

1.5. Approach Bridge (P41-A2)

1.Quantity of Superstructure

(Approach Bridge CANTHO SIDE-2)

I-Girder (P41-A2)

Item		Work Item		Unit	Quantity	Remarks
Concrete	CLASS B	Girder		cu.m	662.9	ock=40Mpa
	CLASS D-1	Deck Slab		cu.m	426.8	ock=30Mpa
		Diaphragm		cu.m	161.3	
		Total		cu.m	588.2	
	CLASS E	Barrier		cu.m	41.0	ock=24Mpa
Form		Deck Slab		sq.m	175.2	
		Girder		sq.m	3,897.7	
		Diaphragm		sq.m	952.8	
		Barrier		sq.m	283.2	
		Total		sq.m	5,308.8	
Re-bar		Deck Slab	- D14	ton	17.8	
			D16 - D22	ton	62.5	
			D25 -	ton	10.5	
			Total	ton	90.8	212.7
		Girder	- D14	ton	52.1	
			D16 - D22	ton	58.5	
			D25 -	ton		
			Total	ton	110.6	166.8
		Diaphragm	- D14	ton	6.9	
			D16 - D22	ton	0.5	
			D25 -	ton		
			Total	ton	7.3	45.3
		Barrier	- D14	ton	6.6	
			D16 - D22	ton	0.1	
			D25 -	ton		
			Total	ton	6.7	163.3
		Total	- D14	ton	83.4	
			D16 - D22	ton	121.6	
			D25 -	ton	10.5	
			Total	ton	215.4	
PC Cable	12S12.7B			ton	39.6	SWPR7B
	4S12.7B	Transverse Tendons		ton	2.6	
		Total		ton	42.2	
Slab Plate				sq.m	3,725.3	
				cu.m	298.0	
			D10, D14	ton	25.8	
Shear Key				Nos	432	
Expansion Joint		Type A		m	22.1	
		Concrete		cu.m	1.1	

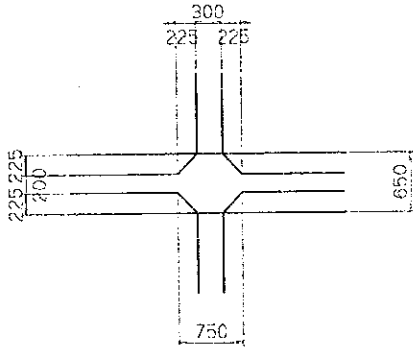
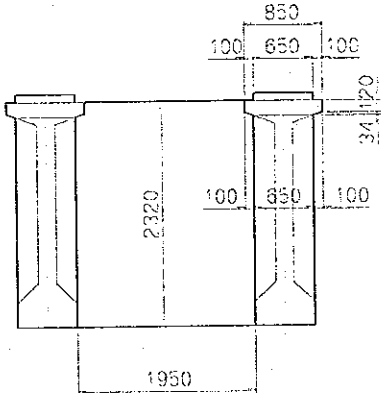
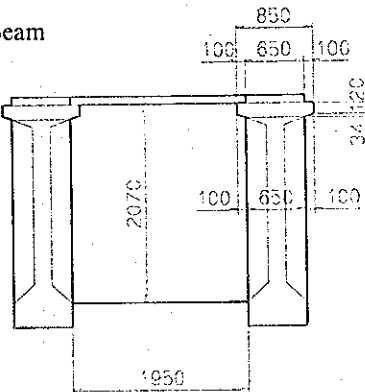
(Approach Bridge CANTHO SIDE-2)
I-Gerder (P41-A2)

Item	Work Item	Unit	Quantity	Remarks	
Bearing	Product layer rubber bearing	Nos	36		
	Anchor Bar	Φ30 L=620	Nos	32	
		Φ50 L=1020	Nos	24	
	Anchor Cap	Φ50 L=550	Nos	24	
		Φ65/50 L=350	Nos	32	
Railing		m	160.0		
		ton	8.7		
Drainage	Pot	Nos	12		
	Pipe	Φ150	m	7.8	
		Φ200	m	134.6	
	Hunger	Φ150	Nos	8	
		Φ200	Nos	88	
Pavement	t=75mm	Aspfalt concrete surface course	sq.m	1,701.3	
	t= 5mm	Water Proofing	sq.m	1,701.3	
		Road Marking	sq.m	68.6	
Concrete Central Reserve	precast L=2000	Nos	38.2		
Erection		ton	92.1	per one dirder	
		Nos.	18.0		
		ton	1,657.2	Total	

1. Concrete

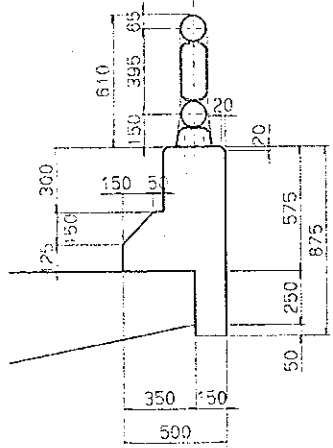
Item	Formula	Quantity																																																			
1. Girder Concrete CLASS "B"	(1) Calculation of Sectional Area [1] Middle Section Summary of Sectional Area For ONE GIRDER <table border="1" style="width:100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width:5%;">No</th> <th style="width:70%;">Formula</th> <th style="width:25%;">(m²)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>0.650×0.080</td> <td>= 0.052</td> </tr> <tr> <td>2</td> <td>0.850×0.120</td> <td>= 0.102</td> </tr> <tr> <td>3</td> <td>$1/2 \times 0.325 \times 0.110 \times 2$</td> <td>= 0.036</td> </tr> <tr> <td></td> <td>0.200×0.110</td> <td>= 0.022</td> </tr> <tr> <td>4</td> <td>1.640×0.200</td> <td>= 0.328</td> </tr> <tr> <td>5</td> <td>$1/2 \times 0.225 \times 0.200 \times 2$</td> <td>= 0.045</td> </tr> <tr> <td></td> <td>0.200×0.200</td> <td>= 0.040</td> </tr> <tr> <td>6</td> <td>0.650×0.250</td> <td>= 0.163</td> </tr> <tr> <td colspan="2" style="text-align: right;">Total Area</td> <td>0.788 m²</td> </tr> </tbody> </table> <div style="text-align: center; margin-top: 20px;"> </div> [2] End Section Summary of Sectional Area For ONE GIRDER <table border="1" style="width:100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width:5%;">No</th> <th style="width:70%;">Formula</th> <th style="width:25%;">(m²)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>0.650×0.080</td> <td>= 0.052</td> </tr> <tr> <td>2</td> <td>0.120×0.850</td> <td>= 0.102</td> </tr> <tr> <td></td> <td>$1/2 \times 0.100 \times 0.034 \times 2$</td> <td>= 0.003</td> </tr> <tr> <td></td> <td>0.650×0.034</td> <td>= 0.022</td> </tr> <tr> <td>3</td> <td>0.650×2.166</td> <td>= 1.408</td> </tr> <tr> <td colspan="2" style="text-align: right;">Total Area</td> <td>1.587 m²</td> </tr> </tbody> </table> <div style="text-align: center; margin-top: 20px;"> </div>	No	Formula	(m ²)	1	0.650×0.080	= 0.052	2	0.850×0.120	= 0.102	3	$1/2 \times 0.325 \times 0.110 \times 2$	= 0.036		0.200×0.110	= 0.022	4	1.640×0.200	= 0.328	5	$1/2 \times 0.225 \times 0.200 \times 2$	= 0.045		0.200×0.200	= 0.040	6	0.650×0.250	= 0.163	Total Area		0.788 m²	No	Formula	(m ²)	1	0.650×0.080	= 0.052	2	0.120×0.850	= 0.102		$1/2 \times 0.100 \times 0.034 \times 2$	= 0.003		0.650×0.034	= 0.022	3	0.650×2.166	= 1.408	Total Area		1.587 m²	
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	<p>(2) Calculation of Concrete Volume</p> <p>[1] P41-A2 Girder Length 39.832 m</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-left: 20px;"> <thead> <tr> <th style="width: 10%;">Section No.</th> <th style="width: 15%;">Section (m²)</th> <th style="width: 15%;">Average of (m²)</th> <th style="width: 15%;">Length of (m)</th> <th style="width: 15%;">Concrete (m³)</th> <th style="width: 30%;">Remark</th> </tr> </thead> <tbody> <tr> <td>END</td> <td>1.587</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>END</td> <td>1.587</td> <td>1.587</td> <td>0.400</td> <td>0.635</td> <td></td> </tr> <tr> <td>MIDDLE</td> <td>0.788</td> <td>1.188</td> <td>6.000</td> <td>7.128</td> <td></td> </tr> <tr> <td>MIDDLE</td> <td>0.788</td> <td>0.788</td> <td>27.032</td> <td>21.301</td> <td></td> </tr> <tr> <td>END</td> <td>1.587</td> <td>1.188</td> <td>6.000</td> <td>7.128</td> <td></td> </tr> <tr> <td>END</td> <td>1.587</td> <td>1.587</td> <td>0.400</td> <td>0.635</td> <td></td> </tr> <tr> <td>Total</td> <td></td> <td></td> <td>39.832</td> <td>36.827</td> <td></td> </tr> </tbody> </table> <p style="margin-left: 40px;">No. of Girder 9 × 2 = 18</p> <p>V= 36.827 × 18 = 662.886 m³</p>	Section No.	Section (m ²)	Average of (m ²)	Length of (m)	Concrete (m ³)	Remark	END	1.587					END	1.587	1.587	0.400	0.635		MIDDLE	0.788	1.188	6.000	7.128		MIDDLE	0.788	0.788	27.032	21.301		END	1.587	1.188	6.000	7.128		END	1.587	1.587	0.400	0.635		Total			39.832	36.827		<p>662.886 m³</p>
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Total			39.832	36.827																																														

Item	Formula	Quantity
2. Diaphragm Concrete CLASS "D-1" 1) Diaphragm	$V1 = \left(\begin{matrix} 0.300 + 0.750 \\ 1.640 + 1.950 \end{matrix} \right) \times \frac{1}{2} \times 0.225 \times 2 = 0.424$ $V = 9 \times 3 \times 2 \times 0.424 = 22.896 \text{ m}^3$ 	22.896 m ³
2) Cross Beam	<p>(1) End Cross Beam</p>  $V2-1 = \left\{ \frac{2.320 \times 1.950 - (0.120 + 0.154) \times 0.100 \times \frac{1}{2}}{2} \right\} \times 0.400 \times 8 \times 2 = 28.778 \text{ m}^3$ <p>(2) Intermediate Cross Beam</p>  $V2-2 = \left\{ \frac{2.070 \times 1.950 - (0.120 + 0.154) \times 0.100 \times \frac{1}{2}}{2} \right\} \times 0.300 \times 8 \times 3 \times 2 = 57.731 \text{ m}^3$	

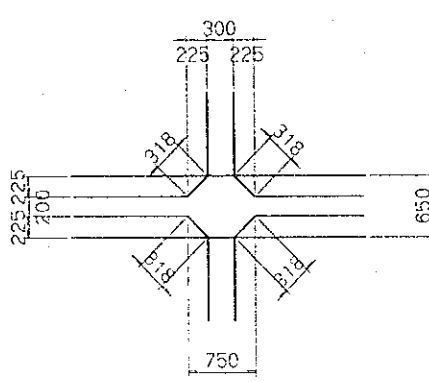
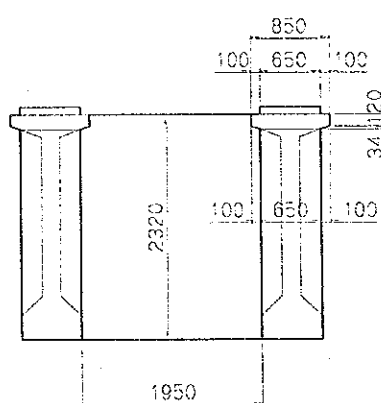
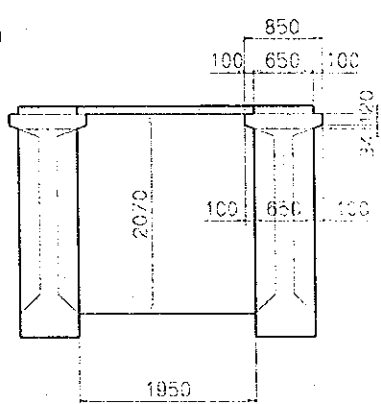
Item	Formula	Quantity
(3) Connection Cross Beam	$V2-3 = \left\{ \begin{array}{l} 2.320 \times 1.950 - (0.120 + 0.154) \times 0.100 \times 1/2 \\ \times 2 \times 2.000 \times 8 \times 1 + 1.587 \times 9 \\ \times 1 \times 0.200 \end{array} \right.$ <p style="text-align: right;">Girder end section area = 74.802 m³</p> <p>Total V2 = 28.778 + 57.731 + 74.802 = 161.311 m³</p>	161.311 m ³
3. Deck Slab Concrete CLASS "D-1"	$A1 = \{ 0.200 + 0.271 \} \times 1/2 \times 0.500 \times 2 = 0.236$ $A2 = \{ 0.271 + 0.308 \} \times 1/2 \times 0.225 \times 2 = 0.130$ $A3 = \{ 0.308 + 0.310 \} \times 1/2 \times 0.100 \times 2 = 0.062$ $A4 = 21.450 \times 0.230 = 4.934$ <p style="text-align: right;">$\Sigma A = 5.362 \text{ m}^2$</p> $V = \frac{5.362 \times (80.000 - 0.200) + 0.336 \times 0.070 \times 22.100}{2} = 426.848 \text{ m}^3$	426.848 m ³

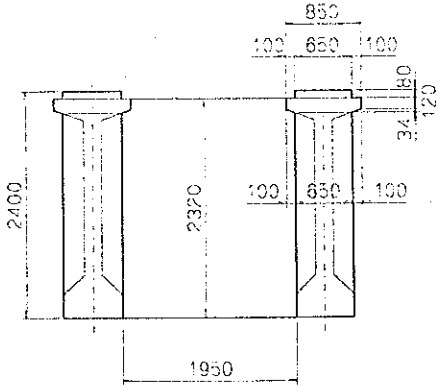
Item	Formula	Quantity
4. Barrier Concrete CLASS "E"	$A1 = 0.300 \times 0.300 = 0.090 \text{ m}^2$	
	$A2 = (0.300 + 0.500) \times \frac{1}{2} \times 0.150 = 0.060 \text{ m}^2$	
	$A3 = 0.500 \times 0.125 = 0.063 \text{ m}^2$	
	$A4 = 0.150 \times 0.300 = 0.045 \text{ m}^2$	
	$A5 = -0.020 \times 0.020 \times \frac{1}{2} \times 2 = -0.001 \text{ m}^2$	
	$A = 0.257 \text{ m}^2$	
	$L = 119.8 \times 4 = 479.200 \text{ m}$	
	$V = 0.257 \times 79.800 \times 2 = 41.017 \text{ m}^3$	41.017 m ³

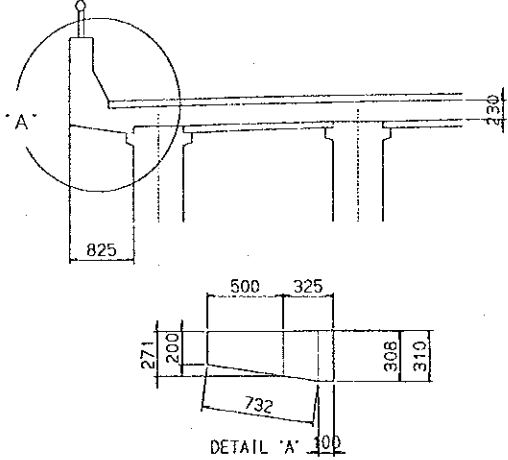
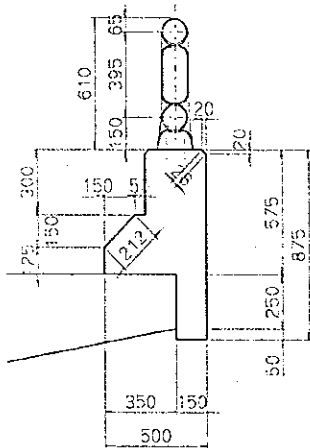


2. Form

Item	Formula	Quantity
1. Girder		
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	1.640×2	= 3.280
5	0.301×2	= 0.602
6	0.250×2	= 0.500
		Total Area 5.468 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
6	2.166×2	= 4.332
		Total Area 4.944 m

Item	Formula	Quantity
<p>2. Diaphragm</p> <p>1) Diaphragm</p>	$a1 = 0.318 \times 2 \times (1.640 + 1.950) \times \frac{1}{2} + 0.300 \times 1.950 = 1.727 \text{ m}^2$ $a2 = 0.318 \times 2 \times (1.640 + 1.950) \times \frac{1}{2} = 1.142 \text{ m}^2$ $A1 = (1.727 \times 2 + 1.142 \times 16) \times 3 \times 2 = 130.356 \text{ m}^2$	
<p>2) Cross Beam</p>	<div style="text-align: center;">  </div> <p>(1) End Cross Beam</p> <div style="text-align: center;">  </div> $A2-1 = [\{ 2.320 \times 1.950 - (0.120 + 0.154) \times 0.100 \} \times 2 + 1.950 \times 0.400] \times 8 \times 2 = 156.371 \text{ m}^2$ <p>(2) Intermediate Cross Beam</p> <div style="text-align: center;">  </div> $A2-2 = [\{ 2.320 \times 1.950 - (0.120 + 0.154) \times 0.100 \} \times 2 + 1.950 \times 0.300] \times 8 \times 3 \times 2 = 459.754 \text{ m}^2$	

Item	Formula	Quantity
	<p data-bbox="316 253 609 286">(3) Connection Cross Beam</p>  $A2-3 = \left[\left\{ 2.320 \times 1.950 - (0.120 + 0.154) \times 0.100 \right\} \times 2 + 1.950 \times 2.000 \right] \times 8 \times 2 = 206.291 \text{ m}^2$ $V2 = 156.371 + 459.754 + 206.291 = 822.416 \text{ m}^2$ $\text{Total } A1 + A2 = 130.356 + 822.416 = 952.772 \text{ m}^2$	<p data-bbox="1278 994 1401 1028">952.772 m²</p>

Item	Formula	Quantity
3. Deck Slab	 $ \begin{aligned} A1 &= (0.200 + 0.732 + 0.100) \times 2 \times (80.000 - 0.200) = 164.707 \text{ m}^2 \\ A2 &= (0.200 + 0.271) \times 1/2 \times 0.500 \times 2 = 0.236 \text{ m}^2 \\ A3 &= (0.271 + 0.308) \times 1/2 \times 0.225 \times 2 = 0.13 \text{ m}^2 \\ A4 &= (0.308 + 0.310) \times 1/2 \times 0.100 \times 2 = 0.062 \text{ m}^2 \\ A5 &= 21.450 \times 0.230 \times 2 = 9.867 \text{ m}^2 \\ \text{Sub-total} &= 175.202 \text{ m}^2 \\ \\ \text{Total A} &= 175.202 \times 1 = 175.202 \text{ m}^2 \end{aligned} $	175.202 m ²
4. Barrier	$ \begin{aligned} A1 &= (0.125 + 0.212 + 0.300 + 0.028 + 0.028 + 0.875 + 0.150 + 0.050) \times 79.800 \times 2 = 282.173 \text{ m}^2 \\ A2 &= 0.300 \times 0.300 = 0.090 \text{ m}^2 \\ A3 &= (0.300 + 0.500) \times 1/2 \times 0.150 = 0.060 \text{ m}^2 \\ A4 &= 0.500 \times 0.125 = 0.063 \text{ m}^2 \\ A5 &= 0.150 \times 0.300 = 0.045 \text{ m}^2 \\ A6 &= -0.020 \times 0.020 \times 1/2 \times 2 = -0.001 \text{ m}^2 \\ \\ A2 \sim A6 &= 0.257 \text{ m}^2 \\ \\ A &= 282.173 + 0.257 \times 4 = 283.201 \text{ m}^2 \end{aligned} $ 	283.201 m ²

4. Reinforcement Bar

4-1. SLAB

SCHEDULE OF REINFORCEMENT												
BAR MARK	SIZE (mm)	DIMENSIONS (mm)						LENGTH (mm)	UNIT WEIGHT (kgf/m)	NO. OF BARS	WEIGHT (kgf)	REMARKS
		a	b	c	d	e	f					
1	25	6500						6500	3.853	185	4,633	
2	25	8250						8250	3.853	185	5,881	
3 - 1	18	10000						10000	1.998	644	12,867	
3 - 2	18	10000						10000	1.998	644	12,867	
4	18	3700						3700	1.998	644	4,761	
5	16	4790						4790	1.578	179	1,353	
6	16	3040						3040	1.578	179	859	
7	16	10000						10000	1.578	358	5,649	
8	16	12000						12000	1.578	716	13,558	
9	16	12000						12000	1.578	558	10,566	
10	14	2610						2610	1.208	186	586	
11	14	3000						3000	1.208	68	246	
12 - 1	14	10000						10000	1.208	350	4,228	
12 - 2	14	10000						10000	1.208	350	4,228	
13	14	3850						3850	1.208	350	1,628	
14	14	1417	199	420				2040	1.208	558	1,375	
15	14	420	199	650	199	420		1890	1.208	2058	4,699	
16	14	109	716	225				1050	1.208	644	817	
								- D14			17,807	
								D16 - D22			62,480	
								D25 -			10,514	
Sub-Total											90,801	

						(kgf)	(ton)
- D14	17,807	×	1	=	17,807	17.8	
D16 - D22	62,480	×	1	=	62,480	62.5	
D25 -	10,514	×	1	=	10,514	10.5	
Total					90,801	90.8	

2. GIRDER

G1,G9

For ONE GIRDER

SCHEDULE OF REINFORCEMENT													
BAR MARK	SIZE (mm)	DIMENSIONS (mm)							LENGTH (mm)	UNIT WEIGHT (kgf/m)	NO. OF BARS	WEIGHT (kgf)	REMARKS
		a	b	c	d	e	f	g					
1	20	354	373	560	384	354			2030	2.466	6	30	
2	20	300	474	373	560	384	474	300	2870	2.466	96	679	
3	20	300	354	373	560	384	354	300	2630	2.466	74	480	
4	16	7870							7870	1.578	12	149	
5	16	7800							7800	1.578	12	148	
6	16	7900							7900	1.578	12	150	
7	16	240	2530	564	2541	240			6120	1.578	6	58	
8	16	240	2532	342	2539	240			5900	1.578	96	894	
9	16	240	2534	114	2536	240			5670	1.578	74	662	
10	12	7868							7870	0.888	28	196	
11	12	7800							7800	0.888	56	388	
12	12	7900							7900	0.888	28	196	
13	12	349	6005	1526					7880	0.888	28	196	
14	12	180	2534	568	2545	180			6010	0.888	6	32	
15	12	180	2538	118	2540	180			5560	0.888	158	780	
16	12	300	362	379	568	390	362	300	2670	0.888	92	218	
17	12	163	568	163					900	0.888	184	147	
18	12	343	50	768	50	343			1560	0.888	184	255	
19	12	180	145	191	568	191	145	180	1600	0.888	48	68	
20	12	180	301	191	568	191	301	180	1920	0.888	126	215	
21	12	1010							1010	0.888	66	59	
22	12	515	197	257	197	55			1230	0.888	14	15	
23	12	100	318	253	318	100			1090	0.888	42	41	
24	12	2100							2100	0.888	8	15	
25	12	400							400	0.888	42	15	
26	12	500							500	0.888	10	4	
27	12	400							400	0.888	12	4	
28	10	3840							3840	0.617	8	19	
29	10	1260							1260	0.617	8	6	
Total									- D14			2,869	
									D16 - D22			3,250	
									D25 -				
									Total			6,119	

G2,G3,G4,G6,G7,G8

For ONE GIRDER

SCHEDULE OF REINFORCEMENT													
BAR MARK	SIZE (mm)	DIMENSIONS (mm)							LENGTH (mm)	UNIT WEIGHT (kgf/m)	NO. OF BARS	WEIGHT (kgf)	REMARKS
		a	b	c	d	e	f	g					
1	20	354	373	560	384	354			2030	2.466	6	30	
2	20	300	474	373	560	384	474	300	2870	2.466	96	679	
3	20	300	354	373	560	384	354	300	2630	2.466	74	480	
4	16	7870							7870	1.578	12	149	
5	16	7800							7800	1.578	12	148	
6	16	7900							7900	1.578	12	150	
7	16	240	2530	564	2541	240			6120	1.578	6	58	
8	16	240	2532	342	2539	240			5900	1.578	96	894	
9	16	240	2534	114	2536	240			5670	1.578	74	662	
10	12	7870							7870	0.888	28	196	
11	12	7800							7800	0.888	56	388	
12	12	7900							7900	0.888	28	196	
13	12	349	6005	1526					7880	0.888	28	196	
14	12	180	2534	568	2545	180			6010	0.888	6	32	
15	12	180	2538	118	2540	180			5560	0.888	158	780	
16	12	300	362	379	568	390	362	300	2670	0.888	92	218	
17	12	163	568	163					900	0.888	184	147	
18	12	343	50	768	50	343			1560	0.888	184	255	
19	12	180	145	191	568	191	145	180	1600	0.888	48	68	
20	12	180	301	191	568	191	301	180	1920	0.888	126	215	
21	12	1470							1470	0.888	66	86	
22	12	515	197	257	197	515			1690	0.888	14	21	
23	12	100	318	253	318	100			1090	0.888	42	41	
24	12	2100							2100	0.888	8	15	
25	12	400							400	0.888	42	15	
26	12	500							500	0.888	10	4	
27	12	400							400	0.888	12	4	
28	10	3840							3840	0.617	8	19	
29	10	1260							1260	0.617	8	6	
									- D14			2,902	
									D16 - D22			3,250	
									D25 -				
									Total			6,152	

SCHEDULE OF REINFORCEMENT														
BAR MARK	SIZE (mm)	DIMENSIONS (mm)							LENGTH (mm)	UNIT WEIGHT (kgf/m)	NO. OF BARS	WEIGHT (kgf)	REMARKS	
		a	b	c	d	e	f	g						
1	20	354	372	560	372	354			2020	2.466	6	30		
2	20	300	474	372	560	372	474	300	2860	2.466	96	677		
3	20	300	354	372	560	372	354	300	2620	2.466	74	478		
4	16	7870							7870	1.578	12	149		
5	16	7800							7800	1.578	12	148		
6	16	7900							7900	1.578	12	150		
7	16	240	2529	564	2529	240			6110	1.578	6	58		
8	16	240	2529	342	2529	240			5880	1.578	96	891		
9	16	240	2529	114	2529	240			5660	1.578	74	661		
10	12	7870							7870	0.888	28	196		
11	12	7800							7800	0.888	56	388		
12	12	7900							7900	0.888	28	196		
13	12	349	6005	1526					7880	0.888	28	196		
14	12	180	2533	568	2533	180			6000	0.888	6	32		
15	12	180	2533	118	2533	180			5550	0.888	158	779		
16	12	300	362	378	568	378	362	300	2650	0.888	92	216		
17	12	163	568	163					900	0.888	184	147		
18	12	343	50	768	50	343			1560	0.888	184	255		
19	12	180	145	191	568	191	145	180	1600	0.888	48	68		
20	12	180	301	191	568	191	301	180	1920	0.888	126	215		
21	12	1470							1470	0.888	66	86		
22	12	515	197	257	197	515			1690	0.888	10	15		
23	12	100	318	253	318	100			1090	0.888	42	41		
24	12	2100							2100	0.888	8	15		
25	12	400							400	0.888	42	15		
26	12	500							500	0.888	10	4		
27	12	400							400	0.888	12	4		
28	10	3840							3840	0.617	8	19		
29	10	1260							1260	0.617	8	6		
Total									- D14				2,893	
									D16 - D22				3,242	
									D25 -					
									Total				6,135	

3) Total Weight

Girder	Nos.	Weight/G	Total	Remark
G1,G9	- D14	2,869	11,476	
	D14 - D25	4	3,250	13,000
	D25 -			
	Sub - Total		24,476	
G2,G3,G4 G6,G7,G8	- D14	2,902	34,824	
	D14 - D25	12	3,250	39,000
	D25 -			
	Sub - Total		73,824	
G5	- D14	2,893	5,786	
	D14 - D25	2	3,242	6,484
	D25 -			
	Sub - Total		12,270	
Total			(kgf)	(ton)
	- D14		52,086	52.1
	D14 - D25		58,484	58.5
	D25 -			
	Total		110,570	110.6

3. DIAPHRAGM

Per EACH

SCHEDULE OF REINFORCEMENT													
(1) END DIAPHRAGM													
BAR MARK	SIZE (mm)	DIMENSIONS (mm)							LENGTH (mm)	UNIT WEIGHT (kgf/m)	NO. OF BARS	WEIGHT (kgf)	REMARKS
		a	b	c	d	e	f	g					
C2	12	100	2530	424	2530	100			5690	0.888	56	283	
C3	12	1850							1850	0.888	144	237	
Sub-Total												520	
(2) INTERMEDIATE DIAPHRAGM													
BAR MARK	SIZE (mm)	DIMENSIONS (mm)							LENGTH (mm)	UNIT WEIGHT (kgf/m)	NO. OF BARS	WEIGHT (kgf)	REMARKS
		a	b	c	d	e	f	g					
C4	12	100	2280	224	2280	100			4990	0.888	56	248	
C5	12	1850							1850	0.888	128	210	
Sub-Total												458	
(3) CONNECTION DIAPHRAGM													
BAR MARK	SIZE (mm)	DIMENSIONS (mm)							LENGTH (mm)	UNIT WEIGHT (kgf/m)	NO. OF BARS	WEIGHT (kgf)	REMARKS
		a	b	c	d	e	f	g					
C1	16	240	1928	240					2410	1.578	120	456	
C6	12	100	2530	774	2530	100			6040	0.888	208	1,116	
C7	12	100	2530	1424	2530	100			6690	0.888	104	618	
C8	12	1962	774	1962					4700	0.888	32	134	
C9	12	1962	1424	1962					5350	0.888	16	76	
C10	12	1850							1850	0.888	304	499	
C11	12	1900							1900	0.888	256	432	
C12	12	####							12000	0.888	10	107	
C13	12	9720							9720	0.888	10	86	
									- D14			3,068	
									D14 - D25			456	
									D25 -				
Sub-Total												3,524	

3) Total Weight

SECTION		Nos.	Weight/EACH	Weight	
				(kgf)	(ton)
END DIAPHRAGM	- D14	2	520	1,040	1.0
	D14 - D25				
	D25 -				
INTERMEDIATE DIAPHRAGM	- D14	6	458	2,748	2.7
	D14 - D25				
	D25 -				
CONNECTION DIAPHRAGM	- D14	1	3068	3,068	3.1
	D14 - D25		456	456	0.5
	D25 -				
Total	- D14			6,856	6.9
	D14 - D25			456	0.5
	D25 -				
	Total			7,312	7.3

4. BARRIER

SCHEDULE OF REINFORCEMENT												
BAR MARK	SIZE (mm)	DIMENSIONS (mm)						LENGTH (mm)	UNIT WEIGHT (kgf/m)	NO. OF BARS	WEIGHT (kgf)	REMARKS
		a	b	c	d	e	f					
P1	14							2030	1.208	1072	2,629	
P2	14							1270	1.208	1072	1,645	
P3	14							9800	1.208	16	189	
P4	14							9900	1.208	32	383	
P5	14							9900	1.208	16	191	
P6	14							12000	1.208	98	1,421	
P7	14							10740	1.208	14	182	
P8	16							1380	1.578	48	105	
								- D14			6,640	
								D16 - D22			105	
								D25 -				
Total Weight											6,745	

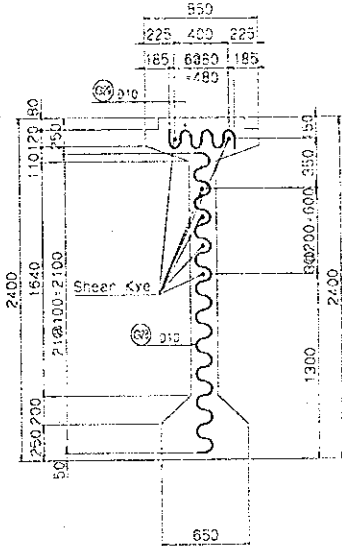
5. P.C. CABLE

Item	Formula						Quantity
1) 12S12.7(B)	1.P41-A2 For ONE GIRDER						
	CABLE VAR.	EACH LENGTH	CABLE NO.	EACH	TOTAL LENGTH	UNIT WEIGHT	WEIGHT
	1	39.590	C1	1	39.590	9.290	367.791
	2	39.558	C2	1	39.558	9.290	367.494
	3	39.530	C3	1	39.530	9.290	367.234
	4	39.504	C4	1	39.504	9.290	366.992
	5	39.474	C5	1	39.474	9.290	366.713
	6	39.450	C6	1	39.450	9.290	366.491
	TOTAL			6	237.106		2202.715
	SUB-TOTAL WEIGHT OF PC CABLES per BRIDGE(A1-P4)						
$W_p = 2202.715 \times 9 \times 2 =$						39648.87 kgf	
						39.6 ton	
TENSION UNIT						EACH	
$N_s = 6 \times 2 \times 9 \times 2 =$						216	
2) 4S12.7B	PC CABLE OF DIAPHRAGMS						
	LOCATION	EACH LENGTH	CABLE NO.	EACH	TOTAL LENGTH	UNIT WEIGHT	WEIGHT
	End Diaphragm	21.366		4	85.5	3.096	264.597
	Intermediate One	21.366		12	256.4	3.096	793.79
	Connection One	21.141		24	507.4	3.096	1570.861
	TOTAL			40	849.240		2629.248
	TOTAL WEIGHT OF PC CABLES per BRIDGE(A1-P12)						
	$W_p = 2629.248 =$						2629.248 kgf
							2.6 ton
	TENSION UNIT						EACH
$N_s = 40 \times 2 =$						80	

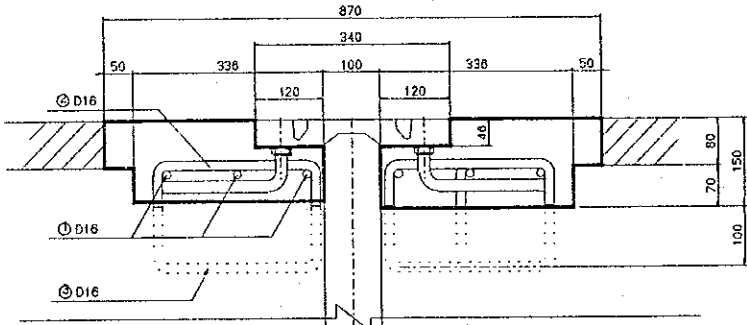
6. Slab Plate

Item	Formula	Quantity																																			
	$A = 1.950 \times 8 \times 39.800 \times 3 \times 2 = 3725.280 \text{ m}^2$	3725.280 m ²																																			
	$V = 3725.28 \times 0.080 = 298.022 \text{ m}^3$	298.022 m ³																																			
Re-bar Per 39.8m																																					
	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>BAR MARK</th> <th>SIZE (mm)</th> <th>LENGTH (mm)</th> <th>WEIGHT/M (kgf/m)</th> <th>WEIGHT /One (kgf)</th> <th>NO. of BARS</th> <th>WEIGHT (kgf)</th> </tr> </thead> <tbody> <tr> <td>S1</td> <td>D 14</td> <td>2070</td> <td>1.208</td> <td>2.501</td> <td>400</td> <td>1,000</td> </tr> <tr> <td>S2</td> <td>D 10</td> <td>12000</td> <td>0.617</td> <td>7.404</td> <td>72</td> <td>533</td> </tr> <tr> <td>S3</td> <td>D 10</td> <td>5190</td> <td>0.617</td> <td>3.202</td> <td>24</td> <td>77</td> </tr> <tr> <td colspan="6"></td> <td>1,610</td> </tr> </tbody> </table>	BAR MARK	SIZE (mm)	LENGTH (mm)	WEIGHT/M (kgf/m)	WEIGHT /One (kgf)	NO. of BARS	WEIGHT (kgf)	S1	D 14	2070	1.208	2.501	400	1,000	S2	D 10	12000	0.617	7.404	72	533	S3	D 10	5190	0.617	3.202	24	77							1,610	
BAR MARK	SIZE (mm)	LENGTH (mm)	WEIGHT/M (kgf/m)	WEIGHT /One (kgf)	NO. of BARS	WEIGHT (kgf)																															
S1	D 14	2070	1.208	2.501	400	1,000																															
S2	D 10	12000	0.617	7.404	72	533																															
S3	D 10	5190	0.617	3.202	24	77																															
						1,610																															
	$W = 1,610 \times 8 \times 2 = 25760 \text{ kgf}$	25760 kgf 25.8 ton																																			
BAR ARRANGEMENT																																					

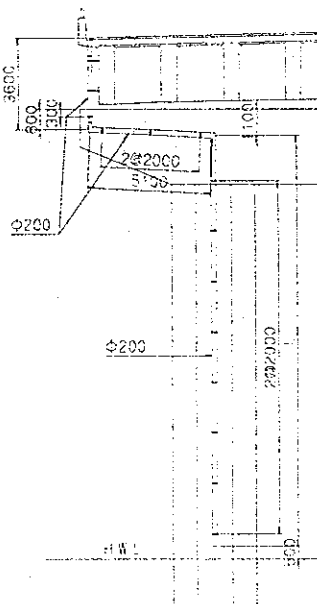
7. Shear Key

Item	Formula	Quantity
	$N = 6 \times 4 \times 9 \times 2$ 	<p style="text-align: right;">Nos</p> <p style="text-align: right;">432</p>

8. ACCESSORY

Item	Formula	Quantity
<p>1. Expansion Joint</p> <p>Nos LENGTH L = 22.100</p> <p>Nos = 1</p> <p>TOTAL LENGTH L = 22.100 × 1 = 22.100 m</p> <p>Concrete</p>  <p style="text-align: center;">per one side</p> <p>A1 = 0.336 × 0.150 - 0.12 × 0.046 = 0.045 A2 = 0.080 × 0.050 = 0.004 Total = 0.049 m² V = 0.049 × 22.100 × 1 = 1.083 m³</p>	<p style="text-align: right;">= 22.100 m</p> <p style="text-align: right;">= 1.083 m³</p>	<p style="text-align: right;">22.100 m</p> <p style="text-align: right;">1.083 m³</p>
<p>2. BEARING PAELASTOMERIC 460*660*108</p> <p>Nos for One SPAN Nos = 9</p> <p>TOTAL Nos Nos = 9 × 4 = 36</p>		<p style="text-align: right;">Nos</p> <p style="text-align: right;">= 36</p>
<p>3. ANCHOR BAR</p> <p>Φ30 L=620 (MOVE) Nos = 8 × 2 × 2 = 32</p> <p>Φ50 L=1020 (FIX) Nos = 8 × 3 × 1 = 24</p>		<p style="text-align: right;">Nos</p> <p style="text-align: right;">= 32</p> <p style="text-align: right;">Nos</p> <p style="text-align: right;">= 24</p>

Item	Formula						Quantity
4. ANCHOR CAP (SGP) 5.Railing	$\Phi 50 \text{ L}=550 \quad (\text{FIX})$						Nos
	$\text{Nos} = 8 \times 3 \times 1 =$						24
	$\Phi 65/50 \text{ L}=350 \quad (\text{MOVE})$						Nos
	$\text{Nos} = 8 \times 2 \times 2 =$						32
$\text{L} = 80.000 \times 2 =$						160.00 m	
per 10m							
Item	Size	Material	Unit Weight	Quantity	Unit	WEIGHT (kgf)	
Post	610*180*130	FCD-450	18.1	5	each	90.5	
Upper Rail	114.3*3.5T	STK-400	19.5	10	m	195.0	
Bottom Rail	76.392.5T	STK-400	5.77	10	m	57.7	
	90*300	STK-400	2.13	1.67	each	3.6	
Connction	87.5*300	STK-400	1.4	1.67	each	2.3	
Anchor Bolt	M22-650	SS-400	2.9	20	each	58.0	
Vertical Member	FBB*32*300	SS-400	2.09	65	each	135.9	
Total						542.9	
$W = 542.9 \times 160.000 \times 0.1 =$						8,686.4 kgf	
						8.7 ton	

Item	Formula	Quantity							
6. Drainage	Pot 300*250 (Drain Box, Screen and Deck Drain) $N = 3 \times 2 \times 2 = 12$	Nos. 12							
	Pipe $\Phi 150$ $L = 0.98 \times 2 \times 2 \times 2 = 7.8 \text{ m}$	7.8 m							
	Pipe $\Phi 200$ $L1 = (3.60 \times 2 + 26.000 \times 2 + 5.10) \times 2 = 128.6 \text{ m}$								
	$L2 = 3.0 \times 2 = 6.0 \text{ m}$								
	$\text{Total} = 134.6 \text{ m}$	134.6 m							
 <table border="1" data-bbox="829 896 1085 1030"> <thead> <tr> <th></th> <th>L 2</th> </tr> </thead> <tbody> <tr> <td>P42</td> <td>2.3</td> </tr> <tr> <td>A2</td> <td>0.7</td> </tr> <tr> <td>Total</td> <td>3.0</td> </tr> </tbody> </table>		L 2	P42	2.3	A2	0.7	Total	3.0	
	L 2								
P42	2.3								
A2	0.7								
Total	3.0								

Item	Formula	Quantity																									
	<p>Hunger $\Phi 150$</p> $N = 2 \times 2 \times 2 = 8$	each 8																									
	per One																										
	<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>BAR MARK</th> <th>SIZE (mm)</th> <th>WEIGHT /One (kgf)</th> <th>NO. of BARS</th> <th>WEIGHT (kgf)</th> </tr> </thead> <tbody> <tr> <td>PL</td> <td>100*6*399</td> <td>0.188</td> <td>2</td> <td>0.376</td> </tr> <tr> <td>PL</td> <td>100*6*363</td> <td>0.171</td> <td>1</td> <td>0.171</td> </tr> <tr> <td>PL</td> <td>100*8*70</td> <td>0.044</td> <td>1</td> <td>0.044</td> </tr> <tr> <td colspan="4"></td> <td style="text-align: right;">0.591</td> </tr> </tbody> </table>	BAR MARK	SIZE (mm)	WEIGHT /One (kgf)	NO. of BARS	WEIGHT (kgf)	PL	100*6*399	0.188	2	0.376	PL	100*6*363	0.171	1	0.171	PL	100*8*70	0.044	1	0.044					0.591	0.591 kgf
BAR MARK	SIZE (mm)	WEIGHT /One (kgf)	NO. of BARS	WEIGHT (kgf)																							
PL	100*6*399	0.188	2	0.376																							
PL	100*6*363	0.171	1	0.171																							
PL	100*8*70	0.044	1	0.044																							
				0.591																							
	<p>Hunger $\Phi 200$</p> $N1 = ((26.000 - 2.000) / 2.000 + 1) \times 2 = 26$ $N2 = (3 + 3) \times 2 = 12$ $N3 = (2 + 1) \times 2 = 6$ <p style="text-align: right;">Sub-Total 44</p> $N = 44 \times 2 = 88$	each 88																									
	per One																										
	<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>BAR MARK</th> <th>SIZE (mm)</th> <th>WEIGHT /One (kgf)</th> <th>NO. of BARS</th> <th>WEIGHT (kgf)</th> </tr> </thead> <tbody> <tr> <td>PL</td> <td>100*6*481</td> <td>0.227</td> <td>2</td> <td>0.454</td> </tr> <tr> <td>PL</td> <td>100*6*363</td> <td>0.171</td> <td>1</td> <td>0.171</td> </tr> <tr> <td>PL</td> <td>100*8*70</td> <td>0.044</td> <td>1</td> <td>0.044</td> </tr> <tr> <td colspan="4"></td> <td style="text-align: right;">0.669</td> </tr> </tbody> </table>	BAR MARK	SIZE (mm)	WEIGHT /One (kgf)	NO. of BARS	WEIGHT (kgf)	PL	100*6*481	0.227	2	0.454	PL	100*6*363	0.171	1	0.171	PL	100*8*70	0.044	1	0.044					0.669	0.669 kgf
BAR MARK	SIZE (mm)	WEIGHT /One (kgf)	NO. of BARS	WEIGHT (kgf)																							
PL	100*6*481	0.227	2	0.454																							
PL	100*6*363	0.171	1	0.171																							
PL	100*8*70	0.044	1	0.044																							
				0.669																							
	<p style="text-align: center;">17@2000*34000</p>																										

9. PAVEMENT

Item	Formula	Quantity
1) Asphalt Concrete t=75mm	$A = 10.750 \times 2 \times (80.000 - \overset{\text{Exp}}{0.870}) = 1701.3 \text{ m}^2$	1,701.3 m ²
2) Water Proofing t=5mm	$A = 10.750 \times 2 \times (80.000 - 0.870) = 1701.3 \text{ m}^2$	1,701.3 m ²
4) Road marking	<p>Bridge Length $L = 80.000 - 0.200 = 79.800 \text{ m}$</p> <p>Side Line</p> $A1 = 79.800 \times 0.200 \times 4 = 63.840 \text{ m}^2$ <p>Center Line</p> $A2 = 79.800 \times 0.100 \times \frac{3}{10} \times 2 = 4.788 \text{ m}^2$ <p>Total $63.840 + 4.788 = 68.6 \text{ m}^2$</p>	68.6 m ²

10. Precast central reverse

Item	Formula	Quantity
1. Concrete	$N = \frac{(80.000 - 0.800 \times 4 - 0.170 \times 2) \times 2}{2.000}$ <p style="text-align: right;">Nos</p> <p style="text-align: right;">= 38.2</p>	38.2
	<div style="text-align: center;"> </div> <p style="text-align: right;">Per 2.0m</p> $V1 = \{ 0.150 + 0.250 \} \times \frac{1}{2} \times 0.500 \times 1.990 = 0.199$ $V2 = \{ 0.250 + 0.600 \} \times \frac{1}{2} \times 0.200 \times 1.990 = 0.169$ $V3 = 0.100 \times 0.600 \times 1.990 = 0.119$ $V4 = - \{ 0.100 + 0.150 \} \times \frac{1}{2} \times 0.125 \times 0.143 \times \frac{1}{2} \times 10 = -0.089$ $V5 = - 0.015 \times 0.015 \times \frac{1}{2} \times 2 \times 1.990 = -0.001$ <p style="text-align: right;">$\Sigma V = 0.397 \text{ m}^3$</p>	0.397 m ³

Item	Formula	Quantity																																										
2). Form	<p style="text-align: right;">Per 2.0m</p> $ \begin{aligned} A1 &= \{ 0.100 + 0.266 + 0.487 + 0.022 \} \times 2 \times 1.990 = 3.483 \\ A2 &= \{ 0.150 + 0.250 \} \times 1/2 \times 0.500 \times 2 = 0.200 \\ A3 &= \{ 0.250 + 0.600 \} \times 1/2 \times 0.200 \times 2 = 0.170 \\ A4 &= 0.100 \times 0.600 \times 2 = 0.120 \\ A5 &= - 0.015 \times 0.015 \times 1/2 \times 2 \times 2 = -0.001 \\ A6 &= 0.125 \times 0.143 \times 10 = 0.179 \\ A7 &= 0.143 \times 0.145 \times 1/2 \times 2 \times 10 = 0.208 \\ A8 &= - 0.266 \times 0.125 \times 10 = -0.333 \\ \Sigma A &= 4.026 \text{ m}^2 \end{aligned} $	<p style="text-align: right;">4.026 m²</p>																																										
3) Re-Bar	<p style="text-align: right;">Per 2.0m</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>BAR MARK</th> <th>SIZE (mm)</th> <th>LENGTH (mm)</th> <th>WEIGHT/M (kgf/m)</th> <th>WEIGHT /One (kgf)</th> <th>NO. of BARS</th> <th>WEIGHT (kgf)</th> </tr> </thead> <tbody> <tr> <td>B1</td> <td>6</td> <td>1460</td> <td>0.222</td> <td>0.324</td> <td>20</td> <td>6</td> </tr> <tr> <td>B2</td> <td>6</td> <td>590</td> <td>0.222</td> <td>0.131</td> <td>20</td> <td>3</td> </tr> <tr> <td>B3</td> <td>6</td> <td>1540</td> <td>0.222</td> <td>0.342</td> <td>10</td> <td>3</td> </tr> <tr> <td>B4</td> <td>6</td> <td>1910</td> <td>0.222</td> <td>0.424</td> <td>14</td> <td>6</td> </tr> <tr> <td colspan="6"></td> <td style="text-align: right;">18</td> </tr> </tbody> </table> <p style="text-align: right;">18 kgf</p>	BAR MARK	SIZE (mm)	LENGTH (mm)	WEIGHT/M (kgf/m)	WEIGHT /One (kgf)	NO. of BARS	WEIGHT (kgf)	B1	6	1460	0.222	0.324	20	6	B2	6	590	0.222	0.131	20	3	B3	6	1540	0.222	0.342	10	3	B4	6	1910	0.222	0.424	14	6							18	<p style="text-align: right;">18 kgf</p>
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4) STUD, PL (SS400)	<p style="text-align: right;">Per 2.0m</p> <p>10-STUD Φ22*180 10-PL 70*12*70</p>	<p style="text-align: right;">6 kgf 3 kgf</p>																																										

Item	Formula	Quantity
5) MORTAR		Per 2.0m
	$V = 0.600 \times 0.030 \times 2.000$	$= 0.036 \text{ m}^3$
6) FILL MORTAR		Per 2.0m
	$A2 = \{ 0.150 + 0.250 \} \times 1/2 \times 0.500 = 0.100$	
	$A3 = \{ 0.250 + 0.600 \} \times 1/2 \times 0.200 = 0.085$	
	$A4 = 0.100 \times 0.600 = 0.060$	
	$A5 = - 0.015 \times 0.015 \times 1/2 \times 2 = -0.001$	
	$\Sigma A = 0.244 \text{ m}^2$	
	$V1 = 0.244 \times 0.010 = 0.002 \text{ m}^3$	
	$V2 = 0.125 \times 0.143 \times 1/2 \times 0.125 \times 10 = 0.011 \text{ m}^3$	
	$\Sigma V = 0.013 \text{ m}^3$	0.013 m ³

11. Erection of girder

Item	Formula	Quantity
1) ERECTION LOAD	(1) Calculation of Sectional Area	
[1] Middle Section	Summary of Sectional Area For ONE GIRDER	
No	Formula (m2)	
1	$0.650 \times 0.080 = 0.052$	
2	$0.850 \times 0.120 = 0.102$	
3	$1/2 \times 0.325 \times 0.110 \times 2 = 0.036$ $0.200 \times 0.110 = 0.022$	
4	$1.640 \times 0.200 = 0.328$	
5	$1/2 \times 0.225 \times 0.200 \times 2 = 0.045$ $0.200 \times 0.200 = 0.040$	
6	$0.650 \times 0.250 = 0.163$	
Total Area		0.788 m ²
[2] End Section	Summary of Sectional Area For ONE GIRDER	
No	Formula (m2)	
1	$0.650 \times 0.080 = 0.052$	
2	$0.120 \times 0.850 = 0.102$	
3	$1/2 \times 0.100 \times 0.034 \times 2 = 0.003$ $0.650 \times 0.034 = 0.022$	
3	$0.650 \times 2.166 = 1.408$	
Total Area		1.587 m ²

Item	Formula	Quantity																																																
	<p>Concrete Volume</p> <p style="text-align: right;">Girder Length 39.832 m</p> <table border="1" style="width: 100%; border-collapse: collapse; margin: 10px 0;"> <thead> <tr> <th style="width: 10%;">Section No.</th> <th style="width: 15%;">Section Area (m2)</th> <th style="width: 15%;">Average of Section (m2)</th> <th style="width: 15%;">Length of Block (m)</th> <th style="width: 15%;">Concrete Volume (m3)</th> <th style="width: 20%;">Remark</th> </tr> </thead> <tbody> <tr> <td>END</td> <td>1.587</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>END</td> <td>1.587</td> <td>1.587</td> <td>0.400</td> <td>0.635</td> <td></td> </tr> <tr> <td>MIDDLE</td> <td>0.788</td> <td>1.188</td> <td>6.000</td> <td>7.128</td> <td></td> </tr> <tr> <td>MIDDLE</td> <td>0.788</td> <td>0.788</td> <td>27.032</td> <td>21.301</td> <td></td> </tr> <tr> <td>END</td> <td>1.587</td> <td>1.188</td> <td>6.000</td> <td>7.128</td> <td></td> </tr> <tr> <td>END</td> <td>1.587</td> <td>1.587</td> <td>0.400</td> <td>0.635</td> <td></td> </tr> <tr> <td>Total</td> <td></td> <td></td> <td>39.832</td> <td>36.827</td> <td></td> </tr> </tbody> </table>	Section No.	Section Area (m2)	Average of Section (m2)	Length of Block (m)	Concrete Volume (m3)	Remark	END	1.587					END	1.587	1.587	0.400	0.635		MIDDLE	0.788	1.188	6.000	7.128		MIDDLE	0.788	0.788	27.032	21.301		END	1.587	1.188	6.000	7.128		END	1.587	1.587	0.400	0.635		Total			39.832	36.827		
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	<p>Erection Weight</p> <p style="padding-left: 20px;">per one girder</p> <p>W = 36.827 × 2500</p>	<p>(kgf)</p> <p>92067.5</p> <p>(ton)</p> <p>92.1</p> <p>Nos.</p>																																																
	<p>Nos. = 9 × 2</p>	<p>= 18</p>																																																
	<p>W = 92067.5 × 18</p>	<p>(kgf)</p> <p>= 1,657,215</p> <p>(ton)</p> <p>1,657.2</p>																																																

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