3.7.3 Check from Load and Resistance Factor Design

(1) Definition of basis conditions

1) Definition of Load Modifer

Load modifer is a factor, relating ductility,redundancy, and operational importance. Load modifer shall be taken as:

a) For loads for which a maximum value of y_i is appropriate:
$\eta_i = \eta_D \eta_R \eta_I \quad \geqq 0.95$

b) For loads for which a minimum value of y_i is appropriate
$\eta_i = 1/(\eta_D \eta_R \eta_I) \quad \leqq 1.00$

where:
η_D = a factor relating to ductility
η_R = a factor relating to redundancy,
η_I = a factor relating to operational importance

i) Determining a factor of Ductility
The structural system of the main bridge was planned and designed to avoid the concentration of the load effects into the limited portion, and as indicated in AASHTO LRFD, the Energy-dissipating devices (elastic bearing, etc.) were also planned and designed. These measures enhance the ductility of the structural system. With this reason, 1.00 was applied for this factor.

$\eta_D = 1.00$

ii) Determining a factor of redundancy
In AASHTO LRFD, the limitation of the above categories are not clearly described. Moreover, in the design of this project, the past records of the same types of bridges were reviewed and studied thoroughly. The structure system is not conventional, but the design procedures and results are confidential for the redundancy. 1.00 was applied for this factor.

$\eta_R = 1.00$

iii) Determining a factor of operational importance
The importance of Main Bridge was already considered in other design conditions with reference to the Japanese standards. Moreover, commonly 1.00 is applied for the similar factor defined in Japanese standards even for the large span bridges. Considering the above reasons, 1.00 was applied for this factor.

$\eta_I = 1.00$

iv) Determination of Load Modifer

A factor of ductility, redundancy, and operational importance is defined in 1), 2), 3) . Load modifer shall be calculated in Equation-1, result is shown below.

- For loads for which a maximum value of y_i is appropriate:

$\eta_i=\eta_D\eta_R\eta_I$ =1.00 *1.00 *1.00 =1.00

- For loads for which a minimum value of y_i is appropriate

$\eta_i=1/(\eta_D\eta_R\eta_I)$ = 1/(1.00 *1.00 *1.00) =1.00

2) Load Combination

a) Load Factor

The total factored force effect shall be taken as:

$Q=\Sigma\eta_i y_i Q_i$

η_i= Load Modifer (=1.00)
y_i= load factor
Q_i= force effects

b) Load Combination

Load combination and load factor shall be taken in 3.7.3.3.

(2) Summary of Load and Resistance Factor Design Method

1) Resistance Factors

Resistance Factor for strength limit state, according to LRFD Bridge Design Specifications (AASHTO, 1998), which is shown below.

For flexure and tension of prestressed concrete	: 1.00
For shear and torsion	: 0.90
For flexure of fully bonded Tendons	: 0.90
For Shear of fully bonded Tendons	: 0.90

2) Factored Flexural Resistance

The factored resistance M_r shall be taken as:

$M_r=\phi M_n$

nominal resistance

$M_n= A_{ps}f_{ps}(d_p-a/2)+A_sf_y(d_s-a/2)-A'_sf'_y(d'_s-a/2)+0.85f'_c(b-b_w)\beta_1h_f(a/2-h_f/2)$

A_{ps}= area of prestressing steel (mm^2)

f_{ps}= average stress in prestressing steel at nominal bending resistance (MPa)

d_p= distance from extreme compression fiber to the centroid of prestressing tendons (mm)

A_s= area of nonprestressed tension reinforcement (mm^2)

f_y= specified yield strength of reinforcing bars (MPa)

d_s= distance from extreme compression fiber to the centroid of nonprestressed tensile reinforcement

A'_s= area of compression reinforcement (mm^2)

f'_y= specified yield strength of compression reinforcement (MPa)

d'_s= distance from extreme compression fiber to centroid of compression reinforcement (mm)

f'_c= specified compressive strength of concrete at 28 days, unless another age is specified (MPa)

b= width of the compression face of the member (mm)

b_w= web width or diameter of a circular section (mm)

β_1= stress block factor

h_f= compression flange depth of an I or T member (mm)

a= $c\beta_1$;depth of the equivalent stress block

3) Factored Compressive Resistance

The factored axial resistance of reinforced concrete compressive components, symmetric about both principal axis, shall be taken as:

$P_r = \phi P_n$

nominal resistance

$P_n =$ $0.80[0.85f'_c(A_g - A_{st}) + f_y A_{st}]$ (for members with tie reinforcement)

$f'_c =$ specified compressive strength of concrete

$A_g =$ gross area of section (mm^2)

$A_{st} =$ total area of longitudinal reinforcement (mm^2)

$f_y =$ specified yield strength of reinforcing bars (MPa)

$\phi =$ resistance factor

4) Factored Tension Resistance

The factored resistance to uniform tension shall be taken as:

$P_r = \phi P_n$

nominal resistance of tension

$P_n =$ $f_y A_{st} + A_{ps}[f_{pe} + f_y]$

$A_{st} =$ total area of longitudinal mild steel reinforcement (mm^2)

$A_{ps} =$ area of prestressing steel (mm^2)

$f_y =$ yield strength of mild steel longitudinal reinforcement (MPa)

$f_{pe} =$ stress in prestressing steel due to prestress after losses (MPa)

5) Factored Shear Resistance

The factored resistance, V_r, shall be taken as:

$V_r = \phi V_n$

nominal resistance of shear, V_n, shall be determined as lesser of:

$V_n = V_c + V_s + V_p$

$V_n = 0.25f'_c b_v d_v + V_p$

$V_c = 0.083\beta f'_c{}^{0.5} b_v d_v$

$V_s = A_v f_y d_v(\cot\theta + \cot\alpha)\sin\alpha / s$

b_v=effectice web width taken as the minimum web width (mm)

d_v=effective shear depth (mm)

s=spacing of stirrups (mm)

β=factor indication ability of diagonally cracked concrete to transmit tension

θ=angle of inclination of diagonal compressive stresses (deg)

α=angle of inclination of transverse reinforcement to longitudinal axis (deg)

A_v=area of shear reinforcement within a distances (mm^2)

(3) Load Combination

Load Combination	DC DW EL	LL IM BR PL	WA	WS	WL	FR	TU CR SH	TG	SE	Use One of These at a Time		
										EQ	CV	CL
Strength I	γ_P	1.75	1.00	-	-	1.00	0.5/1.2	-	-	-	-	-
Strength II	γ_P	1.35	1.00	-	-	1.00	0.5/1.2	-	-	-	-	-
Strength III	γ_P	-	1.00	1.40	-	1.00	0.5/1.2	-	-	-	-	-
Strength IV DC.DW	1.50	-	1.00	-	-	1.00	0.5/1.2	-	-	-	-	-
Strength V	γ_P	1.35	1.00	0.40	1.00	1.00	0.5/1.2	-	-	-	-	-
Extreme Event 1	γ_P	0.50	1.00	-	-	1.00	-	-	-	1.00	-	-
Extreme Event 2	γ_P	0.50	1.00	-	-	1.00	-	-	-	-	1.00	1.00
Service I	1.00	1.00	1.00	0.30	1.00	1.00	1.0/1.2	0.50	0.50	-	-	-
Service II	1.00	1.30	1.00	-	-	1.00	1.0/1.2	-	-	-	-	-
Service III	1.00	0.80	1.00	-	-	1.00	1.0/1.2	0.50	0.50	-	-	-
Service IV(2)	1.00	-	1.00	-	-	1.00	1.0/1.2	1.00	1.00	-	-	-
Fatigue LL.IM & CE only	-	0.75	-	-	-	-	-	-	-	-	-	-
Construction - Strength I(3)	γ_P	1.50(1)	-	-	-	-	-	-	-	-	-	-
Construction - Strength II(3)	γ_P	-	-	1.25	-	-	-	-	-	-	-	-
Construction - Service (3)	γ_P	1.00(1)	-	1.00	-	-	-	-	-	-	-	-
Construction-Extreme Event	γ_P	1.00(1)	-	-	-	-	-	-	-	-	1.00(4)	-

1) Loads from construction equipment.
2) For segmentally constructed bridges.
3) Refer to Notes on load factors for explanation of out of balance calculations. Also refer Cl 5.14.2.3.2 for additional requirements for segmental construction.
4) Accidental impact of precast segment (refer Cl 5.14.2.3.2).

Strength I	Base load combination relating to the normal vehicular use of the bridge without wind.
Strength II	Load combination relating to owner specified design vehicle
Strength III	Load combination relating to ultimate wind loads
Strength IV	Load combination relating to very high dead load to live load ratio.
Strength V	Load combination relating to live loads and wind loads
Extreme Event I	Load combination relating to earthquake
Extreme Event II	Load combination relating to collisions by vessels and vehicles
Service I	Load combination relating to normal operational use
Service II	Load combination intended to control yielding of steel and slip of connections - Only applicable to steel structures

Service III Load combination intended to control cracking in prestressed concrete structures

Fatigue Load combination for elements susceptible to fatigue or fracture damage.

Load factors for Permanent Loads γ_P

Type of Load	Load Factor	
	Max	Min
DC : Component and attachments	1.25	0.90
DW:Wearing Surfaces and Utilities	1.50	0.65
EL : Locked-in Erection Stresses	1.00	1.00

(4) Force Effect

Strength I ; Base load combination relating to the normal vehicular use of the bridge

Load		Live load moment maximum Factor	Live load moment minimum Factor	Live load Shear maximum Factor	Live load Shear minimum Factor	Live load Axial force max Factor	Live load Axial force min Factor
DC		: 1.25	: 0.90	: 1.25	: 0.90	: 1.25	: 0.90
DW		: 1.50	: 0.65	: 1.50	: 0.65	: 1.50	: 0.65
EL		: 1.00	: 1.00	: 1.00	: 1.00	: 1.00	: 1.00
LL	Mmax	: 1.75	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
	Mmin	: 0.00	: 1.75	: 0.00	: 0.00	: 0.00	: 0.00
	Smax	: 0.00	: 0.00	: 1.75	: 0.00	: 0.00	: 0.00
	Smin	: 0.00	: 0.00	: 0.00	: 1.75	: 0.00	: 0.00
	Nmax	: 0.00	: 0.00	: 0.00	: 0.00	: 1.75	: 0.00
	Nmin	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 1.75
BR		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
WS		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
SH		: 0.50	: 0.50	: 0.50	: 0.50	: 0.50	: 0.50
CR		: 0.50	: 0.50	: 0.50	: 0.50	: 0.50	: 0.50
TU		: 0.50	: 0.50	: 0.50	: 0.50	: 0.50	: 0.50
TG		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
EQ		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
CV		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00

Section		N(kN)	S(kN)	M(kNm)	N(kN)	S(kN)	M(kNm)	N(kN)	S(kN)	M(kNm)	N(kN)	S(kN)	M(kNm)	N(kN)	S(kN)	M(kNm)	N(kN)	S(kN)	M(kNm)
A		-518	6510	-728	-412	4457	-728	-707	12516	-728	-379	1835	-728	-248	5561	-728	-820	9056	-728
B	L	-26980	-5776	118860	-21649	-4422	-22175	-26980	-3340	93980	-21751	-6832	35972	-26581	-5316	37383	-22589	-4242	29077
	R	-40428	392	118783	-32331	501	-22252	-46059	3664	64155	-26923	-2670	65645	-39773	679	37511	-33781	996	28785
C	L	-69215	-12731	-164975	-39256	-17764	-242086	-69651	-12665	-167467	-38617	-18807	-226080	-58055	-17348	-229349	-49983	-11007	-156169
	R	-82807	8794	-164515	-47709	12841	-241625	-71393	18620	-270929	-58951	5589	-120595	-69754	13076	-221029	-60156	7927	-163505
D	L	-91761	-5751	-60513	-70048	-4449	-130170	-96969	-2878	-89810	-65285	-7005	-73171	-87645	-7261	-123030	-76408	-2713	-94029
	R	-101591	-257	-60865	-77058	-569	-130522	-115115	3180	-92573	-64166	-3549	-71109	-96609	-1628	-137235	-84417	1104	-80655
E	L	-134059	-11556	-316445	-71879	-15719	-394588	-134273	-11551	-316542	-72586	-18183	-378565	-109344	-17457	-458300	-96817	-9770	-249420
	R	-135515	11069	-314208	-73201	17999	-392351	-112356	23652	-475357	-97106	6683	-216014	-110879	20517	-454644	-98011	7758	-248016
F	L	-142463	1068	138130	-123708	995	2129	-143039	3813	116360	-119107	-1819	50285	-141956	1820	118639	-124585	1002	2948
	R	-150556	8723	138373	-129208	6127	2372	-172270	11246	87807	-103669	3786	79324	-149967	9129	115151	-130060	6106	3171
G	L	-195283	-17710	-159079	-120478	-16258	-178063	-197682	-17563	-163775	-117811	-17779	-162723	-171768	-22658	-181971	-144635	-12583	-148114
	R	-198468	15467	-158834	-121689	13368	-177819	-188138	21289	-219188	-131237	9612	-107899	-173396	15976	-176544	-147236	12384	-144438
H	L	-57628	1493	65857	-47268	1023	-67863	-63041	4346	23831	-39800	-1380	7613	-51307	834	7883	-51884	1552	-37161
	R	-57606	1540	65894	-47267	1061	-67826	-63081	4396	23707	-39735	-1348	7813	-51306	875	7919	-51878	1593	-37124

Strength II ; Load combination relating to owner specified design vehicle

Factor		Live load moment maximum	Live load moment minimum	Live load Shear maximum	Live load Shear minimum	Live load Axial force max	Live load Axial force min
DC		: 1.25	: 0.90	: 1.25	: 0.90	: 1.25	: 0.90
DW		: 1.50	: 0.65	: 1.50	: 0.65	: 1.50	: 0.65
EL		: 1.00	: 1.00	: 1.00	: 1.00	: 1.00	: 1.00
LL	Mmax	: 1.35	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
	Mmin	: 0.00	: 1.35	: 0.00	: 0.00	: 0.00	: 0.00
	Smax	: 0.00	: 0.00	: 1.35	: 0.00	: 0.00	: 0.00
	Smin	: 0.00	: 0.00	: 0.00	: 1.35	: 0.00	: 0.00
	Nmax	: 0.00	: 0.00	: 0.00	: 0.00	: 1.35	: 0.00
	Nmin	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 1.35
BR		: 1.75	: 1.75	: 1.75	: 1.75	: 1.75	: 1.75
WS		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
SH		: 0.50	: 0.50	: 0.50	: 0.50	: 0.50	: 0.50
CR		: 0.50	: 0.50	: 0.50	: 0.50	: 0.50	: 0.50
TU		: 0.50	: 0.50	: 0.50	: 0.50	: 0.50	: 0.50
TG		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
EQ		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
CV		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00

Section		N(kN)	S(kN)	M(kNm)	N(kN)	S(kN)	M(kNm)	N(kN)	S(kN)	M(kNm)	N(kN)	S(kN)	M(kNm)	N(kN)	S(kN)	M(kNm)	N(kN)	S(kN)	M(kNm)
A		-780	6499	-255	-675	4446	-255	-926	11132	-255	-649	2424	-255	-572	5767	-255	-989	7994	-255
B	L	-26990	-5647	100663	-20813	-4284	-11716	-26990	-3768	81470	-20891	-6143	33140	-26683	-5292	37810	-21538	-4145	27821
	R	-40686	496	101058	-31352	425	-11321	-45030	3021	58917	-27181	-2021	56486	-40181	718	38363	-32471	807	28051
C	L	-66916	-13461	-175832	-39227	-16328	-225270	-67252	-13410	-177754	-38734	-17133	-212923	-58307	-17022	-225491	-47502	-11116	-158992
	R	-80398	9446	-174899	-47855	11836	-224337	-71593	17026	-256989	-56527	6242	-130971	-70328	12749	-218495	-57457	8045	-164073
D	L	-91287	-5713	-74161	-67602	-4328	-123103	-95305	-3497	-96762	-63927	-6300	-79132	-88112	-6878	-122389	-72508	-2989	-95223
	R	-101267	-307	-74040	-74709	-559	-122982	-111700	2345	-98501	-64763	-2858	-77150	-97424	-1364	-132954	-80385	732	-84514
E	L	-129171	-12467	-335345	-72497	-14554	-373179	-129336	-12463	-335419	-73042	-16455	-360818	-110105	-17019	-444776	-91734	-9966	-261192
	R	-130908	12291	-332636	-74038	16635	-370469	-113042	21997	-456950	-92479	7906	-234438	-111902	19580	-440972	-93177	8734	-259125
F	L	-143111	1167	124537	-117557	1046	11769	-143555	3285	107743	-114008	-1124	48919	-142720	1748	109500	-118233	1052	12401
	R	-151273	8598	125252	-123189	6033	12485	-168024	10545	86244	-103487	4227	71848	-150818	8911	107338	-123846	6017	13102
G	L	-190059	-17820	-160597	-119388	-15269	-162413	-191910	-17706	-164219	-117330	-16442	-150579	-171919	-21636	-178256	-138023	-12434	-139309
	R	-193126	15509	-159744	-120776	12621	-161561	-185157	20001	-206303	-128142	9724	-107623	-173785	15902	-173406	-140483	11862	-135809
H	L	-56573	1332	53740	-44070	889	-54791	-60748	3533	21320	-38309	-964	3434	-51696	823	9017	-47631	1297	-31106
	R	-56818	1371	54250	-44332	918	-54281	-61042	3574	21705	-38521	-940	4069	-51958	858	9525	-47889	1328	-30597

Strength III

; Load combination relating to ultimate wind loads

		Maximum		Factor	Minimum		Factor
		DC		: 1.25	DC		: 0.90
		DW		: 1.50	DW		: 0.65
		EL		: 1.00	EL		: 1.00
		LL	Mmax	: 0.00	LL	Mmax	: 0.00
			Mmin	: 0.00		Mmin	: 0.00
			Smax	: 0.00		Smax	: 0.00
			Smin	: 0.00		Smin	: 0.00
			Nmax	: 0.00		Nmax	: 0.00
			Nmin	: 0.00		Nmin	: 0.00
		BR		: 0.00	BR		: 0.00
		WS		: 1.40	WS		: 1.40
		SH		: 0.50	SH		: 0.50
		CR		: 0.50	CR		: 0.50
		TU		: 0.50	TU		: 0.50
		TG		: 0.00	TG		: 0.00
		EQ		: 0.00	EQ		: 0.00
		CV		: 0.00	CV		: 0.00

Section		N(kN)	S(kN)	M(kNm)	N(kN)	S(kN)	M(kNm)
A		-518	6510	-728	-412	4457	-728
B	L	-27034	-5191	39868	-17997	-3792	24202
	R	-40417	918	39791	-26909	240	24125
C	L	-59174	-15901	-211079	-39144	-11459	-167124
	R	-71127	11632	-210618	-47206	8431	-166664
D	L	-89696	-5609	-120409	-59354	-3943	-99437
	R	-99034	-452	-120760	-65638	-502	-99788
E	L	-112683	-15551	-399553	-74588	-10633	-301344
	R	-114216	16461	-397316	-75721	12077	-299107
F	L	-145314	1503	78583	-96812	1219	44230
	R	-152558	8222	78826	-101740	5762	44473
G	L	-172452	-18158	-164371	-115733	-11900	-108244
	R	-174601	15684	-164126	-117197	10130	-107999
H	L	-53601	788	13335	-33866	439	-10183
	R	-53600	831	13372	-33865	466	-10146

Strength IV

; Load combination relating to very high dead load to live load ratio

				Factor
		DC		: 1.50
		DW		: 1.50
		EL		: 1.50
		LL	Mmax	: 0.00
			Mmin	: 0.00
			Smax	: 0.00
			Smin	: 0.00
			Nmax	: 0.00
			Nmin	: 0.00
		BR		: 0.00
		WS		: 0.00
		SH		: 0.50
		CR		: 0.50
		TU		: 0.50
		TG		: 0.00
		EQ		: 0.00
		CV		: 0.00

Section		N(kN)	S(kN)	M(kNm)
A		-556	7704	-728
B	L	-31335	-6311	42840
	R	-46879	760	42763
C	L	-68558	-19340	-267794
	R	-82407	13865	-267333
D	L	-103930	-6515	-155754
	R	-114817	-524	-156106
E	L	-130657	-18737	-486855
	R	-132427	19432	-484618
F	L	-168769	1793	76190
	R	-177273	9671	76433
G	L	-200813	-20885	-189944
	R	-203103	17808	-189699
H	L	-60434	925	-6957
	R	-60433	973	-6920

Strength V ; Load combination relating to live loads and wind loads

Factor		Live load moment maximum	Live load moment minimum	Live load Shear maximum	Live load Shear minimum	Live load Axial force max	Live load Axial force min
DC		: 1.25	: 0.90	: 1.25	: 0.90	: 1.25	: 0.90
DW		: 1.50	: 0.65	: 1.50	: 0.65	: 1.50	: 0.65
EL		: 1.00	: 1.00	: 1.00	: 1.00	: 1.00	: 1.00
LL	Mmax	: 1.35	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
	Mmin	: 0.00	: 1.35	: 0.00	: 0.00	: 0.00	: 0.00
	Smax	: 0.00	: 0.00	: 1.35	: 0.00	: 0.00	: 0.00
	Smin	: 0.00	: 0.00	: 0.00	: 1.35	: 0.00	: 0.00
	Nmax	: 0.00	: 0.00	: 0.00	: 0.00	: 1.35	: 0.00
	Nmin	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 1.35
BR		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
WS		: 0.40	: 0.40	: 0.40	: 0.40	: 0.40	: 0.40
SH		: 0.50	: 0.50	: 0.50	: 0.50	: 0.50	: 0.50
CR		: 0.50	: 0.50	: 0.50	: 0.50	: 0.50	: 0.50
TU		: 0.50	: 0.50	: 0.50	: 0.50	: 0.50	: 0.50
TG		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
EQ		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
CV		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00

Section		Live load moment maximum			Live load moment minimum			Live load Shear maximum			Live load Shear minimum			Live load Axial force max			Live load Axial force min		
		N(kN)	S(kN)	M(kNm)	N(kN)	S(kN)	M(kNm)	N(kN)	S(kN)	M(kNm)	N(kN)	S(kN)	M(kNm)	N(kN)	S(kN)	M(kNm)	N(kN)	S(kN)	M(kNm)
A		-518	6510	-728	-412	4457	-728	-663	11143	-728	-386	2435	-728	-310	5778	-728	-727	8005	-728
B	L	-26992	-5642	100805	-20814	-4278	-11575	-26992	-3763	81612	-20893	-6137	33282	-26684	-5287	37951	-21539	-4139	27963
	R	-40425	512	100728	-31092	441	-11652	-44770	3036	58586	-26920	-2005	56155	-39920	733	38032	-32211	823	27720
C	L	-66920	-13456	-175513	-39230	-16323	-224952	-67256	-13404	-177435	-38737	-17127	-212604	-58311	-17017	-225173	-47506	-11110	-158673
	R	-80137	9442	-175053	-47594	11833	-224491	-71332	17023	-257143	-56266	6238	-131125	-70068	12746	-218649	-57196	8042	-164227
D	L	-91289	-5719	-74203	-67604	-4333	-123145	-95307	-3502	-96804	-63929	-6305	-79174	-88114	-6884	-122431	-72510	-2994	-95265
	R	-101007	-302	-74555	-74448	-554	-123497	-111439	2350	-99016	-64502	-2853	-77664	-97163	-1359	-133469	-80125	737	-85029
E	L	-129173	-12469	-335441	-72498	-14556	-373275	-129338	-12465	-335516	-73044	-16457	-360914	-110107	-17021	-444872	-91736	-9967	-261288
	R	-130647	12301	-333204	-73777	16645	-371038	-112781	22008	-457519	-92218	7916	-235007	-111642	19590	-441540	-92916	8745	-259694
F	L	-143115	1167	124519	-117560	1046	11752	-143559	3285	107725	-114011	-1124	48901	-142723	1748	109483	-118237	1052	12384
	R	-151014	8608	124762	-122930	6044	11995	-167765	10555	85754	-103228	4238	71358	-150559	8922	106848	-123587	6028	12612
G	L	-190064	-17813	-160289	-119393	-15262	-162105	-191915	-17699	-163911	-117336	-16435	-150271	-171924	-21629	-177948	-138029	-12427	-139001
	R	-193013	15516	-160043	-120662	12628	-161860	-185044	20008	-206602	-128028	9731	-107922	-173671	15909	-173705	-140370	11869	-136109
H	L	-56707	1332	53852	-44205	889	-54679	-60883	3533	21432	-38444	-964	3546	-51831	823	9129	-47766	1297	-30994
	R	-56690	1378	53889	-44204	925	-54642	-60914	3581	21345	-38393	-933	3708	-51830	865	9165	-47761	1335	-30957

Extreme event I ; Load combination relating to Earthquake(L)

Load		Live load moment maximum Factor	Live load moment minimum Factor	Live load Shear maximum Factor	Live load Shear minimum Factor	Live load Axial force max Factor	Live load Axial force min Factor
DC		: 1.25	: 0.90	: 1.25	: 0.90	: 1.25	: 0.90
DW		: 1.50	: 0.65	: 1.50	: 0.65	: 1.50	: 0.65
EL		: 1.00	: 1.00	: 1.00	: 1.00	: 1.00	: 1.00
LL	Mmax	: 0.50	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
	Mmin	: 0.00	: 0.50	: 0.00	: 0.00	: 0.00	: 0.00
	Smax	: 0.00	: 0.00	: 0.50	: 0.00	: 0.00	: 0.00
	Smin	: 0.00	: 0.00	: 0.00	: 0.50	: 0.00	: 0.00
	Nmax	: 0.00	: 0.00	: 0.00	: 0.00	: 0.50	: 0.00
	Nmin	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.50
BR		: 0.50	: 0.50	: 0.50	: 0.50	: 0.50	: 0.50
WS		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
SH		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
CR		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
TU		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
TG		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
EQ		: 1.00	: 1.00	: 1.00	: 1.00	: 1.00	: 1.00
CV		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00

Section		N(kN)	S(kN)	M(kNm)	N(kN)	S(kN)	M(kNm)	N(kN)	S(kN)	M(kNm)	N(kN)	S(kN)	M(kNm)	N(kN)	S(kN)	M(kNm)	N(kN)	S(kN)	M(kNm)
A		6032	5789	135	6138	3736	135	5978	7505	135	6147	2987	135	6109	5518	135	6021	5050	135
B	L	-25499	-5104	52236	-17521	-3718	750	-25499	-4408	45128	-17550	-4406	17364	-25385	-4972	28957	-17790	-3666	15394
	R	-40047	1526	52371	-28084	1073	885	-41656	2461	36763	-26539	167	25999	-39860	1608	29151	-28499	1215	15467
C	L	-65652	-14173	-170103	-42785	-12438	-160738	-65777	-14154	-170815	-42603	-12736	-156165	-62464	-15492	-188495	-45850	-10507	-136191
	R	-71796	9386	-169968	-44681	8256	-160603	-68535	12193	-200372	-47893	6184	-126023	-68066	10609	-186115	-48238	6852	-138283
D	L	-90304	-6557	-113153	-62427	-4994	-118075	-91792	-5736	-121524	-61066	-5725	-101790	-89128	-6988	-131015	-64244	-4498	-107749
	R	-99481	-1581	-113018	-68617	-1706	-117940	-103345	-599	-122078	-64933	-2558	-100965	-98057	-1972	-134838	-70719	-1228	-103693
E	L	-119603	-18257	-443510	-74627	-15933	-395687	-119664	-18255	-443537	-74829	-16637	-391109	-112541	-19943	-484040	-81752	-14234	-354211
	R	-114834	18546	-443375	-69533	17394	-395552	-108217	22141	-489417	-76363	14161	-345170	-107795	21245	-483499	-76622	14468	-354314
F	L	-138350	2373	137032	-98348	2149	73637	-138515	3157	130812	-97033	1345	87396	-138205	2588	131463	-98598	2151	73871
	R	-145287	8699	137167	-102888	6200	73772	-151491	9420	122720	-95591	5531	95758	-145118	8815	130532	-103132	6194	74000
G	L	-176442	-19818	-159560	-114556	-14933	-124893	-177128	-19776	-160902	-113794	-15367	-120510	-169724	-21231	-166101	-121458	-13883	-116336
	R	-162885	14306	-159385	-99945	9739	-124719	-159933	15969	-176629	-102673	8666	-104742	-155721	14451	-164445	-107244	9458	-115182
H	L	-47471	1391	30434	-30415	1007	-24570	-49018	2206	18426	-28281	321	-3006	-45665	1203	13870	-31734	1158	-15798
	R	-47538	1426	30569	-30488	1028	-24435	-49103	2242	18515	-28336	340	-2824	-45738	1236	14004	-31806	1180	-15663

Extreme event I ; Load combination relating to Earthquake(R)

Factor		Live load moment maximum	Live load moment minimum	Live load Shear maximum	Live load Shear minimum	Live load Axial force max	Live load Axial force min
DC		: 1.25	: 0.90	: 1.25	: 0.90	: 1.25	: 0.90
DW		: 1.50	: 0.65	: 1.50	: 0.65	: 1.50	: 0.65
EL		: 1.00	: 1.00	: 1.00	: 1.00	: 1.00	: 1.00
LL	Mmax	: 0.50	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
	Mmin	: 0.00	: 0.50	: 0.00	: 0.00	: 0.00	: 0.00
	Smax	: 0.00	: 0.00	: 0.50	: 0.00	: 0.00	: 0.00
	Smin	: 0.00	: 0.00	: 0.00	: 0.50	: 0.00	: 0.00
	Nmax	: 0.00	: 0.00	: 0.00	: 0.00	: 0.50	: 0.00
	Nmin	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.50
BR		: 0.50	: 0.50	: 0.50	: 0.50	: 0.50	: 0.50
WS		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
SH		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
CR		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
TU		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
TG		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
EQ		: 1.00	: 1.00	: 1.00	: 1.00	: 1.00	: 1.00
CV		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00

Section		N(kN)	S(kN)	M(kNm)	N(kN)	S(kN)	M(kNm)	N(kN)	S(kN)	M(kNm)	N(kN)	S(kN)	M(kNm)	N(kN)	S(kN)	M(kNm)	N(kN)	S(kN)	M(kNm)
A		-6608	7680	-135	-6503	5627	-135	-6662	9396	-135	-6493	4878	-135	-6531	7409	-135	-6619	6941	-135
B	L	-28521	-5458	72971	-20543	-4072	21485	-28521	-4762	65863	-20572	-4760	38099	-28407	-5326	49692	-20812	-4020	36129
	R	-40864	209	72836	-28901	-244	21350	-42473	1144	57228	-27356	-1150	46464	-40677	291	49616	-29316	-103	35932
C	L	-59020	-16526	-217445	-36153	-14791	-208080	-59145	-16507	-218157	-35971	-15089	-203507	-55832	-17431	-235837	-39218	-12860	-183533
	R	-77196	11334	-217580	-50081	10204	-208215	-73935	14141	-247984	-53293	8132	-173635	-73466	12557	-233727	-53638	8800	-185895
D	L	-90896	-4191	-85425	-63019	-2628	-90347	-92384	-3370	-93796	-61658	-3359	-74062	-89720	-4622	-103287	-64836	-2132	-80021
	R	-100630	1312	-85560	-69766	1187	-90482	-104494	2294	-94620	-66082	335	-73507	-99206	921	-107380	-71868	1665	-76235
E	L	-118913	-13142	-283659	-73937	-10818	-235836	-118974	-13140	-283686	-74139	-11522	-231258	-111851	-14828	-324189	-81062	-9119	-194360
	R	-126272	9434	-283794	-80971	8282	-235971	-119655	13029	-329836	-87801	5049	-185589	-119233	12133	-323918	-88060	5356	-194733
F	L	-150296	-23	37801	-110294	-246	-25594	-150461	762	31581	-108979	-1050	-11835	-150151	193	32232	-110544	-244	-25360
	R	-158268	7604	37666	-115869	5105	-25729	-164472	8325	23219	-108572	4436	-3743	-158099	7720	31031	-116113	5099	-25501
G	L	-180247	-16410	-155108	-118361	-11525	-120441	-180933	-17783	-176569	-117599	-10110	-100322	-173529	-18217	-172186	-125263	-11565	-105521
	R	-197542	16546	-155280	-135885	11979	-120614	-198458	18209	-172524	-141341	10906	-100637	-190034	16691	-160340	-150483	11698	-111077
H	L	-60069	588	28389	-43013	204	-26615	-61616	1403	16381	-40879	-482	-5051	-58263	400	11825	-44332	355	-17843
	R	-59986	638	28254	-42936	240	-26750	-61551	1454	16200	-40784	-449	-5139	-58186	448	11689	-44254	392	-17978

Extreme event II ; Load combination relating to collision by vessels(L)

Factor		Live load moment maximum	Live load moment minimum	Live load Shear maximum	Live load Shear minimum	Live load Axial force max	Live load Axial force min
DC		: 1.25	: 0.90	: 1.25	: 0.90	: 1.25	: 0.90
DW		: 1.50	: 0.65	: 1.50	: 0.65	: 1.50	: 0.65
EL		: 1.00	: 1.00	: 1.00	: 1.00	: 1.00	: 1.00
LL	Mmax	: 0.50	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
	Mmin	: 0.00	: 0.50	: 0.00	: 0.00	: 0.00	: 0.00
	Smax	: 0.00	: 0.00	: 0.50	: 0.00	: 0.00	: 0.00
	Smin	: 0.00	: 0.00	: 0.00	: 0.50	: 0.00	: 0.00
	Nmax	: 0.00	: 0.00	: 0.00	: 0.00	: 0.50	: 0.00
	Nmin	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.50
BR		: 0.50	: 0.50	: 0.50	: 0.50	: 0.50	: 0.50
WS		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
SH		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
CR		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
TU		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
TG		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
EQ		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
CV		: 1.00	: 1.00	: 1.00	: 1.00	: 1.00	: 1.00

Section		Live load moment maximum N(kN)	S(kN)	M(kNm)	Live load moment minimum N(kN)	S(kN)	M(kNm)	Live load Shear maximum N(kN)	S(kN)	M(kNm)	Live load Shear minimum N(kN)	S(kN)	M(kNm)	Live load Axial force max N(kN)	S(kN)	M(kNm)	Live load Axial force min N(kN)	S(kN)	M(kNm)
A		-287	6724	0	-182	4671	0	-341	8440	0	-172	3922	0	-210	6453	0	-298	5985	0
B	L	-27031	-5280	62431	-19053	-3894	10945	-27031	-4584	55322	-19082	-4583	27558	-26917	-5149	39152	-19321	-3843	25588
	R	-40489	875	62431	-28527	422	10945	-42098	1810	46823	-26982	-485	36058	-40302	957	39210	-28941	563	25527
C	L	-62395	-15330	-193485	-39528	-13595	-184120	-62520	-15311	-194197	-39346	-13893	-179547	-59207	-16236	-211877	-42593	-11665	-159573
	R	-74566	10333	-193485	-47452	9203	-184120	-71305	13140	-223889	-50664	7131	-149540	-70837	11556	-209632	-51008	7799	-161800
D	L	-90722	-5370	-99470	-62846	-3808	-104392	-92210	-4549	-107841	-61485	-4538	-88107	-89546	-5802	-117332	-64663	-3312	-94066
	R	-100209	-111	-99470	-69345	-237	-104392	-104073	871	-108530	-65662	-1088	-87417	-98786	-503	-121290	-71448	241	-90145
E	L	-119495	-15622	-362121	-74519	-13299	-314299	-119556	-15621	-362149	-74721	-14003	-309721	-112434	-17308	-402651	-81644	-11599	-272822
	R	-120784	13887	-362121	-75484	12735	-314299	-114167	17482	-408164	-82314	9502	-263917	-113745	16586	-402246	-82572	9809	-273060
F	L	-144681	1170	86877	-104679	946	23482	-144846	1954	80657	-103364	142	37241	-144536	1385	81308	-104929	948	23716
	R	-152145	8156	86877	-109746	5657	23482	-158349	8877	72430	-102449	4988	45468	-151976	8272	80242	-109990	5651	23710
G	L	-178662	-18196	-160796	-116775	-13311	-126129	-179347	-19569	-182257	-116013	-11896	-106010	-171943	-20003	-177874	-123677	-13351	-111209
	R	-177986	15340	-153723	-116330	10773	-119057	-178902	17003	-170967	-121786	9700	-99080	-170478	15485	-158783	-130928	10492	-109519
H	L	-51453	992	29297	-34396	608	-25707	-52999	1807	17289	-32263	-78	-4143	-49647	804	12733	-35715	759	-16935
	R	-51446	1049	29297	-34396	651	-25707	-53010	1865	17243	-32244	-38	-4096	-49646	859	12732	-35713	803	-16935

Extreme event II ; Load combination relating to collision by vessels(R)

Factor		Live load moment maximum	Live load moment minimum	Live load Shear maximum	Live load Shear minimum	Live load Axial force max	Live load Axial force min
DC		: 1.25	: 0.90	: 1.25	: 0.90	: 1.25	: 0.90
DW		: 1.50	: 0.65	: 1.50	: 0.65	: 1.50	: 0.65
EL		: 1.00	: 1.00	: 1.00	: 1.00	: 1.00	: 1.00
LL	Mmax	: 0.50	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
	Mmin	: 0.00	: 0.50	: 0.00	: 0.00	: 0.00	: 0.00
	Smax	: 0.00	: 0.00	: 0.50	: 0.00	: 0.00	: 0.00
	Smin	: 0.00	: 0.00	: 0.00	: 0.50	: 0.00	: 0.00
	Nmax	: 0.00	: 0.00	: 0.00	: 0.00	: 0.50	: 0.00
	Nmin	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.50
BR		: 0.50	: 0.50	: 0.50	: 0.50	: 0.50	: 0.50
WS		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
SH		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
CR		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
TU		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
TG		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
EQ		: 0.00	: 0.00	: 0.00	: 0.00	: 0.00	: 0.00
CV		: 1.00	: 1.00	: 1.00	: 1.00	: 1.00	: 1.00

Section		N(kN)	S(kN)	M(kNm)	N(kN)	S(kN)	M(kNm)	N(kN)	S(kN)	M(kNm)	N(kN)	S(kN)	M(kNm)	N(kN)	S(kN)	M(kNm)	N(kN)	S(kN)	M(kNm)
A		-287	6746	0	-182	4693	0	-341	8462	0	-172	3944	0	-210	6475	0	-298	6007	0
B	L	-26989	-5280	62777	-19011	-3894	11291	-26989	-4584	55668	-19040	-4583	27904	-26875	-5149	39498	-19279	-3843	25934
	R	-40420	861	62777	-28458	408	11291	-42029	1796	47169	-26913	-499	36404	-40233	943	39556	-28872	549	25873
C	L	-62277	-15368	-194063	-39410	-13633	-184698	-62402	-15349	-194775	-39228	-13931	-180125	-59089	-16274	-212455	-42475	-11703	-160151
	R	-74426	10387	-194063	-47312	9257	-184698	-71165	13194	-224467	-50524	7185	-150118	-70697	11610	-210210	-50868	7853	-162378
D	L	-90478	-5376	-99108	-62602	-3814	-104030	-91966	-4555	-107479	-61241	-4544	-87745	-89302	-5808	-116970	-64419	-3318	-93704
	R	-99900	-157	-99108	-69036	-283	-104030	-103764	825	-108168	-65353	-1134	-87055	-98477	-549	-120928	-71139	195	-89783
E	L	-119019	-15776	-365048	-74043	-13453	-317226	-119080	-15775	-365076	-74245	-14157	-312648	-111958	-17462	-405578	-81168	-11753	-275749
	R	-120322	14093	-365048	-75022	12941	-317226	-113705	17688	-411091	-81852	9708	-266844	-113283	16792	-405173	-82110	10015	-275987
F	L	-143964	1180	87955	-103962	956	24560	-144129	1964	81735	-102647	152	38319	-143819	1395	82386	-104212	958	24794
	R	-151409	8148	87955	-109010	5649	24560	-157613	8869	73508	-101713	4980	46546	-151240	8264	81320	-109254	5643	24788
G	L	-178028	-18032	-153867	-116141	-13147	-119200	-178713	-19405	-175328	-115379	-11732	-99081	-171309	-19839	-170945	-123043	-13187	-104280
	R	-182440	15511	-160937	-120784	10944	-126271	-183356	17174	-178181	-126240	9871	-106294	-174932	15656	-165997	-135382	10663	-116733
H	L	-56087	986	29530	-39030	602	-25474	-57633	1801	17522	-36897	-84	-3910	-54281	798	12966	-40349	753	-16702
	R	-56079	1015	29530	-39029	617	-25474	-57643	1831	17476	-36877	-72	-3863	-54279	825	12965	-40346	769	-16702

(5) Flexural Resistance

Table Calculation of flexure resistance

Section	A	B	C	D	E	F	G	H
A_{ps} (mm^2)	18076	55168	117946	64862	151236	97972	91314	31392
A'_{ps} (mm^2)								
f_{ps} (MPa)	1847	1783	1778	1770	1756	1727	1796	1815
f_{pu} (MPa)	1860	1860	1860	1860	1860	1860	1860	1860
f_{py} (MPa)	1570	1570	1570	1570	1570	1570	1570	1570
k	0.392	0.392	0.392	0.392	0.392	0.392	0.392	0.392
A_s (mm^2)	0	0	0	0	0	0	0	0
f_y (MPa)	390	390	390	390	390	390	390	390
d_s (mm)	0	0	0	0	0	0	0	0
A'_s (mm^2)	0	0	0	0	0	0	0	0
f'_y (MPa)	390	390	390	390	390	390	390	390
d'_s (mm)	0	0	0	0	0	0	0	0
f'_c (MPa)	50	50	50	50	50	50	50	50
b (mm)	25000	12400	25000	12400	25000	12400	25000	12400
b_w (mm)	1350	900	1350	900	1350	900	2300	900
β_1	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69
c (mm)	46	270	286	316	362	465	224	157
h_f (mm)	350	300	250	300	250	300	700	300
a	31.422	186.615	197.395	217.816	250.006	321.051	154.356	108.126
Mn kNm	45945	235916	509497	276094	644008	405358	278415	132504
ϕ	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Q	728	118860	270929	156106	489417	138373	219188	67863
η	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Strength I	Strength I	Strength I	Strength IV	Extreme I	Strength I	Strength I	Strength I
Mr kNm	43648	224120	484022	262289	611808	385090	264494	125879
Q_M kNm	728	118860	270929	156106	489417	138373	219188	67863
	OK	OK	OK	OK	OK	OK	OK	OK

(6) Axial Resistance

Table Calculation of axial resistance

Section	A	B	C	D	E	F	G	H
f'_c (MPa)	50	50	50	50	50	50	50	50
A_g (mm^2)	22140100	19763700	23443500	19746000	23355100	19604600	33005600	19866500
A_{st} (mm^2)	37890.8	91154.8	124444.8	97812.8	157734.8	151076.8	97812.8	54423.6
f_y (MPa)	-	-	-	-	-	-	-	-
P_n kN	751475	668867	792848	668038	788710	661420	1118865	673611
ϕ	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Q kN	6662	46879	82807	115115	135515	177273	203103	63081
η	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Extreme I	Strength IV	Strength IV	Strength I	Strength I	Strength I	Strength IV	Strength I
P_r kN	676328	601980	713563	601234	709839	595278	1006979	606250
Q_N kN	6662	46879	82807	115115	135515	177273	203103	63081
	OK	OK	OK	OK	OK	OK	OK	OK

(7) Shear Resistance

Table Calculation of shear resistance

Section	A	B	C	D	E	F	G	H
V_c (N)	754726	503151	754726	503151	754726	503151	1285829	503151
V_s (N)	22248675	22248675	22248675	22248675	22248675	22248675	22248675	22248675
V_p (N)	0	0	0	0	0	0	0	0
f'_c (Mpa)	50	50	50	50	50	50	50	50
f_y (Mpa)	390	390	390	390	390	390	390	390
h (mm)	2700	2700	2700	2700	2700	2700	2700	2700
b_v (mm)	1350	900	1350	900	1350	900	2300	900
d_v (mm)	1944	1944	1944	1944	1944	1944	1944	1944
s (mm)	125	125	125	125	125	125	125	125
β	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
θ (deg)	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2
α (deg)	90	90	90	90	90	90	90	90
A_v (mm^2)	1885	1885	1885	1885	1885	1885	1885	1885
V_u (N)	12516	6832	19340	7261	23652	11246	22658	4396
v	0.0053	0.0043	0.0082	0.0046	0.0100	0.0071	0.0056	0.0028
$v/\sqrt{f'c}$	0.0007	0.0006	0.0012	0.0007	0.0014	0.0010	0.0008	0.0004
ε_x	-1.9E-06	1.15E-04	4.95E-06	6.07E-05	1.92E-06	4.92E-05	1.93E-05	7.71E-05
E_s	200000	200000	200000	200000	200000	200000	200000	200000
E_p	196000	196000	196000	196000	196000	196000	196000	196000
E_c	33900	33900	33900	33900	33900	33900	33900	33900
f_{pe}	1.23	1.15	14.4	6.5	18.9	9.3	8.38	1.17
f_{pc}	0	-4.01	-2.57	-3.01	-3.23	-3.1	-1.87	-2.62
f_{po}	1.23	-22.03	-0.46	-10.90	0.23	-8.62	-2.43	-13.98
V_n (kN)	754726	503151	754726	503151	754726	503151	1285829	503151
ϕ	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Q (kN)	12516	6832	19340	7261	23652	11246	22658	4396
η	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Srength I	Srength I	Strength IV	Srength I	Srength I	Srength I	Srength I	Srength I
V_r (kN)	679253	452835	679253	452835	679253	452835	1157246	452835
Q_S (kN)	12516	6832	19340	7261	23652	11246	22658	4396
	OK	OK	OK	OK	OK	OK	OK	OK

3.7.5 Result of Stress Check at Service Limit State

(1) Unfactored Stress

Load Combination	Section-A		Section-B			
			Left		Right	
	Upper	Bottom	Upper	Bottom	Upper	Bottom
DC(include PS)	1.21	1.7	3.96	7.9	4.51	8.42
LL Max	0	0	2.96	-4.01	2.96	-4.01
LL Min	0	0	-1.63	2.46	-1.58	2.51
CR&SH	0	0	0	0	0	0
TU(+)	0.02	0.02	0.05	0.05	0.05	0.05
TU(-)	-0.01	-0.02	-0.06	-0.04	-0.06	-0.05
TG(+)	0.02	0.41	0.59	0.05	0.58	0.05
TG(-)	-0.04	-0.02	-0.06	-0.44	-0.06	-0.44

Load Combination	Section-C				Section-D			
	Left		Right		Left		Right	
	Upper	Bottom	Upper	Bottom	Upper	Bottom	Upper	Bottom
DC(include PS)	5.16	9.59	5.55	9.97	2.84	15.65	3.21	16.02
LL Max	1.82	-1.55	1.86	-1.51	2.29	-3.01	2.3	-3
LL Min	-2.57	2.91	-2.56	2.92	-0.84	1.88	-0.82	1.9
CR&SH	0.01	0	0.01	0	0	0	0	0
TU(+)	0.09	0.11	0.08	0.13	0.08	0.06	0.08	0.06
TU(-)	-0.09	-0.11	-0.07	-0.12	-0.09	-0.06	-0.09	-0.06
TG(+)	1.18	0.11	1.18	0.13	1.05	0.06	1.05	0.06
TG(-)	-0.09	-0.95	-0.07	-0.96	-0.09	-1.02	-0.09	-1.02

Load Combination	Section-E				Section-F			
	Left		Right		Left		Right	
	Upper	Bottom	Upper	Bottom	Upper	Bottom	Upper	Bottom
DC(include PS)	3.21	19.34	3.25	19.37	17.16	7.54	17.45	7.83
LL Max	3.33	-2.71	3.32	-2.72	2.11	-3.1	2.13	-3.07
LL Min	-3.23	3.55	-3.23	3.55	-0.8	2.88	-0.78	2.9
CR&SH	0.03	-0.02	0.03	-0.02	0	0.01	0	0.01
TU(+)	0.36	0.35	0.37	0.34	0.13	0.32	0.12	0.32
TU(-)	-0.35	-0.35	-0.36	-0.34	-0.13	-0.32	-0.13	-0.32
TG(+)	1.2	0.35	1.21	0.34	1	0.32	0.99	0.32
TG(-)	-0.35	-0.88	-0.36	-0.86	-0.13	-1.12	-0.13	-1.12

Load Combination	Section-G				Section-H	
	Left		Right			
	Upper	Bottom	Upper	Bottom	Upper	Bottom
DC(include PS)	6.01	7.93	6.21	7.91	2.84	4.38
LL Max	0.54	0.21	0.55	0.23	2.1	-2.62
LL Min	-1.87	2.39	-1.87	2.39	-1.81	3.38
CR&SH	0.01	-0.02	0.01	-0.02	0	0
TU(+)	0.09	0.19	0.06	0.21	0.15	0.05
TU(-)	-0.09	-0.19	-0.07	-0.22	-0.15	-0.05
TG(+)	0.75	0.19	0.73	0.21	0.5	0.05
TG(-)	-0.09	-0.66	-0.07	-0.68	-0.15	-0.14

(2) Result of Stress Check at Service Limit State

Service I ; Load combination relating to normal operational use

Unit; MPa

Load			Live load maximum, Temperature (+) Factor	Live load maximum, Temperature (-) Factor	Live load minimum, Temperature (+) Factor	Live load minimum, Temperature (-) Factor
DC,DW,EL			: 1.00	: 1.00	: 1.00	: 1.00
LL	max (Mmax)		: 1.00	: 1.00	: 0.00	: 0.00
	min (Mmin)		: 0.00	: 0.00	: 1.00	: 1.00
WS			: 0.30	: 0.30	: 0.30	: 0.30
SH			: 1.00	: 1.00	: 1.00	: 1.00
CR			: 1.00	: 1.00	: 1.00	: 1.00
TU	+15		: 1.00	: 0.00	: 1.00	: 0.00
	-15		: 0.00	: 1.00	: 0.00	: 1.00
TG	+15		: 0.50	: 0.00	: 0.50	: 0.00
	-15		: 0.00	: 0.50	: 0.00	: 0.50

Live load maximum, Temperature (+)

		Upper fiber factored stress	Upper fiber Allowable Tensile	Upper fiber Allowable Comp	Lower fiber factored stress	Lower fiber Allowable Tensile	Lower fiber Allowable Comp
A		1.26	0.00	30.00	2.04	0.00	30.00
B	L	7.44	0.00	30.00	4.00	0.00	30.00
	R	7.98	0.00	30.00	4.52	0.00	30.00
C	L	8.01	0.00	30.00	8.29	0.00	30.00
	R	8.43	0.00	30.00	8.75	0.00	30.00
D	L	6.04	0.00	30.00	12.78	0.00	30.00
	R	6.42	0.00	30.00	13.16	0.00	30.00
E	L	8.01	0.00	30.00	17.40	0.00	30.00
	R	8.06	0.00	30.00	17.40	0.00	30.00
F	L	20.22	0.00	30.00	5.17	0.00	30.00
	R	20.50	0.00	30.00	5.49	0.00	30.00
G	L	7.26	0.00	30.00	8.55	0.00	30.00
	R	7.41	0.00	30.00	8.59	0.00	30.00
H		5.54	0.00	30.00	1.87	0.00	30.00

Live load maximum, Temperature (-)

		Upper fiber factored stress	Upper fiber Allowable Tensile	Upper fiber Allowable Comp	Lower fiber factored stress	Lower fiber Allowable Tensile	Lower fiber Allowable Comp
A		1.17	0.00	30.00	1.66	0.00	30.00
B	L	6.79	0.00	30.00	3.50	0.00	30.00
	R	7.34	0.00	30.00	4.01	0.00	30.00
C	L	6.79	0.00	30.00	7.16	0.00	30.00
	R	7.26	0.00	30.00	7.56	0.00	30.00
D	L	4.93	0.00	30.00	11.79	0.00	30.00
	R	5.31	0.00	30.00	12.17	0.00	30.00
E	L	5.78	0.00	30.00	15.43	0.00	30.00
	R	5.79	0.00	30.00	15.48	0.00	30.00
F	L	18.98	0.00	30.00	3.13	0.00	30.00
	R	19.29	0.00	30.00	3.45	0.00	30.00
G	L	6.36	0.00	30.00	7.34	0.00	30.00
	R	6.61	0.00	30.00	7.28	0.00	30.00
H		4.60	0.00	30.00	1.58	0.00	30.00

Live load minimum, Temperature (+)

		Upper fiber factored stress	Upper fiber Allowable Tensile	Upper fiber Allowable Comp	Lower fiber factored stress	Lower fiber Allowable Tensile	Lower fiber Allowable Comp
A		1.26	0.00	30.00	2.04	0.00	30.00
B	L	2.85	0.00	30.00	10.47	0.00	30.00
	R	3.44	0.00	30.00	11.04	0.00	30.00
C	L	3.62	0.00	30.00	12.75	0.00	30.00
	R	4.01	0.00	30.00	13.18	0.00	30.00
D	L	2.91	0.00	30.00	17.67	0.00	30.00
	R	3.30	0.00	30.00	18.06	0.00	30.00
E	L	1.45	0.00	30.00	23.66	0.00	30.00
	R	1.51	0.00	30.00	23.67	0.00	30.00
F	L	17.31	0.00	30.00	11.15	0.00	30.00
	R	17.59	0.00	30.00	11.46	0.00	30.00
G	L	4.85	0.00	30.00	10.73	0.00	30.00
	R	4.99	0.00	30.00	10.75	0.00	30.00
H		1.63	0.00	30.00	7.87	0.00	30.00

Live load minimum, Temperature (-)

		Upper fiber factored stress	Upper fiber Allowable Tensile	Upper fiber Allowable Comp	Lower fiber factored stress	Lower fiber Allowable Tensile	Lower fiber Allowable Comp
A		1.17	0.00	30.00	1.66	0.00	30.00
B	L	2.20	0.00	30.00	9.97	0.00	30.00
	R	2.80	0.00	30.00	10.53	0.00	30.00
C	L	2.40	0.00	30.00	11.62	0.00	30.00
	R	2.84	0.00	30.00	11.99	0.00	30.00
D	L	1.80	0.00	30.00	16.68	0.00	30.00
	R	2.19	0.00	30.00	17.07	0.00	30.00
E	L	-0.78	0.00	30.00	21.69	0.00	30.00
	R	-0.76	0.00	30.00	21.75	0.00	30.00
F	L	16.07	0.00	30.00	9.11	0.00	30.00
	R	16.38	0.00	30.00	9.42	0.00	30.00
G	L	3.95	0.00	30.00	9.52	0.00	30.00
	R	4.19	0.00	30.00	9.44	0.00	30.00
H		0.69	0.00	30.00	7.58	0.00	30.00

Service III ; Load combination intended to control cracking in prestressed concrete structures

Unit; MPa

Load		Live load maximum Temperature (+) Factor		Live load maximum Temperature (-) Factor		Live load minimum Temperature (+) Factor		Live load minimum Temperature (-) Factor
DC,DW,EL (DC)		: 1.00		: 1.00		: 1.00		: 1.00
LL	max (Mmax)	: 0.80	Mmax	: 0.80	Mmax	: 0.00	Mmax	: 0.00
	min (Mmin)	: 0.00	Mmin	: 0.00	Mmin	: 0.80	Mmin	: 0.80
WS		: 0.00		: 0.00		: 0.00		: 0.00
SH		: 1.00		: 1.00		: 1.00		: 1.00
CR		: 1.00		: 1.00		: 1.00		: 1.00
TU	+15	: 0.50	+15	: 0.00	+15	: 0.50	+15	: 0.00
	-15	: 0.00	-15	: 0.50	-15	: 0.00	-15	: 0.50
TG	+15	: 0.50	+15	: 0.00	+15	: 0.50	+15	: 0.00
	-15	: 0.00	-15	: 0.50	-15	: 0.00	-15	: 0.50

Live load maximum, Temperature (+)

		Upper fiber factored stress	Upper fiber Allowable Tensile	Upper fiber Allowable Comp	Lower fiber factored stress	Lower fiber Allowable Tensile	Lower fiber Allowable Comp
A		1.24	0.00	30.00	2.02	0.00	30.00
B	L	6.81	0.00	30.00	4.77	0.00	30.00
	R	7.35	0.00	30.00	5.29	0.00	30.00
C	L	7.58	0.00	30.00	8.52	0.00	30.00
	R	7.99	0.00	30.00	8.96	0.00	30.00
D	L	5.52	0.00	30.00	13.33	0.00	30.00
	R	5.90	0.00	30.00	13.71	0.00	30.00
E	L	7.07	0.00	30.00	17.68	0.00	30.00
	R	7.12	0.00	30.00	17.68	0.00	30.00
F	L	19.70	0.00	30.00	5.55	0.00	30.00
	R	19.99	0.00	30.00	5.86	0.00	30.00
G	L	7.08	0.00	30.00	8.36	0.00	30.00
	R	7.25	0.00	30.00	8.39	0.00	30.00
H		5.01	0.00	30.00	2.36	0.00	30.00

Live load maximum, Temperature (-)

		Upper fiber factored stress	Upper fiber Allowable Tensile	Upper fiber Allowable Comp	Lower fiber factored stress	Lower fiber Allowable Tensile	Lower fiber Allowable Comp
A		1.17	0.00	30.00	1.67	0.00	30.00
B	L	6.24	0.00	30.00	4.33	0.00	30.00
	R	6.79	0.00	30.00	4.84	0.00	30.00
C	L	6.49	0.00	30.00	7.56	0.00	30.00
	R	6.94	0.00	30.00	7.95	0.00	30.00
D	L	4.54	0.00	30.00	12.43	0.00	30.00
	R	4.92	0.00	30.00	12.81	0.00	30.00
E	L	5.38	0.00	30.00	16.23	0.00	30.00
	R	5.40	0.00	30.00	16.27	0.00	30.00
F	L	18.65	0.00	30.00	3.99	0.00	30.00
	R	18.96	0.00	30.00	4.30	0.00	30.00
G	L	6.32	0.00	30.00	7.44	0.00	30.00
	R	6.56	0.00	30.00	7.40	0.00	30.00
H		4.30	0.00	30.00	2.14	0.00	30.00

Live load minimum, Temperature (+)

		Upper fiber factored stress	Upper fiber Allowable Tensile	Upper fiber Allowable Comp	Lower fiber factored stress	Lower fiber Allowable Tensile	Lower fiber Allowable Comp
A		1.24	0.00	30.00	2.02	0.00	30.00
B	L	3.14	0.00	30.00	9.94	0.00	30.00
	R	3.72	0.00	30.00	10.50	0.00	30.00
C	L	4.07	0.00	30.00	12.08	0.00	30.00
	R	4.46	0.00	30.00	12.50	0.00	30.00
D	L	3.02	0.00	30.00	17.24	0.00	30.00
	R	3.40	0.00	30.00	17.63	0.00	30.00
E	L	1.83	0.00	30.00	22.69	0.00	30.00
	R	1.88	0.00	30.00	22.70	0.00	30.00
F	L	17.37	0.00	30.00	10.33	0.00	30.00
	R	17.66	0.00	30.00	10.64	0.00	30.00
G	L	5.15	0.00	30.00	10.11	0.00	30.00
	R	5.32	0.00	30.00	10.12	0.00	30.00
H		1.88	0.00	30.00	7.16	0.00	30.00

Live load minimum, Temperature (-)

		Upper fiber factored stress	Upper fiber Allowable Tensile	Upper fiber Allowable Comp	Lower fiber factored stress	Lower fiber Allowable Tensile	Lower fiber Allowable Comp
A		1.17	0.00	30.00	1.67	0.00	30.00
B	L	2.57	0.00	30.00	9.51	0.00	30.00
	R	3.16	0.00	30.00	10.06	0.00	30.00
C	L	2.98	0.00	30.00	11.12	0.00	30.00
	R	3.41	0.00	30.00	11.50	0.00	30.00
D	L	2.03	0.00	30.00	16.34	0.00	30.00
	R	2.42	0.00	30.00	16.73	0.00	30.00
E	L	0.13	0.00	30.00	21.24	0.00	30.00
	R	0.16	0.00	30.00	21.29	0.00	30.00
F	L	16.33	0.00	30.00	8.77	0.00	30.00
	R	16.63	0.00	30.00	9.08	0.00	30.00
G	L	4.39	0.00	30.00	9.18	0.00	30.00
	R	4.62	0.00	30.00	-0.51	0.00	30.00
H		1.17	0.00	30.00	6.94	0.00	30.00

Service IV ; Load combination for segmentally constructed bridges Unit; MPa

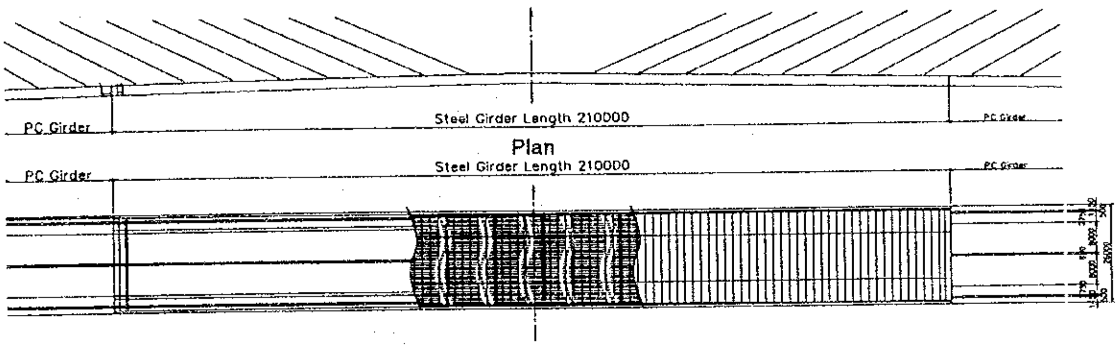
Temperature (+)			Factor	Temperature (-)			Factor
DC,DW,EL			: 1.00	DC			: 1.00
LL	max		: 0.00	LL	Mmax		: 0.00
	min		: 0.00		Mmin		: 0.00
WS			: 0.00	WS			: 0.00
SH			: 1.00	SH			: 1.00
CR			: 1.00	CR			: 1.00
TU		+15	: 1.00	TU		+15	: 0.00
		-15	: 0.00			-15	: 1.00
TG		+15	: 1.00	TG		+15	: 0.00
		-15	: 0.00			-15	: 1.00

		Temperature (+) Upper fiber			Temperature (+) Lower fiber			Temperature (-) Upper fiber			Temperature (-) Lower fiber		
		factored	Allowable		factored	Allowable		factored	Allowable		factored	Allowable	
		stress	Tensile	Comp	stress	Tensile	Comp	stress	Tensile	Comp	stress	Tensile	Comp
A		1.27	0.00	30.00	2.35	0.00	30.00	1.14	0.00	30.00	1.64	0.00	30.00
B	L	4.92	0.00	30.00	8.05	0.00	30.00	3.78	0.00	30.00	7.18	0.00	30.00
	R	5.46	0.00	30.00	8.57	0.00	30.00	4.33	0.00	30.00	7.69	0.00	30.00
C	L	7.08	0.00	30.00	9.92	0.00	30.00	4.90	0.00	30.00	8.00	0.00	30.00
	R	7.45	0.00	30.00	10.36	0.00	30.00	5.35	0.00	30.00	8.35	0.00	30.00
D	L	4.54	0.00	30.00	15.83	0.00	30.00	2.57	0.00	30.00	14.03	0.00	30.00
	R	4.91	0.00	30.00	16.20	0.00	30.00	2.94	0.00	30.00	14.40	0.00	30.00
E	L	5.58	0.00	30.00	20.37	0.00	30.00	2.19	0.00	30.00	17.48	0.00	30.00
	R	5.65	0.00	30.00	20.37	0.00	30.00	2.20	0.00	30.00	17.55	0.00	30.00
F	L	18.86	0.00	30.00	8.51	0.00	30.00	16.77	0.00	30.00	5.39	0.00	30.00
	R	19.12	0.00	30.00	8.80	0.00	30.00	17.06	0.00	30.00	5.68	0.00	30.00
G	L	7.28	0.00	30.00	8.48	0.00	30.00	5.75	0.00	30.00	6.64	0.00	30.00
	R	7.41	0.00	30.00	8.52	0.00	30.00	6.01	0.00	30.00	6.54	0.00	30.00
H		3.82	0.00	30.00	4.53	0.00	30.00	2.39	0.00	30.00	4.10	0.00	30.00

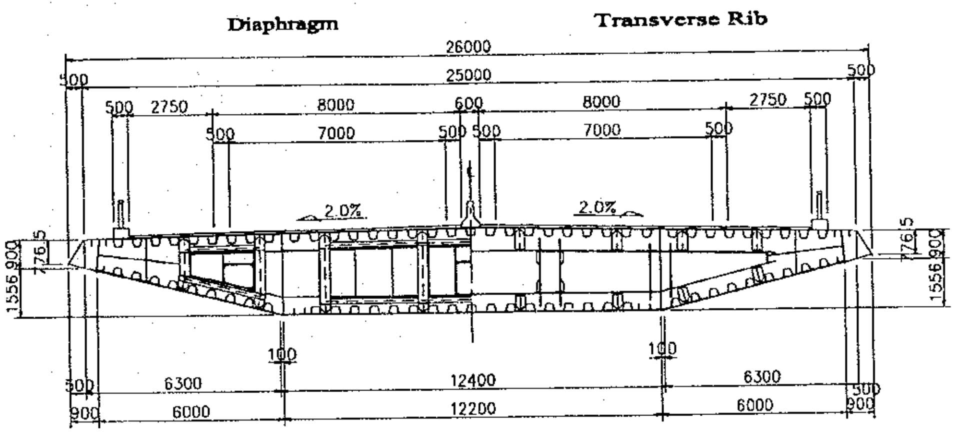
3.8 Design of Steel Girder

3.8.1 Geometry of Steel Girder

General View



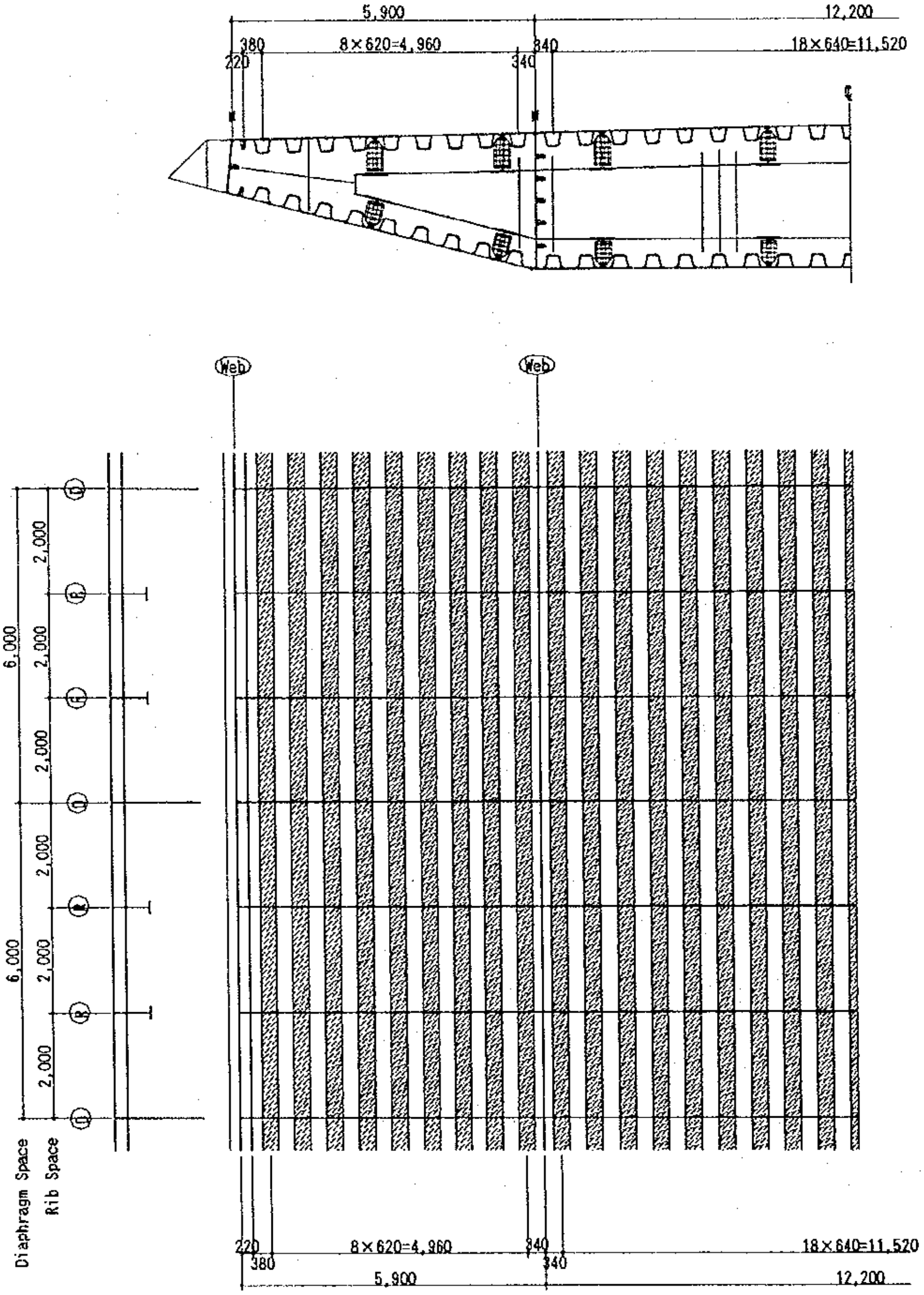
Typical Cross Section



3.8.2 Design of Deck Floor

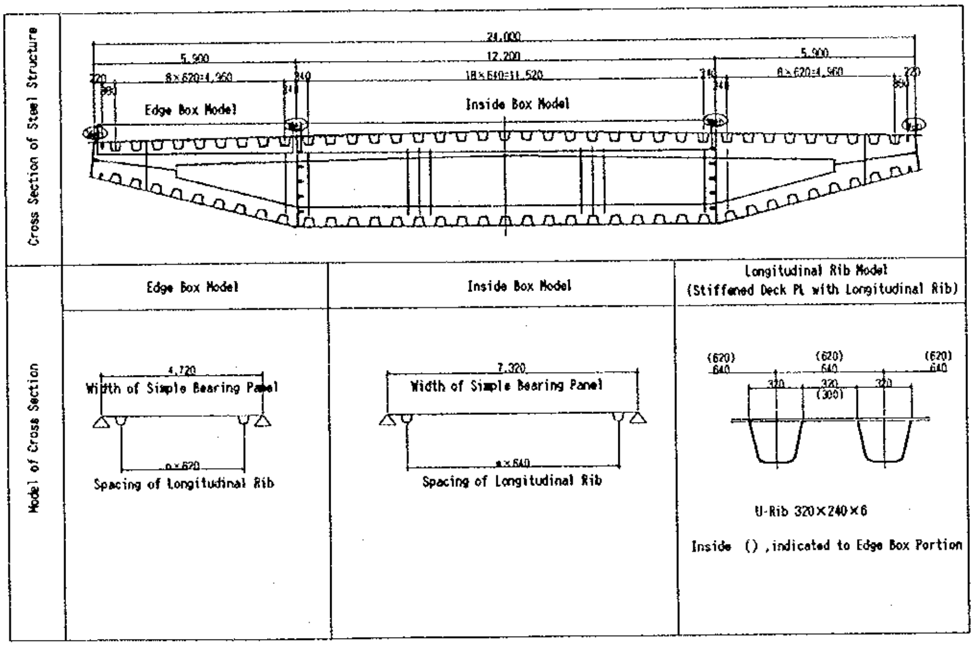
As for design of steel deck floor, the design according to Pelikan & Essilnger Method, based on "Orthotropic Plate Theory".

General View of Steel Plate Deck

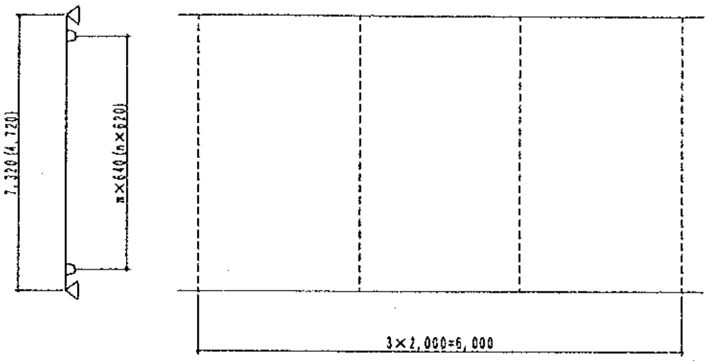


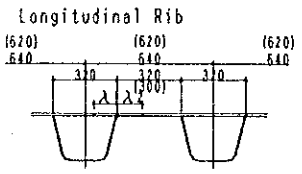
(1) Analysis Model of Steel Deck Floor

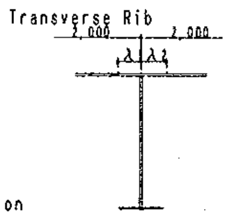
Structure type of main girder is multi cell box girder. Therefore, deck floor considered as continuous girder is supported at web. Further, the equivalence span length calculated from spacing of web, considered as simple bearing panel.



(2) Calculation of Effective Width







( ) indicated to Edge Box Portion

l=200.0cm×0.6=120cm
b1=16.0cm
b2=16.0cm (15.0cm)
b1/l=16.0/120.0=0.1333
b2/l=16.0/120.0=0.1333
(15.0) (0.1250)
λ1={1.06-3.2(b1/l)+4.5(b1/l)^2}×16.0
=11.4
λ2=11.4(11.0)

Inside Box
l=732.0cm
b1=b2=100.0cm
b/l=100.0/732.0=0.1366
λ=70.7cm
2·λ=141.4cm

Edge Box
l=472.0cm
b1=b2=100.0cm
b/l=100.0/472.0=0.2119
λ=58.4cm
2·λ=116.8cm

(3) Design Section Force

Design Section force

		Section Force caused by Live Load	Section Force caused by Dead Load	Design section force
Inside Box (Inside)	Mmax	6.219	0.036	6.255
		(8.028)	(0.036)	(8.064)
	Mmin	-3.045	-0.071	-3.116
		(-4.013)	(-0.071)	(-4.084)
Box girder (Out side)	Mmax	6.205	0.033	6.238
	Mmin	3.326	-0.065	-3.391

( ) ; In case that converted rigidity of lateral rib is not accounted.

(4) Stress Check of Deck Floor

Stress Intensity

		Section Force caused by Live Load	Section Force caused by Dead Load
Inside Box (Inside)	Mmax	-493	1342
		(-636)	(1731)
	Mmin	246	-669
		(322)	(-876)
Box girder (Out side)	Mmax	-507	1342
	Mmin	275	-730

If the converted rigidity of lateral rib is accounted, stress is s=1342kgf/cm^2.
Although stress intensity is less than 1400 kgf, SM490A is adopted for material because of account of superposition with main girder system.

3.8.3 Design of Main Girder

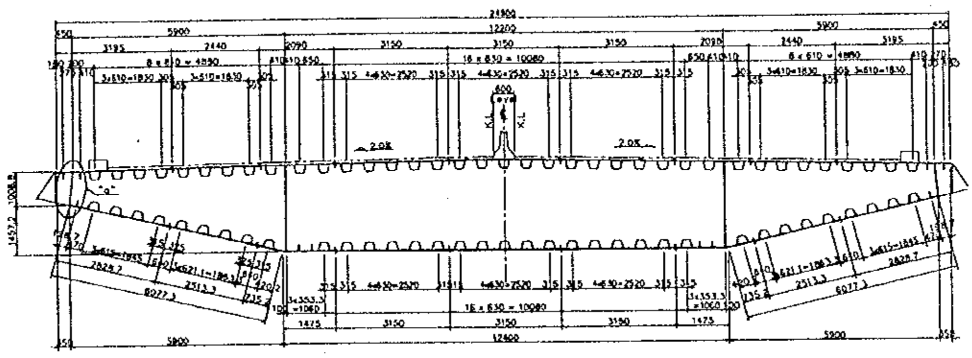
(1) Design concept

- The effective width for bending moments calculated using equivalent, span length that is determined by bending a diaphragm working dead and live load. (SPECIFICATIONS FOR HIGHWAY BRIDGES)
- Effective width is not applied for axial force (In calculation of sections).
- Decks with longitudinal rib of high stress, decrearation of allowable with local buckling is ignored.
- Instead of stability calculation of material affected by longitudinal compressive stress and bending stress, whether sum of those stress is less than allowable stress.
- Design of web conforms with Japanese spec. "Specifications for highway bridges part II steel bridges the third chapter". Longitudinal rib is not effective in calculating section force.
- All section vary at the point of field joint.
- The following table shows, the each way of field joint.

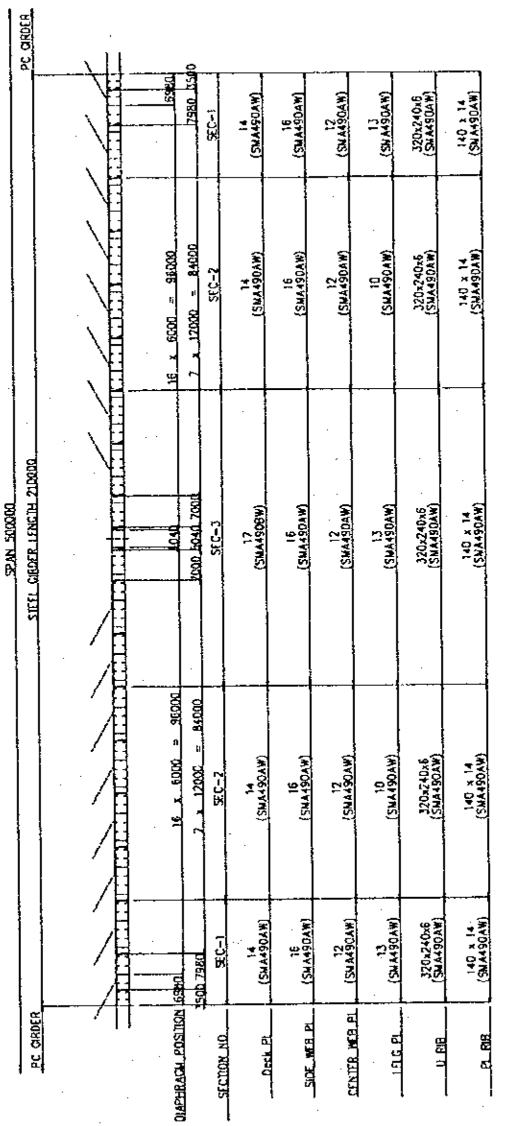
SPLICE METHOD		FIELD OR WELD	BOLT
DECK	Longitudinal Direction	O	
	Transverse Direction	O	
LOWER FLANGE WEB	Longitudinal Direction	O	
	Transverse Direction	O	
WEB	Side Web		O
	Center Web		O
U-RIB	Deck		O
	Lower Flange	O	
TRANSVERSE	Flange, Web		O
	Vertical Member		O
DIAPHRAGM			O
LOCAL RIB CONNECTED RIB			O
FENDER			O

(2) Detail of Steel Girder

Basic Dimension of Steel Girder

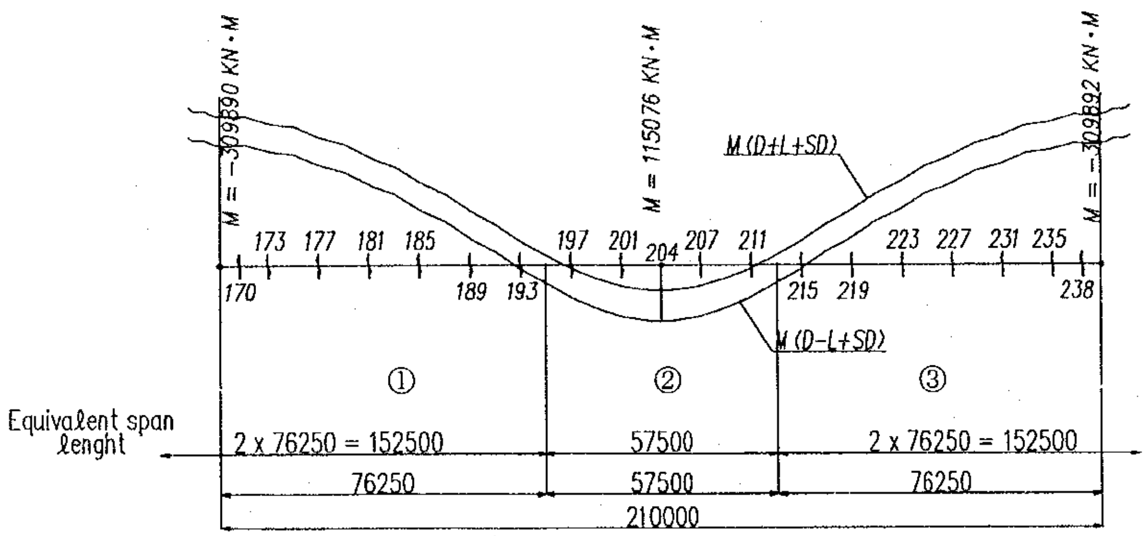


Section Composition of Steel Girder



(3) Calculation of Effective Width of Flange

Design of effective width shall be checked from bending moment according to Japanese specifications for highway bridges.



		①	②	③
Equivalent span lengh:L(cm)		15250	5750	15250
side box	b1(cm)	295	295	295
	b1／L	0.0193	0.0513	0.0193
	λ1／b1	1.000	0.997	1.000
	λ1	295.0	294.2	295.0
center box	b2(cm)	610	610	610
	b2／L	0.0400	0.1061	0.0400
	λ2／b2	1.000	0.888	1.000
	λ2	610.0	541.6	610.0

(4) Calculation of Sectional Force

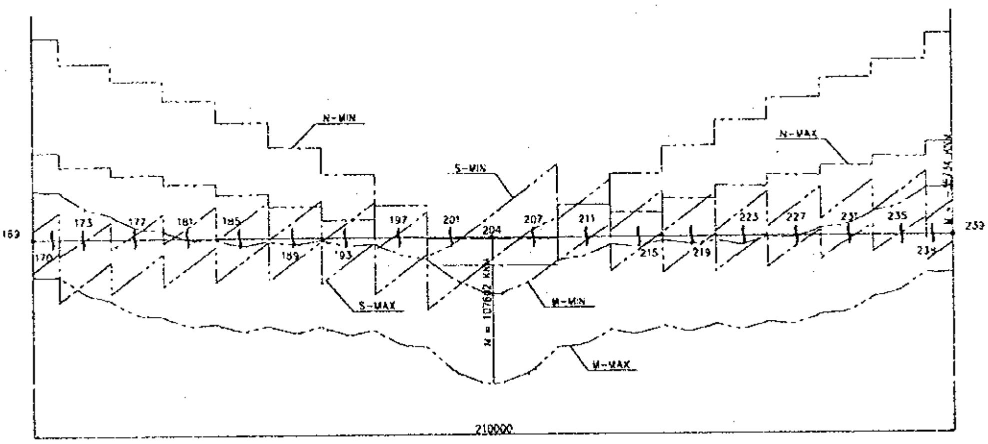


Table Result of Sectional Force

Member	Joint	Nmax N(KN)	Nmax S(KN)	Nmax M(KN·m)	Nmax Load Case	Nmin N(KN)	Nmin S(KN)	Nmin M(KN·m)	Nmin Load Case
169	169	-31715	980	-2393	D+EQ	-49085	1061	-18210	D+L+SD
	170	-31784	253	-232	D+EQ	-49067	189	-16084	D+L+SD
170	170	-31784	276	-232	D+EQ	-49064	225	-16082	D+L+SD
	171	-31833	-244	-191	D+EQ	-49051	-398	-16344	D+L+SD
171	171	-26371	2967	-191	D+EQ	-42846	3265	-16694	D+L+SD
	172	-26391	2760	2644	D+EQ	-42841	3018	-13611	D+L+SD
172	172	-26389	2778	2644	D+EQ	-42836	3048	-13610	D+L+SD
	173	-26478	1846	13030	D+EQ	-42814	1930	-2556	D+L+SD
173	173	-26477	1866	13030	D+EQ	-42809	1963	-2556	D+L+SD
	174	-26508	1552	15612	D+EQ	-42802	1587	83	D+L+SD
174	174	-26506	1573	15612	D+EQ	-42798	1621	83	D+L+SD
	175	-26607	531	20888	D+EQ	-42774	372	4937	D+L+SD
175	175	-23156	2429	20888	D+EQ	-38442	2776	4282	D+L+SD
	176	-23176	2223	23191	D+EQ	-38437	2530	6871	D+L+SD
176	176	-23175	2239	23191	D+EQ	-38433	2556	6870	D+L+SD
	177	-23268	1305	31153	D+EQ	-38414	1437	15663	D+L+SD
177	177	-23266	1323	31153	D+EQ	-38410	1466	15662	D+L+SD
	178	-23298	1009	32914	D+EQ	-38404	1090	17532	D+L+SD
178	178	-23296	1028	32914	D+EQ	-38400	1121	17532	D+L+SD
	179	-23401	-12	35462	D+EQ	-38380	-126	19826	D+L+SD
179	179	-19751	1906	35462	D+EQ	-33698	2351	18846	D+L+SD
	180	-19771	1699	37246	D+EQ	-33694	2104	21000	D+L+SD
180	180	-19770	1713	37246	D+EQ	-33690	2126	21001	D+L+SD
	181	-19865	780	42845	D+EQ	-33673	1007	27807	D+L+SD
181	181	-19864	795	42845	D+EQ	-33670	1034	27807	D+L+SD
	182	-19896	481	43811	D+EQ	-33664	658	29009	D+L+SD
182	182	-19896	497	43811	D+EQ	-33662	684	29009	D+L+SD
	183	-20003	-543	43698	D+EQ	-33645	-564	29053	D+L+SD
183	183	-15856	1555	43698	D+EQ	-28303	2159	27882	D+L+SD
	184	-15877	1349	45137	D+EQ	-28300	1912	29833	D+L+SD
184	184	-15876	1359	45137	D+EQ	-28297	1929	29833	D+L+SD
	185	-15974	426	49148	D+EQ	-28283	810	35694	D+L+SD
185	185	-15974	437	49148	D+EQ	-28281	830	35689	D+L+SD
	186	-16007	125	49574	D+EQ	-28277	455	36561	D+L+SD
186	186	-16007	139	49574	D+EQ	-28275	480	36555	D+L+SD
	187	-16118	-902	47663	D+EQ	-28261	-769	35500	D+L+SD
187	187	-11407	1396	47663	D+EQ	-22182	2214	34042	D+L+SD
	188	-11429	1191	48944	D+EQ	-22180	1967	36033	D+L+SD
188	188	-11428	1199	48944	D+EQ	-22177	1983	36032	D+L+SD
	189	-11529	268	52240	D+EQ	-22166	865	42067	D+L+SD
189	189	-11529	276	52240	D+EQ	-22165	881	42064	D+L+SD
	190	-11562	-36	52421	D+EQ	-22161	506	42990	D+L+SD
190	190	-11562	-27	52421	D+EQ	-22159	524	42986	D+L+SD
	191	-11676	-1067	49679	D+EQ	-22148	-725	42078	D+L+SD
191	191	-6493	1376	49679	D+EQ	-15411	2464	40312	D+L+SD
	192	-6516	1171	50940	D+EQ	-15409	2217	42535	D+L+SD
192	192	-6515	1175	50940	D+EQ	-15407	2228	42535	D+L+SD
	193	-6619	243	54124	D+EQ	-15399	1109	49600	D+L+SD
193	193	-6619	249	54124	D+EQ	-15397	1121	49591	D+L+SD
	194	-6653	-64	54264	D+EQ	-15394	745	50858	D+L+SD
194	194	-6653	-59	54264	D+EQ	-15393	757	50849	D+L+SD
	195	-6771	-1098	51361	D+EQ	-15386	-491	51036	D+L+SD
195	195	-7	2156	28011	D+L+T2+S+SD	-9031	3412	48211	D+L+T2+S+SD
	196	-6	1951	30046	D+L+T2+S+SD	-9030	3166	51351	D+L+T2+S+SD
196	196	-5	1951	30046	D+L+T2+S+SD	-9028	3172	51405	D+L+T2+S+SD
	197	1	1020	36718	D+L+T2+S+SD	-9022	2053	62609	D+L+T2+S+SD
197	197	2	1020	36718	D+L+T2+S+SD	-9019	2061	62599	D+L+T2+S+SD
	198	3	707	38023	D+L+T2+S+SD	-9018	1684	65248	D+L+T2+S+SD
198	198	4	707	38023	D+L+T2+S+SD	-9016	1692	65227	D+L+T2+S+SD
	199	8	-331	38968	D+L+T2+S+SD	-9012	444	69984	D+L+T2+S+SD
199	199	7861	3128	37915	D+L+T2+S+SD	424	4587	68169	D+L+T2+S+SD
	200	7862	2923	40913	D+L+T2+S+SD	425	4340	72449	D+L+T2+S+SD
200	200	7864	2917	40912	D+L+T2+S+SD	428	4339	72408	D+L+T2+S+SD
	201	7867	1986	51931	D+L+T2+S+SD	431	3220	88750	D+L+T2+S+SD
201	201	7868	1980	51931	D+L+T2+S+SD	433	3211	88386	D+L+T2+S+SD

Member	Joint	Smax N(KN)	Smax S(KN)	Smax M(KN·m)	Smax Load Case	Smin N(KN)	Smin S(KN)	Smin M(KN·m)	Smin Load Case
169	169	-43858	2471	3087	D+L+SD	-42773	-686	11622	D+L+T1+SD
	170	-43843	1598	5461	D+L+SD	-42398	-1385	6589	D+L+SD
170	170	-43878	1630	5381	D+L+SD	-42349	-1354	6670	D+L+SD
	171	-43861	1008	5318	D+L+SD	-42477	-1958	5379	D+L+SD
171	171	-38305	4619	2883	D+L+SD	-36549	1426	12583	D+L+T1+SD
	172	-38303	4369	5979	D+L+SD	-36592	1191	14988	D+L+T1+SD
172	172	-38329	4396	5913	D+L+SD	-36550	1216	15055	D+L+T1+SD
	173	-38312	3273	16968	D+L+SD	-36759	148	23276	D+L+T1+SD
173	173	-38340	3302	16892	D+L+SD	-36716	176	23351	D+L+T1+SD
	174	-38331	2926	19528	D+L+SD	-36791	-186	25105	D+L+T1+SD
174	174	-38346	2956	19446	D+L+SD	-36760	-156	25187	D+L+T1+SD
	175	-38302	1713	24284	D+L+SD	-36504	-1244	24035	D+L+SD
175	175	-34685	4044	21822	D+L+SD	-32443	897	29787	D+L+T1+SD
	176	-34680	3797	24331	D+L+SD	-32488	662	31715	D+L+T1+SD
176	176	-34692	3820	24278	D+L+SD	-32463	684	31768	D+L+T1+SD
	177	-34663	2699	32662	D+L+SD	-32680	-388	37780	D+L+T1+SD
177	177	-34677	2725	32603	D+L+SD	-32652	-364	37839	D+L+T1+SD
	178	-34664	2350	34340	D+L+SD	-32729	-727	38830	D+L+T1+SD
178	178	-34673	2379	34274	D+L+SD	-32708	-699	38896	D+L+T1+SD
	179	-34615	1141	36140	D+L+SD	-32490	-1810	36384	D+L+SD
179	179	-30637	3526	33772	D+L+SD	-28152	422	40817	D+L+T1+SD
	180	-30630	3278	35750	D+L+SD	-28197	186	42299	D+L+T1+SD
180	180	-30635	3299	35710	D+L+SD	-28181	204	42339	D+L+T1+SD
	181	-30594	2180	41677	D+L+SD	-27947	-790	44677	D+L+SD
181	181	-30606	2205	41620	D+L+SD	-27925	-767	44734	D+L+SD
	182	-30588	1830	42543	D+L+SD	-28001	-1131	45148	D+L+SD
182	182	-30594	1855	42489	D+L+SD	-27985	-1109	45203	D+L+SD
	183	-30523	620	41636	D+L+SD	-28249	-2324	42792	D+L+SD
183	183	-25786	3227	39246	D+L+SD	-23410	161	46277	D+L+T1+SD
	184	-25777	2979	40909	D+L+SD	-23454	-76	47516	D+L+T1+SD
184	184	-25862	2995	40933	D+L+SD	-23359	-61	47492	D+L+T1+SD
	185	-25811	1880	45477	D+L+SD	-23150	-1078	49536	D+L+SD
185	185	-25820	1899	45436	D+L+SD	-23133	-1061	49577	D+L+SD
	186	-25799	1527	45885	D+L+SD	-23206	-1425	49553	D+L+SD
186	186	-25805	1550	45835	D+L+SD	-23192	-1404	49603	D+L+SD
	187	-25304	379	43099	D+L-T1+SD	-23442	-2622	45701	D+L+SD
187	187	-19752	3174	40350	D+L+SD	-18408	134	49160	D+L+T1+SD
	188	-19741	2928	41968	D+L+SD	-18450	-103	50369	D+L+T1+SD
188	188	-20049	2942	42202	D+L+SD	-18133	-90	50135	D+L+T1+SD
	189	-19988	1832	46570	D+L+SD	-17935	-2124	52696	D+L+SD
189	189	-20002	1847	46551	D+L+SD	-17915	-1110	52715	D+L+SD
	190	-19977	1476	46949	D+L+SD	-17980	-1474	52618	D+L+SD
190	190	-20028	1492	46954	D+L+SD	-17923	-1460	52613	D+L+SD
	191	-19545	309	44599	D+L-T1+SD	-18145	-2680	48464	D+L+SD
191	191	-13362	3329	41214	D+L+SD	-12437	286	51477	D+L+T1+SD
	192	-13349	3084	43013	D+L+SD	-12471	49	52848	D+L+T1+SD
192	192	-13351	3093	43002	D+L+SD	-12462	58	52859	D+L+T1+SD
	193	-13282	1986	48184	D+L+SD	-12259	-993	56617	D+L+SD
193	193	-13291	1998	48171	D+L+SD	-12244	-983	56630	D+L+SD
	194	-13264	1627	48840	D+L+SD	-12298	-1348	56759	D+L+SD
194	194	-13279	1638	48833	D+L+SD	-12278	-1339	56766	D+L+SD
	195	-13179	417	47172	D+L+SD	-12458	-2560	53349	D+L+SD
195	195	-5390	4189	43420	D+L+SD	-4575	1026	56539	D+L+T1+SD
	196	-5379	3944	46087	D+L+SD	-4597	791	58666	D+L+T1+SD
196	196	-5375	3947	46087	D+L+SD	-4596	794	58666	D+L+T1+SD
	197	-5319	2839	55149	D+L+SD	-4361	-265	66145	D+L+SD
197	197	-5316	2843	55149	D+L+SD	-4358	-262	66145	D+L+SD
	198	-5296	2473	57102	D+L+SD	-4391	-625	67410	D+L+SD
198	198	-5292	2477	57102	D+L+SD	-4390	-621	67410	D+L+SD
	199	-5217	1254	59639	D+L+SD	-4497	-1833	67795	D+L+SD
199	199	3875	5319	59637	D+L+SD	5800	2107	56429	D+EQ
	200	3881	5073	63417	D+L+SD	5776	1902	58414	D+EQ
200	200	3885	5071	63417	D+L+SD	5777	1898	58414	D+EQ
	201	3910	3960	77464	D+L+SD	1767	681	81739	D+L+T2+S+SD
201	201	3913	3958	77464	D+L+SD	1769	680	81739	D+L+T2+S-SD

Member	Joint	Mmax N(KN)	Mmax S(KN)	Mmax M(KN·m)	Mmax Load Case	Mmin N(KN)	Mmin S(KN)	Mmin M(KN·m)	Mmin Load Case
169	169	-41591	731	31308	D+L+T1+SD	-45872	951	-41082	D+L-T1+SD
	170	-41673	-133	32303	D+L+T1+SD	-45639	143	-39200	D+L-T1+SD
170	170	-41659	-103	32303	D+L+T1+SD	-45639	177	-39200	D+L-T1+SD
	171	-41853	-726	31256	D+L+T1+SD	-46015	-537	-34725	D+L+SD
171	171	-35750	2892	31256	D+L+T1+SD	-40220	2885	-34725	D+L+SD
	172	-35833	2649	33971	D+L+T1+SD	-40147	2649	-32000	D+L+SD
172	172	-35819	2674	33971	D+L+T1+SD	-40145	2678	-32000	D+L+SD
	173	-35676	1707	39357	D+L+SD	-39288	1751	-26486	D+L-T1+SD
173	173	-35662	1734	39357	D+L+SD	-39287	1781	-26486	D+L-T1+SD
	174	-35785	1355	41668	D+L+SD	-39177	1436	-24070	D+L-T1+SD
174	174	-35771	1383	41668	D+L+SD	-39175	1467	-24070	D+L-T1+SD
	175	-36148	120	45408	D+L+SD	-38825	334	-19595	D+L-T1+SD
175	175	-31960	2465	45408	D+L+SD	-35030	2442	-19595	D+L-T1+SD
	176	-32042	2219	47702	D+L+SD	-34952	2211	-17305	D+L-T1+SD
176	176	-32030	2241	47702	D+L+SD	-34950	2236	-17305	D+L-T1+SD
	177	-32385	1128	55182	D+L+SD	-34604	1201	-9642	D+L-T1+SD
177	177	-32372	1153	55182	D+L+SD	-34603	1227	-9642	D+L-T1+SD
	178	-32486	768	56616	D+L+SD	-34495	886	-8058	D+L-T1+SD
178	178	-32474	795	56616	D+L+SD	-34493	914	-8058	D+L-T1+SD
	179	-32831	-475	57401	D+L+SD	-34148	-205	-6311	D+L-T1+SD
179	179	-28320	1942	57401	D+L+SD	-30087	1951	-6311	D+L-T1+SD
	180	-28395	1693	59179	D+L+SD	-30011	1722	-4507	D+L-T1+SD
180	180	-28385	1712	59179	D+L+SD	-30010	1742	-4507	D+L-T1+SD
	181	-28717	592	64281	D+L+SD	-29680	719	969	D+L-T1+SD
181	181	-28707	615	64281	D+L+SD	-29680	742	969	D+L-T1+SD
	182	-28808	227	64908	D+L+SD	-29567	400	1820	D+L-T1+SD
182	182	-28799	250	64908	D+L+SD	-29567	423	1820	D+L-T1+SD
	183	-29127	-1029	62966	D+L+SD	-29248	-690	1125	D+L-T1+SD
183	183	-23986	1621	62966	D+L+SD	-24593	1688	1125	D+L-T1+SD
	184	-24052	1370	64431	D+L+SD	-24526	1461	2673	D+L-T1+SD
184	184	-24043	1384	64431	D+L+SD	-24524	1475	2673	D+L-T1+SD
	185	-24338	259	68079	D+L+SD	-26492	-104	8668	D-EQ
185	185	-24330	276	68079	D+L+SD	-26492	-85	8668	D-EQ
	186	-24420	-109	68205	D+L+SD	-26451	-397	8304	D-EQ
186	186	-24412	-87	68205	D+L+SD	-26451	-373	8304	D-EQ
	187	-24686	-1362	64602	D+L+SD	-26312	-1410	3829	D-EQ
187	187	-18836	1544	64602	D+L+SD	-21073	1150	3829	D-EQ
	188	-18893	1294	65996	D+L+SD	-21047	945	4866	D-EQ
188	188	-18886	1307	65996	D+L+SD	-21046	959	4866	D-EQ
	189	-19127	192	69331	D+L+SD	-20923	30	7086	D-EQ
189	189	-19120	206	69331	D+L+SD	-20923	46	7086	D-EQ
	190	-19196	-175	69355	D+L+SD	-20882	-266	6919	D-EQ
190	190	-19190	-160	69355	D+L+SD	-20882	-249	6919	D-EQ
	191	-19398	-1426	65416	D+L+SD	-20746	-1287	3069	D-EQ
191	191	-12921	1682	65416	D+L+SD	-14745	1552	3069	D-EQ
	192	-12964	1434	66948	D+L+SD	-14718	1347	4504	D-EQ
192	192	-12959	1443	66948	D+L+SD	-14717	1357	4504	D-EQ
	193	-13147	337	70916	D+L+SD	-14597	427	8512	D-EQ
193	193	-13142	348	70916	D+L+SD	-14597	439	8512	D-EQ
	194	-13192	-35	71155	D+L+SD	-14557	126	8940	D-EQ
194	194	-13188	-24	71155	D+L+SD	-14557	137	8940	D-EQ
	195	-13335	-1277	67926	D+L+SD	-14425	-900	7031	D-EQ
195	195	-5121	2511	67926	D+L+SD	-6608	2652	7031	D-EQ
	196	-5151	2267	70271	D+L+SD	-6583	2447	9557	D-EQ
196	196	-5147	2270	70271	D+L+SD	-6581	2451	9557	D-EQ
	197	-5274	1185	77956	D+L+SD	-6464	1520	18475	D-EQ
197	197	-5270	1189	77956	D+L+SD	-6462	1525	18475	D-EQ
	198	-5312	813	79451	D+L+SD	-6424	1213	20543	D-EQ
198	198	-5308	817	79451	D+L+SD	-6422	1218	20543	D-EQ
	199	-5456	-417	80434	D+L+SD	-6294	181	24049	D-EQ
199	199	3609	3636	80434	D+L+SD	2674	4143	24049	D-EQ
	200	3585	3397	83884	D+L+SD	2700	3938	28050	D-EQ
200	200	3589	3395	83884	D+L+SD	2703	3936	28050	D-EQ
	201	3447	2328	96617	D+L+SD	2817	3005	43639	D-EQ
201	201	3449	2326	96617	D+L+SD	2819	3003	43639	D-EQ

Member	Joint	Nmax				Nmin				Smax				Smin				Mmax				Mmin			
		N(KN)	S(KN)	M(KN·m)	Load Case	N(KN)	S(KN)	M(KN·m)	Load Case	N(KN)	S(KN)	M(KN·m)	Load Case	N(KN)	S(KN)	M(KN·m)	Load Case	N(KN)	S(KN)	M(KN·m)	Load Case	N(KN)	S(KN)	M(KN·m)	Load Case
	202	7869	1667	54688	D+L-T2+S+SD	434	2835	92741	D+L+T2+S+SD	3922	3586	81066	D+L+SD	1760	319	84504	D+L+T2+S+SD	3376	1962	99827	D+L+SD	2858	2690	47939	D-EQ
202	202	7870	1660	54688	D+L-T2+S+SD	437	2821	92186	D+L+T2+S+SD	3925	3582	81066	D+L+SD	1760	317	84504	D+L+T2+S+SD	3379	1959	99827	D+L+SD	2860	2688	47939	D-EQ
	203	7872	416	60932	D+L-T2+S+SD	439	961	103560	D+L+T2+S+SD	3961	2112	89828	D+L+SD	4000	-1126	90813	D+L+SD	3205	493	107111	D+L+SD	3011	1444	60341	D-EQ
203	203	7872	409	60932	D+L-T2+S+SD	440	919	103653	D+L+T2+S+SD	3962	2109	89828	D+L+SD	3999	-1129	90813	D+L+SD	3205	490	107111	D+L+SD	3012	1441	60341	D-EQ
	204	7872	-8	61337	D+L-T2+S+SD	440	84	104576	D+L+T2+S+SD	3974	1619	90802	D+L+SD	3987	-1617	90811	D+L+SD	3253	1	107602	D+L+SD	3062	1024	62821	D-EQ
204	204	7872	-10	61337	D+L-T2+S+SD	440	-82	104576	D+L+T2+S+SD	3975	1618	90802	D+L+SD	3986	-1618	90811	D+L+SD	3253	0	107602	D+L+SD	3062	1024	62821	D-EQ
	205	7872	-426	60899	D+L-T2+S+SD	440	-910	103672	D+L+T2+S+SD	3987	1131	90807	D+L+SD	3974	-2107	89840	D+L+SD	3215	-488	107113	D+L+SD	5384	-1440	62089	D+EQ
205	205	7872	-434	60899	D+L-T2+S+SD	439	-959	103566	D+L+T2+S+SD	3987	1127	90807	D+L+SD	3973	-2111	89840	D+L+SD	3214	-492	107113	D+L+SD	5383	-1446	62089	D+EQ
	206	7870	-1677	54562	D+L-T2+S+SD	437	-2817	92212	D+L+T2+S+SD	1748	-315	84511	D+L+T2+S+SD	3937	-3580	81089	D+L+SD	3358	-1956	99838	D+L+SD	5231	-2689	49680	D+EQ
206	206	7869	-1686	54562	D+L-T2+S+SD	434	-2831	92767	D+L+T2+S+SD	1747	-316	84511	D+L+T2+S+SD	3934	-3584	81089	D+L+SD	3356	-1959	99838	D+L+SD	5229	-2694	49680	D+EQ
	207	7868	-2000	51780	D+L-T2+S+SD	433	-3208	88417	D+L+T2+S+SD	1756	-678	81749	D+L+T2+S+SD	3925	-3957	77489	D+L+SD	3430	-2325	96629	D+L+SD	5191	-3007	45373	D+EQ
207	207	7867	-2005	51780	D+L-T2+S+SD	431	-3218	88782	D+L+T2+S+SD	1755	-680	81750	D+L+T2+S+SD	3923	-3959	77489	D+L+SD	3427	-2327	96629	D+L+SD	5189	-3011	45373	D+EQ
	208	7864	-2936	40691	D+L-T2+S+SD	428	-4337	72454	D+L+T2+S+SD	3406	-1890	56750	D-EQ	3897	-5070	63450	D+L+SD	3570	-3393	83904	D+L+SD	5074	-3942	29762	D+EQ
208	208	7862	-2941	40691	D+L-T2+S+SD	425	-4337	72495	D+L+T2+S+SD	3404	-1892	56750	D-EQ	3893	-5071	63450	D+L+SD	3566	-3395	83904	D+L+SD	5072	-3944	29762	D+EQ
	209	7861	-3147	37677	D+L-T2+S+SD	424	-4584	68218	D+L+T2+S+SD	3428	-2098	54775	D-EQ	3887	-5318	59671	D+L+SD	3591	-3634	80454	D+L+SD	5046	-4150	25753	D+EQ
209	209	7	331	38972	D+L-T2+S+SD	-9009	-443	70040	D+L+T2+S+SD	-4507	1834	67811	D+L+SD	-5203	-1253	59673	D+L+SD	-5472	418	80454	D+L+SD	-3906	-196	25753	D+EQ
	210	3	-707	38028	D+L-T2+S+SD	-9013	-1690	65291	D+L+T2+S+SD	-4401	622	67432	D+L+SD	-5278	-2476	57141	D+L+SD	-5322	-815	79477	D+L+SD	-4034	-1234	22169	D+EQ
210	210	2	-707	38028	D+L-T2+S+SD	-9016	-1683	65311	D+L+T2+S+SD	-4402	626	67432	D+L+SD	-5281	-2472	57141	D+L+SD	-5326	-810	79477	D+L+SD	-4036	-1230	22169	D+EQ
	211	1	-1020	36723	D+L-T2+S+SD	-9017	-2059	62664	D+L+T2+S+SD	-4369	263	66168	D+L+SD	-5302	-2842	55189	D+L+SD	-5281	-1187	77982	D+L+SD	-4074	-1543	20074	D+EQ
211	211	0	-1020	36723	D+L-T2+S+SD	-9019	-2052	62664	D+L+T2+S+SD	-4372	266	66168	D+L+SD	-5304	-2838	55189	D+L+SD	-5285	-1182	77982	D+L+SD	-4076	-1540	20074	D+EQ
	212	-6	-1951	30052	D+L-T2+S+SD	-9025	-3171	51465	D+L+T2+S+SD	-4606	-793	58693	D+L+T1+SD	-5360	-3946	46130	D+L+SD	-5156	-2269	70301	D+L+SD	-4193	-2470	11067	D+EQ
212	212	-7	-1951	30052	D+L-T2+S+SD	-9027	-3169	51555	D+L+T2+S+SD	-4607	-790	58693	D+L+T1+SD	-5364	-3943	46129	D+L+SD	-5160	-2266	70301	D+L+SD	-4195	-2468	11067	D+EQ
	213	-8	-2156	28018	D+L-T2+S+SD	-9028	-3415	48414	D+L+T2+S+SD	-4586	-1025	56569	D+L+T1+SD	-5375	-4188	43464	D+L+SD	-5130	-2510	67957	D+L+SD	-4220	-2673	8522	D+EQ
213	213	-6999	992	28410	D+L-T2+S+SD	-15381	491	51101	D+L+SD	-12463	2560	53388	D+L+SD	-13166	-417	47206	D+L+SD	-13342	1277	67957	D+L+SD	-12035	876	8522	D+EQ
	214	-9037	83	52963	D-EQ	-15389	-757	50912	D+L+SD	-12284	1339	56804	D+L+SD	-13268	-1638	48866	D+L+SD	-13196	26	71186	D+L+SD	-12167	-161	10311	D+EQ
214	214	-9036	90	52963	D-EQ	-15390	-745	50912	D+L+SD	-12301	1349	56795	D+L+SD	-13255	-1627	48874	D+L+SD	-13200	36	71186	D+L+SD	-12168	-152	10311	D+EQ
	215	-9001	-223	52864	D-EQ	-15392	-1121	49647	D+L+SD	-12246	983	56668	D+L+SD	-13282	-1998	48206	D+L+SD	-13149	-346	70948	D+L+SD	-12207	-465	9844	D+EQ
215	215	-9002	-216	52864	D-EQ	-15395	-1109	49664	D+L+SD	-12261	993	56655	D+L+SD	-13274	-1986	48219	D+L+SD	-13155	-335	70948	D+L+SD	-12208	-454	9844	D+EQ
	216	-8898	-1148	49804	D-EQ	-15403	-2228	42600	D+L+SD	-12464	-57	52899	D+L+T1+SD	-13343	-3093	43038	D+L+SD	-12967	-1442	66982	D+L+SD	-12328	-1384	5714	D+EQ
216	216	-8899	-1142	49804	D-EQ	-15405	-2217	42593	D+L+SD	-12473	-49	52888	D+L+T1+SD	-13341	-3084	43049	D+L+SD	-12972	-1433	66982	D+L+SD	-12329	-1376	5714	D+EQ
	217	-8876	-1347	48572	D-EQ	-15407	-2464	40368	D+L+SD	-12439	-286	51515	D+L+T1+SD	-13355	-3329	41248	D+L+SD	-12929	-1681	65448	D+L+SD	-12356	-1581	4248	D+EQ
217	217	-14051	1095	48572	D-EQ	-22143	725	42141	D+L+SD	-18144	2680	48506	D+L+SD	-19538	-309	44630	D+L-T1+SD	-19405	1426	65448	D+L+SD	-18363	1259	4248	D+EQ
	218	-13938	55	51452	D-EQ	-22154	-524	43047	D+L+SD	-17922	1460	52653	D+L+SD	-20020	-1492	46984	D+L+SD	-19197	163	69387	D+L+SD	-18498	221	7958	D+EQ
218	218	-13938	66	51452	D-EQ	-22155	-506	43047	D+L+SD	-17976	1474	52656	D+L+SD	-19973	-1476	46982	D+L+SD	-19203	178	69387	D+L+SD	-18498	236	7958	D+EQ
	219	-13903	-246	51314	D-EQ	-22158	-881	42121	D+L+SD	-17910	1110	52752	D+L+SD	-19997	-1847	46583	D+L+SD	-19126	-204	69362	D+L+SD	-18539	-76	8080	D+EQ
219	219	-13903	-236	51314	D-EQ	-22160	-865	42121	D+L+SD	-17930	1124	52732	D+L+SD	-19983	-1832	46602	D+L+SD	-19132	-190	69362	D+L+SD	-18539	-62	8080	D+EQ
	220	-13804	-1168	48159	D-EQ	-22172	-1983	36086	D+L+SD	-18128	89	50172	D+L+T1+SD	-20046	-2943	42233	D+L+SD	-18892	-1308	66026	D+L+SD	-18662	-992	5717	D+EQ
220	220	-13804	-1158	48159	D-EQ	-22174	-1967	36086	D+L+SD	-18452	103	50410	D+L+T1+SD	-19729	-2928	41995	D+L+SD	-18898	-1294	66026	D+L+SD	-18662	-978	5717	D+EQ
	221	-13782	-1364	46910	D-EQ	-22177	-2215	34094	D+L+SD	-18412	-135	49199	D+L+T1+SD	-19741	-3175	40375	D+L+SD	-18842	-1543	64632	D+L+SD	-18690	-1184	4646	D+EQ
221	221	-18482	930	46910	D-EQ	-28255	768	35556	D+L+SD	-23432	2621	45733	D+L+SD	-25305	-380	43131	D+L-T1+SD	-24691	1363	64632	D+L+SD	-23938	1380	4646	D+EQ
	222	-18371	-110	48966	D-EQ	-28269	-480	36607	D+L+SD	-23182	1404	49632	D+L+SD	-25806	-1550	45864	D+L+SD	-24417	88	68232	D+L+SD	-24077	344	8970	D+EQ
222	222	-18371	-94	48966	D-EQ	-28271	-456	36613	D+L+SD	-23197	1424	49582	D+L+SD	-25800	-1528	45914	D+L+SD	-24425	109	68232	D+L+SD	-24077	364	8970	D+EQ
	223	-18338	-407	48587	D-EQ	-28275	-831	35739	D+L+SD	-23123	1060	49605	D+L+SD	-25820	-1900	45464	D+L+SD	-24335	-277	68106	D+L+SD	-24212	-475	6987	D+L-T1+SD
223	223	-18339	-394	48587	D-EQ	-28278	-811	35745	D+L+SD	-23141	1077	49565	D+L+SD	-25812	-1881	45505	D+L+SD	-24344	-260	68106	D+L+SD	-24213	-457	6987	D+L-T1+SD
	224	-18241	-1326	44723	D-EQ	-28292	-1930	29881	D+L+SD	-23350	60	47519	D+L+T1+SD	-25864	-2996	40959	D+L+SD	-24049	-1385	64456	D+L+SD	-24512	-1476	2700	D+L-T1+SD
224	224	-18241	-1315	44723	D-EQ	-28294	-1913	29884	D+L+SD	-23468	75	47560	D+L+T1+SD	-25754	-2980	40918	D+L+SD	-24057	-1370	64456	D+L+SD	-24512	-1462	2700	D+L-T1+SD
	225	-18220	-1521	43317	D-EQ	-28297	-2159	27931	D+L+SD	-23423	-161	46320	D+L+T1+SD	-25763	-3227	39254	D+L+SD	-23990	-1620	62990	D+L+SD	-24579	-1688	1152	D+L-T1+SD
225	225	-22355	572	43317	D-EQ	-33639	563	29093	D+L+SD	-28239	2323	42818	D+L+SD	-30524	-621	41660	D+L+SD	-29132	1029	62990	D+L+SD	-29234	689	1152	D+L-T1+SD
	226	-22247	-468	43576	D-EQ	-33656	-685	29046	D+L+SD	-27975	1108	45225	D+L+SD	-30595	-1856	42510	D+L+SD	-28803	-250	64930	D+L+SD	-29554	-424	1842	D+L-T1+SD
226	226	-22247	-451	43576	D-EQ	-33659	-659	29045	D+L+SD	-27991	1130	45171	D+L+SD	-30589	-1831	42564	D+L+SD	-28812	-228	64930	D+L+SD	-29554	-401	1842	D+L-T1+SD
	227	-22216	-764	42657	D-EQ	-33665	-1035	27843	D+L+SD	-27915	766	44755	D+L+SD	-30607	-2206	41641	D+L+SD	-28711	-615	64301	D+L+SD	-29666	-743	989	D+L-T1+SD
227	227	-22216	-747	42657	D-EQ	-33667	-1008	27843	D+L+SD	-27938	789	44698	D+L+SD	-30595	-2181	41698	D+L+SD	-28721	-592	64301	D+L+SD	-29666	-720	989	D+L-T1+SD
	228	-22121	-1679	37204	D-EQ	-33684	-2126	21032	D+L+SD	-28171	-204	42356	D+L+T1+SD	-30635	-3299	35727	D+L+SD	-28389	-1711	59196	D+L+SD	-29997	-1742	-4490	D+L-T1+SD
228	228	-22122	-1665	37204	D-EQ	-33688	-2105	21032	D+L+SD	-28188	-187	42316	D+L+T1+SD	-30630	-3279	35767	D+L+SD	-28399	-1693	59196	D+L+SD	-29998	-1723	-4490	D+L-T1+SD
	229	-22102	-1871	35453	D-EQ	-33692	-2351	18877	D+L+SD	-28143	-422	40834	D+L+T1+SD	-30637	-3526	33788	D+L+SD	-28323	-1941	57418	D+L+SD	-30075	-1952	-6296	D+L-T1+SD
229	229	-25739	40	35453	D-EQ	-38374	125	19855	D+L+SD	-32480	1809	36400	D+L+SD	-34616	-1142	36156	D+L+SD	-32835	475	57418	D+L+SD	-34137	204	-6296	D+L-T1+SD
	230	-25634	-1000	33049	D-EQ	-38394	-1122	17557	D+L+SD	-32697	698	38908	D+L+T1+SD	-34674	-2380	34285	D+L+SD	-32477	-795	56629	D+L+SD	-34481	-915	-8046	D+L-T1+SD
230	230	-25635	-979	33049	D-EQ	-38398	-1091	17561	D+L+SD	-32719	726	38842	D+L+T1+SD	-34666	-2351	34351	D+L+SD	-32490	-768	56629	D+L+SD	-34482	-887	-8046	D+L-T1+SD
	231	-25604	-1293	31334	D-EQ	-38404	-1467	15691	D+L+SD	-32642	363	37852	D+L+T1+SD	-34679	-2726	32615	D+L+SD	-32376	-1153	55194	D+L+SD	-34590	-1229	-9630	D+L-T1+SD
231	231	-25605	-1274	31334	D-EQ	-38408	-1438	15691	D+L+SD	-32670	387	37793	D+L+T1+SD	-34664	-2700	32674	D+L+SD	-32388	-1129	55194	D+L+SD	-34592	-1202	-9630	D+L-T1+SD
	232	-25512	-2207	23515	D-EQ	-38427	-2557	6892	D+L+SD	-32453	-685	31776	D+L+T1+SD	-34693	-3821	24285	D+L+SD	-32034	-2241	47710	D+L+SD	-34938	-2237	-17299	D+L-T1+SD
232	232	-25513	-2189	23515	D-EQ	-38431	-2531	6892	D+L+SD	-32478	-663	31723	D+L+T1+SD	-34680	-3798	24338	D+L+SD	-32045	-2219	47710	D+L+SD	-34939	-2212	-17299	D+L-T1+SD
	233	-25494	-2395	21245	D-EQ	-38436	-2777	4302	D+L+SD	-32434	-898	29794	D+L+T1+SD	-34685	-4045	21828	D+L+SD	-31963	-2465	45415	D+L+SD	-35018	-2443	-19590	D+L-T1+SD
233	233	-28931	-503	21245	D-EQ	-42769	-373	4951	D+L+SD	-36495	1243	24041	D+L+SD	-38303	-1714	24291	D+L+SD	-36151	-120	45415	D+L+SD	-38812	-335	-19590	D+L-T1+SD
	234	-28830	-1545	16108	D-EQ	-42793	-1622	93	D+L+SD	-36751	155	25189	D+L+T1+SD	-38347	-2957	19449	D+L+SD	-35774	-1384	41672	D+L+SD	-39163	-1468	-24069	D+L-T1+SD

Member	Joint	Nmax N(KN)	Nmax S(KN)	Nmax M(KN·m)	Nmax Load Case	Nmin N(KN)	Nmin S(KN)	Nmin M(KN·m)	Nmin Load Case
234	234	-28831	-1523	16108	D-EQ	-42796	-1588	93	D+L+SD
	235	-28801	-1836	13571	D-EQ	-42804	-1964	-2547	D+L+SD
235	235	-28802	-1814	13571	D-EQ	-42809	-1931	-2547	D+L+SD
	236	-28713	-2747	3325	D-EQ	-42831	-3049	-13605	D+L+SD
236	236	-28715	-2727	3325	D-EQ	-42836	-3019	-13605	D+L+SD
	237	-28695	-2933	523	D-EQ	-42841	-3265	-16688	D+L+SD
237	237	-34145	271	523	D-EQ	-49046	397	-16341	D+L+SD
	238	-34096	-250	548	D-EQ	-49059	-226	-16082	D+L+SD
238	238	-34095	-225	548	D-EQ	-49062	-190	-16082	D+L+SD
	239	-34027	-952	-1514	D-EQ	-49081	-1062	-18213	D+L+SD
239	239	-34029	-925	-1514	D-EQ	-49086	-1022	-18212	D+L+SD
	240	-33952	-1752	-3523	D-EQ	-49108	-1910	-20387	D+L+SD

Member	Joint	Smax N(KN)	Smax S(KN)	Smax M(KN·m)	Smax Load Case	Smin N(KN)	Smin S(KN)	Smin M(KN·m)	Smin Load Case
234	234	-36781	185	25107	D+L+T1+SD	-38331	-2927	19531	D+L+SD
	235	-36707	-177	23352	D+L+T1+SD	-38341	-3303	16893	D+L+SD
235	235	-36751	-149	23277	D+L+T1+SD	-38313	-3274	16968	D+L+SD
	236	-36542	-1217	15051	D+L+T1+SD	-38330	-4397	5909	D+L+SD
236	236	-36584	-1192	14985	D+L+T1+SD	-38304	-4370	5976	D+L+SD
	237	-36541	-1426	12580	D+L+T1+SD	-38306	-4619	2879	D+L+SD
237	237	-42467	1957	5376	D+L+SD	-43863	-1009	5313	D+L+SD
	238	-42340	1353	6664	D+L+SD	-43880	-1631	5374	D+L+SD
238	238	-42388	1384	6584	D+L+SD	-43844	-1599	5454	D+L+SD
	239	-42763	685	11614	D+L+T1+SD	-43860	-2472	3077	D+L+SD
239	239	-42822	720	11529	D+L+T1+SD	-43817	-2436	3163	D+L+SD
	240	-42768	-151	10276	D+L+T1+SD	-43835	-3326	875	D+L+SD

Member	Joint	Mmax N(KN)	Mmax S(KN)	Mmax M(KN·m)	Mmax Load Case	Mmin N(KN)	Mmin S(KN)	Mmin M(KN·m)	Mmin Load Case
234	234	-35787	-1355	41672	D+L+SD	-39163	-1437	-24069	D+L-T1+SD
	235	-35665	-1735	39359	D+L+SD	-39275	-1783	-26488	D+L-T1+SD
235	235	-35679	-1708	39359	D+L+SD	-39276	-1752	-26488	D+L-T1+SD
	236	-35822	-2675	33970	D+L+T1+SD	-40132	-2679	-32006	D+L+SD
236	236	-35837	-2650	33970	D+L+T1+SD	-40135	-2650	-32006	D+L+SD
	237	-35753	-2892	31255	D+L+T1+SD	-40208	-2885	-34731	D+L+SD
237	237	-41856	726	31255	D+L+T1+SD	-46003	536	-34731	D+L+SD
	238	-41663	102	32299	D+L+T1+SD	-45627	-178	-39209	D+L-T1+SD
238	238	-41676	132	32299	D+L+T1+SD	-45626	-144	-39209	D+L-T1+SD
	239	-41394	-731	31301	D+L+T1+SD	-45860	-952	-41094	D+L-T1+SD
239	239	-41409	-697	31301	D+L+T1+SD	-45862	-916	-41094	D+L-T1+SD
	240	-41299	-1580	29620	D+L+T1+SD	-45978	-1783	-43102	D+L-T1+SD

(5) Resuil of Check of Stress

		UNIT	SECTION 1	SECTION 2	SECTION 3
DECK PL		mm	14	14	17
SIDE WEB PL		mm	16	16	16
CENTER WEB PL		mm	12	12	12
LFLG PL		mm	13	10	13
U RIB			320x240x6	320x240x6	320x240x6
PL RIB			140x14	140x14	140x14
MATERIAL OF DECK			SMA490AW	SMA490AW	SMA490BW
MATERIAL			SMA490AW	SMA490AW	SMA490AW
σ DECK		N/mm2	−77.5 < 210.0	−105.8 < 210.0	−102.5 < 210.0
σ WEB		N/mm2	−87.2 < 141.4	−102.8 < 172.4	118.9 < 167.1
σ LFLG		N/mm2	−87.5 < 88.1	88.5 < 210.0	133.1 < 210.0
τ MAX		N/mm2	−51.5 < 120.0	45.5 < 120.0	−59.1 < 120.0
Combined Stresses		N/mm2	0.21 < 1.20	0.25 < 1.20	0.40 < 1.20
Bioxiol stress condition	DECK	N/mm2	0.99 < 1.20	0.77 < 1.20	0.70 < 1.20
	LFLG	N/mm2	0.94 < 1.20	0.97 < 1.20	1.08 < 1.20
Bioxiol in plone stress condition	DECK	N/mm2	0.96 < 1.00	0.71 < 1.00	0.88 < 1.00
	LFLG	N/mm2	0.95 < 1.00	0.90 < 1.00	0.84 < 1.00

CHECK OF CENTER WEB

case2 : Nmax
case5,11 : Mmax
case6,12 : Mmin

DESIGN RULES AND SPECIFICATIONS FOR HIGHWAY BRIDGES GIVEN BY JAPAN ROAD ASSOCIATION

			sec-1											
			169,239 CASE 2	169,239 CASE 5	169,239 CASE 6	171,237 CASE 2	171,237 CASE 11	171,237 CASE 12	173,235 CASE 2	173,235 CASE 11	173,235 CASE 12	175,233 CASE 2	175,233 CASE 11	175,233 CASE 12
WEB	GRADE OF STIFFENED PLATE		SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W
	WIDTH OF STIFFENED PLATE	b (mm)	2552	2552	2552	2552	2552	2552	2552	2552	2552	2552	2552	2552
	THICKNESS OF STIFFENED PLATE	t (mm)	12 OK	12 OK	12 OK	12 OK	12 OK	12 OK	12 OK	12 OK	12 OK	12 OK	12 OK	12 OK
	NUMBER OF PANELS SEPARATED BY STIFFENED PLATE	n	6	6	6	6	6	6	6	6	6	6	6	6
	SHEAR STRESS OF STIFFENED PLATE	τ (N/mm2)	11.4	7.1	9.2	4.4	28.1	32.2	21.5	18.6	17.3	4.2	27.5	23.7
	STRESS AT EACH EDGE	σ1(N/mm2)	69.0	57.9	82.6	66.7	53.3	81.7	43.2	67.1	60.0	44.3	68.9	49.3
	σ1≧σ2.	σ2(N/mm2)	29.9	-0.6	5.8	31.5	-5.2	6.9	37.9	-14.4	12.3	34.1	-25.2	14.0
	ALLOWABLE STRESS FOR LOCAL BUCKLING OF STIFFENED PLATE	σcal(N/mm2)	151.1	154.5	153.8	150.8	155.3	153.7	148.6	156.4	152.7	149.1	157.9	152.1
	GRADIENT OF STRESS	φ	0.567	1.010	0.930	0.528	1.098	0.916	0.129	1.215	0.795	0.230	1.366	0.716
	COEFFICIENT BY GRADIENT OF STRESS	f	1.018	1.040	1.036	1.016	1.046	1.035	1.003	1.053	1.029	1.006	1.063	1.025
	REQUIRED THICKNESS OF STIFFENED PLATE	t req(mm)	9.1	8.9	8.9	9.1	8.8	8.9	9.2	8.8	9.0	9.2	8.7	9.0
LONGITUDINAL RIB	GRADE OF LONGITUDINAL RIB		SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W
	WIDTH OF LONGITUDINAL RIB	br(mm)	140	140	140	140	140	140	140	140	140	140	140	140
	THICKNESS OF LONGITUDINAL RIB	tr(mm)	14	14	14	14	14	14	14	14	14	14	14	14
	SPACING OF TRANSVERSE STIFFENERS	a (mm)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
	br/tr ≦ 10.5		10.00 OK	10.00 OK	10.00 OK	10.00 OK	10.00 OK	10.00 OK	10.00 OK	10.00 OK	10.00 OK	10.00 OK	10.00 OK	10.00 OK
	REQUIRED SECTIONAL AREA OF LONGITUDINAL RIB	Al·req(cm2)	5.10	5.10	5.10	5.10	5.10	5.10	5.10	5.10	5.10	5.10	5.10	5.10
	SECTIONAL AREA OF LONGITUDINAL RIB	Al(cm2)	19.60 OK	19.60 OK	19.60 OK	19.60 OK	19.60 OK	19.60 OK	19.60 OK	19.60 OK	19.60 OK	19.60 OK	19.60 OK	19.60 OK
	REQUIRED MOMENT OF INERTIA OF LONGITUDINAL RIB	Il·req1(cm4)	800	800	800	800	800	800	800	800	800	800	800	800
	MOMENT OF INERTIA OF LONGITUDINAL RIB	Il(cm4)	1281 OK	1281 OK	1281 OK	1281 OK	1281 OK	1281 OK	1281 OK	1281 OK	1281 OK	1281 OK	1281 OK	1281 OK
	RATIO OF CROSS SECTIONAL AREA OF LONGITUDINAL RIB	δl	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064	0.064
	REQUIRED RELATIVE STIFFNESS RATIO OF LONGITUDINAL RIB	γl	31.942	31.942	31.942	31.942	31.942	31.942	31.942	31.942	31.942	31.942	31.942	31.942
	ASPECT RATIO OF STIFFED PLATE	α	0.784	0.784	0.784	0.784	0.784	0.784	0.784	0.784	0.784	0.784	0.784	0.784
	CRITICAL ASPECT RATIO	α0	3.726	3.726	3.726	3.726	3.726	3.726	3.726	3.726	3.726	3.726	3.726	3.726
	TABLE 3.2.6 (JAPANESE SPECIFICATION)	t0(mm)	19.0	18.6	18.7	19.0	18.5	18.7	19.3	18.4	18.8	19.2	18.2	18.9
	REQUIRED STIFFNESS RATIO OF LONGITUDINAL RIB	γl·reql	19.967	19.967	19.967	19.967	19.967	19.967	19.967	19.967	19.967	19.967	19.967	19.967
TRANSVERSE RIB	GRADE OF TRANSVERSE RIB		SMA400W	SMA400W	SMA400W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W
	THICKNESS OF WEB AT TRANSVERSE RIB	ttw(mm)	10	10	10	10	10	10	10	10	10	10	10	10
	WIDTH OF WEB AT TRANSVERSE RIB	btw(mm)	317	317	317	317	317	317	317	317	317	317	317	317
	THICKNESS OF FLANGE AT TRANSVERSE RIB	ttf(mm)	10	10	10	10	10	10	10	10	10	10	10	10
	WIDTH OF FLANGE AT TRANSVERSE RIB	btf(mm)	100	100	100	100	100	100	100	100	100	100	100	100
	RADIUS OF SCALLOP	R(mm)	35	35	35	35	35	35	35	35	35	35	35	35
	btw/ttw ≦ 46		31.7 OK	31.7 OK	31.7 OK	31.7 OK	31.7 OK	31.7 OK	31.7 OK	31.7 OK	31.7 OK	31.7 OK	31.7 OK	31.7 OK
	((btf-ttw)/2)/ttf ≦	10.5	4.500 OK	4.500 OK	4.500 OK	4.500 OK	4.500 OK	4.500 OK	4.500 OK	4.500 OK	4.500 OK	4.500 OK	4.500 OK	4.500 OK
	REQUIRED MOMENT OF INERTIA OF TRANSVERSE RIB	It·req1(cm4)	2515	2515	2515	2515	2515	2515	2515	2515	2515	2515	2515	2515
	MOMENT OF INERTIA OF TRANSVERSE RIB	It(cm4)	19201 OK	19201 OK	19201 OK	19201 OK	19201 OK	19201 OK	19201 OK	19201 OK	19201 OK	19201 OK	19201 OK	19201 OK
CHECK OF BUCKLING OF WEB PLATE	ALLOWABLE STRESS FOR LOCAL BUCKLING OF STIFFENED PL/	σcal(N/mm2)	151.1	154.5	153.8	150.8	155.3	153.7	148.6	156.4	152.7	149.1	157.9	152.1
	ALLOWABLE SHEAR STRESS	τ (N/mm2)	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0
	FACTOR OF SHEAR STRESS	K	5.521	5.521	5.521	5.521	5.521	5.521	5.521	5.521	5.521	5.521	5.521	5.521
	SPACING OF LONGITUDINAL RIB	b'(mm)	425	425	425	425	425	425	425	425	425	425	425	425
	SPACING OF TRANSVERSE RIB	a'(mm)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
	$(2-\phi)/2\times(\sigma 1/\sigma cal)+\phi/2 \times(\sigma 1/\sigma cal)^2+(\tau/\tau a)^2 \leqq 1$		0.396 OK	0.260 OK	0.427 OK	0.379 OK	0.274 OK	0.490 OK	0.310 OK	0.304 OK	0.319 OK	0.274 OK	0.321 OK	0.285 OK

			sec-2								sec-3					
			177,231 CASE 11	179,229 CASE 11	181,227 CASE 11	183,225 CASE 11	185,223 CASE 11	187,221 CASE 11	189,219 CASE 11	191,217 CASE 11	193,215 CASE 11	195,213 CASE 11	197,211 CASE 11	199,209 CASE 11	201,207 CASE 11	204 CASE 11
WEB	GRADE OF STIFFENED PLATE		SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W
	WIDTH OF STIFFENED PLATE	b (mm)	2555	2540	2540	2540	2546	2546	2553	2553	2553	2553	2553	2553	2553	2553
	THICKNESS OF STIFFENED PLATE	t (mm)	12 OK	10 OK	10 OK	10 OK	10 OK	10 OK	10 OK	10 OK	10 OK	10 OK	10 OK	10 OK	10 OK	10 OK
	NUMBER OF PANELS SEPARATED BY STIFFENED PLATE	n	6	6	6	6	6	6	6	6	6	6	6	6	6	6
	SHEAR STRESS OF STIFFENED PLATE	τ (N/mm2)	13.2	22.2	7.5	18.6	3.2	17.7	2.4	19.3	4.0	28.1	13.3	40.7	26.0	0.0
	STRESS AT EACH EDGE	σ1(N/mm2)	80.6	78.4	85.1	79.0	83.9	75.3	79.8	70.0	75.0	63.0	71.7	65.6	79.6	89.2
	σ1≧σ2.	σ2(N/mm2)	-45.9	-53.1	-62.7	-65.3	-72.6	-73.1	-79.5	-80.3	-87.9	-78.0	-90.1	-101.4	-120.9	-134.2
	ALLOWABLE STRESS FOR LOCAL BUCKLING OF STIFFENED PLATE	σcal(N/mm2)	159.8	132.1	132.9	134.1	134.3	135.8	135.7	138.0	138.3	139.3	139.6	144.2	143.8	143.6
	GRADIENT OF STRESS	φ	1.569	1.677	1.737	1.827	1.865	1.971	1.996	2.147	2.172	2.238	2.257	2.546	2.519	2.504
	COEFFICIENT BY GRADIENT OF STRESS	f	1.078	1.087	1.092	1.100	1.103	1.113	1.115	1.130	1.132	1.139	1.141	1.172	1.169	1.168
	REQUIRED THICKNESS OF STIFFENED PLATE	t req(mm)	8.6	8.5	8.4	8.4	8.4	8.3	8.3	8.2	8.2	8.1	8.1	7.9	7.9	7.9
LONGITUDINAL RIB	GRADE OF LONGITUDINAL RIB		SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W
	WIDTH OF LONGITUDINAL RIB	br(mm)	140	140	140	140	140	140	140	140	140	140	140	140	140	140
	THICKNESS OF LONGITUDINAL RIB	tr(mm)	14	14	14	14	14	14	14	14	14	14	14	14	14	14
	SPACING OF TRANSVERSE STIFFENERS	a (mm)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
	br/tr ≦ 10.5		10.00 OK	10.00 OK	10.00 OK	10.00 OK	10.00 OK	10.00 OK	10.00 OK	10.00 OK	10.00 OK	10.00 OK	10.00 OK	10.00 OK	10.00 OK	10.00 OK
	REQUIRED SECTIONAL AREA OF LONGITUDINAL RIB	Al·req(cm2)	5.11	4.23	4.23	4.23	4.24	4.24	4.26	4.26	4.26	4.26	4.26	4.26	4.26	4.26
	SECTIONAL AREA OF LONGITUDINAL RIB	Al(cm2)	19.60 OK	19.60 OK	19.60 OK	19.60 OK	19.60 OK	19.60 OK	19.60 OK	19.60 OK	19.60 OK	19.60 OK	19.60 OK	19.60 OK	19.60 OK	19.60 OK
	REQUIRED MOMENT OF INERTIA OF LONGITUDINAL RIB	Il·reql(cm4)	799	493	493	493	491	491	489	489	489	489	489	489	489	489
	MOMENT OF INERTIA OF LONGITUDINAL RIB	Il(cm4)	1281 OK	1281 OK	1281 OK	1281 OK	1281 OK	1281 OK	1281 OK	1281 OK	1281 OK	1281 OK	1281 OK	1281 OK	1281 OK	1281 OK
	RATIO OF CROSS SECTIONAL AREA OF LONGITUDINAL RIB	δl	0.064	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077
	REQUIRED RELATIVE STIFFNESS RATIO OF LONGITUDINAL RIB	γl	31.904	55.456	55.456	55.456	55.325	55.325	55.174	55.174	55.174	55.174	55.174	55.174	55.174	55.174
	ASPECT RATIO OF STIFFED PLATE	α	0.783	0.787	0.787	0.787	0.786	0.786	0.783	0.783	0.783	0.783	0.783	0.783	0.783	0.783
	CRITICAL ASPECT RATIO	α0	3.724	4.274	4.274	4.274	4.272	4.272	4.269	4.269	4.269	4.269	4.269	4.269	4.269	4.269
	TABLE 3.2.6 (JAPANESE SPECIFICATION)	t0(mm)	17.9	17.7	17.6	17.5	17.5	17.3	17.3	17.1	17.1	17.0	17.0	16.5	16.5	16.6
	REQUIRED STIFFNESS RATIO OF LONGITUDINAL RIB	γl·reql	19.913	21.332	21.332	21.332	21.215	21.215	21.079	21.079	21.079	21.079	21.079	21.079	21.079	21.079
TRANSVERSE RIB	GRADE OF TRANSVERSE RIB		SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W
	THICKNESS OF WEB AT TRANSVERSE RIB	t tw(mm)	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	WIDTH OF WEB AT TRANSVERSE RIB	b tw(mm)	317	317	317	317	317	317	317	317	317	317	317	317	317	317
	THICKNESS OF FLANGE AT TRANSVERSE RIB	t tf(mm)	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	WIDTH OF FLANGE AT TRANSVERSE RIB	b tf(mm)	100	100	100	100	100	100	100	100	100	100	100	100	100	100
	RADIUS OF SCALLOP	R (mm)	35	35	35	35	35	35	35	35	35	35	35	35	35	35
	btw/ttw ≦ 46		31.7 OK	31.7 OK	31.7 OK	31.7 OK	31.7 OK	31.7 OK	31.7 OK	31.7 OK	31.7 OK	31.7 OK	31.7 OK	31.7 OK	31.7 OK	31.7 OK
	((btf-ttw)/2)/ttf ≦	10.5	4.500 OK	4.500 OK	4.500 OK	4.500 OK	4.500 OK	4.500 OK	4.500 OK	4.500 OK	4.500 OK	4.500 OK	4.500 OK	4.500 OK	4.500 OK	4.500 OK
	REQUIRED MOMENT OF INERTIA OF TRANSVERSE RIB	It·reqI(cm4)	2520	1525	1525	1525	1531	1531	1538	1538	1538	1538	1538	1538	1538	1538
	MOMENT OF INERTIA OF TRANSVERSE RIB	It(cm4)	19201 OK	19201 OK	19201 OK	19201 OK	19201 OK	19201 OK	19201 OK	19201 OK	19201 OK	19201 OK	19201 OK	19201 OK	19201 OK	19201 OK
CHECK OF BUCKLING OF WEB PLATE	ALLOWABLE STRESS FOR LOCAL BUCKLING OF STIFFENED PL/	σcal(N/mm2)	159.8	132.1	132.9	134.1	134.3	135.8	135.7	138.0	138.3	139.3	139.6	144.2	143.8	143.6
	ALLOWABLE SHEAR STRESS	τ (N/mm2)	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0
	FACTOR OF SHEAR STRESS	K	5.521	5.519	5.519	5.519	5.520	5.520	5.521	5.521	5.521	5.521	5.521	5.521	5.521	5.521
	SPACING OF LONGITUDINAL RIB	b'(mm)	426	423	423	423	424	424	426	426	426	426	426	426	426	426
	SPACING OF TRANSVERSE RIB	a'(mm)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
	$(2-\phi)/2\times(\sigma 1/\sigma cal)+\phi/2 \times(\sigma 1/\sigma cal)^2+(\tau/\tau a)^2 \leqq 1$		0.320 OK	0.426 OK	0.444 OK	0.392 OK	0.407 OK	0.333 OK	0.347 OK	0.265 OK	0.274 OK	0.230 OK	0.244 OK	0.254 OK	0.289 OK	0.327 OK

CHECK OF SIDE WEB

DESIGN RULES AND SPECIFICATIONS FOR HIGHWAY BRIDGES GIVEN BY JAPAN ROAD ASSOCIATION

			sec-1										
			169,239 CASE 2	169,239 CASE 5	169,239 CASE 6	171,237 CASE 2	171,237 CASE 11	171,237 CASE 12	173,235 CASE 2	173,235 CASE 11	173,235 CASE 12	175,233 CASE 2	175,233 CASE 11
WEB	GRADE OF STIFFENED PLATE		SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W
	WIDTH OF STIFFENED PLATE	b(mm)	988	988	988	988	988	988	988	988	988	988	988
	THICKNESS OF STIFFENED PLATE	t(mm)	16 OK	16 OK	16 OK	16 OK	16 OK	16 OK	16 OK	16 OK	16 OK	16 OK	16 OK
	NUMBER OF PANELS SEPARATED BY STIFFENED PLATE	n	2	2	2	2	2	2	2	2	2	2	2
	SHEAR STRESS OF STIFFENED PLATE	τ(N/mm2)	5.1	3.0	4.0	1.9	12.1	13.9	9.3	8.3	7.4	1.8	11.8
	STRESS AT EACH EDGE	σ1(N/mm2)	46.7	55.2	38.8	46.6	50.6	39.1	40.2	63.3	32.8	43.9	64.5
	σ1≧σ2,	σ2(N/mm2)	31.7	32.7	9.3	33.1	28.1	10.4	38.2	32.0	14.5	39.9	28.4
	ALLOWABLE STRESS FOR LOCAL BUCKLING OF STIFFENED PLATE	σcal(N/mm2)	174.3	176.4	187.0	173.6	177.3	186.1	169.7	178.7	180.5	170.2	180.6
	GRADIENT OF STRESS	ψ	0.321	0.408	0.760	0.290	0.445	0.734	0.050	0.494	0.558	0.091	0.560
	COEFFICIENT BY GRADIENT OF STRESS	f	1.038	1.053	1.143	1.032	1.061	1.135	1.004	1.072	1.087	1.007	1.087
	REQUIRED THICKNESS OF STIFFENED PLATE	t req(mm)	10.3	10.2	9.4	10.4	10.1	9.5	10.7	10.0	9.9	10.7	9.9
LONGITUDINAL RIB	GRADE OF LONGITUDINAL RIB		SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W
	WIDTH OF LONGITUDINAL RIB	br(mm)	140	140	140	140	140	140	140	140	140	140	140
	THICKNESS OF LONGITUDINAL RIB	tr(mm)	14	14	14	14	14	14	14	14	14	14	14
	SPACING OF TRANSVERSE STIFFENERS	a(mm)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
	br/tr ≦ 10.5		10.00 OK	10.00 OK	10.00 OK	10.00 OK	10.00 OK	10.00 OK	10.00 OK	10.00 OK	10.00 OK	10.00 OK	10.00 OK
	REQUIRED SECTIONAL AREA OF LONGITUDINAL RIB	A1·req(cm2)	7.90	7.90	7.90	7.90	7.90	7.90	7.90	7.90	7.90	7.90	7.90
	SECTIONAL AREA OF LONGITUDINAL RIB	Al(cm2)	19.60 OK	19.60 OK	19.60 OK	19.60 OK	19.60 OK	19.60 OK	19.60 OK	19.60 OK	19.60 OK	19.60 OK	19.60 OK
	REQUIRED MOMENT OF INERTIA OF LONGITUDINAL RIB	Il·reql(cm4)	1027	1027	1027	1027	1027	1027	1027	1027	1027	1027	1027
	MOMENT OF INERTIA OF LONGITUDINAL RIB	Il(cm4)	1281 OK	1281 OK	1281 OK	1281 OK	1281 OK	1281 OK	1281 OK	1281 OK	1281 OK	1281 OK	1281 OK
	RATIO OF CROSS SECTIONAL AREA OF LONGITUDINAL RIB	δl	0.124	0.124	0.124	0.124	0.124	0.124	0.124	0.124	0.124	0.124	0.124
	REQUIRED RELATIVE STIFFNESS RATIO OF LONGITUDINAL RIB	γl	34.807	34.807	34.807	34.807	34.807	34.807	34.807	34.807	34.807	34.807	34.807
	ASPECT RATIO OF STIFFED PLATE	α	2.024	2.024	2.024	2.024	2.024	2.024	2.024	2.024	2.024	2.024	2.024
	CRITICAL ASPECT RATIO	α0	2.899	2.899	2.899	2.899	2.899	2.899	2.899	2.899	2.899	2.899	2.899
	TABLE 3.2.6 (JAPANESE SPECIFICATION)	t0(mm)	21.6	21.3	19.6	21.7	21.2	19.8	22.4	20.9	20.7	22.3	20.7
	REQUIRED STIFFNESS RATIO OF LONGITUDINAL RIB	γl·reql	27.918	27.918	27.918	27.918	27.918	27.918	27.918	27.918	27.918	27.918	27.918
TRANSVERSE RIB	GRADE OF TRANSVERSE RIB		SMA400W	SMA400W	SMA400W	SMA400W	SMA400W	SMA400W	SMA400W	SMA400W	SMA400W	SMA400W	SMA400W
	THICKNESS OF WEB AT TRANSVERSE RIB	ttw(mm)	10	10	10	10	10	10	10	10	10	10	10
	WIDTH OF WEB AT TRANSVERSE RIB	btw(mm)	317	317	317	317	317	317	317	317	317	317	317
	THICKNESS OF FLANGE AT TRANSVERSE RIB	ttf(mm)	10	10	10	10	10	10	10	10	10	10	10
	WIDTH OF FLANGE AT TRANSVERSE RIB	btf(mm)	100	100	100	100	100	100	100	100	100	100	100
	RADIUS OF SCALLOP	R(mm)	35	35	35	35	35	35	35	35	35	35	35
	btw/ttw ≦ 46		31.7 OK	31.7 OK	31.7 OK	31.7 OK	31.7 OK	31.7 OK	31.7 OK	31.7 OK	31.7 OK	31.7 OK	31.7 OK
	((btf-ttw)/2)/ttf ≦	10.5	4.500 OK	4.500 OK	4.500 OK	4.500 OK	4.500 OK	4.500 OK	4.500 OK	4.500 OK	4.500 OK	4.500 OK	4.500 OK
	REQUIRED MOMENT OF INERTIA OF TRANSVERSE RIB	It·reqt(cm4)	63	63	63	63	63	63	63	63	63	63	63
	MOMENT OF INERTIA OF TRANSVERSE RIB	It(cm4)	19201 OK	19201 OK	19201 OK	19201 OK	19201 OK	19201 OK	19201 OK	19201 OK	19201 OK	19201 OK	19201 OK
CHECK OF BUCKLING OF WEB PLATE	ALLOWABLE STRESS FOR LOCAL BUCKLING OF STIFFENED PL/	σcal(N/mm2)	174.3	176.4	187.0	173.6	177.3	186.1	169.7	178.7	180.5	170.2	180.6
	ALLOWABLE SHEAR STRESS	τ (N/mm2)	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0
	FACTOR OF SHEAR STRESS	K	5.584	5.584	5.584	5.584	5.584	5.584	5.584	5.584	5.584	5.584	5.584
	SPACING OF LONGITUDINAL RIB	b'(mm)	494	494	494	494	494	494	494	494	494	494	494
	SPACING OF TRANSVERSE RIB	a'(mm)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
	$(2-\psi)/2\times(\sigma 1/\sigma cal)+\psi/2 \times(\sigma 1/\sigma cal)^2+(\tau/\tau a)^2 \leq 1$		0.238 OK	0.270 OK	0.146 OK	0.240 OK	0.250 OK	0.163 OK	0.238 OK	0.302 OK	0.144 OK	0.249 OK	0.303 OK

			sec-2									sec-3				
			177,231 CASE 11	179,229 CASE 11	181,227 CASE 11	183,225 CASE 11	185,223 CASE 11	187,221 CASE 11	189,219 CASE 11	191,217 CASE 11	193,215 CASE 11	195,213 CASE 11	197,211 CASE 11	199,209 CASE 11	201,207 CASE 11	204 CASE 9
WEB	GRADE OF STIFFENED PLATE		SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W
	WIDTH OF STIFFENED PLATE	b(mm)	988	988	988	988	988	988	988	988	988	988	988	988	988	988
	THICKNESS OF STIFFENED PLATE	t(mm)	16 OK	16 OK	16 OK	16 OK	16 OK	16 OK	16 OK	16 OK	16 OK	16 OK	16 OK	16 OK	16 OK	16 OK
	NUMBER OF PANELS SEPARATED BY STIFFENED PLATE	n	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	SHEAR STRESS OF STIFFENED PLATE	τ(N/mm2)	5.4	9.0	3.0	7.5	1.3	7.2	2.3	7.8	1.6	12.3	5.8	17.8	11.4	0.0
	STRESS AT EACH EDGE	σ1(N/mm2)	74.8	72.4	78.3	72.3	76.6	68.5	72.4	63.1	67.5	49.5	56.2	50.0	60.9	68.3
	σ1≧σ2,	σ2(N/mm2)	26.1	21.8	21.4	16.8	16.6	11.5	11.3	5.5	5.0	-1.2	-2.0	-10.0	-11.1	-12.0
	ALLOWABLE STRESS FOR LOCAL BUCKLING OF STIFFENED PLATE	σcal(N/mm2)	183.4	184.9	185.9	187.2	187.8	189.5	189.9	192.3	192.8	196.4	196.8	202.9	202.3	202.0
	GRADIENT OF STRESS	ψ	0.651	0.699	0.727	0.768	0.783	0.832	0.844	0.913	0.926	1.024	1.036	1.200	1.182	1.176
	COEFFICIENT BY GRADIENT OF STRESS	f	1.111	1.125	1.133	1.146	1.151	1.167	1.171	1.195	1.200	1.237	1.242	1.312	1.304	1.301
	REQUIRED THICKNESS OF STIFFENED PLATE	t req(mm)	9.7	9.5	9.5	9.4	9.3	9.2	9.2	9.0	9.0	8.7	8.6	8.2	8.2	8.3
LONGITUDINAL RIB	GRADE OF LONGITUDINAL RIB		SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W
	WIDTH OF LONGITUDINAL RIB	br(mm)	140	140	140	140	140	140	140	140	140	140	140	140	140	140
	THICKNESS OF LONGITUDINAL RIB	tr(mm)	14	14	14	14	14	14	14	14	14	14	14	14	14	14
	SPACING OF TRANSVERSE STIFFENERS	a(mm)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
	br/tr ≦ 10.5		10.00 OK	10.00 OK	10.00 OK	10.00 OK	10.00 OK	10.00 OK	10.00 OK	10.00 OK	10.00 OK	10.00 OK	10.00 OK	10.00 OK	10.00 OK	10.00 OK
	REQUIRED SECTIONAL AREA OF LONGITUDINAL RIB	Al·req(cm2)	7.90	7.90	7.90	7.90	7.90	7.90	7.90	7.90	7.90	7.90	7.90	7.90	7.90	7.90
	SECTIONAL AREA OF LONGITUDINAL RIB	Al(cm2)	19.60 OK	19.60 OK	19.60 OK	19.60 OK	19.60 OK	19.60 OK	19.60 OK	19.60 OK	19.60 OK	19.60 OK	19.60 OK	19.60 OK	19.60 OK	19.60 OK
	REQUIRED MOMENT OF INERTIA OF LONGITUDINAL RIB	Il·req1(cm4)	1027	1027	1027	1027	1027	1027	1027	1027	1027	1027	1027	1027	1027	1027
	MOMENT OF INERTIA OF LONGITUDINAL RIB	Il(cm4)	1281 OK	1281 OK	1281 OK	1281 OK	1281 OK	1281 OK	1281 OK	1281 OK	1281 OK	1281 OK	1281 OK	1281 OK	1281 OK	1281 OK
	RATIO OF CROSS SECTIONAL AREA OF LONGITUDINAL RIB	δl	0.124	0.124	0.124	0.124	0.124	0.124	0.124	0.124	0.124	0.124	0.124	0.124	0.124	0.124
	REQUIRED RELATIVE STIFFNESS RATIO OF LONGITUDINAL RIB	γl	34.807	34.807	34.807	34.807	34.807	34.807	34.807	34.807	34.807	34.807	34.807	34.807	34.807	34.807
	ASPECT RATIO OF STIFFED PLATE	α	2.024	2.024	2.024	2.024	2.024	2.024	2.024	2.024	2.024	2.024	2.024	2.024	2.024	2.024
	CRITICAL ASPECT RATIO	α0	2.899	2.899	2.899	2.899	2.899	2.899	2.899	2.899	2.899	2.899	2.899	2.899	2.899	2.899
	TABLE 3.2.6 (JAPANESE SPECIFICATION)	t0(mm)	20.2	20.0	19.8	19.6	19.5	19.2	19.2	18.8	18.7	18.2	18.1	17.1	17.2	17.3
	REQUIRED STIFFNESS RATIO OF LONGITUDINAL RIB	γl·req1	27.918	27.918	27.918	27.918	27.918	27.918	27.918	27.918	27.918	27.918	27.918	27.918	27.918	27.918
TRANSVERSE RIB	GRADE OF TRANSVERSE RIB		SMA400W	SMA400W	SMA400W	SMA400W	SMA400W	SMA400W	SMA400W	SMA400W	SMA400W	SMA400W	SMA400W	SMA400W	SMA400W	SMA400W
	THICKNESS OF WEB AT TRANSVERSE RIB	ttw(mm)	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	WIDTH OF WEB AT TRANSVERSE RIB	btw(mm)	317	317	317	317	317	317	317	317	317	317	317	317	317	317
	THICKNESS OF FLANGE AT TRANSVERSE RIB	ttf(mm)	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	WIDTH OF FLANGE AT TRANSVERSE RIB	btf(mm)	100	100	100	100	100	100	100	100	100	100	100	100	100	100
	RADIUS OF SCALLOP	R(mm)	35	35	35	35	35	35	35	35	35	35	35	35	35	35
	btw/ttw ≦ 46		31.7 OK	31.7 OK	31.7 OK	31.7 OK	31.7 OK	31.7 OK	31.7 OK	31.7 OK	31.7 OK	31.7 OK	31.7 OK	31.7 OK	31.7 OK	31.7 OK
	((btf-ttw)/2)/ttf ≦	10.5	4.500 OK	4.500 OK	4.500 OK	4.500 OK	4.500 OK	4.500 OK	4.500 OK	4.500 OK	4.500 OK	4.500 OK	4.500 OK	4.500 OK	4.500 OK	4.500 OK
	REQUIRED MOMENT OF INERTIA OF TRANSVERSE RIB	It·req1(cm4)	63	63	63	63	63	63	63	63	63	63	63	63	63	63
	MOMENT OF INERTIA OF TRANSVERSE RIB	It(cm4)	19201 OK	19201 OK	19201 OK	19201 OK	19201 OK	19201 OK	19201 OK	19201 OK	19201 OK	19201 OK	19201 OK	19201 OK	19201 OK	19201 OK
CHECK OF BUCKLING OF WEB PLATE	ALLOWABLE STRESS FOR LOCAL BUCKLING OF STIFFENED PL	σcal(N/mm2)	183.4	184.9	185.9	187.2	187.8	189.5	189.9	192.3	192.8	196.4	196.8	202.9	202.3	202.0
	ALLOWABLE SHEAR STRESS	τ (N/mm2)	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0	120.0
	FACTOR OF SHEAR STRESS	K	5.584	5.584	5.584	5.584	5.584	5.584	5.584	5.584	5.584	5.584	5.584	5.584	5.584	5.584
	SPACING OF LONGITUDINAL RIB	b'(mm)	494	494	494	494	494	494	494	494	494	494	494	494	494	494
	SPACING OF TRANSVERSE RIB	a'(mm)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
	$(2-\psi)/2\times(\sigma 1/\sigma cal)-\psi/2$ $\times(\sigma 1/\sigma cal)^2+(\tau/\tau a)^2\leqq 1$		0.331 OK	0.314 OK	0.333 OK	0.299 OK	0.313 OK	0.269 OK	0.282 OK	0.232 OK	0.245 OK	0.166 OK	0.152 OK	0.157 OK	0.186 OK	0.207 OK

3.8.4 Design of Diaphragm

(1) Design Concept

Design of diaphragm is as follows.
i) action of floor system
ii) action of girder(diaphragm at cable anchorage)

(2) Section force due to action of floor system

It calculates section forces that web point of main girder is continuous and supported by beam.

1) Loading
Width of load is 2m between diaphragms.

· dead load

pavement	22.5 kN/m x	0.080 x	2.000	=	3.60 kN/m
concrete median barrier		7.0 kN/m x	2.000	=	14.00 kN
concrete + steel barrier		4.0 kN/m x	2.000	=	8.00 kN
steel weight		5.5 kN/m x	2.000	=	11.00 kN/m

· live load
P = 100 kN x (1 + i)

end span	P =	100 x(	1 +	0.358)	=	136 kN
intermediate span	P =	100 x(	1 +	0.322)	=	132 kN
intermediate support	P =	100 x(	1 +	0.340)	=	134 kN

· impact coefficient
end span L = 5.900

$$i = \frac{20}{50 + L} = \frac{20}{50 + 5.900} = 0.358$$

intermediate span L = 12.200

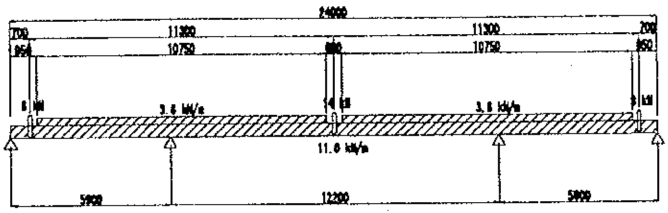
$$i = \frac{20}{50 + L} = \frac{20}{50 + 12.200} = 0.322$$

intermediate support

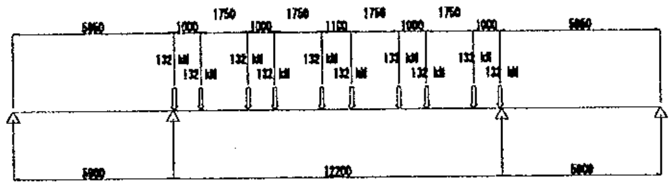
$$i = (0.358 + 0.322) / 2 = 0.340$$

2) Figure of Loading

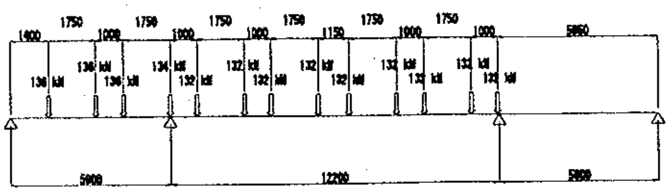
1. DEAD LOAD



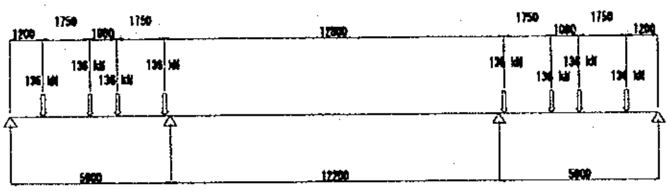
2. LIVE LOAD case1



3. LIVE LOAD case2



4. LIVE LOAD case3



3) Added of section force

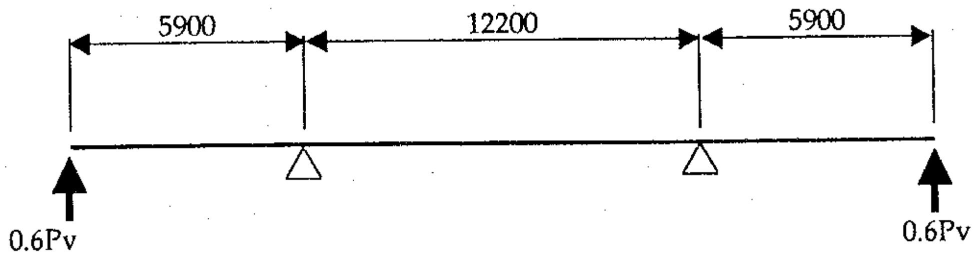
	M(kN·m)	S(kN)
end support	0	228
end span	362	92
intermediate support	-1179	641
intermediate span	1011	7

(3) Section force due to action of main girder

Design of diaphragm at cable anchorage uses load of cable tensions.
Ratio of partial is as follows.

	ratio of partial
web at cable anchorage	0.40
next transverse rib	0.25
diaphragm at cable anchorage	0.60

Design of diaphragm at cable anchorage shall be checked section force of continuous beam that center web point of main girders is as support.



	a component by cable			section force of cross beam		
	Px	Py	Pz	N(kN)	M(kN·m	S(kN)
C35,C50	3264	189	1846	-113	6534	1107
C36,C49	2298	127	1249	-76	4421	749
C37,C48	2459	129	1289	-78	4563	773
C38,C47	2769	140	1405	-84	4975	843
C39,C46	3123	151	1539	-91	5448	923
C40,C45	3437	161	1648	-96	5835	989
C41,C44	4385	198	2052	-119	7263	1231
C42,C43	4797	210	2195	-126	7769	1317

where Px : component of longitudinal direction
Py : component of transverse direction
Pz : component of vertical direction

(4) Design of effective width

1) Effective width of floor system action

Design of effective width shall be checked form of bending moment by 「Japanese spec」. Form of bending moment is calculated by continuous beam that web of main girders is as support.

	L	2 x b	b	equation	b/L	λ	2 x λ
end support	4720	2000	1000	(8.3.1)	0.21	676	1353
end span	4720	2000	1000	(8.3.1)	0.21	676	1353
intermediate suppor	3620	2000	1000	(8.3.2)	0.28	519	1039
intermediate span	7320	2000	1000	(8.3.1)	0.14	827	1654

2) Effective width of main girder action(diaphragm at cable anchorage)

Design of effective width shall be checked form of bending moment by 「Japanese spec」. Form of bending moment is calculated by cantilever beam that center web point of main girders is as support.

	L	2 x b	b	equation	b/L	λ	2 x λ
end span	11800	2000	1000	(8.3.2)	0.08	821	1642
intermediate span	7320	2000	1000	(8.3.1)	0.14	827	1654

(5) Result of Stress Check

Stress due to action of floor system

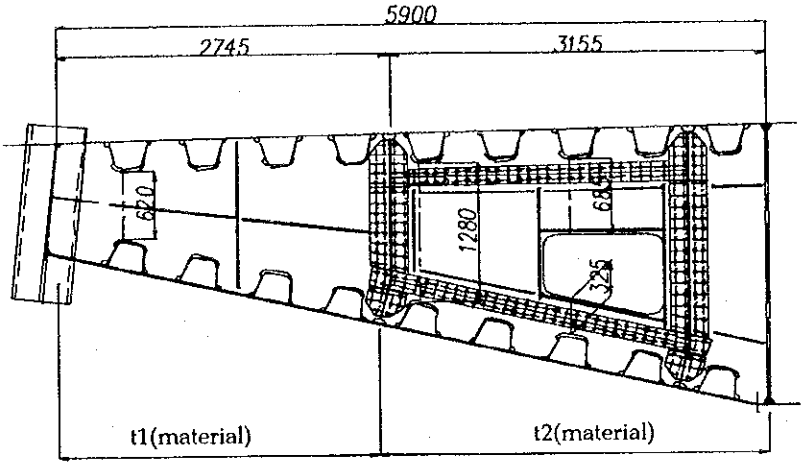
		End Support	End Span	Intermediate Support	Intermediate Span	Allowable
Sectional Force	N kN	0	0	0	0	----
	M kNm	0	362	-1179	1011	----
	S kN	228	92	641	7	----
Stress	σ t N/mm2	0.0 O.K	0.0 O.K	0.0 O.K	0.0 O.K	<140 N/mm2
	σ bu N/mm2	0.0 O.K	-9.7 O.K	25.4 O.K	-14.1 O.K	<140 N/mm2
	σ bl N/mm2	0.0 O.K	11.9 O.K	-29.6 O.K	17.0 O.K	<140 N/mm2
	τ N/mm2	21.2 O.K	4.8 O.K	23.0 O.K	0.2 O.K	< 80 N/mm2
	Σ σ bu N/mm2	0.0 O.K	-9.7 O.K	25.4 O.K	-14.1 O.K	<140 N/mm2
	Σ σ bl N/mm2	0.0 O.K	11.9 O.K	-29.6 O.K	17.0 O.K	<140 N/mm2
	Combined Stress					
	K N/mm2	0.07 O.K	0.01 O.K	0.13 O.K	0.01 O.K	<1.2 N/mm2

Stress due to action of main girder

		C35,C50	C36,C49	C37,C48	C38,C47	Allowable
Sectional Force	N kN	-113	-76	-78	-84	----
	M kNm	6534	4421	4563	4975	----
	S kN	1107	749	773	843	----
Stress	σ t N/mm2	-1.5 O.K	-1.0 O.K	-1.1 O.K	-1.2 O.K	<140 N/mm2
	σ bu N/mm2	-88.2 O.K	-59.7 O.K	-63.4 O.K	-69.2 O.K	<140 N/mm2
	σ bl N/mm2	92.2 O.K	62.4 O.K	76.7 O.K	83.6 O.K	<140 N/mm2
	τ N/mm2	37.7 O.K	25.5 O.K	26.3 O.K	28.7 O.K	< 80 N/mm2
	Σ σ bu N/mm2	-89.7 O.K	-60.7 O.K	-64.6 O.K	-70.4 O.K	<140 N/mm2
	Σ σ bl N/mm2	90.6 O.K	61.3 O.K	75.5 O.K	82.4 O.K	<140 N/mm2
	Combined Stress					
	K N/mm2	0.64 O.K	0.29 O.K	0.40 O.K	0.47 O.K	<1.2 N/mm2

		C39,C46	C40,C45	C41,C44	C42,C43	Allowable
Sectional Force	N kN	-91	-96	-119	-126	----
	M kNm	5448	5835	7263	7769	----
	S kN	923	989	1231	1317	----
Stress	σ t N/mm2	-1.3 O.K	-1.4 O.K	-1.5 O.K	-1.6 O.K	<140 N/mm2
	σ bu N/mm2	-75.8 O.K	-81.1 O.K	-85.1 O.K	-91.0 O.K	<140 N/mm2
	σ bl N/mm2	91.5 O.K	98.0 O.K	100.3 O.K	107.3 O.K	<140 N/mm2
	τ N/mm2	31.4 O.K	33.7 O.K	41.9 O.K	44.9 O.K	< 80 N/mm2
	Σ σ bu N/mm2	-77.1 O.K	-82.5 O.K	-86.6 O.K	-92.6 O.K	<140 N/mm2
	Σ σ bl N/mm2	90.2 O.K	96.6 O.K	98.8 O.K	105.7 O.K	<140 N/mm2
	Combined Stress					
	K N/mm2	0.57 O.K	0.65 O.K	0.77 O.K	0.88 O.K	<1.2 N/mm2

(6) Check of Shear Stress of Diaphragm at Stay Cable Anchorage

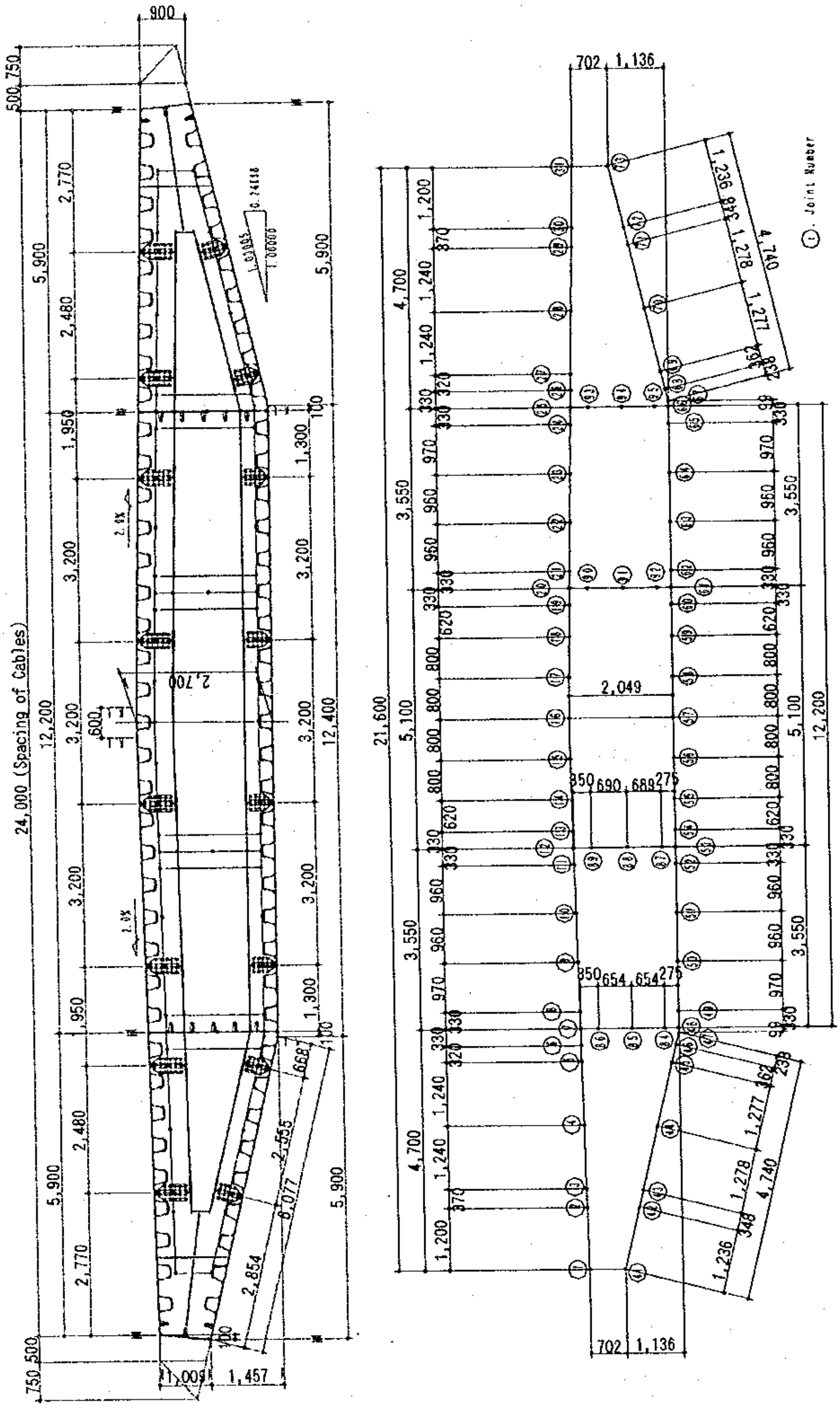


Check of Shear Stress of Diaphragm at Stay Cable Anchorage

	S(kN)	w1	t1	GRADE1	SHEAR STRESS (N/mm^2)		w2	t2	GRADE2	SHEAR STRESS (N/mm^2)	
D1,D34	1107	620	15	SMA490W	119 <	120	1010	11	SMA490W	100 <	120
D3,D32	749	620	11	SMA490W	110 <	120	1010	11	SMA490W	67 <	120
D5,D30	773	620	11	SMA490W	113 <	120	1010	11	SMA490W	70 <	120
D7,D28	843	620	15	SMA490W	91 <	120	1010	11	SMA490W	76 <	120
D9,D26	923	620	15	SMA490W	99 <	120	1010	11	SMA490W	83 <	120
D11,D24	989	620	15	SMA490W	106 <	120	1010	11	SMA490W	89 <	120
D13,D22	1231	620	18	SMA490W	110 <	120	1010	11	SMA490W	111 <	120
D15,D20	1317	620	18	SMA490W	118 <	120	1010	11	SMA490W	119 <	120

3.8.5 Design of Transverse Rib

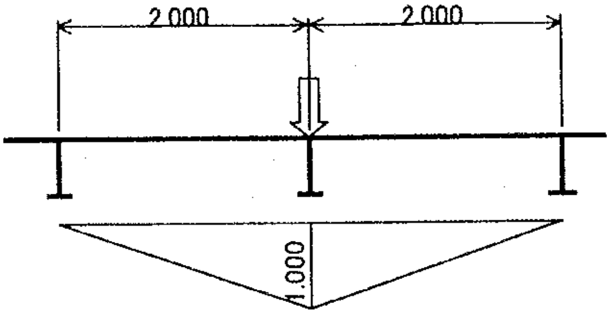
(1) Analysis Model



CROSS SECTION OF TRANSVERSE RIB (S=1:100)

(2) Loading

1) Effective Loading width for longitudinal direction
Effective loading width was considered as spacing of each transverse rib (2.0m).



2) Dead Load

Asphalt Pavement :	2.30 x 0.080 x 2.000	=	0.368 tf/m
Concrete barrier :	0.714 tf/m (7kN/m) x 2.000	=	1.428 tf
Concrete + steel barrier :			
	0.408 tf/m (4kN/m) x 2.000	=	0.816 tf
Unit weight of Steel :			
	0.550 tf/m^2 x 2.000	=	1.1 tf/m

3) Live Load
P= 10.0 tf x 1.000 x (1 + i)
where:
i : Impact Coefficient

(3) Section Force at Transverse Rib and Vertical Member

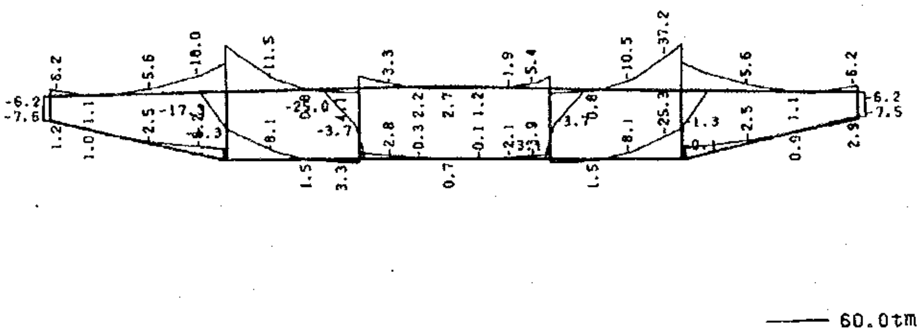
Design Section Force [Dead load + Live load(include impact)]

	Point	N (tf)	M (tfm)	S (tf)	
Upper transverse rib	6	24.13	-16.65		Nmax
	16	-50.89	15.66		Nmin
	11	-9.09	23.78		Mmax
	8	-9.4	-37.26		Mmin
	8			37.77	Smax
Lower transverse rib	57	50.8	3.08		Nmax
	46	-25.76	-7.83		Nmin
	52	8.73	32.62		Mmax
	50	8.73	-33.02		Mmin
	49			23.85	Smax
Vertical member	89	-0.17	-4.45		Nmax
	84	-71.21	14.22		Nmin
	88	-20.79	25.88		Mmax
	89	-13.2	-32.68		Mmin
	89			-42.07	Smax

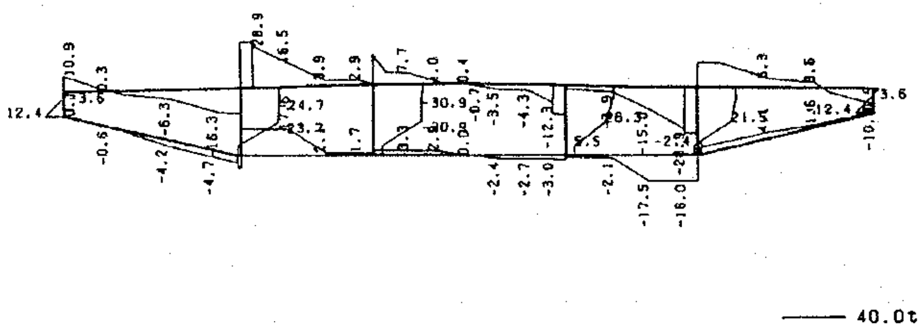
(4) Sectional Forces

Minimum Summary

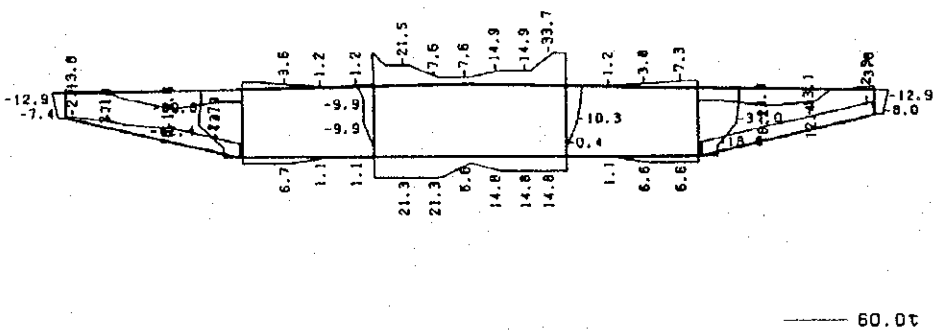
Bending Moment



Shear Force

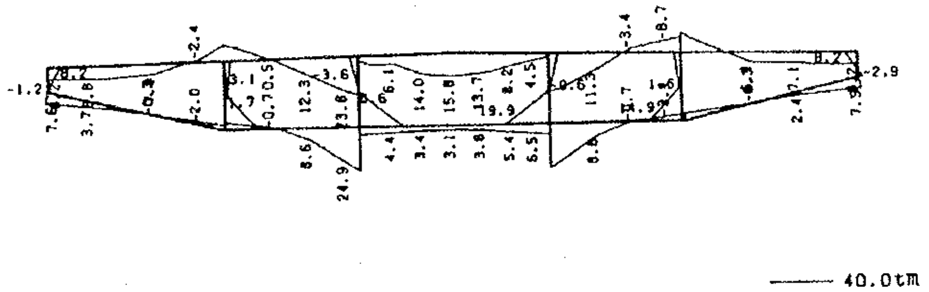


Axial Force

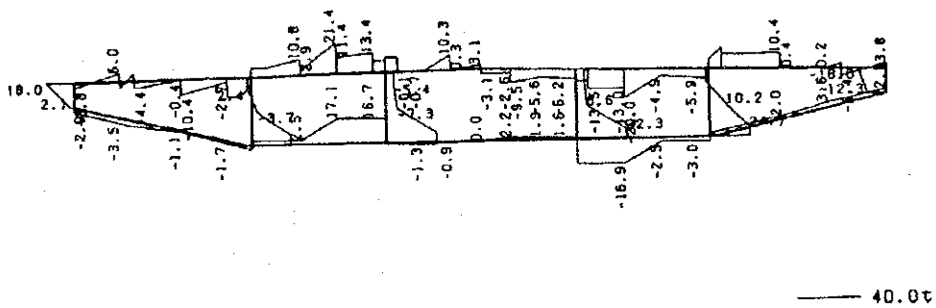


Maximum Summary

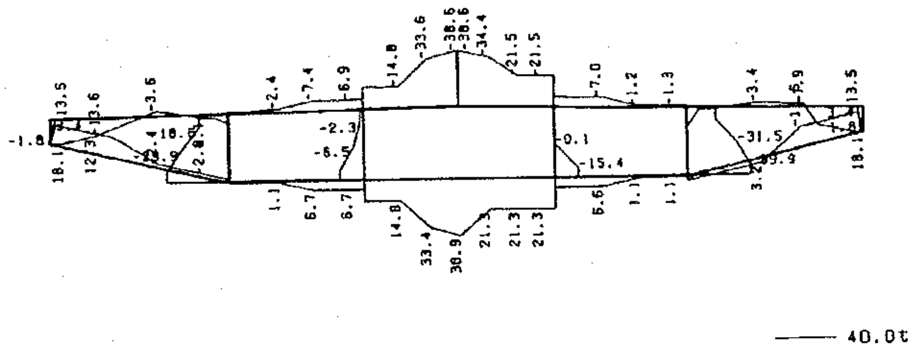
Bending Moment



Shear Force



Axial Force



(5) Result of Stress Check at Transverse Rib

	Upper	Lower
σ N	51 kgf/cm2	56 kgf/cm2
σ Mu	1350 kgf/cm2 < σ ca	-1364 kgf/cm2 < σ ca
σ Ml	-770 kgf/cm2	893 kgf/cm2
σ u	1401 kgf/cm2 < σ ca	-1309 kgf/cm2 < σ ca
σ l	-719 kgf/cm2	949 kgf/cm2
τ	0 kgf/cm2	0 kgf/cm2
τ v	0 kgf/cm2	0 kgf/cm2
τ h	0 kgf/cm2	0 kgf/cm2
σ ca	2100 kgf/cm2	-1715 kgf/cm2

3.8.6 Design of Cable Anchorage

(1) Design Concept

1) Design of Steel Pipe at Anchorage

a) Stress of Steel Pipe at Cable Anchorage

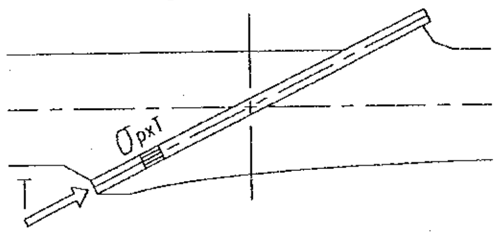
- Normal Stress due to Action as a Tension of Cable : σ_{pxT}
- Shear Stress due to Action as a Tension of Cable : τ_{pxyT}
- Normal Stress due to Action as a Main Girder : σ_{pxG}
- $\Sigma \sigma_{px} = \sigma_{pxT} + \sigma_{pxG} < \sigma_a$
- $\Sigma \tau_{pxy} = \tau_{pxyT} < \tau_a$
- $\left(\frac{\Sigma \sigma_{px}}{\sigma_a} \right)^2 + \left(\frac{\Sigma \tau_{pxy}}{\tau_a} \right)^2 < 1.2$

σ_a : Allowable Normal Stress
τ_a : Allowable Shear Stress

b) Method of Stress Calculation

i) Normal Stress due to Action as a Tension of Cable: σpxT

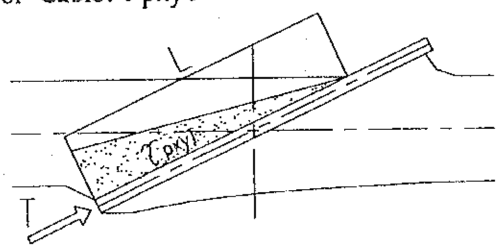
$$\sigma_{pxT} = \rho_{p1} \times \frac{T}{A_p}$$



ρ_{p1} : Foctor of Stress Concentration
T : Tension of Cable
A_p : Sectional Area of Steel Pipe

ii) Shear Stress due to Action as a Tension of Cable: $\tau pxyT$

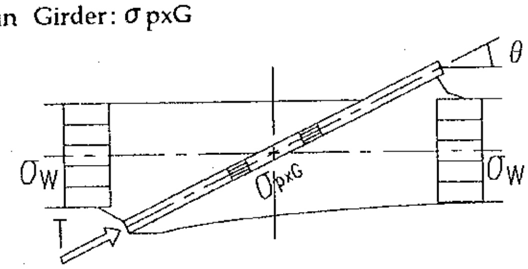
$$\tau_{pxyT} = \frac{T}{2 \times L \times t_p}$$



T : Tension of Cable
t_p : Thickness of Steel Pipe
L : Effective Length of Steel Pipe

iii) Normal Stress due to Action as a Main Girder: σpxG

$$\sigma_{pxG} = \rho_{p2} \times \sigma_w \times \cos^2\theta \times \frac{t_w}{t_p}$$



ρ_{p2} : Factor of Stress Concentration
σ_w : Normal Stress due to Action as a Main Girder
θ : Angle of Stay Cable
t_w : Thickness of Web Plates
t_p : Thickness of Steel Pipe

2) Design of Web at Cabie Anchorage

a) Stress of Web at Cable Anchorage

- Compressive Stress due to Horizontal Component of Cab : σ_{wxT}
- Shear Stress due to Vertical Component of Cable : τ_{wxyT}
- Compressive Stress due to Action as a Main Girder : σ_{wxG}
- Shear Stress due to Action as a Main Girder : τ_{wxyG}

- $\Sigma \sigma_{wx} = \sigma_{wxT} + \sigma_{wxG} < \sigma_a$
- $\Sigma \tau_{wxy} = \tau_{pxyT} + \tau_{pxyG} < \tau_a$
- $\left(\frac{\Sigma \sigma_{wx}}{\sigma_a}\right)^2 + \left(\frac{\Sigma \tau_{wxy}}{\tau_a}\right)^2 < 1.2$

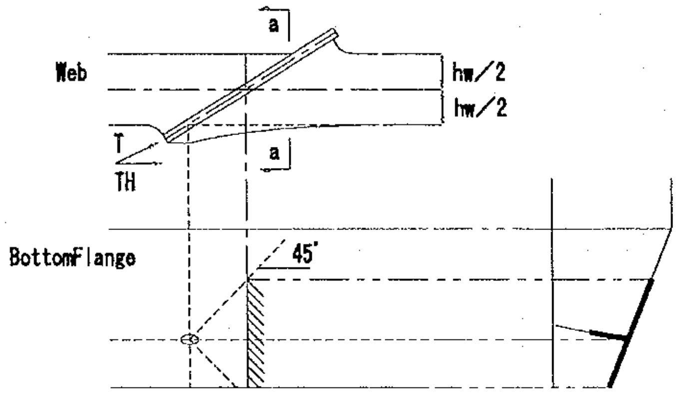
σ_a : Allowable Normal Stress
τ_a : Allowable Shear Stress

b) Method of Stress Calculation

i) Compressive Stress due to Horizontal Component of Cable: σwxT

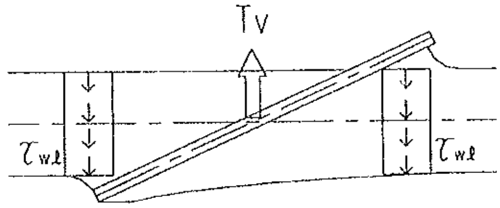
$$\sigma_{wxT} = \frac{3}{4} \times \frac{T_H}{A_{e(a)}}$$

T_H : Horizontal Component of Cable
$A_{e(a)}$: Effective Sectional Area of Main Girders



ii) Shear Stress due to Vertical Component of Cable: τ_{wxyT}

$$\tau_{wxyT} = \frac{\alpha \times T_v}{h_w \times t_w}$$



T_v : Vertical Component of Cable
h_w : Width of Web Plates
t_w : Thickness of Web Plates
α : Distribution factor of Vertical Force

iii) Compressive Stress and Shear Stress due to Action as a Main (: σ_{wxG}, τ_{wxyG}

$$\sigma_{wxG} = \sigma_w \times \frac{A_o}{A_e}$$

σ_w : Compressive Stress due to Action as a Main Girder before Reinforced
A_o : Effective Sectional Area of Main Girders before Reinforced
A_e : Effective Sectional Area of Main Girders After Reinforced

$$\tau_{wxyG} = \tau_w \times \frac{t_{wo}}{t_w}$$

τ_w : Shear Stress due to Action as a Main Girder before Reinforced
t_{wo} : Thickness of Web Plates before Reinforced
t_w : Thickness of Web Plates After Reinforced

3) Design of Deck and Bottom Flange

a) Stress of Deck and Bottom Flange at Cable Anchorage

		Deck	Bottom Flange
• Longitudinal Stress due to Horizontal Component of Cal	:	σ_{DxT} :	σ_{FxT}
• Transverse Stress due to Vertical Component of Cable	:	σ_{DyT} :	σ_{FyT}
• Shear Stress due to Horizontal Component of Cable	:	τ_{DxyT} :	τ_{FxyT}
• Longitudinal Stress due to Aaction as a part of main G	:	σ_{DxG} :	σ_{FxG}
• Shear Stress due to Aaction as a part of main Girder	:	τ_{DxyG} :	τ_{FxyG}

Deck

- $\Sigma\sigma_{Dx} = \sigma_{DxT} + \sigma_{DxG} < \sigma_{ca}$
- $\Sigma\sigma_{Dy} = \sigma_{DyT} < \sigma_{ca}$
- $\Sigma\tau_{Dxy} = \tau_{DxyT} + \tau_{DxyG} < \tau_{a}$
- $\left(\frac{\Sigma\sigma_{Dx}}{\sigma_a}\right)^2 - \left(\frac{\Sigma\sigma_{Dx}}{\sigma_a}\right) \times \left(\frac{\Sigma\sigma_{Dy}}{\sigma_a}\right) + \left(\frac{\Sigma\sigma_{Dy}}{\sigma_a}\right)^2 + \frac{\Sigma\tau_{Dxy}}{\tau_a})^2$

< 1.2

Bottom Flange

- $\Sigma\sigma_{Fx} = \sigma_{FxT} + \sigma_{FxG} < \sigma_{ca}$
- $\Sigma\sigma_{Fy} = \sigma_{FyT} < \sigma_{ca}$
- $\Sigma\tau_{Fxy} = \tau_{FxyT} + \tau_{FxyG} < \tau_{a}$
- $\left(\frac{\Sigma\sigma_{Fx}}{\sigma_a}\right)^2 - \left(\frac{\Sigma\sigma_{Fx}}{\sigma_a}\right) \times \left(\frac{\Sigma\sigma_{Fy}}{\sigma_a}\right) + \left(\frac{\Sigma\sigma_{Fy}}{\sigma_a}\right)^2 + \frac{\Sigma\sigma_{Fy}}{\tau_a})^2$

< 1.2

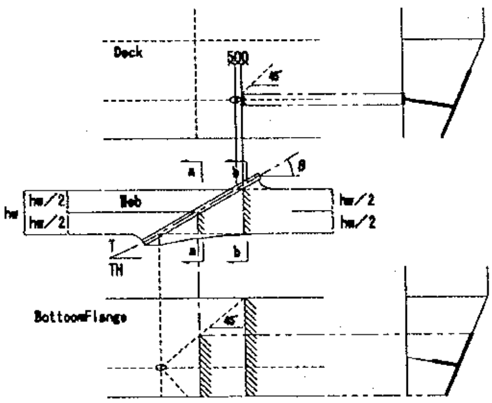
b) Method of Stress Calculation

i) Longitudinal Stress due to Horizontal Component of Cable: σ_{DxT}、σ_{FxT}

$$\sigma_{DxT} = \frac{T_H}{A_{e(b)}} \qquad \sigma_{FxT} = \frac{3}{4} \times \frac{T_H}{A_{e(a)}}$$

T_H : Tension of Cable

$A_{e(a.b)}$: Effective Sectional Area of Main Girders

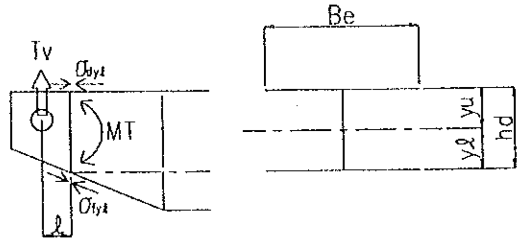


ii) Transverse Stress due to Vertical Component of Cable : σ_{DyT} , σ_{FyT}

$$M_T = 0.4 \times T_v \times L$$

$$\sigma_{DyT} = \frac{M_T}{I_D} \times y_u$$

$$\sigma_{FyT} = \frac{M_T}{I_D} \times y_L$$

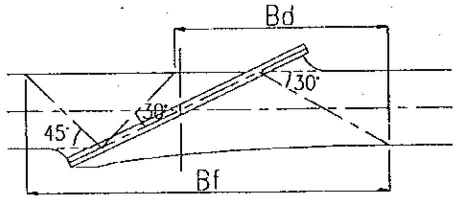


T_v : Vertical Component of Cable
ID : Momennt of Inrtia of Section
Be : Effective Width of Flanges

iii).Shear Stress due to Horizontal Component of Cable: τ_{DxyT} , τ_{FxyT}

$$\tau_{DxyT} = \tau_{FxyT} = \frac{T_H}{B_D \times T_D + B_F \times T_F}$$

T_H : Horizontal Component of Cable
B_D、B_F : Effective Length of Shear Stress
t_D : Thickness of Deck
t_F : Thickness of Bottom Flange



iv) Longitudinal Stress and Shear Stress due to Aaction as a part of main Girder: $\sigma_{D(F)xG}$, $\tau_{D(F)xG}$

$$\sigma_{D(F)xG} = \sigma_{D(F)x} \times \frac{A_o}{A_e}$$

$$\tau_{D(F)xyG} = \tau_{D(F)xy} \times \frac{T_{D(F)O}}{T_{D(F)}}$$

$\sigma_{D(F)xG}$: Longitudinal Stress and due to Aaction as a part of main Girder
A_o : Effective Sectional Area of Main Girders (before Reinforced)
A_e : Effective Sectional Area of Main Girders (After Reinforced)

$\tau_{D(F)xy}$: Shear Stress due to Action as a Main Girder before Reinforced
$t_{D(F)O}$: Thickness of Flange Plates before Reinforced
$t_{D(F)}$: Thickness of Flange Plates After Reinforced

(2) Dimension of Stay Cable

			Cable							
			C35	C36	C37	C38	C39	C40	C41	C42
Angle of Stay Cable	θ xz	(rad)	0.514663	0.497813	0.482902	0.469645	0.457807	0.447196	0.437652	0.429041
	θ yz	(rad)	1.468767	1.469791	1.470796	1.471783	1.472751	1.473702	1.474635	1.475551
	θ xy	(rad)	0.057834	0.055025	0.052558	0.050373	0.048426	0.046680	0.045104	0.043675
	θ lz	(rad)	0.513946	0.497178	0.482334	0.469133	0.457342	0.446771	0.437261	0.428680
Tension in Stay Cable	Working Tension	(kN)	3750	2615	2776	3105	3482	3812	4841	5275
	Design load	(kN)	3755	2619	2779	3108	3485	3815	4845	5280
Kind of Cabule	Nos of Strand		37S	30S	30S	30S	37S	37S	45S	50S
Ultimate Strength of Cable	0.45Pu	(kN)	4295	4295	4295	4295	4295	4295	4295	5224
Component of Tension	Vertical Force:Tv	Pz(kN)	1846	1249	1289	1405	1539	1648	2052	2195
	Horizontal force:Th	Px(kN)	3264	2298	2459	2769	3123	3437	4385	4797
	Out Plane:Tc	Py(kN)	189	127	129	140	151	161	198	210

(3) Design of Cable Anchorage

1) Case of σmax

a) Design of Steel Pipe at Anchorage

			Cable							
			C35	C36	C37	C38	C39	C40	C41	C42
Action as a Tension of Cable: σp1	Kind of Cable		37S	30S	30S	30S	37S	37S	45S	50S
	Factor of Stress Concentration: ρp1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
σp1=ρp1*T/Ap	Tension in Stay Anchorage:T	(kN)	4558.0	4558.0	4558.0	4558.0	4558.0	4558.0	5830.0	5830.0
	Thickness of Steel Pipe:tp	(mm)	32	32	32	32	32	32	32	32
	Radius of Steel Pipe: ϕ	(mm)	514	514	514	514	514	514	514	514
	Sectional Area of Steel Pipe:Ap	(mm2)	48456	48456	48456	48456	48456	48456	48456	48456
	Compressive Stress: σp1	(N/mm2)	103	103	103	103	103	103	132	132
Action as a part of main Girders: σp2	Factor of Stress Concentration: ρp2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
	Compressive Stress in Web Plates: σw	(N/mm2)	63	75	78	77	74	70	57	61
σp2=ρp2*σw*(cosθ)^2*(tw/tp)	Thickness of Web Plates:tw	(mm)	16	16	16	16	16	16	16	16
	Angle of Stay Cable: θ	(rad)	0.517	0.500	0.485	0.472	0.460	0.449	0.439	0.431
	Thickness of Steel Pipe:tp	(mm)	32	32	32	32	32	32	32	32
	Compressive Stress: σp2	(N/mm2)	31	37	40	40	39	37	30	33
Compound Stress: σp	σp1	(N/mm2)	103	103	103	103	103	103	132	132
	σp2	(N/mm2)	31	37	40	40	39	37	30	33
σp=σp1+σp2≦σa	σp	(N/mm2)	135	141	143	143	142	140	163	165
	σa	(SCW480)	170	170	170	170	170	170	170	170
	Decision		OK	OK	OK	OK	OK	OK	OK	OK
Shear Stress: τ	Factor of Stress Concentration: ρ	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
	Tension in Stay Cable:T	(kN)	4558.0	4558.0	4558.0	4558.0	4558.0	4558.0	5830.0	5830.0
τ=ρ*T/(2*L*tp)<τa	Effective Length of Steel Pipe:L	(mm)	2371	2439	2505	2566	2625	2680	2732	2782
	Thickness of Steel Pipe:tp	(mm)	32	32	32	32	32	32	32	32
	Shear Stress: τ	(N/mm2)	39	38	37	36	35	35	43	43
	τa	(SCW480)	100	100	100	100	100	100	100	100
	Decision		OK	OK	OK	OK	OK	OK	OK	OK
Check for Combined Stresses	σp	(N/mm2)	135	141	143	143	142	140	163	165
	σa	(SCW480)	170	170	170	170	170	170	170	170
(σp/σa)^2+(τ/τa)^2≦1.2	τ	(N/mm2)	39	38	37	36	35	35	43	43
	τa	(SCW480)	100	100	100	100	100	100	100	100
	Combined Stresses≦1.2		0.78	0.83	0.85	0.84	0.83	0.80	1.10	1.12
	Decision		OK	OK	OK	OK	OK	OK	OK	OK

b) Design of Web at Cable Anchorage

Group	Item	C35	C36	C37	C38	C39	C40	C41	C42	Remark
		Cable								
Dimension	material	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	before Reinforced
	material	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	After Reinforced
	Width of Web Plates: Hw (mm)	1045	1045	1045	1045	1045	1045	1045	1045	
	Thickness of Bottom flange Plates: tf (mm)	13	13	10	10	10	10	13	13	before Reinforced
	Thickness of Bottom flange Plates: tf' (mm)	13	13	10	10	10	10	13	13	After Reinforced
	Thickness of Web Plates: tw (mm)	16	16	16	16	16	16	16	16	before Reinforced
	Thickness of Web Plates: tw' (mm)	19	20	27	26	26	24	26	28	After Reinforced
	Radius of Steel Pipe: d (mm)	514	514	514	514	514	514	514	514	
	Effective Length of Steel Pipe: LS1 (mm)	2370.7	2439.5	2504.7	2566.5	2625.0	2680.2	2732.4	2781.6	Rear of Steel Pipe
	Effective Length of Steel Pipe: LS2 (mm)	3632.2	3744.3	3850.5	3950.8	4045.6	4135.0	4219.3	4298.8	Front of Steel Pipe
	Effective Sectional Area of Main Girders: Ae (mm2)	20309	20795	18276	18605	18913	19203	22809	23141	before Reinforced — Ae= Hw*tw/2+Hw*tf/2/tan θ
	Effective Sectional Area of Main Girders: Ae' (mm2)	21877	22885	24023	23830	24138	23383	28034	29411	After Reinforced
Cable	Angle of Stay Cable: θ (rad)	0.517	0.500	0.485	0.472	0.460	0.449	0.439	0.431	
	Tension in Stay Cable: T (kN)	4558.0	4558.0	4558.0	4558.0	4558.0	4558.0	5830.0	5830.0	
	Vertical Force: V (kN)	2252.5	2185.1	2124.8	2070.9	2022.4	1978.6	2480.2	2434.4	V=T*sin θ
	Horizontal force: H (kN)	3962.5	4000.1	4032.4	4060.4	4084.8	4106.1	5276.1	5297.4	H=T*cos θ
	Horizontal force: Hx (kN)	2971.9	3000.1	3024.3	3045.3	3063.6	3079.6	3957.1	3973.1	Hx3/4*H
Compressive Stress	σ i=Hx/Ae' (N/mm2)	136	131	126	128	127	132	141	135	
	σ w (N/mm2)	63	75	78	77	74	70	57	61	Action as a part of main Girders
	σ o= σ w* β (N/mm2)	59	68	60	60	58	57	46	48	β =Ae/Ae'
	Σ σ = σ i+ σ o (N/mm2)	195	199	185	188	185	189	187	183	
	σ a (N/mm2)	210	210	210	210	210	210	210	210	
	Σ σ / σ a	0.93	0.95	0.88	0.90	0.88	0.90	0.89	0.87	
Shear Stress	Foctor of Stress Concentration: ρ	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	
	τ Tt (N/mm2)	66	61	44	44	43	46	53	49	Rear of Steel Pipe τ Tt=T/(2*LS1*tw')* ρ
	τ Tb (N/mm2)	43	40	28	29	28	30	35	31	Front of Steel Pipe τ Tb=T/(2*LS2*tw')* ρ
	τ Tt/ τ a (N/mm2)	0.55	0.51	0.37	0.37	0.36	0.38	0.44	0.41	
	τ Tb/ τ a (N/mm2)	0.36	0.33	0.24	0.24	0.23	0.25	0.29	0.26	
	Distribution factor of Vertical Force: α	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	
	τ T' (N/mm2)	45	42	30	30	30	32	37	33	τ T'=V/(Hw*tw')* α
	τ w (N/mm2)	8	5	3	5	6	7	6	11	Action as a part of main Girders
	τ o= τ w* β (N/mm2)	7	4	2	3	4	4	4	7	β =tw/tw'
	Σ τ = τ T'+ τ o (N/mm2)	52	46	32	33	34	36	40	40	
	τ a (N/mm2)	120	120	120	120	120	120	120	120	
	Σ τ / τ a	0.44	0.38	0.27	0.28	0.28	0.30	0.34	0.33	
Combined Stresses≦1.2		1.05	1.05	0.85	0.88	0.86	0.90	0.91	0.87	(Σ σ / σ a)^2+(Σ τ / τ a)^2

c) Design of Bottom Flange at Cable Anchorage

				C35	C36	C37	C38	C39	C40	C41	C42	Remark
Dimension	material	Deck		SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	before Reinforced
				SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	After Reinforced
		Bottom flange		SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	before Reinforced
				SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	After Reinforced
	Deck	Width: Bd	(mm)	1642	1642	1642	1642	1642	1642	1642	1642	
		Thickness: td	(mm)	14	14	14	14	14	14	17	17	before Reinforced
		Thickness: td'	(mm)	14	14	14	14	14	14	17	17	After Reinforced
	Diaphragm	Width: HwD	(mm)	1222	1232	1245	1253	1262	1269	1274	1281	
		Thickness: tD	(mm)	11	11	11	11	11	11	11	11	before Reinforced
		Thickness: tD'	(mm)	11	11	11	11	11	11	11	11	After Reinforced
	Bottom flange	Width: Bf	(mm)	1642	1642	1642	1642	1642	1642	1642	1642	
		Thickness: tf	(mm)	13	13	10	10	10	10	13	13	before Reinforced
		Thickness: tf'	(mm)	13	13	10	10	10	10	13	13	After Reinforced
	After Reinforced	Section Modulus: wd	(cm3)	30601	30872	30492	30724	30942	31146	37648	37863	
		Section Modulus: wf	(cm3)	28956	29215	23931	24123	24304	24473	30757	30939	
	Component of Tension	Tension in Stay Cable: T	(kN)	4558.0	4558.0	4558.0	4558.0	4558.0	4558.0	5830.0	5830.0	
		Angle of Stay Cable: θ	(rad)	0.517	0.500	0.485	0.472	0.460	0.449	0.439	0.431	
		Angle of Stay Cable: ψ	(rad)	1.469	1.470	1.471	1.472	1.473	1.474	1.475	1.476	
		Horizontal Component: H	(kN)	3962.5	4000.1	4032.4	4060.4	4084.8	4106.1	5276.1	5297.4	H=T*cos θ
		Vertical Component: V	(kN)	2240.8	2173.9	2114.2	2060.7	2012.7	1969.3	2468.8	2423.4	V=T*sin θ *sin ψ
		Radius of Steel Pipe: ϕ	(mm)	514	514	514	514	514	514	514	514	
	Web at Cable Anchorage	Width: Hwc	(mm)	1045	1045	1045	1045	1045	1045	1045	1045	
		Thickness: tw	(mm)	16	16	16	16	16	16	16	16	before Reinforced
		Thickness: tw'	(mm)	19	20	27	26	26	24	26	28	After Reinforced
	Effective Sectional Area: Ae(before Reinforced)		(mm2)	20309	20795	18276	18605	18913	19203	22809	23141	Ae=Hwc*tw/2+Hwc*tf/2/tan θ
	Effective Sectional Area: Ae'(After Reinforced)		(mm2)	21877	22885	24023	23830	24138	23383	28034	29411	
Bottom flange	Longitudinal Stress at Bottom flange	σ d	(N/mm2)	136	131	126	128	127	132	141	135	σ d=3/4*H/Ae'
		σ w	(N/mm2)	63	75	78	77	74	70	57	61	Action as a part of main Girders
		σ o	(N/mm2)	59	68	60	60	58	57	46	48	σ o= σ w*Ae/Ae'
		σ xd	(N/mm2)	195	199	185	188	185	189	187	183	σ xd= σ d+ σ o
		σ ca	(N/mm2)	210	210	210	210	210	210	210	210	
	Transverse Stress at Bottom flange	Length of Cantilever: L	(mm)	919	957	992	1024	1055	1084	1111	1137	L=Hwc/2/tan θ
		σ yd	(N/mm2)	-28	-28	-35	-35	-35	-35	-36	-36	σ yd=0.4*V*L/wd
		σ ca	(N/mm2)	210	210	210	210	210	210	210	210	
	Shear Stress	Bd	(mm)	2890	2939	2985	3029	3071	3110	3148	3184	Bd=Hwc*(1/tan θ +1/tan(π /6)-1/tan(θ + π /6))
		Bf	(mm)	4469	4540	4607	4669	4728	4783	4835	4884	Bf=Hwc*(1/tan θ +1/tan(π /6)+1)
		τ di	(N/mm2)	40	40	46	46	45	45	45	45	H/((Bd*td)+(Bf*tf))
		τ w	(N/mm2)	10	7	5	8	10	11	8	14	Action as a part of main Girders
		τ o	(N/mm2)	10	7	5	8	10	11	8	14	τ o= τ w*tf/tf'
		τ	(N/mm2)	50	47	51	53	55	55	53	59	τ = τ di+ τ o
		τ a	(N/mm2)	120	120	120	120	120	120	120	120	
	Combined Stresses≦1.2			1.04	1.05	0.96	1.00	0.99	1.02	0.99	1.00	(σ xd/ σ ca)^2+(τ / τ a)^2
	Check for Biaxial Stress Condition≦1.2			1.18	1.20	1.13	1.18	1.17	1.20	1.17	1.18	(σ xd/ σ ca)^2+(σ xd/ σ ca)*(σ yd/ σ ca)+(σ yd/ σ ca)^2+(τ / τ a)^2

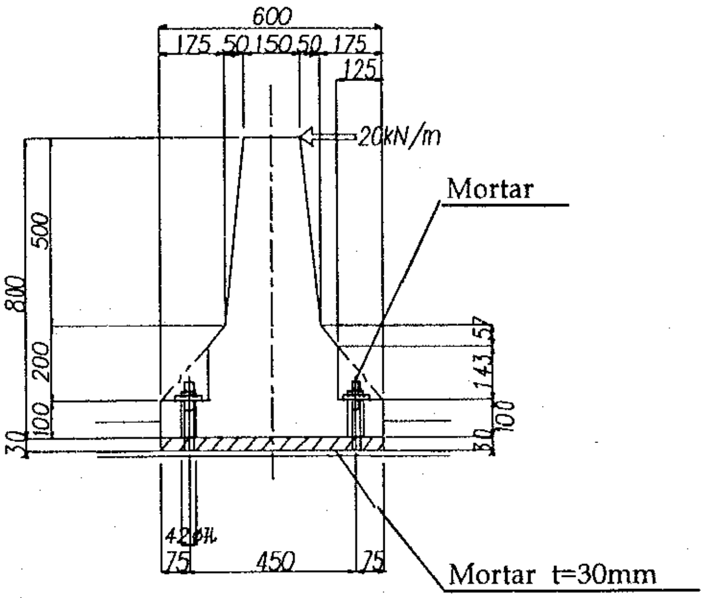
d) Design of Deck at Cable Anchorage

				C35	C36	C37	C38	C39	C40	C41	C42	Remark
Dimension	material	Deck		SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	before Reinforced
				SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	After Reinforced
		Bottom flange		SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	before Reinforced
				SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	SMA490W	After Reinforced
	Deck	Width: Bd	(mm)	1642	1642	1642	1642	1642	1642	1642	1642	
		Thickness: td	(mm)	14	14	14	14	14	14	17	17	before Reinforced
		Thickness: td'	(mm)	14	14	14	14	14	14	17	17	After Reinforced
	Diaphragm	Width: HwD	(mm)	1116	1120	1127	1131	1135	1138	1138	1141	
		Thickness: tD	(mm)	11	11	11	11	11	11	11	11	before Reinforced
		Thickness: tD'	(mm)	11	11	11	11	11	11	11	11	After Reinforced
	Bottom flange	Width: Bf	(mm)	1642	1642	1642	1642	1642	1642	1642	1642	
		Thickness: tf	(mm)	13	13	10	10	10	10	13	13	before Reinforced
		Thickness: tf'	(mm)	13	13	10	10	10	10	13	13	After Reinforced
	After Reinforced	Section Modulus: wd	(cm3)	27724	27839	27410	27510	27604	27693	33401	33495	
		Section Modulus: wf	(cm3)	26207	26317	21392	21474	21552	21625	27169	27248	
	Component of Tension	Tension in Stay Cable: T	(kN)	4558.0	4558.0	4558.0	4558.0	4558.0	4558.0	5830.0	5830.0	
		Angle of Stay Cable: θ	(rad)	0.5169	0.5000	0.4850	0.4716	0.4597	0.4490	0.4394	0.4308	
		Angle of Stay Cable: ψ	(rad)	1.4688	1.4698	1.4708	1.4718	1.4728	1.4737	1.4746	1.4756	
		Horizontal Component: H	(kN)	3962.5	4000.1	4032.4	4060.4	4084.8	4106.1	5276.1	5297.4	H=T*cos θ
		Vertical Component: V	(kN)	2240.8	2173.9	2114.2	2060.7	2012.7	1969.3	2468.8	2423.4	V=T*sin θ *sin ψ
		Radius of Steel Pipe: φ	(mm)	514	514	514	514	514	514	514	514	
	Web at Cable Anchorage	Width: Hwc	(mm)	1045	1045	1045	1045	1045	1045	1045	1045	
		Thickness: tw	(mm)	16	16	16	16	16	16	16	16	before Reinforced
		Thickness: tw'	(mm)	19	20	27	26	26	24	26	28	After Reinforced
	Effective Sectional Area: Ae(before Reinforced)		(mm2)	30301	30525	30738	30939	31129	31308	34640	34833	Ae=Hwc*tf+ φ /2*sin θ *td+450*td (φ /2*sin θ ≧450)
	Effective Sectional Area: Ae'(After Reinforced)		(mm2)	33436	34705	42233	41389	41579	39668	45090	47373	Ae=Hwc*tf+2* φ /2*sin θ *td (φ /2*sin θ ≦450)
Deck	Longitudinal Stress at Bottom flange	σ d	(N/mm2)	119	115	95	98	98	104	117	112	σ d=H/Ae'
		σ w	(N/mm2)	63	75	78	77	74	70	57	61	Action as a part of main Girders
		σ o	(N/mm2)	57	66	57	58	56	55	44	45	σ o= σ w*Ae/Ae'
		σ xd	(N/mm2)	176	181	152	156	154	158	161	157	σ xd= σ d+ σ o
		σ ca	(N/mm2)	210	210	210	210	210	210	210	210	
	Transverse Stress at Bottom flange	Length of Cantilever: L	(mm)	520	536	551	566	579	592	604	615	L= φ /2/sin θ
		σ yd	(N/mm2)	17	17	17	17	17	17	18	18	σ yd=0.4*V*L/wd
		σ ca	(N/mm2)	210	210	210	210	210	210	210	210	
	Shear Stress	Bd	(mm)	2890	2939	2985	3029	3071	3110	3148	3184	Bd=Hwc*(1/tan θ +1/tan(π /6)-1/tan(θ + π /6))
		Bf	(mm)	4469	4540	4607	4669	4728	4783	4835	4884	Bf=Hwc*(1/tan θ +1/tan(π /6)+1)
		τ di	(N/mm2)	40	40	46	46	45	45	45	45	H/((Bd*td)+(Bf*tf))
		τ w	(N/mm2)	11	8	6	9	12	11	10	19	Action as a part of main Girders
		τ o	(N/mm2)	11	8	6	9	12	11	10	19	τ o= τ w*td/td'
		τ	(N/mm2)	51	48	52	54	57	56	55	64	τ = τ di+ τ o
		τ a	(N/mm2)	120	120	120	120	120	120	120	120	
	Combined Stresses≦1.2			0.89	0.90	0.71	0.76	0.76	0.79	0.79	0.84	(σ xd/ σ ca)^2+(τ / τ a)^2
	Check for Biaxial Stress Condition≦1.2			0.82	0.84	0.66	0.70	0.71	0.73	0.74	0.78	(σ xd/ σ ca)^2+(σ xd/ σ ca)*(σ yd/ σ ca)+(σ yd/ σ ca)^2+(τ / τ a)^2

3.8.7 Design of Accessories

(1) Design of Central Separation Belt

- Form : Precasting Concrete Wall
- Connection of Wall and Deck : High Strength Bolt
- Design Load of Bolt : Clash Load 20kN at the top of Wall
- Incremental Coefficient for Allowable Stress : 1.7
- Number of Bolts : 10 a Block



Force Acting on a Bolt

Tensile Force

$$Pv = 20.0 \times 2.0 \times \frac{0.830}{0.450} \times \frac{1}{1.7} = 43.4 \text{ kN}$$

Horizontal Force

$$Ph = 20.0 \times 2.0 \times \frac{1}{1.7} = 23.5 \text{ kN}$$

Bolts

M 22 (SS400)

Effective Diameter	:	D2 =	20.376 mm
Minimum Diameter	:	D1 =	19.294 mm

Section Area : $A = \frac{1}{4} \times (\frac{D2 + D1}{2})^2 \cdot \pi \cdot$ 309.0 mn

Stress on a Bolt

$$\sigma = \frac{43.4 \times 10^3}{5 \times 309.0} = 28.1 \text{ N/mm}^2 < \sigma a = 140.0 \text{ N/mm}^2 \quad \text{O.K}$$

$$\tau = \frac{23.5 \times 10^3}{10 \times 309.0} = 7.6 \text{ N/mm}^2 < \tau a = 80.0 \text{ N/mm}^2 \quad \text{O.K}$$

$$k = \left(\frac{28.1}{140.0}\right)^2 + \left(\frac{7.6}{80.0}\right)^2 = 0.05 < 1.2 \quad \text{O.K}$$

Stress on Weld

Check on fillet weld of 6mm

Section Area : $A = 22 \times \pi \times 6 \times 1 = 293.186 \text{ mm}^2$

$$\tau = \frac{43.4 \times 10^3}{5 \times 293.2} = 29.6 \text{ N/mm}^2 < \tau a = 80.0 \text{ N/mm}^2 \quad \text{O.K}$$

$$\tau = \frac{23.5 \times 10^3}{10 \times 293.2} = 8.0 \text{ N/mm}^2 < \tau a = 80.0 \text{ N/mm}^2 \quad \text{O.K}$$

$$k = \left(\frac{29.6}{80.0}\right)^2 + \left(\frac{8.0}{80.0}\right)^2 = 0.15 < 1.0 \quad \text{O.K}$$

Bearing Stress of Concrete on Washer

Washers 1 - PL 70 x 12 x 70 (SS400)

Diameter of Bolt Hole : 42 ϕ

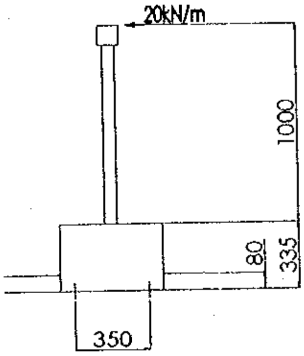
Bearing Area : $A = 70 \times 70 - 1/4 \times 42^2 \times \pi = 3515 \text{ mm}^2$

$$\sigma b = \frac{43.4 \times 10^3}{5 \times 3515} = 2.5 \text{ N/mm}^2 < \sigma ba = 0.3\,\sigma ck = 7.2 \text{ N/mm}^2 \quad \text{O.K}$$

$(\sigma ck = 24.0 \text{ N/mn})$

(2) Design of Curb

- Form : Precasting Concrete Wall
- Connection of Wall and Deck : High Strength Bolts
- Design Load of Bolts : Clash Load 20kN at the top of Hand Rail
- Incremental Coefficient for Allowable Stress : 1.7
- Number of Bolts : 8 a Block



Force Acting on a Bolt

Tensile Force

$$Pv = 20.0 \times 2.0 \times \frac{1.335}{0.350} \times \frac{1}{1.7} = 89.75 \quad kN$$

Horizontal Force

$$Ph = 20.0 \times 2.0 \times \frac{1}{1.7} = 23.5 \quad kN$$

Bolts

M22 (SS400)

Effective Diameter : 20.376 mm

Minimum Diameter : 19.294 mm

Section Area : $\frac{1}{4} \times \left(\frac{D2 + D1}{2} \right)^2 \pi = 309.0 \quad mm^2$

Stress on a Bolt

$$\sigma = \frac{89.75 \times 10^3}{4 \times 309.0} = 72.6 \quad N/mm^2 < \sigma a = 140.0 \ N/mm^2 \quad O.K$$

$$\sigma = \frac{23.5 \times 10^3}{8 \times 309.0} = 9.5 \quad N/mm^2 < \tau a = 80.0 \ N/mm^2 \quad O.K$$

$$k = \left(\frac{72.6}{140.0} \right)^2 + \left(\frac{9.5}{80.0} \right)^2 = 0.28 < 1.20 \quad O.K$$

Stress on a Weld

Check on Fillet Weld of 6mm

Section Area : A = $22 \times \pi \times 6 \times 1 = 293.186 \ \text{mm}^2$

$$\sigma = \frac{89.75 \ \times \ 10^3}{4 \times \ 293.2} = 76.5 \ \text{N/mm}^2 < \sigma a = 80.0 \ \text{N/mm}^2 \ \text{O.K}$$

$$\sigma = \frac{23.5 \ \times \ 10^3}{8 \times \ 293.2} = 10.0 \ \text{N/mm}^2 < \tau a = 80.0 \ \text{N/mm}^2 \ \text{O.K}$$

$$k = \left(\frac{72.6}{80.0} \right)^2 + \left(\frac{10.0}{80.0} \right)^2 = 0.93 < 1.00 \ \text{O.K}$$

Bearing Stress of Concrete on Washer

Washers 1 - PL 70 x 12 x 70 (SS400)

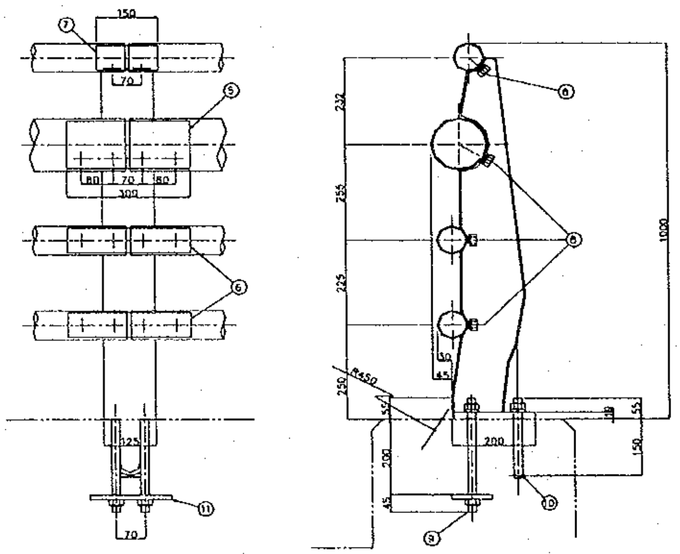
Diameter of Bolt Hole : 42 ϕ

Bearing Area : A= $70 \times 70 - 1/4 \times 42^2 \times \pi = 3515 \ \text{mm}^2$

$$\sigma b = \frac{89.75 \ \times \ 10^3}{4 \times \ 3515} = 6.4 \ \text{N/mm}^2 < \sigma ba = 0.3 \sigma ck = 7.2 \ \text{N/mm}^2$$

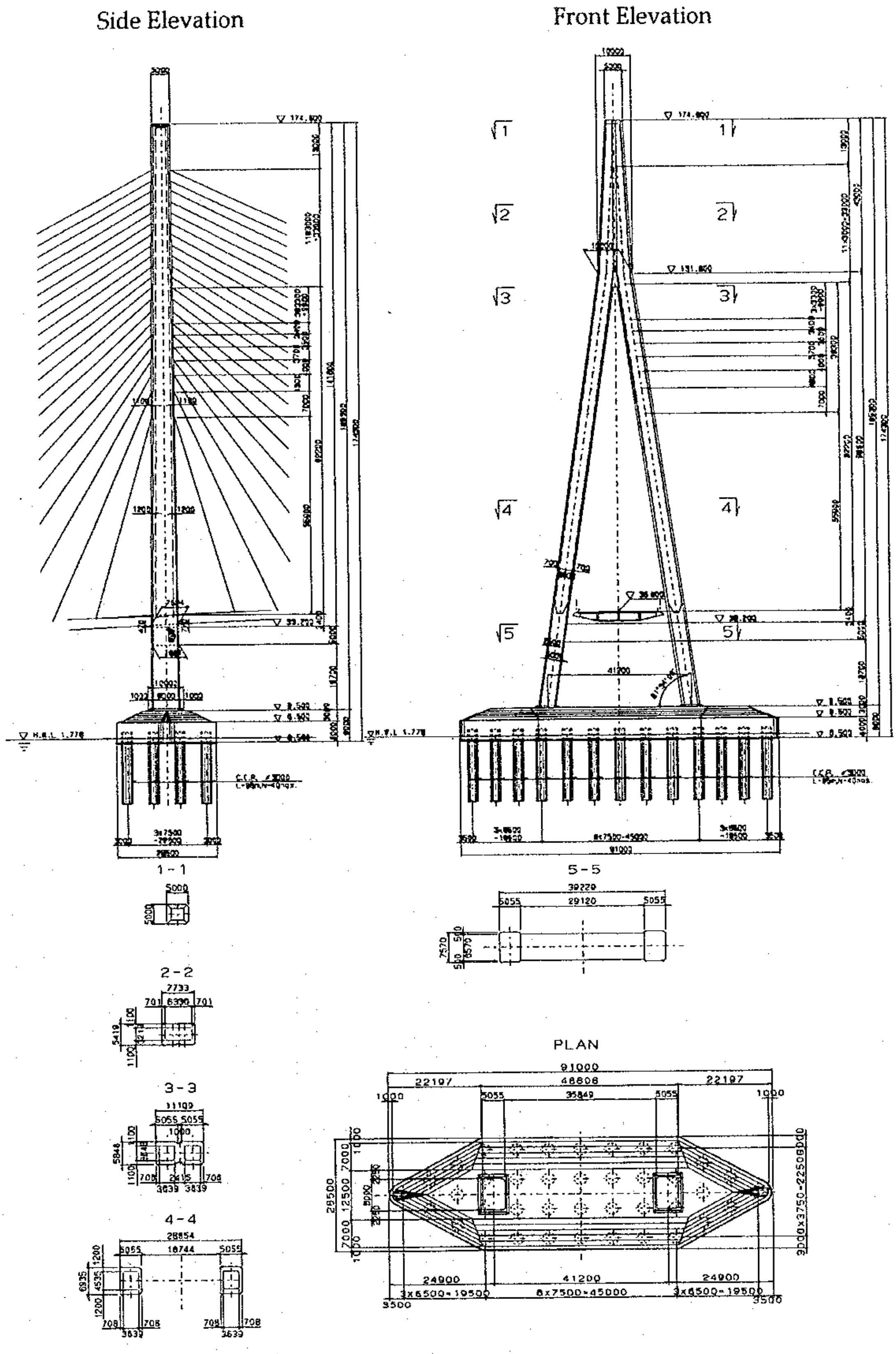
$(\sigma ck = 24.0 \ \text{N/mm}^2)$ O.K

Detail of Hand Rail



3.9 Design of Pylon

3.9.1 General View of Pylon



3.9.2 Calculation Result of Section Force at Pylon

Table Sectional Forces at Pylon Longitudinal Direction

		A-A			B-B		
		Axial Force (kN)	Shear Force (kN)	Bending Moment (kNm)	Axial Force (kN)	Shear Force (kN)	Bending Moment (kNm)
DC		-12674	-3133	0	-102292	-11317	-549286
DW		-1429	665	0	-16467	1556	46604
LL	Mmax	0	0	0	-8675	2753	81930
	Mmin	0	0	0	-5234	-1779	-44303
	Smax	-971	1100	0	-10948	3466	65337
	Smin	-263	-485	0	-2889	-2546	-34058
	Nmax	40	49	0	1107	1672	10918
	Nmin	-1233	692	0	-14145	489	33329
WS	→	0	604	3391	-6101	-2234	4824
	←	0	-604	-3391	6101	2234	-4824
WL	L→R	0	0	0	0	0	0
	R→L	0	0	0	0	0	0
TU	Up	42	76	0	117	13	5222
	Down	-42	-76	0	-117	-13	-5222
CR		1	2	0	-3	-1	53
SH		0	0	0	0	0	0
TG		-18	19	0	-208	55	3219
EQ	→	-104	-1662	3035	-63	-2057	-127524
	←	104	1662	-3035	63	2057	127524

		C-C			D-D		
		Axial Force (kN)	Shear Force (kN)	Bending Moment (kNm)	Axial Force (kN)	Shear Force (kN)	Bending Moment (kNm)
DC		-151144	2157	-145655	-187483	2167	-86956
DW		-14799	131	42055	-16742	-32	41446
LL	Mmax	-10308	572	43832	-9638	587	57428
	Mmin	-1227	-536	-12980	-3097	-594	-27063
	Smax	-6682	882	33303	-6800	719	50854
	Smin	-4606	-754	-3567	-5842	-713	-20944
	Nmax	127	72	3544	107	135	7258
	Nmin	-11359	48	29950	-12640	-158	25781
WS	→	-5533	1747	-6305	-4775	16368	392351
	←	5533	-1747	6305	4775	-16368	-392351
WL	L→R	-15	7	435	-443	-307	-2766
	R→L	15	-7	-435	443	307	2766
TU	Up	-28	-224	-16572	-121	-603	-32346
	Down	28	224	16572	121	603	32346
CR		-2	1	171	1	1	193
SH		0	0	8	0	0	12
TG		-113	-62	-3638	-56	-89	-6012
EQ	→	2236	7865	401343	2271	18605	851952
	←	-2236	-7865	-401343	-2271	-18605	-851952

Table Sectional Forces at Pylon Transversal Direction

		A-A			B-B		
		Axial Force (kN)	Shear Force (kN)	Bending Moment (kNm)	Axial Force (kN)	Shear Force (kN)	Bending Moment (kNm)
DC+DW		-14102	0	0	-118762	0	0
LL	Mmax	-389	5	35	-8306	130	3937
	Mmin	389	-5	-35	-8306	-130	-3837
	Smax	-389	5	35	-8306	130	3937
	Smin	389	-5	-35	-8306	-130	-3837
	Nmax	11	0	0	974	0	0
	Nmin	-651	0	0	-13850	0	0
WS	L→R	1	1342	3662	-10	9613	174764
	R→L	1	-1342	-3662	-10	-9613	-174764
WL	L→R	0	0	1	0	5	92
	R→L	0	0	-1	0	-5	-92
EQ	L→R	0	573	3126	-11	2906	55466
	R→L	0	-573	-3126	-11	-2906	-55466

		C-C			D-D		
		Axial Force (kN)	Shear Force (kN)	Bending Moment (kNm)	Axial Force (kN)	Shear Force (kN)	Bending Moment (kNm)
DC+DW		-165945	-2710	-31498	-204224	-14738	-193035
LL	Mmax	-4974	20	319	-5510	133	544
	Mmin	-7318	-32	-637	-8034	-242	-2198
	Smax	-4974	20	319	-5510	133	544
	Smin	-7318	-32	-637	-8034	-242	-2198
	Nmax	0	0	0	0	0	0
	Nmin	-10652	-11	-301	-11262	-91	-1376
WS	L→R	-49566	3145	91060	-69311	11359	117462
	R→L	49753	-4692	-109140	69281	-11173	-116721
WL	L→R	-15	1	10	-443	322	2934
	R→L	15	-1	-10	443	-322	-2934
EQ	L→R	-19883	3173	66931	-39495	13390	116879
	R→L	19849	-3180	-66778	39495	-13411	-116944