

Checking Stress during construction stage
 Load Combinations for Checking Stress during construction stage

COMBINATION 14			
Section	N(T)	V(T)	M(T.m)
	633.99	3.70	0.00
SEC-1	633.99	3.35	-40.47
SEC-2	644.24	-2.44	-38.74
SEC-3	653.03	0.41	-38.79
SEC-4	661.26	3.37	-39.88
SEC-5	661.23	4.54	-22.73
SEC-6	656.44	0.00	4.87
SEC-7	661.23	-4.54	-22.73
SEC-8	661.26	-3.37	-39.88
SEC-9	653.03	-0.41	-38.79
SEC-10	644.24	2.44	-38.74
SEC-11	633.99	-3.35	-40.47
SEC-12	633.99	-3.70	0.00
SEC-13			

Stress checking during construction stage (AASHTO 5.9.4.2)

Section	COMBINATION 14			
	σ_t (T/m ²)	Checking	σ_b (T/m ²)	Checking
SEC-1	512.28	OK	512.28	OK
SEC-2	448.35	OK	664.46	OK
SEC-3	816.99	OK	1062.95	OK
SEC-4	829.94	OK	1075.49	OK
SEC-5	839.05	OK	1090.00	OK
SEC-6	893.84	OK	1035.68	OK
SEC-7	973.71	OK	943.32	OK
SEC-8	893.84	OK	1035.68	OK
SEC-9	839.05	OK	1090.00	OK
SEC-10	829.94	OK	1075.49	OK
SEC-11	816.99	OK	1062.95	OK
SEC-12	448.35	OK	664.46	OK
SEC-13	512.28	OK	512.28	OK

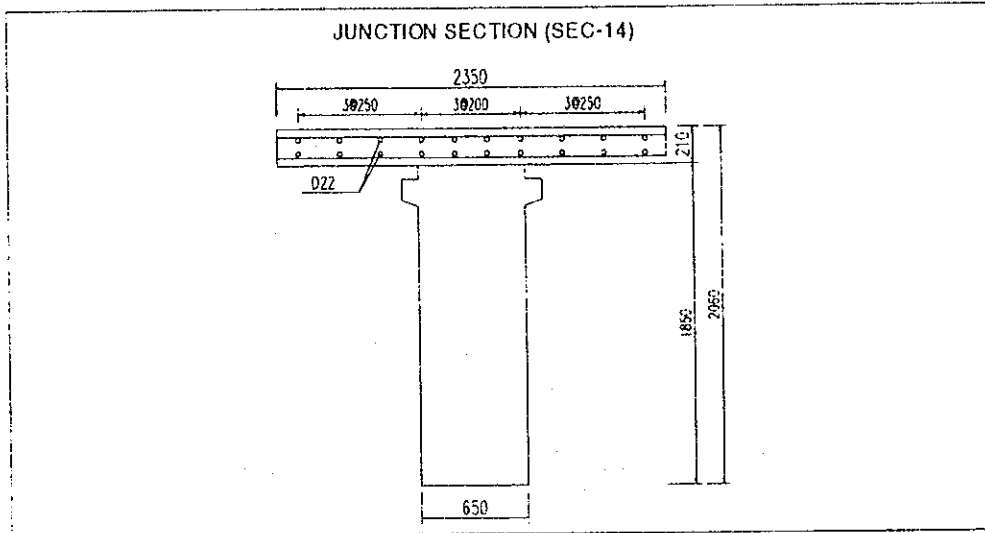
Checking Stress at service stage
Load Combinations for Checking Stress at service stage

Section	COMBINATION 11			COMBINATION 12			COMBINATION 13		
	N(T)	V(T)	M(T.m)	N(T)	V(T)	M(T.m)	N(T)	V(T)	M(T.m)
			Factor						
			Load type						
			Girder Selfweight G_DC	1.00					
			Slab+Dia. Selfweight S_D	1.00					
			Surface + Railings DW	1.00					
			Max. Live Load LL_MAX	0.80					
			Min. Live Load LL_MIN	0.00					
			Max. Impact IM_MAX	0.80					
			Min. Impact IM_MIN	0.00					
			Creep Diff. CR_D	1.00					
			Shrinkage Diff. SH_D	1.00					
			Temperature Diff. TG	0.50					
			Creep CR	1.00					
			Prestress PS	1.00					
			Girder Selfweight G_DC	1.00					
			Slab+Dia. Selfweight S_D	1.00					
			Surface + Railings DW	1.00					
			Max. Live Load LL_MAX	0.00					
			Min. Live Load LL_MIN	0.80					
			Max. Impact IM_MAX	0.00					
			Min. Impact IM_MIN	0.80					
			Creep Diff. CR_D	1.00					
			Shrinkage Diff. SH_D	1.00					
			Temperature Diff. TG	0.50					
			Creep CR	1.00					
			Prestress PS	1.00					
			Girder Selfweight G_DC	1.00					
			Slab+Dia. Selfweight S_D	1.00					
			Surface + Railings DW	1.00					
			Max. Live Load LL_MAX	0.00					
			Min. Live Load LL_MIN	0.80					
			Max. Impact IM_MAX	0.00					
			Min. Impact IM_MIN	0.80					
			Creep Diff. CR_D	1.00					
			Shrinkage Diff. SH_D	1.00					
			Temperature Diff. TG	0.50					
			Creep CR	1.00					
			Prestress PS	1.00					
SEC-1	766.13	29.12	17.06	766.13	17.37	10.92	770.93	18.19	14.45
SEC-2	734.64	26.99	-9.18	734.64	15.68	-17.72	739.30	16.50	-16.62
SEC-3	597.59	13.79	54.10	597.59	2.06	8.58	601.44	4.27	12.48
SEC-4	580.08	14.26	65.68	580.08	2.65	11.46	583.93	5.25	16.36
SEC-5	542.35	12.24	81.13	542.35	0.68	10.05	546.21	4.33	17.45
SEC-6	488.87	9.52	122.66	488.87	0.50	38.83	492.74	4.78	49.27
SEC-7	475.48	-1.67	137.51	475.48	-12.52	51.85	479.34	-5.70	65.06
SEC-8	488.87	-6.36	92.14	488.87	-17.20	19.22	492.74	-8.76	34.00
SEC-9	542.35	-14.08	16.70	542.35	-27.01	-35.26	546.21	-15.26	-16.97
SEC-10	580.08	-7.87	-9.14	580.08	-22.82	-54.25	583.93	-10.15	-30.27
SEC-11	597.59	-6.68	-22.33	597.59	-21.79	-69.51	601.44	-8.72	-39.81
SEC-12	734.64	-21.02	-77.49	734.64	-36.45	-165.15	739.30	-21.98	-93.77
SEC-13	766.13	-22.20	-52.38	766.13	-37.87	-150.42	770.93	-22.66	-68.65

Stress checking at service stage (AASHTO 5.9.4.2)

Section	COMBINATION 11			COMBINATION 12			COMBINATION 13		
	σ_t (T/m ²)	Checking	σ_b (T/m ²)	σ_t (T/m ²)	Checking	σ_b (T/m ²)	σ_t (T/m ²)	Checking	σ_b (T/m ²)
SEC-1	475.54	OK	431.55	470.00	OK	441.83	476.07	OK	438.80
SEC-2	459.37	OK	483.62	451.65	OK	498.47	455.61	OK	499.52
SEC-3	582.03	OK	426.20	544.32	OK	519.62	551.02	OK	515.06
SEC-4	575.81	OK	387.00	530.95	OK	498.01	538.47	OK	491.43
SEC-5	554.51	OK	322.23	495.85	OK	467.07	505.42	OK	455.46
SEC-6	540.34	OK	191.00	471.41	OK	360.82	483.47	OK	343.15
SEC-7	1097.30	OK	705.85	680.01	OK	532.42	747.84	OK	562.64
SEC-8	515.25	OK	252.82	455.28	OK	400.55	470.92	OK	374.08
SEC-9	501.34	OK	453.51	458.46	OK	559.40	477.02	OK	525.60
SEC-10	513.91	OK	540.18	476.58	OK	632.54	499.88	OK	586.91
SEC-11	518.72	OK	583.05	479.64	OK	679.88	507.70	OK	622.39
SEC-12	397.63	OK	602.44	318.41	OK	754.91	385.88	OK	633.72
SEC-13	412.81	OK	547.91	324.24	OK	712.19	401.00	OK	578.05

Stress Check at Junction of the Girders



Moment due to Service Load	M=	150.4 tf.m	
Tensile Reinforcement	$A_s=2 \times D22$ (Nos=2x10=20)		
Stress of Concrete	$f_{cj} =$	164.9 t/m ²	< 1835.5 t/m ²
Stress of Tensile Reinf.	$f_s =$	-844.9 t/m ²	> -17896.1 t/m ²

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

$$V_h = V_u / d_e$$

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
 Required area of reinforcement:

$$A_{st} \geq \max(0.35 b_v / f_y; (V_h - c b_v - \mu P_u) / \mu f_y)$$

Width of the interface between the girder and the deck:

Yield strength of reinforcement

Cohesion factor

Friction factor

Permanent net compressive force normal to the shear plane

$b_v =$ 600 mm
 $f_y =$ 390 MPa
 $c =$ 0.17 MPa
 $\mu =$ 0.7
 $P_c =$ 58750 N

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
d_e (mm)	1076	1155	1475	1542	1657	1782	1793	1782	1657	1542	1475	1155	1076
Interface Shear(N):													
Girder Selfweight G_DC	349173	320848	239289	210674	165110	73982	0	-73982	-165110	-210674	-239289	-320848	-349173
Slab+ Dia. Selfweight S_D	218990	207799	153657	139138	108891	-48396	0	-48396	-108891	-139138	-153657	-207799	-218990
Surface + Railings DW	135003	120919	57753	39481	1416	-5661	-65099	-51677	-126287	-104649	-122920	-188108	-202192
Max. Live Load LL_MAX	100776	96705	87730	82968	72910	43647	37162	22128	10893	21023	18786	13495	13458
Min. Live Load LL_MIN	-7533	-7603	-20346	-23972	-33703	-39447	-62840	-77815	-108277	-116852	-120537	-128713	-130935
Max. Impact IM_MAX	33256	31913	28951	27379	24060	14403	12264	7302	3595	6938	6199	4453	4411
Min. Impact IM_MIN	-2486	-2509	-6714	-7911	-11122	-13017	-20737	-25679	-35732	-38561	-39777	-42475	-43209
Creep Diff. CR_D	1179148	873859	-551084	-809192	-1259938	-1784325	-1868829	-1784325	-1259938	-809192	-551084	873859	1179148
Shrinkage Diff. SH_D	69672	67595	55911	55947	56043	56195	56210	56195	56043	55947	55911	67595	69672
Temperature Diff. TG	94058	91253	75480	75529	75659	75863	75884	75863	75659	75529	75480	91253	94058
Creep CR	7009	8037	8030	8034	8036	8035	9181	10279	9654	9162	13526	-4416	-3326
Total	2187085	1818929	155715	-170040	-747813	-1469466	-1743228	-1786613	-1504382	-1095052	-897048	329486	587095
A_{st} required (mm ²)	2043034	1680199	11975	-312269	-889608	-1579980	-1876231	-1919537	-1662879	-1278426	-1082347	140348	395053
	7860	6512	419	993	3108	5636	6722	6880	5940	4532	3814	1056	2000
Area of Stirrups (mm ²)	3695	3695	3695	924	924	924	924	924	924	924	3695	3695	3695
Area of Dowel bars (mm ²)	(D14@150)	(D14@150)	(D14@150)	(D14@300)	(D14@300)	(D14@300)	(D14@300)	(D14@300)	(D14@300)	(D14@300)	(D14@150)	(D14@150)	(D14@150)
Total Connector Area (mm ²)	6371	6371	6371	6371	6371	6371	6371	6371	6371	6371	6371	6371	6371
	(D24@150)	(D24@150)	(D24@150)	(D24@150)	(D24@150)	(D24@150)	(D24@150)	(D24@150)	(D24@150)	(D24@150)	(D24@150)	(D24@150)	(D24@150)
	10066	10066	10066	7295	7295	7295	7295	7295	7295	7295	10066	10066	10066
Checking	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK

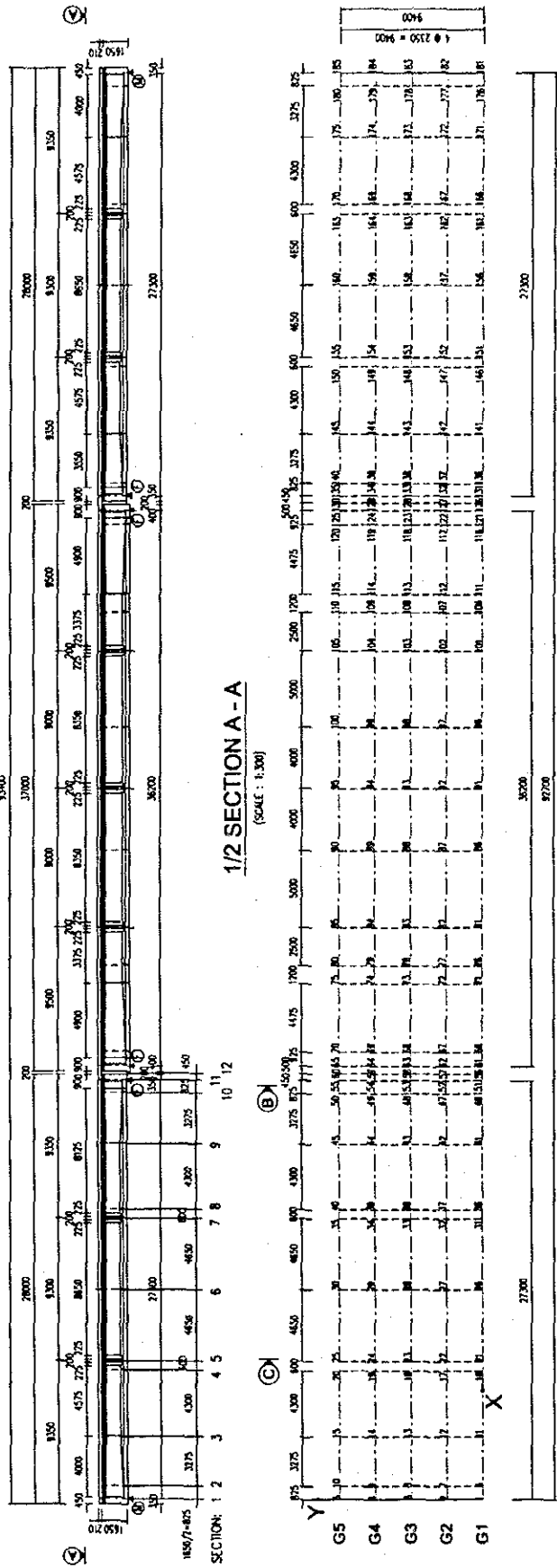
Checking Nominal Flexural Strength of Deck Slab (Article 5.7.3.2.2 AASHTO)

	Section A	Section B	Section C
Sectional Properties			
Depth of Slab	H 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_{st} 162 mm	162 mm	162 mm
Area of Compressive Reinforcement	A_{sc} 0 mm ²	0 mm ²	0 mm ²
Distance from extreme compressive fibre to centroid of Compressive Reinforcement	d_{sc} 48 mm	48 mm	48 mm
Calculation of Mr			
Stress block factor	β_1 0.76	0.76	0.76
Distance from extreme compressive fibre to the Neutral Axis	c 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	ϕ 0.9	0.9	0.9
Factored Resistance	Mr 100,029,726 N.mm	100,029,726 N.mm	100,029,726 N.mm
Checking			
Factored Bending Moment due to External Loads	Mu 91,089,350 N.mm	53,663,150 N.mm	7,617,528 N.mm
	OK	OK	OK

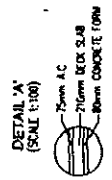
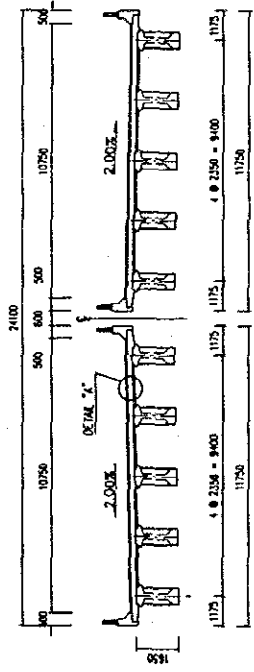
1. Structural Views, Design Sections & Cable Arrangement
 I.1 Structural View & Design Sections

(3) PC COMPOSITE I BEAM (CONNECTED),
 CASE 4

3 CONTINUOUS SPAN L = 28.0m + 37.0m + 28.0m
 ELEVATION
 (SCALE: 1:300)



1/2 SECTION B-B (SCALE 1:200)
 1/2 SECTION C-C (SCALE 1:200)



4 Summary of Sectional Forces:

Section	S.W of girder			S.W of Deck Slab+Diaphragms			S.W of Surface		
	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	24.15	0.00	0.00	16.84	0.00	0.00	10.64	-1.21
SEC-2	0.00	21.98	19.03	0.00	15.82	13.47	0.00	9.36	7.04
SEC-3	0.00	15.24	79.96	0.00	11.78	58.68	0.00	4.90	29.36
SEC-4	0.00	8.38	130.73	0.00	6.48	97.94	0.00	-1.78	35.84
SEC-5	0.00	7.42	135.47	0.00	5.74	101.60	0.00	-2.71	34.49
SEC-6	0.00	0.00	152.71	0.00	0.00	114.94	0.00	-2.76	38.43
SEC-7	0.00	-7.42	135.47	0.00	-5.74	101.60	0.00	-3.54	10.10
SEC-8	0.00	-8.38	130.73	0.00	-6.48	97.94	0.00	-4.47	7.70
SEC-9	0.00	-15.24	79.96	0.00	-11.78	58.68	0.00	-11.14	-25.68
SEC-10	0.00	-21.98	19.03	0.00	-15.82	13.47	0.00	-15.91	-69.47
SEC-11	0.00	-24.15	0.00	0.00	-16.84	0.00	0.00	-17.19	-83.12

Section	Prestress			LiveLoad max			LiveLoad min		
	N (tf)	V (tf)	M (tf.m)	N (tf)	V (tf)	M (tf.m)	N (tf)	V (tf)	M (tf.m)
SEC-1	376.48	-35.59	0.00	0.00	8.94	1.85	0.00	-1.08	-1.80
SEC-2	376.48	-33.67	-58.07	0.00	8.51	5.71	0.00	-1.09	-0.74
SEC-3	383.70	-26.85	-160.66	0.00	7.40	26.02	0.00	-1.60	-3.72
SEC-4	391.44	-19.10	-256.30	0.00	5.39	44.15	0.00	-3.18	-8.43
SEC-5	395.85	-11.30	-265.79	0.00	5.12	45.80	0.00	-3.48	-9.11
SEC-6	397.25	0.00	-297.30	0.00	2.54	44.43	0.00	-5.08	-12.79
SEC-7	395.85	11.37	-265.38	0.00	2.65	32.20	0.00	-8.43	-16.77
SEC-8	391.44	19.10	-255.85	0.00	2.44	29.31	0.00	-8.71	-17.21
SEC-9	383.70	26.77	-160.35	0.00	1.51	13.09	0.00	-10.52	-24.91
SEC-10	376.48	33.58	-58.06	0.00	1.22	12.36	0.00	-11.44	-46.09
SEC-11	376.48	35.59	0.00	0.00	1.21	13.11	0.00	-11.70	-53.57

Section	Differential Creep			Differential Shrinkage			Differential Temperature		
	N (tf)	V (tf)	M (tf.m)	N (tf)	V (tf)	M (tf.m)	N (tf)	V (tf)	M (tf.m)
SEC-1	72.79	0.00	8.45	6.58	0.00	0.65	8.88	0.00	0.88
SEC-2	50.64	0.00	6.04	6.36	0.00	0.63	8.59	0.00	0.85
SEC-3	-32.45	0.00	-2.94	5.39	0.00	0.53	7.28	0.00	0.72
SEC-4	-93.19	0.00	-9.70	5.43	0.00	0.53	7.33	0.00	0.72
SEC-5	-83.88	0.00	-8.85	6.62	0.00	0.66	8.94	0.00	0.89
SEC-6	-119.86	0.00	-12.66	5.45	0.00	0.54	7.36	0.00	0.73
SEC-7	-83.88	0.00	-8.85	6.62	0.00	0.66	8.94	0.00	0.89
SEC-8	-93.19	0.00	-9.70	5.43	0.00	0.53	7.33	0.00	0.72
SEC-9	-32.45	0.00	-2.94	5.39	0.00	0.53	7.28	0.00	0.72
SEC-10	50.64	0.00	6.04	6.36	0.00	0.63	8.59	0.00	0.85
SEC-11	72.79	0.00	8.45	6.58	0.00	0.65	8.88	0.00	0.88

Section	Secondary force due to Creep			Impact max			Impact min		
	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	0.72	0.00	0.00	2.95	0.61	0.00	-0.36	-0.59
SEC-2	0.00	0.95	0.79	0.00	2.81	1.89	0.00	-0.36	-0.25
SEC-3	0.00	0.95	3.90	0.00	2.44	8.59	0.00	-0.53	-1.23
SEC-4	0.00	0.95	8.00	0.00	1.78	14.57	0.00	-1.05	-2.78
SEC-5	0.00	0.95	8.57	0.00	1.69	15.11	0.00	-1.15	-3.01
SEC-6	0.00	0.99	12.99	0.00	0.84	14.66	0.00	-1.68	-4.22
SEC-7	0.00	0.95	17.42	0.00	0.87	10.63	0.00	-2.78	-5.53
SEC-8	0.00	0.95	17.99	0.00	0.81	9.67	0.00	-2.88	-5.68
SEC-9	0.00	0.95	22.08	0.00	0.50	4.32	0.00	-3.47	-8.22
SEC-10	0.00	0.95	25.20	0.00	0.40	4.08	0.00	-3.78	-15.21
SEC-11	0.00	1.14	25.98	0.00	0.40	4.33	0.00	-3.86	-17.68

(1) Nominal Flexural Strength of Girder during Construction Stage (AASHTO LRFD 5.7.3.2.2) - 1/2

	Unit	Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section 7
Sectional Properties								
Depth of Girder	mm	1,650	1,650	1,650	1,650	1,650	1,650	1,650
Width of Deck Slap	mm	650	650	650	650	650	650	650
Depth of Deck Slap	mm	250	210	210	210	210	210	210
Total width of Webs	mm	650	569	200	200	200	200	200
Width of Siffit Slap	mm	650	650	650	650	650	650	650
Depth of Soffit Slap	mm	250	250	250	250	250	250	250
Total Area of Prestressing Cables	mm ²	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	mm	771.0	957.0	1,224.0	1,458.0	1,480.0	1,560.0	1,480.0
Area of Tensile Reinforcement	mm ²	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Distance from extreme compressive fibre to centroid of Tensile Reinforcement	mm	1,650.0	1,650.0	0.0	0.0	0.0	0.0	0.0
Area of Compressive Reinforcement	mm ²	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Distance from extreme compressive fibre of Compressive Reinforcement	mm	1,650.0	1,650.0	0.0	0.0	0.0	0.0	0.0
Calculation of Mr								
Stress block factor		0.76	0.76	0.76	0.76	0.76	0.76	0.76
Distance from extreme compressive fibre Neutral Axis	mm	343	395	985	1,022	1,025	1,035	1,025
Depth of equivalent stress block	mm	262	302	753	781	783	791	783
Average stress in Prestress stell at nominal bending resistance	Mpa	1,629	1,645	1,441	1,495	1,499	1,514	1,499
Nominal Resistance	N.mm	3.70E+09	4.73E+09	5.01E+09	6.37E+09	6.50E+09	6.98E+09	6.50E+09
Flexural Resistance factor	ϕ	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Factored Resistance	N.mm	3.70E+09	4.73E+09	5.01E+09	6.37E+09	6.50E+09	6.98E+09	6.50E+09
Checking								
Factored Bending Moment due to External Loads	N.mm	0.00E+00	4.88E+08	2.08E+09	3.43E+09	3.56E+09	4.01E+09	3.56E+09

(1) Nominal Flexural Strength of Girder during Construction Stage (AASHTO LRFD 5.7.3.2.2) -2/2

	Unit	Section 8	Section 9	Section 10	Section 11
Sectional Properties					
Depth of Girder	H	1,650	1,650	1,650	1,650
Width of Deck Slap	bd	650	650	650	650
Depth of Deck Slap	hd	210	210	210	250
Total width of Webs	bw	200	200	569	650
Width of Siffit Slap	bs	650	650	650	650
Depth of Soffit Slap	hs	250	250	250	250
Total Area of Prestressing Cables	Ap	3,553.6	3,553.6	3,553.6	3,553.6
Distance from extreme compressive fibre to centroid of Tensile Reinforcement	dp	1,458.0	1,224.0	957.0	771.0
Area of Tensile Reinforcement	Ast	0.0	0.0	0.0	0.0
Distance from extreme compressive fibre to centroid of Tensile Reinforcement	dst	0.0	0.0	0.0	1,650.0
Area of Compressive Reinforcement	Asc	0.0	0.0	0.0	0.0
Distance from extreme compressive fibre of Compressive Reinforcement	dsc	0.0	0.0	0.0	1,650.0
Calculation of Mr					
Stress block factor	$\beta 1$	0.76	0.76	0.76	0.76
Distance from extreme compressive fibre Neutral Axis	c	1,022	985	395	343
Depth of equivalent stress block	a	781	753	302	262
Average stress in Prestress steli at nominal bending resistance	fps	1,495	1,441	1,645	1,629
Nominal Resistance	Mn	6.37E+09	5.01E+09	4.73E+09	3.70E+09
Flexural Resistance factor	ϕ	1.0	1.0	1.0	1.0
Factored Resistance	Mr	6.37E+09	5.01E+09	4.73E+09	3.70E+09
Checking					
Factored Bending Moment due to External Loads	Mu	3.43E+09	2.08E+09	4.88E+08	0.00E+00

(2) Checking Nominal Shear Strength of Section during Construction Stage - 1/2

	Unit	Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section 7
Sectional Properties								
Depth of Girder	mm	1,650	1,650	1,650	1,650	1,650	1,650	1,650
Width of Deck Slap	mm	650	650	650	650	650	650	650
Depth of Deck Slap	mm	210	210	210	210	210	210	210
Total width of Webs	mm	650	569	200	200	200	200	200
Width of Soffit Slap	mm	650	650	650	650	650	650	650
Depth of Soffit Slap	mm	250	250	250	250	250	250	250
Total Area of Prestressing Cables	mm ²	3,554	3,554	3,554	3,554	3,554	3,554	3,554
Distance from extreme compressive fibre to centroid of Prestressing Cables	mm	879	957	1,224	1,458	1,480	1,560	1,480
Area of Tensile Reinforcement	mm ²	0	0	0	0	0	0	0
Distance from extreme compressive fibre to centroid of Tensile Reinforcement	mm	0	0	0	0	0	0	0
Area of Compressive Reinforcement	mm ²	0	0	0	0	0	0	0
Distance from extreme compressive fibre to centroid of Compressive Reinforcement	mm	0	0	0	0	0	0	0
Calculation of Mr								
Effective shear Depth	mm	1,188	1,188	1,188	1,188	1,188	1,188	1,188
Effective web width	mm	650	569	200	200	200	200	200
Spacing of stirrups	mm ²	150	150	150	300	300	300	300
Angle of inclination of transverse reinforcement to longitudinal axis of girder	degree	90	90	90	90	90	90	90
Factor indicating ability of diagonally cracked concrete to transmit tension		6.4	6.3	6.4	5.5	5.5	5.3	5.5
Area of shear reinf. within a distances	mm ²	616	616	616	308	308	308	308
Strain in the tensile reinforcement		-0.000167	-0.000161	-0.000167	-0.000080	-0.000076	-0.000059	-0.000076
Inclination angle of diagonal compressive stress	degree	27.00	27.00	62.91	27.00	27.00	27.00	27.00
Component of effective prestressed force in the direction of the applied shear	N	-3.56E+05	-3.37E+05	-2.68E+05	-1.91E+05	-1.13E+05	0.00E+00	1.14E+05
Nominal Resistance of Concrete	N	2.59E+06	2.24E+06	7.94E+05	6.83E+05	7.70E+05	6.63E+05	6.80E+05
Nominal Resistance of Reinforcement	N	3.73E+06	3.73E+06	3.75E+06	9.33E+05	9.33E+05	9.33E+05	9.33E+05
Nominal Resistance	N	5.96E+06	5.63E+06	2.11E+06	1.43E+06	1.50E+06	1.60E+06	1.73E+06
Resistance factor for shear		0.9	0.9	0.9	0.9	0.9	0.9	0.9
Factored Resistance	N	5.37E+06	5.07E+06	1.90E+06	1.28E+06	1.35E+06	1.44E+06	1.55E+06
Checking								
Factored Moment due to External Loads	N.mm	0.00E+00	4.88E+08	2.08E+09	3.43E+09	3.56E+09	4.01E+09	3.56E+09
Factored Axial Force due to External Loads	N	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Factored Shear Force due to External Loads	N	6.15E+05	5.67E+05	4.05E+05	2.23E+05	1.97E+05	0.00E+00	1.97E+05

(2) Checking Nominal Shear Strength of Section during Construction Stage - 2/2

	Unit	Section 8	Section 9	Section 10	Section 11
Sectional Properties					
Depth of Girder	mm	1,650	1,650	1,650	1,650
Width of Deck Slap	mm	650	650	650	650
Depth of Deck Slap	mm	210	210	210	210
Total width of Webs	mm	200	200	569	650
Width of Soffit Slap	mm	650	650	650	650
Depth of Soffit Slap	mm	250	250	250	250
Total Area of Prestressing Cables	mm ²	3,554	3,554	3,554	3,554
Distance from extreme compressive fibre to centroid of Prestressing Cables	mm	1,458	1,224	957	879
Area of Tensile Reinforcement	mm ²	0	0	0	0
Distance from extreme compressive fibre to centroid of Tensile Reinforcement	mm	0	0	0	0
Area of Compressive Reinforcement	mm ²	0	0	0	0
Distance from extreme compressive fibre to centroid of Compressive Reinforcement	mm	0	0	0	0
Calculation of Mr					
Effective shear Depth	mm	1,188	1,188	1,188	1,188
Effective web width	mm	200	200	569	650
Spacing of stirrups	mm	300	150	150	150
Angle of inclination of transverse reinforcement to longitudinal axis of girder	degree	90	90	90	90
Factor indicating ability of diagonally cracked concrete to transmit tension		5.5	6.4	6.3	6.4
Area of shear reinf. within a distance	mm ²	308	616	616	616
Strain in the tensile reinforcement		-0.000080	-0.000167	-0.000161	-0.000167
Inclination angle of diagonal compressive stress	degree	27.00	27.00	27.00	27.00
Component of effective prestressed force in the direction of the applied shear	N	1.91E+05	2.68E+05	3.36E+05	3.56E+05
Nominal Resistance of Concrete	N	6.83E+05	7.95E+05	2.24E+06	2.59E+06
Nominal Resistance of Reinforcement	N	9.33E+05	3.73E+06	3.73E+06	3.73E+06
Nominal Resistance	N	1.81E+06	2.64E+06	6.31E+06	6.67E+06
Resistance factor for shear		0.9	0.9	0.9	0.9
Factored Resistance	N	1.63E+06	2.38E+06	5.68E+06	6.01E+06
Checking					
Factored Moment due to External Loads	N.mm	3.43E+09	2.08E+09	4.88E+08	0.00E+00
Factored Axial Force due to External Loads	N	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Factored Shear Force due to External Loads	N	2.23E+05	4.05E+05	5.67E+05	6.15E+05

(3) Nominal Flexural Strength of Girder at Service Stage (AASHTO LRFD 5.7.3.2.2) -1/2

	Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section 7
Sectional Properties							
Depth of Girder	H	1,860	1,860	1,860	1,860	1,860	1,860
Width of Deck Slab	bd	2,035	2,035	2,035	2,035	2,035	2,035
Depth of Deck Slab	hd	210	210	210	210	210	210
Total width of Webs	bw	650	569	200	200	200	200
Width of Soffit Slab	bs	650	650	650	650	650	650
Depth of Soffit Slab	hs	250	250	250	250	250	250
Total Area of Prestressing Cables	Ap	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 Prestressing Cables	dp	1,089.0	1,167.0	1,434.0	1,668.0	1,770.0	1,690.0
Area of Tensile Reinforcement	Ast	0.0	0.0	0.0	0.0	0.0	0.0
Distance from extreme compressive fibre to centroid of Tensile Reinforcement	dst	0.0	0.0	0.0	0.0	0.0	0.0
Area of Compressive Reinforcement	Asc	0.0	0.0	0.0	0.0	0.0	0.0
Distance from extreme compressive fibre to centroid of Compressive Reinforcement	dsc	0.0	0.0	0.0	0.0	0.0	0.0
Calculation of Mr							
Stress block factor	β_1	0.76	0.76	0.76	0.76	0.76	0.76
Distance from extreme compressive fibre to the Neutral Axis	c	356	404	1,019	1,048	1,050	1,050
Depth of equivalent stress block	a	272	309	779	801	809	803
Average stress in Prestress steel at nominal bending resistance	fps	1,690	1,680	1,490	1,533	1,536	1,536
Nominal Resistance	Mn	5.96E+09	6.44E+09	8.38E+09	9.86E+09	1.00E+10	1.00E+10
Flexural Resistance factor	ϕ	1.0	1.0	1.0	1.0	1.0	1.0
Factored Resistance	Mr	5.96E+09	6.44E+09	8.38E+09	9.86E+09	1.00E+10	1.00E+10
Checking							
Factored Bending Moment due to External Loads	Mu	7.03E+07	6.82E+08	2.79E+09	4.42E+09	4.96E+09	3.91E+09

(3) Nominal Flexural Strength of Girder at Service Stage (AASHTO LRFD 5.7.3.2.2) -2/2

	Unit	Section 8	Section 9	Section 10	Section 11
Sectional Properties					
Depth of Girder	mm	1,860	1,860	1,860	1,860
Width of Deck Slab	mm	2,035	2,035	2,035	2,035
Depth of Deck Slab	mm	210	210	210	210
Total width of Webs	mm	200	200	569	650
Width of Soffit Slab	mm	650	650	650	650
Depth of Soffit Slab	mm	250	250	250	250
Total Area of Prestressing Cables					
Distance from extreme compressive fibre to centroid of Prestressing Cables	mm	1,668.0	1,434.0	693.0	771.0
Area of Tensile Reinforcement	mm ²	0.0	0.0	0.0	0.0
Distance from extreme compressive fibre to centroid of Tensile Reinforcement	mm	0.0	0.0	0.0	1,860.0
Area of Compressive Reinforcement	mm ²	0.0	0.0	0.0	0.0
Distance from extreme compressive fibre to centroid of Compressive Reinforcement	mm	0.0	0.0	0.0	1,860.0
Calculation of Mr					
Stress block factor		0.76	0.76	0.76	0.76
Distance from extreme compressive fibre to the Neutral Axis	mm	1,048	1,019	379	343
Depth of equivalent stress block	mm	801	779	289	262
Average stress in Prestress steel at nominal bending resistance	Mpa	1,533	1,490	1,576	1,629
Nominal Resistance	N.mm	9.86E+09	8.38E+09	3.08E+09	3.70E+09
Flexural Resistance factor		1.0	1.0	1.0	1.0
Factored Resistance	N.mm	9.86E+09	8.38E+09	3.08E+09	3.70E+09
Checking					
Factored Bending Moment due to External Loads	N.mm	3.70E+09	1.79E+09	1.07E+09	1.61E+09

(4) Checking Nominal Shear Strength of Section at Service Stage - 1/2

	Unit	Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section 7
Sectional Properties								
Depth of Girder	mm	1,860	1,860	1,860	1,860	1,860	1,860	1,860
Width of Deck Slap	mm	2,035	2,035	2,035	2,035	2,035	2,035	2,035
Depth of Deck Slap	mm	210	210	210	210	210	210	210
Total width of Webs	mm	650	569	200	200	200	200	200
Width of Soffit Slap	mm	650	650	650	650	650	650	650
Depth of Soffit Slap	mm	250	250	250	250	250	250	250
Total Area of Prestressing Cables	mm ²	3,554	3,554	3,554	3,554	3,554	3,554	3,554
Distance from extreme compressive fibre to centroid of Prestressing Cables	mm	1,089	1,167	1,434	1,668	1,690	1,770	1,690
Area of Tensile Reinforcement	mm ²	0	0	0	0	0	0	0
Distance from extreme compressive fibre to centroid of Tensile Reinforcement	mm	0	0	0	0	0	0	0
Area of Compressive Reinforcement	mm ²	0	0	0	0	0	0	0
Distance from extreme compressive fibre to centroid of Compressive Reinforcement	mm	0	0	0	0	0	0	0
Calculation of Mr								
Effective shear Depth	mm	1,339	1,339	1,339	1,339	1,339	1,339	1,339
Effective web width	mm	650	569	200	200	200	200	200
Spacing of stirrups	mm ²	150	150	150	300	300	300	300
Angle of inclination of transverse reinforcement to longitudinal axis of girder	degree	90	90	90	90	90	90	90
Factor indicating ability of diagonally cracked concrete to transmit tension		5.9	5.8	5.5	5.1	5.1	5.0	5.4
Area of shear reinf. within a distance	mm ²	616	616	616	308	308	308	308
Strain in the tensile reinforcement		-0.000125	-0.000119	-0.000105	-0.000031	-0.000029	-0.000013	-0.000066
Inclination angle of diagonal compressive stress	degree	27.00	27.00	25.45	27.00	27.00	27.00	27.00
Component of effective prestressed force in the direction of the applied shear	N	-3.56E+05	-3.37E+05	-2.68E+05	-1.91E+05	-1.13E+05	0.00E+00	1.14E+05
Nominal Resistance of Concrete	N	2.69E+06	2.34E+06	7.80E+05	7.18E+05	7.17E+05	7.00E+05	7.55E+05
Nominal Resistance of Reinforcement	N	4.21E+06	4.21E+06	4.50E+06	1.05E+06	1.05E+06	1.05E+06	1.05E+06
Nominal Resistance	N	6.55E+06	6.21E+06	2.41E+06	1.58E+06	1.66E+06	1.75E+06	1.92E+06
Resistance factor for shear		0.9	0.9	0.9	0.9	0.9	0.9	0.9
Factored Resistance	N	5.89E+06	5.59E+06	2.17E+06	1.42E+06	1.49E+06	1.58E+06	1.73E+06
Checking								
Factored Moment due to External Loads	N.mm	7.03E+07	6.82E+08	2.79E+09	4.42E+09	4.55E+09	4.96E+09	3.91E+09
Factored Axial Force due to External Loads	N	3.97E+05	2.85E+05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Factored Shear Force due to External Loads	N	8.84E+05	8.16E+05	5.88E+05	2.89E+05	2.48E+05	1.31E+05	3.33E+05

(4) Checking Nominal Shear Strength of Section at Service Stage - 2/2

	Unit	Section 8	Section 9	Section 10	Section 11
Sectional Properties					
Depth of Girder	mm	1,860	1,860	1,860	1,860
Width of Deck Slap	mm	2,035	2,035	2,035	2,035
Depth of Deck Slap	mm	210	210	210	210
Total width of Webs	mm	200	200	569	650
Width of Soffit Slap	mm	650	650	650	650
Depth of Soffit Slap	mm	250	250	250	250
Total Area of Prestressing Cables					
Distance from extreme compressive fibre to centroid of Prestressing Cables	mm	1,668	1,434	693	771
Area of Tensile Reinforcement	mm ²	0	0	0	0
Distance from extreme compressive fibre to centroid of Tensile Reinforcement	mm	0	0	1,860	1,860
Area of Compressive Reinforcement	mm ²	0	0	0	0
Distance from extreme compressive fibre to centroid of Compressive Reinforcement	mm	0	0	1,860	1,860
Calculation of Mr					
Effective shear Depth	mm	1,339	1,339	1,339	1,339
Effective web width	mm	200	200	569	650
Spacing of stirrups	mm	300	150	150	150
Angle of inclination of transverse reinforcement to longitudinal axis of girder	degree	90	90	90	90
Factor indicating ability of diagonally cracked concrete to transmit tension		5.4	6.5	5.4	5.3
Area of shear reinf. within a distance	mm ²	308	616	616	616
Strain in the tensile reinforcement		-0.000074	-0.000179	-0.000075	-0.000055
Inclination angle of diagonal compressive stress	degree	27.00	27.00	27.00	27.00
Component of effective prestressed force in the direction of the applied shear	N	1.91E+05	2.68E+05	3.36E+05	3.56E+05
Nominal Resistance of Concrete	N	7.64E+05	9.16E+05	2.18E+06	2.42E+06
Nominal Resistance of Reinforcement	N	1.05E+06	4.21E+06	4.21E+06	4.21E+06
Nominal Resistance	N	2.01E+06	2.95E+06	6.72E+06	6.98E+06
Resistance factor for shear		0.9	0.9	0.9	0.9
Factored Resistance	N	1.81E+06	2.65E+06	6.05E+06	6.28E+06
Checking					
Factored Moment due to External Loads	N.mm	3.70E+09	1.79E+09	1.07E+09	1.61E+09
Factored Axial Force due to External Loads	N	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Factored Shear Force due to External Loads	N	3.61E+05	5.72E+05	8.06E+05	8.73E+05

5.3 Checking Stress
 5.3.1 Load Combinations for Checking Stress during construction stage

COMBINATION 14			
Load type	Factor		
Girder Selfweight G_DC	1.00		
Slab+Dia. Selfweight S_DC	1.00		
Prestress PS	1.00		
Section	N(T)	V(T)	M(T.m)
SEC-1	376.48	5.40	0.00
SEC-2	376.48	4.13	-25.57
SEC-3	383.70	0.17	-22.02
SEC-4	391.44	-4.24	-27.64
SEC-5	395.85	1.86	-28.72
SEC-6	397.25	0.00	-29.65
SEC-7	395.85	-1.78	-28.31
SEC-8	391.44	4.25	-27.19
SEC-9	383.70	-0.25	-21.71
SEC-10	376.48	-4.21	-25.55
SEC-11	376.48	-5.40	0.00

5.3.2 Stress checking during construction stage (AASHTO 5.9.4.2)

Section	COMBINATION 14		
	σ_t (T/m ²)	Checking	σ_b (T/m ²) Checking
SEC-1	338.69	OK	338.69 OK
SEC-2	286.02	OK	456.48 OK
SEC-3	507.14	OK	674.28 OK
SEC-4	499.35	OK	704.62 OK
SEC-5	267.77	OK	446.58 OK
SEC-6	502.06	OK	719.20 OK
SEC-7	269.04	OK	445.28 OK
SEC-8	501.04	OK	702.97 OK
SEC-9	508.31	OK	673.13 OK
SEC-10	286.08	OK	456.41 OK
SEC-11	338.69	OK	338.69 OK

6.3 Checking Stress

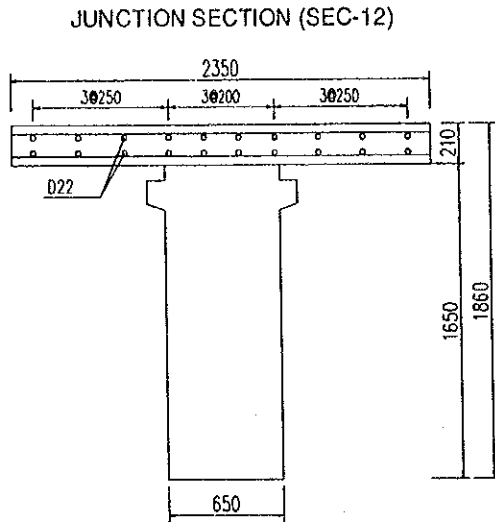
6.3.1 Load Combinations for Checking Stress at service stage

Section	COMBINATION 11				COMBINATION 12				COMBINATION 13			
	N(T)	V(T)	M(T.m)	Factor	N(T)	V(T)	M(T.m)	Factor	N(T)	V(T)	M(T.m)	Factor
SEC-1	460.29	26.27	10.30	1.00	460.29	15.61	6.42	1.00	464.73	16.76	8.78	1.00
SEC-2	437.78	23.49	-4.57	1.00	437.78	13.28	-11.44	1.00	442.07	14.44	-10.22	1.00
SEC-3	360.28	13.89	36.88	0.80	360.28	4.32	5.24	0.00	363.92	6.02	9.55	1.00
SEC-4	307.34	0.66	54.37	0.00	307.34	-8.45	-1.58	0.80	311.00	-5.07	7.75	0.00
SEC-5	323.07	5.54	55.32	0.00	323.07	-3.61	-3.11	0.00	327.54	0.10	7.03	0.00
SEC-6	286.53	0.93	57.29	0.00	286.53	-7.17	-3.59	0.80	290.21	-1.77	10.38	0.00
SEC-7	323.07	-1.55	25.73	0.80	323.07	-13.33	-26.38	0.00	327.54	-4.37	-8.09	0.00
SEC-8	307.34	3.33	20.88	0.00	307.34	-8.54	-28.61	0.80	311.00	0.73	-9.94	0.00
SEC-9	360.28	-8.83	-13.43	0.00	360.28	-21.64	-53.86	0.80	363.92	-10.44	-27.00	0.00
SEC-10	437.78	-17.88	-49.57	0.00	437.78	-31.35	-111.76	0.00	442.07	-19.18	-62.30	0.00
SEC-11	460.29	-20.16	-33.64	0.00	460.29	-33.90	-104.60	0.00	464.73	-21.46	-47.15	0.00

6.3.2 Stress checking at service stage (AASHTO 5.9.4.2)

Section	COMBINATION 11		COMBINATION 12		COMBINATION 13							
	σ_t (T/m ²)	Checking	σ_b (T/m ²)	Checking	σ_t (T/m ²)	Checking	σ_b (T/m ²)	Checking				
SEC-1	309.58	OK	278.39	OK	305.63	OK	286.18	OK	310.91	OK	284.33	OK
SEC-2	298.14	OK	312.31	OK	291.18	OK	326.65	OK	295.38	OK	327.08	OK
SEC-3	368.34	OK	247.47	OK	339.49	OK	322.33	OK	346.81	OK	315.50	OK
SEC-4	334.65	OK	159.06	OK	284.11	OK	289.20	OK	295.94	OK	270.90	OK
SEC-5	265.60	OK	101.44	OK	206.79	OK	216.02	OK	219.90	OK	199.03	OK
SEC-6	317.66	OK	134.14	OK	262.97	OK	274.47	OK	278.94	OK	245.69	OK
SEC-7	235.82	OK	159.47	OK	183.37	OK	261.65	OK	204.68	OK	228.69	OK
SEC-8	304.40	OK	236.96	OK	259.68	OK	352.10	OK	279.95	OK	312.07	OK
SEC-9	322.47	OK	366.49	OK	285.61	OK	462.12	OK	313.49	OK	401.96	OK
SEC-10	252.55	OK	406.23	OK	189.54	OK	536.02	OK	242.63	OK	435.76	OK
SEC-11	264.81	OK	366.69	OK	192.52	OK	509.27	OK	253.93	OK	396.73	OK

6.3.3 Stress Check at Junction of the Girders



Moment due to Service Load	$M =$	104.6 tf.m	M_{max} : Combination 12
Tensile Reinforcement	$A_s = 2 \times D22$ (Nos=2x10=20)		
Stress of Concrete	$f_{cj} =$	214.3 t/m ² <	1835.5 t/m ²
Stress of Tensile Reinf.	$f_s =$	-798.2 t/m ² >	-17896.1 t/m ²

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

- Horizontal Shear per unit length of girder V_h due to Vertical Shear V_u $V_h = V_u / d_e$
 Distance from the centroid of tensile steel to the midthickness of the deck d_e
 Required area of reinforcement: $A_{vf} = \max \{0.35 b_v / f_y; (V_h - c b_v - \mu P_D) / \mu f_y\}$
 Width of the interface between the girder and the deck: $b_v = 650 \text{ mm}$
 Yield strength of reinforcement $f_y = 390 \text{ MPa}$
 Cohesion factor $c = 0.17 \text{ MPa}$
 Friction factor $\mu = 0.7$
 Permanent net compressive force normal to the shear plan $P_c = 58750 \text{ N}$

Section	SEC-1	SEC-2	SEC-3	SEC-4	SEC-5	SEC-6	SEC-7	SEC-8	SEC-9	SEC-10	SEC-11
d_e (mm)	984	1062	1329	1563	1585	1665	1585	1563	1329	1062	984
Interface Shear(N):											
Girder Selfweight G_DC	236823	215503	149416	82140	72752	0	-72752	-82140	-149416	-215503	-236823
Slab+Dia. Selfweight S_D	165150	155169	115545	63519	56260	0	-56260	-63519	-115545	-155169	-165150
Surface + Railings DW	104333	91772	48004	-17468	-26604	-27021	-34686	-43822	-109294	-156060	-168622
Max. Live Load LL_MAX	87694	83443	72561	52858	50179	24913	25979	23942	14855	11934	11902
Min. Live Load LL_MIN	-10611	-10672	-15654	-31175	-34163	-49796	-82621	-85442	-103166	-112231	-114738
Max. Impact IM_MAX	28939	27536	23945	17443	16559	8221	8573	7901	4902	3938	3928
Min. Impact IM_MIN	-3502	-3522	-5166	-10288	-11274	-16433	-27265	-28196	-34045	-37036	-37863
Creep Diff. CR_D	713863	496611	-318222	-913852	-822532	-1175387	-822532	-913852	-318218	496611	713863
Shrinkage Diff. SH_D	64510	62380	52891	53234	64945	53494	64945	53234	52891	62380	64510
Temperature Diff. TG	87088	84213	71402	71866	87676	72216	87676	71866	71402	84213	87088
Creep CR	7014	9330	9332	9332	9336	9661	9330	9334	9337	9334	11212
Total	1495413	1225958	224874	-580929	-491427	-1039902	-789726	-937057	-539086	141678	321908
Min	1364667	1100784	107549	-692693	-603601	-1133265	-934165	-1082538	-696054	-23461	153478
A_{vf} required (mm ²)	5327	4340	673	2386	2060	4000	3271	3814	2399	368	1028
Area of Stirrups (mm ²)	3695	3695	3695	924	924	924	924	924	3695	3695	3695
Area of Dowel bars (mm ²)	3770	3770	3770	3770	3770	3770	3770	3770	3770	3770	3770
Total Connector Area (mm ²)	7464	7464	7464	4694	4694	4694	4694	4694	7464	7464	7464
Checking	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK

8. Design of Deck Slab

8.1 Summary of Bending Moment:

Bending Moment due to Live Load:

(a) Continuous Slab

- 1) Effective Span Length: 1.700 m
- 2) Load 10.000 T
- 3) Impact Factor IM 33%
- 4) Positive Moment $M=0.8*(1+IM)*(0.125+0.07)F$ 2.92 T.m/m
- 5) Negative Moment $M=-(1+IM)*(0.15S+0.125)*F$ -5.05 T.m/m

(2) Cantilever Slab

- 1) Effective Span Length 0.100 m < 0.5m --> ignore
- 2) Load 10.000 T
- 3) Impact Factor IM 33%
- 4) Negative Moment $M=$ 0.00 T.m/m

Bending Moment due to Self-weight of Slab:

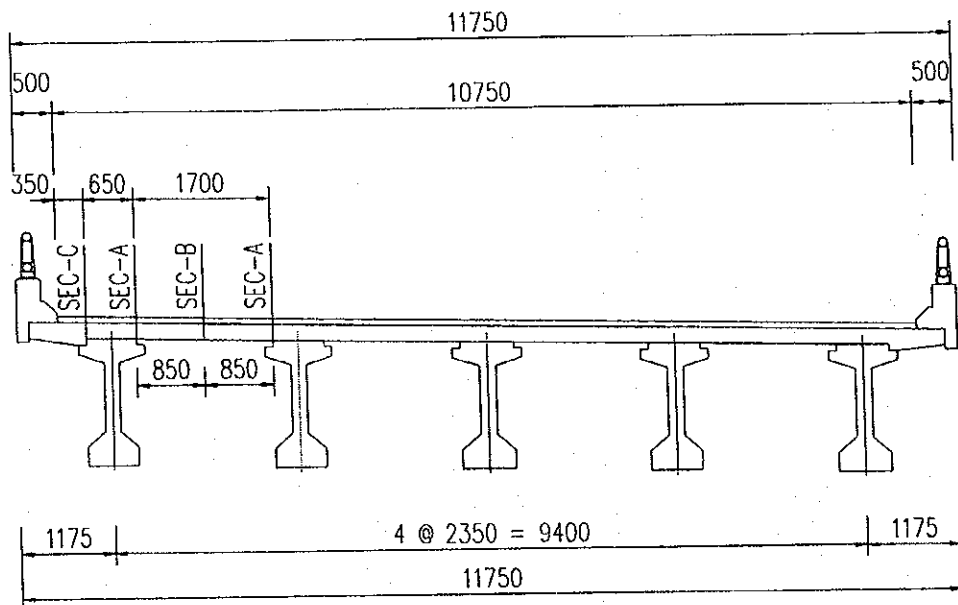
Section	A	B	C
Bending Moment (T.m)	-0.152	0.152	-0.150

Bending Moment due to Asphalt Concrete:

Section	A	B	C
Bending Moment (T.m)	-0.050	0.050	-0.030

Bending Moment due to Parapet & Railings:

Section	A	B	C
Bending Moment (T.m)	0.000	0.000	-0.424



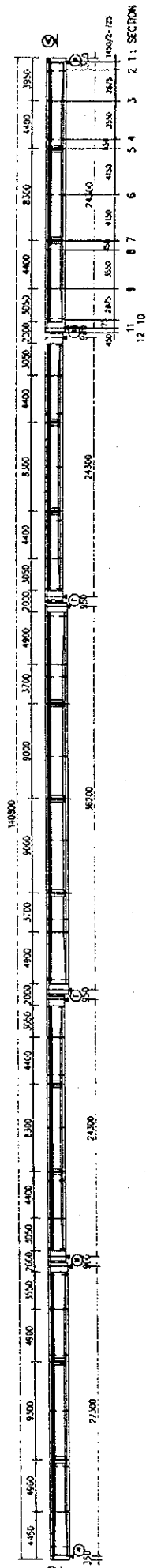
8.2 Checking Nominal Flexural Strength of Deck Slab (Article 5.7.3.2.2 AASHTO)

	Section A	Section B	Section C
Sectional Properties			
Depth of Slab	H 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	d_{st} 162 mm	162 mm	162 mm
Area of Compressive Reinforcement	A_{sc} 0 mm ²	0 mm ²	0 mm ²
fibre to centroid of Compressive Reinforcement	d_{sc} 48 mm	48 mm	48 mm
Calculation of Mr			
Stress block factor	β_1 0.76	0.76	0.76
Distance from extreme compressive fibre to the Neutral Axis	c 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	ϕ 0.9	0.9	0.9
Factored Resistance	Mr 100,029,726 N.mm	100,029,726 N.mm	100,029,726 N.mm
Checking			
Factored Bending Moment due to External Loads	Mu 91,089,350 N.mm	53,663,150 N.mm	7,617,528 N.mm
	OK	OK	OK

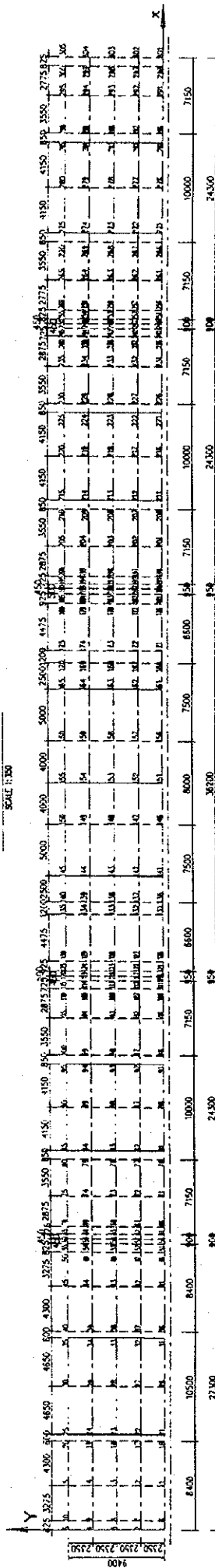
(4) PC COMPOSITE I BEAM (CONNECTED),
CASE 6

Structural Views, Design Sections

5 CONTINUOUS SPANS L=28m+25m+37m+2@25m
ELEVATION
SCALE 1:200



SECTION A - A
SCALE 1:300



Summary of Sectional Forces:

Section	S.W of girder			S.W of Deck Slab+Diaphragms			S.W of Surface		
	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	20.29	0.00	0.00	14.99	0.00	0.00	14.67	-47.06
SEC-2	0.00	18.29	15.91	0.00	13.97	11.95	0.00	13.39	-35.49
SEC-3	0.00	12.97	59.29	0.00	10.55	45.97	0.00	9.08	-4.31
SEC-4	0.00	7.59	95.79	0.00	6.17	75.64	0.00	3.78	18.74
SEC-5	0.00	6.30	101.69	0.00	5.12	80.44	0.00	2.46	21.39
SEC-6	0.00	0.00	114.76	0.00	0.00	91.07	0.00	1.48	40.81
SEC-7	0.00	-6.30	101.69	0.00	-5.12	80.44	0.00	-4.78	34.34
SEC-8	0.00	-7.59	95.79	0.00	-6.17	75.64	0.00	0.24	35.16
SEC-9	0.00	-12.97	59.29	0.00	-10.55	45.97	0.00	-5.28	26.22
SEC-10	0.00	-18.29	15.91	0.00	-13.97	11.95	0.00	-9.16	6.97
SEC-11	0.00	-20.29	0.00	0.00	-14.99	0.00	0.00	-10.44	-1.12

Section	Prestress			LiveLoad max			LiveLoad min		
	N (tf)	V (tf)	M (tf.m)	N (tf)	V (tf)	M (tf.m)	N (tf)	V (tf)	M (tf.m)
SEC-1	374.55	-38.90	0.00	0.00	10.56	12.07	0.00	-1.23	-37.14
SEC-2	374.55	-36.49	-69.04	0.00	10.29	11.33	0.00	-1.23	-30.61
SEC-3	381.16	-29.39	-162.76	0.00	9.28	12.16	0.00	-1.30	-15.24
SEC-4	388.39	-21.41	-250.64	0.00	7.84	24.89	0.00	-2.18	-10.84
SEC-5	393.64	-13.04	-265.36	0.00	7.41	28.58	0.00	-2.46	-10.41
SEC-6	395.96	0.00	-298.35	0.00	4.30	37.96	0.00	-2.39	-8.00
SEC-7	393.64	13.09	-264.92	0.00	2.48	38.30	0.00	-4.20	-5.76
SEC-8	388.39	21.38	-250.18	0.00	2.48	36.06	0.00	-5.13	-5.10
SEC-9	381.16	29.29	-162.38	0.00	1.25	21.37	0.00	-6.87	-2.30
SEC-10	374.55	36.34	-68.99	0.00	0.81	5.30	0.00	-7.97	-0.50
SEC-11	374.55	38.75	0.00	0.00	0.80	1.54	0.00	-8.41	-1.50

Section	Differential Creep			Differential Shrinkage			Differential Temperature		
	N (tf)	V (tf)	M (tf.m)	N (tf)	V (tf)	M (tf.m)	N (tf)	V (tf)	M (tf.m)
SEC-1	71.16	0.00	8.31	6.27	0.00	0.62	8.47	0.00	0.84
SEC-2	48.80	0.00	5.88	6.04	0.00	0.60	8.16	0.00	0.81
SEC-3	-22.96	0.00	-1.85	5.19	0.00	0.51	7.00	0.00	0.69
SEC-4	-75.12	0.00	-7.66	5.22	0.00	0.51	7.05	0.00	0.69
SEC-5	-69.27	0.00	-7.22	6.32	0.00	0.63	8.53	0.00	0.85
SEC-6	-102.61	0.00	-10.72	5.25	0.00	0.51	7.09	0.00	0.70
SEC-7	-69.27	0.00	-7.22	6.32	0.00	0.63	8.53	0.00	0.85
SEC-8	-75.12	0.00	-7.66	5.22	0.00	0.51	7.05	0.00	0.69
SEC-9	-22.96	0.00	-1.85	5.19	0.00	0.51	7.00	0.00	0.69
SEC-10	48.80	0.00	5.88	6.04	0.00	0.60	8.16	0.00	0.81
SEC-11	71.16	0.00	8.31	6.27	0.00	0.62	8.47	0.00	0.84

Section	Secondary force due to Creep			Impact max			Impact min		
	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	-2.91	70.76	0.00	3.49	3.98	0.00	-0.41	-12.25
SEC-2	0.00	-2.91	68.36	0.00	3.40	3.74	0.00	-0.41	-10.10
SEC-3	0.00	-2.91	60.28	0.00	3.06	4.01	0.00	-0.43	-5.03
SEC-4	0.00	-2.91	49.94	0.00	2.59	8.21	0.00	-0.72	-3.58
SEC-5	0.00	-2.91	47.47	0.00	2.45	9.43	0.00	-0.81	-3.44
SEC-6	0.00	-2.87	35.38	0.00	1.42	12.53	0.00	-0.79	-2.64
SEC-7	0.00	-2.91	23.30	0.00	0.82	12.64	0.00	-1.39	-1.90
SEC-8	0.00	-2.91	20.82	0.00	0.82	11.90	0.00	-1.69	-1.68
SEC-9	0.00	-2.91	10.48	0.00	0.41	7.05	0.00	-2.27	-0.76
SEC-10	0.00	-2.91	2.40	0.00	0.27	1.75	0.00	-2.63	-0.17
SEC-11	0.00	-2.91	0.00	0.00	0.27	0.51	0.00	-2.77	-0.49

(1) Nominal Flexural Strength of Girder during Construction Stage (AASHTO LRFD 5.7.3.2.2) - 1/2

	Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section 7
	Unit						
Sectional Properties							
Depth of Girder	H	1,650	1,650	1,650	1,650	1,650	1,650
Width of Deck Slap	bd	600	600	600	600	600	600
Depth of Deck Slap	hd	200	200	200	200	200	200
Total width of Webs	bw	600	569	200	200	200	200
Width of Siffit Slap	bs	600	600	600	600	600	600
Depth of Soffit Slap	hs	250	250	250	250	250	250
Total Area of Prestressing Cables	Ap	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	900.0	984.0	1,231.0	1,448.0	1,560.0	1,482.0
Area of Tensile Reinforcement	Ast	0.0	0.0	0.0	0.0	0.0	0.0
Distance from extreme compressive fibre to centroid of Tensile Reinforcement	dst	0.0	0.0	0.0	0.0	0.0	0.0
Area of Compressive Reinforcement	Asc	0.0	0.0	0.0	0.0	0.0	0.0
Distance from extreme compressive fibre of Compressive Reinforcement	dsc	0.0	0.0	0.0	0.0	0.0	0.0
Calculation of Mr							
Stress block factor	β_1	0.76	0.76	0.76	0.76	0.76	0.76
Distance from extreme compressive fibre Neutral Axis	c	375	397	986	1,021	1,035	1,025
Depth of equivalent stress block	a	286	303	754	780	791	784
Average stress in Prestress stell at nominal bending resistance	fps	1,643	1,650	1,443	1,493	1,514	1,500
Nominal Resistance	Mn	4.42E+09	4.89E+09	4.95E+09	6.21E+09	6.88E+09	6.42E+09
Flexural Resistance factor	ϕ	1.0	1.0	1.0	1.0	1.0	1.0
Factored Resistance	Mr	4.42E+09	4.89E+09	4.95E+09	6.21E+09	6.88E+09	6.42E+09
Checking							
Factored Bending Moment due to External Loads	Mu	0.00E+00	4.18E+08	1.58E+09	2.57E+09	3.09E+09	2.73E+09

(1) Nominal Flexural Strength of Girder during Construction Stage (AASHTO LRFD 5.7.3.2.2) -2/2

	Unit	Section 8	Section 9	Section 10	Section 11
Sectional Properties					
Depth of Girder	mm	1,650	1,650	1,650	1,650
Width of Deck Slap	mm	600	600	600	600
Depth of Deck Slap	mm	200	200	200	200
Total width of Webs	mm	200	200	569	600
Width of Siffit Slap	mm	600	600	600	600
Depth of Soffit Slap	mm	250	250	250	250
Total Area of Prestressing Cables					
Distance from extreme compressive fibre to centroid of Tensile Reinforcement	mm	1,448.0	1,231.0	984.0	900.0
Area of Tensile Reinforcement	mm ²	0.0	0.0	0.0	0.0
Distance from extreme compressive fibre to centroid of Tensile Reinforcement	mm	0.0	0.0	0.0	0.0
Area of Compressive Reinforcement	mm ²	0.0	0.0	0.0	0.0
Distance from extreme compressive fibre of Compressive Reinforcement	mm	0.0	0.0	0.0	0.0
Calculation of Mr					
Stress block factor		0.76	0.76	0.76	0.76
Distance from extreme compressive fibre Neutral Axis	mm	1,021	986	397	375
Depth of equivalent stress block	mm	780	754	303	286
Average stress in Prestress stell at nominal bending resistance	Mpa	1,493	1,443	1,650	1,643
Nominal Resistance	N.mm	6.21E+09	4.95E+09	4.89E+09	4.42E+09
Flexural Resistance factor		1.0	1.0	1.0	1.0
Factored Resistance	N.mm	6.21E+09	4.95E+09	4.89E+09	4.42E+09
Checking					
Factored Bending Moment due to External Loads	N.mm	2.57E+09	1.58E+09	4.18E+08	0.00E+00

(2) Checking Nominal Shear Strength during Construction Stage - 1/2

	Unit	Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section 7
Sectional Properties								
Depth of Girder	H	1,650	1,650	1,650	1,650	1,650	1,650	1,650
Width of Deck Slap	bd	600	600	600	600	600	600	600
Depth of Deck Slap	hd	200	200	200	200	200	200	200
Total width of Webs	bw	600	569	200	200	200	200	200
Width of Soffit Slap	bs	600	600	600	600	600	600	600
Depth of Soffit Slap	hs	250	250	250	250	250	250	250
Total Area of Prestressing Cables	Ap	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	900	984	1,231	1,448	1,482	1,560	1,482
Area of Tensile Reinforcement	Ast	0	0	0	0	0	0	0
Distance from extreme compressive fibre to centroid of Tensile Reinforcement	dst	0	0	0	0	0	0	0
Area of Compressive Reinforcement	Asc	0	0	0	0	0	0	0
Distance from extreme compressive fibre to centroid of Compressive Reinforcement	dsc	0	0	0	0	0	0	0
Calculation of Mr								
Effective shear Depth	dv	1,188	1,188	1,188	1,188	1,188	1,188	1,188
Effective web width	bv	600	569	200	200	200	200	200
Spacing of stirrups	s	150	150	150	300	300	300	300
Angle of inclination of transverse reinforcement to longitudinal axis of girder	α	90	90	90	90	90	90	90
Factor indicating ability of diagonally cracked concrete to transmit tension	β	6.6	6.4	6.8	6.2	6.2	6.1	6.2
Area of shear reinf. within a distance	Av	616	616	616	308	308	308	308
Strain in the tensile reinforcement	ex	-0.000184	-0.000173	-0.000213	-0.000156	-0.000151	-0.000140	-0.000151
Inclination angle of diagonal compressive stress	θ	27.00	27.00	27.00	27.00	27.00	27.00	27.00
Component of effective prestressed force in the direction of the applied shear								
Nominal Resistance of Concrete	Vp	-3.89E+05	-3.65E+05	-2.94E+05	-2.14E+05	-1.30E+05	0.00E+00	1.31E+05
Nominal Resistance of Reinforcement	Vc	2.46E+06	2.29E+06	8.46E+05	7.79E+05	7.72E+05	7.56E+05	7.72E+05
Nominal Resistance	Vs	3.73E+06	3.73E+06	3.73E+06	9.33E+05	9.33E+05	9.33E+05	9.33E+05
Resistance factor for shear	Vn	5.81E+06	5.65E+06	2.08E+06	1.50E+06	1.57E+06	1.69E+06	1.84E+06
Factored Resistance	ϕ	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Checking	Vr	5.23E+06	5.09E+06	1.87E+06	1.35E+06	1.42E+06	1.52E+06	1.65E+06
Factored Moment due to External Loads	Mu	0.00E+00	4.18E+08	1.58E+09	2.57E+09	2.73E+09	3.09E+09	2.73E+09
Factored Axial Force due to External Loads	Nu	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Factored Shear Force due to External Loads	Vu	5.29E+05	4.84E+05	3.53E+05	2.06E+05	1.71E+05	2.00E+05	1.71E+05

(2) Checking Nominal Shear Strength of Section during Construction Stage - 2/2

	Unit	Section 8	Section 9	Section 10	Section 11
Sectional Properties					
Depth of Girder	mm	1,650	1,650	1,650	1,650
Width of Deck Slap	mm	600	600	600	600
Depth of Deck Slap	mm	200	200	200	200
Total width of Webs	mm	200	200	569	600
Width of Soffit Slap	mm	600	600	600	600
Depth of Soffit Slap	mm	250	250	250	250
Total Area of Prestressing Cables	mm ²	3,554	3,554	3,554	3,554
Distance from extreme compressive fibre to centroid of Prestressing Cables	mm	1,448	1,231	984	900
Area of Tensile Reinforcement	mm ²	0	0	0	0
Distance from extreme compressive fibre to centroid of Tensile Reinforcement	mm	0	0	0	0
Area of Compressive Reinforcement	mm ²	0	0	0	0
Distance from extreme compressive fibre to centroid of Compressive Reinforcement	mm	0	0	0	0
Calculation of Mr					
Effective shear Depth	mm	1,188	1,188	1,188	1,188
Effective web width	mm	200	200	569	600
Spacing of stirrups	mm	300	150	150	150
Angle of inclination of transverse reinforcement to longitudinal axis of girder	degree	90	90	90	90
Factor indicating ability of diagonally cracked concrete to transmit tension		6.2	6.8	6.4	6.6
Area of shear reinf. within a distance	mm ²	308	616	616	616
Strain in the tensile reinforcement		-0.000156	-0.000220	-0.000173	-0.000184
Inclination angle of diagonal compressive stress	degree	27.00	27.00	27.00	27.00
Component of effective prestressed force in the direction of the applied shear	N	2.14E+05	2.93E+05	3.63E+05	3.87E+05
Nominal Resistance of Concrete	N	7.79E+05	8.46E+05	2.29E+06	2.46E+06
Nominal Resistance of Reinforcement	N	9.33E+05	3.73E+06	3.73E+06	3.73E+06
Nominal Resistance	N	1.93E+06	2.67E+06	6.38E+06	6.58E+06
Resistance factor for shear		0.9	0.9	0.9	0.9
Factored Resistance	N	1.73E+06	2.40E+06	5.74E+06	5.93E+06
Checking					
Factored Moment due to External Loads	N.mm	2.57E+09	1.58E+09	4.18E+08	0.00E+00
Factored Axial Force due to External Loads	N	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Factored Shear Force due to External Loads	N	2.06E+05	3.53E+05	4.84E+05	5.29E+05

(3) Nominal Flexural Strength of Girder at Service Stage (AASHTO LRFD 5.7.3.2.2) -1/2

	Unit	Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section 7
Sectional Properties								
Depth of Girder	mm	1,860	1,860	1,860	1,860	1,860	1,860	1,860
Width of Deck Slab	mm	2,035	2,035	2,035	2,035	2,035	2,035	2,035
Depth of Deck Slab	mm	210	210	210	210	210	210	210
Total width of Webs	mm	600	569	200	200	200	200	200
Width of Soffit Slab	mm	600	600	600	600	600	600	600
Depth of Soffit Slab	mm	250	250	250	250	250	250	250
Total Area of Prestressing Cables	mm ²	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 Prestressing Cables	mm	1,110.0	1,194.0	1,441.0	1,658.0	1,692.0	1,770.0	1,629.0
Area of Tensile Reinforcement	mm ²	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Distance from extreme compressive fibre to centroid of Tensile Reinforcement	mm	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Area of Compressive Reinforcement	mm ²	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Distance from extreme compressive fibre to centroid of Compressive Reinforcement	mm	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Calculation of Mr								
Stress block factor		0.76	0.76	0.76	0.76	0.76	0.76	0.76
Distance from extreme compressive fibre to the Neutral Axis	mm	383	405	1,020	1,047	1,051	1,059	1,051
Depth of equivalent stress block	mm	293	309	779	800	803	809	803
Average stress in Prestress steel at nominal bending resistance	Mpa	1,680	1,684	1,491	1,531	1,537	1,548	1,537
Nominal Resistance	N.mm	6.08E+09	6.62E+09	8.42E+09	9.80E+09	1.00E+10	1.05E+10	1.00E+10
Flexural Resistance factor		1.0	1.0	1.0	1.0	1.0	1.0	1.0
Factored Resistance	N.mm	5.08E+09	6.62E+09	8.42E+09	9.80E+09	1.00E+10	1.05E+10	1.00E+10
Checking								
Factored Bending Moment due to External Loads	N.mm	7.72E+08	4.54E+08	1.83E+09	3.22E+09	3.47E+09	4.19E+09	3.77E+09

(3) Nominal Flexural Strength of Girder at Service Stage (AASHTO LRFD 5.7.3.2.2) -2/2

	Unit	Section 8	Section 9	Section 10	Section 11	Section 12
Sectional Properties						
Depth of Girder	mm	1,860	1,860	1,860	1,860	1,860
Width of Deck Slab	mm	2,035	2,035	2,035	2,035	2,035
Depth of Deck Slab	mm	210	210	210	210	210
Total width of Webs	mm	200	200	569	600	600
Width of Soffit Slab	mm	600	600	600	600	600
Depth of Soffit Slab	mm	250	250	250	250	250
Total Area of Prestressing Cables	mm ²	3,553.6	3,553.6	3,553.6	3,553.6	0.0
Distance from extreme compressive fibre to centroid of Prestressing Cables	mm	1,658.0	1,441.0	1,194.0	1,110.0	1,860.0
Area of Tensile Reinforcement	mm ²	0.0	0.0	0.0	0.0	7,603.0
Distance from extreme compressive fibre to centroid of Tensile Reinforcement	mm	0.0	0.0	0.0	0.0	1,755.0
Area of Compressive Reinforcement	mm ²	0.0	0.0	0.0	0.0	0.0
Distance from extreme compressive fibre to centroid of Compressive Reinforcement	mm	0.0	0.0	0.0	0.0	1,860.0
Calculation of Mr						
Stress block factor		0.76	0.76	0.76	0.76	0.76
Distance from extreme compressive fibre to the Neutral Axis	mm	1,047	1,020	405	383	190
Depth of equivalent stress block	mm	800	779	309	293	145
Average stress in Prestress steel at nominal bending resistance	Mpa	1,531	1,491	1,684	1,680	1,807
Nominal Resistance	N.mm	9.80E+09	8.42E+09	6.62E+09	6.08E+09	4.99E+09
Flexural Resistance factor		1.0	1.0	1.0	1.0	0.8
Factored Resistance	N.mm	9.80E+09	8.42E+09	6.62E+09	6.08E+09	3.74E+09
Checking						
Factored Bending Moment due to External Loads	N.mm	3.58E+09	2.25E+09	6.21E+08	6.37E+07	7.72E+08

(4) Checking Nominal Shear Strength of Section at Service Stage - 1/2

	Unit	Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section 7
Sectional Properties								
Depth of Girder	mm	1,860	1,860	1,860	1,860	1,860	1,860	1,860
Width of Deck Slap	mm	2,035	2,035	2,035	2,035	2,035	2,035	2,035
Depth of Deck Slap	mm	210	210	210	210	210	210	210
Total width of Webs	mm	600	569	200	200	200	200	200
Width of Soffit Slap	mm	600	600	600	600	600	600	600
Depth of Soffit Slap	mm	250	250	250	250	250	250	250
Total Area of Prestressing Cables	mm ²	3,554	3,554	3,554	3,554	3,554	3,554	3,554
Distance from extreme compressive fibre to centroid of Prestressing Cables	mm	1,110	1,194	1,441	1,658	1,692	1,770	1,692
Area of Tensile Reinforcement	mm ²	0	0	0	0	0	0	0
Distance from extreme compressive fibre to centroid of Tensile Reinforcement	mm	0	0	0	0	0	0	0
Area of Compressive Reinforcement	mm ²	0	0	0	0	0	0	0
Distance from extreme compressive fibre to centroid of Compressive Reinforcement	mm	0	0	0	0	0	0	0
Calculation of Mr								
Effective shear Depth	mm	1,339	1,339	1,339	1,339	1339b	1,339	1,339
Effective web width	mm	600	569	200	200	200	200	200
Spacing of stirrups	mm ²	150	150	150	300	300	300	300
Angle of inclination of transverse reinforcement to longitudinal axis of girder	degree	90	90	90	90	90	90	90
Factor indicating ability of diagonally cracked concrete to transmit tension		5.8	5.9	6.2	5.7	5.6	5.4	5.5
Area of shear reinf. within a distances	mm ²	616	616	616	308	308	308	308
Strain in the tensile reinforcement		-0.000117	-0.000130	-0.000168	-0.000105	-0.000098	-0.000069	-0.000084
Inclination angle of diagonal compressive stress	degree	27.00	27.00	24.49	27.00	27.00	27.00	27.00
Component of effective prestressed force in the direction of the applied shear	N	-3.89E+05	-3.65E+05	-2.94E+05	-2.14E+05	-1.30E+05	0.00E+00	1.31E+05
Nominal Resistance of Concrete	N	2.45E+06	2.38E+06	8.69E+05	7.99E+05	7.89E+05	7.59E+05	7.74E+05
Nominal Resistance of Reinforcement	N	4.21E+06	4.21E+06	4.71E+06	1.05E+06	1.05E+06	1.05E+06	1.05E+06
Nominal Resistance	N	6.27E+06	6.22E+06	2.38E+06	1.64E+06	1.71E+06	1.81E+06	1.96E+06
Resistance factor for shear	ϕ	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Factored Resistance	N	5.64E+06	5.60E+06	2.15E+06	1.47E+06	1.54E+06	1.63E+06	1.76E+06
Checking								
Factored Moment due to External Loads	N.mm	7.72E+08	4.54E+08	1.83E+09	3.22E+09	3.47E+09	4.19E+09	3.77E+09
Factored Axial Force due to External Loads	N	0.00E+00	2.74E+05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Factored Shear Force due to External Loads	N	8.92E+05	8.29E+05	6.32E+05	3.97E+05	3.38E+05	1.08E+05	2.57E+05

(4) Checking Nominal Shear Strength of Section at Service Stage - 2/2

	Unit	Section 8	Section 9	Section 10	Section 11
Sectional Properties					
Depth of Girder	mm	1,860	1,860	1,860	1,860
Width of Deck Slap	mm	2,035	2,035	2,035	2,035
Depth of Deck Slap	mm	210	210	210	210
Total width of Webs	mm	200	200	569	600
Width of Soffit Slap	mm	600	600	600	600
Depth of Soffit Slap	mm	250	250	250	250
Total Area of Prestressing Cables	mm ²	3,554	3,554	3,554	3,554
Distance from extreme compressive fibre to centroid of Prestressing Cables	mm	1,658	1,441	1,194	1,110
Area of Tensile Reinforcement	mm ²	0	0	0	0
Distance from extreme compressive fibre to centroid of Tensile Reinforcement	mm	0	0	0	0
Area of Compressive Reinforcement	mm ²	0	0	0	0
Distance from extreme compressive fibre to centroid of Compressive Reinforcement	mm	0	0	0	0
Calculation of Mr					
Effective shear Depth	mm	1,339	1,339	1,339	1,339
Effective web width	mm	200	200	569	600
Spacing of stirrups	mm	300	150	150	150
Angle of inclination of transverse reinforcement to longitudinal axis of girder	degree	90	90	90	90
Factor indicating ability of diagonally cracked concrete to transmit tension		5.6	6.3	6.0	6.1
Area of shear reinf. within a distances	mm ²	308	616	616	616
Strain in the tensile reinforcement		-0.000092	-0.000162	-0.000133	-0.000143
Inclination angle of diagonal compressive stress	degree	27.00	27.00	27.00	27.00
Component of effective prestressed force in the direction of the applied shear	N	2.14E+05	2.93E+05	3.63E+05	3.87E+05
Nominal Resistance of Concrete	N	7.83E+05	8.89E+05	2.39E+06	2.57E+06
Nominal Resistance of Reinforcement	N	1.05E+06	4.21E+06	4.21E+06	4.21E+06
Nominal Resistance	N	2.05E+06	2.97E+06	6.97E+06	7.17E+06
Resistance factor for shear		0.9	0.9	0.9	0.9
Factored Resistance	N	1.84E+06	2.67E+06	6.27E+06	6.45E+06
Checking					
Factored Moment due to External Loads	N.mm	3.58E+09	2.25E+09	6.21E+08	6.37E+07
Factored Axial Force due to External Loads	N	0.00E+00	0.00E+00	2.74E+05	3.87E+05
Factored Shear Force due to External Loads	N	2.56E+05	4.47E+05	6.36E+05	7.00E+05

Stress checking during construction stage (AASHTO 5.9.4.2)

Checking Stress during construction stage
 Load Combinations for Checking Stress during construction stage

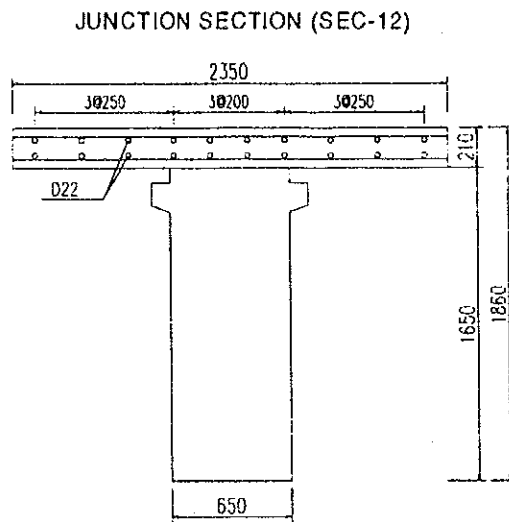
COMBINATION 14			
Load type	Factor		
Girder Selfweight G_DC	1.00		
Slab+Dia. Selfweight S_DC	1.00		
Prestress PS	1.00		
Section	N(T)	V(T)	M(T.m)
SEC-1	374.55	-3.61	0.00
SEC-2	374.55	-4.23	-41.18
SEC-3	381.16	-5.87	-57.50
SEC-4	388.39	-7.65	-79.21
SEC-5	393.64	-1.63	-83.23
SEC-6	395.96	0.00	-92.53
SEC-7	393.64	1.67	-82.79
SEC-8	388.39	7.63	-78.75
SEC-9	381.16	5.77	-57.12
SEC-10	374.55	4.08	-41.13
SEC-11	374.55	3.47	0.00

Section	COMBINATION 14	
	$\sigma_1(\text{T/m}^2)$	Checking
SEC-1	363.87	OK
SEC-2	254.98	OK
SEC-3	382.51	OK
SEC-4	311.19	OK
SEC-5	107.14	OK
SEC-6	275.01	OK
SEC-7	108.60	OK
SEC-8	313.05	OK
SEC-9	384.06	OK
SEC-10	255.14	OK
SEC-11	363.87	OK

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

Section	COMBINATION 11			COMBINATION 12			COMBINATION 13		
	N(T)	V(T)	M(T.m)	N(T)	V(T)	M(T.m)	N(T)	V(T)	M(T.m)
SEC-1	456.21	19.38	45.89	456.21	6.84	-6.47	460.45	8.15	33.47
SEC-2	433.47	17.20	10.63	433.47	4.94	-33.99	437.55	6.25	-1.02
SEC-3	366.88	10.18	10.41	366.88	-1.08	-18.74	370.39	0.30	-2.18
SEC-4	322.02	1.56	9.14	322.02	-9.11	-28.87	325.54	-6.79	-16.99
SEC-5	334.96	5.81	9.87	334.96	-4.70	-31.62	339.22	-2.08	-20.11
SEC-6	302.14	3.19	14.20	302.14	-3.94	-34.71	305.68	-1.39	-25.85
SEC-7	334.96	-3.38	9.43	334.96	-10.49	-37.45	339.22	-6.02	-30.89
SEC-8	322.02	7.59	8.80	322.02	-0.51	-35.00	325.54	4.95	-29.22
SEC-9	366.88	-1.09	1.32	366.88	-9.73	-23.86	370.39	-2.42	-21.07
SEC-10	433.47	-7.13	-19.24	433.47	-16.47	-25.41	437.55	-7.99	-24.48
SEC-11	456.21	-9.03	9.87	456.21	-18.83	6.64	460.45	-9.88	8.65

Stress Check at Junction of the Girders



Moment due to Service Load	M=	45.9 tf.m	
Tensile Reinforcement	As=2xD22 (Nos=2x10=20)		
Stress of Concrete	fcj=	101.6 t/m ²	< 1835.5 t/m ²
Stress of Tensile Reinf.	fs=	-298.1 t/m ²	> -17896.1 t/m ²

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

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
 Required area of reinforcement:
 $A_v \geq \max \{0.35 b_v / f_y; (V_h - c b_v - \mu P_c) / \mu f_y\}$
 Width of the interface between the girder and the deck:
 Yield strength of reinforcement
 Cohesion factor
 Friction factor
 Permanent net compressive force normal to the shear plan

$V_h = V_u / d_e$
 d_e
 A_v
 $b_v = 600$ mm
 $f_y = 390$ MPa
 $c = 0.17$ MPa
 $\mu = 0.7$
 $P_c = 58750$ N

Section	SEC-1	SEC-2	SEC-3	SEC-4	SEC-5	SEC-6	SEC-7	SEC-8	SEC-9	SEC-10	SEC-11
d_s (mm)	1005	1089	1336	1553	1587	1665	1587	1553	1336	1089	1005
Interface Shear(N):											
Girder Selfweight G_DC	198978	179336	127238	74409	61759	1	-61759	-74408	-127238	-179336	-198978
Slab+Dia. Selfweight S_D	147002	137021	103446	60495	50211	0	-50211	-60495	-103446	-137020	-147002
Surface + Railings DW	143878	131316	89064	37063	24120	14560	-46832	2317	-51735	-89816	-102377
Max. Live Load LL_MAX	103574	100934	91017	76891	72664	42200	24314	24327	12234	7946	7887
Min. Live Load LL_MIN	-12051	-12088	-12737	-21404	-24138	-23476	-41236	-50354	-67419	-78163	-82431
Max. Impact IM_MAX	34180	33308	30036	25374	23979	13926	8024	8028	4037	2622	2603
Min. Impact IM_MIN	-3977	-3989	-4203	-7063	-7966	-7747	-13608	-16617	-22248	-25794	-27202
Creep Diff. CR_D	697806	478528	225170	-736664	-679326	-1006300	-679326	-736664	-225174	-478526	-697806
Shrinkage Diff. SH_D	61525	59278	50876	51199	61986	51490	61986	51199	50876	59278	61525
Temperature Diff. TG	83059	80025	68682	69119	83681	69511	83681	69119	68682	80025	83059
Creep CR	-28555	-28556	-28553	-28559	-28553	-28183	-28555	-28557	-28551	-28557	-28559
Total	1441447	1171190	306636	-370675	-329479	-842795	-688679	-745134	-400315	193668	375964
Min	1287665	1020872	168643	-501407	-458225	-930145	-775860	-844459	-506253	79142	255842
Max	5129	-4139	972	1686	1527	3256	2691	2942	1703	558	1226
Area of Stirrups (mm ²)	3695	3695	3695	924	924	924	924	924	3695	3695	3695
Area of Dowel bars (mm ²)	(D14@150)	(D14@150)	(D14@150)	(D14@300)	(D14@300)	(D14@300)	(D14@300)	(D14@300)	(D14@150)	(D14@150)	(D14@150)
Total Connector Area (mm ²)	7464	7464	7464	4694	4694	4694	4694	4694	7464	7464	7464
Checking	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK

Design of Deck Slab

Summary of Bending Moment:

Bending Moment due to Live Load:

(a) Continuous Slab

1) Effective Span Length	1.700 m	
2) Load	10.000 T	
3) Impact Factor IM	33%	
4) Positive Moment	$M=0.8*(1+IM)*(0.12S+0.07)$	2.92 T.m/m
5) Negative Moment	$M=-(1+IM)*(0.15S+0.125)*$	-5.05 T.m/m

(2) Cantilever Slab

1) Effective Span Length	0.100 m < 0.5m --> ignore	
2) Load	10.000 T	
3) Impact Factor IM	33%	
4) Negative Moment		M= 0.00 T.m/m

Bending Moment due to Self-weight of Slab:

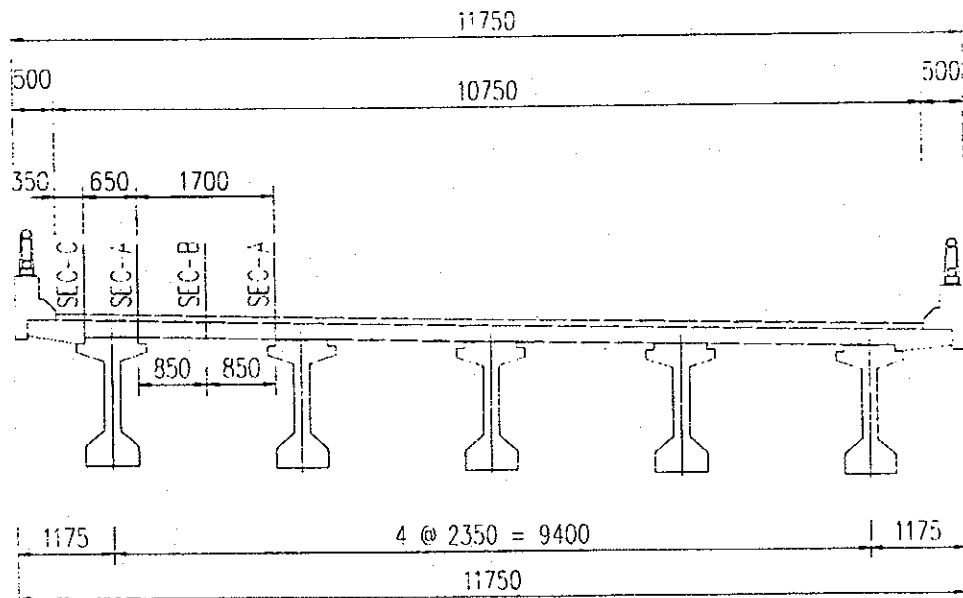
Section	A	B	C
Bending Moment (T.m)	-0.152	0.152	-0.150

Bending Moment due to Asphalt Concrete:

Section	A	B	C
Bending Moment (T.m)	-0.050	0.050	-0.030

Bending Moment due to Parapet & Railings:

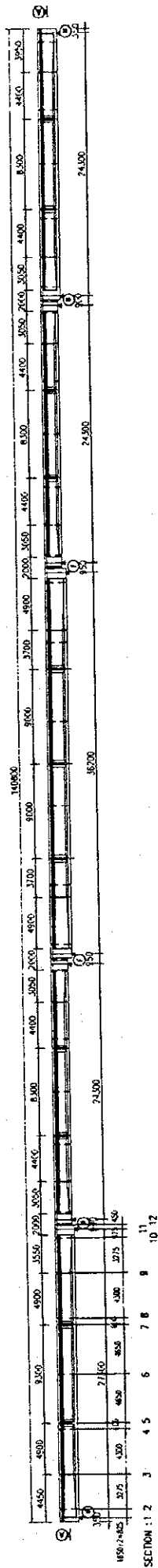
Section	A	B	C
Bending Moment (T.m)	0.000	0.000	-0.424



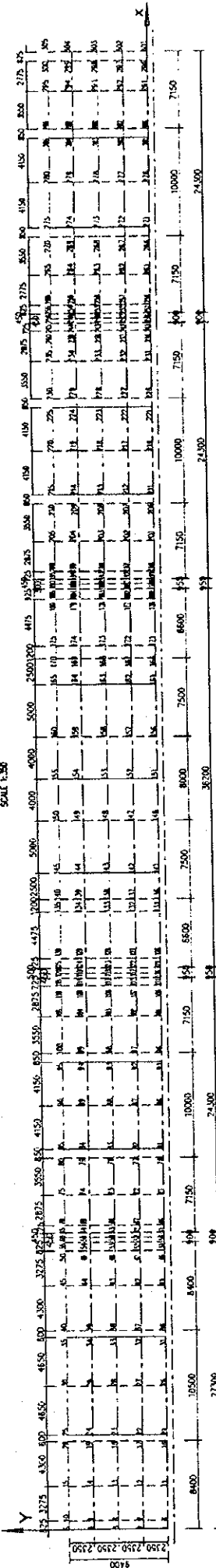
Checking Nominal Flexural Strength of Deck Slab (Article 5.7.3.2.2 AASHTO)

	Section A	Section B	Section C
Sectional Properties			
Depth of Slab	H 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_{st} 162 mm	162 mm	162 mm
Area of Compressive Reinforcement	A_{sc} 0 mm ²	0 mm ²	0 mm ²
Distance from extreme compressive fibre to centroid of Compressive Reinforcement	d_{sc} 48 mm	48 mm	48 mm
Calculation of Mr			
Stress block factor	β_1 0.76	0.76	0.76
Distance from extreme compressive fibre to the Neutral Axis	c 28 mm	28 mm	28 mm
Depth of equivalent stress block	a 22 mm	22 mm	22 mm
Nominal Resistance	Min 111,144,141 N.mm	111,144,141 N.mm	111,144,141 N.mm
Flexural Resistance factor	ϕ 0.9	0.9	0.9
Factored Resistance	Mr 100,029,726 N.mm	100,029,726 N.mm	100,029,726 N.mm
Checking			
Factored Bending Moment due to External Loads	Mu 91,089,350 N.mm	53,663,150 N.mm	7,617,528 N.mm
	OK	OK	OK

5 CONTINUOUS SPANS L=28m+25m+37m+2@25m
ELEVATION
SCALE 1:300



SECTION A - A
SCALE 1:300



Summary of Sectional Forces:

Section	S.W of girder			S.W of Deck Slab+Diaphragms			S.W of Surface		
	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	24.15	0.00	0.00	16.84	0.00	0.00	11.62	-1.21
SEC-2	0.00	21.98	19.03	0.00	15.82	13.47	0.00	10.34	7.85
SEC-3	0.00	15.24	79.96	0.00	11.78	58.68	0.00	5.25	33.37
SEC-4	0.00	8.38	130.73	0.00	6.48	97.94	0.00	-0.81	44.03
SEC-5	0.00	7.42	135.47	0.00	5.74	101.60	0.00	-1.74	43.26
SEC-6	0.00	0.00	152.71	0.00	0.00	114.94	0.00	-1.79	51.65
SEC-7	0.00	-7.42	135.47	0.00	-5.74	101.60	0.00	-8.76	27.75
SEC-8	0.00	-8.38	130.73	0.00	-6.48	97.94	0.00	-3.43	26.08
SEC-9	0.00	-15.24	79.96	0.00	-11.78	58.68	0.00	-10.11	-3.02
SEC-10	0.00	-21.98	19.03	0.00	-15.82	13.47	0.00	-14.87	-43.20
SEC-11	0.00	-24.15	0.00	0.00	-16.84	0.00	0.00	-16.15	-55.99

Section	Prestress			LiveLoad max			LiveLoad min		
	N (tf)	V (tf)	M (tf.m)	N (tf)	V (tf)	M (tf.m)	N (tf)	V (tf)	M (tf.m)
SEC-1	376.48	-35.59	0.00	0.00	8.73	1.80	0.00	-0.68	-1.75
SEC-2	376.48	-33.67	-58.07	0.00	8.32	5.55	0.00	-0.69	-0.44
SEC-3	383.70	-26.85	-160.66	0.00	6.75	25.37	0.00	-1.06	-2.24
SEC-4	391.44	-19.10	-256.30	0.00	5.35	43.27	0.00	-2.87	-5.29
SEC-5	395.85	-11.30	-265.79	0.00	5.08	44.92	0.00	-3.17	-5.74
SEC-6	397.25	0.00	-297.30	0.00	2.53	44.14	0.00	-4.66	-7.77
SEC-7	395.85	11.37	-265.38	0.00	1.26	32.95	0.00	-6.56	-10.06
SEC-8	391.44	19.10	-255.85	0.00	2.43	30.31	0.00	-8.14	-10.31
SEC-9	383.70	26.77	-160.35	0.00	1.48	13.74	0.00	-9.87	-15.47
SEC-10	376.48	33.58	-58.06	0.00	1.17	12.23	0.00	-10.71	-36.33
SEC-11	376.48	35.59	0.00	0.00	1.16	12.93	0.00	-10.96	-43.18

Section	Differential Creep			Differential Shrinkage			Differential Temperature		
	N (tf)	V (tf)	M (tf.m)	N (tf)	V (tf)	M (tf.m)	N (tf)	V (tf)	M (tf.m)
SEC-1	72.79	0.00	8.45	6.58	0.00	0.65	8.88	0.00	0.88
SEC-2	50.64	0.00	6.04	6.36	0.00	0.63	8.59	0.00	0.85
SEC-3	-32.45	0.00	-2.94	5.39	0.00	0.53	7.28	0.00	0.72
SEC-4	-93.19	0.00	-9.70	5.43	0.00	0.53	7.33	0.00	0.72
SEC-5	-83.88	0.00	-8.85	6.62	0.00	0.66	8.94	0.00	0.89
SEC-6	-119.86	0.00	-12.66	5.45	0.00	0.54	7.36	0.00	0.73
SEC-7	-83.88	0.00	-8.85	6.62	0.00	0.66	8.94	0.00	0.89
SEC-8	-93.19	0.00	-9.70	5.43	0.00	0.53	7.33	0.00	0.72
SEC-9	-32.45	0.00	-2.94	5.39	0.00	0.53	7.28	0.00	0.72
SEC-10	50.64	0.00	6.04	6.36	0.00	0.63	8.59	0.00	0.85
SEC-11	72.79	0.00	8.45	6.58	0.00	0.65	8.88	0.00	0.88

Section	Secondary force due to Creep			Impact max			Impact min		
	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	0.72	0.00	0.00	2.88	0.59	0.00	-0.23	-0.58
SEC-2	0.00	0.95	0.79	0.00	2.74	1.83	0.00	-0.23	-0.15
SEC-3	0.00	0.95	3.90	0.00	2.23	8.37	0.00	-0.35	-0.74
SEC-4	0.00	0.95	8.00	0.00	1.76	14.28	0.00	-0.95	-1.75
SEC-5	0.00	0.95	8.57	0.00	1.68	14.82	0.00	-1.05	-1.90
SEC-6	0.00	0.99	12.99	0.00	0.83	14.56	0.00	-1.54	-2.57
SEC-7	0.00	0.95	17.42	0.00	0.42	10.87	0.00	-2.17	-3.32
SEC-8	0.00	0.95	17.99	0.00	0.80	10.00	0.00	-2.69	-3.40
SEC-9	0.00	0.95	22.08	0.00	0.49	4.54	0.00	-3.26	-5.11
SEC-10	0.00	0.95	25.20	0.00	0.38	4.04	0.00	-3.54	-11.99
SEC-11	0.00	1.14	25.98	0.00	0.38	4.27	0.00	-3.62	-14.25

(1) Nominal Flexural Strength of Girder during Construction Stage (AASHTO LRFD 5.7.3.2.2) - 1/2

	Unit	Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section 7
Sectional Properties								
Depth of Girder	mm	1,650	1,650	1,650	1,650	1,650	1,650	1,650
Width of Deck Slap	mm	650	650	650	650	650	650	650
Depth of Deck Slap	mm	250	210	210	210	210	210	210
Total width of Webs	mm	650	569	200	200	200	200	200
Width of Siffit Slap	mm	650	650	650	650	650	650	650
Depth of Soffit Slap	mm	250	250	250	250	250	250	250
Total Area of Prestressing Cables	mm ²	3,553.6	3,353.6	3,553.6	3,353.6	3,553.6	3,553.6	3,353.6
Distance from extreme compressive fibre to centroid of Tensile Reinforcement	mm	771.0	957.0	1,224.0	1,458.0	1,480.0	1,560.0	1,480.0
Area of Tensile Reinforcement	mm ²	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Distance from extreme compressive fibre to centroid of Tensile Reinforcement	mm	1,650.0	1,650.0	0.0	0.0	0.0	0.0	0.0
Area of Compressive Reinforcement	mm ²	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Distance from extreme compressive fibre of Compressive Reinforcement	mm	1,650.0	1,650.0	0.0	0.0	0.0	0.0	0.0
Calculation of Mr								
Stress block factor		0.76	0.76	0.76	0.76	0.76	0.76	0.76
Distance from extreme compressive fibre Neutral Axis	mm	343	395	985	1,022	1,025	1,035	1,025
Depth of equivalent stress block	mm	262	302	753	781	783	791	783
Average stress in Prestress stell at nominal bending resistance	Mpa	1,629	1,645	1,441	1,495	1,499	1,514	1,499
Nominal Resistance	N.mm	3.70E+09	4.73E+09	5.01E+09	6.37E+09	6.50E+09	6.98E+09	6.50E+09
Flexural Resistance factor		1.0	1.0	1.0	1.0	1.0	1.0	1.0
Factored Resistance	N.mm	3.70E+09	4.73E+09	5.01E+09	6.37E+09	6.50E+09	6.98E+09	6.50E+09
Checking								
Factored Bending Moment due to External Loads	N.mm	0.00E+00	4.88E+08	2.08E+09	3.43E+09	3.56E+09	4.01E+09	3.56E+09

(1) Nominal Flexural Strength of Girder during Construction Stage (AASHTO LRFD 5.7.3.2.2) -2/2

	Unit	Section 8	Section 9	Section 10	Section 11
Sectional Properties					
Depth of Girder	mm	1,650	1,650	1,650	1,650
Width of Deck Slap	mm	650	650	650	650
Depth of Deck Slap	mm	210	210	210	250
Total width of Webs	mm	200	200	569	650
Width of Siffit Slap	mm	650	650	650	650
Depth of Soffit Slap	mm	250	250	250	250
Total Area of Prestressing Cables					
Distance from extreme compressive fibre to centroid of Tensile Reinforcement	mm	1,458.0	1,224.0	957.0	771.0
Area of Tensile Reinforcement	mm ²	0.0	0.0	0.0	0.0
Distance from extreme compressive fibre to centroid of Tensile Reinforcement	mm	0.0	0.0	0.0	1,650.0
Area of Compressive Reinforcement	mm ²	0.0	0.0	0.0	0.0
Distance from extreme compressive fibre of Compressive Reinforcement	mm	0.0	0.0	0.0	1,650.0
Calculation of Mr					
Stress block factor		0.76	0.76	0.76	0.76
Distance from extreme compressive fibre Neutral Axis	mm	1,022	985	395	343
Depth of equivalent stress block	mm	781	753	302	262
Average stress in Prestress stell at nominal bending resistance	Mpa	1,495	1,441	1,645	1,629
Nominal Resistance	N.mm	6.37E+09	5.01E+09	4.73E+09	3.70E+09
Flexural Resistance factor		1.0	1.0	1.0	1.0
Factored Resistance	N.mm	6.37E+09	5.01E+09	4.73E+09	3.70E+09
Checking					
Factored Bending Moment due to External Loads	N.mm	3.43E+09	2.08E+09	4.88E+08	0.00E+00

(2) Checking Nominal Shear Strength of Section during Construction Stage - 1/2

	Unit	Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section 7
Sectional Properties								
Depth of Girder	mm	1,650	1,650	1,650	1,650	1,650	1,650	1,650
Width of Deck Slap	mm	650	650	650	650	650	650	650
Depth of Deck Slap	mm	210	210	210	210	210	210	210
Total width of Webs	mm	650	569	200	200	200	200	200
Width of Soffit Slap	mm	650	650	650	650	650	650	650
Depth of Soffit Slap	mm	250	250	250	250	250	250	250
Total Area of Prestressing Cables	mm ²	3,554	3,554	3,554	3,554	3,554	3,554	3,554
Distance from extreme compressive fibre to centroid of Prestressing Cables	mm	879	957	1,224	1,458	1,480	1,560	1,480
Area of Tensile Reinforcement	mm ²	0	0	0	0	0	0	0
Distance from extreme compressive fibre to centroid of Tensile Reinforcement	mm	0	0	0	0	0	0	0
Area of Compressive Reinforcement	mm ²	0	0	0	0	0	0	0
Distance from extreme compressive fibre to centroid of Compressive Reinforcement	mm	0	0	0	0	0	0	0
Calculation of Mr								
Effective shear Depth	mm	1,188	1,188	1,188	1,188	1,188	1,188	1,188
Effective web width	mm	650	569	200	200	200	200	200
Spacing of stirrups	mm	150	150	150	300	300	300	300
Angle of inclination of transverse reinforcement to longitudinal axis of girder	degree	90	90	90	90	90	90	90
Factor indicating ability of diagonally cracked concrete to transmit tension		6.4	6.3	6.4	5.5	5.5	5.3	5.5
Area of shear reinf. within a distance	mm ²	616	616	616	308	308	308	308
Strain in the tensile reinforcement		-0.000167	-0.000161	-0.000167	-0.000080	-0.000076	-0.000059	-0.000076
Inclination angle of diagonal compressive stress	degree	27.00	27.00	26.91	27.00	27.00	27.00	27.00
Component of effective prestressed force in the direction of the applied shear	N	-3.56E+05	-3.37E+05	-2.68E+05	-1.91E+05	-1.13E+05	0.00E+00	1.14E+05
Nominal Resistance of Concrete	N	2.59E+06	2.24E+06	7.94E+05	6.83E+05	6.80E+05	6.63E+05	6.80E+05
Nominal Resistance of Reinforcement	N	3.73E+06	3.73E+06	3.75E+06	9.33E+05	9.33E+05	9.33E+05	9.33E+05
Nominal Resistance	N	5.96E+06	5.63E+06	2.11E+06	1.43E+06	1.50E+06	1.60E+06	1.73E+06
Resistance factor for shear		0.9	0.9	0.9	0.9	0.9	0.9	0.9
Factored Resistance	N	5.37E+06	5.07E+06	1.90E+06	1.28E+06	1.35E+06	1.44E+06	1.55E+06
Checking								
Factored Moment due to External Loads	N.mm	0.00E+00	4.88E+08	2.08E+09	3.43E+09	3.56E+09	4.01E+09	3.56E+09
Factored Axial Force due to External Loads	N	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Factored Shear Force due to External Loads	N	6.15E+05	5.67E+05	4.05E+05	2.23E+05	1.97E+05	0.00E+00	1.97E+05

(2) Checking Nominal Shear Strength of Section during Construction Stage - 2/2

	Unit	Section 8	Section 9	Section 10	Section 11
Sectional Properties					
Depth of Girder	mm	1,650	1,650	1,650	1,650
Width of Deck Slap	mm	650	650	650	650
Depth of Deck Slap	mm	210	210	210	210
Total width of Webs	mm	200	200	569	650
Width of Soffit Slap	mm	650	650	650	650
Depth of Soffit Slap	mm	250	250	250	250
Total Area of Prestressing Cables	mm ²	3,554	3,554	3,554	3,554
Distance from extreme compressive fibre to centroid of Prestressing Cables	mm	1,458	1,224	957	879
Area of Tensile Reinforcement	mm ²	0	0	0	0
Distance from extreme compressive fibre to centroid of Tensile Reinforcement	mm	0	0	0	0
Area of Compressive Reinforcement	mm ²	0	0	0	0
Distance from extreme compressive fibre to centroid of Compressive Reinforcement	mm	0	0	0	0
Calculation of Mr					
Effective shear Depth	mm	1,188	1,188	1,188	1,188
Effective web width	mm	200	200	569	650
Spacing of stirrups	mm ²	300	150	150	150
Angle of inclination of transverse reinforcement to longitudinal axis of girder	degree	90	90	90	90
Factor indicating ability of diagonally cracked concrete to transmit tension		5.5	6.4	6.4	6.4
Area of shear reinf. within a distance	mm ²	308	616	616	616
Strain in the tensile reinforcement		-0.000080	-0.000167	-0.000161	-0.000167
Inclination angle of diagonal compressive stress	degree	27.00	27.00	27.00	27.00
Component of effective prestressed force in the direction of the applied shear	N	1.91E+05	2.68E+05	3.36E+05	3.56E+05
Nominal Resistance of Concrete	N	6.83E+05	7.95E+05	2.24E+06	2.59E+06
Nominal Resistance of Reinforcement	N	9.33E+05	3.73E+06	3.73E+06	3.73E+06
Nominal Resistance	N	1.81E+06	2.64E+06	6.31E+06	6.67E+06
Resistance factor for shear		0.9	0.9	0.9	0.9
Factored Resistance	N	1.63E+06	2.38E+06	5.68E+06	6.01E+06
Checking					
Factored Moment due to External Loads	N.mm	3.43E+09	2.08E+09	4.88E+08	0.00E+00
Factored Axial Force due to External Loads	N	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Factored Shear Force due to External Loads	N	2.23E+05	4.05E+05	5.67E+05	6.15E+05

(3) Nominal Flexural Strength of Girder at Service Stage (AASHTO LRFD 5.7.3.2.2) -1/2

	Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section 7
Sectional Properties							
Depth of Girder	1,860	1,860	1,860	1,860	1,860	1,860	1,860
Width of Deck Slab	2,035	2,035	2,035	2,035	2,035	2,035	2,035
Depth of Deck Slab	210	210	210	210	210	210	210
Total width of Webs	650	569	200	200	200	200	200
Width of Soffit Slab	650	650	650	650	650	650	650
Depth of Soffit Slab	250	250	250	250	250	250	250
Total Area of Prestressing Cables	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 Prestressing Cables	1,089.0	1,167.0	1,434.0	1,668.0	1,690.0	1,770.0	1,690.0
Area of Tensile Reinforcement	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Distance from extreme compressive fibre to centroid of Tensile Reinforcement	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Area of Compressive Reinforcement	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Distance from extreme compressive fibre to centroid of Compressive Reinforcement	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Calculation of Mr							
Stress block factor	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Distance from extreme compressive fibre to the Neutral Axis	356	404	1,019	1,048	1,050	1,059	1,050
Depth of equivalent stress block	272	309	779	801	803	809	803
Average stress in Prestress steel at nominal bending resistance	1,690	1,680	1,490	1,533	1,536	1,548	1,536
Nominal Resistance	5.96E+09	6.44E+09	8.38E+09	9.86E+09	1.00E+10	1.05E+10	1.00E+10
Flexural Resistance factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Factored Resistance	5.96E+09	6.44E+09	8.38E+09	9.86E+09	1.00E+10	1.05E+10	1.00E+10
Checking							
Factored Bending Moment due to External Loads	6.92E+07	6.91E+08	2.83E+09	4.52E+09	4.66E+09	5.15E+09	4.19E+09

(3) Nominal Flexural Strength of Girder at Service Stage (AASHTO LRFD 5.7.3.2.2) -2/2

	Unit	Section 8	Section 9	Section 10	Section 11	Section 12
Sectional Properties						
Depth of Girder	mm	1,860	1,860	1,860	1,860	1,860
Width of Deck Slab	mm	2,035	2,035	2,035	2,035	2,035
Depth of Deck Slab	mm	210	210	210	210	210
Total width of Webs	mm	200	200	569	650	650
Width of Soffit Slab	mm	650	650	650	650	650
Depth of Soffit Slab	mm	250	250	250	250	250
Total Area of Prestressing Cables	mm ²	3,553.6	3,553.6	3,553.6	3,553.6	0.0
Distance from extreme compressive fibre to centroid of Prestressing Cables	mm	1,668.0	1,434.0	693.0	771.0	1,860.0
Area of Tensile Reinforcement	mm ²	0.0	0.0	0.0	0.0	7,603.0
Distance from extreme compressive fibre to centroid of Tensile Reinforcement	mm	0.0	0.0	0.0	1,860.0	1,755.0
Area of Compressive Reinforcement	mm ²	0.0	0.0	0.0	0.0	0.0
Distance from extreme compressive fibre to centroid of Compressive Reinforcement	mm	0.0	0.0	0.0	1,860.0	1,860.0
Calculation of Mr						
Stress block factor		0.76	0.76	0.76	0.76	0.76
Distance from extreme compressive fibre to the Neutral Axis	mm	1,048	1,019	379	343	176
Depth of equivalent stress block	mm	801	779	289	262	134
Average stress in Prestress steel at nominal bending resistance	Mpa	1,533	1,490	1,576	1,629	1,811
Nominal Resistance	N.mm	9.86E+09	8.38E+09	3.08E+09	3.70E+09	5.00E+09
Flexural Resistance factor		1.0	1.0	1.0	1.0	0.8
Factored Resistance	N.mm	9.86E+09	8.38E+09	3.08E+09	3.70E+09	3.75E+09
Checking						
Factored Bending Moment due to External Loads	N.mm	4.00E+09	2.13E+09	6.74E+08	1.19E+09	1.19E+09

(4) Checking Nominal Shear Strength of Section at Service Stage - 1/2

	Unit	Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section 7
Sectional Properties								
Depth of Girder	H	1,860	1,860	1,860	1,860	1,860	1,860	1,860
Width of Deck Slap	bd	2,035	2,035	2,035	2,035	2,035	2,035	2,035
Depth of Deck Slap	hd	210	210	210	210	210	210	210
Total width of Webs	bw	650	569	200	200	200	200	200
Width of Soffit Slap	bs	650	650	650	650	650	650	650
Depth of Soffit Slap	hs	250	250	250	250	250	250	250
Total Area of Prestressing Cables	Ap	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	1,089	1,167	1,434	1,668	1,690	1,770	1,690
Area of Tensile Reinforcement	Ast	0	0	0	0	0	0	0
Distance from extreme compressive fibre to centroid of Tensile Reinforcement	dst	0	0	0	0	0	0	0
Area of Compressive Reinforcement	Asc	0	0	0	0	0	0	0
Distance from extreme compressive fibre to centroid of Compressive Reinforcement	dsc	0	0	0	0	0	0	0
Calculation of Mr								
Effective shear Depth	dv	1,339	1,339	1,339	1,339	1,339	1,339	1,339
Effective web width	bv	650	569	200	200	200	200	200
Spacing of stirrups	s	150	150	150	300	300	300	300
Angle of inclination of transverse reinforcement to longitudinal axis of girder	α	90	90	90	90	90	90	90
Factor indicating ability of diagonally cracked concrete to transmit tension	β	5.9	5.8	5.5	5.0	5.0	4.9	5.2
Area of shear reinf. within a distance	Av	616	616	616	380	308	308	308
Strain in the tensile reinforcement	ex	-0.000124	-0.000119	-0.000103	-0.000022	-0.000021	-0.000001	-0.000047
Inclination angle of diagonal compressive stress	θ	27.00	27.00	25.59	27.00	27.00	27.00	27.00
Component of effective prestressed force in the direction of the applied shear	Vp	-3.56E+05	-3.37E+05	-2.68E+05	-1.91E+05	-1.13E+05	0.00E+00	1.14E+05
Nominal Resistance of Concrete	Vc	2.69E+06	2.33E+06	7.78E+05	7.10E+05	7.08E+05	6.87E+05	7.35E+05
Nominal Resistance of Reinforcement	Vs	4.21E+06	4.21E+06	4.48E+06	1.05E+06	1.05E+06	1.05E+06	1.05E+06
Nominal Resistance	Vn	6.54E+06	6.20E+06	2.41E+06	1.57E+06	1.65E+06	1.74E+06	1.90E+06
Resistance factor for shear	ϕ	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Factored Resistance	Vr	5.89E+06	5.58E+06	2.17E+06	1.41E+06	1.48E+06	1.57E+06	1.71E+06
Checking								
Factored Moment due to External Loads	Mu	6.92E+07	6.91E+08	2.83E+09	4.52E+09	4.66E+09	5.15E+09	4.19E+09
Factored Axial Force due to External Loads	Nu	3.97E+05	2.85E+05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Factored Shear Force due to External Loads	Vu	8.93E+05	8.26E+05	5.78E+05	3.03E+05	2.61E+05	1.15E+05	3.29E+05

(4) Checking Nominal Shear Strength of Section at Service Stage - 2/2

	Unit	Section 8	Section 9	Section 10	Section 11
Sectional Properties					
Depth of Girder	mm	1,860	1,860	1,860	1,860
Width of Deck Slap	mm	2,035	2,035	2,035	2,035
Depth of Deck Slap	mm	210	210	210	210
Total width of Webs	mm	200	200	569	650
Width of Soffit Slap	mm	650	650	650	650
Depth of Soffit Slap	mm	250	250	250	250
Total Area of Prestressing Cables	mm ²	3,554	3,554	3,554	3,554
Distance from extreme compressive fibre to centroid of Prestressing Cables	mm	1,668	1,434	693	771
Area of Tensile Reinforcement	mm ²	0	0	0	0
Distance from extreme compressive fibre to centroid of Tensile Reinforcement	mm	0	0	1,860	1,860
Area of Compressive Reinforcement	mm ²	0	0	0	0
Distance from extreme compressive fibre to centroid of Compressive Reinforcement	mm	0	0	1,860	1,860
Calculation of Mr					
Effective shear Depth	mm	1,339	1,339	1,339	1,339
Effective web width	mm	200	200	569	650
Spacing of stirrups	mm	300	150	150	150
Angle of inclination of transverse reinforcement to longitudinal axis of girder	degree	90	90	90	90
Factor indicating ability of diagonally cracked concrete to transmit tension		5.3	6.2	5.5	5.4
Area of shear reinf. within a distance	mm ²	308	616	616	616
Strain in the tensile reinforcement		-0.000055	-0.000157	-0.000085	-0.000065
Inclination angle of diagonal compressive stress	degree	27.00	27.00	27.00	27.00
Component of effective prestressed force in the direction of the applied shear	N	1.91E+05	2.68E+05	3.36E+05	3.56E+05
Nominal Resistance of Concrete	N	7.44E+05	8.79E+05	2.21E+06	2.45E+06
Nominal Resistance of Reinforcement	N	1.05E+06	4.21E+06	4.21E+06	4.21E+06
Nominal Resistance	N	1.99E+06	2.95E+06	6.08E+06	7.02E+06
Resistance factor for shear		0.9	0.9	0.9	0.9
Factored Resistance	N	1.79E+06	2.65E+06	6.08E+06	6.32E+06
Checking					
Factored Moment due to External Loads	N.mm	4.00E+09	2.13E+09	6.74E+08	1.19E+09
Factored Axial Force due to External Loads	N	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Factored Shear Force due to External Loads	N	3.41E+05	5.57E+05	7.90E+05	8.57E+05

Checking Stress during construction stage
 Load Combinations for Checking Stress during construction stage (AASHTO 5.9.4.2)

COMBINATION 14			
Section	Load type	Factor	
	Girder Selfweight G_DC	1.00	
	Slab+Dia. Selfweight S_D	1.00	
	Prestress PS	1.00	
Section	N(T)	V(T)	M(T.m)
SEC-1	376.48	5.40	0.00
SEC-2	376.48	4.13	-25.57
SEC-3	383.70	0.17	-22.02
SEC-4	391.44	-4.24	-27.64
SEC-5	395.85	1.86	-28.72
SEC-6	397.25	0.00	-29.65
SEC-7	395.85	-1.78	-28.31
SEC-8	391.44	4.25	-27.19
SEC-9	383.70	-0.25	-21.71
SEC-10	376.48	-4.21	-25.55
SEC-11	376.48	-5.40	0.00

Section	COMBINATION 14		
	σ_1 (T/m ²)	Checking	σ_8 (T/m ²)
SEC-1	338.69	OK	338.69
SEC-2	286.02	OK	456.48
SEC-3	507.14	OK	674.28
SEC-4	499.35	OK	704.62
SEC-5	267.77	OK	446.58
SEC-6	502.06	OK	719.20
SEC-7	269.04	OK	445.28
SEC-8	501.04	OK	702.97
SEC-9	508.31	OK	673.13
SEC-10	286.08	OK	456.41
SEC-11	338.69	OK	338.69

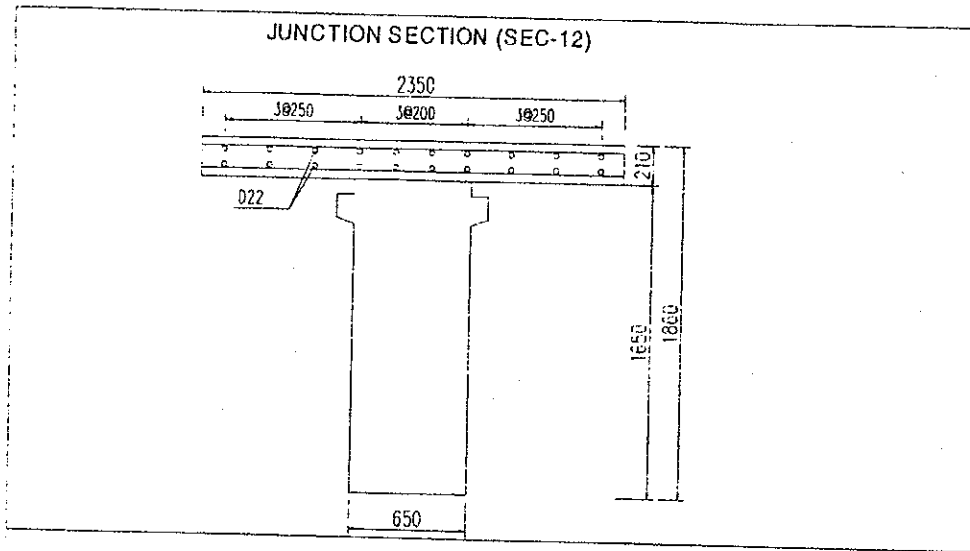
Checking Stress at service stage
Load Combinations for Checking Stress at service stage

Section	COMBINATION II			COMBINATION 12			COMBINATION 13		
	N(T)	V(T)	M(T.m)	N(T)	V(T)	M(T.m)	N(T)	V(T)	M(T.m)
SEC-1	460.29	27.02	10.24	460.29	17.01	6.48	464.73	17.74	8.78
SEC-2	437.78	24.26	-3.93	437.78	14.68	-10.31	442.07	15.42	-9.42
SEC-3	360.28	13.56	40.20	360.28	5.25	10.82	363.92	6.38	13.56
SEC-4	307.34	1.59	61.61	307.34	-7.16	9.95	311.00	-4.10	15.94
SEC-5	323.07	6.48	63.16	323.07	-2.30	9.25	327.54	1.07	15.80
SEC-6	286.53	1.88	70.20	286.53	-5.77	14.97	290.21	-0.81	23.61
SEC-7	323.07	-8.24	44.17	323.07	-16.57	-1.60	327.54	-9.59	9.55
SEC-8	307.34	4.35	40.33	307.34	-6.89	-2.89	311.00	1.77	8.44
SEC-9	360.28	-7.83	9.93	360.28	-19.91	-21.16	363.92	-9.40	-4.34
SEC-10	437.78	-16.89	-23.44	437.78	-29.53	-75.11	442.07	-18.13	-36.03
SEC-11	460.29	-19.18	-6.71	460.29	-32.07	-66.40	464.73	-20.41	-20.02

Stress checking at service stage (AASHTO 5.9.4.2)

Section	COMBINATION 11		COMBINATION 12		COMBINATION 13	
	σ_1 (T/m ²)	Checking	σ_1 (T/m ²)	Checking	σ_1 (T/m ²)	Checking
SEC-1	309.52	OK	278.50	OK	310.91	OK
SEC-2	298.79	OK	310.98	OK	296.20	OK
SEC-3	371.37	OK	239.62	OK	350.46	OK
SEC-4	341.20	OK	142.20	OK	303.34	OK
SEC-5	273.49	OK	86.07	OK	228.73	OK
SEC-6	329.26	OK	104.36	OK	290.82	OK
SEC-7	254.38	OK	123.30	OK	222.44	OK
SEC-8	321.97	OK	191.71	OK	296.56	OK
SEC-9	343.77	OK	311.24	OK	334.14	OK
SEC-10	279.02	OK	351.70	OK	269.24	OK
SEC-11	292.25	OK	312.56	OK	281.57	OK
			305.68	OK	286.07	OK
			292.32	OK	324.30	OK
			344.58	OK	309.12	OK
			294.52	OK	262.38	OK
			219.23	OK	191.78	OK
			279.65	OK	231.68	OK
			208.31	OK	213.05	OK
			282.92	OK	292.25	OK
			315.42	OK	384.77	OK
			226.68	OK	459.52	OK
			231.43	OK	432.52	OK
					284.33	OK
					325.39	OK
					306.01	OK
					251.85	OK
					181.83	OK
					215.20	OK
					194.09	OK
					269.30	OK
					348.37	OK
					380.93	OK
					342.21	OK

Stress Check at Junction of the Girders



Moment due to Service Load $M = 66.4 \text{ tf.m}$
 Tensile Reinforcement $A_s = 2 \times D22 (\text{Nos} = 2 \times 10 = 20)$
 Stress of Concrete $f_{cj} = 136.1 \text{ t/m}^2 < 1835.5 \text{ t/m}^2$
 Stress of Tensile Reinf. $f_s = -506.7 \text{ t/m}^2 > -17896.1 \text{ t/m}^2$

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

Horizontal Shear per unit length of girder V_h due to Vertical Shear V_u $V_h = V_u / d_e$
 Distance from the centroid of tensile steel to the midthickness of the deck d_e
 Required area of reinforcement: $A_v = \max \{ 0.35 b_v / f_y, (V_h - c b_v - \mu P_c) / \mu f_y \}$
 Width of the interface between the girder and the deck: $b_v = 650 \text{ mm}$
 Yield strength of reinforcement $f_y = 390 \text{ MPa}$
 Cohesion factor $c = 0.17 \text{ MPa}$
 Friction factor $\mu = 0.7$
 Permanent net compressive force normal to the shear plane $P_c = 58750 \text{ N}$

Section	SEC-1	SEC-2	SEC-3	SEC-4	SEC-5	SEC-6	SEC-7	SEC-8	SEC-9	SEC-10	SEC-11
d_e (mm)	984	1062	1329	1563	1585	1665	1585	1563	1329	1062	984
Interface Shear (N):											
Girder Selfweight G_DC	236823	215503	149416	82140	72752	0	-72752	-82140	-149416	-215503	-236823
Slab+Dia. Selfweight S_	165150	155169	115545	63519	56260	0	-56260	-63519	-115545	-155169	-165150
Surface + Railings DW	113929	101367	51502	-7927	-17063	-17570	-85875	-33633	-99105	-145828	-158389
Max. Live Load LL_MAX	85568	81548	66203	52444	49834	24764	12395	23791	14526	11432	11400
Min. Live Load LL_MIN	-6690	-6743	-10406	-28192	-31084	-45711	-64376	-79836	-96829	-105071	-107456
Max. Impact IM_MAX	28237	26911	21847	17307	16445	8172	4090	7851	4794	3773	3762
Min. Impact IM_MIN	-2208	-2225	-3434	-9303	-10258	-15085	-21244	-26346	-31954	-34673	-35461
Creep Diff. CR_D	713863	496611	-318222	-913852	-822532	-1175387	-822532	-913852	-318218	496611	713863
Shrinkage Diff. SH_D	64510	62380	52891	53234	64945	53494	64945	53234	52891	62380	64510
Temperature Diff. TG	87088	84213	71402	71866	87676	72216	87676	71866	71402	84213	87088
Creep CR	7014	9330	9332	9332	9336	9661	9330	9334	9337	9334	11212
Total	1502181	1233033	219916	-571937	-182345	-1024649	-858982	-927070	-529335	151244	331473
Min	1379479	1115605	118027	-679184	-589965	-1118381	-961088	-1064892	-677437	-3705	173394
A_v required (mm ²)	5351	4366	655	2337	2010	3946	3369	3750	2330	403	1063
Area of Stirrups (mm ²)	3695	3695	3695	924	924	924	924	924	3695	3695	3695
Area of Dowel bars (mm ²)	(D14@150)	(D14@150)	(D14@150)	(D14@300)	(D14@300)	(D14@300)	(D14@300)	(D14@300)	(D14@150)	(D14@150)	(D14@150)
Total Connector Area (mm ²)	3770	3770	3770	3770	3770	3770	3770	3770	3770	3770	3770
Checking	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK

Design of Deck Slab

Summary of Bending Moment:

Bending Moment due to Live Load:

(a) Continuous Slab

1) Effective Span Length	1.700 m	
2) Load	10.000 T	
3) Impact Factor IM	33%	
4) Positive Moment	$M=0.8*(1+IM)*(0.12S+0.07)$	2.92 T.m/m
5) Negative Moment	$M=-1*(1+IM)*(0.15S+0.125)*$	-5.05 T.m/m

(2) Cantilever Slab

1) Effective Span Length	0.100 m < 0.5m --> ignore	
2) Load	10.000 T	
3) Impact Factor IM	33%	
4) Negative Moment		M= 0.00 T.m/m

Bending Moment due to Self-weight of Slab:

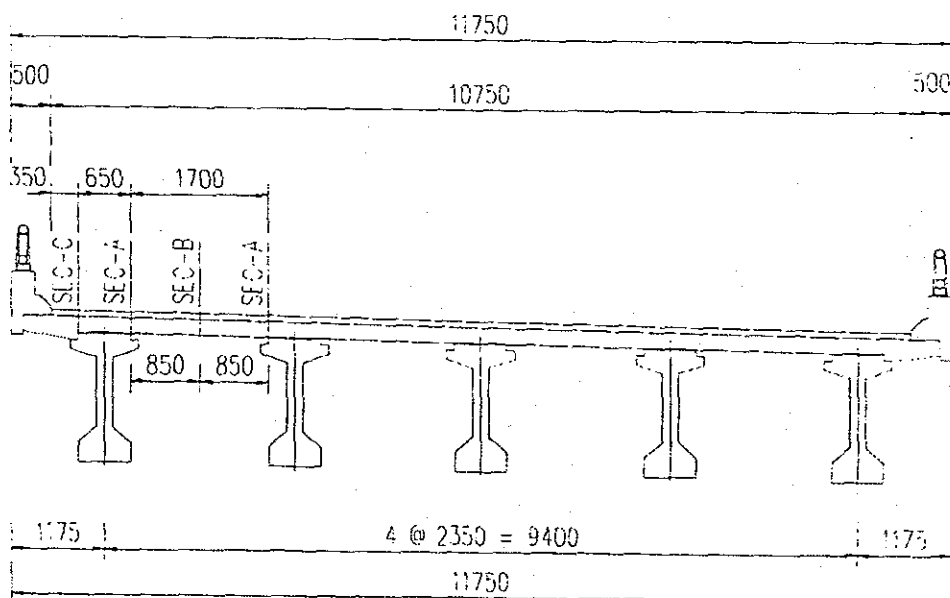
Section	A	B	C
Bending Moment (T.m)	-0.152	0.152	-0.150

Bending Moment due to Asphalt Concrete:

Section	A	B	C
Bending Moment (T.m)	-0.050	0.050	-0.030

Bending Moment due to Parapet & Railings:

Section	A	B	C
Bending Moment (T.m)	0.000	0.000	-0.424



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

	Section A	Section B	Section C
Sectional Properties			
Depth of Slab	H	210 mm	210 mm
Width of Slab	ds	1000 mm	1000 mm
Area of Tensile Reinforcement	A_{st}	1885 mm ²	1885 mm ²
Distance from extreme compressive fibre to centroid of Tensile Reinforcement	d_{st}	162 mm	162 mm
Area of Compressive Reinforcement	A_{sc}	0 mm ²	0 mm ²
Distance from extreme compressive fibre to centroid of Compressive Reinforcement	d_{sc}	48 mm	48 mm
Calculation of Mr			
Stress block factor	β_1	0.76	0.76
Distance from extreme compressive fibre to the Neutral Axis	c	28 mm	28 mm
Depth of equivalent stress block	a	22 mm	22 mm
Nominal Resistance	Mn	111,144,141 N.mm	111,144,141 N.mm
Flexural Resistance factor	ϕ	0.9	0.9
Factored Resistance	Mr	100,029,726 N.mm	100,029,726 N.mm
Checking			
Factored Bending Moment due to External Loads	Mu	53,663,150 N.mm	7,617,528 N.mm
		OK	OK

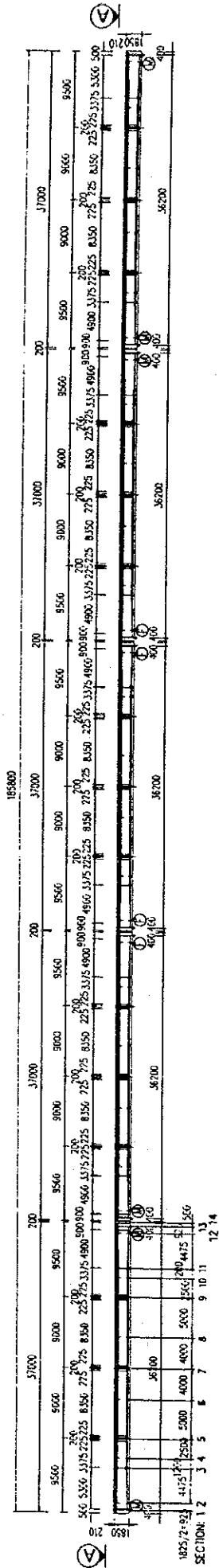
(5) PC COMPOSITE I BEAM (CONNECTED),
CASE 7

Structural Views, Design Sections

5 CONTINUOUS SPANS 5@37.0m, W = 11.75m

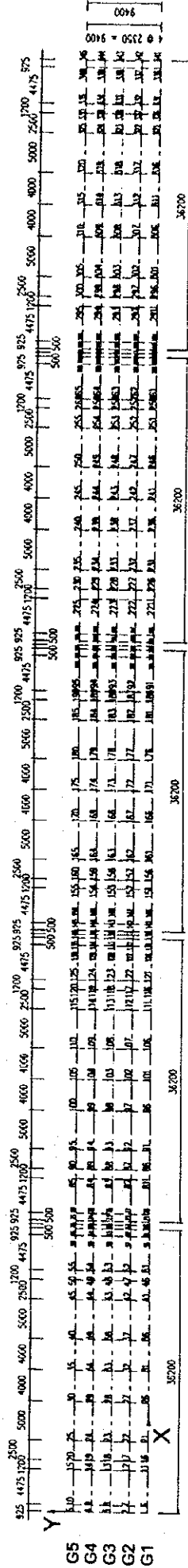
ELEVATION

(SCALE : 1:600)



SECTION A-A

(SCALE : 1:600)



Summary of Sectional Forces:

Section	S.W of girder			S.W of Deck Slab+Diaphragms			S.W of Surface		
	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	35.61	0.00	0.00	22.33	0.00	0.00	13.80	-0.99
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	159.40	0.00	15.67	102.60	0.00	5.41	50.89
SEC-4	0.00	21.48	186.93	0.00	14.19	120.51	0.00	4.06	56.77
SEC-5	0.00	16.84	234.83	0.00	11.10	152.13	0.00	0.18	62.06
SEC-6	0.00	7.54	295.78	0.00	4.94	192.23	0.00	-0.54	78.71
SEC-7	0.00	0.00	311.09	0.00	0.00	202.10	0.00	-6.61	64.70
SEC-8	0.00	-7.54	295.78	0.00	-4.94	192.23	0.00	-5.23	56.20
SEC-9	0.00	-16.84	234.83	0.00	-11.10	152.13	0.00	-12.84	11.42
SEC-10	0.00	-21.48	186.93	0.00	-14.19	120.51	0.00	-10.64	-10.27
SEC-11	0.00	-24.40	159.40	0.00	-15.67	102.60	0.00	-12.51	-24.16
SEC-12	0.00	-32.72	31.60	0.00	-21.19	20.13	0.00	-19.15	-94.18
SEC-13	0.00	-35.61	0.00	0.00	-22.33	0.00	0.00	-20.59	-112.56

Section	Prestress			LiveLoad max			LiveLoad min		
	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	-510.74	0.00	4.26	66.24	0.00	-3.90	-9.91
SEC-7	656.44	0.00	-508.31	0.00	3.17	65.61	0.00	-5.36	-12.61
SEC-8	661.23	7.94	-510.74	0.00	2.18	53.10	0.00	-7.62	-14.37
SEC-9	661.26	24.57	-426.84	0.00	1.11	32.07	0.00	-9.10	-17.88
SEC-10	653.03	35.26	-346.23	0.00	2.09	21.01	0.00	-11.33	-22.78
SEC-11	644.24	42.51	-300.75	0.00	1.87	17.76	0.00	-11.68	-27.09
SEC-12	633.99	50.56	-92.20	0.00	1.37	17.03	0.00	-12.41	-63.68
SEC-13	633.99	54.23	0.00	0.00	1.36	17.99	0.00	-12.61	-72.77

Section	Differential Creep			Differential Shrinkage			Differential Temperature		
	N (tf)	V (tf)	M (tf.m)	N (tf)	V (tf)	M (tf.m)	N (tf)	V (tf)	M (tf.m)
SEC-1	120.24	0.00	13.76	7.10	0.00	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	-8.15	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	-19.15	5.73	0.00	0.57	7.74	0.00	0.77
SEC-7	-190.57	0.00	-20.11	5.73	0.00	0.57	7.74	0.00	0.77
SEC-8	-181.95	0.00	-19.15	5.73	0.00	0.57	7.74	0.00	0.77
SEC-9	-128.48	0.00	-13.22	5.71	0.00	0.57	7.72	0.00	0.77
SEC-10	-82.52	0.00	-8.15	5.71	0.00	0.57	7.70	0.00	0.77
SEC-11	-56.20	0.00	-5.24	5.70	0.00	0.57	7.70	0.00	0.77
SEC-12	89.11	0.00	10.39	6.89	0.00	0.69	9.31	1.00	0.93
SEC-13	120.24	0.00	13.76	7.10	0.00	0.71	9.59	2.00	0.96

Section	Secondary force due to Creep			Impact max			Impact min		
	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	-2.24
SEC-6	0.00	0.82	11.55	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	-4.16
SEC-8	0.00	1.05	19.05	0.00	0.72	17.52	0.00	-2.51	-4.74
SEC-9	0.00	0.98	24.23	0.00	0.37	10.58	0.00	-3.00	-5.90
SEC-10	0.00	0.93	26.58	0.00	0.69	6.93	0.00	-3.74	-7.52
SEC-11	0.00	1.38	28.01	0.00	0.62	5.86	0.00	-3.85	-8.94
SEC-12	0.00	-0.45	30.02	0.00	0.45	5.62	0.00	-4.09	-21.01
SEC-13	0.00	-0.34	29.66	0.00	0.45	5.94	0.00	-4.16	-24.01