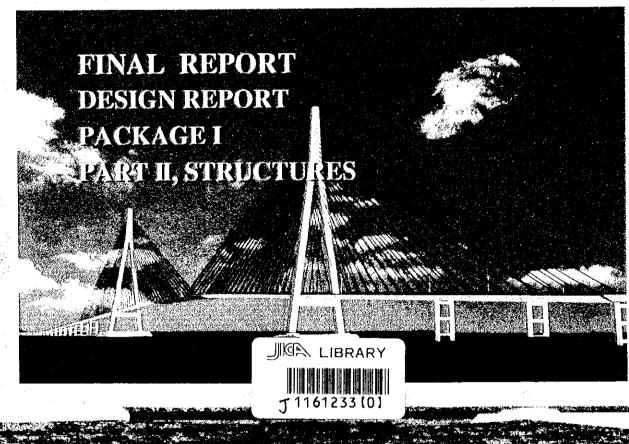
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JAPAN INTERNATIONAL COOPERATION AGENCY (JICA) MINISTRY OF TRANSPORT SOCIALIST REPUBLIC OF VIET NAM

THE DETAILED DESIGN ON THE CAN THO BRIDGE CONSTRUCTION IN SOCIALIST REPUBLIC OF VIET NAM



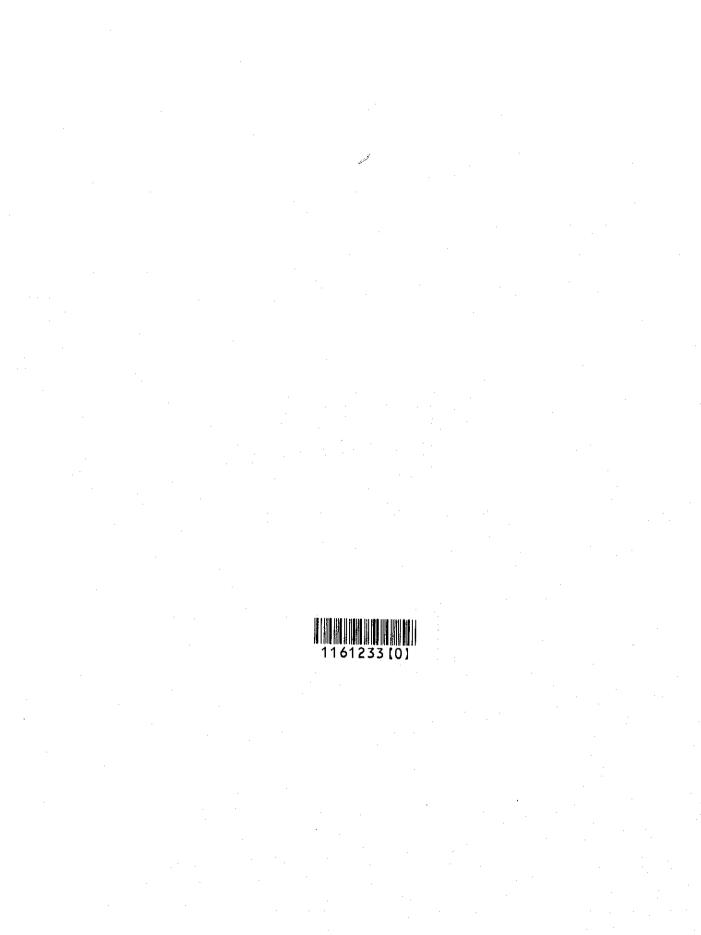
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THE DETAILED DESIGN ON THE CAN THO BRIDGE CONSTRUCTION IN SOCIALIST REPUBLIC OF VIET NAM

FINAL REPORT DESIGN REPORT PACKAGE I PART II, STRUCTURES

OCTOBER 2000

NIPPON KOEI CO., LTD.



DESIGN REPORT II STRUCTURES, PACKAGE-1

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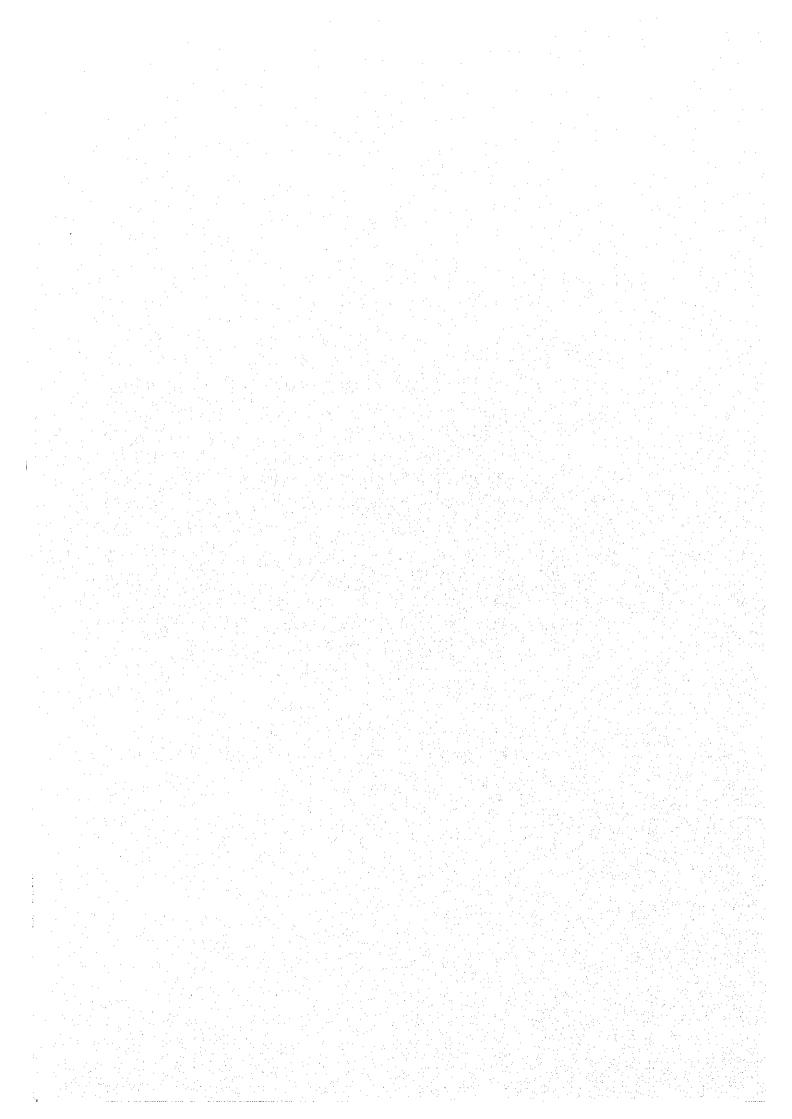
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DESIGN REPORT II

STRUCTURES, PACKAGE-1

CHAPTER 1 GENERAL

1.1 Summary of Categorization

1.1.1 General

The structures of Package -1 and 3 were categorized into the following summary tables with considering the design conditions and dimensions of the structures, and the design analysis was studied for the most severe design condition.

The categorized structures are summarized as follows:

Structure	Number of Categorized	Remarks	
	Structures		
1) Bridges	· · ·		
1-1) Superstructures	15 types	PC Box:	2types
		PRC Hollow Slab:	2types
	· · · ·	PC Composite I beam (Connected):	8types
		PC Composite I beam (Simple Span):	3types
1-2) Abutments	11 types	Reversed T type	
1-3) Piers	16 types	3 column type:	8 types
		Solid single column type:	2 types
		Wall type:	6 types
2) Culvert Box			
2-1) Culvert Box	14 types	1 cell type:	10types
		2 cells type:	4types
2-2) Wing Wall	3 types		

Table 1.1 Summary of Categorized Structures

1.1.2 Bridges

(1) Superstructures

Type for De	esign	Span Arrangement		Name of Bridges	
PC Box Girder	Case 1	42 + 75 + 42	-	Cai Rang Bridge (Package -3)	
	Case 2	36.5+57+36.5	-	Tra On Bridge (Package - 1)	
PRC Hollow Slab	Case 1	4 @ 25	-	NH. 91B, Over Bridge	
				(Package-3)	
	Case 2	2 @ 24.5 + 34.5 + 2 @ 24.5	-	NH. 54, Over Bridge	
				(Pacakge-1)	
PC Composite	Case 1	31 (H=1.85) + 31 (H=1.85)	-	Cai Rang Bridge (Package - 3)	
I beam	Case 2	37 (H=1.85) + 31 (H=1.65)	-	Cai Rang Bridge (Package - 3)	
(Connected or	Case 3	25(H=1.45) + 37(H=1.85) +	-	Small Tra Va Bridge (Package	
Simple Spans)		25(H=1.45)		- 1)	
	Case 4	28(H=1.65) + 37(H=1.85) +	-	Cai Da Bridge (Package-3)	
· · · ·		28(H=1.65)	-	Cai Nai Bridge (Package-3)	
	Case 6	28(H=1.65) + 25(H=1.65) +	-	Ap My Bridge (Package-3)	
· · · ·		37(H=1.85) + 2@25(H=1.65)			
	Case 7	5 @ 37(H=1.85)	-	Large Tra Va Bridge	
				(Package-1)	
			-	Tra On Bridge (Package-1)	
· · · ·			-	Cai Tac 1 Bridge (Package-3)	
· .	Case 8	28(H=1.65) + 37(H=1.85) +	-	NH No.91, Rampway Bridge	
		28(H=1.65), *W=6.5		(Package-3)	
PC Composite	Case 1	25(H=1.45)	-	Ba Mang Bridge (Package-3)	
I beam	Case 2	31(H=1.85)	-	Cai Rang Bridge (Package-3)	
(Simple Span)	Case 3	37(H=1.85)	-	Cai Rang Bridge (Package-3)	
			-	Cai Tac 2 Bridge (Package-3)	

Table 1.2	Summary	of Superstructure	for Design
-----------	---------	-------------------	------------

Remarks: (H=1.65) indicates the height of PC I beam.

*W=6.5 indicates the Carriageway width of the Bridge Case 8.

Abutments (2)

Type for Design	Height of abutment	Type & Diameter of Piles
A1	9.2m	Cast in Place Concrete Pile 1.5m
A2	9.2m	Cast in Place Concrete Pile 1,5m
A3	8.2m	Cast in Place Concrete Pile 1.5m
A4	8.8m	Cast in Place Concrete Pile 1.5m
A5	8.0m	Cast in Place Concrete Pile 1.5m
A6	7.52, 7.6, 7.8m	Cast in Place Concrete Pile 1.5m
A8	8.0m	Cast in Place Concrete Pile 1.5m
A2-DP	9.2m	Driving Square Pile 0.45m x 0.45m
A3-DP	8.2m	Driving Square Pile 0.45m x 0.45m
A7-DP	7.6m	Driving Square Pile 0.45m x 0.45m
A9-DP	7.8m	Driving Square Pile $0.45 \mathrm{m} \ge 0.45 \mathrm{m}$
Notes:	In the Design of "Type Adstudied.	0.45m x 0.45m 6", the highest Abutment (7.8

Table 1.3 Summary of Abutments for Design

(3)	Piers

Type for	Height of Piers	Type & Diameter of Piles	Type of Pier
Design			
P2	8.6m, 9.1m	Cast in Place Concrete Pile 1.5m	Solid Single Column Type
P4	12.6m,	Cast in Place Concrete Pile $1.5 \mathrm{m}$	Wall Type
	13.6m,14.4m		
P5	11.2m	Cast in Place Concrete Pile 1.5m	Wall Type
P6	9.5m	Cast in Place Concrete Pile 1.5m	3 Column Type
P7	7.4m	Cast in Place Concrete Pile 1.5m	3 Column Type
P8	8.0m, 8.7m,	Cast in Place Concrete Pile 1.5m	3 Column Type
	9.0m		
P9	9.1m, 10.8m	Cast in Place Concrete Pile 1.5m	3 Column Type
P11	8.4m, 9.0m	Cast in Place Concrete Pile 1.5m	3 Column Type
P13	8.1m	Cast in Place Concrete Pile 1.5m	Wall Type
P14	8.5m	Cast in Place Concrete Pile 1.5m	Wall Type
P15	9.0m	Cast in Place Concrete Pile 1.5m	Wall Type
P16	9.1m	Cast in Place Concrete Pile 1.5m	Wall Type
P3-DP	9.2m	Driving Square Pile $0.45m \ge 0.45m$	Solid Single Column Type
P6-DP	8.7m	Driving Square Pile $0.45m \ge 0.45m$	3 Column Type
P9-DP	11.5m	Driving Square Pile $0.45m \ge 0.45m$	3 Column Type
P12-DP	7.7m	Driving Square Pile $0.45m \ge 0.45m$	3 Column Type

Table 1.4 Summary of Piers for Design

Notes:

In the Design, the highest Pier was studied for the types of piers with some heights.

1.1.3 Culverts

(1) Culverts

		0
Type for	Size & Number of Cell	Facilities in the Cell
Design	Width x Height x Number	· · · · · · · · · · · · · · · · · · ·
B1	2.5m x 1.5m x 1	Waterway
B2	2.5m x 2.0m x 1	Waterway
B3	3.0m x 3.2m x 1	Waterway
B4	3.0m x 3.5m x 1	Waterway
B5	3.0m x 3.8m x 1	Waterway
B6	5.0m x 3.8m x 1	Waterway & Foot Path
B7	5.0m x 4.0m x 1	Waterway & Foot Path
B8	5.0m x 4.0m x 1	Waterway
B9	5.0m x 4.5m x 1	Waterway & Foot Path
B10	6.5m x 4.5m x 1	Waterway & Foot Path
B11	2.5m x 1.5m x 2	Waterway
B12	2.5m x 2.0m x 2	Waterway
B13	2.5m x 2.0m x 2	Waterway
B14	5.0m x 4.5m x 2	Waterway

Table 1.5 Summary of Culverts for	r Design
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(2) Wing Wall

	Table 1.0 Summary of Wing Wanton Debign
Type for	Dimension
Design	Length of Footing x Width of Footing x Maximum Height
W1	8.7m x 4.1m x 5.9m
W2	7.2m x 3.5m x 5.1m
W3	3.5m x 1.9m x 3.0m

Table 1.6 Summary of Wing Wall for Design

1.1.4 Types of Structures in Package-1

Tabl	e 1.7 Summ	ary or 1 ype	es of Structures	пгаск	age-1		
<1> Bridges							
Supers	structures	· · · · · · · · · · · · · · · · · · ·		Substr	uctures	3	
Large Tra Va (STA: 0+5	78.55 ~ 0+860.	15)					•
- PC Composite I beam	n (Connected):	: Case 7	Abutments:	A1: Typ	e A1	A2:	Type A1
			Piers:	P1: Type			Туре Рб
				РЗ: Туре			Type P6
				Р5: Туре		P6:	Туре Рб
				Р7: Тур	e P6		
Small Tra Va (STA: 1+8							· ·
- PC Composite I bear	n (Connected)	: Case 3	Abutments:	А1: Тур			Type A3
			Piers:	P1: Typ	e P7	P2:	Type P7
Tra On (STA: 3+582.00	~ 3+842.00)				.		
- PC Box Girder:		Case 2	Abutments:	A1: Typ			Type A1
- PC Composite I bear	m (Connected)	: Case 7	Piers:	P1: Typ			Type P2
				РЗ: Тур		1.1	Type P4
				Р5: Тур	e PZ	10:	Type P2
NH No.54 Interchange	Over Bridge (A 1. 11		۸ ۵	Tuno A4
- PRC Hollow Slab:		Case 2	Abutments:	A1: Typ			: Type A4
			Piers:	P1: Typ			Type P13 Type P14
	· · · · ·			РЗ: Тур	e115	1 4	Type114
<2> Culverts	Tring of		STA	· · · · · ·	Туре	of	Type of
STA	Type of Culvert	Type of			Culve		Wing Wall
		Wing Wall	(INTERCHAN	GE 2)	Cuirc	,	This Tun
(MAIN ROUTE)	-	Type W1	Ramp "A" - Kn	•	Type	B1	Type W1
Km 0+51.8	Type B3	Type W2	-		Type	· •	Type W1
Km 0+183.7	• •	Type W2	Ramp "B" - Kn		Туре		Type W1
Km 0+369.5	Type B3		Ramp "C" - Kn		Туре		Type W1
Km 1+063.2 (Path)	Туре В9	Type W3	Ramp "D" - Kr	n 0+300	Type	DI	Type wi
Km 1+300	Type B11	Type W1					
Km 1+560	Туре В4	Type W2					
Km 2+150	Type B12	Type W1					
Km 2+620 (Path)	Туре Вб	Type W2					
Km 2+835	Type B12	Type W1					
Km 3+170	Type B11	Type W1	· ·	· · · · ·			
Km 4+125	Type B11	Type W1					
NIL 4T IZJ		T					

Table 1.7 Summary of Types of Structures in Package-1

II - 1- 7

Type B14

Type B10

Km 4+318

Km 4+640 (Path)

Type W3

Type W3

1.1.5 Types of Structures in Package-3

	uctures in Packa		<u>_</u>
<1> Bridges		Cultoturatura	
Superstructures		Substructures	<u> </u>
Cai Tac 1 (STA: 8+456.85 ~ 8+642.75)		· · · · · · · ·	
- PC Composite I beam (Connected): Case 7	Abutments:	A1: Type A6	A2: Type A1
	Piers:	P1: Type P11	P2: Type P8
•		РЗ: Туре Р8	P4: Type P11
Cai Tac 2 (STA: 9+431.45 ~ 9+468.55)			
- PC Composite I beam (Simple Span):Case 3	Abutments:	A1: Type A8	A2: Type A5
Cai Da (STA: 10+416.25 ~ 10+509.75)			
- PC Composite I beam (Connected): Case 4	Abutments:	A1: Type A6	A2: Type A6
	Piers:	P1: Type P9	P2: Type P9
Ba Mang (STA: 11+202.45 ~ 11+227.55)			
- PC Composite I beam (Simple Span):Case 1	Abutments:	A1: Type A9-DP	
		A2: Type A9-DP	
Cai Nai (STA: 12+336.25 ~ 12+429.75)	· · · ·		
- PC Composite I beam (Connected): Case 4	Abutments:	A1: Type A3-DP	
		A2: Type A3-DP	
	Piers:	P1: Type P9-DP	
		P2: Type P9-DP	
Ap My (STA: 13+109.55 ~ 13+250.45)			
- PC Composite I beam (Connected): Case 6	Abutments:	A1: Type A2-DP	
		A2: Type A2-DP	
	Piers:	P1: Type P12-DF	,
		P2: Type P9-DP	
		P3: Type P9-DP	
		P4: Type P12-DF	>
Cai Rang (STA: 13+806.40 ~ 14+064.90)			
- PC Box Girder: Case 1	Abutments:	A1: Type A2-DP	•
- PC Composite I beam (Connected): Case 1		A2: Type A2-DP	
- PC Composite I beam (Connected): Case 2	Piers:	P1: Type P2	P2: Type P5
- PC Composite I beam (Simple Span): Case 2		P3: Type P5	P4: Type P2
- PC Composite I beam (Simple Span): Case 3		P5: Type P6-DP	
NH No.91B Interchange Over Bridge (STA: 10-	+000.00)		
- PRC Hollow Slab: Case 1	Abutments:	A1: Type A2	A2: Type A2
	Piers:	P1: Type P15	P2: Type P16
		P3: Type P15	
NH No.91B Interchange Ramp Way Bridge			
- PC Composite I beam (Connected): Case 8	Abutments:	A1: Type A7-DP	A2: Type A7-DP
	Piers:	P1: Type P3-DP	P2: Type P3-DP
· · · · · · · · · · · · · · · · · · ·			

Table 1.8 Types of Structures in Package-3 (1/2)

<2> Culverts			·		
STA	Type of	Type of	STA	Type of	Type of
·	Culvert	Wing Wall		Culvert	Wing Wall
(MAIN ROUTE)			(MAIN ROUTE)		
Km 7+820	Type B5	Type W2	Km 13+600	Type B11	Type W1
Km 7+950	Type B12	Type W1	Km 14+247	Туре В7	Type W3
Km 8+820	Type B12	Type W1	Km 14+450	Type B11	Type W1
Km 9+326	Type B12	Type W1	Km 14+625	Type B11	Type W1
Km 9+760	Type B11	Type W1	Km 14+890	Type B11	Type W1
Km 10+310	Type B12	Type W1	(INTERCHANGE 3)		
Km 10+690	Type B11	Type W1	Ramp "A" - Km 0+154	Type B11	Type W1
Km 10+950	Type B11	Type W1	Ramp "B" - Km 0+286.5	Type B11	Type W1
Km 11+451	Type B11	Type W1	Ramp "C" - Km 0+300	Туре В8	Type W3
Km 11+690	Type B12	Type W1	Ramp "D" - Km 0+300	Type B2	Type W1
Km 11+976.50 (Path)	Type B7	Type W3	Ramp "F" - Km 0+300	Type B8	Type W3
Km 12+180	Type B13	Type W1			
Km 12+592.50 (Path)	Type B7	Type W3	(INTERSECTION 4)		
Km 12+756	Type B5	Type W2	Ramp "B" - Km0+223	Type B11	Type W1

Table 1.8 Types of Structures in Package-3 (2/2)

1.2 Design Condition

1.2.1 General

Generally, the design method, the design theory, and the design philosophies were based on the "Design Criteria on the Detailed Design of the Can Tho Bridge Construction in Socialist Republic of Viet Nam", September , 1999.

- 1.2.2 References and Software
 - (1) References
 - Design Criteria on the Detailed Design of the Can Tho Bridge Construction in Socialist Republic of Viet Nam, September, 1999
 - The AASHTO LRFD 1998 Bridge Design Specification shall be applied for design excepting the live loads.
 - The Standard Specifications for Highway Bridges (Japanese Road Association - 1996)
 - The Design Specifications for Highway Bridges and Culverts (22TCN18-79)

(2) Software

- UC Dos Japanese Software, applied for Substructure and Foundation Design
- UC Bridge Japanese Software, applied for the Superstructure Design of PRC Hollow Slab
- APPLLO Grid Japanese Software, applied for the frame analysis of PC Composite I beam
 - SAP 2000 U.S. Software, applied for the Frame Analysis of Superstructures & Substructures
 - LEAP-5 British Software, applied for the Superstructure Design of PC Box Girder, and the Frame Analysis of Culvert Box & Multicolumn or Rigid Frame Piers

MicrosoftApplied for the Sectional Analysis of RC ConcreteExcelSections

1.2.3 Load and Load Combinations

Generally, Loads and Load Combinations were based on the "Design Criteria". Addition were described as follows:

	Table 1.9 Addition of Loads
Live Load	Refer to "Design Criteria"
	Japanese Live Load B for Bridges
	Vietnamese HK-80 Load for Culvert Box
Creep & Shrinkage	(PC Box Girder & PRC Hollow Slab)
	- "CEP-PIF" was applied to define the Creep & Shrinkage.
	(PC Composite I beam)
	 Creep Coefficient t = infinity 2.2
	- Creep Coefficient of slab at t = 1.2
	- Different Shrinkage between Girder & Slab at t = 140days:
	0.00004
Settlement of Piers	(PC Box Girder)
(Displacement)	- 15mm in the vertical direction
	(PRC Hollow Slab & PC Composite I beam)
	- 10mm in the vertical direction
Vessel Collision Force	Loading Elevation: Water level with 5% frequency
	Force: The formula defined in Clause 3.14, AASHTO
	LRFD was applied. In this formula, vessel impact
	velocity was defined as the velocity of water flow,
· · · · · · · · · · · · · · · · · · ·	and Dead weight tonnage of vessel was defined
	based on the Vietnamese Classification of Streams.

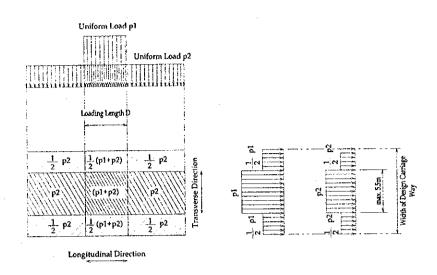
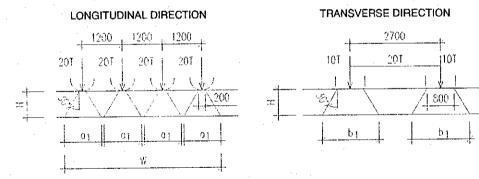
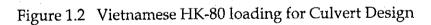


Figure 1.1 Japanese Live Load B (L Load) for Bridge Design

						L: Span Length (m)
	Sub-Loading					
p]	Main load l-Loading			p2-Loading		-
Loading	Weight	kgf/m^2	V	Veight (kgf/m	²)	
length D (m)	For M	For V	L<=80	80 <l<=130< td=""><td>L>130</td><td></td></l<=130<>	L>130	
10	1 000	1 200	350	430 - L	300	50% of main loading

Table 1.10	Japanese Live Load B ([L Load] :	for Bridges
------------	------------------------	------------	-------------





Combination of Loads for individual structures are summarized in the following:

(1) Superstructures	
 Check of tensile stress 	SERVICE-III
- Check of resistance	STRENGTH-I, STRENGTH-III &
	STRENGTH IV
(2) Substructures & Foundations	
- Abutments	STRENGTH I-1, STRENGTH I-2, STRENGTH I-
	3, EXTREME EVENT I-1, and EXTREME EVENT
	I-2
- Piers	STRENGTH I-1, STRENGTH I-2, STRENGTH III,
	EXTREME EVENT I-1, EXTREME EVENT I-2,
	and SERVICE I
(3) Culvert Box	
- Culvert Box	STRENGTH I, STRENGTH IV, and
	SERVICE I
- Wing Wall	STRENGTH I & STRENGTH II

Table 1.11	Combination	of Loac	ls f	for Structures
------------	-------------	---------	------	----------------

1.2.4 Soil Properties for Design

STA		B.P. ~ 4+500 (Package-1)	4+500 ~ 7+600	7+600 ~ 11+0 (Package-3)	
Bridge		 Large Tra Va Small Tra Va Tra On Interchange No.54 Over bridge 		 Cai Tac 1 Cai Tac 2 Cai Da Interchang No.91B C bridge Rampway Bridge Interchang 	of
No. of Be	owling	D-1 ~ D-9		No.91B D-18 ~ D-2	1 D-22 ~ D-28
Point					
	Ν	1	1	1	1
	ф	5	5	4	4
Layer	Ŷ	16	16	16	16 7
C1	γ '	7	7	7	
CI	Ċ	10	10	10	10
	E0	2000	2000	2000	2000
· · ·	qu	30	30	35	20
	N	8	12	18	20
	φ	14	14	14	14
Louor	γ	19	19	19	19
Layer	γ'	10	10	10	10
C2	Ċ	20	20	50	50
	E0	5000	8000	12000	3500
	qu	60	150	220	150
	N		20	-	-
	φ	-	. 10	-	-
τ	Ϋ́Υ	-	18	-	-
Layer	γ'	-	. 9	-	· · · -
S/St	Ċ	-	10	-	-
	E0	-	13000	•	-
	qu	-	300		
* Notes:	N:	N value (Blows/300	mm)	C: Cohesion (
	ф:	Friction Angle of So	il (Degree)	E0: Modulus o	of Deformation (kN/m2)
	γ.	Unit Weight of Soil	•	4 ·	d Compression Strength
· .	γ':	Dry Unit Weight of	Soil (kN/m3)	(kN/m2)	
	* Frici	ion of C1 Layer was i	gnored.		

Table 1.12 Summary of Soil Properties for Design (1/2)

		Table 1.12 Summ	ary of Soll Proj	perne	es for Design (2/2)
STA		B.P. ~ 4+500	4+500 ~ 7+600		7+600 ~ 11+000	11+000 ~ E.P
Bridge		(Package-1) - Large Tra Va - Small Tra Va - Tra On - Interchange No.54 Over bridge	(Package-?)	- - -	(Package-3) Cai Tac 1 Cai Tac 2 Cai Da Interchange No.91B Over bridge Rampway Bridge of Interchange No.91B	(Package-3) - Ba Mang - Cai Nai - Ap My - Cai Rang
No. of Bo Point	owling	D-1 ~ D-9			D-18 ~ D-21	D-22 ~ D-28
Layer St/C1	Ν φ γ Υ' C	28 15 19.5 10 170	25 15 19.5 10 170		29 15 19.5 10 170	28 15 19.5 10 170
	E0 qu	19000 450	17500 450		20000 450	19000 450
Layer S1	Ν φ γ' C E0 qu	60 40 21 12 50 27000 1000	60 40 21 12 50 27000 1000	•	60 40 21 12 50 27000 1000	60 40 21 12 50 27000 1000
* Notes:	N: ¢:	N value (Blows/300) Friction Angle of Soi	nm) I (Degree)	C: E0:		ormation (kN/m2)
	γ: γ': * Frict	Unit Weight of Soil (Dry Unit Weight of S tion of C1 Layer was i	Soil (kN/m3)	qu:	Unconfined Con (kN/m2)	npression Strength

Table 1.12 Summary of Soil Properties for Design (2/2)

1.2.5 Design of the Connecting Portion of Pile Top and Footing

The following analyses were studied for the connecting portion of pile top and footing, based on the "Japanese Manual for the Design of Pile Foundation":

(1) Checking of Push out Force

1) Vertical Bearing Pressure of the Pile Cap caused by the Pile

The following formula should be applied for the checking:

$$\sigma_{cv} = P / (\pi D^2/4) \leq \sigma_{ca}$$

where,

P: Axial Force of Pile

D: Diameter of Pile

- σ_{cv} : Vertical Bearing Pressure of Pile Cap
- σ_{ca} : Allowable Vertical Bearing Pressure of Pile Cap (0.5 x σ_{ck} = 0.5 x 240 kgf/cm² = 120 kgf/cm² = 11.8 Mpa)
- 2) Vertical Punching Shear of the Pile Cap caused by the Pile

 $\tau_c = P / \{\pi \times (D + h) \times h\} \leq = \tau_a$

P:

where,

- D: Diameter of Pile
- h: depth from the pile head to the upper surface of Pile cap
- τ_c : Punching Shear of Pile Cap

Axial Force of Pile

 τ_a : Allowable Punching Shear of Pile Cap

 $(9.0 \text{ kgf/cm}^2 = 0.88 \text{ Mpa})$

- (2) Checking of Horizontal Force
 - Horizontal Bearing Pressure of the Pile Cap caused by the Pile

 $\sigma_{ch} = H / (Dl) \le \sigma_{ca}$

where,

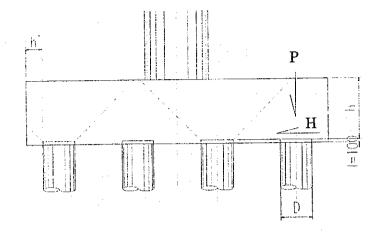
- H: Horizontal Force at the top of Pile D: Diameter of Pile
 - 1: 100mm (Embedded length of Pile into Pile cap)
 - σ_{ch} : Horizontal Bearing Pressure of Pile Cap
 - σ_{ca} : Allowable Horizontal Bearing Pressure of Pile Cap
 - $(0.3 \times \sigma_{ck} = 0.3 \times 240 \text{ kgf/cm}^2 = 72 \text{ kgf/cm}^2 = 7.0 \text{ Mpa})$
- 2) Horizontal Punching Shear of the Pile Cap caused by the Pile

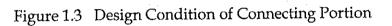
 $\tau_{c} = H / \{h' \times (2l + D + 2h')\} \le \tau_{a}$

where, H: Horizontal Force at the top of Pile

- D: Diameter of Pile
- h': Nearest Length from the side surface of Pile to the side
 - surface of Pile cap
- I: 100mm (Embedded length of Pile into Pile cap)

- τ_c : Horizontal Punching Shear of Pile Cap
- τ_a : Allowable Horizontal Punching Shear of Pile Cap (9.0 kgf/cm² = 0.88 Mpa)





1.2.6 Materials

(1) Concrete

	Tab.	e 1.13 Concrete for Design (1/2)
Grade	fc'	Typical use
В	40 Mpa	PC box girder, PC I-Girder
C	35 Mpa	Hollow Slab
D	30 Mpa	In situ concrete : Bored pile, Deck Slab
Е	24 Mpa	In situ concrete : Pier, Abut, Pile cap, Wing wall, retaining wall, Culverts
F	20 Mpa	In situ concrete : Base concrete, Apron
G	15 Mpa	In situ concrete : Lean Concrete, Plain Concrete
* fc':	Compressive	strength of concrete at 28 days

Table 1.13 Concrete for Design (2/2)

Grade	fc'	Ec (Mpa)	E	XP	
В	40Mpa	33 990			
D	30Mpa	29 440	10.8 x 1.0E-6 (/°C)		
Ē	24Mpa	26 330			
* Ec:	Young's M	lodulus (AASHT	TO LRFD, 5.4.2.4)	$Ec = 0.043\gamma_c^{1.5} \times \sqrt{fc'}$	
γ.:	Density of (concrete (kg/m ³)			
EXP:	Coefficient	of thermal expans	sion and contraction		

<Allowable Stress of Concrete>

 For checking of tensile stress in Serviceability limit state (SERVICE-III): 0.25 x √f'c

~ for PC Box Girder & PC Composite I beam For checking of tensile stress in stages during construction,

and serviceability limit state: $0.50 \times \sqrt{f'c}$

~ for PRC Hollow slab

Stress at interface between pre-casting segments: No tension allowed.

(2) Reinforcement Steel

•••

- Specified Yield Strength:	Plain Round:	240Mpa
•	High Yield deformed:	390MPa

Es =

- Modulus of elasticity of reinforcement steel:

200,000 Mpa

Dia. (mm)	Area (mm2)	Mass kg/m	Dia. (mm)	Area (mm2)	Mass kg/m
10	78.5	0.617	20	314.2	2.466
12	113.1	0.888	22	380.1	2.984
14	153.9	1.208	24	490.9	3.85
16	201.1	1.578	28	615.8	4.83
18	254.5	1.998	32	804.2	6.31

Table 1.14 Summary of Reinforcement Steel

Strength	Diameter		Hook (mm)		ap Splice (mm	•
of	(mm)	(kg/m)		Grade A	Grade B	Grade C
Concrete						
24Mpa	Plain Round		440	0.00	200	
	6	0.222	129	300	300	300
	8	0.395	151	300	300	318
	10	0.617	173	300	304	398
	Deformed					
	10	0.617	175	300	304	398
	12	0.888	210	300	365	477
	14	1.208	245	328	426	557
	16	1.578	280	374	487	636
	18	1.998	315	421	548	716
	20	2.466	350	500	650	850
	22	2.984	385	605	787	1029
	25	3.853	437	782	1016	1329
	28	4.834	534	980	1274	1667
	32	6.313	610	1280	1665	2177
30Mpa	Plain Round	_				
	6	0.222	129	300	300	300
	8	0.395	151	.300	300	318
	10	0.617	173	300	304	398
	Deformed	•		•	• •	
	10	0.617	175	300	304	398
	12	0.888	210	300	365	477
	14	1.208	245	328	426	557
	16	1.578	280	374	487	636
	18	1.998	315	421	548	716
	20	2.466	350	468	608	796
	22	2.984	385	541	704	920
	25	3.853	437	699	909	1188
	28	4.834	534	877	1140	1491
	32	6.313	610	1145	1489	1947
35Mpa	Plain Round					
	6	0.222	129	300	300	300
	8	0.395	151	300	300	318
	10	0.617	173	300	304	398
	Deformed					
	10	0.617	175	300	304	398
	12	0.888	210	300	365	477
	14	1.208	245	328	426	557
•	16	1.578	280	374	487	636
	18	1.998	315	421	548	716
	20	2.466	350	468	608	796
	22	2.984	385	515	669.	875
	25	3.853	437	647	841	1100
	28	4.834	534	812	1055	1380
	32	6.313	610	1060	1378	1803

Table 1.15 Summary of Development of Reinforcement Steel (1/2)

	10010 0/00		1		· · ·	<i>'</i>
Strength	Diameter	Unit weight	Hook (mm)]	Lap Splice (mm	ı)
of	(mm)	(kg/m)		Grade A	Grade B	Grade C
Concrete						
40Mpa	Plain Round					
	6	0.222	129	300	300	300
	8	0.395	151	300	300	318
	10	0.617	173	300	304	398
	Deformed		·			
	10	0.617	175	300	304	398
	12	0.888	210	300	365	477
	14	1.208	245	328	426	557
	16	1.578	280	374	487	636
	18	1.998	315	421	548	716
	20	2.466	350	468	608	796
	22	2,984	385	515	669	875
	25	3.853	437	605	787	1029
	28	4.834	534	759	987	1291
	32	6.313	610	992	1289	1686

Table 1.15 Summary of Development of Reinforcement Steel (2/2)

Reference: AASHTO 98 - Article 5.11.2 - Page 5-138

Hook and Bends (For Standard Hooks)

<Longitudinal Reinforcement>

- 180°-bend, plus a 4.0 d_b extension, but not less than 65mm at the free end of the bar, or
- 90°-bend, plus a 12.0 d_b extension at the free end of the bar <Transverse Reinforcement>
 - No.16 bar (Dia. 15.9mm) and smaller -90° -bend, plus a 6.0 d_b extension at the free end of the bar,
 - No.19, No.22 and No.25 bar (Dia. 19.1mm, 22.2mm, and 25.4mm, respectively) 90°-bend, plus a 12.0 d_b extension at the free end of the bar, and
 - No.25 bar (Dia. 25.4mm) and smaller 135°-bend, plus a 6.0 d_b extension at the free end of the bar.

where,

-

- d_b: nominal diameter of reinforcing bar (mm)
- Reference: AASHTO 98 Article 5.10.2.1 Page 5-90

Minimum Bend Diameters (For Standard Hooks)

Bar Size and Use	Minimum Diameter
No.10 (Dia. 9.5mm) through No.16 (Dia. 15.9mm)	6.0d _h
– Genera	1
No.10 (Dia. 9.5mm) through No.16 (Dia. 15.9mm)	4.0d _b
- Stirrups and Ties	8
No.19 (Dia. 19.1mm) through No.25 (Dia. 25.4mm)	6.0d _b
– Genera	1
No.29 (Dia. 28.7mm), No.32 (Dia. 32.3mm),	8.0d _b
and No.36 (Dia. 35.8mm)	
No.43 (Dia. 43.0mm) and No.57 (Dia. 57.3mm)	10.0d _b
Reference: AASHTO 98 - Article 5.10).2.3 - Page 5-

(3) PC Strand

Table 1.16	Summary	of PC Strands

	Internal	External	Transverse
Type of PC Steel	12S12.7	12S15.2	3S12.7
Sectional Area (mm2)	1,184.5	1,664.5	296.1
Nominal Strength (N/mm2)	1,860	1,860	1,860 .
Yield Strength (N/mm2)	1,395	1,395	1,395
Young's Modules (MPa)	196,000	196,000	196,000
Friction Loss Coefficient (/m)	0.004	0.004	0.004
Angle Coefficient (/Deg.)	0.25	0.25	0.25
Set Losses (mm)			
One side Tensioning	5	5	5
Both side Tensioning	10	10	10

- 1.2.7 Span Length Arrangement and Foundation Pile for the Minor Bridges in the Approach Roads
 - (1) General

After the discussion about the Draft Final Report on 7 August 2000, the Vietnamese side requested the review of the types of the minor bridges in the approach roads, namely, Package-1 and Package-3. The item number in the "Minutes of Meeting on the Draft Final Report" is "3.2".

Accordingly, the Study Team reviewed the minor bridges, and some of them were revised as shown in the following.

(2) Summary of Revision

The following table shows the summary of modifications for the bridges in the approach roads (Package-1 & 3).

Bridge	Modification	
- Large Tra Va	Span Length Arrangement	
U	(Original)	
	PC I beam: 4@31 = 124m	
	PC Box Girder: 56+80+56 = 192m	
	Total Length: 316m	
	(Modified)	
	PC I beam: 4@35+4@35 = 280m	
- Tra On	Span Length Arrangement	
	(Original)	
	PC I beam: 1@31 = 31m	
	PC Box Girder: 56+80+56= 192m	
	PC I beam: 1@31 = 31m	
	Total Length: 254m	
	(Modified)	
	PC I beam: 2@36=72m	
	PC Box Girder: 36.5+57.0+36.5=130m	
	PC I beam: 2@29=58m	
	Total Length: 260m	

1) Package-1 (Approach Road on Vinh Long side)

2) Package-3 (Approach Road on Can Tho side)

	Bridge	Modification
	Ba Mang	Pile Foundation The types of piles are changed from bore-hole
		pile to driven pile, and the penetration depths were shortened with considering the geotechnical conditions. Type of Superstructure * The connection between spans were removed,
		and changed to the simple spans.
-	Cai Nai	Pile Foundation The types of piles are changed from bore-hole pile to driven pile, and the penetration depths were shortened with considering the geotechnical conditions. Type of Superstructure * The connection between spans were removed, and changed to the simple spans.
_	Ар Му	Pile Foundation The types of piles are changed from bore-hole pile to driven pile, and the penetration depths were shortened with considering the geotechnical conditions. Type of Superstructure * The connection between spans were removed, and changed to the simple spans.
-	Cai Rang	Pile Foundation The types of piles of the substructures supporting PC I beams (A1, A2, P5) are changed from bore- hole pile to driven pile, and the penetration depth were shortened with considering the geotechnical conditions. Type of Superstructure * The connection between spans were removed, and changed to the simple spans.
	NH No.91B Interchange Ramp Way Bridge	Pile Foundation The types of piles are changed from bore-hole pile to driven pile, and the penetration depths were shortened with considering the geotechnical conditions. Type of Superstructure * The connection between spans were removed, and changed to the simple spans.

- (3) Policy of Revision
 - 1) Span Length Arrangement for the Approach Roads

The navigational clearances were reviewed, and the span lengths for two bridges were reduced with considering the requirement. The comparison tables for these bridges are shown in Figure 1.4 and Figure 1.5, respectively.

2) Foundation Pile for the Approach Span and Approach Road Bridges

The geotechnical conditions were reviewed. The summary of soil properties is shown in Table 1.12.

In the Draft Final Report, the Layer and the Layers, "St/C1" or "S1" were regarded as the bearing stratum, and in the revision, the Clay Layer "C2" was regarded as the bearing stratum for some types of Minor Bridges at some locations.

The types of pile foundations were selected with considering the following items:

Location & Soil Properties of C2 Layer

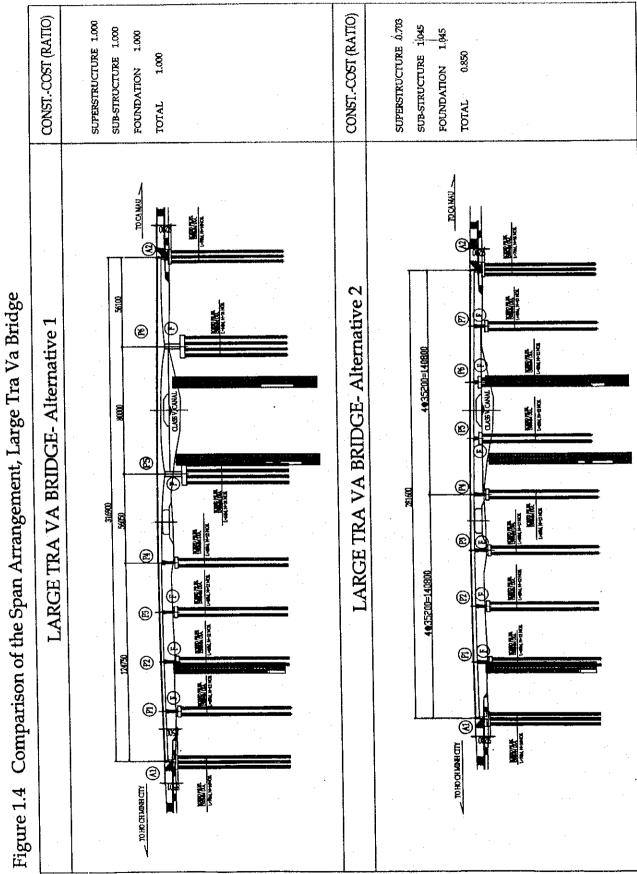
At the each location of minor bridge, the depth and soil properties of C2 Layer were reviewed. With considering the available construction depth of driven pile (40m), the bridges with the following design conditions were reviewed;

- The depth of the C2 Layer is less than 35m from the existing ground level.
- The design N value of C2 Layer is more than "20".
 (Based on the Standard Specification of Highway Bridge, Japan Road Association)
- Type of Superstructure

The driven piles were only applied for the substructures supporting the simple span portions of PC I beam.

In case that the C2 Layer is regarded as the bearing stratum, the differential settlements of substructures will be happened. To prevent the effects caused by these settlements for the superstructures, the continuous spans of superstructures will not be adopted.

The PC I beam can be the simple span, however the PC Box Girder and PRC Hollow Slab can not be the simple span because of their design and construction features.



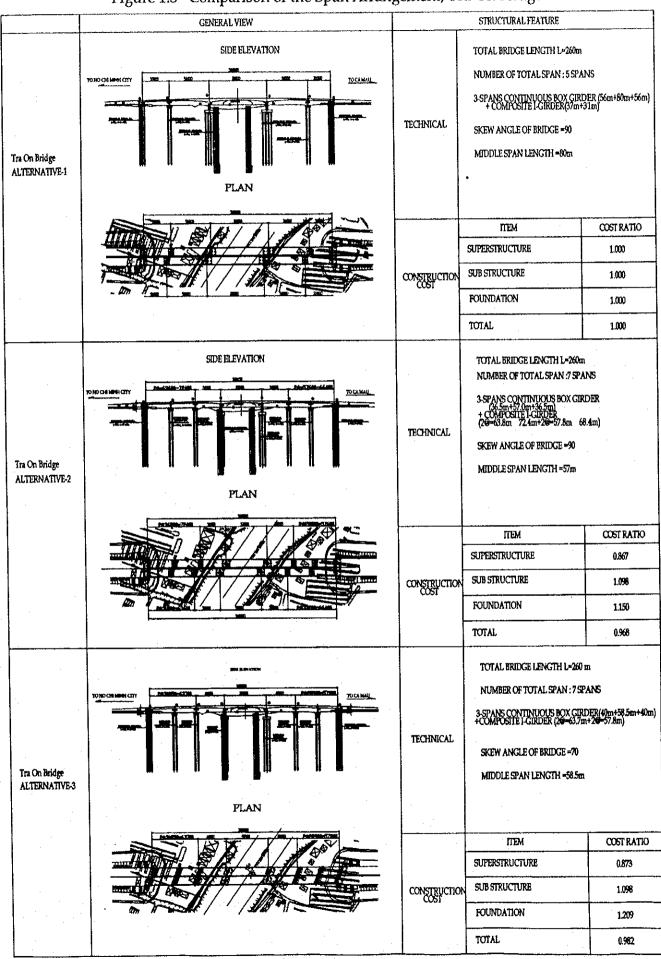
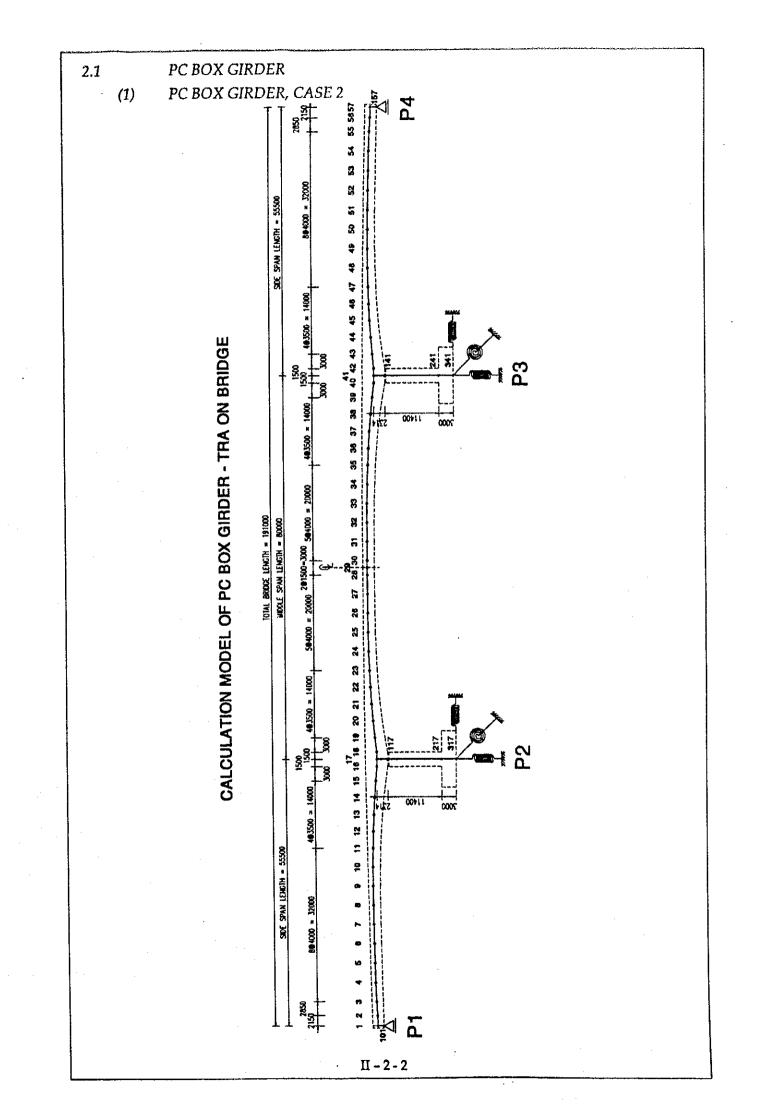


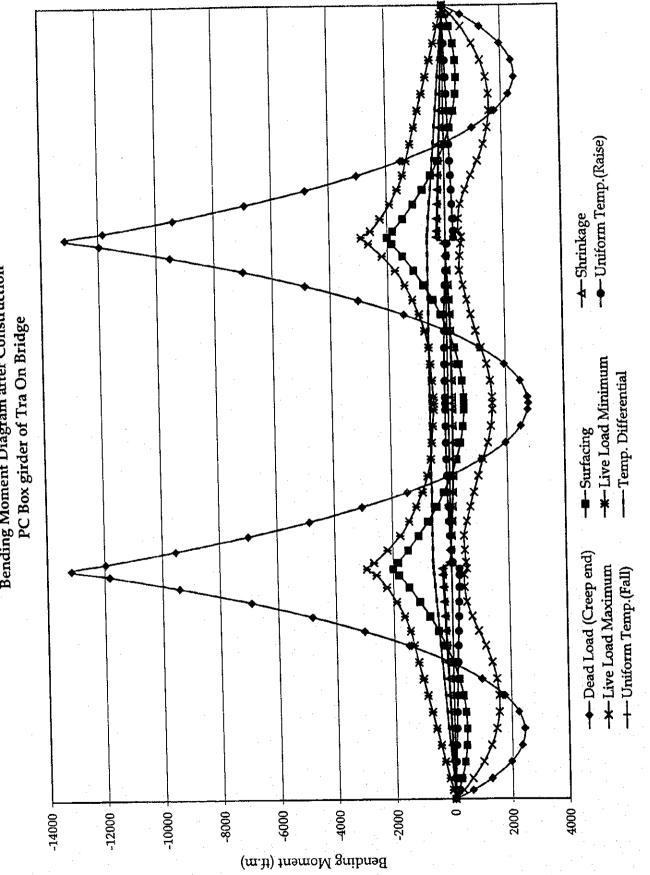
Figure 1.5 Comparison of the Span Arrangement, Tra On Bridge

Chapter 2

DESIGN SUMMARY OF SUPERSTRUCTURES

2.1		PC BOX GIRDER	II - 2 - 2
	(1)	PC BOX GIRDER, CASE 2	II - 2 - 2
2.2		PRC HOLLOW SLAB	II - 2 - 6
	(1)	PRC HOLLOW SLAB, CASE 2	II - 2 - 6
2.3		PC COMPOSITE I BEAM (CONNECTED)	II - 2 - 10
· · ·	(1)	PC COMPOSITE I BEAM (CONNECTED), CASE 3	lI - 2 - 10
	(2)	PC COMPOSITE I BEAM (CONNECTED), CASE 7	II - 2 - 27





Bending Moment Diagram after Construction

II – 2 – 3

Summary of Bending Stress at Service Load Design - PC Box girder of Tra On Bridge

			P1~P2 [Section 6]	ection 6]	P2 [Section 17]	ion 17]	P2~P3 [Section 29]	tion 29]	P3 [Section 41]	on 41]	P3~P4 [Section 52]	ction 52]
		. 	- uct	Bottom	Top	Bottom	Top	Bottom	Top	Bottom	Top	Bottom
			r de L	Slah	Slab	Slab	Slab	Slab	Slab	Slab	Slab	Slab
				200 00	20 012	690.75	431.26	11.069-	-712.29	690.75	371.48	-623.99
<u>(</u>)	Self Weight of Girder (Include Creep) DC	p) DC	3/1.40	44.070-	23.24.74.7-			VC COF	111 08	104 35	64 43	-111.84
<u>1-</u>	Dead I and of Surface Load	DW	64.43	-111.84	-111.08	104.35	10.87	+1.22.24	00.111-	DO-FOT		
		HS	-13.99	24.23	-17.44	16.38	3.71	-48.82	-17.44	16.38	-13.99	24.23
i	Shrinkage		1015	1163.01	1975 26	-352.65	176.18	1042.49	1375.26	-352.65	-48.15	1163.91
	Pre-stress	2	C1.04	T2-00TT								
<u> </u>	Live Load with Impact Factor			() 	i c T	3	137 59	370 40	37.10	-21.64	215.13	-372.68
	Maximum	LL_MAX	215.13	-372.68	37.10	+0.12-	00707	21-7 /C-	ST.		01 OF	157.20
	Minimum	ILL_MIN	-87.95	152.20	-166.10	146.81	-79.65	114.92	-166.10	140.01	06.10-	
:	Thermal Rice and Fall					•		=			ļ	đ
	$\frac{1}{1} \sum_{i=1}^{n} \frac{1}{i} \sum_{i=1}^{n} \frac{1}$	TIR	12.27	-21.26	15.30	-14.37	-3.23	42.25	15.30	-14.37	12.27	-21.26
	In case of Misurg (Truck)	TITE -	12.77	21 76	-15.30	14.37	3.23	-42.25	-15.30	14.37	-12.27	21.26
	In Case of Falling (-20Deg)	JUL						150 00	17 A 7 A	37.64	-27.87	48.2
:	Differential Temperature (5Deg)	TG	-27.87	48.27	-34./4	32.64	07.04-	00.001				*****
<u></u>	Wind load on Structure				1	i t	(;	3	22.00	18.20	11 09	-19 23
10	Maximum	WL_MAX	11.10	-19.22	C/.4I	00.01-	24·11	12.01-	00-07 7		2052	9010
 สิบา	Minimum	ML-MIN	-22.56	39.11	5.92	-5.56	-25.36	40.42	c0.4	00.0-	00.77-	
ipuə	Support Setlement								00 80	20.00	27 M	46.82
<u> </u>	Maximum	SE MAX	27.02	46.81	33.69	-31.65	01-11	-10.07	04-00	2		
	Minimum	SE_MIN	-17.55	30.39	-21.87	20.55	-11.46	16.87	-23.60	20.97	-17.54	30.40
╉	Combination SERVICE III								_			1
(zu	COMPARATION CONTRACTOR		545.88	154.17	564.13	441.53	875.22	-135.67	564.13	441.53	545.88	154.17
			303.41	574.07	401.57	576.29	625.44	254.26	401.57	576.29	303.41	2/4.U/
			574 57	104.48		406.26	841.77	-35.92	601.45	408.03	574.56	104.47
	SEKVICE III-3		550.03	146.99		435.00	848.23	-120.42	570.86	436.77	550.01	146.98
iqu	SERVICE III-4			210.02	270 40		558.01	404.95	377.11	597.62	277.45	619.09
	SERVICE III-5		TT-//7					200 AE	346 51	62636	252.90	661.60
	SERVICE III-6		252.89	661.59	348.81	99.079	004.47	1	TCOLO			
əę				СK СK		QK	0	Š	ر 	ž	, 	4

Notes: Load Factors of Combinations:

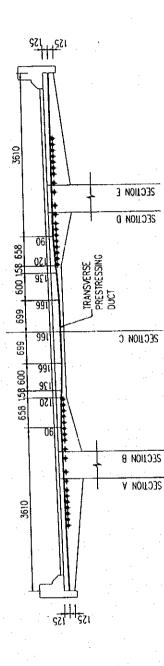
123. LUQU I HULVIN VI COTT								6					
						ŝ		9					
									(f	WAY NAY!		SF NAX	
COMBINATION		ΜC	SH	۲ ۲	LL MAX	LL MAX LL MIN		IUF	- 1				
				1.00									*
	5	8	8.1	1.00	0.80								
	2017												-
	S.	e F	8	1.0		0.80							
SERVICE III-2	3.1	A.1	001					**********************		000		5	
			5	S	0.80		1001		000	2.0			
		n T	A.1	3	2			Press Press of the state of the					
DENVICE HER				and a second sec				Ę	050	0.30		3.1	
	S	2	8		0.80			3	22.5				
		N'T									0.30		2
		Ş	S	Ş			1.00		0.00		3		
SERVICE III-5	N.T	N'T	3.1	×.4					second a state of the second se				5
				Ş				8	0.50		25.2		N.1
	100	871	NT.	1 .W		0,00	-						

II - 2 - 4

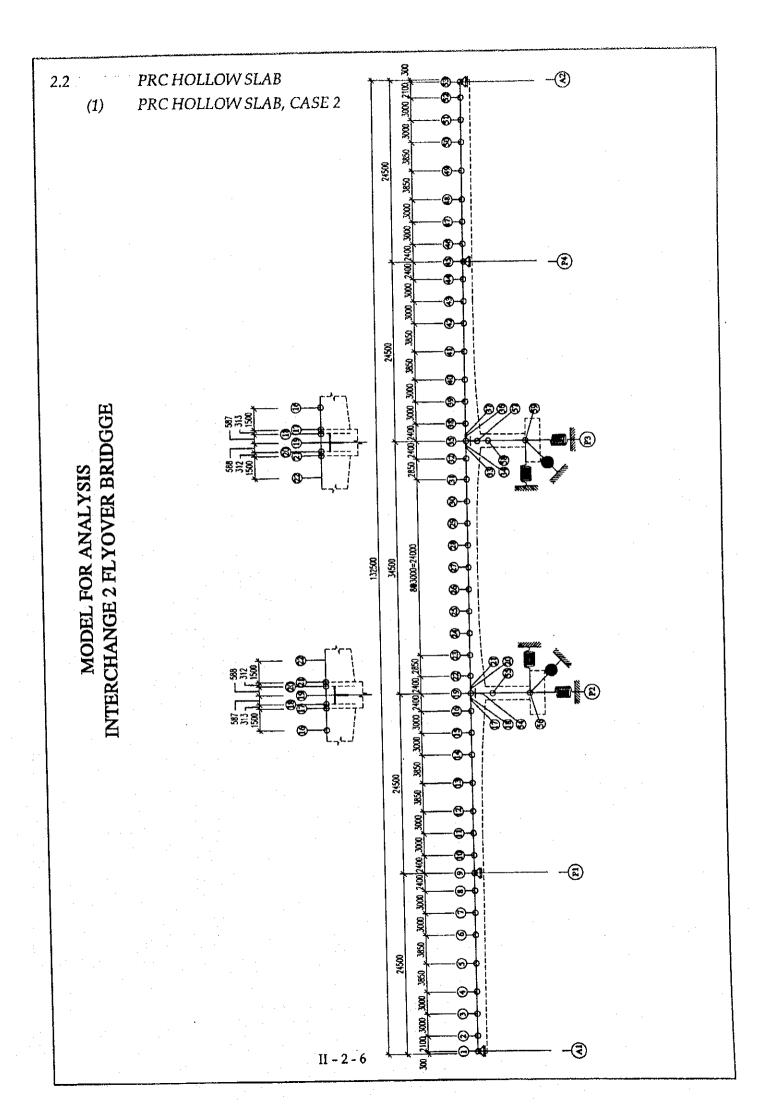
Unit: ff/m^2 Summary of Bending Stress for Slab in Transverse Direction - PC Box Girder of Tra On bridge

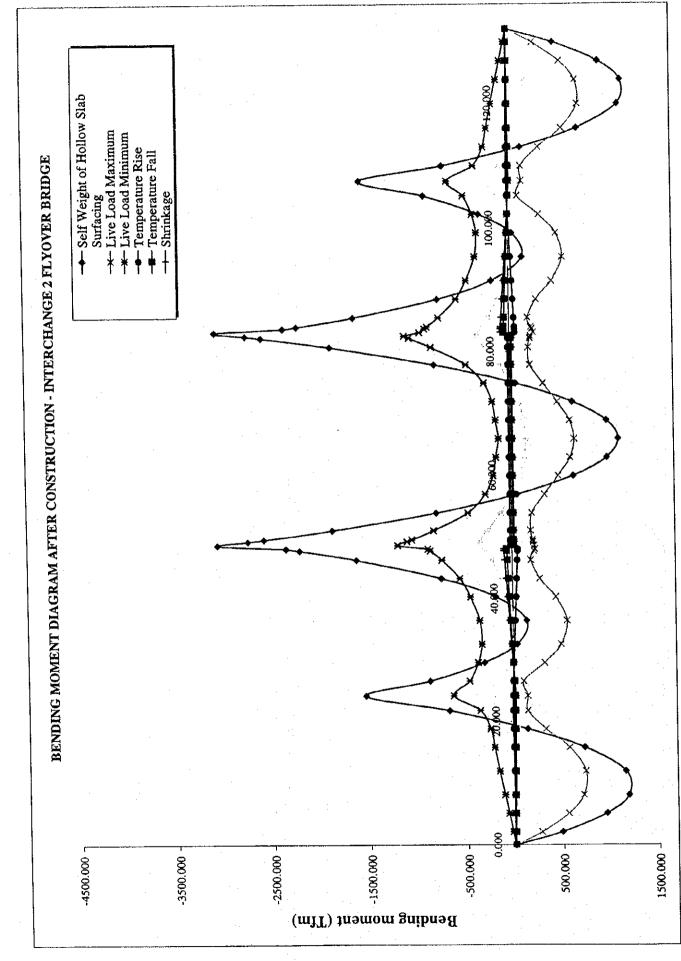
				-			
		After nre	After prestressing	SERVICE	ICEI	SEKVICE III	
•	-		>	-			
-		Ton	Bottom	Top	Bottom	Top	Bottom
		Fiber	Fiher	Fiber	Fiber	Fiber	Fiber
		1371.1			10101	17 73	17618
C	Cortion-A	110.23	3.72	-40.38	40-401	C7.77-	0T-07T
Cantlever Jiau		107.45	00 E2	-47 03	160.95	-12.73	126.65
	Section-b	017-0CT	22.44				
5		18.61	207.31	562.09	-306.17	461.35	z#.cnz-
Continuous Slab	Section	10.04				C4 C F	106 65
	Section-D	136.45	-22.53	47.03	160.Y2	C/777-	77.077
		00 0 4 4	2 77	40.38	154.34	-12.23	126.18
[Cantilever Slab	Section-E	C7.011	1.1	2007			1 000
California cana		2447 > 0	7447 > 66 > -374	1631.0	$1631.6 > \sigma c$	ς Υ	ac > -322.5
Allowable Stress		2 . /EE7					OK OK
5			Ň	5	CF CF		4
Cneck							

<u>Notes:</u> * SERVICE I : Checking compressive stress * SERVICE III : Checking tensile stress



II – 2 – 5





II - 2 - 7

11 - J

SUMMARY OF FLEXURAL STRESS AT SERVICE LIMIT STATE - INTERCHANGE 2 FLYOVER BRIDGE

n 19]	Bottom	fiber	4.086	0.532	-0.045	-1.737	-0.311	1 584	107-1	0.029	-0.029	-0.215	0.411	2.588	4.104	2.402	2.343	4.544	4.485				SE_Min					1.000	1.000
P2 [Section 19]	Top	fiber	-3.683	-0.479	0.020	3.911	275.0		-1.422	-0.013	0.013	0.188	-0.381	-0.012	-1.369	0.163	0.189	-1.763	-1.737	OK			SE_Max			1.000			
ction 12]	Bottom	fiber	-0.138	-0.001	0.068	7.249	366 1	1 1 20	1.109	-0.044	0.044	-0.324	0.290	5.759	8.113	5.390	5.479	8.359	8.448	K			TUF				1.000		1.000
P1 ~ P2 [Section 12]	Top	fiber	0.124	0.001	-0.061	-0.442	100	C4C.1	-1.050	0.040	-0.040	0.291	-0.261	0.897	-1.219	1.228	1.149	-1.439	-1.519	OK			TUR			1.000		1.000	
tion 91	Bottom	fiber	4.967	0.682	-0.059	-2.482		-0.401	2.045	0.039	-0.039	-1.250	. 0.518	822 6	4.743	1.527	1.449	5.300	5.222	оК		tors	LL_Min		0.800			0.800	0.800
P1 [Section 9]	Top	fiber	-4.548	-0.624	0.054	6.444		0.422	-1.873	-0.036	0.036	1.144	1	1 663	-0.173					0		Load Factors	LL_Max	0.800		0.800	0.800		
ection 61	Bottom	fiher	-2.835	-0.435	0.047	10.695		-2.228	0.824	0.031	-0.031	-0 986	0.409	5 E07	8 M38	4.642				OK			PS	1.000	1.000	1:000	1.000	1.000	1.000
A1 PI [Section 6]		t vp Fiher	2.456	0376	0.041	-2.289		1.930	-0.713	2000-	0.027	1 2 2 V	-0.354		071.7	2.955	3 008	-0.367	-0.314				HS	1.000	1.000	1.000	1.000	1.000	1.000
	-			Nuc.	100	LIC PS		LL_Max	LL_Min	on me	TUF	CE Mar	SE_Min		-				·	-2.950			MC	1.000	1.000	1.000	1.000	1.000	1.000
	• • •							g Moment	Moment						-					∧ 30 ∧			DC	1.000	1.000	1.000	1 000	1 000	1.000
		-	1	Sell Weight of Hollow Stau	Dead Load due to Surfacing	Shrinkage	Live Load with Impact Factor	In case of Maximum Bending Moment	In case of Minimum Bending Moment	Thermal Rise and Fall	In case of Rasing (+10 Deg) In case of Falling (-10 Deg)	Support Settlement	Maximum	Combination Service III	SERVICE III-1	SERVICE III-2	SEKVICE III-3	SERVICE III-4	SERVICE III-5 SEDVICE III-6		T and Bactors of Combinations		Combination Service III	CERVICE III-1	SED VICE III-2	SERVICE III-2			SERVICE III-6
		(8					-1				÷.,	ribn9.				(eqi	W)	ssə.	nS	mo)				<u> </u>	-13	<u> </u>	- 1 *	-1	

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SUMMARY OF FLEXURAL STRESS AT SERVICE LIMIT STATE - INTERCHANGE 2 FLYOVER BRIDGE

-0.746 3.308 660.9 2.586 2.539 0.023 0.309 6.431 6.384 -0.666 -0.035 -2.865 0.623 0.023 -4.490 10.791 SE_Min P4 ~ A2 [Section 49] Bottom fiber g 1.259 1.299 0.540 -0.020 0.020 0.646 0.268 3.963 L.546 4.589 4.629 -2.518 2.482 3.889 0.577 0.031 SE_Max 1.000 1.000 fiber Top 0.039 2.738 4.743 .449 5.300 5.222 -0.059 -1.250 0.518 0.682 2.045 0.039 1.527 0.461 4.967 -2.482 1.000 Bottom TUF fiber P4 [Section 45] Ş 1.145 0.683 -4.548 0.054 0.422 -0.036 0.036 0.474 1.663 0.173 2.772 2.844 -0.611 -0.624 6.444 1.000 TUR fiber Top 5.759 8.113 5.479 8.448 -1.775 0.044 0.324 0.290 5.390 8.359 -0.138 -0.001 0.068 7.249 1.169 0.044 LL_Min P3 ~ P4 [Section 42] Bottom 0.800 fiber Load Factors QK -1.519 1.595 -1.050 0.040 0.040 1.219 1.228 1.149 1.439 0.124 0.291 -0.2610.897 LL Max -0.442 0.001 -0.061 0.800 0.800 0.800 Top fiber -0.341 0.630 3.903 2.589 4.604 4.086 0.447 0.109 -1.737 1.247 -0.071 2.632 2.446 4.461 Bottom 80.1 1.000 000.1 1.000 fiber PS P3 [Section 35] <u>S</u> 0.079 0.104 0.052 -1.186 -1.680 -1.837 -0.402 -0.120 0.302 0.131 0.027 -3.683 3.911 1.000 1.000 000 1.000 fiber Top HS -0.042 3.476 1.109 0.943 3.848 -4.304 -0.612 -0.127 8.152 -2.550 0.459 0.083 0.289 1.068 3.682 P2 ~ P3 [Section 27] 1.000 1.000 1.000 Bottom 1.000 DW fiber <u> N</u> 0.039 4.319 4.320 1.396 .853 929 3.806 0.058 2.269 -0.038 0.038 0.270 0.542 -1.903 -0.428 2.161 1.000 1.000 1.000 1.000 fiber В Top in case of Maximum Bending Moment LL_Max SE_Max n case of Minimum Bending Moment LL_Min SE_Min -2.950 TUF MO Ы E S Combination Service III ۸ g ٨ Load Factors of Combinations ive Load with Impact Factor In case of Rasing (+10 Deg) Dead Load due to Surfacing Self Weight of Hollow Slab n case of Falling (-10 Deg) 14.000 **Combination Service III** Chermal Rise and Fal Support Settlement SERVICE III-3 **SERVICE III-2** SERVICE III-3 SERVICE III-4 SERVICE III-2 **SERVICE III-4** SERVICE III-5 SERVICE III-1 SERVICE III-6 SERVICE III-1 PC Tendon Maximum Checking Shrinkage Minimum (sqM) seeus <u>Notes</u> Bending Suess due to Each Loading (Mpa) Sombination of Bending

80.00

1.000

1.000

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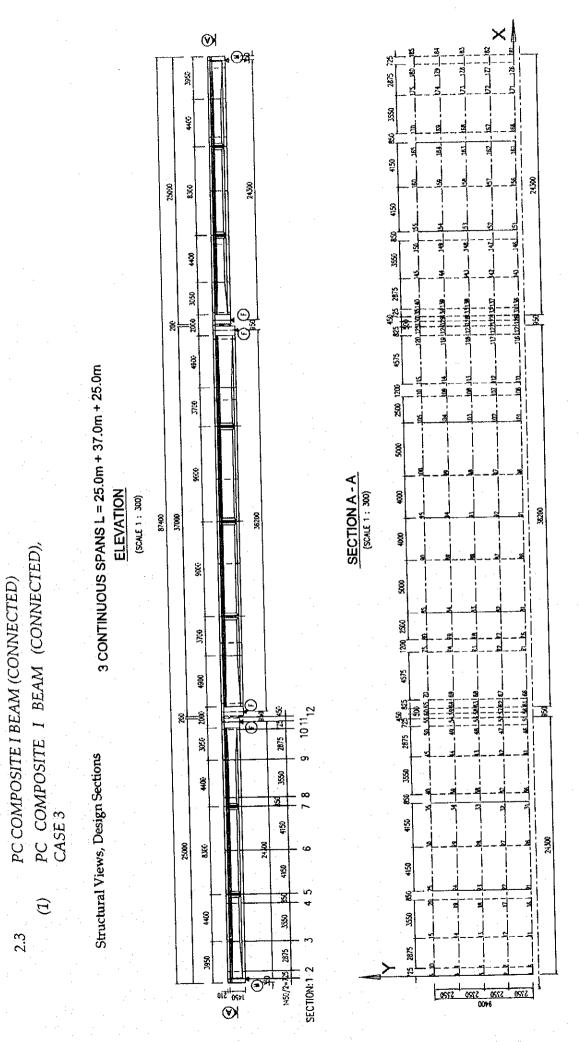
SERVICE III-5 SERVICE III-6

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1.000

1.000

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Summary of Sectional Forces:

Section	S.'	W of girde	r	S.W of Dec	k Slab+Di	aphragms	S.V	V of Surfac	
	N (tf)	V (tf)	M (tf.m)	N (tf)	V (tf)	M (tf.m)	N (tf)	<u>V (tt)</u>	M (tf.m)
SEC-1	0.00	20.76	0.00	0.00	14.99	0.00	0.00	9,33	-1.41
SEC-2	0.00	19.08	14.44	0.00	14.10	10.54	0.00	8.21	4.95
SEC-3	0.00	14.53	62.75	0.00	10,55	45.97	0.00	3.74	22.13
SEC-4	0.00	7.74	102.27	0.00	6.17	75.64	0.00	-1.06	27.86
SEC-5	0.00	6.39	108.28	0.00	5.12	80.44	0.00	-2.38	26.39
SEC-6	0.00	0.00			0.00	91.07	0.00	-2.73	28.34
SEC-7	0.00	-6.39		0.00	-5.12	80.44	0.00	-8.89	4.86
SEC-8	0.00	-7.74	102.27		-6.17	75.64	0.00	-4.89	1.41
SEC-9	0.00			1 1	-10.55	45.97	0.00	-10.40	-25.74
SEC-10	0.00	-19.08			-14.10	10.54	0.00	-14.75	-61.47
SEC-11	0.00	-20.76	0.00	0.00	-14.99	0.00	0.00	-15.88	-72.57
									<u> </u>

Section		Prestress		Liv	veLoad ma	ıx	Li	veLoad mi	
	N (tf)	V (tf)	M (tf.m)	N (tf)	V (tf)	M (tf.m)	N (tf)	<u>V (tf)</u>	M (tf.m)
SEC-1	376.83	-34.64	0.00	0.00	8.41	1.96	0.00	-1.04	-1.90
SEC-2	376.83	-32.49	-53.02	0.00	7.99	4.70	0.00	-1.04	-0.67
SEC-3	383.09	-26.09	-139.56	0.00	6.40	21.22	0.00	-1.19	-3.10
SEC-4	389.95	-18.93	-217.17	0.00	5.12	35.47	0.00	-2.74	-6.79
SEC-5	395.20	-11.66	-230.19	0.00	4.71	37.73	0,00	-3.16	-7.72
SEC-6	397.67	0.04		0.00	2.24	36.61	0.00	-4.67	-11.03
SEC-0	395.20	11.69		0.00	1.04	26.05	0.00	-6.69	-14.54
SEC-8	389.95	18.91			2.02		0.00	-8.29	-15.18
SEC-8	383.09	26.01		0.00	1.25	9.29	0.00	-9.97	-21.38
SEC-10	376.83	32.37	1		1.24	8.99	0.00	-11.12	-39.77
SEC-10 SEC-11	376.83		I 1		1.24	i . •	0.00	-11.37	-46.18
SEC-11	570.05	51.01	0.00	0.00					

Section	Diffe	erential Cr	eep	Differe	ential Shrir	ikage	Differen	itial Tempe	
	N (tf)	V (tf)	M (tf.m)	N (tf)	V (tf)	M (tf.m)	N (tf)	V (tf)	<u>M (tf.m)</u>
SEC-1	77.20	0.00	9.17	5.70	0.00	0.55	7.69	0.00	0.75
SEC-2	55.21	0.00	6.77	5.53	0.00	0.54	7.47	0.00	0.72
SEC-3	-26.02	0.00	-2.07	4.83	0.00	0.46	6.53	0.00	0.63
SEC-4	-83.82	0.00	-8.57	4.87	0.00	0.47	6.57	0.00	0.63
SEC-5	-80.53	0.00		5.75	0.00	0.56	7.76	0.00	0.76
SEC-6	-113.44	0.00		4.90	0.00	0.47	6.62	0.00	0.64
SEC-7	-80.53	0.00		5.75	0.00	0.56	7.76	0.00	0.76
SEC-8	-83.82	0.00		4.87	0.00	0.47	6.57	0.00	0.63
SEC-9	-26.02	0.00	-2.07	4.83	0.00	0.46	6.53	0.00	0.63
SEC-10	55.21	0.00	•	5.53	0.00	0.54	7.47	0.00	0.72
SEC-11	77.20	0.00		5.70	0.00	0.55	7.69	0.00	0.75
ULS AL						1.			

Section	Secondary	force due	to Creep	lo	npact max		I	npact min	<u> </u>
	N (tf)	V (tf)	M (tf.m)	N (tf)	V (tf)	M (tf.m)	N (tf)	V (tř) 🛛	M (tf.m)
SEC-1	0.00	1.58	0.00	0.00	2.77	0.65	0.00	-0.34	-0.63
SEC-2	0.00	1.58	1.14	0.00	2.64	1.55	0.00	-0.34	-0.2
SEC-3	0.00	1.58	5.68	0.00	2.11	7.00	0.00	-0.39	-1.0
SEC-4	0.00	1.58	11.28	0.00	1.69	11.71	0.00	-0.91	-2.2
SEC-5	0.00	1.58	12.61	0.00	1.55	12.45	0.00	-1.04	-2.5
SEC-6	0.00	1.45		0.00	0.74	12.08	0.00	-1.54	-3.6
SEC-7	0.00	1.33	1	0.00	0.34	8.60	0.00	-2.21	-4.8
SEC-8	0.00	1.33	I . I	0.00	0.67	7.31	0.00	-2.74	-5.0
SEC-9	0.00	2.15	1 1	0.00	0.41	3.07	0.00	-3.29	-7.0
SEC-10	0.00	1.49		0.00	0.41	2.97	0.00	-3.67	-13.1
SEC-11	0.00	1.41	1	0.00	0.41	3.20	0.00	-3.75	-15.2
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Unit Section 1 Section 2 Section 3	-	Unit	Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section 7
Sectional Properties									
Depth of Girder	н	mm	1,450	1,450	1,450	1,450	1,450	1,450	1,450
Width of Deck Slap	pq	um	600	600	600	600	600	600	600
Depth of Deck Slap	hd	mm	210	210	210	210	210	210	210
Total width of Webs	hwd	um	650	576	200	200	200	200	
Width of Siffit Slap	psq	mm	650	650	650	650	650	650	650
Depth of Soffit Slap	hs	um	250	250	250	250	250	250	250
Total Area of Prestressing Cables	Ap	mm2	3,553.6	3,553.6	3,553.6	3,553.6	3,553.6	3,553.6	3,553.6
Distance from extreme compressive fibre to centroid of			-						
Tensile Reinforcement	dp	шш	778.0	843.0	1,07	1,261.0	1,29	1,360.0	1,291.0
Area of Tensile Reinforcement	Ast	mm2	0.0	0.0	0.0	0.0	0.0	0.0	
Distance from extreme compressive fibre to centroid of									
Tensile Reinforcement	dst	mm	0.0	0.0	0.0	0.0	0.0	0.0	
Area of Compressive Reinforcement	Asc	mm2	0.0	0.0	0.0	0.0	0.0	0.0	
Distance from extreme compressive fibre of									
Compressive Reinforcement	dsc	шш	0.0	0.0	0.0	0.0	0.0	0.0	
Calculation of Mr			-						-
Stress block factor	β1		0.76	0.76	0.76	0.76	0	0.76	0.76
Distance from extreme compressive fibre Neutral Axis	J	un mu	343	385	954	992		1,008	266
Depth of equivalent stress block	B	ШШ	262	294	729	758	762	2/1/0	762
Average stress in Prestress stell at nominal bending									
resistance	sdj -	Mpa	1,630	!	[1,450			1,458
Nominal Resistance	Mn	N.mm	3.74E+09	4.02E+09	4.06E+09	5.14E+09	5.32E+09	5.72E+09	5.32E+09
Flexural Resistance factor	e		1.0	1.0	1.0	1.0	1.0	1.0	1.0
Factored Resistance	Mr	N.mm	3.74E+09	4.02E+09	4.062,154,	5.14E+09	5.32E+09	5.72E+09	5.32E+09
Checking			-						
Factored Bending Moment due to External Loads	Mu	N.mm	0.00E+00	3.75E+08	1.63E+09	2.67E+09	2.83E+09	3.18E+09	2.83E+09

(1) Nominal Flexural Strength of Girder during Construction Stage (AASHTO LRFD 5.7.3.2.2) -2/2	ruction S	itage (AA	SHTO LI	RFD 5.7.3	.2.2) -2/2		
		Unit	Section 8	Section 9	Section 9 Section 10 Section 11	Section 11	
Sectional Properties			-				
Depth of Girder	H	mm	1,450	1,450	1,450	1,450	
Width of Deck Slap	þq	mm	600	600	009	600	
Depth of Deck Slap	hd	шш	210	210	210	210	
Total width of Webs	bw	шш	200	200	576	650	
Width of Siffit Slap	bs	mm	650	. 650	650	650	
Depth of Soffit Slap	hs	шш	250	250	250	250	
Total Area of Prestressing Cables	Ap	mm2	3,553.6	3,553.6	3,553.6	3,553.6	
Distance from extreme compressive fibre to centroid of		-					
Tensile Reinforcement	dp	mm	1,261.0	1,070.0	84	778.0	
Area of Tensile Reinforcement	Ast	mm2	0.0	0.0	0.0	0.0	
Distance from extreme compressive fibre to centroid of					-	-	
Tensile Reinforcement	dst	uuu	0.0	0.0	0.0	0.0	
Area of Compressive Reinforcement	Asc	mm2	0.0	0.0	0.0	0.0	
Distance from extreme compressive fibre of		·					
Compressive Reinforcement	dsc	um	0.0	0.0	0.0	0.0	
Calculation of Mr							الموادي
Stress block factor	β1		0.76	0.76	0.76	0.76	
Distance from extreme compressive fibre Neutral Axis	C	uuu	992	954	385	343	
Depth of equivalent stress block	a	uuu	758	729	294	262	
Average stress in Prestress stell at nominal bending							
resistance	fps	Mpa	1,450	1,395	-	1,630	
Nominal Resistance	Mn	N.mm	5.14E+09	4.06E+09	4.02E+09	3.74E+09	
Flexural Resistance factor	9		1.0	1.0	1.0	1.0	
Factored Resistance	Mr	N.mm	5.14E+09	4.06E+09	4.02E+09	3.74E+09	
Checking	-						
Factored Bending Moment due to External Loads	Mu	N.mm	2.67E+09	1.63E+09	3.75E+08	0.00E+00	

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		Unit	Unit Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section /
Sectional Properties							017 5		
Depth of Girder	I	mm	1,450	1,450	1,	1,450	1,450	1,45U	1,45U
Width of Deck Slan	pq	mm	600	0 09	600	600	600	600	60
Douth of Dock Slan	hd	шш	210	210	210	210	210	210	210
Total width of Webe	bw	um	650	576	200	200	200	200	200
	şq	mm	650	650	650	650	650	650	650
VVIGUI UI SOULI SIAP	hs	a u u	250	250	250	250	250	250	250
Total Area of Prestressing Cables	Ap	mm2	3,554	3,554	3,554	3,554	3,554	3,554	3,554
Distance from extreme compressive fibre to centroid of							1		
Prestressing Cables	db	шш	778	84	1,U/	97/T	1,241	0£/T	67(T
Area of Tensile Reinforcement	Ast	mm2	0	0					>
Distance from extreme compressive fibre to centroid of									
Tensile Reinforcement	dst		0						
Area of Comressive Reinforcement	Asc	mm2	0	0	0				
Distance from extreme compressive fibre to centroid of									
Compressive Reinforcement	dsc	mm	0	0		0			
3		•							
Effective shear Depth	dv	шш	1,044	1,	1	1,		1	1,
Effective web width	þv	шш	650						
Spacing of stirrups	S	mm2	150	150	150	300	300	300	300
Angle of inclination of transverse reinforcement to						. (~	2	2
longitudinal axis of girder	ಶ	degree	8	8	8	8	06	3	3
Factor indicating ability of diagonally cracked concrete					, 	1 	t		
to transmit tension	β		6.3	6.2	5.4	5.1	5.1	4.4	4.0
Area of shear reinf. within a distances	Av	mm2	616			÷	<u> </u>		
Strain in the tensile reinforcement	εx		-0.000162	ð Ý	ō. Ç	o o	-0.000024	-0.00006	-0.000069
Inclination angle of diagonal compressive stress	θ	degree	27.00	27.00	23.40	27.00	27.00	00./Z	00 [.] /2
Component of effective pretressed force in the direction		,					1 175 105		1 17E 10E
of the applied shear	Vp	z	-3.46E+U5	1	1	1			1
Nominal Resistance of Concrete	Vc	z	2.25E+06	1.96E+06		- 1			<u> </u>
Nominal Resistance of Reinforcement	Vs	Z	3.28E+06	3.28E+06			<u> </u>		+
Nominal Resistance	Vn	z	5.19E+06	4.92E+06	1	<u>.</u>			-
Resistance factor for shear	9		0.9	0.9					!
Factored Resistance	Vr	z	4.67E+06	4.42E+06	5 1.64E+06	1.07E+06	1.13E+06	1.22E+06	1.38E+06
Checking								<u>!</u>	
Factored Moment due to External Loads	Mu	N.mm	0.00E+00	<u> </u>	1,		2.85E+U9	0.18E+09	
Factored Axial Force due to External Loads	л Z	z	0.00E+00						
Factored Shear Force due to External Loads	Vu	Z	5.36E+05	1 4.98E+05	51 3.76E+05				

	Virt Section 8	Unit	Section 8	Section 9	Section 10	Section 11	
Sectional Properties							
Depth of Girder	H	шш	1,450	1,	1,450	Ι,	
Width of Deck Slap	pq	шш	600	009	600		
Depth of Deck Slap	pų	шш	210	210	210		
Total width of Webs	рw	шш	200	200	576		
Width of Soffit Slap	bs	шш	650	650	650		
Depth of Soffit Slap	hs	um	250	250	250	250	
Total Area of Prestressing Cables	Ap	mm2	3,554	3,554	3,554	3,554	-
Distance from extreme compressive fibre to centroid of							<u> </u>
Prestressing Cables	dр	шш	1,261	1,070	8	17	
Area of Tensile Reinforcement	Ast	mm2	0	0	0	0	
Distance from extreme compressive fibre to centroid of			,		(
Tensile Reinforcement	dst		0		0		
Area of Comressive Reinforcement	Asc	mm2	0	0	0	0	
Distance from extreme compressive fibre to centroid of							<u> </u>
Compressive Reinforcement	dsc	шш	0	0	Ð	5	
Calculation of Mr		-					
Effective shear Depth	dv	шш	1,044	1	1,044	1	
Effective web width	ρΛ	mm	200	200	576		
Spacing of stirrups	s	mm2	300	150	150	150	
Angle of inclination of transverse reinforcement to					:		
longitudinal axis of girder	ჾ	degree	8	60	6	66	
Factor indicating ability of diagonally cracked concrete	I		1	0	Ţ	ľ	
to transmit tension	β		5.5	6. 8	0.I	/.0	
Area of shear reinf. within a distances	Av	mm2	308	616	919	i	
Strain in the tensile reinforcement	X3		-0.000088	-0.000208	-0.000148	-0.000107	
Inclination angle of diagonal compressive stress	θ	degree	27.00	27.00	27.00	27.00	
Component of effective pretressed force in the direction				-	-		
of the applied shear	γp	z	1.89E+05	2.60E+05	3.24E+05		
Nominal Resistance of Concrete	Vc	Z	6.07E+05	7.43E+05	1.94E+06		
Nominal Resistance of Reinforcement	Vs	Z	8.20E+05	3.28E+06	3.28E+06		
Nominal Resistance	Λn	Z	1.62E+06	2.35E+06	5.54E+06	പ്	and the second se
Resistance factor for shear	э		0.9	0.9	0.9		
Factored Resistance	Vr	Z	1.45E+06	2.11E+06	4.99E+06	5.09E+06	
Checking				ļ	1	<u> </u>	
Factored Moment due to External Loads	Mu	uuur N	2.67E+09			1	
Factored Axial Force due to External Loads	Nu	z	0.00E+00	. 1			
T CLAL TANK A. T. C.		11		201020 C			

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۰.		•,	Unit	Section 1	Section 2	Section 3	Section 4	Section 5		Cernon /
1	Sectional Properties							077 4	1 220	1 460
- +	The of Cardon	H	unu	1,660	1,660	1,660	1,000	1,000	Λ00'Τ	7,000
i		pq	шш	2,035	2,035	2,035	2,035	2,035	2,035	2,035
	Width of Deck Slap	- P4	mm	210	210	210	210	210	210	210
	Depth of Deck Slab			650	576	200	200	200	200	200
	Total width of Webs	Ma	זוחוו			250	6ED	ARO	650	650
	Width of Soffit Slab	ps	uuu	nca	000	0.00	000			
•	Denth of Soffit Slab	hs	um	250	250	250	nc7	NC7	NC7	22
			-							
•	Total Area of Prestressing Cables	Ap	mm2	3,553.6	3,553.6	3,553.6	3,553.6	3,553.6	3,553.6	3,553.6
•	Distance from extreme compressive fibre to centroid of	- Т		088.0	1 053 0	1 280.0	1.471.0	1,501.0	1,570.0	1,501.0
	Prestressing Cables	Act	mm2	0.0	0.0	0.0	0.0		0.0	0.0
I	Area of lensule Keinforcement	1 201								
I-2-1	Distance from extreme compressive fibre to centroid of Tonsila Reinforcement	dst	mm	0.0	0.0	0.0				0.0
5	Area of Compressive Reinforcement	Asc	mm2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Distance from extreme compressive fibre to centroid of	<u> </u>				Ċ		00		0.0
	Compressive Reinforcement	dsc	H H H H H H H H H H H H H H H H H H H	U.U	0.0					
	Calculation of Mr				Ì		74.0	74.0	72.0	0.76
	Stress block factor	β1		0.76	0.76	0./0	00	0/.0	0/.0	222
•	Distance from extreme compressive fibre to the Neutral			357	305	995	1.024	1.028	1,037	
	Axis	U		400						786
	Depth of equivalent stress block	a	ä	697	202					
	Average stress in Prestress stell at nominal bending			1 674	1 665	1 455	1 497	1,503		1,503
	resistance	sdr	INIPA	¥/0/T	L	5	0 61	28.8	0 74 F+09	a a
	Nominal Resistance	uW	N.mm	9.30E+09	TU/.c					
	Flexural Resistance factor	ð		I:0	1	1	<u> </u>			000
	Factored Resistance	Mr	N.mm	5.30E+09	5.70E+09	7.41E+09	8.61E+U9	9 8.8UE+U9		- بايند
	Checking									
	The second s	Ňu	N	1730F+07						

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H mun 1.660 1.660 1.660 1.660 1.660 1.660 1.660 1.660 1.660 1.660 1.660 1.660 1.660 1.660 1.660 1.660 1.660 1.660 1.660 2.035 2.036 2.010 2.010 2.010 2.010 2.010 2.010 2.010 2.010 2.010		IInit Section 8 Section	Unit	Section 8	Section 9	Section 10	Section 11	
Iab IA mm $1,660$ $1,660$ $1,660$ $1,660$ $1,660$ $1,660$ $1,660$ $1,660$ $1,660$ $1,660$ $1,660$ 210 </th <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>								
and bd/mm 2003 <t< td=""><td>Sectional rioperues</td><td>I</td><td>mm</td><td>1.660</td><td>1.660</td><td></td><td>1.660</td><td></td></t<>	Sectional rioperues	I	mm	1.660	1.660		1.660	
National State National Matrix National M		, P4	u u	2,025	2 035		2.035	
Data Data <thdata< th=""> Data Data <th< td=""><td></td><td>7 P 4</td><td></td><td>210</td><td>210</td><td>210</td><td>210</td><td>· • • · • · · · · · · · · · · · · · · ·</td></th<></thdata<>		7 P 4		210	210	210	210	· • • · • · · · · · · · · · · · · · · ·
Webs Wurd ω_{00} ω	Depth of Deck Slap					E76		
Image: Slab bs mm 550 650	Total width of Webs	MQ	um	7007		0/0	0.00	
Slab nm 250 <td>Width of Soffit Slab</td> <td>bs</td> <td>mm</td> <td>650</td> <td>650</td> <td></td> <td>650</td> <td></td>	Width of Soffit Slab	bs	mm	650	650		650	
Trestressing Cables Ap mm2 $3,553.6$ $3,557.6$ $3,557.6$	Depth of Soffit Slab	hs	unu	250	250		250	
Trestnessing Cables Ap mm2 $3,553.6$ $3,557.6$ $3,567.6$ $3,567.6$ $3,567.6$ $3,567.6$ $3,567.6$ $3,567.6$ $3,567.6$ $3,567.6$ $3,567.6$ $3,567.6$ $3,567.6$ $3,567.6$ $3,567.6$ $3,567.6$ $3,567.6$ $3,567.6$ $3,567.6$ $3,567.6$								
extreme compressive fibre to centroid of ablesdpmm $1.471.0$ $1.280.0$ 607.0 ablesReinforcementAstmm2 0.0 0.0 0.0 0.0 extreme compressive fibre to centroid of treementdstmm 0.0 0.0 0.0 0.0 rementAscmm2 0.0 0.0 0.0 0.0 0.0 rement 0.0 0.0 0.0 0.0 0.0 0.0 rement 0.0 0.0 0.0 0.0 0.0 rement 0.0 0.0 0.0 0.0 0.0 ressive Reinforcement 0.0 0.0 0.0 0.0 extreme compressive fibre to centroid of dect 0.0 0.0 0.0 extreme compressive fibre to the Neutral ctor 0.0 </td <td>Total Area of Prestressing Cables</td> <td>Ap</td> <td>mm2</td> <td>3,553.6</td> <td></td> <td>3,553.6</td> <td>3,553.6</td> <td></td>	Total Area of Prestressing Cables	Ap	mm2	3,553.6		3,553.6	3,553.6	
ables dp mm $1,471.0$ $1,280.0$ 607.0 e Ktreme compressive fibre to centroid of extreme compressive fibre to centroid of ressive Reinforcement Ast mm2 0.0 0.0 0.0 0.0 rement Asc mm2 0.0 0.0 0.0 0.0 recement Asc mm2 0.0 0.0 0.0 0.0 ressive Reinforcement Asc mm2 0.0 0.0 0.0 extreme compressive fibre to centroid of deinforcement 0.0 0.0 0.0 0.0 extreme compressive fibre to the Neutral 0.76 0.76 0.76 0.76 0.76 ctor 0.0 0.0 0.0 0.0 0.0 0.0 dent stress block m $1,024$ 995 367 367 ralent stress block m $1,024$ 995 367 $1,455$ $1,545$ $1,545$ in Prestress stell at nominal bending fps Min $N.mn$	Distance from extreme compressive fibre to centroid of							
Reinforcement Ast mm2 0.0	Prestressing Cables	dp	mm	1,471.0		607.0	672.0	
extreme compressive fibre to centroid of recementdstmm 0.0 0.0 0.0 0.0 ressive ReinforcementAscmm2 0.0 0.0 0.0 0.0 extreme compressive fibre to centroid of extreme compressive fibre to the Neutral $\beta 1$ 0.76 0.76 0.76 extreme compressive fibre to the Neutral $\beta 1$ 0.76 0.76 0.76 0.76 restreme compressive fibre to the Neutral α mm $1,024$ 995 367 restreme compressive fibre to the Neutral α mm $1,024$ 995 367 restreme compressive fibre to the Neutral α mm $1,024$ 995 367 restreme compressive fibre to the Neutral α mm 783 760 280 restreme compressive fibre to the Neutral α mm $1,024$ 995 367 restreme compressive fibre to the Neutral α mm $1,024$ 995 367 ralent stress block a mm $1,024$ 995 367 rance factor ϕ Mm $N.mm$ $8.61E+09$ $2.57E+09$ rance factor ϕ Mm $N.mm$ 2.610 1.0 rance factor ϕ Mm $N.mm$ $2.61E+09$ $2.57E+09$ rance Mr $N.mm$ $2.61E+09$ $2.67E+09$ 3.0	Area of Tensile Reinforcement	Ast	mm2	0.0	0.0	0.0	0.0	
rcementdstmm 0.0 0.0 0.0 0.0 ressive ReinforcementAscmm2 0.0 0.0 0.0 0.0 extreme compressive fibre to centroid of deinforcementdscmm 0.0 0.0 0.0 0.0 Reinforcement $\beta 1$ $\beta 1$ 0.76 0.76 0.76 0.76 ctor $\beta 1$ $\beta 1$ 0.76 0.76 0.76 0.76 ctor $\beta 1$ $\beta 1$ 0.76 0.76 0.76 0.76 ctor $\beta 1$ $\gamma 1$ $\gamma 2$ $\gamma 2$ $\gamma 2$ extreme compressive fibre to the Neutral c mm $1,024$ 995 367 extreme compressive fibre to the Neutral c mm 783 760 280 extreme compressive fibre to the Neutral c mm 783 760 280 in Prestress stell at nominal bendingfpsMpa $1,497$ $1,455$ $1,545$ in Prestress stell at nominal bendingfpsMm $8.61E+09$ $2.71E+09$ $2.57E+09$ in Rece Min $N.mm$ $8.61E+09$ $7.41E+09$ $2.57E+09$ 3.000 ince factor ϕ Min $N.mm$ $2.661+09$ $2.67E+09$ 3.000	Distance from extreme compressive fibre to centroid of							
ressive ReinforcementAscmm20.00.00.00.00.0extreme compressive fibre to centroid of deterementdscmm0.00.00.00.01Reinforcement α mm0.0 α α 0.00.00.01Reinforcement β β β β α α 0.00.00.01Reinforcement β β β α α α 0.76 α 0.760.761extreme compressive fibre to the Neutral extreme compressive fibre to the Neutral extreme compressive fibre to the Neutral extreme compressive fibre to the Neutral e α <	Tensile Reinforcement	dst	mm	0.0	0.0	0.0	1,660.0	
extreme compressive fibre to centroid of deinforcementmm 0.0 0.0 0.0 1.0 Reinforcement 0.0 0.0 0.0 0.0 0.0 1.0 Reinforcement $\beta 1$ 0.76 0.76 0.76 0.76 0.76 ctor $\beta 1$ $\beta 1$ 0.76 0.76 0.76 0.76 0.76 extreme compressive fibre to the Neutral extreme compressive fibre to the Neutral ctor α mm 1.024 995 367 alent stress block α mm 783 760 280 280 alent stress block α mm 783 760 280 alent stress block α mm 783 760 280 alent stress stell at nominal bending fps fps Mpa 1.497 1.455 1.545 tance mm $8.61E+09$ $7.41E+09$ $2.57E+09$ 3.05 tance mm $8.61E+09$ $7.41E+09$ $2.57E+09$ 3.05 tance mm $8.61E+09$ $7.41E+09$ $2.57E+09$ 3.05	Area of Compressive Reinforcement	Asc	mm2	0.0	0.0	0.0	0.0	
Reinforcement dsc mm 0.0 0.0 0.0 0.0 1 ctor $\beta 1$ $\beta 1$ 0.76 </td <td>Distance from extreme compressive fibre to centroid of</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>-</td> <td></td>	Distance from extreme compressive fibre to centroid of						-	
ctor $\beta 1$ 0.76	Compressive Reinforcement	dsc	unu	0.0	0.0	0.0	1,660.0	
block factor $\beta 1$ 0.76 <th< td=""><td>Calculation of Mr</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<>	Calculation of Mr							
cc from extreme compressive fibre to the Neutralcmm1,024995367of equivalent stress blockamm783760280ge stress in Prestress stell at nominal bendingfpsMpa1,4971,4551,545incemm8.61E+097.41E+092.57E+093.05al Resistancemm8.61E+097.41E+092.57E+093.05ed Resistancemm8.61E+097.41E+092.57E+093.05ed Resistancemm8.61E+097.41E+092.57E+093.05in Resistancemmmm8.61E+097.067.01 <tr< td=""><td>Stress block factor</td><td>β1</td><td></td><td>0.76</td><td>0.76</td><td>0.76</td><td>0.76</td><td></td></tr<>	Stress block factor	β1		0.76	0.76	0.76	0.76	
c mm $1,024$ 995 367 of equivalent stress block a mm 783 760 280 ge stress in Prestress stell at nominal bending fps Mpa $1,497$ $1,455$ $1,545$ $1,545$ nce Min N.mm $8.61E+09$ $7.41E+09$ $2.57E+09$ 3.05 al Resistance factor mm $8.61E+09$ $7.41E+09$ $2.57E+09$ 3.05 ed Resistance Min N.mm $8.61E+09$ $7.41E+09$ $2.57E+09$ 3.05 $1, 1, 2, 1, 2, 1, 2, 2, 3, 1, 2, 4, 2, 4, 3, 3, 1$	Distance from extreme compressive fibre to the Neutral							
of equivalent stress block a mm 783 760 280 ge stress in Prestress stell at nominal bending fps Mpa 1,497 1,455 1,545 ince fps Mpa 1,497 1,455 1,545 3.05 and Resistance Min N.mm 8.61E+09 2.57E+09 3.05 al Resistance factor φ 1.0 1.0 1.0 1.0 ed Resistance Mir N.mm 8.61E+09 2.57E+09 3.05	Axis	U	mm	1,024			336	
ge stress in Prestress stell at nominal bending ncefpsMpa $1,497$ $1,455$ $1,545$ ncence Mn $N.mm$ $8.61E+09$ $7.41E+09$ $2.57E+09$ 3.09 al Resistance ϕ mn $8.61E+09$ $7.41E+09$ $2.57E+09$ 3.09 al Resistance factor ϕ Mn $N.mm$ $8.61E+09$ $7.41E+09$ $2.57E+09$ 3.09 ed Resistance mn $N.mm$ $8.61E+09$ $7.41E+09$ $2.57E+09$ 3.09	Depth of equivalent stress block	а	mm	783	760		257	
Ince fps Mpa 1,497 1,455 1,545 nal Resistance Mn N.mm 8.61E+09 7.41E+09 2.57E+09 3.05 al Resistance factor φ 1.0 1.0 1.0 1.0 ed Resistance Mr N.mm 8.61E+09 7.41E+09 2.57E+09 3.05	Average stress in Prestress stell at nominal bending							
nal Resistance Min N.mm 8.61E+09 2.57E+09 al Resistance factor φ 1.0 1.0 1.0 ed Resistance Mir N.mm 8.61E+09 2.57E+09 d Resistance Mir N.mm 2.61E+09 2.57E+09	resistance	fps	Mpa	1,497				
al Resistance factor ϕ 1.0 1.0 1.0 1.0 ed Resistance $M_{\rm T}$ N.mm 8.61E+09 7.41E+09 2.57E+09 ed Resistance N.m. 2.55E+09 7.41E+09 2.57E+09 2.57E+09 2.57E+09 2.57E+09 2.57E+09 2.57E+09 2.57E+09 2.57E+08 2.57E+08 2.57E+08 2.57E+08 2.57E+08 2.58E+08 2.58	Nominal Resistance	Mn	N.mm	8.61E+09	7.41E+09	2.57E+09	3.09E+09	
ed Resistance Mr N.mm 8.61E+09 7.41E+09 2.57E+09	Flexural Resistance factor	æ		1.0	1.0	1.0	1.0	
J 7 3: 3: 3: 40 - 4 - 4 - 4 - 4 - 4 - 4 - 4 - 4 - 4	Factored Resistance	Mr	N.mm	8.61E+09	7.41E+09	2.57E+09	3.09E+09	
N N 2 855+00 1 405+00 8 785+08	Checking							
MIN DETERMINE TO THE TOTAL OF THE DETERMINE DETERMINE DETERMINE	Factored Bending Moment due to External Loads	Mu	N.mm	2.85E+09	1.40E+09	8.78E+08	1.31E+09	

(4) Checking Nominal Shear Strength of Section at Service Stage - 1/2	rvice Sta	ge - 1/2 Unit	Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section 7
Sectional Properties									
Denth of Girder	H	шш	1,660	1,660	1,660	1,660			1,660
Width of Derk Slan	pq	mm	2,035	2,035	2,035	2,035	2,035	2,035	2,035
Douth of Dork Clan	hd	mm	210	210	210	210			210
Total width of Wohe	bw	mm	650	576	200	200	200	200	200
I Otal Widut of Tcos	psq	mm	650	650	650	650	650		650
Denth of Soffit Slap	sy	uuu	250	250	250	250	250	250	250
Total Area of Prestnessing Cables	Ap	mm2	3,554	3,554	3,554	3,554	3,554	3,554	3,554
Distance from extreme compressive fibre to centroid of			-						
Prestressing Cables	dp	mm	988	1,05	1,280	1,47	1,50	7,2/1	IUC,I
Area of Tensile Reinforcement	Ast	mm2	0	0	0	0			0
Distance from extreme compressive fibre to centroid of					G	c			C
Tensile Reinforcement	dst								
Area of Comressive Reinforcement	Asc	mm2	0	0	0				
Distance from extreme compressive fibre to centroid of									¢
Compressive Reinforcement	dsc	mm	0	0		0	2	2	₽
Calculation of Mr									
Effective shear Depth	dv	шш	1,195	1,195	1'	1,		F,	1,
6 Effective web width	hv	шщ	650	576					
Spacine of stirrups	s	mm2	150	150	150	300	300	300	300
Angle of inclination of transverse reinforcement to								:	ć
longitudinal axis of girder	ø	degree	8	8	8	6	06	8	6
Factor indicating ability of diagonally cracked concrete							1	1	
to transmit tension	β		6.1	6.1	5.9	5.4	5.4	5.0	9.6
Area of shear reinf. within a distances	Av	mm2	616			308	,	<u> </u>	305
Strain in the tensile reinforcement	X3		-0.000143	-0.000139	-0.000140	-0.000069	<u>8</u>	õ o	-0.000102
Inclination angle of diagonal compressive stress	θ	degree	27.00	27.00	25.11	27.00	27.00	27.00	27.00
Component of effective pretressed force in the direction									
of the applied shear	Vp	Z	-3.46E+05	1					
Nominal Resistance of Concrete	Vc	Z	2.49E+06						7.09E+05
Nominal Resistance of Reinforcement	Vs	z	3.76E+06				<u> </u>	1	
Nominal Resistance	Vn	z	5.89E+06	5.62E+06	,	÷,	-i	<u> </u>	
Resistance factor for shear	ф		0.9			1		j	!
Factored Resistance	Vr	z	5.31E+06	5.06E+06	1.92E+06	1.28E+06	1.35E+06	1.44E+06	1.59E+06
Checking						.)			
Factored Moment due to External Loads	Mu	N.mm	7.30E+07	. !				ļ	
Factored Axial Force due to External Loads	Nu	z	4.14E+05			1		1	0.00E+00
Factored Shear Force due to External Loads	Λu	z	7.90E+05	7.32E+05	5.27E+05	2.85E+05	5.26E+05	5 1.19E+05	

	Unit	Unit	Section 8	Section 9	Section 10	Section 11	
Sectional Properties							
Depth of Girder	Ξ	mm	1,660		1,660		
Width of Deck Slap	pq	шш	2,035	2,035	2,035	2	
Denth of Deck Slap	hd	mm	210	210	210		
Total width of Webs	bw	mm	200	200	576		
Width of Soffit Slap	bs	uu	650	650	650		
Depth of Soffit Slap	hs	uuu	250	250	250	250	
Total Area of Prestressing Cables	Ap	mm2	3,554	3,554	3,554	3,554	
Distance from extreme compressive fibre to centroid of							
Prestressing Cables	dþ	шш	1,471	1,280	60	67	· · · · · · · · · · · · · · · · · · ·
Area of Tensile Reinforcement	Ast	mm2	0	0	0	0	
Distance from extreme compressive fibre to centroid of							
Tensile Reinforcement	dst	-	0	0	1,660	1,66	
Area of Comressive Reinforcement	Asc	mm2	0	0	0	0	
Distance from extreme compressive fibre to centroid of				-			
Compressive Reinforcement	dsc	uuu	0	0	1,660	1,660	
Calculation of Mr							
Effective shear Depth	dv	mm	1,195	1	1	1,	
Effective web width	pv	шш	200	200	576		
Spacing of stirrups	s	mm2	300	150	150	150	
Angle of inclination of transverse reinforcement to							
longitudinal axis of girder	ø	degree	8	60	8	66	
Factor indicating ability of diagonally cracked concrete				. (1		
to transmit tension	đ		5.8	6.8	5.5	5.4 4.0	
Area of shear reinf. within a distances	Av	mm2	308	_	616		
Strain in the tensile reinforcement	ХЗ		-0.000116	-0.000211	-0.000085	-0.000066	
Inclination angle of diagonal compressive stress	θ	degree	27.00	27.00	27.00	27.00	
Component of effective pretressed force in the direction		·					
of the applied shear	۷p	z	1.89E+05	2.60E+05	3.24E+05		
Nominal Resistance of Concrete	Vc	Z	7.28E+05	8.51E+05	1.99E+06		
Nominal Resistance of Reinforcement	Vs	N	9.39E+05	3.76E+06	3.76E+06		
Nominal Resistance	νn	Z	1.86E+06	2.65E+06	6.07E+06	6	
Resistance factor for shear	9		0.9	0.9	0.9		
Factored Resistance	Vr	z	1.67E+06	2.39E+06	5.47E+06	5.66E+06	
Checking					· · ·		
Factored Moment due to External Loads	Mu	N.mm	2.85E+09	1.40E+09	8.78E+08	1	
Factored Axial Force due to External Loads	Nu	N	0.00E+00		0.00E+00		
Eactored Chear Earce due to External Loads	1.11	z	3.43E+05	5.32E+05	7.19E+05	7 746+05	

Stress checking during construction stage (AASHTO 5.9.4.2

		COMBIN/	COMBINATION 14	
Section	$\sigma_t(T/m^2)$	Checking	$\sigma_{\rm b}({\rm T/m}^2)$	Checking
SEC-1	414.39	OK	414.39	OK
SEC-2	321.53	OK	579.01	-
SEC-3	507.15	ОK	816.68	
SEC-4	480.25	УÓ	865.21	-
SEC-5	258.55	OK	615.65	
SEC-6	454.42	-	915.97	
SEC-7	260.03	OK	614.13	ОĶ
SEC-8	482.08		863.40	
SEC-9	508.70		815.14	
SEC-10	321.64	OK	578.88	
SEC-11	414.39	ОK	414.39	А М

uring												 				~		~		<u> </u>		
n Stress di	14	Factor	1.00	1.00	•	·		· . · .	·	1.00	M(T.m)	0.00	-28.03	-30.84	-39.26	-11.17	-47.87	-41.12	-38.88	-30.54	-28.01	0.00
constructic r Checking	OMBINATION	ype	ght G_DC	veight S_D		•	·		· ·		V(T)	 1.12	0.68	-1.01	-5.02	-0.14	F0.0	0.18	5.00	0.93	-0.80	-1.12
lecking Stress during construction Load Combinations for Checking Stress during	COMI	Load type	Girder Selfweight G	Slab+Dia. Selfweight S				۰.	· · ·	Prestress PS	N(T)	 376.83	376.83	383.09	389.95	395.20	397.67	395.20	389.95	383.09	376.83	376.83
Checking Stress during construction Load Combinations for Checking S		<u> </u>	<u> </u>	<u> </u>							Section	 SEC-1	SEC-2	SEC-3	SEC-4	SEC-5	SEC-6	SEC-7	SEC-8	SEC-9	SEC-10	SEC-11

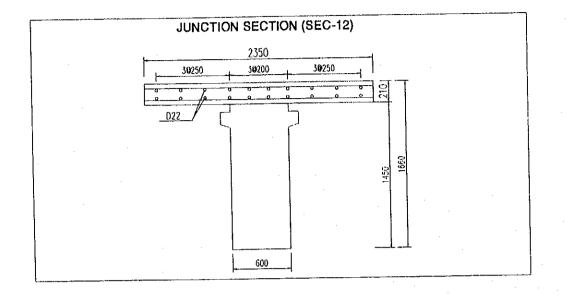
Checking Stress at service stage Load Combinations for Checking Stress at service stage

	COM	COMBINATION	11	COM	TOM THAN TO THE TOTAL	1			
	I nad type	tvne	Factor	Load type	type	Factor	Load type	type	Factor
	Cindor Salfwaight G DC		1.00	Girder Selfweight G_DC	ight G_DC	1.00	Girder Selfweight G_DC	ight G_DC	1.00
	Onder Jenwerg	colfinaiobt S DC	1.00	Slab+Dia. Selfweight S_DC	weight S_DC	1.00	Slab+Dia. Selfweight S_D	weight S_D	1.00
		verbruche	1.00	Surface + Railings DW	ings DW	1.00	Surface + Railings DW	ings DW	1.00
	Surface - Naum	Tood I MAX	0.80	Max. Live Load LL_MAX	d LL_MAX	0.00	Max. Live Load LL_MAX	A LL_MAX	0.00
	Max. Live Load 11 MIN		0.00	Min. Live Load LL_MIN	d LL_MIN	0.80	Min. Live Load LL_MIN	NIM_11 P	0.00
	Max Impact IM MAX	M MAX	0.80	Max. Impact IM_MAX	M_MAX	0.00	Max. Impact IM_MAX	IM_MAX	0.00
	Min Impact IM MIN	MIN N	0.00	Min. Impact IM_MIN	M_MIN	0.80	Min. Impact IM_MIN	M_MIN	0.00
	Creep Diff. CR D		1.00	Creep Diff. CR_D	ζD	1.00	Creep Diff. CR_D	D D	1.00
	Shrinkage Diff.	Diff. SH_D	1.00	Shrinkage Diff. SH_D	f. sH_D	1.00	Shrinkage Diff. SH_D	ii. SH_D	1.00
	Temperature Diff. TG	Diff. TG	0.50	Temperature Diff. TG	Diff. TG	0.50	Temperature Ditt. TG	Diff. TG	- 1.00 - 1
	Creep CR Prestress PS		1.00	Creep CR Prestress PS		1.00	Creep UK Prestress PS		1.00
Section	N(T)	V(T)	M(T.m)	(E)N	(T)V	M(T.m)	N(T)	(1)	M(1.m)
SEC-1	463.56	20.97	10.77	1 63.56	10.92	6.66	117.791	12.03	9.06
SEC.7	111.30	18.97	-9.28	11 1.30	9.36	-14.99	H12.01	10.47	-13.92
5EC-2		11.12	18.24	365.17	3.05	-7.63	368.43	4.31	-4.02
CEC.4	314 29	0.95	29.83	314.29	-7.42	-15.13	317.58	1 .50	-7.59
SEC.5			30.21	324.29	1 .31	-18.15	328.17	-0.95	-9.56
SEC-6	292.44		27.48	292.44	-6.20	-23.21	295.75	-1.23	-11.16
SEC-7	324.29		8.67	324.29	-14.49	-34.51	328.17	-7.38	-18.67
SEC-8	314.29		4.15	314.29	-7.39	-35.58	317.58	1.44	-19.11
SEC-0	365.17		-15.67	365.17	1 6.71-	-18.31	368.43	-7.32	-25.25
SEC-10	H1.30		-35.01	1130	-25.91	-86.88	115.01	-14.07	-4.21
CEC-11	463.56	.t	-13.83	463.56	-27.68	-73.30	(1+'29F	-15.58	-23.79

					COMBINATION 12	TION 12			COMBIN.	COMBINATION 13	
	COMBI	COMBINATION II		1		(m)		π (T/m ²)	Charling	סי(T/m ²)	Checking
Section	$\alpha.(T/m^2)$ Checking	$\alpha_{\rm b}(T/m^2)$	Checking	σ _t (T/m [*]) C	Checking 0h(1/m)	α ^p (1/m)	Lhecking	0414/471	9		
							- 				
			-				5	360.18	-	326.12	0K
(318 80	ХĊ	354.51	y X	27472	40	AT AND			
SEC-1	NO 67.600				کر کر	387 68	ХĊ	334.54	-	387.7 1	č
SEC-2	336.91 OK	372.38		00.000	5			267 17		377.93	ОĶ
		309.65		355.23	ŏ	C7.C85					10
vec-3	-			CC 70C	УK	355.86		308.04		337.40	Ś
SEC-4		70.022		77.127	5			72152		269.64	oK
((166.27		221.78	N N	CT-987					
2012	-			73 676	NC OK	356.63		282.84		325.60	Š
SEC-6	_	212.54		00.07	2			00100		292.66	Х ХО
1 () (220.68		203.01	ok	3.29.79		10.121			, , ; , ,
SEC-1				37 270	NK OK	111 59		296.50		370.56	č
SEC-8	316.53 OK	300.47	ź	C/-0/7			JC JC	3.10.68	ОĶ	139.91	о К
		108.72		314.14	č	10.400		0.0¥0			10
261-2	•			217 01	УÇ	580.14		299.81		10.01	ž
SEC-10	Ť	/7.144		1/1/17				277 01		++~[L+	о Хо
SEC-11	330.70 OK	382.69	OK	261.59	X O	Q1./5C		10.770			

Stress checking at Service stage (AASHTO 5.9.4.2)

Stress Check at Junction of the Girders



Horizontal Shear per unit length of girder V _h due to Vertical Shear V _u Distance from the centroid of tensile steel to the midthickness of the deck	ength of gire of tensile ste	ler V _h due to sel to the mi	v Vertical Sh dthickness c	lear V _u of the deck	Υ ^ν Υ ^ν	V _h = V _u /d _e d _e А _и					
Required area of remuced and $A_{a'} >= \max \{0.35 b_v / f_y; (V_h - c b_v - \mu^F W)$ Width of the interface between the girder and Vield strength of reinforcement	b _v / f _y ; (V _h - o reen the gird nent	s b _v - μ P _c) / μ f _y } ter and the deck:	ty) leck:	·	ار به ا الم بح ر	H 1	600 пли 390 МРа 0.17 МРа	m Pa Pa			
Cohesion factor Friction factor	. *	-			ייי ש א בי ע	n H	0.7 58750 N				
Permanent net compressive force normal to the shear plan	e force norn	al to the sh	ear pian						-	01 000	SEC.11
	SEC-1	SEC-2	SEC-3	SEC-4	SEC-5	SEC-6	SEC-7	SEC-8	SEL-Y		
Section	000	816	1175	1366	1396	1465	1396	1366	1175	948	883
d _* (mm)	000								111120	187087	-203618
Interface Shear(N): Cirdor Solfweight G DC	203618	187087	142459	75906	62712	00	-62712	-75906	-142 1 16	-138230	-147002
Slab+Dia. Selfweight S_D	147002	138230	103446	60495	21212	0	-87157	-47978	-102031	-144687	-155726
Surface + Railings DW	91529	80490	36715	50241	46187	21980	10205	19789	1224	12161	12135
Max. Live Load LL_MAX	52475	-10237	-11626	-26899	+7905-	F6231-	-65601	-81339	97808	-107070	-111005
Min. Live Load LL_MUN Max Timpact IM MAX	27207	25850	20727	16580	, 15242	7254	3368	-26842	-32277	-36002	-36795
Min. Impact IM_MIN	-3361	· · ·	-3837	-8877	-789696	-1112450	-789696	-821957	-255193	541424	757067
Creep Diff. CR_D	757067		CATCC7-	12227	56355	48061	56355	17754	60 F /F	54255	10200
Shrinkage Diff. SH_D	75351	CC2FC	64002	64468	76079	64882	76079	64168	64002	11598	13855
Temperature Dift. 16	15166		15467	15464	15464	14266	13077	130/9	210/0	069042	111965
Creep CK T1 Max	1455583	119	237841	-501449	-490789	-982786	-830694	7174-080	-400724	68418	247530
I Otal Min	1332387	107	138843	-604045	-593-114	0767/01-	1965	3472	2049	069	1358
Avr required (mm2)	5181	1 224	720	7907	17777						
			3205	FC6	924	6 24	924	1 26	3695	3695	3695
Area of Stirrups (nun^2)	3695		2022	1008@FLQ)	(D14@300)	(D14@300)	(D143-300)	(D146300)	(D146	(D146.150)	(0518F1(1))
	(D140150)	(0519410)		3770	i	3770	3770	3770		37/0	5770 (D2018-0)
Area of Dowel bars (mm)	(D20@150)	D20	(D20@150)	(D20-6:150)	(D20@150)	(D203-150)	(D20@150)	(D20)	(UC12012(1)	1912	1-9 1 2
Total Connector Area (mm ²)	1 91-2		191-2	F69F	1691	1 69 1	+69t	+40+			
					OK	OK	oK	OK	oK	ОK	ok
Checking	OK	ok	OK.	40							
			÷								

Design of connectors at the interface between girder and deck slab (AASHTO 5.8.4):

Design of Deck Slab

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Sumary of Bending Moment:

Bending Moment due to Live Load:

	1.700 m 10.000 T 33% A=0.8*(1+IM) A=-(1+IM)*(0)*(0.12S+0.0		T.m/m T.m/m	
(2) Cantilever Slab 1) Effective Span Length 2) Load 3) Impact Factor IM 4) Negative Moment	0.100 n 10.000 T 33%		-	T.m/m	
Bending Moment due to Self-z Section Bending Moment (T.m)	veight of Slat A -0.152	b: B 0.152	C -0.150		
<i>Bending Moment due to Asph</i> Section Bending Moment (T.m)	<i>alt Concrete:</i> A -0.050	B 0.050	C -0.030		
Bending Moment due to Para Section Bending Moment (T.m)	pet & Railing A 0.000	g <i>s:</i> B 0.000	C -0.424	· · · ·	
		11750		· · · ·	
500	· · · · · · · · · · · · · · · · · · ·	10750		· · · ·	500
350 650 1700	-				
	 				
1175	4	@ 2350 = 940	30		1175
		11750	· · · · · · · · · · · · · · · · · · ·		

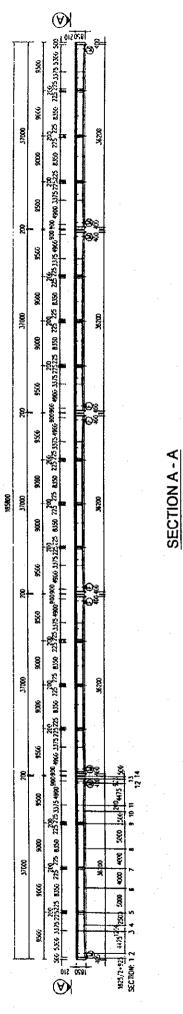
Checking Nominal Flexural Strength of Deck Slab (Article 5.7.3.2.2 AASHTO)

PC COMPOSITE I BEAM (CONNECTED), CASE 7

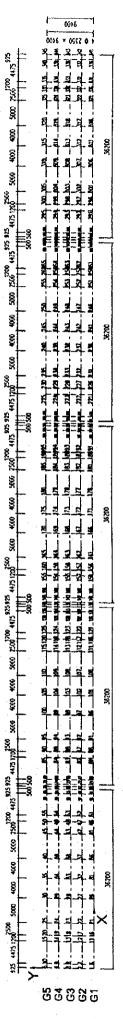
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Structural Views, Design Sections

5 CONTINUOUS SPANS 5@37.0m, W = 11.75m ELEVATION (SAUL: 11500)







Section	S.1	N of girde	r	S.W of Dec	k Slab+Dia	aphragms	S.W	of Surfac	
	N (tf)	V (tf)	M (tf.m)	N (tf)	V (tf)	M (tf.m)	N (tf)	V (II)	<u>M (tf.m)</u>
SEC-1	0.00	35.61	0.00	0.00	22.33	0.00	0.00	13,80	-(),99
SEC-2	0.00	32.72	31.60	0.00	21.19	20.13	0.00	12.36	11.11
SEC-3	0.00	24.40		l	15.67	102.60	0.00	5.41	50.89
SEC-4	0.00	21.48		0.00	14.19	120.51	0.00	4.06	56.77
SEC-5	0.00	16.84			11.10	152.13	0.00	0.18	
SEC-6	0.00	7.54			4.94	192.23	0.00	-0.54	78.71
SEC-0	0.00	0.00			0.00	202.10	0.00	-6.61	64.70
SEC-7 SEC-8	0.00	-7.54	· · · ·		-4.94	192.23	0.00	-5.23	56.20
SEC-0 SEC-9	0.00	-16.84		1		152.13	0.00	-12.84	11.42
SEC-10	0.00	-21.48		• • • •			0.00	-10.64	-10.27
SEC-10	0.00	-24.40	-			102.60	0.00	-12.51	-24.16
SEC-11	0.00	-32.72					0.00	-19.15	-94.18
SEC-12 SEC-13	0.00					0.00	0.00	-20.59	-112.50

Section		Prestress		Liv	eLoad ma	x	Liv	eLoad mir	<u>۱</u>
Jection	N (tf)	V (tf)	M (tf.m)	N (tf)	V(tf)	M (tf.m)	N (tf)	V (tf)	M (tf.m)
SEC-1	633.99	-54.23	0.00	0.00	9.82	2.72	0.00	-0.80¦	-2.68
SEC-2	633.99	~50.56	-92.20	0.00	9.44	7.07	0.00	-0.80	-0.63
SEC-3	644.24	-42.51	-300.75	0.00	7.63	37.61	0.00	-1.52	-3.51
SEC-4	653.03	-35.26	-346.23	0.00	8.12	44.51	0.00	-2.37	-4.47
SEC-5	661.26	-24.57	-426.84	0.00	7.14	57.39	0.00	-3.33	-6.80
SEC-6	661.23	-7.94	1	0.00	4.26	66.24	0.00	-3.90	-9.91
SEC-7	656.44	0.00	1 . 1	0.00	3.17	65.61	0.00	-5.36	-12.61
SEC-8	661.23	7.94	i I	0.00	2.18	53.10	0.00	-7.62	-14.37
SEC-9	661.26	24.57			1.11	32.07	0.00	-9.10	-17.88
SEC-10	653.03	35.26	1	0.00	2.09	21.01	0.00	-11.33	
SEC-11	644.24	42.51		0.00	1.87	17.76	0.00	-11.68	-27.09
SEC-12	633.99	50.56	· ·	0.00	1.37	17.03	0.00	-12.41	-63.68
SEC-12	633.99	54.23			1.36	17.99	0.00	-12.61	-72.7

Section	Diffe	rential Cr	Pen	Differe	ntial Shrin	kage	Different	ial Tempe	rature
Section	N (tf)	V (tf)	M (tf.m)	N (tf)	V (tf)	M (tf.m)	N (tf)	V (tt)	M (tf.m)
SEC-1	120.24	0.00	13.76	7.10	0.00j	0.71	9.59	0.00	0.96
SEC-2	89.11	0.00	10.39	6.89	0.00	0.69	9.31	0.00	0.93
SEC-3	-56.20	0.00	-5.24	5.70	0.00	0.57	7.70	0.00	0.77
SEC-4	-82.52	0.00		5.71	0.00	0.57	7.70	0.00;	0.77
SEC-5	-128.48	0.00	-13.22	5.71	0.00	0.57	7.72	0.00	0.77
SEC-6	-181.95	0.00		5.73	0.00	0.57	7.74	0.00	0.77
SEC-7	-190.57	0.00		5.73	0.00	0.57	7.74	0.00	0.77
SEC-8	-181.95	0.00		5.73	0.00	0.57	7.74	0.00	0.77
SEC-9	-128.48	0.00	i I	5.71	0.00	0.57	7.72	0.00	0.77
SEC-10	-82.52	0.00	1 1	5.71	0.00	i1	7.70	0.00	0.77
SEC-10 SEC-11	-56.20	0.00	L I	5.70	0.00		7.70	0.00	0.77
SEC-12	89.11	0.00		6.89	0.00		9.31	1.00	0.93
SEC-12	120.24	0.00	1. 1		0.00		9.59	2.00	0.9

Section	Secondary	force due	to Creep	In	npact max		In	pact min	
Section	N (tf)	V (tf)	M (tf.m)	N (tf)	V (tf)	M (tf.m)	N (tf)	V (tf)	M (tf.m)
SEC-1	0.00	0.71	0.00	0.00	3.24	0.90	0.00	-0.26	-0,89
SEC-2	0.00	0.82	0.76	0.00	3.11	2.33	0.00	-0.27	-0.21
SEC-3	0.00	0.82	4.42	0.00	2.52	12.41	0.00	-0.50	-1.16
SEC-4	0.00	0.82	5.41	0.00	2.68	14.69	0.00	-0.78	-1.47
SEC-5	0.00	0.82	7.45	0.00	2.36	18.94	0.00	-1.10	-2.2-
SEC-6	0.00	0.82		0.00	1.41	21.86	0.00	-1.29	-3.27
SEC-7	0.00	0.94	14.83	0.00	1.05	21.65	0.00	-1.77	-4.10
SEC-8	0.00	1.05	19.05	0.00	0.72	17.52	0.00	-2.51	-4.7
SEC-9	0.00	0.98		0.00	0.37	10.58	0.00	-3.00	-5.9
SEC-10	0.00	0.93	26.58	0.00	0.69	6.93	0.00	-3.74	-7.5
SEC-11	0.00	1.38		0.00	0.62	5.86	0.00	-3.85	-8,9
SEC-12	0.00	-0.45		0.00	0.45	5.62	0.00	-4.09	-21.0
SEC-13	0.00	-0.34		0.00	0.45	5.94	0.00	-4.16	-24.0

Cirder during Construction	uction St	age (AA	ruction Stage (AASHTO LRFD 5.7.3.2.2) - 1/2	(FD 5.7.3.	2.2) - 1/2				
(1) Nominal Flexural Sutengui of Suren and Sur		Unit	Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section 7
Sectional Properties			1 850	1 850	1.850	1.850	1,850	1,850	1,850
Depth of Girder	Ľ,		1,000	4,000	650	650	650	650	650
TARIATE of Dork Slan	bd	um	8	2			010	010	210
Wildlich Dece and	hđ	mm	210	210	210	210	210		017
Depth of Deck Stap	hw	um um	650	580	200	200	200	200	200
Total width of Webs	2 4	um	650	650	650	650	650	650	650
Width of Siffit Slap	s r	uuu	250	250	250	250	250	250	250
Depth of Softit Slap									
	٩٣	2 mm	5,922.6	5,922.6	5,922.6	5,922.6	5,922.6	5,922.6	5,922.6
Total Area of Prestressing Cables									
Distance from extreme compressive fibre to centroid of	սր	unu	971.0	1,050.0	1,370.0	1,437.0	1,552.0	1,677.0	1,688.0
Tensile Reinforcement	A of	Cmm	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Area of Tensile Reinforcement	191		}						
Distance from extreme compressive fibre to centroid of		•	, ,		00	0	00	0.0	0.0
Toncila Reinforrement	dst	mm	0.0	0.0	0.0				
A of Commercive Reinforcement	Asc	mm2	0.0	0.0	0.0	0.0	0.0	0.0	
Distance from extreme compressive fibre of		-		Ċ	Ċ			00	0.0
Commessive Reinforcement	dsc	m	0.0	0.0	0.0	2.0			
Colorion of Mr		 - -							20.0
	81		0.76	0.76	0.76	0.76	0.76		
Stress block factor		mm	549	612	1,479	1,500			
Darth of equivalent stress block	a b	uuu	420	467	1,130	1,147	1,172	1,197	1,199
Average stress in Prestress stell at nominal bending			1				1 346	1 374	1 376
	fps	Mpa	1,566		1	5			10
Iteliautic	чW	N.mm	7.06E+09	7.57E+09	7.32E	7.89E+09	8.88E	9.995	01+310.1
NULLIAI NEUCONALICE	θ		1.0	1.0	1.0	1.0			0.1
Flexural Icesistance	Mr	N.mm	7.06E+09	7.57E+09	7.32E+09	7.89E+09	8.88E+09	9.99E+09	1.01E+10
ractoreu Nesustative									
Checking	N ¹¹	Nmm	0.00E+00		7.76E+08 3.93E+09	4.61E+09	5.80E+09	7.32E+09	7.70E+09
Factored Bending Moment due to External Loaus	7777								

11) Non	(1) Nominal Flexural Strength of Girder during Constr	truction Stage		AASHTO LKFU 5.7.3.2.2) -2/2	XFD 5.7.3	7.7- (7.7:				
		2	Unit	Section 8	Section 9	Section 10	Section 11	Section 12	Section 13	
Sectiona	Certional Promerties			-						
Certavia	Douth of Circlor	T	mm	1,850	1,850	1,850	1,850	1,850	1,850	
Tri-Pic	Deput of Dock Slam	pq	unu	650	650	650	650	650	650	
	It of Dack Star	hd	mm	210	210	210	210	210	210	
	Deput of Deck Stap	bw	um	200	200	200	200	580	650	
	10tat Width of Siffit Slan	ps	uuu	650	650	650	650	650	650	
	Widuit of Soffit Slap	su	mm	250	250	250	250	250	250	
Total	Total Area of Prestressing Cables	Ap	mm2	5,922.6	5,922.6	5,922.6	5,922.6	5,922.6	5,922.6	
Dista	Distance from extreme compressive fibre to centroid of	dp	unu	1,677.0	1,552.0	1,437.0	1,370.0	1,050.0	970.0	
Area	Area of Tensile Reinforcement	Ast	mm2	0.0	0.0	0.0	0.0	0.0	0.0	
	Distance from extreme compressive fibre to centroid of	det.		00	0.0	0.0	0.0	0.0	0.0	
2-30	I ensile Keintorcement	Asc	mm2	0.0			0.0	0.0	0.0	
	Area of Compressive Achicorcentum Dictance from extreme compressive fibre of									
Com	Compressive Reinforcement	dsc	uuu	0.0	0.0	0.0	0.0	0.0	0.0	
Calculat	Calculation of Mr									
Stree	Stress block factor	β1		0.76	0.76	0.76		5	0.76	
Dist	Distance from extreme compressive fibre Neutral Axis	c	unu	1,566					549	
Dept	Depth of equivalent stress block	а	uuu	1,197	1,172	1,147	1,130	467	420	
Aver	Average stress in Prestress stell at nominal bending								v V H	
resis	resistance	fps	Mpa	1,374					- 000.1	
Non	Nominal Resistance	Мп	N.mm	9.99E+09	8.88E+09	7.89E	7.32E	7.57E	7.06E+09	
Flex	Flexural Resistance factor	9	-	1.0	1.0	1.0		1.0	1.0	
Facto	Factored Resistance	Mr	N.mm	9.99E+09	8.88E+09	7.89E+09	7.32E+09	7.57E+09	7.06E+09	
Checking	Ŕ								00.100.0	
Fact	Factored Bending Moment due to External Loads	Mu	N.mm	7.32E+09	5.80E+09	4.61E+09	3.93E+09	7.765+08	0.00±+00	

44 (A ASHTO I RFD 5.7.3.2.2) -2/2 -tion Sta Č • . ۲

(2) Construction Strength of Section during Construction Stage - 1/2	ig Consti	uction St	tage - 1/2	·					
(2) Checking indulated differ on the second of the second		Unit	Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section 7
Sectional Properties			010	1 050	1 850	1 850	1.850	1.850	1,850
Depth of Girder	E	mm	1,850	1,000	1,000	CED.	650	650	650
Width of Deck Slap	pq	шш	650	000	000	0.00	0.00	010	210
Denth of Derk Slap	рч	шш	210	210	710	012	017		017
Depart of Debe	hw	mm	650	580	200	200	200	500	2007
10tal Widul 01 Webs	å	um	650	650	650	650	650	650	650
Width of Sound Stap	hs	mm	250	250	250	250	250	250	250
Ueptin of Sofiti Stap									
Total Area of Prestressing Cables	Ap	mm2	5,923	5,923	5,923	5,923	5,923	5,923	5,923
Distance from extreme compressive fibre to centroid of	ap	шш	1//6	1,050	1,370	1,437	1,552	1,677	1,688
Prestressing Caples	Ast	mm2	0	0	0	0	0	0	0
Distance from extreme compressive fibre to centroid of	407		c	C	0	0	0	0	0
Tensile Reinforcement	Asr	mm2	0	0	0	0	0	0	0
	2								
Distance from extreme compressive fibre to centrold of	dsc	mm	0	0	0	0	0	0	0
Calculation of MIT	dv	mm	1,332	1,332	1,332	1,332	1,332	1,332	1,332
Lifective snear Depui	, îr	mm	650	580	200	200	200	200	200
Effective web width	3		150	150	150	300	300	300	300
Spacing of stirrups	s	ZUIUI	PCT		224				
Angle of inclination of transverse reinforcement to	. 2	degree	6	06	06	6	6	6	90
Iongitudinal axis of grder Eactor indicating ability of diagonally cracked concrete	5							L 1	L
to transmit tension	æ		6.8	6.8	6.1	6.6	6.3	5.5	5.4
Area of shear reinf. within a distances	Av	mm2	616	_	616	308		80£	308
Strain in the tensile reinforcement	ХЗ	-	-0.000254	-0.000248	-0.000245	-0.000219	-0.000163	-0.000055	-0.000.0-
Inclination angle of diagonal compressive stress	θ	degree	27.00	27.00	23.14	25.06	2/.00	M./7	007/7
Component of effective pretressed force in the direction		2	E ADELOE	E DEVEADE	1 255+05	-3 53E+05	-2 46E+05	-7.94E+04	0.00E+00
of the applied shear	۲P	z	-0.42ETUJ	<u> </u>	_			7.69E+05	7.55E+05
Nominal Resistance of Concrete	ζ	z	0.00ETU0			_1_	<u> </u>	1 055+06	1 05E+06
Nominal Resistance of Reinforcement	Vs	z	4.195+06	4.19E+U0	4.9915100			1 74F+06	1 80E+06
Nominal Resistance	۳۷	z	6.72E+06	6.43E+U6				0.0.17	60
Resistance factor for shear	\$		0.9	0.9		-	F	1 565406	<u>1 62E+06</u>
Factored Resistance	Vr	z	6.05E+06	9./9E+U0	2.025+00			20. 701	
Checking					00 T	4 21ET00	E ROETOO	7 375+00	7 70E+09
Factored Moment due to External Loads	Мu	Mm.N	0.0012+00				1	0.00E+00	0.00E+00
Factored Axial Force due to External Loads	Nn N	z	0.0010+00			1	1	1 876+05	0.000
Factored Shear Force due to External Loads	Λu	z	8.69E+UD	8.09E+UO				~~ ~ /or T	200

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Sectional Properties H mm 1.850 200				Section 8	Section 9	Section 10	Section 11	Section 12		
Hmm1.8501.850laphdmm 650 650 laphdmm 650 650 laphm 210 210 lebsbymm 650 650 laphn 210 210 laphn 250 250 laphm 2592 5923 sertessing CablesApmm 250 sertessing CablesApmm 250 sertessing CablesAs 0 0 wreme compressive fibre to centroid of $4p$ mm 1.677 blesmm 1.677 1.532 blesmm2 0 0 compressive fibre to centroid of $4st$ mm 0 wreme compressive fibre to centroid of $4st$ mm 200 sive Reinforcement $4sr$ mm 230 1.332 blip 0 0 0 0 0 sive Reinforcement by mm 2.300 1.332 blip 0 0 0 0 0 sive Reinforcement by mm 2.300 1.332 blip 0 0 0 0 0 sive Reinforcement by mm 2.300 1.300 sinforcement by by mm 0 sinforcement by by mm 0 sinforcement by by mm 0 sinforcement by <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>										
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Supplehidmm 210 210 Stapbwmm 200 200 Websbsmm 550 5923 Slapmm 250 5923 Slapmm 1.677 1.552 Slapmm2 $5,923$ $5,923$ Sizemm2 $5,923$ $5,923$ Streme compressive fibre to centroid ofdpmm 1.677 1.552 wetterne compressive fibre to centroid ofdstmm2 0.0 0 wetterne compressive fibre to centroid ofdstmm2 0.0 0 Sive ReinforcementAscmm2 0.0 0 extreme compressive fibre to centroid ofdstmm2 0.0 0 sive ReinforcementAscmm2 0.0 0 0 sive Reinforcement 0 0 0 0		pq	un mu	650	650	650	650	650		
StapDevmm 200 200 Slapbsmm 650 650 SlapSlapbsmm 650 650 SlapSlapmm 270 200 200 SlapExtressing CablesAstmm2 $5,923$ $5,923$ restreme compressive fibre to centroid ofdpmm 1.677 1.552 blesAstmm2 0 0 0 cementAstmm2 0 0 0 extreme compressive fibre to centroid ofdstmm 1.677 1.552 extreme compressive fibre to centroid ofdstmm2 0 0 cementAscmm2 0 0 0 extreme compressive fibre to centroid ofdscmm 1.332 1.332 orightbymm 1.332 1.332 1.332 extreme compressive fibre to centroid ofdscmm 2.00 90 extreme compressive fibre to centroid ofdscmm 2.92 90 extreme compressive fibre to centroid ofdscmm 2.00 90 extreme compressive fibre to centroid ofdscmm 2.92 90 extreme compressive fibre to centroid ofdsc <td></td> <td>pq</td> <td>mm</td> <td>210</td> <td>210</td> <td>210</td> <td>210</td> <td>210</td> <td></td> <td></td>		pq	mm	210	210	210	210	210		
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SlapImm 250 256 SlapFighthpmm2 $5,923$ $5,923$ Festressing CablesAptmm2 $5,923$ $5,923$ Extreme compressive fibre to centroid ofdpmm2 0 0NetAstmm2 0 00Sive ReinforcementAstmm2 0 00extreme compressive fibre to centroid ofdstmm2 0 00extreme compressive fibre to centroid ofdstmm2 0 00extreme compressive fibre to centroid ofdstmm $1,332$ $1,332$ extreme compressive fibre to centroid ofdstmm 200 00extreme compressive fibre to centroid ofdstmm 200 00extreme compressive fibre to centroid ofdstmm 200 200 extreme compressive fibre to centroid ofdstmm 200 200 extreme compressive fibre to centroid ofdstmm 200 200 extreme compressive fibre to centroid of dst mm2 200 200 extreme compressive fibre to centroid of dst mm2 200 200 extreme compressive fibre to centroid of dst mm2 200 200 extreme compressive fibre $ststst200200extreme compressive fibreststst200200extreme compressive fibreststst$				650	650	650	650	650		
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restressing CablesApmm2 $5,923$ $5,923$ $5,923$ restressing Cablesrestressing Cables $4p$ mm2 $1,677$ $1,552$ blesAstmm2 0 0 totalAstmm2 0 0 ReinforcementAstmm2 0 0 ReinforcementAstmm2 0 0 sive ReinforcementAscmm2 0 0 sive ReinforcementAscmm2 0 0 sive ReinforcementAscmm2 $1,332$ $1,332$ bepthdvmm $1,332$ $1,332$ $1,332$ totalbymm 200 200 0 widthsmm2 300 150 widthsmm2 300 150 widthsmm2 300 150 widthsmm2 300 200 widthsmm2 300 200 widthsmm2 300 200 widths $1,000$ 0 0 reinforcements 0 0 0 reinforcements $1,000$ 0 0 reinforcements 0 0 0 reinforceme										
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ve web widthsmm2300150g of stirrupsof inclination of transverse reinforcement tos 90 90 90 of inclination of transverse reinforcement to α degree 90 90 90 indicating ability of diagonally cracked concrete β 5.5 6.3 5.5 6.3 smit tensionf shear reinf. within a distances Av $mm2$ 308 616 f shear reinf. within a distances ϕ ϕ 0.000083 -0.000083 -0.000163 in the tensile reinforcement εx Av $mm2$ 308 616 f shear reinf. within a distances ϕ ϕ 0.00083 -0.000163 -1.000083 f shear reinf. within a distances ϕ Av $mm2$ 308 616 f shear reinf. within a distances ϕ ϕ 0.00083 -0.000083 -0.000163 f shear reinf. within a distances ϕ b $degree$ 27.00 27.00 in the tensile reinforcement v_r v_r N $7.94E+04$ $2.46E+05$ onent of effective pretressed force in the direction v_r N $7.04E+04$ $2.46E+05$ applied shear v_r N $7.04E+04$ $2.46E+05$ applied shear v_r N $1.05E+06$ 0.9 and Resistance of Concrete v_r N $1.05E+06$ 0.9 and Resistance v_r N $1.71E+06$ $2.91E+06$ and Resistance v_r <		hur.	mm	200	200	200	200	580		
g of stirrupssIIIIL00of inclination of transverse reinforcement to indicating ability of diagonally cracked concrete f shear reinf. within a distancess 90 90 f shear reinf. within a distances Av $mm2$ 308 616 f shear reinf. within a distances Av $mm2$ 308 616 in the tensile reinforcement B $arm2$ 308 616 in the tensile reinforcement ex θ θ 616 in the tensile reinforcement vv N $7.94E+04$ $2.46E+05$ onent of effective pretressed force in the direction Vp N $7.94E+04$ $2.46E+05$ applied shear vc N N $7.69E+05$ $8.86E+05$ applied shear vc N N 0.9 0.9 and Resistance of Reinforcement Vs N $1.05E+06$ $2.19E+06$ and Resistance Vr N N 0.9 0.9 and Resistance Vr N $1.05E+06$ $2.91E+06$ and Resistance Vr N N 0.9 0.9 and Resistance Vr		3	1000	002	150	150		150	0 150	
of inclination of transverse reinforcement to indicating ability of diagonally cracked concrete indicating ability of diagonally cracked concrete is find axis of girder909090indicating ability of diagonally cracked concrete in the tension β 5.5 6.3 616 in dicating ability of diagonally cracked concrete in the tension β 5.5 6.3 616 in the tension $\delta = 0.000083$ -0.000083 -0.000163 -1.000083 -0.000163 -1.000083 in the tensile reinforcement tion angle of diagonal compressive stress onent of effective pretressed force in the direction applied shear V_p N $7.94E+04$ $2.46E+05$ applied shear V_p N $7.94E+04$ $2.46E+05$ $8.86E+05$ applied shear V_p N $7.94E+04$ $2.46E+05$ applied shear V_p N $7.94E+04$ $2.46E+05$ all Resistance of Concrete V_p N $7.94E+04$ $2.46E+05$ all Resistance of Reinforcement V_p N $7.94E+04$ $2.46E+05$ all Resistance V_p N $1.05E+06$ 0.9 all Resistance V_p N N 0.9 0.9 all Resistance V_p V_p N 0.9 0.9 all Resistance		s	7UIU	000	201					
indicating ability of diagonally cracked concrete α aegree γ_0 γ_0 γ_0 indicating ability of diagonally cracked concrete β 5.5 6.3 in the tension f shear reinf. within a distances Av $mm2$ 308 616 in the tensile reinforcement e_x Av $mm2$ 308 616 in the tensile reinforcement e_x θ $degree$ 27.00 27.00 in the tensile reinforcement e_x θ $degree$ 27.00 27.00 onent of effective pretressed force in the direction V_p N $7.94E+04$ $2.46E+05$ applied shear V_c N $7.09E+06$ $4.19E+06$ all Resistance of Reinforcement V_c N $1.05E+06$ 0.9 all Resistance V_r N $1.05E+06$ 0.9 and Resistance V_r N $1.05E+06$ $2.91E+06$ and Resistance V_r N $1.05E+06$ 0.9 and Resistance V_r N $1.05E+06$ 0.9 and Resistance V_r N 0.9 0.9 and Resistance V_r N $1.71E+06$ $2.91E+06$ and Resistance V_r N N 0.9 0.9 and Resistance V_r N 0.9 0.9 and Resistance V_r N N 0.9 0.9 and Resistance V_r N N 0.9 0.9 and Resistance V_r </td <td>of transverse reinforcement to</td> <td></td> <td>-</td> <td>G</td> <td>G</td> <td>6</td> <td>6</td> <td>6</td> <td>6</td> <td></td>	of transverse reinforcement to		-	G	G	6	6	6	6	
indicating ability of diagonally cracked concrete β 5.5 6.3 6.3 smit tension if shear reinf. within a distances Av $mm2$ 308 616 in the tensile reinforcement εx 0.000083 -0.000163 -0.00164 -0.00164 -0.00164 -0.00164 -0.00164 -0.00164 -0.00164 -0.00164 -0.00164 -0.00164 -0.00164 -0.00164 -0.00164 -0.00164 -0.00164	girder	ಶ	degree	R	04	2				
smittension β 3.3 616 f shear reinf. within a distances Av $mm2$ 308 616 in the tensile reinforcement ex 0.000083 -0.000163 -1000083 tion angle of diagonal compressive stress θ degree 27.00 27.00 onent of effective pretressed force in the direction Vp N $7.94E+04$ $2.46E+05$ applied shear Vc N $7.69E+06$ $8.86E+05$ al Resistance of Concrete Vc N $1.05E+06$ $4.19E+06$ al Resistance Vn N $1.89E+06$ $2.91E+06$ and Resistance Vr N $1.39E+06$ $2.91E+06$ and Resistance Vr N $1.39E+06$ $2.91E+06$ and Resistance Vr Nn $1.71E+06$ $2.91E+06$ and Resistance Vr Nn $7.32E+09$ $5.80E+09$	ility of diagonally cracked concrete			ե Մ	2 7	Υ	89	6.8	6.8	
f shear reinf. within a distancesAvmm2 500 010 in the tensile reinforcementex -0.000083 -0.000163 -0.000163 -0.000163 tion angle of diagonal compressive stress θ degree 27.00 27.00 27.00 onent of effective pretressed force in the direction V_p N $7.94E+04$ $2.46E+05$ applied shear V_p N $7.09E+06$ $8.86E+05$ all Resistance of Concrete V_c N $1.05E+06$ $4.19E+06$ all Resistance V_n N $1.05E+06$ 0.9 and Resistance V_n N $1.05E+06$ $2.91E+06$ and Resistance V_n N $1.71E+06$ $2.91E+06$ and Resistance V_n N $1.71E+06$ $2.62E+06$ and Resistance V_n N_n $7.32E+09$ $5.80E+09$		8		C.C	2.0	0.0				
in the tensile reinforcementex-0.000083-0.000163-	within a distances	Av	mm2	305					0000-	
tion angle of diagonal compressive stress θ degree 27.00 27.00 onent of effective pretressed force in the direction V_P N $7.94E+04$ $2.46E+05$ applied shear V_C N $7.69E+05$ $8.86E+05$ all Resistance of Concrete V_C N $7.69E+06$ $4.19E+06$ all Resistance V_N N $1.05E+06$ $4.19E+06$ all Resistance V_N N 0.9 0.9 all Resistance V_N N $1.769E+06$ $2.91E+06$ all Resistance V_N N $1.71E+06$ $2.91E+06$ ed Resistance V_1 N $1.71E+06$ $2.62E+06$ ed Resistance V_1 N N 0.9 0.9	reinforcement	£X		-0.000083	-0.000165	C77000'0-	107000	-		
onent of effective pretressed force in the direction V_p N $7.94E+04$ $2.46E+05$ applied shear V_c V N $7.69E+05$ $8.86E+05$ all Resistance of Concrete V_c N $1.05E+06$ $4.19E+06$ all Resistance of Reinforcement V_n N $1.05E+06$ $2.91E+06$ all Resistance V_n N $1.05E+06$ $2.91E+06$ and Resistance V_n N 0.9 0.9 ance factor for shear V_r N $1.71E+06$ $2.62E+06$ ed Resistance W_n $N.mm$ $7.32E+09$ $5.80E+09$	diagonal compressive stress	θ	degree	27.00	00./Z	00.72	NN: 77		-	
applied shear Vp N $7.94E+104$ $2.46E+104$ rail Resistance of Concrete Vc N $7.69E+05$ $8.86E+05$ rail Resistance of Reinforcement Vs N $1.05E+06$ $4.19E+06$ rail Resistance Vn N $1.05E+06$ $4.19E+06$ rail Resistance Vn N $1.05E+06$ $2.91E+06$ rail Resistance Vn N $1.05E+06$ $2.91E+06$ ance factor for shear vr N 0.9 0.9 ed Resistance Vr N $1.71E+06$ $2.62E+06$ ance factor for shear Vn $Nnnn$ $7.32E+09$ $5.80E+09$	tive pretressed force in the direction						A DEELOS	5 06E+05	5 47E+05	
ail Resistance of ConcreteVcN $7.69E+05$ $8.86E+00$ all Resistance of ReinforcementVsN $1.05E+06$ $4.19E+06$ all ResistanceVnN $1.89E+06$ $2.91E+06$ ance factor for shear ϕ N 0.9 0.9 ed ResistanceVrN $1.71E+06$ $2.62E+06$ ance factor for shear ψ N $1.71E+06$ $2.62E+06$ ed ResistanceMuNmm $7.32E+09$ $5.80E+09$		νp	z	7.94E+04	2.465+00	0.005700				
al Resistance of ReinforcementVsN1.05E+064.19E+06al ResistanceVnN1.89E+062.91E+06ance factor for shear φ 0.90.9ed ResistanceVrN1.71E+062.62E+06ance factor for shear ψ Nn7.32E+095.80E+09	of Concrete	Vc	z	C0+369.7	CN+398.8	9.40ETU3			4	
nal Resistance Vn N1.89E+062.91E+06ance factor for shear φ 0.90.9ed Resistance Vr N1.71E+062.62E+06ed Resistance Mu Nmm7.32E+095.80E+09	of Reinforcement	Vs	Z	1.05E+06	4.19E+06	4.19E+06				
ance factor for shear φ 0.9 0.9 ance factor for shear ψ N 1.71E+06 2.62E+06 ed Resistance Nu N.mm 7.32E+09 5.80E+09		μŊ	z	1.89E+06	2.91E+06	3.02E+06	m		2	
ed Resistance Vr N 1.71E+06 2.62E+06 Mu N.mm 7.32E+09 5.80E+09	r shear	ə		0.9	0.9	0.9			1	
au Nummer die die Gebernal Frankeiten Mu N.mm 7.32E+09 5.80E+09		Vr	z	1.71E+06	2.62E+06	2.71E+06	2.78E+06	5 6.70E+06	6 7.U3E+U6	
1 Mu N.mm 7.32E+09 5.80E+09							1			
	in to External (aads	Mu	N.mm	7.32E+05		4.61E+09			1	
ds Nu N. 0.00E+00 0.00E+00	o due to External Loads	nZ	z	0.00E+0C		<u> </u>				
V. N 1 87F+05 4.19E+05			Z	1 87F+0F		5.35E+05	6.01E+05	5 8.09E+05	5 8.69E+05	

time Nominal Shear Strength of Section during Construction Stage.

(2) Nominal Flevitral Strength of Girder at Service Stage (AASHTO LRFD 5.7.3.2.2) -1/2	ge (AAS)	HTO LR	FD 5.7.3.2	2) -1/2				-	
		Unit	Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section 7
Sectional Properties									
Douth of Cirder	H	mm	2,060	2,060	2,060	2,060	2,060	7,060	2,060
	pq	шш	2,035	2,035	2,035	2,035	2,035	2,035	2,035
	hd	um	210	210	210	210	210	210	210
	Mq	unu	. 650	580	200	200	200	200	200
I otal width of vveus	- <u>s</u>	mm	650	650	650	650	650	650	650
Width of Sofiit Slab	2 4		250	250	250	250	250	250	250
Depth of Soffit Slab	SIL	ITTT							
Total Area of Prestressing Cables	Ap	mm2	5,922.6	5,922.6	5,922.6	5,922.6	5,922.6	5,922.6	5,922.6
Distance from extreme compressive fibre to centroid of	ар	шш	1,181.0	1,260.0	1,580.0	1,647.0	1,762.0	1,887.0	1,898.0
Prestressing Captes	Ast	mm2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Distance from extreme compressive fibre to centroid of	·							(
Tensile Reinforcement	dst	mm	0.0	0.0		0.0	0.0	0.0	0.0
Area of Compressive Reinforcement	Asc	mm2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Distance from extreme compressive fibre to centroid of				ĊĊ		00	00	00	00
Compressive Reinforcement	dsc	шш	0.0	0.0		^ '^			
Calculation of Mr			14.0	L C	74.0	74.0	0 76	0.76	0.76
Stress block factor	β1		0.76	0.70	0/.0	0/.0	0/'0	0.70	07.0
Distance from extreme compressive fibre to the Neutral			1 1			1 660	1 506	1 621	רא 1 1 א
Axis	Ų	mm	C9C	679					- 20 F
Depth of equivalent stress block	IJ	uuu	432	481	1,178	1,191	1,212	1,232	1,234
Average stress in Prestress stell at nominal bending			ד ד ע ד			1 3 <i>L</i>		1 415	7121
resistance	fps	Mpa	1/9/I	T,bUU	1	1			L L
Nominal Resistance	Mn	N.mm	1.00E+10	1.07E+10	1.28E	1.34E	1.455+10	. 3 2 C . 1	01+346.1
Flexural Resistance factor	9- 1		1.0	1.0	1.0	1.0	1.0		I.U
Factored Resistance	Mr	N.mm	1.00E+10	1.07E+10	1.28E+10	1.34E+10	1.45E+10	1.58E+10	1.59±+10
Checking							· · · · · ·		
Factored Bending Moment due to External Loads	Mu	N.mm	1.25E+08	1.04E+09	4.95E+09	5.77±+09	7.14E+09	8.834+04	8.4312+09
		•		•					

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Unit Section 8 Section 9 Section 10 Section 11 Section 12 Section 12 Section 13 Section 14 Section 14 <th></th> <th>(3) Nominal Flexural Strength of Girder at Service Sta</th> <th>ge (AASI</th> <th>HTO LR</th> <th>ge (AASHTO LRFD 5.7.3.2.2) -2/2</th> <th></th> <th></th> <th>· · ·</th> <th></th> <th></th> <th></th>		(3) Nominal Flexural Strength of Girder at Service Sta	ge (AASI	HTO LR	ge (AASHTO LRFD 5.7.3.2.2) -2/2			· · ·			
Sectional Properties H mm 2060	-1			Unit	Section 8	9	Section 10	Section 11	Section 12	Section 13	Section 14
Width of Sofiit Slab H mm 2060 2060 2060 2060 2060 2060 2060 2060 2035		inctional Properties			-						0100
Verter Number 2005	- 1		H	mm	2,060	2,060	2,060	2,060	2,060		7,000
	, I 		P4	mm	2,035	2,035	2,035	2,035	2,035		2,035
Depth of Deck Slab Dw mm 200 200 500 580 650 Total vidih of Kels bw mm 200 200 200 580 650 Width of Kels bw mm 250 <		Width of Deck Slap	7 2 2	-	010	210	210	210	210		210
Total width of Webs pw mm $\frac{50}{50}$ \frac	i	Depth of Deck Slab	ри Г	111111	000			200	580		650
Width of Soffit Slab bs mm 550 550 250		Total width of Webs	MQ		007	200	2007		222		650
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		Width of Soffit Slab	şq	шш	650	650	069	000	000		
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	•	Denth of Soffit Slab	hs	шш	250	250	250	250	250		007
Total Area of Prestressing Cables Ap mm2 5,922.6 5,922	•								ļ		
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		Total Area of Prestressing Cables	Ap	mm2	5,922.6	5,922.6	5,922.6	5,922.6			0.0
Prestressing Cables dp mm 1.8870 $1.762.0$ $1.647.0$ $1.00.0$ 00.0		Distance from extreme compressive fibre to centroid of							•		2 060 0
Area of Tensile Reinforcement Ast mm2 0.0 0		Prestressing Cables	dp	шш	1,887.0						0.00/1
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$. 1	Arra of Toneilo Reinforcement	Ast	mm2	0.0	0.0	0.0	0.0			V.6U0//
Tensile Reinforcement Tensile Reinforcement Option Extense compressive fibre to centroid of Asc mm 0.0]	ALEA OF LEIDING ANGLAUTICATION FILME TO CONTROL OF									
Tensile kendorcement Tensile kendorcement Asc nun2 0.0	[]-2	Distance from extreme compressive more to certain of	det	uuu	0.0			0.0			1,955.0
Area of Compressive ReinforcementAscmm20.0 <td>2-3</td> <td>Tensile Reinforcement</td> <td>nen</td> <td>177777</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>00</td>	2-3	Tensile Reinforcement	nen	177777							00
ce from extreme compressive fibre to centroid of essive Reinforcement dsc mm 0.0 0.0 0.0 2,060.	34	Area of Compressive Reinforcement	Asc	mm2	0.0	0.0	0.0	0.0			
ressive Reinforcementdscmm0.00.00.00.00.0 $2,0000$ $2,0000$ n of Mrn of Mrn of Mrn of Mr0.760.760.760.760.760.76block factorpn1,5111,5811,5311,541582540ce from extreme compressive fibre to the Neutralcmm1,6121,5861,5581,541582540of equivalent stress blockamm1,2321,2121,1911,178445413ge stress in Prestress stell at nominal bendingfpsMpa1,4151,3911,3671,3521,4811,540ncencenm1,6121,3911,3671,3521,4811,540al Resistancemn1,6101,01,01,01,01,01,0al Resistance factor ψ N.mm1.58E+101.34E+101.28E+101,01,01,0al Resistance1,01,01,01,01,01,01,01,0al ResistanceMrN.mm1.58E+101.34E+101.28E+101,01,01,0al ResistanceMrN.mm1.58E+101.45E+101.28E+101,01,01,0al ResistanceMrN.mm1.58E+101.45E+101.28E+101,01,01,0al ResistanceMrN.mm1.58E+101.45E+101.28E+101,01,01,0al Res		Distance from extreme compressive fibre to centroid of	-								0 040 0
n of Mr n of Mr 0.76 0.7		Compressive Reinforcement	dsc	mm	0.0			0.0			
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		Calculation of Mr					ì				94.0
ce from extreme compressive fibre to the Neutralcmm $1,612$ $1,586$ $1,558$ $1,541$ 582 540 of equivalent stress blockamm $1,232$ $1,212$ $1,191$ $1,178$ 445 413 ge stress in Prestress stell at nominal bendingfpsMpa $1,415$ $1,391$ $1,367$ $1,352$ $1,481$ $1,540$ ncefpsMinN.mm $1.58E+10$ $1.45E+10$ $1.34E+10$ 1.352 $1,481$ $1,540$ al Resistanceal Resistancemin $1.616+10$ $1.34E+10$ $1.34E+10$ 1.0 1.0 al Resistancemin $1.58E+10$ $1.45E+10$ $1.34E+10$ $1.28E+10$ $6.14E+09$ al Resistancemin $1.58E+10$ $1.45E+10$ $1.24E+10$ 1.0 1.0 ed Resistancemin $N.mm$ $1.58E+10$ $1.45E+10$ $1.28E+10$ $6.14E+09$ ed ResistanceMin $N.mm$ $1.58E+10$ $1.24E+10$ $1.26E+10$ $6.14E+09$ ed ResistanceMin $N.mm$ $8.22E+09$ $6.02E+09$ $4.54E+09$ $2.0E+09$ $2.30E+09$		Stress block factor	β1		0.76	0.76	0.76	0.70			0/.0
cmun1,6121,5361,5381,541 0.02	•	Distance from extreme compressive fibre to the Neutral									176
of equivalent stress blockamm1,2321,2121,1911,1/8443443ge stress in Prestress stell at nominal bendingfpsMpa1,4151,3911,3671,3521,4811,540nceMnN.mm1.58E+101.4151,3911,3671,3521,4811,540nceMnN.mm1.58E+101.4151,34E+101.28E+105.11E+096.14E+09al Resistancem1.01.01.01.01.01.0al Resistancem1.58E+101.45E+101.24E+101.01.0al Resistancem1.01.01.01.01.0al Resistancem1.58E+101.45E+101.24E+105.11E+096.14E+09ed ResistanceMuN.mm8.22E+096.02E+093.67E+092.50E+092.30E+09		Axis	υ	um	1,612						
ge stress in Prestress stell at nominal bending fpsfpsMpa $1,415$ $1,367$ $1,352$ $1,481$ $1,540$ ncemcmn 1.58 ± 10 1.34 ± 10 1.352 $1,481$ $1,540$ ncemn $N.mm$ 1.58 ± 10 1.45 ± 10 1.28 ± 10 5.11 ± 0 6.14 ± 00 nal Resistance ϕ 1.0 1.0 1.0 1.0 1.0 1.0 al Resistance mn 1.58 ± 10 1.45 ± 10 1.28 ± 10 5.11 ± 0 6.14 ± 00 ed Resistance mn 1.58 ± 10 1.45 ± 10 1.28 ± 10 $5.11E+09$ $6.14E+09$ ed Resistance mn 1.58 ± 10 1.45 ± 10 1.28 ± 10 $5.11E+09$ $6.14E+09$ ed Resistance mn 1.58 ± 10 1.45 ± 10 1.28 ± 10 $5.11E+09$ $2.10E+09$ ed Resistance mn $N.mm$ 8.22 ± 0 $4.54E+09$ $3.67E+09$ $1.50E+09$ $2.30E+09$	• •	Depth of equivalent stress block	ъ	uuu	1,232						ROT
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	-	Average stress in Prestress stell at nominal bending			1						1.816
nal Resistance Mn N.mm $1.58E+10$ $1.34E+10$ $1.28E+10$ $2.11E+09$ $0.14E+09$ al Resistance φ 1.0 <		resistance	fps	Mpa	cIF/I			10		r v	U U U
al Resistance factor p 1.0 1.0 1.0 1.0 1.0 ed Resistance Mr N.mm 1.58E+10 1.45E+10 1.28E+10 5.11E+09 6.14E+09 ed Resistance Mu N.mm 8.22E+09 6.02E+09 4.54E+09 3.67E+09 2.30E+09		Nominal Resistance	Mn	N.mm	1.58E+10			<u>⊣ </u>	<u> </u>	- 1	a 0
ed Resistance Mr. N.mm 1.58E+10 1.45E+10 1.34E+10 1.28E+10 5.11E+09 0.14E+09 0.14E+0		Flexural Resistance factor	φ		1.0					<u></u>	00-400-1
ed Rending Moment due to External Loads Mu N.mm 8.22E+09 6.02E+09 4.54E+09 3.67E+09 2.30E+09		Factored Resistance	Mr	N.mm	1.58E+10	_	_		_		4.205-07
ad Rending Moment due to External Loads Mu N.mm 8.22E+09 6.02E+09 4.54E+09 3.67E+09 1.50E+09 2.50E+09	-	Checking									
		Factored Bending Moment due to External Loads	Mu	N.mm	8.22E+09	6.02E+09	4.54E+09	3.67E+09			

(4) Checking Nominal Shear Strength of Section at Se	Service Stage - 1/2	ge - 1/2 Unit	Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section 7
Sectional Properties				0,000	070 0	070 C	2 060	090 0	2 060
Depth of Girder	H	mm	2,060	2,060	7,000	2,000	2,000		2000 C
Width of Deck Slap	pq	um	2,035	2,035	2,035	2,005	C\$U,2		010
Denth of Deck Slap	Ъđ	шш	210	210	210	210	017	017	017
Total width of Webs	hw	шш	650	580	200	200	200		500
10tal Widdl of 1100	bs	mm	650	650	650	650	650		650
Pouth of Soffit Slan	hs	mm	250	250	250	250	250	250	250
Deput of court one									
Total Area of Prestressing Cables	Ap	mm2	5,923	5,923	5,923	5,923	5,923	5,923	5,923
Distance from extreme compressive fibre to centroid of					1 100	1 617	692 1	1 887	1 808
Prestressing Cables	dp	шш	1,181	1,26U		1,04/	70 / T		
Area of Tensile Reinforcement	Ast	mm2	0	0			0		
Distance from extreme compressive fibre to centroid of	t T		C	C	0	0	0		0
Tensile Reinforcement	4 cr			0	0	0	0	0	0
	164								
Distance from extreme compressive fibre to centroid of	dsc	шш	0	0	0	0	0	0	0
Compressive Activity Compressive									
Calculation of Mr			1 483	1 483	1 483	1.483	1,483	1,483	1,483
Effective shear Depth	n	111111	7,100		200	200	200	200	200
Effective web width	λά	unu	000			000			300
Spacing of stirrups	S	mm2	150	120	ncı	nne	200		222
Angle of inclination of transverse reinforcement to			Ş	ç	2	U	8	5	6
longitudinal axis of girder	ಶ	degree	ß	Ŗ	20	R	2		
Factor indicating ability of diagonally cracked concrete	8		6.8	6.7	4.7	6.0	5.7	5.1	5.1
to transmit tension	A1/	Cmm	616	616	616	308	308	308	308
Area of shear reint, within a distances	2 2		-000000	-0.000196	-0.000178	-0.000155	-0.000107	-0.000033	-0.000029
Strain in the tensile reinforcement	5 9	Jaman	27.00	27.00	22.17	24.07	27.00	27.00	27.00
	2	Action							
Component of effective preficesed force in the unrection	νn	Z	-5.42E+05	-5.06E+05	-4.25E+05	-3.53E+05		•	0.00E+00
of the applied shear	ν. - Γ	z	3 43E+06	3.04E+06	7.31E+05	9.30E+05	8.88E+05	7.98E+05	7.94E+05
Nominal Kesistance of Concrete	Ve	z	4 66F+06	4.66E+06	5.83E+06	1.33E+06	1.17E+06	1.17E+06	1.17E+06
Nominal Kesistance of Keinforcement	51	14	7555-06	7101+06	2 54F+06	1 91 E+06	1.81E+06	1.88E+06	1.96E+06
Nominal Resistance	ц,	2	0.00	00	00	00	60		
Resistance factor for shear	¢		0.3	2'n	2.00 C	10.10	1 100100	-	9UT372 L
Factored Resistance	Vr	z	6.79E+06	6.47±+06	2.295+00	1./2E+00	1.035700		00.10.11
Checking				1				_	O OEL TOO
Factored Moment due to External Loads	Mu	N.mm	1.25E+08			5.77E+U9		8.80E+U9	0.001109
Factored Axial Force due to External Loads	Nu	z	6.37E+05			0.001:400			
Factored Shear Force due to External Loads	νu	z	1.17E+06	1.09E+06	8.02E+05	7.0/E+05	c0+362.c	c0+3cc.2	
			·						

	/ 	Unit	Section 8	Section 9	Section 10	Section 11	Section 12	Section 13
Certional Properties								
Douth of Girder	H	E E E	2,060	2;060	2,060		2,060	2,060
Width of Deck Slan	pq	шш	2,035	2,035	2,035	2	650	650
Thush of Dork Clan	Pq	mm	210	210	210	210	210	2,035
Lepul VI Dech Jidy Tatal width of Wohe	hw	mm	200	200	200	200	580	650
10tal widul 01 Webs Width of Soffit Slan	şq	шш	650	650	. 650	650	650	650
Depth of Soffit Slap	hs	mm	250	250	250	250	250	250
Total Area of Prestressing Cables	Ap	mm2	5,923	5,923	5,923	5,923	5,923	5,923
Distance from extreme compressive fibre to centroid of	1		1 887	1 762	1 647	1.580	800	879
Prestressing Cables	d d		0 /00/T				C	
Area of Tensile Reinforcement	Ast	7mm		.				
Distance from extreme compressive fibre to centroid of Tensile Reinforcement	dst		0	0	0	0	2,060	2,060
A rea of Comressive Reinforcement	Asc	mm2	0	0	0	0	0	0
Distance from extreme compressive fibre to centroid of								
Commessive Reinforcement	dsc	шш	0	0	0	0	2,060	2,060
Calculation of Mr								
Effective shear Denth	dv	um	1,483	1,483	1,483	Ľ,	1,	1
Effective web width	hv	шш	200	200		200	580	
Smarino of stirruns	s	mm2	300	150	150	150	150	150
Angle of inclination of transverse reinforcement to					,	Ş	ç	2
longitudinal axis of girder	ø	degree	6	90	96	₽	3	3
Factor indicating ability of diagonally cracked concrete	c		Ж	2	x Y	84	60	5.7
to transmit tension	۹.		1.0	20.0	2		516	
Area of shear reinf. within a distances	Av	Zuuu	308	010	- 1		010	0000
Strain in the tensile reinforcement	X3		-0.000063	-0.000163	-0.000233	997/0///-	-0.00100	
Inclination angle of diagonal compressive stress	θ	degree	27.00	27.00	27.00	00.72	M. /2	M. /2
Component of effective pretressed force in the direction								2072702
of the applied shear	٩V	z	7.94E+04	Z.46E+U3	1		0.001-000.0	
Nominal Resistance of Concrete	Vc	z	8.33E+05	9.85E+U5			2./1E+U0	
Nominal Resistance of Reinforcement	۲s	z	1.17E+06	4.66E+06	1		<u> </u>	
Nominal Resistance	νn	z	2.08E+06	3.21E+06	ς Μ	ത്	~	<u>~</u>
Resistance factor for shear	Ð		0.9	0.9		1		<u> </u>
Factored Resistance	٧r	Z	1.87E+06	2.89E+06	2.99E+06	3.05E+06	7.08E+06	7.28E+U6
hecking								1
Factored Moment due to External Loads	Мu	N.mm	8.22E+09					
Factored Axial Force due to External Loads	nN	z	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
							1	1

Checking Stress during construction Load Combinations for Checking Stress during

114 Factor	1.00	1.00			 	1.00	M(T.m)		0.00 to 17	-38.74	-38.79	-39.88	-22.73	1.87	-22.73	-39.88	-38.79	-38.74	-40.47	0.00
در المحمد ال المحمد المحمد	eight G_DC	fweight 5_D		÷			V(T)		3.7U	-2.44	0.41	3.37	4.54	0.00	1 51	-3.37	11.0-	2.44	-3.35	-3.70
CON	Girder Selfweight G	Slab+Dia. Selfweight S				Prostress PS	N(T)		77.550 623.00	644.24	653.03	661.26	661.23	656.44	661.23	661.26	653.03	641.24	633.99	633.99
							Section	(SEC-3	SEC-4	SEC-5	SEC-6	SEC-7	SEC-8	SEC-9	SEC-10	SEC-11	SEC-12	SEC-13

Stress checking during construction stage (AASHTO 5.9.4.2)

Section		COMBINATION 14	TION 14	
-	$\sigma_t(T/m^2)$	Checking	σ _h (T/m²)	Checking
SEC-1	512.28	OK	512.28	оK
SEC-2	448.35	oK	91-1-99	оK
SEC-3	816.99	OK NO	1062.95	Хo
SEC-4	829.94	OK	1075.49	ЮК
SEC-5	839.05	OK	1090.00	ОК
SEC-6	893.84	оĶ	1035.68	ОK
SEC-7	973.71	УÓ	943.32	0K
SEC-8	893.84	ОĶ	1035.68	бĶ
SEC-9	839.05	ЮК	1090.00	Х Х
SEC-10	829.94	Хŏ	1075.49	ОK
SEC-11	816.99	о Хо	1062.95	оқ
SEC-12	448.35	ð	91-1-99	ОĶ
SEC-13	512.28	ð	512.28	0K

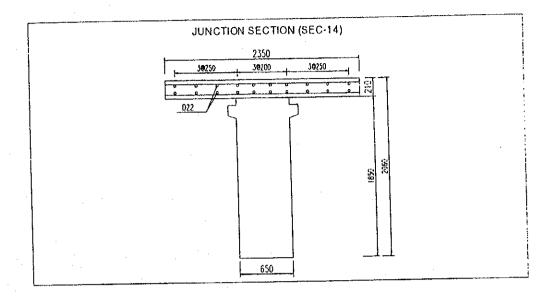
Checking Stress at service stage Load Combinations for Checking Stress at service stage

		COMBINATION 11	111	CON	COMBINATION 12	112	COM	COMBINATION 13	113
	Load type	type	Factor	Load type	type	Factor	Load type	type	Factor
-	Girder Selfweight G_DC	ight C_DC	1.00	Girder Selfweight G_DC	ight C_DC	1.00	Girder Selfweight G_DC	ight G_DC	1.00
	Slab+Dia. Selfweight S_D	weight S_D	1.00	Slah+Dia. Selfweight S_D	weight S_D	1.00	Slab+Dia. Selfweight S_D	weight S_D	1.00
	Surface + Railings DW	ings DW	1.00	Surface + Railings DW	ings DW	1.00	Surface + Railings DW	ings DW	1.00
÷.,	Max. Live Load LL MAX	d LL MAX	0.80	Max. Live Load LL_MAX	Id LL_MAX	0.00	Max. Live Load LL_MAX	Id LL_MAX	0.00
•	Min. Live Load LL_MIN		0.00	Min. Live Load LL_MIN	d LL_MIN	0.80	Min. Live Load LL_MIN	d LL_MIN	0.00
	Max. Impact IM_MAX	M_MAX	0.80	Max. Impact IM_MAX	M_MAX	0.00	Max. Impact IM_MAX	M_MAX	0.00
	Min. Impact IM_MIN	MIN	0.00	Min. Impact IM_MIN	MIN	0.80	Min. Impact IM_MIN	MIM_M	0.00
	Creep Diff. CR_D	R D	1.00	Creep Diff. CR_D	20.	1.00	Creep Diff. CR_D	27	1.00
	Shrinkage Diff. SH_D	r sh_D	1.00	Shrinkage Diff. SH_D	f. SH_D	1.00	Shrinkage Diff. SH_D	f. SH_D	1.00
	Temperature Diff. TG	Diff. TG	0.50	Temperature Diff. TG	Diff. TG	0.50	Temperature Diff. TG	Diff. TG	1.00
	Creen CR		1.00	Creep CR		1.00	Creep CR		1.00
	Prestress PS		1.00	Prestress PS		1.00	Prestress PS		1.00
Saction	LUN		M(T.m)	(T)N	V(T)	M(T.m)	N(T)	V(T)	M(T.m)
SEC-1	766.13	28.67	16.87	766.13	17.37	11.11	770.93	18.22	11.45
SEC-2	19.167	26.57	1-2-6-	131.64	15.68	-17.72	739.30	16.53	-16.59
SEC-3	597.59	11.91	52.29	597.59	2.18	8.54	FF 109	3.79	12.66
SEC-4	580.08	13.93	63.55	580.08	2.77	11.44	583.93	5.29	16.57
SEC-5	542.35	11.97	78.42	542.35	0.83	10.13	546.21	1.36	f2'21
SEC-6	188.87	9.35	119.82	188.87	0.66	38.79	192.74	4.81	t9.73
SEC-7	475.48	-2.29	135.06	475.48	-11.37	51.84	HE-674	-5.67	65.64
SEC-8	188.87	-6.41	90.83	188.87	-16.83	19.04	192.71	-8.73	34.71
SEC-9	542.35	-14.05	17.62	542.35	-24.91	-35.54	546.21	-15.23	-16.12
SEC-10	580.08	-7.90	-7.32	580.08	-22.18	-53,91	583.93	-10.12	-29.29
SEC-11	597.59	-6.70	-20.29	597.59	-21.11	-68.01	601.44	-8.69	-38.80
SEC-12	734.64	-21.00	96°t2-	19'167	-35.65	-160.84	739.30	-21.95	-92.62
SEC-13	766.13	-22.18	-18.81	766.13	+0°26-	-145.37	270.93	-22.63	-67.46
	_								

(AASHTO 5.9.4.2)
Stress checking at service stage

		COMBIN	COMBINATION 8			COMBIN	COMBINATION 9			COMBIN,	</th <th></th>	
Section	$\sigma_1(T/m^2)$	Checking	$\sigma_{\rm b}(T/m^2)$	Checking	σ _ι (T/m ²)	Checking	$\sigma_{\rm h}(T/m^2)$	Checking	σ _ι (T/m²)	Checking	$\sigma_{b}(T/m^{2})$	Checking
SEC-1	175.37		431.87	0 K	470.17		11.51	ХÖ	476.07	-	438.80	У0 ХО
SEC-2	129.04	-	184.25	0K	451.65		81-861	QK	455.63	-	74.9017	У ХО
SEC.3	580.51		429.90	Ŋ	544.29		519.70	OK	551.16	-	514.70	0K
SEC-4	574.05	, XO	391.35	Ŏ	530.93	ОĶ	498.05	OK	538.64	QK	491.00	0 X
SEC-5	552.27	-	327.75	о К	495.91		466.92	OK	505.67	_	454.86	OK
SEC-6	538.01		196.74	9 K	471.38		360.89	OK	483.85		342.22	0K
SEC-7	1085.36	-	700.89	УO	679.98	-	532.40	У К	750.66	-	563.81	0 X
SFC.8	51.17	-	255.49	ÖK	455.13		400.92	OK	471.50	_	372.65	о ЖО
CHC P	502.10	-	451.65	Š	458.23		559.97	ОĶ	477.72	_	523.88	0K
SEC-10	515 11	-	536.46	УÓ	476.86	-	631.84	ОК	500.69	-	584.90	0K
SEC.11	520.41	-	578.86	ОK	480.88		676.79	QK	508.54	Ξ.	620.31	ОK
SEC-12	399.92	-	598.04	УÓ	322.31	o¥0	14.747	OK	386.93	ð	631.71	о Х
SEC-13	416.04	-	541.92	УÓ	328.81	ХÓ	703.73	Х Х	402.07	•	576.06	0K

Stress Check at Junction of the Girders



Moment due to Service Loa	ad M=	145.4 tf.m	
Tensile Reinforcement As=	=2xD22(No	os=2x10=20)	1005 E 1 /7
Stress of Concrete	fcj=	$159.4 \text{ t/m}^2 <$	1835.5 t/m2
Stress of Tensile Reinf.	fs=	-816.5 t/m2 >	-17896.1 t/m2

Horizontal Shear per unit length of girder V _h due to Vertical Shear Distance from the centroid of tensile steel to the midthickness of th	length of gi d of tensile s	rder V _h due tecl to the n	to Vertical nidthicknes	Shear V. s of the deck	· -,	$V_{h} = V_{u}/d_{e}$ d_{e}							
Kequired area of reinforcement: $A_{a'} >= \max \{0.35 b_v / t_y; (V_h - c b_v - \mu P_c) / \mu t_y\}$ Width of the interface between the girder and the deck: Yield strength of reinforcement	emenu. 35 bv / fy; (V _h - ween the gu ement	- с b _v - µ P _c) / rder and the	μty) edeck:			ه الم مرکب الم	600 mm 390 MPa 0.17 MPa	nm ViPa ViPa					
Cohesion factor Friction factor Permanent net compressive force normal to the shear plan	ve force norr	nal to the sl	iear plan		- 	1 11 11 2	0.7 58750 N	7					
Section	SEC-1	SEC-2	SEC-3	SEC-4	SEC-5	SEC-6	SEC-7	SEC-8	SEC-9	SEC-10	SEC-11	SEC-12	SEC-13
գ. (տու)	1076	1155	1475	1542	1657	1782	1793	1782	1657	1542	1475	1155	1076
Interface Shcar(N):	1017	310012	030010	T29016	145110	73982	0	-73982	-165110	-210674	-239289	-320848	-3-49173
Girder Selfweight G_UC			153657	139138		48396	0	-18396	-108891-	-139138	-153657	-207799	-218990
State + Dia. Seriver Build - D			53097	39796		-5341	-64779	-51323	-125929	-104385	-122656	-187797	-201881
Max. Live Load LL_MAX		92551	74826	79660	70061	41824	31107	21337	10855	20465	18301	13409	133//
Min. Live Load LL_MIN		-7885	-14884	-23194		-38268	-52533	-74715	-89260	111124	60241 I-	12125	710C71-
Max. Impact IM_MAX	31792	30542	24692	26288		128021	50701	1HU/	2000	-36671	-37788	10154	F620F-
Min. Impact IM_MIN	-2582	-2602	-1912 55108.1	1-C01-01	10/01-	-1784325	-1868829	-1784325	-1259938	-809192	-551084	873859	1179148
	66677	67595	55911	22672	56043	56195	56210	56195	56043	21655	55911	67595	69672
	9,0058	91253	75480	75529		75863	75884	75863	75659	75529	75480	91 253	94058
	7009		8030	8034	8036	8035	9181	10279	9654	9162	13526	914-	-3326
Total	2181500	1813719	133897	-174125	-751287	-1471570	-1750961	-1787311	-1504075	-1095532	-897429	329681	587298
	2042961	1680139	14584	-310920	-887840	-1578093	-1862203	-1915060	-1637228	-1270545	-10/4066	150015	94050F
Avf required (111112)	01-87	649	339	988	3101	5630	6670	6864	5846	1503	3783	1001	7000
A of Climical (mm ²)	3695	3695	3695	924	924	924	924	924	924	924			3695
	(051-9-11(1)	ria)	(D14@120)	(006% HICI)	(0053FICI)	(I)(11 a/3()()	(0059 FICI)	(00£9HCI)	(00E@FICI)	(00£@±1Cl)	(Ditatio)	(D]4#150) (1	(D14=150)
Area of Dowel bars (mm^2)	6371	6371		6371	6371	6371	6371	6.5/1	6.5/1	1700			174.0
5	(1)24a:150) 10066	(1)24 6(150) 10066	(051a150) 10066	(1)24 6 150) 7295	(1)24@150) 7295	(1)24@15(1) 7295	(1)24 6 150)	(1)24 6(150) 7295	(1)248(150) 7295	(1)24/a/15(1)	(024#150) 10066	10066	(n<1'a+7(1)
			ì	:0	Č	ý	Ż	Š.	ž	ÖK	ý	У ХО	0K
Checking	ok	OK	ň	ž	40	40		20					

Design of connetor at the interface between girder and deck slab (AASHTO 5.8.4):

Design of Deck Slab

Sumary of Bending Moment:

Bending Moment due to Live Load:

 (a) Continuous Slab 1) Effective Span Length 2) Load 3) Impact Factor IM 4) Positive Moment 5) Negative Moment 	1.700 m 10.000 T 33% M=0.8*(1+1M) M=-(1+1M)*(0.	-		ſ.m/m ſ.m/m
(2) Cantilever Slab 1) Effective Span Length 2) Load 3) Impact Factor IM 4) Negative Moment	0.100 m 10.000 T 33%	< 0.5m> ig M=		T.m/m
<i>Bending Moment due to Self</i> Section Bending Moment (T.m)	<i>weight of Slat</i> A -0.152	в 0.152	C -0.150	
Bending Moment due to Asp Section Bending Moment (T.m)	A	B 0.050	C -0.030	
<i>Bending Moment due to Par</i> Section Bending Moment (T.m)	apet & Railing A 0.000	s: B 0.000	C -0.424	
500		11750	· · · · · · · · · · · · · · · · · · ·	500
		10750	<u>.</u>	Ĵ.
1175	4 @	2350 = 9400 11750		1175

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(OTHSA.
cle 5.7.3.2.2 A
c Slab (Arti
gth of Decl
xural Stren
Jominal Fle
Checking N

			Section A	Section B	Section C
Sectional Properties	S				
	Depth of Slab	н	210 mm	210 mm	210 mm
	Width of Slab	ds	1000 mm	1000 mm	1000 mm
	Area of Tensile Reinforcement	A _{st}	1885 mm ²	1885 mm ²	1885 mm ²
	Distance from extreme compressive fibre to centroid of Tensile Reinforcement	d"	162 mm	162 mm	162 mm
·	Area of Compressive Reinforcement	Asc	0 mm ²	0 mm^2	$0 \mathrm{mm}^2$
	Distance from extreme compressive fibre				
	to centroid of Compressive Reinforcement d_{sc}	d _{st}	48 mm	48 mm	48 mm
Calculation of Mr	Stress block factor	ß,	0.76	0.76	0.76
	Distance from extreme compressive fibre				
	to the Neutral Axis	υ	28 mm	28 mm	28 mm
	Depth of equivalent stress block	a	22 mm	22 mm	22 mm
	Nominal Resistance	Mn	111,144,141 N.mm	111,144,141 N.mm	111,144,141 N.mm
	Flexural Resistance factor	q	0.9	0.9	0.9
	Factored Resistance	Mr	100,029,726 N.mm	100,029,726 N.unu	100,029,726 N.mm
Checking	Factored Bending Moment due to				
9	External Loads	Mu	91,089,350 N.mm	53,663,150 N.mm OK	7,617,528 N.mm OK