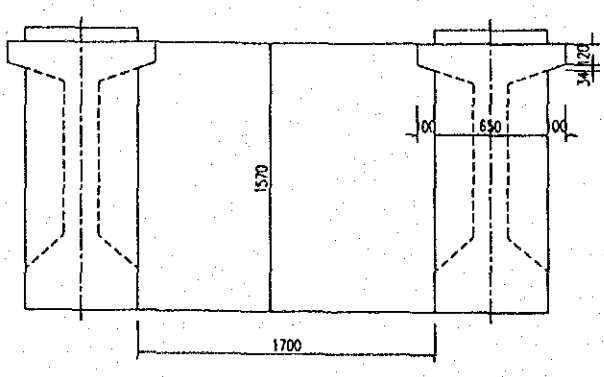


A2= 0.318 × 2 × (0.890 + 1.166) × 1/2 × 2
× 10 × 2 × 1
+ 0.2 × 1.166 × 2 × 10 × 2 × 1
- 0.65 × 0.890 × 2 × 10 × 2 × 1
= 12.340 m2

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

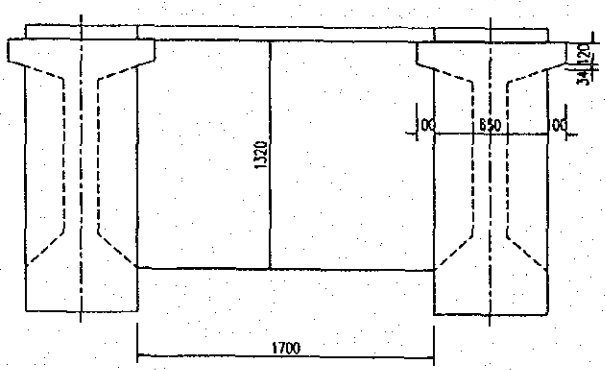
Item	Formula	Quantity
2. Diaphragm CLASS "C"		

(1) End Cross Beam



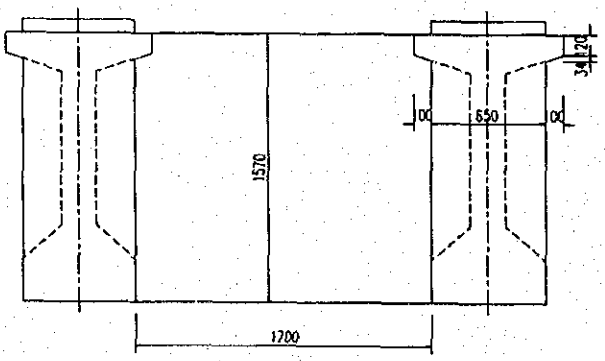
A1= [{ 1.570 × 1.700 - (0.120 + 0.154) × 2/2 × 0.100 }
× 2 + 0.500 × 1.700] × 8 × 1 = 49.066 m2

(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

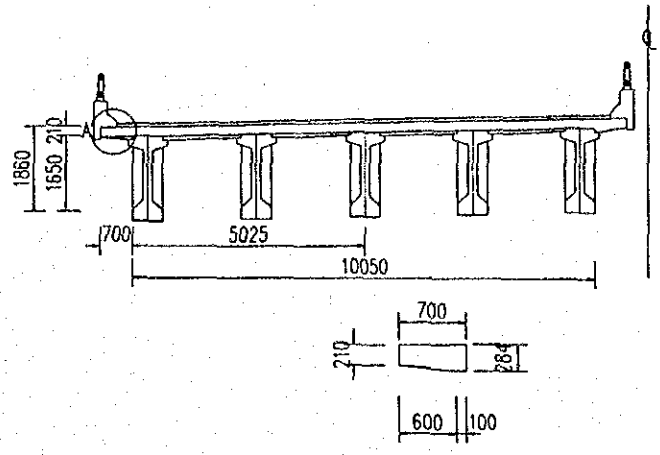
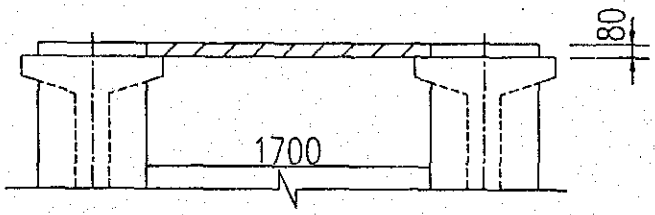
(3) Connection Cross Beam



A1= [{ 1.570 × 1.700 - (0.120 + 0.154) × 2/2 × 0.100 }
× 1.100 + 1.100 × 1.700] × 8 × 1 = 38.206 m2

Sub-total A = 49.066 + 76.371 + 38.206 = 163.643 m2 163.643 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	
		

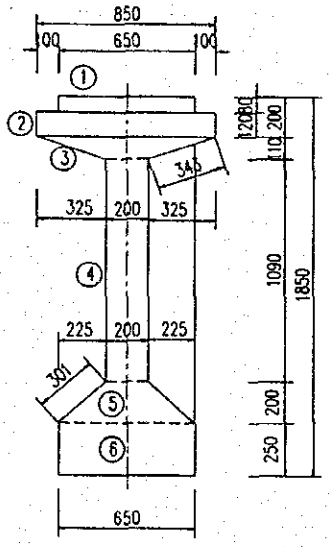
Item	Formula	Quantity
1. Girder CLASS "B" 1) Girder	(1) Calculation of Sectional Area	

[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

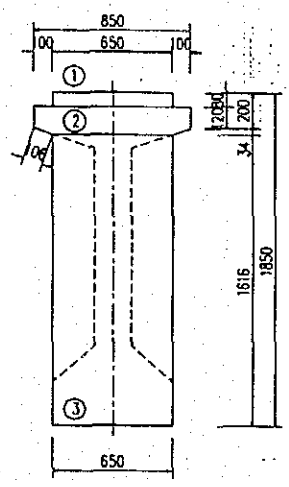


[2] End Section

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

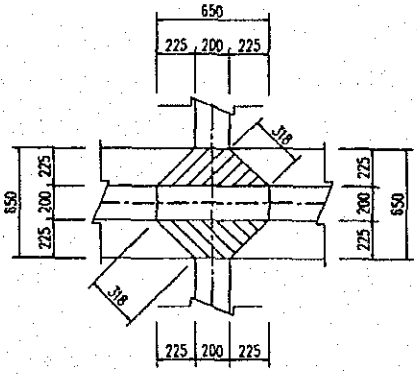
[1] A1-A2 Girder Length 37.000 m

Section №	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

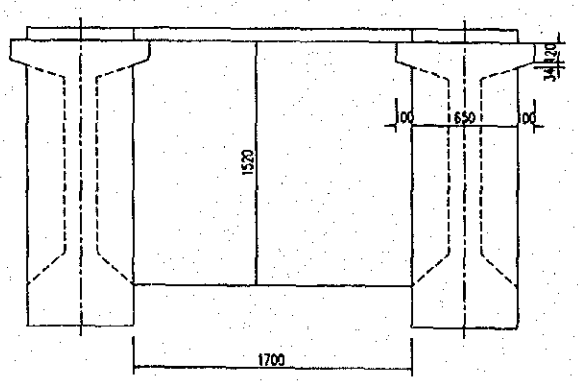


A3= 0.318 × 2 × (1.090 + 1.366) × 1/2 × 2
× 10 × 3 × 1
+ 0.2 × 1.366 × 2 × 10 × 3 × 1
- 0.65 × 1.090 × 2 × 10 × 3 × 1
= 20.742 m2

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

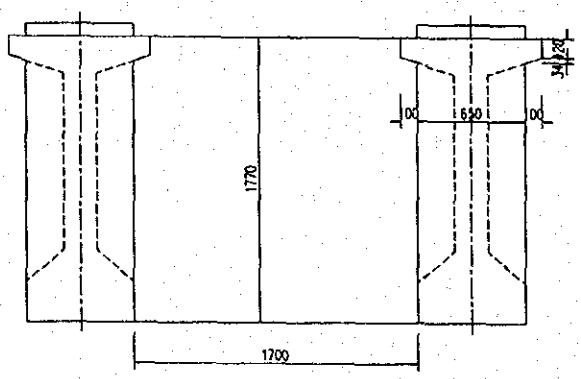
Item	Formula	Quantity
2. Diaphragm CLASS "C"		

(1) Intermediate Cross Beam



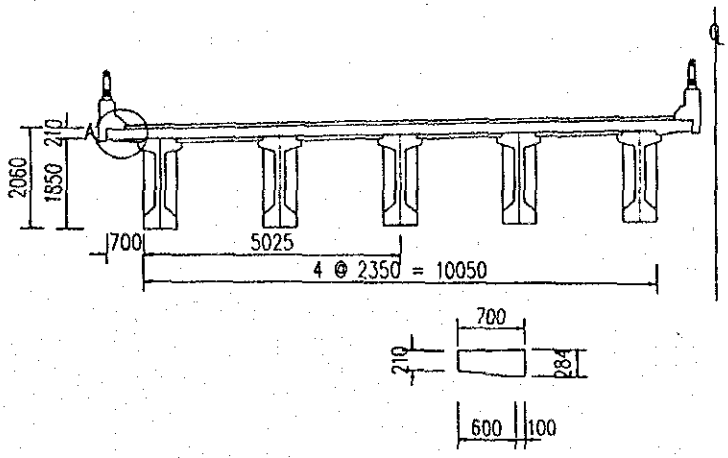
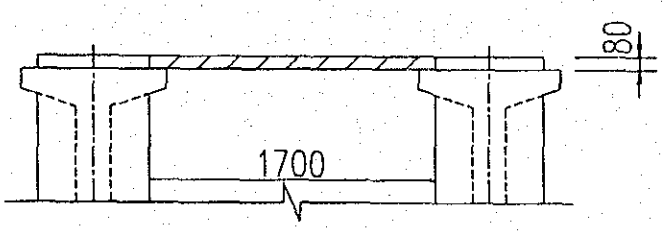
A2= [{ 1.700 × 1.520 - (0.120 + 0.154) × 2/2 × 0.100 }
× 2 + 0.200 × 1.700] × 8 × 3 × 1
× = 130.877 m2

(3) Connection Cross Beam



A1= [{ 1.770 × 1.700 - (0.120 + 0.154) × 2/2 × 0.100 }
× 2 + 0.900 × 1.700] × 8 × 2 = 119.891 m2
Sub-total A = 0.000 + 130.877 + 119.891 = 250.768 m2 250.768 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 	

No.

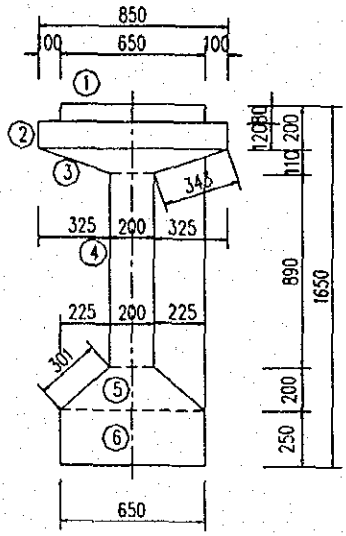
Item	Formula	Quantity
1. Girder CLASS "B" 1) Girder	(1) Calculation of Sectional Area	

[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

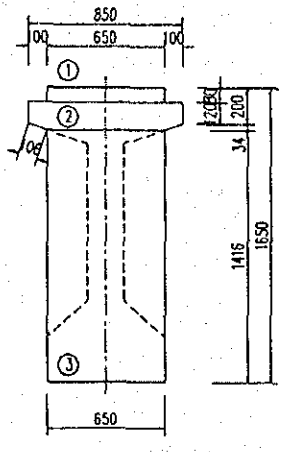


[2] End Section

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

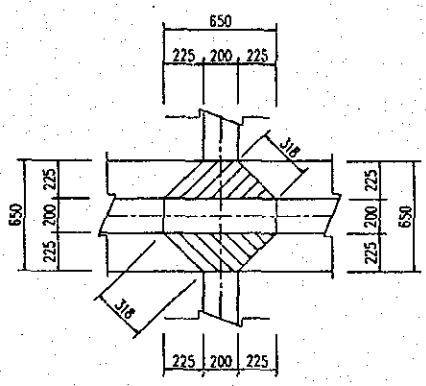
[1] A1-A2 Girder Length 37.000 m

Section №	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

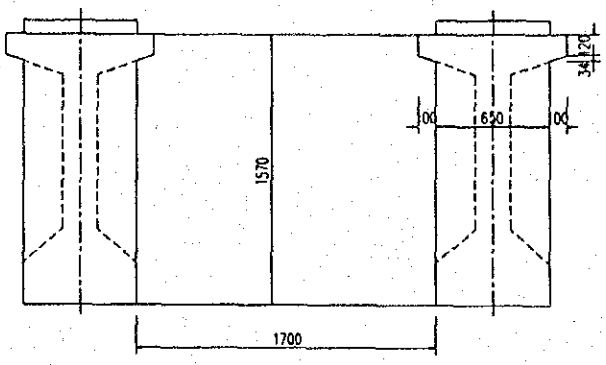


A2= 0.318 × 2 × (0.890 + 1.166) × 1/2 × 2
× 10 × 2 × 1
+ 0.2 × 1.166 × 2 × 10 × 2 × 1
- 0.65 × 0.890 × 2 × 10 × 2 × 1
= 12.340 m2

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

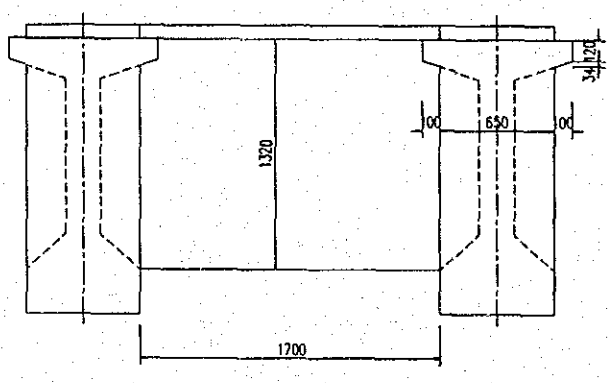
Item	Formula	Quantity
2. Diaphragm CLASS "C"		

(1) End Cross Beam



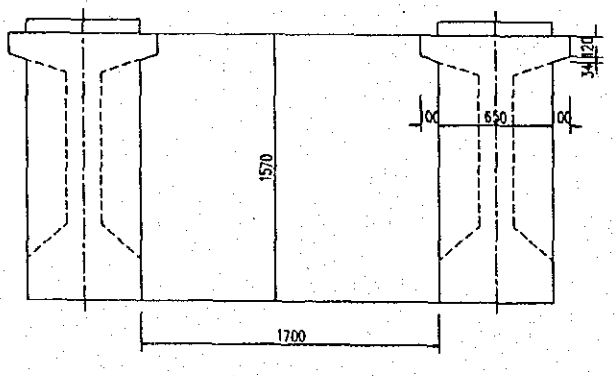
A1= [{ 1.570 × 1.700 - (0.120 + 0.154) × 2/2 × 0.100 }
× 2 + 0.500 × 1.700] × 8 × 1 = 49.066 m2

(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

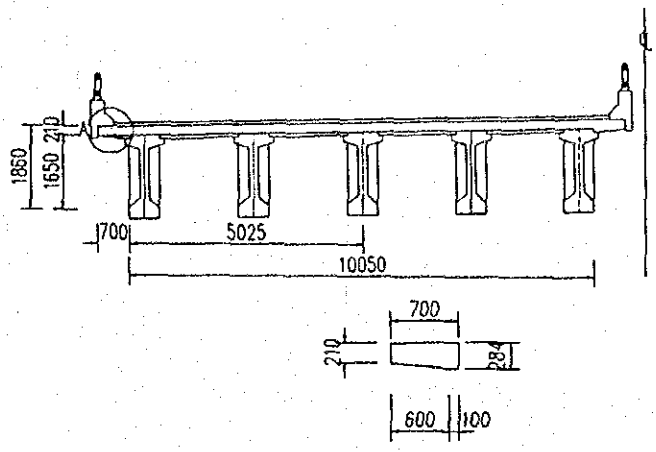
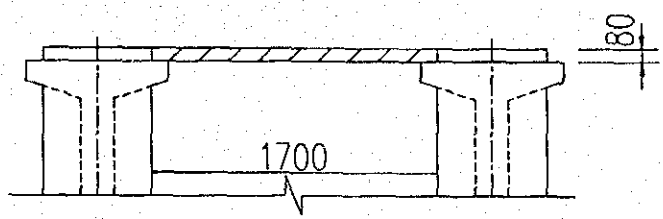
(3) Connection Cross Beam



A1= [{ 1.570 × 1.700 - (0.120 + 0.154) × 2/2 × 0.100 }
× 1.100 + 1.100 × 1.700] × 8 × 1 = 38.206 m2

Sub-total A = 49.066 + 76.371 + 38.206 = 163.643 m2 163.643 m2

P2-A2

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	
		

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		9	90.5	2.320	209.844
TOTAL			9	90.450		209.844

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

Wp= 209.844 x 1 x 2 = 419.688

TENSION UNIT EACH

Ns= 9 * 2 = 18

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

SHEATING F 50/55MM 90.450 x 1 x 2 = 180.900 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 180.900 = 0.568 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		9	90.5	2.320	209.844
TOTAL			9	90.450		209.844

TOTAL WEIGHT OF PC CABLES per BRIDGE(A1-P4) kg

Wp= 209.844 × 1 × 4 = 839.376

TENSION UNIT EACH

Ns= 9 * 4 = 36

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

SHEATING F 50/55MM 90.450 x 1 x 4 = 361.800 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 361.800 = 1.136 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		9	90.5	2.320	209.844
TOTAL			9	90.450		209.844

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

Wp= 209.844 × 1 × 2 = 419.688

TENSION UNIT EACH

Ns= 9 * 2 = 18

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

SHEATING F 50/55MM 90.450 x 1 x 2 = 180.900 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 180.900 = 0.568 m3

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

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

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) CONNECTION 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
F1	16	1700							1700	1.578	96	257.53	
F2	14	245	1910	245					2400	1.208	112	324.71	
F3	14	198	1759	1128	1759	198			5042	1.208	56	341.08	
F4	14	198	1759	1200	1759	198			5114	1.208	28	172.98	
F5	16	9950							9950	1.578	2	31.40	
F6	14	797	810	797					2404	1.208	28	81.31	
Sub-Total												1209.01	

3) Total Weight

SECTION		Nos.	Weight/EACH	Weight
END DIAPHRAGM		4	317.94	1271.8
(+) INTERMEDIATE DIAPHRAGM (OF GIRDER L=28M)		8	269.43	2155.4
(+) INTERMEDIATE DIAPHRAGM (OF GIRDER L=37M)		6	304.42	1826.5
CONNECTION DIAPHRAGM		4	1209.01	4836.0
Total				10089.8

No.

A1-A2

Par BRIDGE

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	1176	32915.2	
S2	20	10850							10850	2.466	1176	31465.2	
S3	14	133	623	207					963	1.208	2492	2899.0	
S4	22	12000							12000	2.984	400	14323.2	
S5	14	27460							27460	1.208	200	6634.3	
S6	14	22180							22180	1.208	200	5358.7	
S6'	14	24606							24606	1.208	200	5944.8	
S7	25	11350							11350	3.853	70	3061.2	
S8	25	10850							10850	3.853	70	2926.4	
S9	12	210	145	210					565	0.888	15575	7814.3	
Total												113342.30	