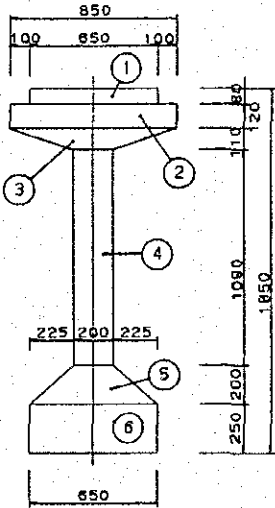
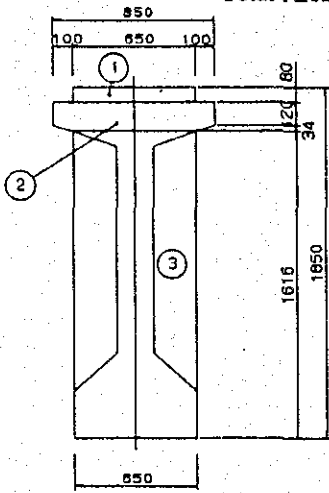


3.7. Cai Rang bridge

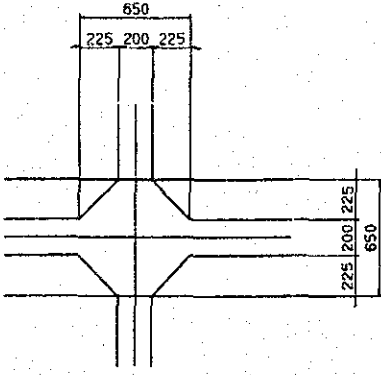
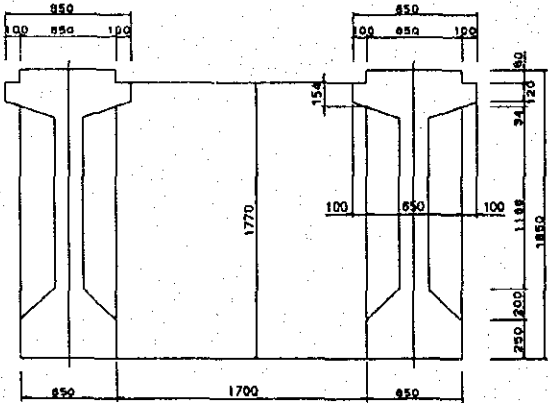
1.Quantity of Superstructure

Approach Bridge

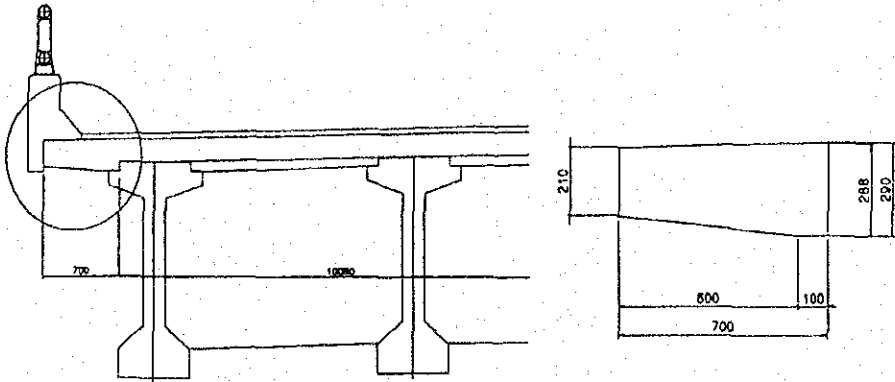
Item		Work Item	Unit	Quantity	Remarks	
Concrete	CLASS B	Girder	cu.m	765.6	$\sigma_{ck}=40\text{Mpa}$	
	CLASS D-1	Deck Slab	cu.m	164.9	$\sigma_{ck}=30\text{Mpa}$	
		Diaphragm	cu.m	86.8		
		Total	cu.m	251.6		
Form		Deck Slab	sq.m	563.8		
		Girder	sq.m	8616.9		
		Diaphragm	sq.m	493.2		
		Total	sq.m	9673.9		
Re-bar		Deck Slab	- D14	ton	37.2	
			D14 - D25	ton	129.2	
			D25 -	ton		
			Total	ton	166.4	
		Girder	- D14	ton	23.4	
			D14 - D25	ton	134.4	
			D25 -	ton	-	
			Total	ton	157.8	
		Diaphragm	- D14	ton	46.4	
			D14 - D25	ton	165.6	
			D25 -	ton	-	
			Total	ton	212.0	
		Total	- D14	ton	107.0	
			D14 - D25	ton	429.2	
			D25 -	ton	0.0	
			Total	ton	536.3	
PC Cable	12S12.7B		ton	39.6	SWPR7B	
	3S12.7B	Transverse Tendons	ton	0.6		
Sheathing	Φ 80/85		m	4259.4		
	Φ 50/55		m	723.6		
	Sement Grout in Sheathing			m ³	22.8	
Expansion Joint		Type A	m	64.5		
Pavement	t=70mm	Aspfalt concrete surface course	sq.m	2128.5		
	t=5mm	Water proofing	sq.m	2128.5		
		Road Marking	sq.m	99.0		
Bearing		Product layer rubber bearing	600*300*57	nos	20	
			550*300*57	nos	40	
		Anchor Bar	Φ 75 L=1550	nos	48	
		Anchor Cap	Φ 95 L=800	nos	32	
			Φ 125 L=800	nos	16	
Concrete Form			sq.m	336.6		
			cu.m	26.9		
		D14	ton	3.2		
Shear Key			nos	300		
Erection			ton	71.4	per one girder(MAX)	
			ton	1914.1	Total	

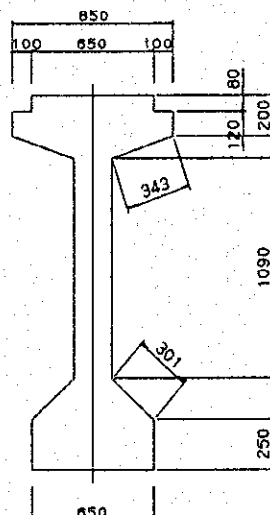
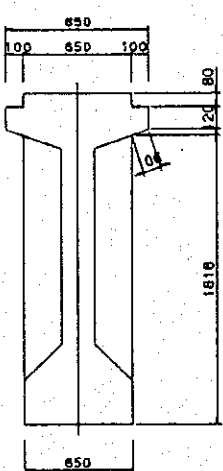
Item	Formula	Quantity																											
1. Girder Concrete CLASS "B" 1) Girder	<p>(1) Calculation of Sectional Area</p> <p>[1] Middle Section</p> <p>Summary of Sectional Area For ONE GIRDER</p> <table border="1" data-bbox="347 439 1082 741"> <thead> <tr> <th>No</th> <th>Formula</th> <th>(m²)</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>1.090×0.200</td> <td>= 0.218</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> </tbody> </table> <p style="text-align: right;">Total Area 0.678 m²</p> 	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	1.090×0.200	= 0.218	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	
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	1.090×0.200	= 0.218																											
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																											
	<p>[2] End Section</p> <p>Summary of Sectional Area For ONE GIRDER</p> <table border="1" data-bbox="347 1379 1082 1581"> <thead> <tr> <th>No</th> <th>Formula</th> <th>(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>0.650×1.616</td> <td>= 1.050</td> </tr> </tbody> </table> <p style="text-align: right;">Total Area 1.229 m²</p> 	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	0.650×1.616	= 1.050										
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	0.650×1.616	= 1.050																											

Item	Formula	Quantity																																																																																																
	<p>(2) Calculation of Concrete Volume</p> <p style="text-align: right;">Girder Length 31.000 m</p> <table border="1"> <thead> <tr> <th>Section No.</th> <th>Section Area (m²)</th> <th>Average of Section (m²)</th> <th>Length of Block (m)</th> <th>Concrete Volume (m³)</th> <th>Remark</th> </tr> </thead> <tbody> <tr> <td>END</td> <td>1.229</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>END</td> <td>1.229</td> <td>1.229</td> <td>0.500</td> <td>0.615</td> <td></td> </tr> <tr> <td>MIDDLE</td> <td>0.678</td> <td>0.954</td> <td>4.400</td> <td>4.198</td> <td></td> </tr> <tr> <td>MIDDLE</td> <td>0.678</td> <td>0.678</td> <td>21.200</td> <td>14.374</td> <td></td> </tr> <tr> <td>END</td> <td>1.229</td> <td>0.954</td> <td>4.400</td> <td>4.198</td> <td></td> </tr> <tr> <td>END</td> <td>1.229</td> <td>1.229</td> <td>0.500</td> <td>0.615</td> <td></td> </tr> <tr> <td>Total</td> <td></td> <td></td> <td>31.000</td> <td>24</td> <td></td> </tr> </tbody> </table> <p style="text-align: center;">No. of Girder 5 × 1 = 5</p> <p>V1= 24.000 × 5 × 4 = 480.000 m³</p> <p style="text-align: right;">Girder Length 37.000 m</p> <table border="1"> <thead> <tr> <th>Section No.</th> <th>Section Area (m²)</th> <th>Average of Section (m²)</th> <th>Length of Block (m)</th> <th>Concrete Volume (m³)</th> <th>Remark</th> </tr> </thead> <tbody> <tr> <td>END</td> <td>1.229</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>END</td> <td>1.229</td> <td>1.229</td> <td>0.500</td> <td>0.615</td> <td></td> </tr> <tr> <td>MIDDLE</td> <td>0.678</td> <td>0.954</td> <td>5.300</td> <td>5.056</td> <td></td> </tr> <tr> <td>MIDDLE</td> <td>0.678</td> <td>0.678</td> <td>25.400</td> <td>17.221</td> <td></td> </tr> <tr> <td>END</td> <td>1.229</td> <td>0.954</td> <td>5.300</td> <td>5.056</td> <td></td> </tr> <tr> <td>END</td> <td>1.229</td> <td>1.229</td> <td>0.500</td> <td>0.615</td> <td></td> </tr> <tr> <td>Total</td> <td></td> <td></td> <td>37.000</td> <td>28.563</td> <td></td> </tr> </tbody> </table> <p style="text-align: center;">No. of Girder 5 × 1 = 5</p> <p>V2= 28.563 × 5 × 2 = 285.630 m³</p> <p style="text-align: right;">Σ A = 765.630 m³ 765.63 m³</p>	Section No.	Section Area (m ²)	Average of Section (m ²)	Length of Block (m)	Concrete Volume (m ³)	Remark	END	1.229					END	1.229	1.229	0.500	0.615		MIDDLE	0.678	0.954	4.400	4.198		MIDDLE	0.678	0.678	21.200	14.374		END	1.229	0.954	4.400	4.198		END	1.229	1.229	0.500	0.615		Total			31.000	24		Section No.	Section Area (m ²)	Average of Section (m ²)	Length of Block (m)	Concrete Volume (m ³)	Remark	END	1.229					END	1.229	1.229	0.500	0.615		MIDDLE	0.678	0.954	5.300	5.056		MIDDLE	0.678	0.678	25.400	17.221		END	1.229	0.954	5.300	5.056		END	1.229	1.229	0.500	0.615		Total			37.000	28.563		
Section No.	Section Area (m ²)	Average of Section (m ²)	Length of Block (m)	Concrete Volume (m ³)	Remark																																																																																													
END	1.229																																																																																																	
END	1.229	1.229	0.500	0.615																																																																																														
MIDDLE	0.678	0.954	4.400	4.198																																																																																														
MIDDLE	0.678	0.678	21.200	14.374																																																																																														
END	1.229	0.954	4.400	4.198																																																																																														
END	1.229	1.229	0.500	0.615																																																																																														
Total			31.000	24																																																																																														
Section No.	Section Area (m ²)	Average of Section (m ²)	Length of Block (m)	Concrete Volume (m ³)	Remark																																																																																													
END	1.229																																																																																																	
END	1.229	1.229	0.500	0.615																																																																																														
MIDDLE	0.678	0.954	5.300	5.056																																																																																														
MIDDLE	0.678	0.678	25.400	17.221																																																																																														
END	1.229	0.954	5.300	5.056																																																																																														
END	1.229	1.229	0.500	0.615																																																																																														
Total			37.000	28.563																																																																																														

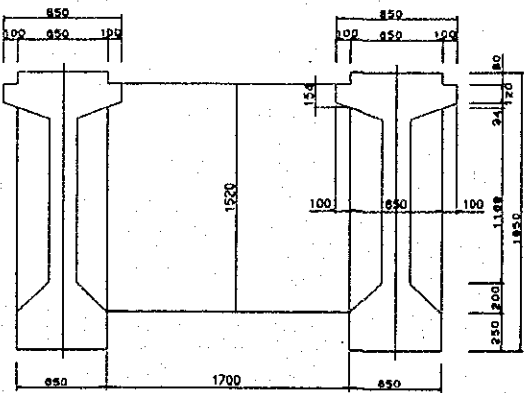
Item	Formula	Quantity
2. Diaphragm Concrete CLASS "D-1" 1) Diaphragm	 $V = \left(\frac{0.200 + 0.650}{2} \right) \times 1/2 \times 0.225 \times 2 = 0.235$ $N1 = 5 \times 3 \times 2 = 30$ $N2 = 5 \times 3 \times 2 = 30$ $N3 = 5 \times 2 \times 2 = 20$ $N4 = 5 \times 3 \times 2 = 30$ $N = 110$ $V1 = 0.235 \times 56 = 13.160 \text{ m}^3$	
2) Cross Beam	(1) End Cross Beam 	
	$V2-1 = \left\{ \frac{1.770 \times 1.700}{2} - \frac{(0.120 + 0.154) \times 0.100}{4} \right\} \times 12 = 71.558 \text{ m}^3$	

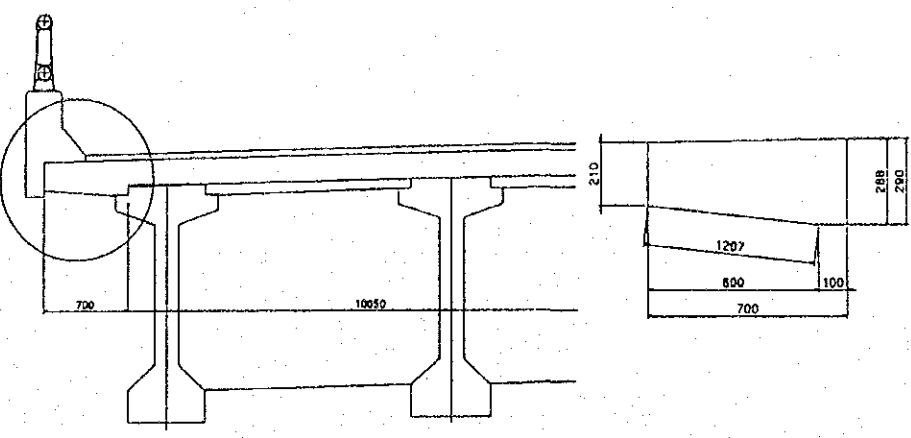
Item	Formula	Quantity
	<p>(2) Intermediate Cross Beam</p> <p> $V = \left\{ 1.520 \times 1.700 - \frac{(0.120 + 0.154) \times 1.700}{2} \right\} \times 0.100 \times 2 = 2.045 \text{ m}^3$ </p> <p> $N1 = 4 \times 3 \times 2 = 24$ $N2 = 4 \times 3 \times 2 = 24$ $N3 = 4 \times 2 \times 2 = 16$ $N4 = 4 \times 3 \times 2 = 24$ $N = 88$ </p> <p> $V2-2 = 2.045 \times 14 = 28.630 \text{ m}^3$ </p> <p> $V2 = 71.558 + 2.045 = 73.603 \text{ m}^3$ </p> <p> Total 86.763 m^3 </p>	<p>86.763 m³</p>

Item	Formula	Quantity
3. Deck Slab Concrete CLASS "D-1"	 $ \begin{aligned} A1 &= (0.21 + 0.288) \times \frac{1}{2} \times 0.600 \times 2 = 0.299 \\ A2 &= (0.288 + 0.290) \times \frac{1}{2} \times 0.100 \times 2 = 0.058 \\ A3 &= 10.050 \times 0.210 = 2.111 \\ \Sigma A &= 2.468 \text{ m}^2 \\ L1 &= 31.000 - 0.200 \times 4 = 30.200 \\ L2 &= 37.000 - 0.200 \times 2 = 36.600 \\ L &= 66.800 \\ V &= 2.468 \times 66.800 = 164.862 \end{aligned} $	164.862 m ³

Item	Formula	Quantity																																										
1. Girder																																												
1) Girder	<p>(1) Calculation of Sectional Area</p> <p>[1] Middle Section</p> <p>Summary of Sectional Length For ONE GIRDER</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 10px;"> <thead> <tr> <th style="width: 5%;">No</th> <th style="width: 60%;">Formula</th> <th style="width: 35%;">(m)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>0.080×2</td> <td>= 0.160</td> </tr> <tr> <td>2</td> <td>0.120×2</td> <td>= 0.240</td> </tr> <tr> <td>3</td> <td>0.343×2</td> <td>= 0.686</td> </tr> <tr> <td>4</td> <td>1.090×2</td> <td>= 2.180</td> </tr> <tr> <td>5</td> <td>0.301×2</td> <td>= 0.602</td> </tr> <tr> <td>6</td> <td>0.250×2</td> <td>= 0.500</td> </tr> <tr> <td colspan="2" style="text-align: right;">Total Area</td> <td>4.368 m</td> </tr> </tbody> </table>  <p>[2] End Section</p> <p>Summary of Sectional Length For ONE GIRDER</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 10px;"> <thead> <tr> <th style="width: 5%;">No</th> <th style="width: 60%;">Formula</th> <th style="width: 35%;">(m)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>0.080×2</td> <td>= 0.160</td> </tr> <tr> <td>2</td> <td>0.120×2</td> <td>= 0.240</td> </tr> <tr> <td>3</td> <td>0.106×2</td> <td>= 0.212</td> </tr> <tr> <td>4</td> <td>1.616×2</td> <td>= 3.232</td> </tr> <tr> <td colspan="2" style="text-align: right;">Total Area</td> <td>3.844 m</td> </tr> </tbody> </table> 	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	= 0.500	Total Area		4.368 m	No	Formula	(m)	1	0.080×2	= 0.160	2	0.120×2	= 0.240	3	0.106×2	= 0.212	4	1.616×2	= 3.232	Total Area		3.844 m	
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	= 0.500																																										
Total Area		4.368 m																																										
No	Formula	(m)																																										
1	0.080×2	= 0.160																																										
2	0.120×2	= 0.240																																										
3	0.106×2	= 0.212																																										
4	1.616×2	= 3.232																																										
Total Area		3.844 m																																										

Item	Formula	Quantity																																																						
	(2) Calculation of Form Area																																																							
	Girder Length 31.000 m																																																							
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Section No.</th> <th>Section Length (m)</th> <th>Average of Section (m)</th> <th>Length of Block (m)</th> <th>Form Area (m²)</th> <th>Remark</th> </tr> </thead> <tbody> <tr> <td>END</td> <td>3.844</td> <td></td> <td></td> <td>1.229</td> <td>End-sec</td> </tr> <tr> <td>END</td> <td>3.844</td> <td>3.844</td> <td>0.500</td> <td>1.922</td> <td></td> </tr> <tr> <td>MIDDLE</td> <td>4.368</td> <td>4.106</td> <td>4.400</td> <td>18.066</td> <td></td> </tr> <tr> <td>MIDDLE</td> <td>4.368</td> <td>4.368</td> <td>21.200</td> <td>92.602</td> <td></td> </tr> <tr> <td>END</td> <td>3.844</td> <td>4.106</td> <td>4.400</td> <td>18.066</td> <td></td> </tr> <tr> <td>END</td> <td>3.844</td> <td>3.844</td> <td>0.500</td> <td>1.922</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>1.229</td> <td>End-sec</td> </tr> <tr> <td>Total</td> <td></td> <td></td> <td>31.000</td> <td>135.036</td> <td></td> </tr> </tbody> </table>	Section No.	Section Length (m)	Average of Section (m)	Length of Block (m)	Form Area (m ²)	Remark	END	3.844			1.229	End-sec	END	3.844	3.844	0.500	1.922		MIDDLE	4.368	4.106	4.400	18.066		MIDDLE	4.368	4.368	21.200	92.602		END	3.844	4.106	4.400	18.066		END	3.844	3.844	0.500	1.922						1.229	End-sec	Total			31.000	135.036		
Section No.	Section Length (m)	Average of Section (m)	Length of Block (m)	Form Area (m ²)	Remark																																																			
END	3.844			1.229	End-sec																																																			
END	3.844	3.844	0.500	1.922																																																				
MIDDLE	4.368	4.106	4.400	18.066																																																				
MIDDLE	4.368	4.368	21.200	92.602																																																				
END	3.844	4.106	4.400	18.066																																																				
END	3.844	3.844	0.500	1.922																																																				
				1.229	End-sec																																																			
Total			31.000	135.036																																																				
	No. of Girder 5 × 2 = 10																																																							
A1	= 135.036 × 10 × 4	= 5401.440 m ²																																																						
	Girder Length 37.000 m																																																							
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Section No.</th> <th>Section Length (m)</th> <th>Average of Section (m)</th> <th>Length of Block (m)</th> <th>Form Area (m²)</th> <th>Remark</th> </tr> </thead> <tbody> <tr> <td>END</td> <td>3.844</td> <td></td> <td></td> <td>1.229</td> <td>End-sec</td> </tr> <tr> <td>END</td> <td>3.844</td> <td>3.844</td> <td>0.500</td> <td>1.922</td> <td></td> </tr> <tr> <td>MIDDLE</td> <td>4.368</td> <td>4.106</td> <td>5.300</td> <td>21.762</td> <td></td> </tr> <tr> <td>MIDDLE</td> <td>4.368</td> <td>4.368</td> <td>25.400</td> <td>110.947</td> <td></td> </tr> <tr> <td>END</td> <td>3.844</td> <td>4.106</td> <td>5.300</td> <td>21.762</td> <td></td> </tr> <tr> <td>END</td> <td>3.844</td> <td>3.844</td> <td>0.500</td> <td>1.922</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>1.229</td> <td>End-sec</td> </tr> <tr> <td>Total</td> <td></td> <td></td> <td>37.000</td> <td>160.773</td> <td></td> </tr> </tbody> </table>	Section No.	Section Length (m)	Average of Section (m)	Length of Block (m)	Form Area (m ²)	Remark	END	3.844			1.229	End-sec	END	3.844	3.844	0.500	1.922		MIDDLE	4.368	4.106	5.300	21.762		MIDDLE	4.368	4.368	25.400	110.947		END	3.844	4.106	5.300	21.762		END	3.844	3.844	0.500	1.922						1.229	End-sec	Total			37.000	160.773		
Section No.	Section Length (m)	Average of Section (m)	Length of Block (m)	Form Area (m ²)	Remark																																																			
END	3.844			1.229	End-sec																																																			
END	3.844	3.844	0.500	1.922																																																				
MIDDLE	4.368	4.106	5.300	21.762																																																				
MIDDLE	4.368	4.368	25.400	110.947																																																				
END	3.844	4.106	5.300	21.762																																																				
END	3.844	3.844	0.500	1.922																																																				
				1.229	End-sec																																																			
Total			37.000	160.773																																																				
	No. of Girder 5 × 2 = 10																																																							
A2	= 160.773 × 10 × 2	= 3215.460 m ²																																																						
	A = 8616.9	8,616.9 m ²																																																						

Item	Formula	Quantity								
	<p>(2) Intermediate Cross Beam</p>  <table border="1" data-bbox="582 772 853 907"> <thead> <tr> <th></th> <th>N</th> </tr> </thead> <tbody> <tr> <td>L=37.0</td> <td>24</td> </tr> <tr> <td>L=31.0</td> <td>32</td> </tr> <tr> <td>Total</td> <td>56</td> </tr> </tbody> </table> $A2-2 = \left[\left(\frac{1.520 \times 1.700}{2} - \left(\frac{0.120 + 0.154}{2} \right) \times 1.700 \right) \times 56 + 1.700 \times 0.200 \right] \times 56$ $= 305.379 \text{ m}^2$ $V2 = 121.734 + 305.379 = 427.113 \text{ m}^2$ <p style="text-align: right;">Total 493.249 m²</p>		N	L=37.0	24	L=31.0	32	Total	56	<p style="text-align: right;">493.249 m²</p>
	N									
L=37.0	24									
L=31.0	32									
Total	56									

Item	Formula	Quantity
3. Deck Slab	 <p data-bbox="399 694 1244 772"> $L = 37.000 \times 2 + 31.000 \times 4 - 0.200 \times 4 = 197.200$ </p> <p data-bbox="399 795 1276 840"> $A1 = (0.210 + 1.207) \times 2 \times 197.200 = 558.865 \text{ m}^2$ </p> <p data-bbox="399 840 1276 884"> $A2 = (0.200 + 0.288) \times 1/2 \times 0.600 \times 4 = 0.586 \text{ m}^2$ </p> <p data-bbox="399 884 1276 929"> $A3 = (0.288 + 0.290) \times 1/2 \times 0.100 \times 4 = 0.116 \text{ m}^2$ </p> <p data-bbox="399 929 1276 974"> $A4 = 10.050 \times 0.210 \times 2 = 4.221 \text{ m}^2$ </p> <p data-bbox="1037 940 1276 985"> $A = 563.788 \text{ m}^2$ </p>	563.788 m ²

Total Weight of Girder

	- D14	D14 - D25	Total	Note
L=36.0m	8,459.8	53,412.0	61,871.8	
L=31.0m	14,927.6	81,034.0	95,961.6	
Total	23,387.4	134,446.0	157,833.4	(kgf)
	23.4	134.4	157.8	(ton)

Total Weight of Slab

	nos	- D14	D14 - D25	Total	Note
L=370m	4	29,948.4	55,984.4	85,932.8	
L=31.6m	6	7,300.2	73,191.6	80,491.8	
Total		37,248.6	129,176.0	166,424.6	(kgf)
		37.2	129.2	166.4	(ton)

No. _____

LIST OF REINFORCEMENT

L=37.0

SIGN	DIACETER	LENGTH	NOS.	UNIT WEIGHT	PIECE WEIGHT	TOTAL WEIGHT	NOTE
S 1	D20	11,350	232	2.466	28.000	6,496.0	
2	D20	10,850	232	2.466	26.800	6,217.6	
3	D14	963	464	1.208	1.160	538.2	
4	D14	25,752	200	1.208	31.100	6,220.0	
5	D25	11,350	15	3.854	43.700	655.5	
5'	D25	10,850	15	3.854	41.800	627.0	
6	D12	565	1,452	0.888	0.502	728.9	
					TOTAL	21,483.2	
					D25	1282.5	
					D22	0.0	
					D20	12713.6	
					D14	6758.2	
					D12	728.9	
					Total	21,483.2	
						(kgf)	
				- D14		7,487.1	
				D14 - D25		13,996.1	
					Total	21,483.2	

Item	Formula						Quantity	
PC CABLE 1) 12S12.7	L=37.0m For One Girder							
	CABLE VAR.	EACH LENGTH	CABLE NO.	EACH	TOTAL LENGTH	UNIT WEIGHT	WEIGHT	
	1	36.702	C1	1	34.702	9.290	322.4	
	2	36.714	C2	1	34.714	9.290	322.5	
	3	36.754	C3	1	36.754	9.290	341.4	
	4	36.784	C4	1	36.784	9.290	341.7	
	5	36.822	C5	1	36.822	9.290	342.1	
	TOTAL			5	179.776		1670.1	
	SUB-TOTAL WEIGHT OF PC CABLES per BRIDGE							
	$W_p = 1670 \times 5 \times 2 =$							16,701.0 kgf
								16.7 ton
	TENSION UNIT							
	$N_s = 5 \times 2 \times 2 =$							20.0 nos
	HEATHING Φ 80/85							
	$L = 179.776 \times 5 \times 2 =$							1,797.8 m
	CENEBT GROUT							
	$V = 0.903 \times 5 \times 2 =$							9.0 m ³
	L=31m For One Girder							
	CABLE VAR.	EACH LENGTH	CABLE NO.	EACH	TOTAL LENGTH	UNIT WEIGHT	WEIGHT	
	1	30.702	C1	1	30.702	9.290	285.2	
	2	30.732	C2	1	30.732	9.290	285.5	
	3	30.794	C3	1	30.794	9.290	286.1	
	4	30.856	C4	1	30.856	9.290	286.7	
TOTAL			4	123.084		1143.5		
SUB-TOTAL WEIGHT OF PC CABLES per BRIDGE								
$W_p = 1144 \times 5 \times 4 =$							22,870.0 kgf	
							22.9 ton	
TENSION UNIT								
$N_s = 4 \times 2 \times 4 =$							32.0 nos	
HEATHING Φ 80/85								
$L = 123.084 \times 5 \times 4 =$							2,461.7 m	
CENEBT GROUT								
$V = 0.618 \times 5 \times 4 =$							12.4 m ³	

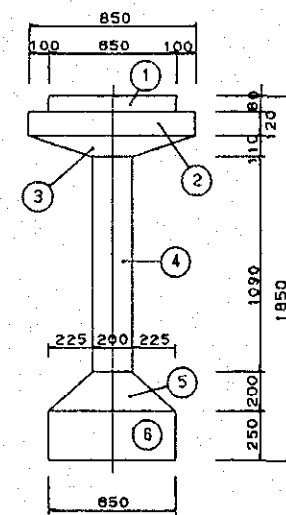
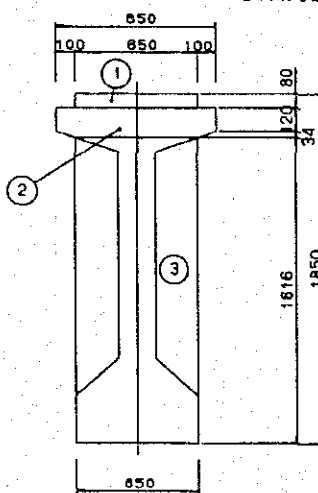
Item	Formula						Quantity
2) 3S12.7	PC CABLE OF DIAPHRAGMS						
LOCATION	EACH LENGTH	CABLE NO.	EACH	TOTAL LENGTH	UNIT WEIGHT	WEIGHT	
Connection One	10.050		26	261.3	2.322	606.739	
TOTAL			26	261.300		606.739	
	TOTAL WEIGHT OF PC CABLES per BRIDGE(A1-P12)						
	Wp=	606.739	=				606.7 kgf
							0.6 ton
	TENSION UNIT						
	Ns=	26 × 2	=				52.0 nos
	HEATHING Φ 50/55						
	L=	723.600	=				723.6 m
	CENEBT GROUT						
	V=	0.002 × 723.600	=				1.4 m ³

Item	Formula	Quantity
1. Expansion Joint (TYPE A)	EACH LENGTH $L = 10.750$ $N = 3 \times 2 = 6$ TOTAL LENGTH $L = 10.750 \times 6 = 64.500 \text{ m}$	64.500 m
2. BEARING PAD	ELASTOMERIC 600*300*57 EACH for One SPAN $N = 5$ TOTAL EACH $N = 5 \times 4 = 20$ nos ELASTOMERIC 550*300*57 EACH for One SPAN $N = 5$ TOTAL EACH $N = 5 \times 8 = 40$ nos	20 nos 40 nos
3. ANCHOR BAR	$\Phi 75 \quad L=1550 \quad (\text{MOVE})$ $N = 4 \times 4 = 16$ nos $\Phi 75 \quad L=1550 \quad (\text{FIX})$ $N = 4 \times 8 = 32$ nos Total = 48 nos	16 nos 32 nos 48 nos
4. ANCHOR CAP (SGP)	$\Phi 100 \quad L=800 \quad (\text{FIX})$ $N = 4 \times 8 = 32$ nos $\Phi 150 \quad L=800 \quad (\text{MOVE})$ $N = 4 \times 4 = 16$ nos	32 nos 16 nos
5. Railing	$L1 = 37.000 \times 2 + 31.000 \times 4 = 198.0 \text{ m}$ $L = 198.000 \times 2 = 396 \text{ m}$	198.0 m 396 m

Item	Formula	Quantity
9 Pavement	1) Pavement t=75mm	
	$L = 37.000 \times 2 + 31.000 \times 4 = 198.0 \text{ m}$	
	$A = 10.750 \times 198.00 = 2128.5 \text{ m}^2$	2128.5 m ²
	2) Water Proofing t=5mm	
	$A = = 2128.5 \text{ m}^2$	2128.5 m ²
	3) Road marking	
	Bridge Length $L = 198.000 = 198.000 \text{ m}$	
	Side Line	
	$A1 = 198.000 \times 0.100 \times 4 = 79.200 \text{ m}^2$	
	Center Line	
	$L = 198.000 / 5.000 = 39.6 \text{ m}$	
	$A2 = 2.500 \times 0.100 \times 39.6 \times 2 = 19.800 \text{ m}^2$	
	$\text{Total } 79.200 + 19.800 = 99.0 \text{ m}^2$	99.0 m ²

Item	Formula	Quantity
Concrete Form	$L1 = 37.000 \times 2 + 31.000 \times 4 = 198.000$ $A = 1.700 \times 198.000 = 336.600 \text{ m}^2$ $V = 336.60 \times 0.080 = 26.928 \text{ m}^3$ $W = 26.928 \times 120.00 \text{ (kg/M3)} = 3231.36 \text{ kg}$ <p style="text-align: right;">3.2 ton</p>	

Item	Formula	Quantity
Concrete Form	$L1 = 37.000 \times 2 + 31.000 \times 4 = 198.000$ $A = 1.700 \times 198.000 = 336.600 \text{ m}^2$ $V = 336.60 \times 0.080 = 26.928 \text{ m}^3$ $W = 26.928 \times 120.00 \text{ (kg/M3)} = 3231.36 \text{ kg}$ <p style="text-align: right;">3.2 ton</p>	

Item	Formula	Quantity																																																			
Efection	<p>(1) Calculation of Sectional Area</p> <p>[1] Middle Section</p> <p>Summary of Sectional Area For ONE GIRDER</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 10px;"> <thead> <tr> <th style="width: 5%;">No</th> <th style="width: 60%;">Formula</th> <th style="width: 35%;">(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>1.090×0.200</td> <td>= 0.218</td> </tr> <tr> <td>5</td> <td>$0.500 \times 0.225 \times 0.200 \times 2$</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>0.678 m²</td> </tr> </tbody> </table>  <p>[2] End Section</p> <p>Summary of Sectional Area For ONE GIRDER</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 10px;"> <thead> <tr> <th style="width: 5%;">No</th> <th style="width: 60%;">Formula</th> <th style="width: 35%;">(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>0.650×1.616</td> <td>= 1.050</td> </tr> <tr> <td colspan="2" style="text-align: right;">Total Area</td> <td>1.229 m²</td> </tr> </tbody> </table> 	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	1.090×0.200	= 0.218	5	$0.500 \times 0.225 \times 0.200 \times 2$	= 0.045		0.200×0.200	= 0.040	6	0.650×0.250	= 0.163	Total Area		0.678 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	0.650×1.616	= 1.050	Total Area		1.229 m²	
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	1.090×0.200	= 0.218																																																			
5	$0.500 \times 0.225 \times 0.200 \times 2$	= 0.045																																																			
	0.200×0.200	= 0.040																																																			
6	0.650×0.250	= 0.163																																																			
Total Area		0.678 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	0.650×1.616	= 1.050																																																			
Total Area		1.229 m²																																																			

Item	Formula	Quantity																																																																																																
	<p>Concrete Volume</p> <p style="text-align: right;">Girder Length 37.000 m</p> <table border="1" data-bbox="491 300 1262 629"> <thead> <tr> <th>Section No.</th> <th>Section Area (m²)</th> <th>Average of Section (m²)</th> <th>Length of Block (m)</th> <th>Concrete Volume (m³)</th> <th>Remark</th> </tr> </thead> <tbody> <tr> <td>END</td> <td>1.229</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>END</td> <td>1.229</td> <td>1.229</td> <td>0.500</td> <td>0.615</td> <td></td> </tr> <tr> <td>MIDDLE</td> <td>0.678</td> <td>0.954</td> <td>5.300</td> <td>5.056</td> <td></td> </tr> <tr> <td>MIDDLE</td> <td>0.678</td> <td>0.678</td> <td>25.400</td> <td>17.221</td> <td></td> </tr> <tr> <td>END</td> <td>1.229</td> <td>0.954</td> <td>5.300</td> <td>5.056</td> <td></td> </tr> <tr> <td>END</td> <td>1.229</td> <td>1.229</td> <td>0.500</td> <td>0.615</td> <td></td> </tr> <tr> <td>Total</td> <td></td> <td></td> <td>37.000</td> <td>28.563</td> <td></td> </tr> </tbody> </table> <p>Efection Weight per one girder $W 1 = 28.563 \times 2500 = 71407.5 \text{ kgf}$</p> <p style="text-align: right;">Girder Length 31.000 m</p> <table border="1" data-bbox="491 725 1262 1055"> <thead> <tr> <th>Section No.</th> <th>Section Area (m²)</th> <th>Average of Section (m²)</th> <th>Length of Block (m)</th> <th>Concrete Volume (m³)</th> <th>Remark</th> </tr> </thead> <tbody> <tr> <td>END</td> <td>1.229</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>END</td> <td>1.229</td> <td>1.229</td> <td>0.500</td> <td>0.615</td> <td></td> </tr> <tr> <td>MIDDLE</td> <td>0.678</td> <td>0.954</td> <td>4.400</td> <td>4.198</td> <td></td> </tr> <tr> <td>MIDDLE</td> <td>0.678</td> <td>0.678</td> <td>21.200</td> <td>14.374</td> <td></td> </tr> <tr> <td>END</td> <td>1.229</td> <td>0.954</td> <td>4.400</td> <td>4.198</td> <td></td> </tr> <tr> <td>END</td> <td>1.229</td> <td>1.229</td> <td>0.500</td> <td>0.615</td> <td></td> </tr> <tr> <td>Total</td> <td></td> <td></td> <td>31.000</td> <td>24.000</td> <td></td> </tr> </tbody> </table> <p>Efection Weight per one girder $W 2 = 24.00 \times 2500 = 60000.0 \text{ kgf}$</p> <p>$W = 71407.5 \times 10 + 60000.0 \times 20 = 1914075 \text{ kgf}$ 1914.1 t</p>	Section No.	Section Area (m ²)	Average of Section (m ²)	Length of Block (m)	Concrete Volume (m ³)	Remark	END	1.229					END	1.229	1.229	0.500	0.615		MIDDLE	0.678	0.954	5.300	5.056		MIDDLE	0.678	0.678	25.400	17.221		END	1.229	0.954	5.300	5.056		END	1.229	1.229	0.500	0.615		Total			37.000	28.563		Section No.	Section Area (m ²)	Average of Section (m ²)	Length of Block (m)	Concrete Volume (m ³)	Remark	END	1.229					END	1.229	1.229	0.500	0.615		MIDDLE	0.678	0.954	4.400	4.198		MIDDLE	0.678	0.678	21.200	14.374		END	1.229	0.954	4.400	4.198		END	1.229	1.229	0.500	0.615		Total			31.000	24.000		<p>71407.5 kgf</p> <p>60000.0 kgf</p> <p>1914075 kgf 1914.1 t</p>
Section No.	Section Area (m ²)	Average of Section (m ²)	Length of Block (m)	Concrete Volume (m ³)	Remark																																																																																													
END	1.229																																																																																																	
END	1.229	1.229	0.500	0.615																																																																																														
MIDDLE	0.678	0.954	5.300	5.056																																																																																														
MIDDLE	0.678	0.678	25.400	17.221																																																																																														
END	1.229	0.954	5.300	5.056																																																																																														
END	1.229	1.229	0.500	0.615																																																																																														
Total			37.000	28.563																																																																																														
Section No.	Section Area (m ²)	Average of Section (m ²)	Length of Block (m)	Concrete Volume (m ³)	Remark																																																																																													
END	1.229																																																																																																	
END	1.229	1.229	0.500	0.615																																																																																														
MIDDLE	0.678	0.954	4.400	4.198																																																																																														
MIDDLE	0.678	0.678	21.200	14.374																																																																																														
END	1.229	0.954	4.400	4.198																																																																																														
END	1.229	1.229	0.500	0.615																																																																																														
Total			31.000	24.000																																																																																														

2.Quantity of Superstructure - main bridge

Item		Work Item	Unit	Quantity			Remarks
				Right	Left	Total	
Concrete	CLASS B	Cantilever	m ³	543.5	543.5	1,087.0	ck=400kgf/cm ²
		Support	m ³	1,038.5	1,038.5	2,077.0	
		Total	m ³	1,582.0	1,582.0	3,164.0	
Form		External + Internal	m ²	4,597.2	4,597.2	9,194.4	
		Total	m ²	4,597.2	4,597.2	9,194.4	
Re-bar		D14	ton	48.8	48.8	97.7	
		D16~D25	ton	200.0	200.0	400.0	
		Total	ton	248.9	248.9	497.7	
PC Steel	12S12.7B	Internal Longitudinal Prestressing Tendons	ton	29.1	29.1	58.1	SWPR7B
	12S15.2	External Longitudinal Prestressing Tendons	ton	13.0	13.0	26.0	SWPR7B
	3S12.7	Internal Transverse Tendons	ton	4.2	4.2	8.4	
Anchor	12S12.7B	Dead Anchors	set	0.0	0.0	0.0	
		Live Anchors	set	172.0	172.0	344.0	
	12S15.2	Live Anchors	set	36.0	36.0	72.0	
		Dead Anchors	set	163.0	163.0	326.0	
	3S12.7	Live Anchors	set	163.0	163.0	326.0	
		Dead Anchors	set	163.0	163.0	326.0	
Duct	φ80/85	For Internal Longitudinal Prestressing Tendons	m	3,130.1	3,130.1	6,260.2	
	φ90/100	For External Longitudinal Prestressing Tendons	m	984.7	984.7	1,969.5	
	at Duct 25x	For Internal Transverse Tendons	m	1,866.4	1,866.4	3,732.7	
Cement grout in sheath			m ³	13.2	13.2	26.4	
Bearing		Product layer rubber bearing 1410x1410x214	set	4.0	4.0	8.0	
		Product layer rubber bearing 660x560x125	set	4.0	4.0	8.0	
		Non-Shrink Mortar	m ³	2.0	2.0	4.0	
Expansion joint		100mm Expansion Joint	m	21.5	21.5	43.0	
Pavement	t=70mm	Asphalt concrete surface course	m ²	1,709.3	1,709.3	3,418.6	
	t=5mm	Water proofing	m ²	1,709.3	1,709.3	3,418.6	
Anchorage	φ75, L=1250mm		set	8.0	8.0	16.0	
	φ125, L=2500mm		set	8.0	8.0	16.0	

1. Concrete volume of PC box girder (Class B, $f_c = 40\text{MPa}$)

1) Section area

Block	Section	Height	Distance	Accumulative Distance	Width of Deck Slab	Thickness of Deck Slab	Width of Deck Slab Haunch	Thickness of Deck Slab Haunch	Thickness of Deck Slab	Length of Flange	Thickness of Flange tip	Thickness of Flange base	Width of Bottom Slab	Thickness of Bottom Slab	Haunch of Bottom Slab	Section Area
	1	2.200		0.000	11.450	2.200	0.000	0.000	0.000	2.475	0.250	0.550	3.250	6.500	0.500	16.280
	2	2.200	1.602	1.602	11.450	2.200	0.000	0.000	0.000	2.475	0.250	0.550	3.250	6.500	0.500	16.280
1A	3	2.200	0.000	1.602	11.450	0.250	1.200	0.300	0.300	2.475	0.250	0.550	0.600	6.500	0.500	9.045
	4	2.200	1.000	2.602	11.450	0.250	1.200	0.300	0.300	2.475	0.250	0.550	0.555	6.500	0.413	8.446
	5	2.200	0.500	3.102	11.450	0.250	1.200	0.300	0.300	2.475	0.250	0.550	0.533	6.500	0.370	8.144
	6	2.200	3.000	6.102	11.450	0.250	1.200	0.300	0.300	2.475	0.250	0.550	0.400	6.500	0.250	7.040
	7	2.202	4.000	10.102	11.450	0.250	1.200	0.300	0.300	2.475	0.250	0.550	0.400	6.500	0.250	7.042
	8	2.221	4.000	14.102	11.450	0.250	1.200	0.300	0.300	2.475	0.250	0.550	0.400	6.500	0.260	7.114
	9	2.280	4.000	18.102	11.450	0.250	1.200	0.300	0.300	2.475	0.250	0.550	0.400	6.500	0.270	7.218
	10	2.383	3.560	21.662	11.450	0.250	1.200	0.300	0.300	2.475	0.250	0.550	0.400	6.500	0.300	7.471
	11	2.549	3.560	25.222	11.450	0.250	1.200	0.300	0.300	2.475	0.250	0.550	0.500	6.500	0.350	8.279
	12	2.795	3.560	28.782	11.450	0.250	1.200	0.300	0.300	2.475	0.250	0.550	0.500	6.500	0.410	8.855
	13	3.074	3.000	31.782	11.450	0.250	1.200	0.300	0.300	2.475	0.250	0.550	0.600	6.500	0.480	9.988
	14	3.428	3.000	34.782	11.450	0.250	1.200	0.300	0.300	2.475	0.250	0.550	0.600	6.500	0.560	10.837
	15	3.867	3.000	37.782	11.450	0.250	1.200	0.300	0.300	2.475	0.250	0.550	0.600	6.500	0.670	11.946
	16	4.400	3.000	40.782	11.450	0.250	1.200	0.300	0.300	2.475	0.250	0.550	0.600	6.500	0.800	13.275
	17	4.400	3.000	43.782	11.450	0.250	1.200	0.300	0.300	2.475	0.250	0.550	0.600	6.500	0.800	13.275
	18	3.867	3.000	46.782	11.450	0.250	1.200	0.300	0.300	2.475	0.250	0.550	0.600	6.500	0.670	11.946
	19	3.428	3.000	49.782	11.450	0.250	1.200	0.300	0.300	2.475	0.250	0.550	0.600	6.500	0.560	10.837
	20	3.074	3.000	52.782	11.450	0.250	1.200	0.300	0.300	2.475	0.250	0.550	0.600	6.500	0.480	9.988
	21	2.795	3.000	55.782	11.450	0.250	1.200	0.300	0.300	2.475	0.250	0.550	0.500	6.500	0.410	8.855
	22	2.549	3.560	59.342	11.450	0.250	1.200	0.300	0.300	2.475	0.250	0.550	0.500	6.500	0.350	8.279
	23	2.383	3.560	62.902	11.450	0.250	1.200	0.300	0.300	2.475	0.250	0.550	0.400	6.500	0.300	7.471
	24	2.280	3.560	66.462	11.450	0.250	1.200	0.300	0.300	2.475	0.250	0.550	0.400	6.500	0.270	7.218
	25	2.221	4.000	70.462	11.450	0.250	1.200	0.300	0.300	2.475	0.250	0.550	0.400	6.500	0.260	7.114
	26	2.202	4.000	74.462	11.450	0.250	1.200	0.300	0.300	2.475	0.250	0.550	0.400	6.500	0.250	7.042
	27	2.200	4.000	78.462	11.450	0.250	1.200	0.300	0.300	2.475	0.250	0.550	0.400	6.500	0.250	7.040
	28	2.200	3.010	81.472	11.450	0.250	1.200	0.300	0.300	2.475	0.250	0.550	0.400	6.500	0.250	7.040

Block Section	Height	Distance	Accumulative Distance	Width of Deck Slab		Thickness of Deck Slab		Length of Flange	Thickness of Flange tip		h of Bottom of Slab	Thickness of Bottom of Slab		Section Area
				Deck Slab	Deck Slab Haunch	Deck Slab	Deck Slab Haunch		Flange	Flange		Slab	Slab	
2	2.202	4.000	85.472	11.450	1.200	0.250	1.200	2.475	0.250	0.550	0.400	0.250	0.300	7.042
3	2.221	4.000	89.472	11.450	1.200	0.250	1.200	2.475	0.250	0.550	0.400	0.250	0.300	7.114
4	2.280	4.000	93.472	11.450	1.200	0.250	1.200	2.475	0.250	0.550	0.400	0.270	0.300	7.218
5	2.383	3.560	97.032	11.450	1.200	0.250	1.200	2.475	0.250	0.550	0.400	0.300	0.300	7.471
6	2.549	3.560	100.592	11.450	1.200	0.250	1.200	2.475	0.250	0.550	0.500	0.350	0.300	8.279
7	2.795	3.560	104.152	11.450	1.200	0.250	1.200	2.475	0.250	0.550	0.500	0.410	0.300	8.855
8	3.074	3.000	107.152	11.450	1.200	0.250	1.200	2.475	0.250	0.550	0.600	0.480	0.300	9.988
9	3.428	3.000	110.152	11.450	1.200	0.250	1.200	2.475	0.250	0.550	0.600	0.560	0.300	10.837
10	3.867	3.000	113.152	11.450	1.200	0.250	1.200	2.475	0.250	0.550	0.600	0.670	0.300	11.946
11	4.400	3.000	116.152	11.450	1.200	0.250	1.200	2.475	0.250	0.550	0.600	0.800	0.300	13.275
12	4.400	3.000	119.152	11.450	1.200	0.250	1.200	2.475	0.250	0.550	0.600	0.800	0.300	13.275
11	3.867	3.000	122.152	11.450	1.200	0.250	1.200	2.475	0.250	0.550	0.600	0.670	0.300	11.946
10	3.428	3.000	125.152	11.450	1.200	0.250	1.200	2.475	0.250	0.550	0.600	0.560	0.300	10.837
9	3.074	3.000	128.152	11.450	1.200	0.250	1.200	2.475	0.250	0.550	0.600	0.480	0.300	9.988
8	2.795	3.000	131.152	11.450	1.200	0.250	1.200	2.475	0.250	0.550	0.500	0.410	0.300	8.855
7	2.549	3.560	134.712	11.450	1.200	0.250	1.200	2.475	0.250	0.550	0.500	0.350	0.300	8.279
6	2.383	3.560	138.272	11.450	1.200	0.250	1.200	2.475	0.250	0.550	0.400	0.300	0.300	7.471
5	2.280	3.560	141.832	11.450	1.200	0.250	1.200	2.475	0.250	0.550	0.400	0.270	0.300	7.218
4	2.221	4.000	145.832	11.450	1.200	0.250	1.200	2.475	0.250	0.550	0.400	0.260	0.300	7.114
3	2.202	4.000	149.832	11.450	1.200	0.250	1.200	2.475	0.250	0.550	0.400	0.250	0.300	7.042
2	2.200	4.000	153.832	11.450	1.200	0.250	1.200	2.475	0.250	0.550	0.400	0.250	0.300	7.040
50	2.200	3.000	156.832	11.450	1.200	0.250	1.200	2.475	0.250	0.550	0.533	0.370	0.300	8.144
51	2.200	0.500	157.332	11.450	1.200	0.250	1.200	2.475	0.250	0.550	0.555	0.413	0.300	8.446
52	2.200	1.000	158.332	11.450	1.200	0.250	1.200	2.475	0.250	0.550	0.600	0.500	0.300	9.045
53	2.200	0.000	158.332	11.450	2.200	0.250	0.000	2.475	0.250	0.550	3.250	0.500	0.000	16.280
54	2.200	1.990	160.322	11.450	2.200	0.250	0.000	2.475	0.250	0.550	3.250	0.500	0.000	16.280

Concrete

Item	Formula	Quantity
2) Bulkheads, manholes Anchorage etc.	(1) Bulkheads	
* Bulkheads 1, 4, 7 (girder height 2.2m):		
A1 =	$5.700 \times 1.700 - 2 \times 1/2 \times (0.300$	
x	$0.300 + 1.200 \times 0.300) =$	9.240 m^2
A2 =	$-1.000 \times 1.700 \text{ (manhole)} =$	-1.700 m^2
$\Sigma A =$	$9.240 + -1.700 =$	7.540 m^2
V1 =	$7.54 \times 0.300 =$	2.262 m^3
V2 =	$(1.850 \times 0.550 - 0.300 \times 0.300$	
x	$1/2) \times 0.350 \times 4 =$	1.362 m^3
$\Sigma V =$	$2.262 + 1.362 =$	3.624 m^3
		per each 3.624 m^3
* Bulkheads 2, 6 (girder height 2.584m):		
A1 =	$5.500 \times 1.976 - 2 \times 1/2 \times (0.300$	
x	$0.300 + 1.200 \times 0.300) =$	10.418 m^2
A2 =	$-1.000 \times 1.976 \text{ (manhole)} =$	-1.976 m^2
$\Sigma A =$	$10.418 + -1.976 =$	8.442 m^2
V1 =	$8.442 \times 0.300 =$	2.533 m^3
V2 =	$(1.750 \times 0.780 - 0.300 \times 0.300$	
x	$1/2) \times 0.350 \times 4 =$	1.848 m^3
$\Sigma V =$	$2.533 + 1.848 =$	4.381 m^3
		per each 4.381 m^3

Concrete

Item	Formula	Quantity
* Bulkheads 3, 5 (girder height 2.584m):		
A1	= 5.500 × 1.976 - 2×1/2 ×(0.300	
	× 0.300 + 1.200 × 0.300)=	10.418 m ²
A2	= -1.000 × 1.976 (manhole) =	-1.976 m ²
Σ A	= 10.418 + -1.976 =	8.442 m ²
V1	= 8.442 × 0.300 =	2.533 m ³
V2	=(1.750 × 0.780 - 0.300 ×	
	1/2)× 0.350 × 4 =	1.848 m ³
Σ V	= 2.533 + 1.848 =	4.381 m ³
		per each 4.381 m ³
(2) Intermediate Cross Beam on Pier Head		
* Cross Beam		
A1	= 5.300 × 3.350 - 0.300 × 0.300	
	- 0.300 × 1.200 =	17.305 m ²
A2	= -1.000 × 1.700 + 2×1/2 ×	
	0.150 (manhole-B) =	-1.678 m ²
Σ A	= 17.305 + -1.678 =	15.627 m ²
V	= 15.627 × 3.000 =	46.881 m ³
		per each 46.881 m ³

Concrete

Item	Formula	Quantity
(3) Supporting Part on Side Span (Manhole, Haunch etc)		
* Manhole-A (Subtraction) -Bottom Slab		
A	= -1.000 × 2.000 + 4×1/2 × 0.150	per each
×	0.150 =	-0.831 m ³
V	= -1.955 × 1/2 × (0.475 + 0.375) =	
* Haunch (Top Slab)		
A	= 1/2 × 1.000 × 0.200 =	per each
V	= 0.100 × 4.500 =	0.450 m ³
A	= 1/2 × 1.000 × 0.200 =	per each
V	= 0.100 × 4.100 =	0.410 m ³
* Expansion Joint		
- P1 Pier Side		
V1	= -11.000 × 0.440 × 0.160 =	-0.774 m ³
- P4 Pier Side		
V2	= -11.000 × 0.440 × 0.160 =	-0.774 m ³

Concrete

Item	Formula	Quantity
(4)Anchorage		
* TYPE A-1		
$V = \frac{1}{6} \times 0.325 \times (2.347 \times 1.046 + (2.347 + 0.418) \times (1.046 + 0.830) + 0.418 \times 0.830) = 0.433 \text{ m}^3$	per each 0.433 m ³	
* TYPE A-2		
$V = \frac{1}{6} \times 0.325 \times (2.347 \times 0.546 + (2.347 + 0.418) \times (0.546 + 0.330) + 0.418 \times 0.330) = 0.208 \text{ m}^3$	per each 0.208 m ³	
* TYPE-B1		
$V = 0.81 \times ((0.418 \times 0.328) + \frac{1}{2} \times (1.900 \times 0.328)) = 0.363 \text{ m}^3$	per each 0.363 m ³	
* TYPE-B2		
$V = 0.41 \times ((0.418 \times 0.328) + \frac{1}{2} \times (1.900 \times 0.328)) = 0.184 \text{ m}^3$	per each 0.184 m ³	

Concrete

Item	Formula						Quantity
	Block	Anchorage	Unit Volume	Nos	Concrete	Subtotal	
		Type	m ³		m ³	of block	
	B2	B1	0.363	4	1.454	1.822	
		B2	0.184	2	0.368		
	B3	B1	0.363	4	1.454	1.454	
	B4	B1	0.363	4	1.454	1.454	
	B5	B1	0.363	4	1.454	1.454	
	B6	B1	0.363	4	1.454	1.454	
	B8	A1	0.433	4	1.732	1.732	
	B9	A1	0.433	4	1.732	2.148	
		A2	0.208	2	0.416		

3) Total Concrete

(1) Supporting Part on P2 Side

Block	Section	Section Area (m ²)	Average of Section Area (m ²)	Length of Block (m)	Concrete Volume (m ³)	Bulkhead, Cross Beam (m ³)	Subtraction of manhole (m ³)	Top Slab Haunch (m ³)	Subtraction of Expansion Joint (m ³)	Anchorage (m ³)	Total of each Block (m ³)
	1	16.280									
	2	16.280	16.280	1.602	26.081						
	3	9.045	12.663	0.000	0.000						
	4	8.446	8.745	1.000	8.745						
	5	8.144	8.295	0.500	4.147						
	6	7.040	7.592	3.000	22.776		-0.831	0.450	-0.774		60.594
2	7	7.042	7.041	4.000	28.163						
3	8	7.114	7.078	4.000	28.311	3.624				1.822	61.920
4	9	7.218	7.166	4.000	28.664						
5	10	7.471	7.345	3.560	26.147					1.454	56.265
6	11	8.279	7.875	3.560	28.036						
7	12	8.855	8.567	3.560	30.499	4.381				1.454	64.370
8	13	9.988	9.421	3.000	28.264						
9	14	10.837	10.412	3.000	31.237						
10	15	11.946	11.392	3.000	34.175					1.454	95.130
11	16	13.275	12.611	3.000	37.832						
12	17	13.275	13.275	3.000	39.825	46.881					
11	18	11.946	12.611	3.000	37.832			0.410		1.454	164.234
Total				46.782	440.734	54.886	-0.831	0.860	-0.774	7.637	502.51

(2) Cantilever part on P2

Block	Section	Section Area (m ²)	Average of Section Area (m ²)	Length of Block (m)	Concrete Volume (m ³)	Bulkhead, Cross Beam (m ³)	Subtraction of manhole (m ³)	Top Slab Haunch (m ³)	Subtraction of Expansion Joint (m ³)	Anchorage (m ³)	Total of each Block (m ³)
	18	11.946									
10	19	10.837	11.392	3.000	34.175						
9	20	9.988	10.412	3.000	31.237						
8	21	8.855	9.421	3.000	28.264						93.676
7	22	8.279	8.567	3.560	30.499	4.381					
6	23	7.471	7.875	3.560	28.036						
5	24	7.218	7.345	3.560	26.147					1.732	90.795
4	25	7.114	7.166	4.000	28.664						
3	26	7.042	7.078	4.000	28.311						
2	27	7.040	7.041	4.000	28.163					2.148	87.286
Total				31.680	263.496	4.381	0.000	0.000	0.000	3.880	271.757

(3) Supporting Part on Center Span (Closure Block)

Block	Section	Section Area (m ²)	Average of Section Area (m ²)	Length of Block (m)	Concrete Volume (m ³)	Bulkhead, Cross Beam (m ³)	Subtraction of manhole (m ³)	Top Slab Haunch (m ³)	Subtraction of Expansion Joint (m ³)	Anchorage (m ³)	Total of each Block (m ³)
13	28	7.040	7.040	3.010	21.190	3.624					
Total				3.010	21.190	3.624					24.814

(4) Cantilever part on P3

Block	Section	Section Area (m ²)	Average of Section Area (m ²)	Length of Block (m)	Concrete Volume (m ³)	Bulkhead, Cross Beam (m ³)	Subtraction of manhole (m ³)	Top Slab Haunch (m ³)	Subtraction of Expansion Joint (m ³)	Anchorage (m ³)	Total of each Block (m ³)
	28	7.040									
2	29	7.042	7.041	4.000	28.163						
3	30	7.114	7.078	4.000	28.311						
4	31	7.218	7.166	4.000	28.664					2.148	87.286
5	32	7.471	7.345	3.560	26.147	4.381					
6	33	8.279	7.875	3.560	28.036						
7	34	8.855	8.567	3.560	30.499					1.732	90.795
8	35	9.988	9.421	3.000	28.264						
9	36	10.837	10.412	3.000	31.237						
10	37	11.946	11.392	3.000	34.175						93.676
Total				31.680	263.496	4.381	0.000	0.000	0.000	3.880	271.757

(5) Supporting Part on P3 Side

Block	Section	Section Area (m ²)	Average of Section Area (m ²)	Length of Block (m)	Concrete Volume (m ³)	Bulkhead Cross Beam (m ³)	Subtraction of manhole (m ³)	Top Slab Haunch (m ³)	Subtraction of Expansion Joint (m ³)	Anchorage (m ³)	Total of each Block (m ³)
	37	11.946									
11	38	13.275	12.611	3.000	37.832						
12	39	13.275	13.275	3.000	39.825	46.881					
11	40	11.946	12.832	3.000	38.496			0.410		1.454	164.898
10	41	10.837	11.392	3.000	34.175						
9	42	9.988	10.412	3.000	31.237						
8	43	8.855	9.421	3.000	28.264					1.454	95.130
7	44	8.279	8.567	3.560	30.499						
6	45	7.471	7.875	3.560	28.036	4.381				1.454	64.370
5	46	7.218	7.345	3.560	26.147						
4	47	7.114	7.166	4.000	28.664					1.454	56.265
3	48	7.042	7.078	4.000	28.311						
2	49	7.040	7.041	4.000	28.163	3.624				1.822	61.920
1B	50	8.144	8.144	3.000	24.433						
	51	8.446	8.295	0.500	4.147						
	52	9.045	8.745	1.000	8.745						
	53	16.280	12.663	0.000	0.000						
	54	16.280	16.280	1.990	32.397		-0.831	0.450	-0.774		68.567
Total				47.170	449.371	54.886	-0.831	0.860	-0.774	7.637	511.15

(6) Total of Concrete

	Concrete (m ³)	Remarks
Supporting Part on P5 Side	502.512	
Cantilever part on P5	271.757	
Supporting Part on Center Span (Closure b)	24.814	
Cantilever part on P6	271.757	
Supporting Part on P6 Side	511.149	
Total of supporting part	1,038.475	
Total of Cantilever part	543.514	
Gross Total	1,581.989	

Block	Section	Height	Distance	Accumulative Distance	Width of Deck Slab	Thickness of Deck Slab	Width of Deck Slab	Thickness of Deck Slab	Length of Flange	Thickness of Flange tip	Thickness of Flange base	Width of Webs	Thickness of Bottom Slab	Width of Bottom Slab	Thickness of Bottom Slab	Haunch of Bottom Slab	Length of external
4	25	2.221	4.000	70.462	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.400	6.500	0.260	0.300	15.328	
3	26	2.202	4.000	74.462	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.400	6.500	0.250	0.300	15.290	
2	27	2.200	4.000	78.462	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.400	6.500	0.250	0.300	15.286	
13	28	2.200	3.010	81.472	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.400	6.500	0.250	0.300	15.286	
2	29	2.202	4.000	85.472	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.400	6.500	0.250	0.300	15.290	
3	30	2.221	4.000	89.472	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.400	6.500	0.260	0.300	15.328	
4	31	2.280	4.000	93.472	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.400	6.500	0.270	0.300	15.446	
5	32	2.383	3.560	97.032	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.400	6.500	0.300	0.300	15.652	
6	33	2.549	3.560	100.592	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.500	6.500	0.350	0.300	15.984	
7	34	2.795	3.560	104.152	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.500	6.500	0.410	0.300	16.476	
8	35	3.074	3.000	107.152	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.600	6.500	0.480	0.300	17.034	
9	36	3.428	3.000	110.152	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.600	6.500	0.560	0.300	17.742	
10	37	3.867	3.000	113.152	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.600	6.500	0.670	0.300	18.620	
11	38	4.400	3.000	116.152	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.600	6.500	0.800	0.300	19.686	
12	39	4.400	3.000	119.152	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.600	6.500	0.800	0.300	19.686	
11	40	3.867	3.000	122.152	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.600	6.500	0.670	0.300	18.620	
10	41	3.428	3.000	125.152	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.600	6.500	0.560	0.300	17.742	
9	42	3.074	3.000	128.152	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.600	6.500	0.480	0.300	17.034	
8	43	2.795	3.000	131.152	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.500	6.500	0.410	0.300	16.476	
7	44	2.549	3.560	134.712	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.500	6.500	0.350	0.300	15.984	
6	45	2.383	3.560	138.272	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.400	6.500	0.300	0.300	15.652	
5	46	2.280	3.560	141.832	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.400	6.500	0.270	0.300	15.446	
4	47	2.221	4.000	145.832	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.400	6.500	0.260	0.300	15.328	
3	48	2.202	4.000	149.832	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.400	6.500	0.250	0.300	15.290	
2	49	2.200	4.000	153.832	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.400	6.500	0.250	0.300	15.286	
50	2.200	3.000		156.832	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.533	6.500	0.370	0.300	15.286	
51	2.200	0.500		157.332	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.555	6.500	0.413	0.300	15.286	
52	2.200	1.000		158.332	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.600	6.500	0.500	0.300	15.286	
53	2.200	0.000		158.332	11.450	2.200	0.000	0.000	2.475	0.250	0.550	3.250	6.500	0.500	0.000	15.286	
54	2.200	1.990		160.322	11.450	2.200	0.000	0.000	2.475	0.250	0.550	3.250	6.500	0.500	0.000	15.286	

Item	Formula	Quantity
2) Supporting Part on Side of Span		
* Manhole		
A1 =	$-1.000 \times 2.000 + 4 \times \frac{1}{2} \times 0.150 = -1.955 \text{ m}^2$	
A2 =	$0.300 \times (1.700 + 1.700 + 0.700 + 0.212 \times 4) = 1.694 \text{ m}^2$	
$\Sigma A =$	$-1.955 + 1.694 = -0.261 \text{ m}^2$	per each -0.261 m ²
<h3>MANHOLE</h3>		

3) Total of External Form

(1) Supporting Part on P2 Side

Block	Section	Length of External Form (m)	Average Length of External (m)	Length of Block (m)	External Form Area (m ²)	Side Form Area (m ²)	Subtraction of manhole (m ²)	Total Area per each Block (m ²)
1A	1	15.286						
	2	15.286	15.286	1.602	24.489	16.280		
	3	15.286	15.286	0.000	0.000			
	4	15.286	15.286	1.000	15.286			
	5	15.286	15.286	0.500	7.643			
	6	15.286	15.286	3.000	45.859	7.040	-0.261	116.336
2	7	15.290	15.288	4.000	61.153			
3	8	15.328	15.309	4.000	61.237	7.114		129.504
4	9	15.446	15.387	4.000	61.549			
5	10	15.652	15.549	3.560	55.355	7.471		124.375
6	11	15.984	15.818	3.560	56.313			
7	12	16.476	16.230	3.560	57.780	8.855		122.948
8	13	17.034	16.755	3.000	50.266			
9	14	17.742	17.388	3.000	52.165			
10	15	18.620	18.181	3.000	54.544	11.946		168.921
11	16	19.686	19.153	3.000	57.460			
12	17	19.686	19.686	3.000	59.059			
11	18	18.620	19.153	3.000	57.460	11.946		185.925
Total				46.782	777.618	70.653	-0.261	848.01

Bottom form 304.083

(2) Cantilever part on P2

Block	Section	Length of External Form (m)	Average Length of External (m)	Length of Block (m)	External Form Area (m ²)	Side Form Area (m ²)	Subtraction of manhole (m ²)	Total Area per each Block (m ²)
	18	18.620						
10	19	17.742	18.181	3.000	54.544			
9	20	17.034	17.388	3.000	52.165			
8	21	16.476	16.755	3.000	50.266	8.855		165.830
7	22	15.984	16.230	3.560	57.780			
6	23	15.652	15.818	3.560	56.313			
5	24	15.446	15.549	3.560	55.355	7.218		176.666
4	25	15.328	15.387	4.000	61.549			
3	26	15.290	15.309	4.000	61.237			
2	27	15.286	15.288	4.000	61.153	7.040		190.979
Total				31.680	510.362	23.113	0.000	533.475

(3) Supporting Part on Center Span (Closure Block)

Block	Section	Length of External Form (m)	Average Length of External (m)	Length of Block (m)	External Form Area (m ²)	Side Form Area (m ²)	Subtraction of manhole (m ²)	Total Area per each Block (m ²)
13	28	15.286	15.286	3.010	46.012			
Total				3.010	46.012			46.012

Bottom form 19.565

(4) Cantilever part on P3

Block	Section	Length of External Form (m)	Average Length of External (m)	Length of Block (m)	External Form Area (m ²)	Side Form Area (m ²)	Subtraction of manhole (m ²)	Total Area per each Block (m ²)
	28	15.286						
2	29	15.290	15.288	4.000	61.153			
3	30	15.328	15.309	4.000	61.237	7.114		
4	31	15.446	15.387	4.000	61.549			191.053
5	32	15.652	15.549	3.560	55.355	7.471		
6	33	15.984	15.818	3.560	56.313			
7	34	16.476	16.230	3.560	57.780			176.919
8	35	17.034	16.755	3.000	50.266	9.988		
9	36	17.742	17.388	3.000	52.165			
10	37	18.620	18.181	3.000	54.544			166.963
Total				31.680	510.362	24.573	0.000	534.935

(5) Supporting Part on P3 Side

Block	Section	Length of External Form (m)	Average Length of External (m)	Length of Block (m)	External Form Area (m ²)	Side Form Area (m ²)	Subtraction of manhole (m ²)	Total Area per each Block (m ²)
	37	18.620						
11	38	19.686	19.153	3.000	57.460	13.275		
12	39	19.686	19.686	3.000	59.059			
11	40	18.620	18.620	3.000	55.861			185.655
10	41	17.742	18.181	3.000	54.544	10.837		
9	42	17.004	17.388	3.000	52.165			
8	43	16.476	16.755	3.000	50.266			167.812
7	44	15.984	16.230	3.560	57.780	8.279		
6	45	15.652	15.818	3.560	56.313			122.372
5	46	15.446	15.549	3.560	55.355	7.218		
4	47	15.328	15.387	4.000	61.549			124.122
3	48	15.290	15.309	4.000	61.237	7.042		
2	49	15.286	15.288	4.000	61.153			129.432
1B	50	15.286	15.286	3.000	45.859	8.144		
	51	15.286	15.286	0.500	7.643			
	52	15.286	15.286	1.000	15.286			
	53	15.286	15.286	0.000	0.000			
	54	15.286	15.286	1.990	30.420	16.280	-0.261	123.371
Total				47.170	781.950	71.074	-0.261	852.76

Bottom form 306.605

(6) Total of External Form

	External Form (m ²)	Bottom Form (m ²)	Side Form (m ²)	Total (m ²)	Remarks
Supporting Part on P2 Side	473.274	304.083	70.653	848.010	
Cantilever part on P2	510.362		23.113	533.475	
Supporting Part on Center Span (Closu	26.447	19.565	0.000	46.012	
Cantilever part on P3	510.362		24.573	534.935	
Supporting Part on P3 Side	475.084	306.605	71.074	852.763	
Total of supporting part	974.805	630.253	141.727	1,746.785	
Total of Cantilever part	1,020.724		47.686	1,068.410	
Gross Total	1,995.529	630.253	189.413	2,815.195	

(2) Internal Form:

1) Length of Internal form on Design Sections:

Block	Section	Height	Distance	Accumulative Distance	Width of Deck Slab	Thickness of Deck Slab	Width of Deck Slab Haunch	Thickness of Deck Slab Haunch	Length of Flange	Thickness of Flange	Thickness of Flange tip	Thickness of Flange base	Width of Webs	Width of Bottom Slab	Thickness of Bottom Slab	Thickness of Bottom Slab	Haunch of Bottom Slab	Length of Internal Form
1		2.200	0.000	0.000	11.450	2.200	0.000	0.000	2.475	0.250	0.250	0.550	3.250	6.500	0.500	0.000	0.000	0.000
2		2.200	1.602	1.602	11.450	2.200	0.000	0.000	2.475	0.250	0.250	0.550	3.250	6.500	0.500	0.000	0.000	0.000
3		2.200	0.000	1.602	11.450	0.250	1.200	0.300	2.475	0.250	0.250	0.550	0.600	6.500	0.500	0.300	0.300	7.922
4		2.200	1.000	2.602	11.450	0.250	1.200	0.300	2.475	0.250	0.250	0.550	0.555	6.500	0.413	0.300	0.300	8.186
5		2.200	0.500	3.102	11.450	0.250	1.200	0.300	2.475	0.250	0.250	0.550	0.533	6.500	0.370	0.300	0.300	8.316
6		2.200	3.000	6.102	11.450	0.250	1.200	0.300	2.475	0.250	0.250	0.550	0.400	6.500	0.250	0.300	0.300	8.822
7		2.202	4.000	10.102	11.450	0.250	1.200	0.300	2.475	0.250	0.250	0.550	0.400	6.500	0.250	0.300	0.300	8.826
8		2.221	4.000	14.102	11.450	0.250	1.200	0.300	2.475	0.250	0.250	0.550	0.400	6.500	0.260	0.300	0.300	8.844
4		2.280	4.000	18.102	11.450	0.250	1.200	0.300	2.475	0.250	0.250	0.550	0.400	6.500	0.270	0.300	0.300	8.942
5		2.383	3.560	21.662	11.450	0.250	1.200	0.300	2.475	0.250	0.250	0.550	0.400	6.500	0.300	0.300	0.300	9.088
6		2.549	3.560	25.222	11.450	0.250	1.200	0.300	2.475	0.250	0.250	0.550	0.500	6.500	0.350	0.300	0.300	9.120
7		2.795	3.560	28.782	11.450	0.250	1.200	0.300	2.475	0.250	0.250	0.550	0.500	6.500	0.410	0.300	0.300	9.492
8		3.074	3.000	31.782	11.450	0.250	1.200	0.300	2.475	0.250	0.250	0.550	0.600	6.500	0.480	0.300	0.300	9.710
9		3.428	3.000	34.782	11.450	0.250	1.200	0.300	2.475	0.250	0.250	0.550	0.600	6.500	0.560	0.300	0.300	10.258
10		3.867	3.000	37.782	11.450	0.250	1.200	0.300	2.475	0.250	0.250	0.550	0.600	6.500	0.670	0.300	0.300	10.916
11		4.400	3.000	40.782	11.450	0.250	1.200	0.300	2.475	0.250	0.250	0.550	0.600	6.500	0.800	0.300	0.300	11.722
12		4.400	3.000	43.782	11.450	0.250	1.200	0.300	2.475	0.250	0.250	0.550	0.600	6.500	0.800	0.300	0.300	11.722
11		3.867	3.000	46.782	11.450	0.250	1.200	0.300	2.475	0.250	0.250	0.550	0.600	6.500	0.670	0.300	0.300	10.916
10		3.428	3.000	49.782	11.450	0.250	1.200	0.300	2.475	0.250	0.250	0.550	0.600	6.500	0.560	0.300	0.300	10.258
9		3.074	3.000	52.782	11.450	0.250	1.200	0.300	2.475	0.250	0.250	0.550	0.600	6.500	0.480	0.300	0.300	9.710
8		2.795	3.000	55.782	11.450	0.250	1.200	0.300	2.475	0.250	0.250	0.550	0.500	6.500	0.410	0.300	0.300	9.492
7		2.549	3.560	59.342	11.450	0.250	1.200	0.300	2.475	0.250	0.250	0.550	0.500	6.500	0.350	0.300	0.300	9.120
6		2.383	3.560	62.902	11.450	0.250	1.200	0.300	2.475	0.250	0.250	0.550	0.400	6.500	0.300	0.300	0.300	9.088
5		2.280	3.560	66.462	11.450	0.250	1.200	0.300	2.475	0.250	0.250	0.550	0.400	6.500	0.270	0.300	0.300	8.942
4		2.221	4.000	70.462	11.450	0.250	1.200	0.300	2.475	0.250	0.250	0.550	0.400	6.500	0.260	0.300	0.300	8.844
3		2.202	4.000	74.462	11.450	0.250	1.200	0.300	2.475	0.250	0.250	0.550	0.400	6.500	0.250	0.300	0.300	8.826
2		2.200	4.000	78.462	11.450	0.250	1.200	0.300	2.475	0.250	0.250	0.550	0.400	6.500	0.250	0.300	0.300	8.822
13		2.200	3.010	81.472	11.450	0.250	1.200	0.300	2.475	0.250	0.250	0.550	0.400	6.500	0.250	0.300	0.300	8.822

Block	Section	Height	Distance	Accumulative		Width of Deck Slab	Thickness of Deck Slab	Width of Deck Slab	Thickness of Deck Slab	Thickness of Flange	Length of Flange	Thickness of Flange tip	Thickness of Flange base	Width of Webs	of Bottom Slab	Thickness of Bottom Slab	Haunch of Bottom Slab	Length of Internal Flange
				Distance	Distance													
2	29	2.202	4.000	85.472	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.400	6.500	0.250	0.300	8.826		
3	30	2.221	4.000	89.472	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.400	6.500	0.260	0.300	8.844		
4	31	2.280	4.000	93.472	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.400	6.500	0.270	0.300	8.942		
5	32	2.383	3.560	97.032	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.400	6.500	0.300	0.300	9.088		
6	33	2.549	3.560	100.592	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.500	6.500	0.350	0.300	9.120		
7	34	2.795	3.560	104.152	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.500	6.500	0.410	0.300	9.492		
8	35	3.074	3.000	107.152	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.600	6.500	0.480	0.300	9.710		
9	36	3.428	3.000	110.152	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.600	6.500	0.560	0.300	10.258		
10	37	3.867	3.000	113.152	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.600	6.500	0.670	0.300	10.916		
11	38	4.400	3.000	116.152	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.600	6.500	0.800	0.300	11.722		
12	39	4.400	3.000	119.152	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.600	6.500	0.800	0.300	11.722		
11	40	3.867	3.000	122.152	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.600	6.500	0.670	0.300	10.916		
10	41	3.428	3.000	125.152	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.600	6.500	0.560	0.300	10.258		
9	42	3.074	3.000	128.152	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.600	6.500	0.480	0.300	9.710		
8	43	2.795	3.000	131.152	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.500	6.500	0.410	0.300	9.492		
7	44	2.549	3.560	134.712	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.500	6.500	0.350	0.300	9.120		
6	45	2.383	3.560	138.272	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.400	6.500	0.300	0.300	9.088		
5	46	2.280	3.560	141.832	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.400	6.500	0.270	0.300	8.942		
4	47	2.221	4.000	145.832	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.400	6.500	0.260	0.300	8.844		
3	48	2.202	4.000	149.832	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.400	6.500	0.250	0.300	8.826		
2	49	2.200	4.000	153.832	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.400	6.500	0.250	0.300	8.822		
50	2.200	3.000		156.832	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.533	6.500	0.370	0.300	8.316		
51	2.200	0.500		157.332	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.555	6.500	0.413	0.300	8.186		
52	2.200	1.000		158.332	11.450	0.250	1.200	0.300	2.475	0.250	0.550	0.600	6.500	0.500	0.300	7.922		
53	2.200	0.000		158.332	11.450	2.200	0.000	0.000	2.475	0.250	0.550	3.250	6.500	0.500	0.000	0.000		
54	2.200	1.990		160.322	11.450	2.200	0.000	0.000	2.475	0.250	0.550	3.250	6.500	0.500	0.000	0.000		

Internal Form

Item	Formula	Quantity
2) Bulkheads, manholes Anchorage etc.	(1) Bulkheads	
	* Bulkheads 1, 4, 7 (girder height 2.2m):	
	A1 = 5.700 × 1.700 - 2×1/2 × (0.300 + 1.200 × 0.300) = 9.240 m ²	
	A2 = 2 × 0.550 × (1.000 - 0.300) + 2 × 0.300 × 1.700 = 1.790 m ²	
	A3 = -1.000 × 1.700 (manhole) = -1.700 m ²	
	Σ A = 9.240 + 1.790 - 1.700 = 9.330	per each 9.330 m ²
	* Bulkheads 2, 6 (girder height 2.584m):	
	A1 = 5.500 × 1.976 - 2×1/2 × (0.300 + 1.200 × 0.300) = 10.418 m ²	
	A2 = 2 × 0.780 × (1.000 - 0.300) + 2 × 0.300 × 1.976 = 2.278 m ²	
	A3 = -1.000 × 1.976 (manhole) = -1.976 m ²	
	Σ A = 10.418 + 2.278 - 1.976 = 10.720	per each 10.720 m ²

Item	Formula	Quantity
* Bulkheads 3, 5 (girder height 2.584m):		
A1 =	5.500 × 1.976 - 2×1/2 × 0.300	
×	0.300 + 1.200 × 0.300	10.418 m ²
A2 =	2 × 0.890 × (1.000 - 0.300)	
+	2 × 0.300 × 1.976	2.432 m ²
A3 =	-1.000 × 1.976 (manhole)	-1.976 m ²
Σ A =	10.418 + 2.432 - 1.976	10.874
		per each 10.874 m ²
(2) Intermediate Cross Beam on Pier Head		
* Cross Beam		
A1 =	5.300 × 3.350 - 0.300 × 0.300	
-	0.300 × 1.200	17.305 m ²
A2 =	-1.000 × 1.700	
+	2×1/2 × 0.150 × 0.150	
+	3.000 × (2 × (1.700 - 0.150))	
+	(1.000 - 2 × 0.150)	
+	(2.000 × 0.150 × 2 ^{0.5})	10.995 m ²
Σ A =	17.305 + 10.995	28.300 m ²
		per each 28.300 m ²

Item	Formula	Quantity
(3) Anchorage		
* TYPE A-1		
A =	$2 \times 1/2 \times 0.342 \times (0.418 + 2.347)$	
+	$1/2 \times 0.330 \times (0.830 + 1.046)$	
+	$1/2 \times 1.900 \times (0.830 + 1.046)$	per each
	= 3.037 m ²	3.037 m ²
* TYPE A-2		
A =	$2 \times 1/2 \times 0.342 \times (0.418 + 2.347)$	
+	$1/2 \times 0.330 \times (0.330 + 0.546)$	
+	$1/2 \times 1.900 \times (0.330 + 0.546)$	per each
	= 1.922 m ²	1.922 m ²
* TYPE-B1		
V =	0.418×0.336	
+	$1/2 \times (1.900 \times 0.336)$	
+	$0.840 \times (0.418 + 0.336 + 1.900)$	per each
	= 2.689 m ³	2.689 m ³
* TYPE-B2		
V =	0.418×0.336	
+	$1/2 \times (1.900 \times 0.336)$	
+	$0.425 \times (0.418 + 0.336 + 1.900)$	per each
	= 1.588 m ³	1.588 m ³

Item	Formula	Quantity
Block No.	Anchorage Type	Unit Area m ²
B2	B1	2.689
	B2	1.588
B3	B1	2.689
B4	B1	2.689
B5	B1	2.689
B6	B1	2.689
B8	A1	3.037
B9	A1	3.037
	A2	1.922

3) Total of Internal Form

(1) Supporting Part on P2 Side

Block	Section	Length of Internal Form (m)	Average Length of Internal Form (m)	Length of Block (m)	Internal Form Area (m ²)	Cross Beam Bulkhead (m ²)	Anchorage (m ²)	Total Area per each Block (m ²)
1A	1	0.000						
	2	0.000	0.000	1.602	0.000			
	3	7.922	3.961	0.000	0.000			
	4	8.186	8.054	1.000	8.054			
	5	8.316	8.251	0.500	4.126			
	6	8.822	8.569	3.000	25.708			37.888
2	7	8.826	8.824	4.000	35.298			
3	8	8.844	8.835	4.000	35.342	9.330	13.931	93.901
4	9	8.942	8.893	4.000	35.574			
5	10	9.088	9.015	3.560	32.095		10.756	78.425
6	11	9.120	9.104	3.560	32.412			
7	12	9.492	9.306	3.560	33.131	10.720	10.756	87.019
8	13	9.710	9.601	3.000	28.804			
9	14	10.258	9.984	3.000	29.953			
10	15	10.916	10.587	3.000	31.762		10.756	101.275
11	16	11.722	11.319	3.000	33.958			
12	17	11.722	11.722	3.000	35.167			
11	18	10.916	11.319	3.000	33.958	28.300	10.756	142.139
Total				46.782	435.342	48.350	56.955	540.65

(2) Cantilever part on P2

Block	Section	Length of Internal Form (m)	Average Length of Internal Form (m)	Length of Block (m)	Internal Form Area (m ²)	Cross Beam Bulkhead (m ²)	Anchorage (m ²)	Total Area per each Block (m ²)
	18	10.916						
10	19	10.258	10.587	3.000	31.762			
9	20	9.710	9.984	3.000	29.953			
8	21	9.492	9.601	3.000	28.804			90.519
7	22	9.120	9.306	3.560	33.131			
6	23	9.088	9.104	3.560	32.412			
5	24	8.942	9.015	3.560	32.095	10.874	12.148	120.660
4	25	8.844	8.893	4.000	35.574			
3	26	8.826	8.835	4.000	35.342			
2	27	8.822	8.824	4.000	35.298		15.992	122.206
Total				31.680	294.371	10.874	28.140	333.385

(3) Supporting Part on Center Span (Closure Block)

Block	Section	Length of Internal Form (m)	Average Length of Internal Form (m)	Length of Block (m)	Internal Form Area (m ²)	Cross Beam Bulkhead (m ²)	Anchorage (m ²)	Total Area per each Block (m ²)
13	28	8.822	8.822	3.010	26.555	9.330		35.885
Total				3.010	26.555	9.330	0.000	35.885

(4) Cantilever part on P3

Block	Section	Length of Internal Form (m)	Average Length of Internal Form (m)	Length of Block (m)	Internal Form Area (m ²)	Cross Beam Bulkhead (m ²)	Anchorage (m ²)	Total Area per each Block (m ²)
	28	8.822						
2	29	8.826	8.824	4.000	35.298			
3	30	8.844	8.835	4.000	35.342			
4	31	8.942	8.893	4.000	35.574		15.992	122.206
5	32	9.088	9.015	3.560	32.095	10.874		
6	33	9.120	9.104	3.560	32.412			
7	34	9.492	9.306	3.560	33.131		12.148	120.660
8	35	9.710	9.601	3.000	28.804			
9	36	10.258	9.984	3.000	29.953			
10	37	10.916	10.587	3.000	31.762			90.519
Total				31.680	294.371	10.874	28.140	333.385

(5) Supporting Part on P3 Side

Block	Section	Length of Internal Form (m)	Average Length of Internal Form (m)	Length of Block (m)	Internal Form Area (m ²)	Cross Beam Bulkhead (m ²)	Anchorage (m ²)	Total Area per each Block (m ²)
	37	10.916						
11	38	11.722	11.319	3.000	33.958			
12	39	11.722	11.722	3.000	35.167			
11	40	10.916	10.916	3.000	32.749	28.300	10.756	140.930
10	41	10.258	10.587	3.000	31.762			
9	42	9.710	9.984	3.000	29.953			
8	43	9.492	9.601	3.000	28.804		10.756	101.275
7	44	9.120	9.306	3.560	33.131			
6	45	9.088	9.104	3.560	32.412	10.720	10.756	87.019
5	46	8.942	9.015	3.560	32.095			
4	47	8.844	8.893	4.000	35.574		10.756	78.425
3	48	8.826	8.835	4.000	35.342			
2	49	8.822	8.824	4.000	35.298	9.330	13.931	93.901
1B	50	8.316	8.316	3.000	24.949			
	51	8.186	8.251	0.500	4.126			
	52	7.922	8.054	1.000	8.054			
	53	0.000	3.961	0.000	0.000			
	54	0.000	0.000	1.990	0.000			37.129
Total				47.170	433.374	48.350	56.955	538.68

(6) Total of Internal Form

	External Form Area (m ²)	Cross Beam Bulkhead (m ²)	Anchorage (m ²)	Total (m ²)	Remarks
Supporting Part on P5 Side	435.342	48.350	56.955	540.647	
Cantilever part on P5	294.371	10.874	28.140	333.385	
Supporting Part on Center Span (Closur	26.555	9.330	0.000	35.885	
Cantilever part on P6	294.371	10.874	28.140	333.385	
Supporting Part on P6 Side	433.374	48.350	56.955	538.679	
				0.000	
Total of supporting part	895.271	106.030	113.911	1,115.211	
Total of Cantilever part	588.742	21.747	56.280	666.769	
Gross Total	1,484.013	127.777	170.191	1,781.981	

Total of Form

Unit m²

Classification	External Form	Bottom Form	Internal Form	Side Form	Cross Beam Bulkhead	Anchor age	Total
Supporting Part	974.805	630.253	895.271	141.727	106.030	113.911	2,861.997
Cantilever Part	1,020.724		588.742	47.686	21.747	56.280	1,735.179
Total	1,995.529	630.253	1,484.013	189.413	127.777	170.191	4,597.176

Total of Form

Unit m²

Classification	External Form	Bottom Form	Internal Form	Side Form	Cross Beam Bulkhead	Anchorage	Total
Supporting Part	974.805	630.253	895.271	141.727	106.030	113.911	2,861.997
Cantilever Part	1,020.724		588.742	47.686	21.747	56.280	1,735.179
Total	1,995.529	630.253	1,484.013	189.413	127.777	170.191	4,597.176

3. Re-bar

Type	Dia	Unit	Block 1A	Block 2,3	Block 4,5	Block 6,7	Block 8,9,10	Block 11,12,11	Sub Total	Remarks
P	D14	kg	2042.8	2129.4	2032.9	1741.6	2730.3	3110.7	13787.7	
	D16	kg	4599.3	5675.9	5389.5	5613	6292.7	7400.2	34970.6	
	D22	kg	2008.2	2595.6	2501	2580.4	3993.1	5404.3	19082.6	
	Total	kg	8650.3	10400.9	9923.4	9935	13016.1	15915.2	67840.9	

Type	Dia	Unit	Block 10,9,8	Block 7,6,5	Block 4,3,2	Block 13	Block 2,3,4	Block 5,6,7	Sub Total	Remarks
P	D14	kg	2746.2	2994.9	3071.7	759.7	3071.7	2994.9	15639.1	
	D16	kg	6870	8020.3	8082.4	1791.9	8082.4	8020.3	40867.3	
	D22	kg	4164.3	3799.5	2040.2	1578.3	2040.2	3799.5	17422	
	Total	kg	13780.5	14814.7	13194.3	4129.9	13194.3	14814.7	73928.4	

Type	Dia	Unit	Block 8,9,10	Block 11,12,11	Block 10,9,8	Block 7,6	Block 5,4	Block 3,2	Sub Total	Remarks
P	D14	kg	2746.2	3110.7	2730.3	1741.6	2032.9	2129.4	14491.1	
	D16	kg	6870	7400.2	6292.7	5613	5389.5	5675.9	37241.3	
	D22	kg	4164.3	5404.3	3993.1	2580.4	2501	2595.6	21238.7	
	Total	kg	13780.5	15915.2	13016.1	9935	9923.4	10400.9	72971.1	

Type	Dia	Unit	Block 1B						Sub Total	Remarks
P	D14	kg	2271.1						2271.1	
	D16	kg	5048.3						5048.3	
	D22	kg	2171.8						2171.8	
	Total	kg	9491.2						9491.2	

type	Dia	Unit	Railling	Cross Beam	Anchorage	Bulkhead		Sub Total	Gross Total	Remarks
P	D14	kg		735.2		1924			2659.2	
	D16	kg		5855.4	13971.6	2150.2			21977.2	
	D22	kg								
	Total	kg		6590.6	13971.6	4074.2			24636.4	

(5) Total of re-bar

	D14	D16	D22	Total (kg)	Remarks
Supporting Part on P2 Side	14452.5	40464.9	19082.6	74000.0	
Cantilever part on P2	9477.6	28467.0	10004.0	47948.6	
Supporting Part on Center Span	759.7	1791.9	1578.3	4129.9	
Cantilever part on P3	9477.6	28467.0	10004.0	47948.6	
Supporting Part on P3 Side	14680.8	40913.9	19246.2	74840.9	
Total of supporting part	29893.0	83170.7	39907.1	152970.8	
Total of Cantilever part	18955.2	56934.0	20008.0	95897.2	
Gross Total	48848.2	140104.7	59915.1	248868.0	

1) Longitudinal Prestressing Internal Tendons

12S12.7B(SWPR7B)

Length of PC Steel L

--

Unit Weight: 9.288 kgf/m

(1) P2 Tendons on Top Slab

PC Steel	Length of (m)	Unit Weight (kg)	Each	Weight of (kg)	Remarks
S101	72.072	669.4	1	669.4	
S102	64.071	595.1	1	595.1	
S103	64.068	595.1	1	595.1	
S104	56.053	520.6	1	520.6	
S105	56.069	520.8	1	520.8	
S106	48.033	446.1	1	446.1	
S107	48.072	446.5	1	446.5	
S108	40.900	379.9	1	379.9	
S109	40.950	380.3	1	380.3	
S110	33.781	313.8	1	313.8	
S111	33.841	314.3	1	314.3	
S112	30.249	281.0	1	281.0	
S113	26.723	248.2	1	248.2	
S114	17.734	164.7	1	164.7	
S115	14.620	135.8	1	135.8	
S116	8.796	81.7	1	81.7	
S117	8.779	81.5	1	81.5	
S118	72.493	673.3	1	673.3	
S119	63.404	588.9	1	588.9	
S120	64.436	598.5	1	598.5	
S121	55.663	517.0	1	517.0	
S122	56.366	523.5	1	523.5	
S123	48.180	447.5	1	447.5	
S124	48.329	448.9	1	448.9	
S125	41.031	381.1	1	381.1	
S126	41.164	382.3	1	382.3	
S127	33.894	314.8	1	314.8	
S128	34.012	315.9	1	315.9	
S129	30.354	281.9	1	281.9	
S130	26.852	249.4	1	249.4	
S131	17.773	165.1	1	165.1	
S132	14.810	137.6	1	137.6	
S133	8.784	81.6	1	81.6	
S134	8.772	81.5	1	81.5	
Total	1331.128		34	12,363.6	

(2)

P3 Tendons on Top Slab

PC Steel	Length of (m)	Unit Weight (kg)	Each	Weight of (kg)	Remarks
S201	72.072	669.4	1	669.4	
S202	64.071	595.1	1	595.1	
S203	64.068	595.1	1	595.1	
S204	56.053	520.6	1	520.6	
S205	56.069	520.8	1	520.8	
S206	48.033	446.1	1	446.1	
S207	48.072	446.5	1	446.5	
S208	40.900	379.9	1	379.9	
S209	40.950	380.3	1	380.3	
S210	33.781	313.8	1	313.8	
S211	33.841	314.3	1	314.3	
S212	30.249	281.0	1	281.0	
S213	26.723	248.2	1	248.2	
S214	17.734	164.7	1	164.7	
S215	14.620	135.8	1	135.8	
S216	8.796	81.7	1	81.7	
S217	8.779	81.5	1	81.5	
S218	72.493	673.3	1	673.3	
S219	63.404	588.9	1	588.9	
S220	64.436	598.5	1	598.5	
S221	55.663	517.0	1	517.0	
S222	56.366	523.5	1	523.5	
S223	48.180	447.5	1	447.5	
S224	48.329	448.9	1	448.9	
S225	41.031	381.1	1	381.1	
S226	41.164	382.3	1	382.3	
S227	33.894	314.8	1	314.8	
S228	34.012	315.9	1	315.9	
S229	30.354	281.9	1	281.9	
S230	26.852	249.4	1	249.4	
S231	17.773	165.1	1	165.1	
S232	14.810	137.6	1	137.6	
S233	8.784	81.6	1	81.6	
S234	8.772	81.5	1	81.5	
Total	1331.128		34	12,363.6	

(4) P2-P3 Tendons on Bottom Slab

PC Steel	Length of (m)	Unit Weight (kg)	Each	Weight of (kg)	Remarks
S401	33.168	308.1	1	308.1	
S402	33.168	308.1	1	308.1	
S403	33.168	308.1	1	308.1	
S404	33.168	308.1	1	308.1	
S405	25.050	232.7	1	232.7	
S406	25.050	232.7	1	232.7	
S407	17.052	158.4	1	158.4	
S408	17.052	158.4	1	158.4	
S409	17.052	158.4	1	158.4	
S410	33.168	308.1	1	308.1	
S411	33.168	308.1	1	308.1	
S412	33.168	308.1	1	308.1	
S413	33.168	308.1	1	308.1	
S414	25.050	232.7	1	232.7	
S415	25.050	232.7	1	232.7	
S416	17.052	158.4	1	158.4	
S417	17.052	158.4	1	158.4	
S418	17.052	158.4	1	158.4	
Total	467.856		18	4,346.0	

Length of PC Steel L

--

Unit Weight : 13.212 kgf/m

(1) P1-P2 Tendons

PC Steel	Length of (m)	Unit Weight (kg)	Each	Weight of (kg)	Remarks
C11	42.539	562.0	1	562.0	
C12	42.539	562.0	1	562.0	
C13	42.539	562.0	1	562.0	
C14	42.539	562.0	1	562.0	
C15	42.539	562.0	1	562.0	
C16	42.539	562.0	1	562.0	
Total	255.234		6	3,372.0	

(2) P2-P3 Tendons

PC Steel	Length of (m)	Unit Weight (kg)	Each	Weight of (kg)	Remarks
C21	79.044	1,044.3	1	1,044.3	
C22	79.044	1,044.3	1	1,044.3	
C23	79.044	1,044.3	1	1,044.3	
C24	79.044	1,044.3	1	1,044.3	
C25	79.044	1,044.3	1	1,044.3	
C26	79.044	1,044.3	1	1,044.3	
Total	474.264		6	6,265.8	

(3) P3-P4 Tendons

PC Steel	Length of (m)	Unit Weight (kg)	Each	Weight of (kg)	Remarks
C31	42.539	562.0	1	562.0	
C32	42.539	562.0	1	562.0	
C33	42.539	562.0	1	562.0	
C34	42.539	562.0	1	562.0	
C35	42.539	562.0	1	562.0	
C36	42.539	562.0	1	562.0	
Total	255.234		6	3,372.0	

3) Transverse Prestressing Tendons (Top Slab) 3S12

Length of PC Steel L



Unit Weight: 2.262 kgf/m

PC Steel No.	Segment Number	Length of (m)	Unit Weight (kg)	Each	Weight of (kg)	Remarks
3.0m Segment	6	11.450	25.9	3	466.2	
3.56m Segment	6	11.450	25.9	4	621.6	
4.0m Segment	6	11.450	25.9	4	621.6	
Closure Segmen	1	11.450	25.9	3	77.7	
Supporting Part	2	11.450	25.9	47	2,434.6	
Total		57.250		61	4,221.7	

Total Tendons Numt 163 Nos.
 Total Tendons Lengt 1,866.357 m

(11) Total of PC Steel

Item		Each (Nos.)	Length of (m)	Weight of (kg)	Remarks
Longitudina l Prestressing Internal Tendons	12S12.7 B (SWPR7 B)	P2 Tendons on Top Slab	34	1,331.128	12,363.6
		P3 Tendons on Top Slab	34	1,331.128	12,363.6
		P2~P3 Tendons on Bottom	18	467.856	4,346.0
		Total	86	3,130.112	29,073.2
Longitudina l Prestressing External	12S15.2 (SWPR7 B)	P1-P2 Tendons	6	255.234	3,372.0
		P2-P3 Tendons	6	474	6,265.8
		P3-P4 Tendons	6	255.234	3,372.0
		Total	18	984.732	13,009.8
Transverse Prestressing Tendons	3S12				
			163	1866.357	4221.7

Item	Formula	Quantity
5. Bearing		
1) Rubber Bearing		
(1) Elastomeric Bearing 660x560x125 on Pier 1	N = 4 each	4 each
(2) Elastomeric Bearing 1410x1410x214 on Pier 2	N = 4 each	4 each
2) Non-Shrink Mortar	Bearing Mort Anchor mortar	
P1, P4	0.16 + 0.24 = 0.399 m ³	
P2, P3	0.81 + 0.80 = 1.607 m ³	
	Total	2.005 m ³
Non-Shrink Mortar		
1) Pier P1, P4	Average height of trapezoid = 38 mm Average area of the top and bottom of trapezoid S = (660 + 100 + 1/2 x 38) x (560 + 100 + 1/2 x 38) = 0.529 m ² Volume of the trapezoid V = S x h x 8 = 0.529 x 0.0375 x 8 = 0.159 m ³	0.159 m ³
2) Pier P2, P3	Average height of trapezoid = 43 mm Average area of the top and bottom of trapezoid S = (1410 + 100 + 1/2 x 43) x (1410 + 100 + 1/2 x 43) = 2.345 m ² Volume of the trapezoid V = S x h x 8 = 2.345 x 0.043 x 8 = 0.807 m ³	0.807 m ³
3) Void of anchor void	Diameter 175 mm Length 1250 mm Volume Cross-section area 1.25 x 0.024 x 8 = 0.24 m ³	0.24 m ³
	Diameter 225 mm Length 2500 mm Volume Cross-section area 2.5 x 0.040 x 8 = 0.8 m ³	0.8 m ³

Item	Formula	Quantity
6. Pavement	Pavement	
	* Asphalt concrete t=70mm :	
	A = 10.750 × 159.000 = 1,709.250 m ²	1,709.3 m ²
	* Water proofing t=5mm :	
	A = 10.750 × 159.000 = 1,709.25 m ²	1,709.25 m ²

QUANTITY TABLE OF ABUTMENTS

ITEMS		UNIT	ABUTMENT A1	ABUTMENT A2	TOTAL	
A- ABUTMENT						
PILE	NUMBER OF PILES	PILE	90.0	90.0	180.0	
	TOTAL LENGTH OF RC PILES □ 450mm	m	3600.0	3600.0	7200.0	
	CONCRETE CLASS D	m ³	732.0	732.0	1463.9	
	REINFORCEMENT	D32	kg	459.0	459.0	918.0
		D28	kg	0.0	0.0	0.0
		D25	kg	46548.0	46548.0	93096.0
		D22	kg	89496.0	89496.0	178992.0
		D16	kg	5985.0	5985.0	11970.0
		φ 6	kg	16551.0	16551.0	33102.0
TOTAL		kg	159039.0	159039.0	318078.0	
ABUTMENT	CONCRETE CLASS E	m ³	597.1	597.1	1194.2	
	REINFORCEMENT	D25	kg	12973.0	12973.0	25946.0
		D22	kg	4913.0	4913.0	9826.0
		D20	kg	5793.0	5793.0	11586.0
		D18	kg	711.0	711.0	1422.0
		D16	kg	4516.0	4516.0	9032.0
		D14	kg	2978.0	2978.0	5956.0
		D10	kg	126.0	126.0	252.0
		TOTAL	kg	32010.0	32010.0	64020.0
	FORM	m ²	623.4	623.4	1246.8	
	SEAFFOLDING	H ≤ 4 m	m ²	142.4	142.4	284.8
		4m < H < 30m	m ²	562.2	562.2	1124.4
	SUPPORT	m ³	12.3	12.3	24.6	
	LEAN CONCRETE CLASS G	m ³	16.6	16.8	33.2	
	BLINDING STONE	m ³	33.2	33.2	66.4	
EXCAVATION	m ³	1724.3	1500.4	3224.7		
BACK FILL	m ³	227.3	109.5	336.8		
B- APPROACH SLAB						
	CONCRETE CLASS E	m ³	43.2	43.2	86.5	
	LEAN CONCRETE CLASS G	m ³	13.3	13.3	26.6	
	FORM	m ²	24.2	24.2	48.3	
	ASPHATIC JOINT FILLER T=20mm	m ³	0.4	0.4	0.8	
	REINFORCEMENT	D20	kg	3421.6	3421.6	6843.2
		D16	kg	3402.3	3402.3	6804.6
		D10	kg	255.8	255.8	511.6
		TOTAL	kg	7079.7	7079.7	14159.4
C- SLOPE PROTECTION						
SIDE SLOPE	STONE MASONRY T=300mm	m ³	830.6	816.6	1647.2	
	BLINDING AGGREGATE T=100mm	m ³	273.2	268.2	541.4	
	GEOTEXTILE	m ²	664.0	660.0	1324.0	
	PVC PILE ϕ50mm DIA., L=1000mm	m	74.0	74.0	148.0	
FOOTING	WOODEN PILE LENGTH L=3m	m	8886.0	8831.0	17717.0	
	BLINDING	m ³	11.8	11.8	23.6	
	STONE MASONRY	m ³	53.3	53.0	106.3	
	EXCAVATION	m ³	639.8	636.0	1275.8	
	BACK FILL	m ³	444.0	442.0	886.0	
	LENGTH OF FOOTING	m	148.1	147.2	295.3	

QUANTITY SURVEYING ABUTMENT FOR A1

No.

Item	Formula	Quantity
3.1.1) Concrete		
3.1.1.1 BackWall		
v1 =	24.10 x 2.04 x 0.40 =	19.62 m3
3.1.1.2 Frontwall		
v2 =	24.10 x ((4.94 + 5.18) / 2	
x	1.50 - 0.10 ^2 / 2) =	182.82 m3
3.1.1.3 Corbel		
v3 =	0.30 x (0.30 + 0.60) / 2	
x	x 23.10 =	3.12 m3
3.1.1.4 Haunch		
v4 =	6.98 x 0.50 x 0.50 / 2 x 2	
=	=	1.74 m3
3.1.1.5 Wingwall		
v5 = (3.50 x (6.98 + 6.89) / 2	
+	1.85 x (1.05 + 3.41) / 2	
x	x 0.50 x 2 =	28.40 m3
3.1.1.6 Parapet		
v6 = (0.50 x 0.30 + 0.20 ^2	
-	0.15 ^2 / 2) x 5.75 x 2	
=	=	2.06 m3
3.1.1.7 Footing		
v7 =	24.10 x 7.50 x 2.00	
-	12 x pi x 0.75 ^2 x 0.1	
=	=	359.38 m3
	Total	597.1 m3
3.1.2) Form		
3.1.2.1 BackWall		
a1 =	2.00 x 2.04 x 24.10 =	
-	2.04 x (0.50 + 0.50) x 2	
=	=	94.02 m2
3.1.2.2 Frontwall		
a2 =	24.1 x (4.94 + 5.181)	
-	(0.5 + 0.5) x 5.181 x 2	
+	5.06 x 1.5 x 2 =	248.74 m2
3.1.2.3 Corbel		
a3 = (0.3 + (0.3 ^2 + 0.3 ^2) ^ 0.5	
x	x 23.1 =	16.73 m2
3.1.2.4 Haunch		
a4 =	+ (0.5 ^2 + 0.5 ^2) ^ 0.5	
x	x 6.975 x 2 =	9.86
3.1.2.5 Wingwall		
a5 =	2 x (3.5 x (6.975 + 6.89)	
+	+ 1.85 x (1.05 + 3.41)	
+	0.5 x (1.05 + 2.97 + 3.50)	
-	0.5 x 6.98) =	114.13 m2
3.1.2.6 Parapet		
a6 = (5.75 x (0.5 + 0.3 + 0.05	
+	+ 1.4142 x 0.15 + 0.05)	
+	+ 2 x 0.17875) x 2	
=	=	13.50 m2
3.1.2.7 Footing		
a7 =	2 x (24.100 + 7.500) x 2.00	
Total	Total	126.40 m2
		623.4 m2

QUANTITY SURVEYING ABUTMENT FOR A1

No.

Item	Formula	Quantity
3.1.3) Scaffolding:	3.1.3.1 (H<=4m) $A2 = \left(\frac{2 \times (24.10 + 7.50)}{2} + \frac{8}{2} \right) \times 1.85$	142.4 m2
	3.1.3.2 (4m< H<=30m) $A2 = \frac{((24.1+2) \times (5.35+1.5+2) + (0.5+2) \times (5.35+1-1) + (24.1-2 \times 1.5) \times (5.35-1+1) + (0.5+2) \times (5.35+1.5+2)) \times (2.04+4.94)}{2}$	562.2 m2
3.1.4) Support	$= \left(\frac{9.35 - 1.55}{2} + \frac{5.48}{2} \right) \times 1.85$	12.3 m3
3.1.5) Lean Concrete	3.1.5.1 Concrete class G $V = \left(\frac{0.1 \times ((24.10 + 0.2) \times (7.50 + 1.50) + 0.2 \times 12)}{2} \right) \times \pi \times 1.50^2$	16.6 m3
	3.1.5.2 Form $A = \frac{0.1 \times ((24.10 + 0.2) \times 7.50 + 0.2 \times 12)}{2}$	6.40 m2
3.1.6) Blinding Stone	$V = \left(\frac{0.2 \times ((24.10 + 0.2) \times (7.50 + 1.50) + 0.2 \times 12)}{2} \right) \times \pi \times 1.50^2$	33.2 m3
3.1.7) Bored Pile	* Concrete D $N = 90$	90 nos per 40.0m
	$V1 = \left(\frac{0.450 \times 0.450 \times 0.020}{4} \right) \times 10.000$	8.068 m3
	$V2 = \left(\frac{0.450 \times 0.450 \times 0.020}{4} + \frac{0.090 \times 0.090}{4} \right) \times 10.000$	0.065 m3
	$V = 8.133 \times 90$	731.970 m3
	*Form $A1 = 0.020 \times 1.414 \times 4 \times 10.000$	1.131 m2
	$A2 = 0.410 \times 3 \times 10.000$	12.300 m2
	$A3 = 0.450 \times 0.450 \times 0.020 \times 10.000$	0.202 m2
	$A4 = \left(\frac{0.450 + 0.090}{2} \right) \times 10.000$	0.502 m2
	$A = A1 + A2 + A3 + A4$	55.640 m2 (per one)
3.1.8) Earthworks	3.1.8.1 Excavation for foundation $= \frac{1.99}{3} \times 6 \times \left(\frac{9.50 \times 26.10}{2} + \frac{13.48 \times 30.08}{2} \right) + \left(\frac{9.50 + 13.48}{2} \right) \times (26.10 + 30.08)$	644.9 m3
	3.1.8.2 Excess Soil = Lean Concrete + Blinding Stone + Footing Volume + Pile Occupied Volume $\text{Pile Occupied Volume} = 12 \times \frac{\pi}{4} \times 1.50^2$	8.48 m3
	$\text{Excess Soil} = 644.9 - 8.48$	417.63 m3
	3.1.8.3 Back Fill $= 227.3$	227.3 m3