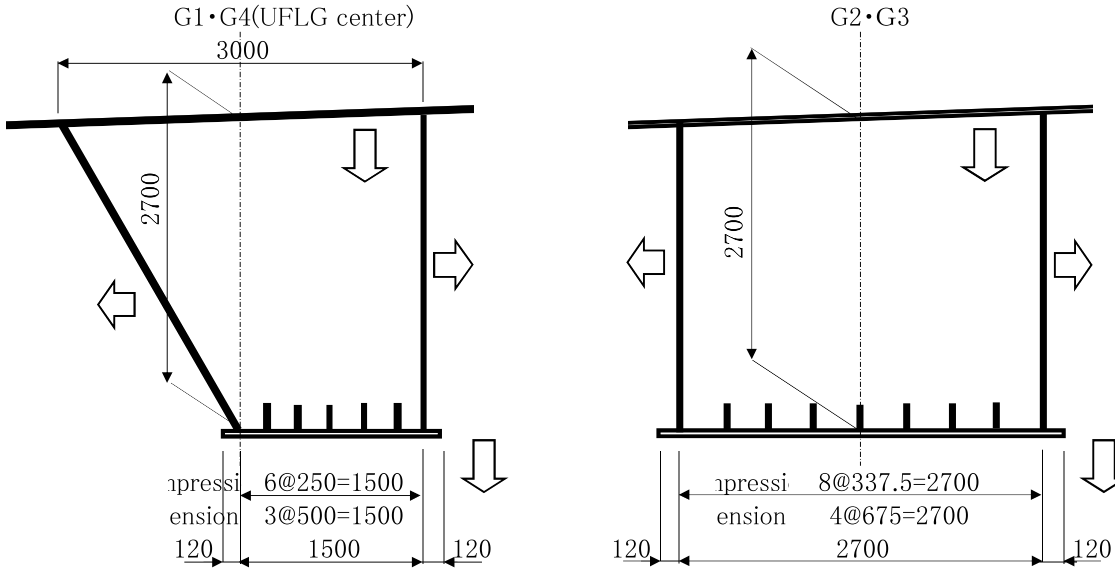
4. Main girder design

4. 1. Guidelines for design

1) Implement cross-section calculation by using panel point cross-sectional force calculated in the structural analysis of the previous section.
Cross-sectional force at the location of cross-sectional change is calculated by interpolating the above valu

2) The cross-section of the main girder is considered one member-one cross-section, and cross-sectional change is implemented at the joint.
The location of the joint is determined by considering transporting conditions.

3) The form of the girder should be as the following cross-section.
- The height of the main girder(under surface of steel plate deck to top surface of bottom flange) is 2700m constantly. Deck plate thickness and bottom flange thickness both are increased for under side.
- The longitudinal rib of the bottom flange is G1・G4 : compression side 5, tension side2
G2・G3 : compression side 7, tension side 3



4) Minimum thickness of bottom flange
① minimum thickness of compression flange ･･･ Specifications for Highway Bridges Ⅱ. 4.2.4
SM490Y(thickness less than 75mm) $t = b/(46 \times f \times n)$
SM570(thickness less than 75mm) $t = b/(40 \times f \times n)$
t : thickness(mm)
b : maximum width of stiffening plate(mm)
n : number of panels separated by longitudinal stiffeners
f : coefficient by stress gradient(1.00)

②minimum thickness of tension flange ･･･ Specifications for Highway Bridges Ⅱ. 11.3.3
$t = b/(80 \times n)$
t : thickness(mm)
b : maximum width of stiffening plate(mm)
n : number of panels separated by longitudinal stiffeners

5) Web thickness

Horizontal stiffeners are one layer at principle.

as for the case of SM490Y $t = hw/209$

as for the case of SM570 $t = hw/188$

t : web thickness(mm) hw : web height(mm)

6) Transverse ribs are located at center between diaphragm to diaphragm.

7) The material for the main girder is fundamentally SM490Y.
SM490Y is t=40mm maximum, and for what exceeds, steel with constant yield point must be used.

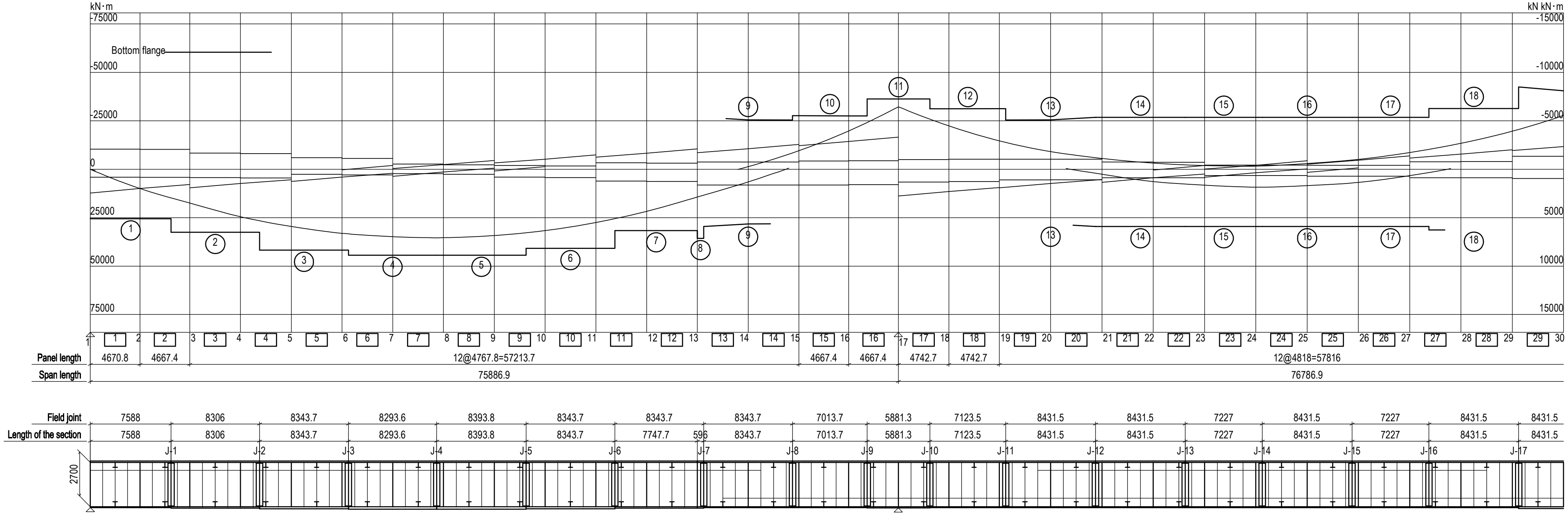
8) The minimum difference of thickness at the joint is 2mm, and maximum difference is less than 25mm and als
less than half of the thickness itself. When the difference is less than 6mm, the filler should be as follows.

Difference of thickness of base material	Location of joint
2mm	filler plate 2.3mm
3mm	filler plate 3.2mm
4mm,5mm	filler plate 4.5mm
6mm～	filler plate with the same thickness of the difference

４．２．Stress diagram

STRESS DIAGRAM (1) S=1:400

G1



Unit : mm N/mm2

		1		2	3	4	5	6	7	8	9		10	11		12
Section		Sec-1		Sec-2	Sec-3	Sec-4	Sec-5	Sec-6	Sec-7	Sec-7	Sec-8		Sec-9	Sec-10		Sec-11
Deck Plate	Thickness	16, 16, 16		16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16		16, 16, 16	16, 16, 16		16, 16, 16
	Quality	(1),(1),(1)		(1),(1),(1)	(1),(1),(1)	(1),(1),(1)	(1),(1),(1)	(1),(1),(1)	(1),(1),(1)	(1),(1),(1)	(1),(1),(1)		(1),(1),(1)	(3),(3),(3)		(1),(1),(1)
Longit Rib 1	Number	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL
	Section	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24
Longit Rib 2	Number	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib
	Section	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8
Left Web	Height	3062.5	3062.5	3062.5	3062.5	3062.5	3062.5	3062.5	3062.5	3062.5	3062.5	3062.5	3062.5	3062.5	3062.5	3062.5
	Thickness	15(3)		15(3)	15(3)	15(3)	15(3)	15(3)	15(3)	15(3)	15(3)		17(3)	17(3)		17(3)
Right Web	Height	2730	2730	2730	2730	2730	2730	2730	2730	2730	2730	2730	2730	2730	2730	2730
	Thickness	15(3)		15(3)	15(3)	15(3)	15(3)	15(3)	15(3)	15(3)	15(3)		17(3)	17(3)		17(3)
Bottom flange Vertical rib	Number	2		2	2	2	2	2	2	5	5		5	5		5
	Width	170		170	200	200	200	200	170	170	170		170	200		170
	Thickness	17(3)		17(3)	22(3)	22(3)	22(3)	22(3)	17(3)	17(3)	17(3)		17(3)	22(3)		17(3)
Lflg W=1740 T		10(3)		18(3)	27(3)	30(3)	30(3)	26(3)	17(3)	17(3)	10(3)		10(3)	15(3)		12(3)
Deck Plate	σ	0	-52	-87	-103	-108	-108	-102	-84	-46	-45	30	87	110	110	91
	σa	140	140	140	140	140	140	140	140	140	140	140	140	210	210	140
	σa-σ	140	88	53	37	32	32	38	56	94	95	110	53	100	100	49
Bottom flange	σ	0	122	172	168	168	168	169	169	84	95	-63	-172	-187	-187	-174
	σa	210	210	210	210	210	210	210	210	210	210	190	196	210	210	210
	σa-σ	210	88	38	42	42	42	41	41	126	115	127	24	23	23	36
Web	τ	48	37	28	17	9	9	17	27	36	34	45	47	49	41	38
	τa	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
	Combined	0.16	0.36	0.68	0.63	0.62	0.62	0.64	0.66	0.20	0.23	0.14	0.71	0.85	0.83	0.72
Calculated points		Left	J-1	J-2	J-3		J-4	J-5	J-6	Left	J-7	J-8	J-9	Max Left	Max Right	J-10
Deck Plate σspl												45	120			126
Bottom flange σspl			157	209	205			206	209		124					

		13			14				15						16			
Section		Sec-12			Sec-13				Sec-14						Sec-15			
Deck Plate	Thickness	16, 16, 16			16, 16, 16				16, 16, 16						16, 16, 16			
	Quality	(1),(1),(1)			(1),(1),(1)				(1),(1),(1)						(1),(1),(1)			
Longit Rib 1	Number	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL
	Section	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24
Longit Rib 2	Number	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib
	Section	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8
Left Web	Height	3062.5	3062.5	3062.5	3062.5	3062.5	3062.5	3062.5	3062.5	3062.5	3062.5	3062.5	3062.5	3062.5	3062.5	3062.5	3062.5	3062.5
	Thickness	15(3)			15(3)				15(3)						15(3)			
Right Web	Height	2730	2730	2730	2730	2730	2730	2730	2730	2730	2730	2730	2730	2730	2730	2730	2730	2730
	Thickness	15(3)			15(3)				15(3)						15(3)			
Bottom flange Vertical rib	Number	5			5				5						5			
	Width	170			170				170						170			
	Thickness	17(3)			17(3)				17(3)						17(3)			
Lflg W=1740 T		10(3)			10(3)				10(3)						10(3)			
Deck Plate	σ	49	-7	20	-7	20	-26	8	-26	8	-31	6	-31	6	-31	6	-24	16
	σa	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140
	σa-σ	91	133	120	133	120	114	132	114	132	109	134	109	134	109	134	116	124
Bottom flange	σ	-103	15	-43	15	-43	55	-16	55	-16	66	-12	66	-12	66	-12	50	-34
	σa	190	210	190	210	190	210	190	210	190	210	190	210	190	210	190	210	190
	σa-σ	87	195	147	195	147	155	174	155	174	144	179	144	178	144	178	160	156
Web	τ	33	22	22	22	22	14	14	14	14	10	10	10	10	10	10	17	17
	τa	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
	Combined	0.27	0.03	0.05	0.03	0.05	0.07	0.01	0.07	0.01	0.10	0.01	0.10	0.01	0.10	0.01	0.06	0.03
Calculated points		J-11	J-12	J-12	Left	Left	J-13	J-13	Left	Left			J-14	J-14	Left	Left	J-15	J-15
Deck Plate σspl		70		32				21						19				25
Bottom flange σspl			44				79						97				80	

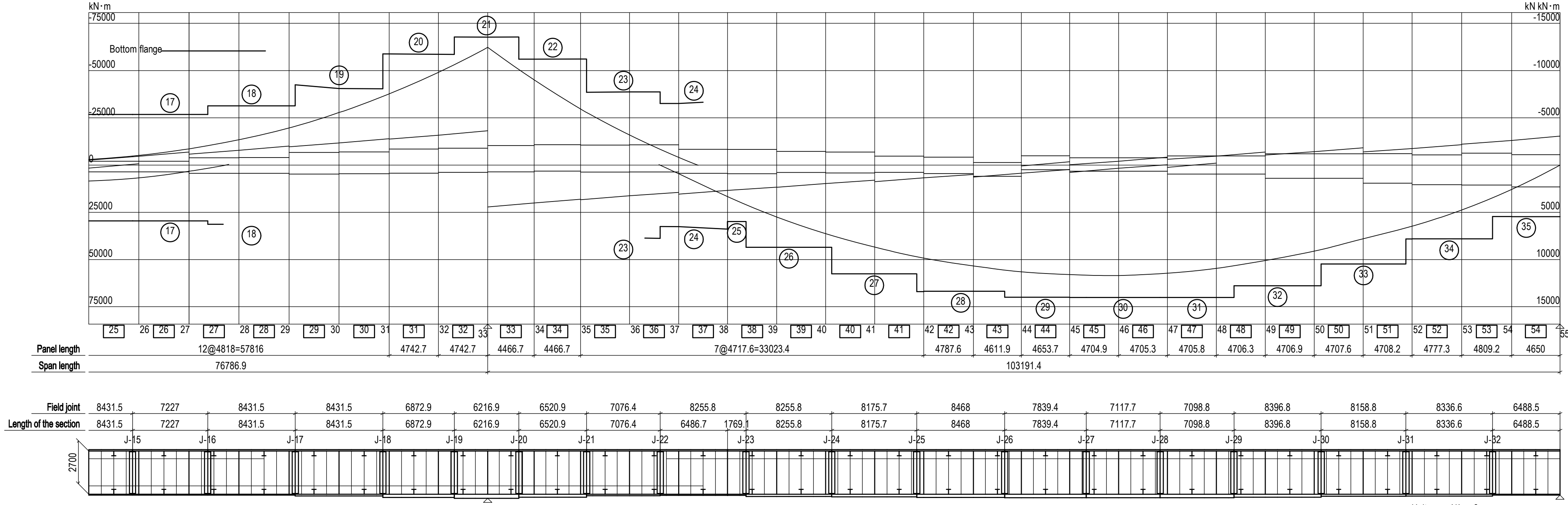
Grade
(1):SM400
(2):SM490
(3):SM490Y
(4):SM570
(5):SM400-H
(6):SM490-H
(7):SM520-H
(8):SM570-H

PROJECT NAME	FINANCED BY	COUNTERPART	JICA STUDY TEAM
DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	JAPAN INTERNATIONAL COOPERATION AGENCY	REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.

	NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
PREPARED BY	S. IMADA			STRESS DIAGRAM (1)	2
CHECKED BY	T. HAYAKAWA				DWG No.
APPROVED BY	Y. SANO				P2-SB-0008

STRESS DIAGRAM (2) S=1:400

G1



Unit : mm N/mm2

		17				18			19	20	21		22	23		
Section		Sec-16				Sec-17			Sec-18	Sec-19	Sec-20		Sec-21	Sec-22		
Deck Plate	Thickness	16, 16, 16				16, 16, 16			16, 16, 16	16, 16, 16	16, 16, 16		16, 16, 16	16, 16, 16		
	Quality	(1),(1),(1)				(1),(1),(1)			(3),(3),(3)	(3),(3),(3)	(3),(3),(3)		(3),(3),(3)	(1),(1),(1)		
Longit Rib 1	Number	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL
	Section	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24
Longit Rib 2	Number	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib
	Section	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8
Left Web	Height	3062.5	3062.5	3062.5	3062.5	3062.5	3062.5	3062.5	3062.5	3062.5	3062.5	3062.5	3062.5	3062.5	3062.5	3062.5
	Thickness	15(3)				15(3)			15(3)	17(3)	17(3)		17(3)	15(3)		
Right Web	Height	2730	2730	2730	2730	2730	2730	2730	2730	2730	2730	2730	2730	2730	2730	2730
	Thickness	15(3)				15(3)			15(3)	17(3)	17(3)		17(3)	15(3)		
Bottom flange Vertical rib	Number	5				5			5	5	5		5	5		
	Width	170				170			200	200	200		200	200		
	Thickness	17(3)				17(3)			22(3)	22(3)	22(3)		22(3)	22(3)		
Lflg W=1740 T		10(3)				12(3)			21(3)	41(7)	52(7)		38(3)	19(3)		
Deck Plate	σ	-24	16	-6	35	-6	34	68	115	160	184	184	154	92	0	26
	σa	140	140	140	140	140	140	140	210	210	210	210	210	140	140	140
	σa-σ	116	124	134	105	134	106	72	95	50	26	26	56	48	140	114
Bottom flange	σ	50	-34	12	-73	11	-69	-138	-189	-190	-193	-193	-189	-152	0	-45
	σa	210	190	210	190	210	210	210	210	210	210	210	210	210	210	210
	σa-σ	160	156	198	117	199	141	72	21	20	17	17	21	58	210	165
Web	τ	17	17	24	24	24	24	36	45	48	51	62	60	62	54	54
	τa	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
	Combined	0.06	0.03	0.04	0.13	0.04	0.12	0.46	0.87	0.89	0.92	0.98	0.93	0.65	0.20	0.20
Calculated points		Left	Left	J-16	J-16	Left	Left	J-17	J-18	J-19	Max Left	Max Right	J-20	J-21	Right	Right
Deck Plate σspl					48			89	148	210			203	123		
Bottom flange σspl				55												

		24			25	26	27	28	29	30	31	32	33	34	35	
Section		Sec-23			Sec-23	Sec-24	Sec-25	Sec-26	Sec-27	Sec-28	Sec-29	Sec-30	Sec-31	Sec-32	Sec-33	
Deck Plate	Thickness	16, 16, 16			16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	
	Quality	(1),(1),(1)			(1),(1),(1)	(1),(1),(1)	(3),(3),(3)	(3),(3),(3)	(3),(3),(3)	(3),(3),(3)	(3),(3),(3)	(3),(3),(3)	(3),(3),(3)	(1),(1),(1)	(1),(1),(1)	
Longit Rib 1	Number	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL
	Section	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24
Longit Rib 2	Number	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib
	Section	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8
Left Web	Height	3062.5	3062.5	3062.5	3062.5	3062.5	3062.5	3062.5	3062.4	3062.4	3062.4	3062.4	3062.4	3062.4	3062.5	3062.5
	Thickness	15(3)			15(3)	15(3)	17(4)	17(4)	17(4)	17(4)	17(4)	17(4)	17(4)	15(3)	15(3)	
Right Web	Height	2730	2730	2730	2730	2730	2730	2730	2730.1	2730.2	2730.2	2730.2	2730.2	2730.2	2730	2730
	Thickness	15(3)			15(3)	15(3)	17(4)	17(4)	17(4)	17(4)	17(4)	17(4)	17(4)	15(3)	15(3)	
Bottom flange Vertical rib	Number	5			2	2	2	2	2	2	2	2	2	2	2	
	Width	170			170	200	200	200	200	200	200	200	200	200	170	
	Thickness	17(3)			17(3)	22(3)	22(4)	22(4)	22(4)	22(4)	22(4)	22(4)	22(4)	22(3)	17(3)	
Lflg W=1740 T		15(3)			15(3)	29(3)	32(4)	41(8)	44(8)	44(8)	44(8)	38(4)	27(4)	24(3)	12(3)	
Deck Plate	σ	0	28	-55	-70	-114	-145	-159	-167	-167	-165	-156	-137	-104	-60	0
	σa	140	140	140	140	140	210	210	210	210	210	210	210	140	140	140
	σa-σ	140	112	85	70	26	65	51	43	43	45	54	73	36	80	140
Bottom flange	σ	0	-54	104	147	180	215	212	212	213	209	213	218	179	134	0
	σa	210	210	210	210	210	255	255	255	255	255	255	255	210	210	210
	σa-σ	210	156	106	63	30	40	43	43	42	46	42	37	31	76	210
Web	τ	55	55	47	46	34	22	18	11	9	13	18	25	34	48	58
	τa	120	120	120	120	120	145	145	145	145	145	145	145	120	120	120
	Combined	0.21	0.21	0.30	0.54	0.76	0.70	0.67	0.66	0.67	0.65	0.68	0.73	0.75	0.45	0.23
Calculated points		J-22	J-22	Right	J-23	J-24	J-25	J-26	J-27		J-28	J-29	J-30	J-31	J-32	Right
Deck Plate σspl			40													
Bottom flange σspl		13			189	207	251	251	252		247	250	251	204	166	

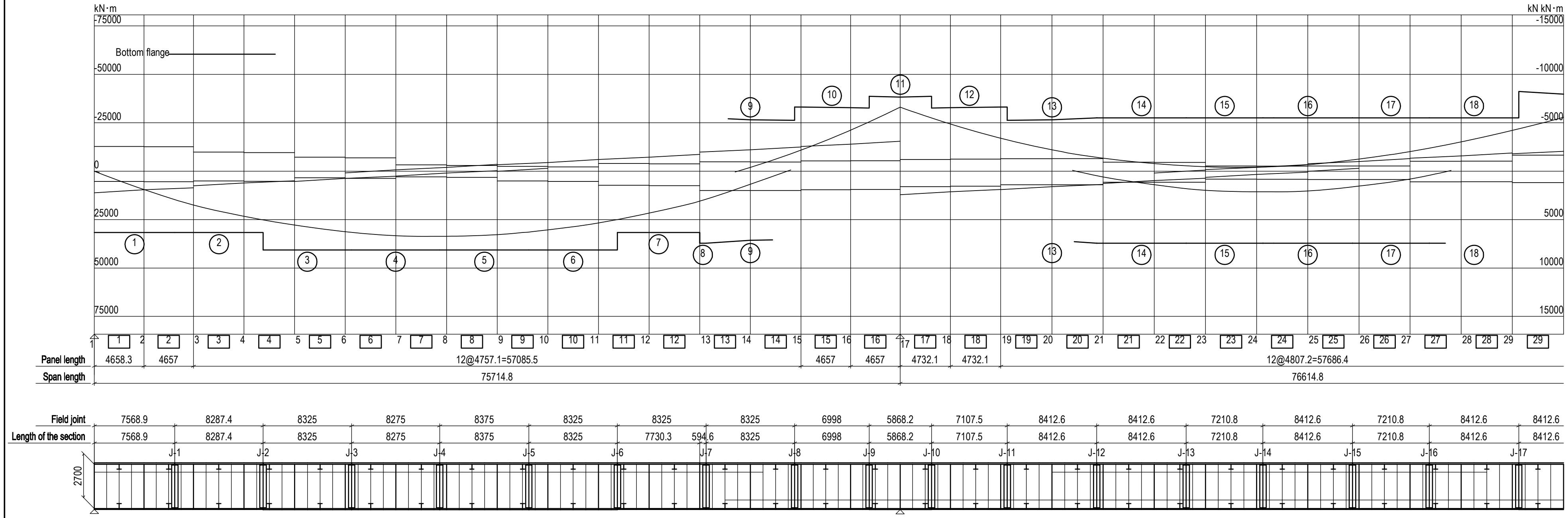
Grade
(1):SM400
(2):SM490
(3):SM490Y
(4):SM570
(5):SM400-H
(6):SM490-H
(7):SM520-H
(8):SM570-H

PROJECT NAME	FINANCED BY	COUNTERPART	JICA STUDY TEAM
DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	JAPAN INTERNATIONAL COOPERATION AGENCY	REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.

	NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
PREPARED BY	S. IMADA			STRESS DIAGRAM (2)	2
CHECKED BY	T. HAYAKAWA				DWG No.
APPROVED BY	Y. SANO				P2-SB-0009

STRESS DIAGRAM (3) S=1:400

G2



Unit : mm N/mm2

		1		2	3	4	5	6	7	8	9		10	11		12	13			14				15				16			
Section		Sec-1		Sec-2	Sec-3	Sec-4	Sec-5	Sec-6	Sec-7	Sec-7	Sec-8		Sec-9	Sec-10		Sec-11	Sec-12			Sec-13				Sec-14				Sec-15			
Deck Plate	Thickness	16, 16, 16		16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16		16, 16, 16	16, 16, 16		16, 16, 16	16, 16, 16			16, 16, 16				16, 16, 16				16, 16, 16			
	Quality	(1),(1),(1)		(1),(1),(1)	(1),(1),(1)	(1),(1),(1)	(1),(1),(1)	(1),(1),(1)	(1),(1),(1)	(1),(1),(1)	(1),(1),(1)		(1),(1),(1)	(3),(3),(3)		(1),(1),(1)	(1),(1),(1)			(1),(1),(1)				(1),(1),(1)				(1),(1),(1)			
Longit Rib 1	Number	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib
	Section	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8
Longit Rib 2	Number	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL
	Section	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24
Left Web	Height	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673
	Thickness	14(3)		14(3)	14(3)	14(3)	14(3)	14(3)	14(3)	14(3)	14(3)		14(3)	14(3)		14(3)	14(3)			14(3)				14(3)				14(3)			
Right Web	Height	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727
	Thickness	14(3)		14(3)	14(3)	14(3)	14(3)	14(3)	14(3)	14(3)	14(3)		14(3)	14(3)		14(3)	14(3)			14(3)				14(3)				14(3)			
Bottom flange Vertical rib	Number	3		3	3	3	3	3	3	7	7		7	7		7	7			7				7				7			
	Width	170		170	170	170	170	170	170	170	170		170	170		170	170			170				170				170			
	Thickness	17(3)		17(3)	17(3)	17(3)	17(3)	17(3)	17(3)	17(3)	17(3)		17(3)	17(3)		17(3)	17(3)			17(3)				17(3)				17(3)			
Lflg W=1740 T		10(3)		10(3)	16(3)	16(3)	16(3)	16(3)	10(3)	10(3)	10(3)		12(3)	14(3)		12(3)	10(3)			10(3)				10(3)				10(3)			
Deck Plate	σ	0	-50	-85	-101	-108	-108	-100	-85	-51	-48	32	86	111	111	92	54	-8	23	-8	23	-30	9	-30	9	-35	7	-35	8	-27	19
	σa	140	140	140	140	140	140	140	140	140	140	140	140	210	210	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140
	σa-σ	140	90	55	39	32	32	40	55	89	92	108	54	99	99	48	86	132	117	132	117	110	131	110	131	105	133	105	132	113	121
Bottom flange	σ	0	98	167	163	174	173	162	166	88	82	-57	-142	-173	-173	-153	-96	13	-40	13	-40	51	-16	51	-16	60	-12	60	-13	46	-33
	σa	210	210	210	210	210	210	210	210	210	210	156	182	200	200	182	156	210	156	210	156	210	156	210	156	210	156	210	156	210	156
	σa-σ	210	112	43	47	36	37	48	44	122	128	99	40	27	27	29	60	197	116	197	116	159	140	159	140	150	144	150	143	164	123
Web	τ	47	40	27	18	8	8	17	27	34	40	47	53	56	44	42	35	28	28	28	28	18	18	18	18	11	11	12	12	19	19
	τa	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
	Combined	0.15	0.27	0.65	0.60	0.67	0.67	0.60	0.64	0.22	0.22	0.16	0.56	0.80	0.75	0.59	0.25	0.05	0.07	0.05	0.07	0.07	0.02	0.07	0.02	0.09	0.01	0.09	0.01	0.06	0.04
Calculated points		Left	J-1	J-2	J-3		J-4	J-5	J-6	Left	J-7	J-8	J-9	Max Left	Max Right	J-10	J-11	J-12	J-12	Left	Left	J-13	J-13	Left	Left	J-14	J-14			J-15	J-15
Deck Plate σspl												48	120			128	76		36				23				23				30
Bottom flange σspl			129	200	195		208	195	201		107							39				73				86				71	

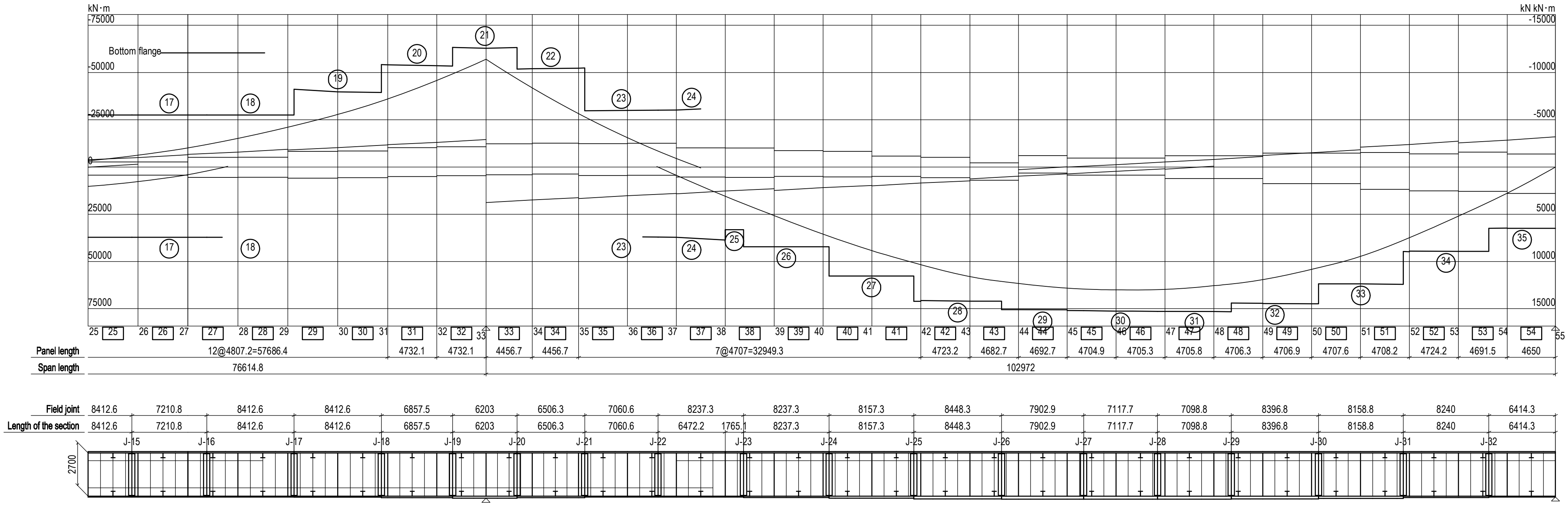
Grade
(1):SM400
(2):SM490
(3):SM490Y
(4):SM570

PROJECT NAME	FINANCED BY	COUNTERPART	JICA STUDY TEAM
DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	JAPAN INTERNATIONAL COOPERATION AGENCY	REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.

	NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
PREPARED BY	S. IMADA			STRESS DIAGRAM (3)	2
CHECKED BY	T. HAYAKAWA				DWG No.
APPROVED BY	Y. SANO				P2-SB-0010

STRESS DIAGRAM (4) S=1:400

G2



Unit : mm N/mm2

		17				18			19	20	21		22	23			24			25	26	27	28	29	30	31	32	33	34	35	
Section		Sec-16				Sec-17			Sec-18	Sec-19	Sec-20		Sec-21	Sec-22			Sec-23			Sec-23	Sec-24	Sec-25	Sec-26	Sec-27	Sec-28	Sec-29	Sec-30	Sec-31	Sec-32	Sec-33	
Deck Plate	Thickness	16, 16, 16				16, 16, 16			16, 16, 16	16, 16, 16	16, 16, 16		16, 16, 16	16, 16, 16			16, 16, 16			16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	
	Quality	(1),(1),(1)				(1),(1),(1)			(3),(3),(3)	(3),(3),(3)	(3),(3),(3)		(3),(3),(3)	(1),(1),(1)			(1),(1),(1)			(1),(1),(1)	(1),(1),(1)	(3),(3),(3)	(3),(3),(3)	(3),(3),(3)	(3),(3),(3)	(3),(3),(3)	(3),(3),(3)	(3),(3),(3)	(1),(1),(1)	(1),(1),(1)	
Longit Rib 1	Number	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib
	Section	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8
Longit Rib 2	Number	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	3-PL	3-PL	4-PL	4-PL	4-PL	5-PL	6-PL	6-PL	5-PL
	Section	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24
Left Web	Height	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2672.9	2672.9	2672.9	2672.9	2672.8	2672.8	2673	2673
	Thickness	14(3)				14(3)			14(3)	14(3)	14(3)		14(3)	14(3)			14(3)			14(3)	14(3)	14(3)	14(3)	14(3)	14(3)	14(3)	14(3)	14(3)	14(3)	14(3)	
Right Web	Height	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727.1	2727.1	2727.1	2727.1	2727.2	2727.2	2727	2727
	Thickness	14(3)				14(3)			14(3)	14(3)	14(3)		14(3)	14(3)			14(3)			14(3)	14(3)	14(3)	14(3)	14(3)	14(3)	14(3)	14(3)	14(3)	14(3)	14(3)	
Bottom flange Vertical rib	Number	7				7			7	7	7		7	7			7			3	3	3	3	3	3	3	3	3	3	3	
	Width	170				170			170	200	200		200	170			170			170	170	200	200	200	200	200	200	200	170	170	
	Thickness	17(3)				17(3)			17(3)	22(3)	22(3)		22(3)	17(3)			17(3)			17(3)	17(3)	22(3)	22(3)	22(3)	22(3)	22(3)	22(3)	22(3)	17(3)	17(3)	
Lflg W=1740 T		10(3)				10(3)			14(3)	20(3)	27(3)		19(3)	11(3)			11(3)			11(3)	17(3)	26(3)	35(3)	38(3)	38(3)	38(3)	35(3)	28(3)	18(3)	10(3)	
Deck Plate	σ	-27	19	-7	39	-7	39	72	113	154	175	175	147	88	0	28	0	28	-50	-65	-116	-152	-168	-177	-170	-169	-160	-134	-99	-51	0
	σa	140	140	140	140	140	140	140	210	210	210	210	210	140	140	140	140	140	140	140	140	210	210	210	210	210	210	210	140	140	140
	σa-σ	113	121	133	101	133	101	68	97	56	35	35	63	52	140	112	140	112	90	75	24	58	42	33	40	41	50	76	41	89	140
Bottom flange	σ	46	-33	12	-67	12	-67	-124	-177	-194	-190	-190	-189	-151	0	-48	0	-48	84	123	182	184	179	179	179	178	180	181	182	121	0
	σa	210	156	210	156	210	156	156	200	210	210	210	210	170	210	170	210	170	210	210	210	210	210	210	210	210	210	210	210	210	210
	σa-σ	164	123	198	89	198	89	32	23	16	20	20	21	19	210	122	210	122	126	87	28	26	31	31	31	32	30	29	28	89	210
Web	τ	19	19	27	27	27	27	36	43	51	53	67	65	62	56	56	56	56	48	47	40	31	22	14	10	12	19	32	48	57	65
	τa	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
	Combined	0.06	0.04	0.05	0.13	0.05	0.13	0.39	0.78	0.96	0.95	1.04	1.00	0.66	0.22	0.22	0.22	0.22	0.25	0.42	0.81	0.80	0.71	0.70	0.70	0.69	0.73	0.77	0.84	0.43	0.29
Calculated points		Left	Left	J-16	J-16	Left	Left	J-17	J-18	J-19	Max Left	Max Right	J-20	J-21	J-22	J-22	Left	Left	Right	J-23	J-24	J-25	J-26	J-27		J-28	J-29	J-30	J-31	J-32	Right
Deck Plate σspl					53			93	148	210			203	123		39															
Bottom flange σspl				49											10					155	206	206	206	205		205	209	205	204	149	

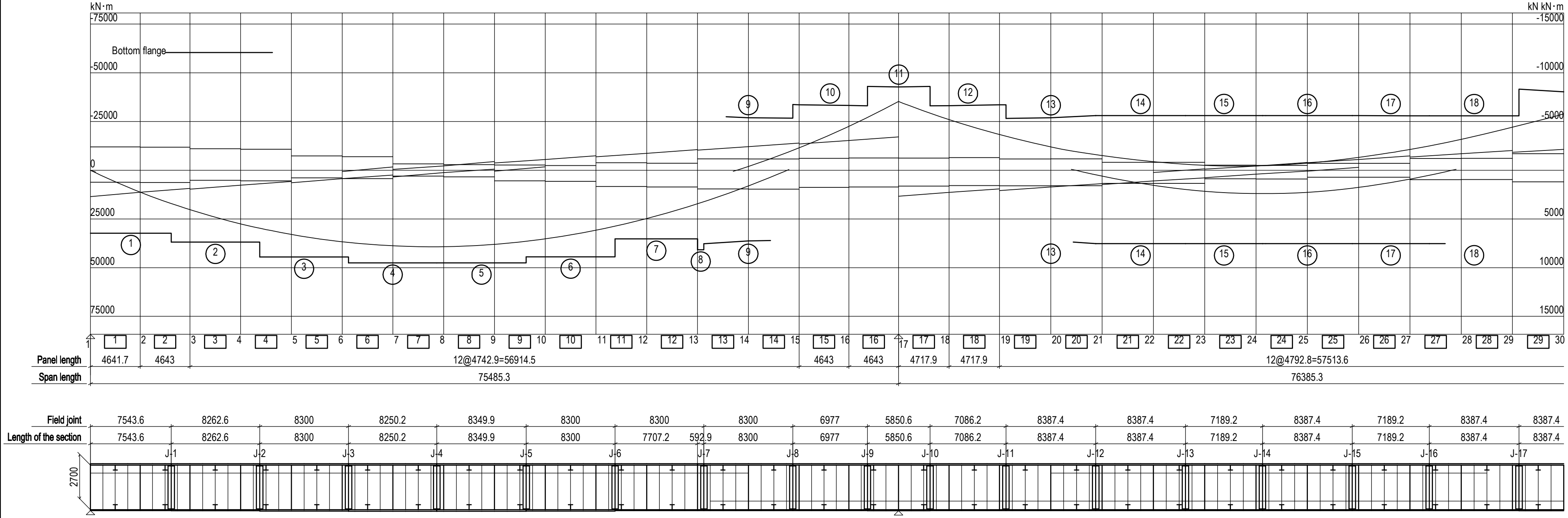
Grade
(1):SM400
(2):SM490
(3):SM490Y
(4):SM570

PROJECT NAME	FINANCED BY	COUNTERPART	JICA STUDY TEAM
DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	JAPAN INTERNATIONAL COOPERATION AGENCY	REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.

	NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
PREPARED BY	S. IMADA			STRESS DIAGRAM (4)	2
CHECKED BY	T. HAYAKAWA				DWG No.
APPROVED BY	Y. SANO				P2-SB-0011

STRESS DIAGRAM (5) S=1:400

G3



Unit : mm N/mm2

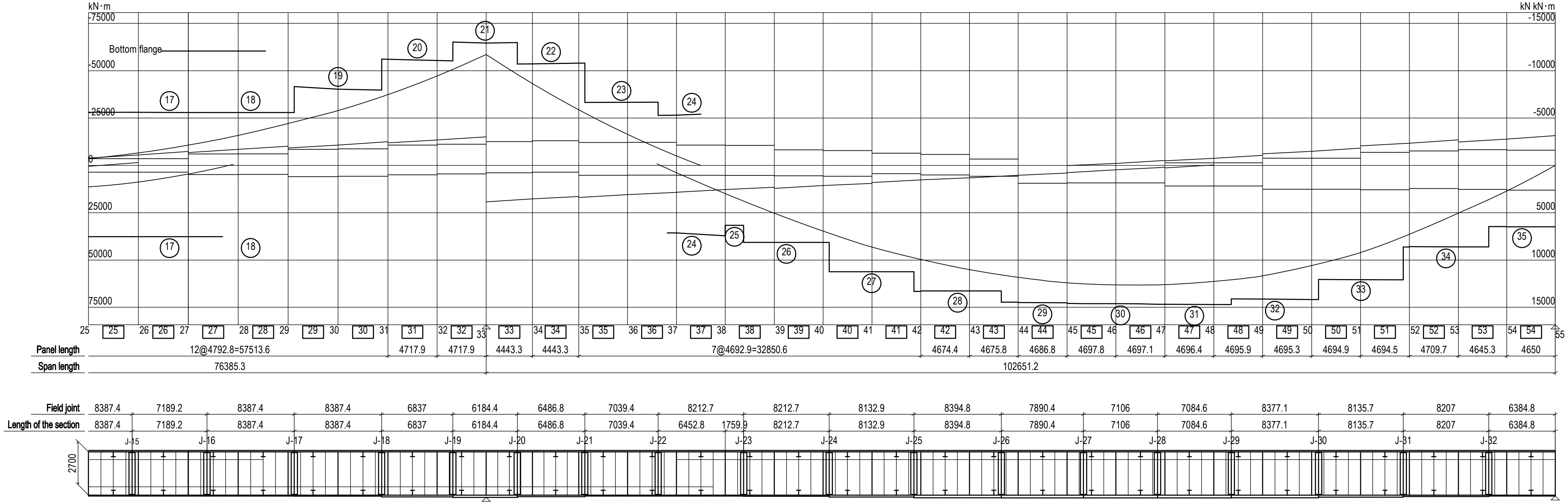
		1		2	3	4	5	6	7	8	9		10	11		12	13			14				15				16			
Section		Sec-1		Sec-2	Sec-3	Sec-4	Sec-5	Sec-6	Sec-7	Sec-7	Sec-8		Sec-9	Sec-10		Sec-11	Sec-12			Sec-13				Sec-14				Sec-15			
Deck Plate	Thickness	16, 16, 16		16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16		16, 16, 16	16, 16, 16		16, 16, 16	16, 16, 16			16, 16, 16				16, 16, 16				16, 16, 16			
	Quality	(1),(1),(3)		(1),(1),(1)	(1),(1),(1)	(1),(1),(1)	(1),(1),(1)	(1),(1),(1)	(1),(1),(1)	(1),(1),(1)	(1),(1),(1)		(1),(1),(1)	(3),(3),(3)		(1),(1),(1)	(1),(1),(1)			(1),(1),(1)				(1),(1),(1)				(1),(1),(1)			
Longit Rib 1	Number	7-PL	7-PL	7-PL	6-PL	6-PL	6-PL	6-PL	5-PL	5-PL	5-PL	5-PL	5-PL	5-PL	5-PL	5-PL	5-PL	5-PL	5-PL	5-PL	5-PL	5-PL	5-PL	5-PL	5-PL	5-PL	5-PL	5-PL	5-PL	5-PL	5-PL
	Section	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24
Longit Rib 2	Number	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib
	Section	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8
Left Web	Height	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727
	Thickness	14(3)		14(3)	14(3)	14(3)	14(3)	14(3)	14(3)	14(3)	14(3)		14(3)	14(3)		14(3)	14(3)			14(3)				14(3)				14(3)			
Right Web	Height	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673
	Thickness	14(3)		14(3)	14(3)	14(3)	14(3)	14(3)	14(3)	14(3)	14(3)		14(3)	14(3)		14(3)	14(3)			14(3)				14(3)				14(3)			
Bottom flange Vertical rib	Number	3		3	3	3	3	3	3	7	7		7	7		7	7			7				7				7			
	Width	170		170	170	170	170	170	170	170	170		170	200		170	170			170				170				170			
	Thickness	17(3)		17(3)	17(3)	17(3)	17(3)	17(3)	17(3)	17(3)	17(3)		17(3)	22(3)		17(3)	17(3)			17(3)				17(3)				17(3)			
Lflg W=1740 T		10(3)		13(3)	18(3)	20(3)	20(3)	18(3)	12(3)	12(3)	10(3)		12(3)	14(3)		12(3)	10(3)			10(3)				10(3)				10(3)			
Deck Plate	σ	0	-41	-72	-86	-91	-91	-86	-74	-43	-41	27	76	97	97	82	48	-6	21	-6	21	-26	8	-26	8	-32	6	-32	6	-24	16
	σa	140	140	140	140	140	140	140	140	140	140	140	140	210	210	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140
	σa-σ	140	99	68	54	49	49	54	66	97	99	113	64	113	113	58	92	134	119	134	119	114	132	114	132	108	134	108	134	116	124
Bottom flange	σ	0	111	170	175	174	174	172	171	89	90	-60	-149	-166	-166	-161	-102	13	-45	13	-45	55	-17	55	-17	67	-13	67	-13	51	-34
	σa	210	210	210	210	210	210	210	210	210	210	156	182	200	200	182	156	210	156	210	156	210	156	210	156	210	156	210	156	210	156
	σa-σ	210	99	40	35	36	36	38	39	121	120	96	33	35	35	21	53	197	111	197	111	155	139	155	139	143	143	143	143	159	122
Web	τ	55	44	32	19	9	9	20	31	40	42	51	56	59	48	44	39	29	29	29	29	20	20	20	20	12	12	12	12	20	20
	τa	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
	Combined	0.21	0.34	0.68	0.70	0.67	0.67	0.68	0.69	0.24	0.25	0.18	0.62	0.76	0.71	0.66	0.29	0.06	0.08	0.06	0.08	0.09	0.03	0.09	0.03	0.11	0.01	0.11	0.01	0.07	0.04
Calculated points		Left	J-1	J-2	J-3		J-4	J-5	J-6	Left	J-7	J-8	J-9	Max Left	Max Right	J-10	J-11	J-12	J-12	Left	Left	J-13	J-13	Left	Left	J-14	J-14			J-15	J-15
Deck Plate σspl												48	119			128	76		36				23				23				30
Bottom flange σspl			145	202	208			206	205		116							39				77				93				77	

Grade
(1):SM400
(2):SM490
(3):SM490Y
(4):SM570

PROJECT NAME	FINANCED BY	COUNTERPART	JICA STUDY TEAM		NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	JAPAN INTERNATIONAL COOPERATION AGENCY	REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.	PREPARED BY	S. IMADA			STRESS DIAGRAM (5)	2
				CHECKED BY	T. HAYAKAWA				DWG No.
				APPROVED BY	Y. SANO				P2-SB-0012

STRESS DIAGRAM (6) S=1:400

G3



Unit : mm N/mm2

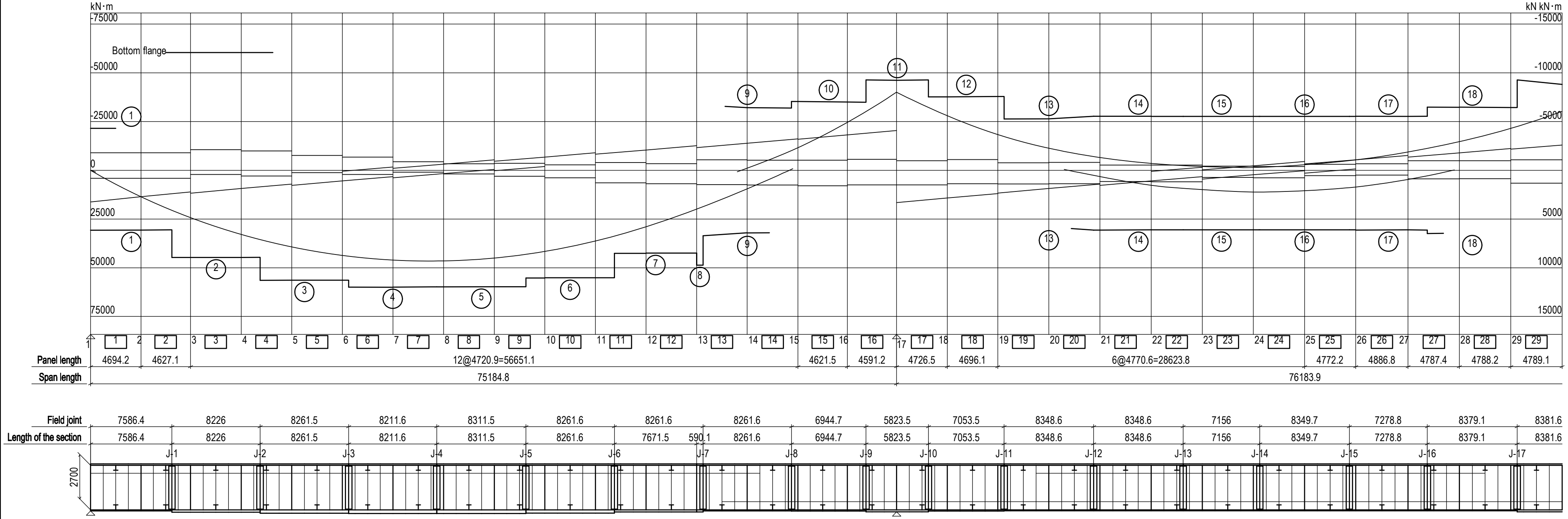
		17				18			19	20	21		22	23	24		25	26	27	28	29	30	31	32	33	34	35	
Section		Sec-16				Sec-17			Sec-18	Sec-19	Sec-20		Sec-21	Sec-22	Sec-23		Sec-23	Sec-24	Sec-25	Sec-26	Sec-27	Sec-28	Sec-29	Sec-30	Sec-31	Sec-32	Sec-33	
Deck Plate	Thickness	16, 16, 16				16, 16, 16			16, 16, 16	16, 16, 16	16, 16, 16		16, 16, 16	16, 16, 16	16, 16, 16		16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	
	Quality	(1),(1),(1)				(1),(1),(1)			(3),(3),(3)	(3),(3),(3)	(3),(3),(3)		(3),(3),(3)	(1),(1),(1)	(1),(1),(1)		(1),(1),(1)	(1),(1),(1)	(3),(3),(3)	(3),(3),(3)	(3),(3),(3)	(3),(3),(3)	(3),(3),(3)	(3),(3),(3)	(3),(3),(3)	(1),(1),(1)	(1),(1),(1)	
Longit Rib 1	Number	5-PL	5-PL	4-PL	4-PL	4-PL	4-PL	4-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	2-PL	2-PL	2-PL	2-PL	2-PL	2-PL	3-PL	3-PL	4-PL	4-PL	5-PL	5-PL	5-PL	5-PL
	Section	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24
Longit Rib 2	Number	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib
	Section	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8
Left Web	Height	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727	2727.2	2727.2	2727.2	2727.2	2727.2	2727.1	2727.1	2727	2727
	Thickness	14(3)				14(3)			14(3)	14(3)	14(3)		14(3)	14(3)	14(3)		14(3)	14(3)	14(3)	14(3)	14(3)	14(3)	14(3)	14(3)	14(3)	14(3)	14(3)	
Right Web	Height	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2673	2672.8	2672.8	2672.8	2672.8	2672.8	2672.9	2672.9	2673	2673
	Thickness	14(3)				14(3)			14(3)	14(3)	14(3)		14(3)	14(3)	14(3)		14(3)	14(3)	14(3)	14(3)	14(3)	14(3)	14(3)	14(3)	14(3)	14(3)	14(3)	
Bottom flange Vertical rib	Number	7				7			7	7	7		7	7	7		3	3	3	3	3	3	3	3	3	3	3	
	Width	170				170			170	200	200		200	170	170		170	170	200	200	200	200	200	200	200	170	170	
	Thickness	17(3)				17(3)			17(3)	22(3)	22(3)		22(3)	17(3)	17(3)		17(3)	17(3)	22(3)	22(3)	22(3)	22(3)	22(3)	22(3)	22(3)	17(3)	17(3)	
Lflg W=1740 T		10(3)				10(3)			14(3)	21(3)	28(3)		20(3)	12(3)	10(3)		10(3)	16(3)	25(3)	32(3)	36(3)	36(3)	36(3)	34(3)	27(3)	17(3)	10(3)	
Deck Plate	σ	-24	16	-7	34	-7	34	64	105	144	165	165	141	87	30	-49	-64	-114	-147	-168	-172	-172	-165	-157	-132	-100	-51	0
	σa	140	140	140	140	140	140	140	210	210	210	210	210	140	140	140	140	140	210	210	210	210	210	210	210	140	140	140
	σa-σ	116	124	133	106	133	106	76	105	66	45	45	69	53	110	91	76	26	63	42	38	38	45	53	78	40	89	140
Bottom flange	σ	51	-34	15	-70	15	-70	-128	-182	-193	-190	-190	-189	-151	-54	84	125	185	182	183	180	182	181	180	181	184	117	0
	σa	210	156	210	156	210	156	156	200	210	210	210	210	182	156	210	210	210	210	210	210	210	210	210	210	210	210	210
	σa-σ	159	122	195	86	195	86	28	18	17	20	20	21	31	102	126	85	25	28	27	30	28	29	30	29	26	93	210
Web	τ	20	20	28	28	28	28	36	44	51	54	67	65	62	57	49	48	39	29	22	19	14	16	23	36	49	55	63
	τa	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
	Combined	0.07	0.04	0.05	0.14	0.05	0.14	0.42	0.82	0.95	0.95	1.03	0.99	0.66	0.22	0.25	0.43	0.82	0.77	0.74	0.72	0.72	0.72	0.73	0.79	0.85	0.41	0.28
Calculated points		Left	Left	J-16	J-16	Left	Left	J-17	J-18	J-19	Max Left	Max Right	J-20	J-21	J-22	Right	J-23	J-24	J-25	J-26	J-27		J-28	J-29	J-30	J-31	J-32	Right
Deck Plate σspl					53			93	145	199			193	123	45													
Bottom flange σspl				53													158	209	204	208	207		209	207	205	206	145	

Grade
(1):SM400
(2):SM490
(3):SM490Y
(4):SM570

PROJECT NAME	FINANCED BY	COUNTERPART	JICA STUDY TEAM		NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	JAPAN INTERNATIONAL COOPERATION AGENCY	REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.	PREPARED BY	S. IMADA			STRESS DIAGRAM (6)	2
				CHECKED BY	T. HAYAKAWA				DWG No.
				APPROVED BY	Y. SANO				P2-SB-0013

STRESS DIAGRAM (7) S=1:400

G4



Unit : mm N/mm2

		1			2	3	4	5	6	7	8	9		10	11		12
Section		Sec-1			Sec-2	Sec-3	Sec-4	Sec-5	Sec-6	Sec-7	Sec-7	Sec-8		Sec-9	Sec-10		Sec-11
Deck Plate	Thickness	16, 16, 16			16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16		16, 16, 16	16, 16, 16		16, 16, 16
	Quality	(3),(1),(1)			(1),(1),(1)	(1),(1),(1)	(1),(1),(1)	(1),(1),(1)	(1),(1),(1)	(1),(1),(1)	(1),(1),(1)	(1),(1),(1)		(1),(1),(1)	(3),(3),(3)		(1),(1),(1)
Longit Rib 1	Number	10-PL	10-PL	9-PL	9-PL	9-PL	9-PL	9-PL	9-PL	9-PL	8-PL	8-PL	8-PL	8-PL	8-PL	8-PL	7-PL
	Section	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24
Longit Rib 2	Number	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib
	Section	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8
Left Web	Height	2728.4	2728.4	2728.4	2728.5	2728.7	2728.8	2728.8	2729	2729.1	2729.2	2729.3	2729.4	2729.5	2729.5	2729.5	2729.6
	Thickness	15(3)			15(3)	15(3)	15(3)	15(3)	15(3)	15(3)	15(3)	15(3)		17(3)	17(3)		17(3)
Right Web	Height	3063.9	3063.9	3063.9	3063.8	3063.7	3063.5	3063.5	3063.4	3063.3	3063.2	3063.1	3063	3062.9	3062.9	3062.9	3062.9
	Thickness	15(3)			15(3)	15(3)	15(3)	15(3)	15(3)	15(3)	15(3)	15(3)		17(3)	17(3)		17(3)
Bottom flange Vertical rib	Number	2			2	2	2	2	2	2	5	5		5	5		5
	Width	170			200	200	200	200	200	200	200	170		170	200		200
	Thickness	17(3)			22(3)	22(3)	22(3)	22(3)	22(3)	22(3)	22(3)	17(3)		17(3)	22(3)		22(3)
Lflg W=1740 T		14(3)			28(3)	41(7)	45(7)	45(7)	40(3)	26(3)	26(3)	13(3)		15(3)	25(3)		15(3)
Deck Plate	σ	0	0	-44	-76	-90	-95	-95	-90	-76	-45	-46	27	82	102	102	86
	σa	140	140	140	140	140	140	140	140	140	140	140	140	140	210	210	140
	σa-σ	140	140	96	64	50	45	45	50	64	95	94	113	58	108	108	54
Bottom flange	σ	0	-1	141	167	165	163	163	164	166	86	117	-67	-181	-182	-182	-180
	σa	210	147	210	210	210	210	210	210	210	210	210	210	210	210	210	210
	σa-σ	210	146	69	43	45	47	47	46	44	124	93	143	29	28	28	30
Web	τ	62	62	48	37	23	13	13	22	34	45	45	57	59	61	51	47
	τa	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
	Combined	0.27	0.27	0.51	0.67	0.61	0.58	0.58	0.60	0.66	0.25	0.37	0.23	0.83	0.87	0.83	0.79
Calculated points		Left	Left	J-1	J-2	J-3		J-4	J-5	J-6	Left	J-7	J-8	J-9	Max Left	Max Right	J-10
Deck Plate σspl													42	115			120
Bottom flange σspl				185	204	206		209	206	206		154					

		13			14				15						16			
Section		Sec-12			Sec-13				Sec-14						Sec-15			
Deck Plate	Thickness	16, 16, 16			16, 16, 16				16, 16, 16						16, 16, 16			
	Quality	(1),(1),(1)			(1),(1),(1)				(1),(1),(1)						(1),(1),(1)			
Longit Rib 1	Number	7-PL	7-PL	7-PL	7-PL	7-PL	6-PL	6-PL	6-PL	6-PL	6-PL	6-PL	6-PL	6-PL	6-PL	6-PL	6-PL	6-PL
	Section	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24
Longit Rib 2	Number	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib
	Section	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8
Left Web	Height	2729.7	2729.8	2729.8	2729.8	2729.8	2729.9	2729.9	2729.9	2729.9	2729.9	2729.9	2729.9	2729.9	2729.9	2729.9	2730	2730
	Thickness	15(3)			15(3)				15(3)						15(3)			
Right Web	Height	3062.8	3062.7	3062.7	3062.7	3062.7	3062.6	3062.6	3062.6	3062.6	3062.6	3062.6	3062.6	3062.6	3062.6	3062.6	3062.5	3062.5
	Thickness	15(3)			15(3)				15(3)						15(3)			
Bottom flange Vertical rib	Number	5			5				5						5			
	Width	170			170				170						170			
	Thickness	17(3)			17(3)				17(3)						17(3)			
Lflg W=1740 T		10(3)			10(3)				10(3)						10(3)			
Deck Plate	σ	48	-7	19	-7	19	-25	7	-25	7	-31	4	-31	4	-31	4	-24	14
	σa	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140
	σa-σ	92	133	121	133	121	115	133	115	133	109	136	109	136	109	136	116	126
Bottom flange	σ	-125	18	-48	18	-48	64	-17	64	-17	77	-10	77	-11	77	-11	61	-34
	σa	190	210	190	210	190	210	190	210	190	210	190	210	190	210	190	210	190
	σa-σ	66	192	142	192	142	146	174	146	174	133	180	133	180	133	180	149	156
Web	τ	43	30	30	30	30	19	19	19	19	12	12	12	12	12	12	19	19
	τa	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
	Combined	0.40	0.06	0.08	0.06	0.08	0.10	0.02	0.10	0.02	0.14	0.01	0.14	0.01	0.14	0.01	0.09	0.04
Calculated points		J-11	J-12	J-12	Left	Left	J-13	J-13	Left	Left			J-14	J-14	Left	Left	J-15	J-15
Deck Plate σspl		69		29				18						16				22
Bottom flange σspl			52				93						113				95	

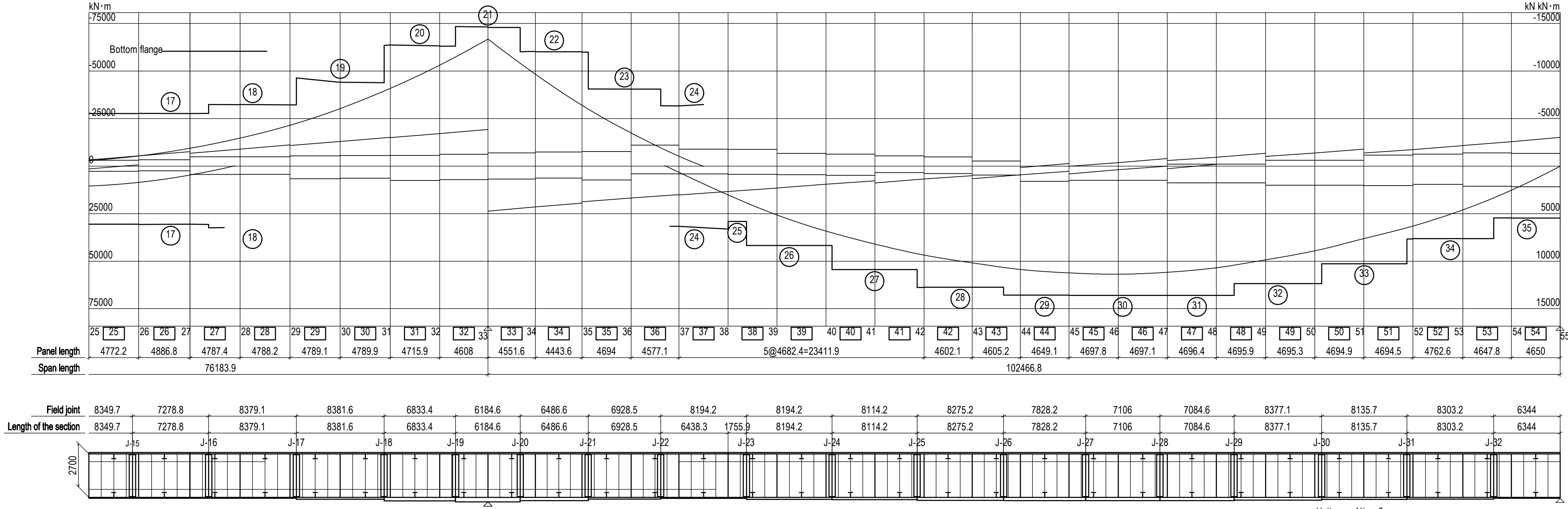
Grade
(1):SM400
(2):SM490
(3):SM490Y
(4):SM570
(5):SM400-H
(6):SM490-H
(7):SM520-H
(8):SM570-H

PROJECT NAME	FINANCED BY	COUNTERPART	JICA STUDY TEAM
DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	JAPAN INTERNATIONAL COOPERATION AGENCY	REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.

	NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
PREPARED BY	S. IMADA			STRESS DIAGRAM (7)	2
CHECKED BY	T. HAYAKAWA				DWG No.
APPROVED BY	Y. SANO				P2-SB-0014

STRESS DIAGRAM (8) S=1:400

G4



Unit : mm N/mm2

		17				18			19	20	21		22	23	24		25	26	27	28	29	30	31	32	33	34	35	
Section		Sec-16				Sec-17			Sec-18	Sec-19	Sec-20		Sec-21	Sec-22	Sec-23		Sec-23	Sec-24	Sec-25	Sec-26	Sec-27	Sec-28	Sec-29	Sec-30	Sec-31	Sec-32	Sec-33	
Deck Plate	Thickness	16, 16, 16				16, 16, 16			16, 16, 16	16, 16, 16	16, 16, 16		16, 16, 16	16, 16, 16	16, 16, 16		16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	16, 16, 16	
	Quality	(1),(1),(1)				(1),(1),(1)			(3),(3),(3)	(3),(3),(3)	(3),(3),(3)		(3),(3),(3)	(1),(1),(1)	(1),(1),(1)		(1),(1),(1)	(1),(1),(1)	(3),(3),(3)	(3),(3),(3)	(3),(3),(3)	(3),(3),(3)	(3),(3),(3)	(3),(3),(3)	(3),(3),(3)	(1),(1),(1)	(1),(1),(1)	
Longit Rib 1	Number	6-PL	6-PL	8-PL	8-PL	8-PL	8-PL	7-PL	7-PL	6-PL	6-PL	5-PL	6-PL	4-PL	4-PL	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib
	Section	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8
Longit Rib 2	Number	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	6-U-Rib	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL	3-PL
	Section	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	320*240*8	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24	250*24
Left Web	Height	2730	2730	2728.7	2728.7	2728.7	2728.7	2728.7	2728.8	2728.9	2728.9	2728.9	2728.9	2729	2729.6	2730	2730	2730	2730	2730.2	2730.3	2730.3	2730.2	2730.2	2730.1	2730.1	2730	2730
	Thickness	15(3)				15(3)			15(3)	17(3)	17(3)		17(3)	15(3)	15(3)		15(3)	15(3)	17(4)	17(4)	17(4)	17(4)	17(4)	17(4)	17(4)	15(3)	15(3)	
Right Web	Height	3062.5	3062.5	3063.7	3063.7	3063.7	3063.7	3063.6	3063.5	3063.5	3063.5	3063.5	3063.5	3063.4	3062.8	3062.5	3062.5	3062.5	3062.5	3062.3	3062.3	3062.3	3062.3	3062.3	3062.4	3062.4	3062.5	3062.5
	Thickness	15(3)				15(3)			15(3)	17(3)	17(3)		17(3)	15(3)	15(3)		15(3)	15(3)	17(4)	17(4)	17(4)	17(4)	17(4)	17(4)	17(4)	15(3)	15(3)	
Bottom flange Vertical rib	Number	5				5			5	5	5		5	5	5		2	2	2	2	2	2	2	2	2	2	2	
	Width	170				170			200	200	200		200	200	170		170	200	200	200	200	200	200	200	200	200	170	
	Thickness	17(3)				17(3)			22(3)	22(3)	22(3)		22(3)	22(3)	17(3)		17(3)	22(3)	22(4)	22(4)	22(4)	22(4)	22(4)	22(4)	22(4)	22(3)	17(3)	
Lflg W=1740 T		10(3)				12(3)			24(3)	45(7)	57(7)		42(7)	21(3)	14(3)		14(3)	27(3)	29(4)	38(4)	42(8)	42(8)	42(8)	36(4)	26(4)	23(3)	12(3)	
Deck Plate	σ	-24	14	-7	29	-7	29	61	106	147	169	174	146	92	32	-50	-65	-108	-139	-154	-163	-164	-162	-153	-134	-102	-58	0
	σa	140	140	140	140	140	140	140	210	210	210	210	210	140	140	140	140	140	210	210	210	210	210	210	210	140	140	140
	σa-σ	116	126	133	111	133	111	79	104	63	41	36	64	48	108	90	75	32	71	56	47	46	48	57	76	38	82	140
Bottom flange	σ	61	-34	19	-77	18	-73	-146	-189	-191	-192	-192	-188	-155	-64	96	140	177	216	213	212	213	210	215	217	178	129	0
	σa	210	190	210	190	210	210	210	210	210	210	210	210	210	210	210	210	210	255	255	255	255	255	255	255	210	210	210
	σa-σ	149	156	191	113	192	137	64	21	19	18	18	22	55	146	114	70	33	39	42	43	42	45	40	38	32	81	210
Web	τ	19	19	29	29	29	29	41	50	51	54	64	61	60	57	48	47	33	22	17	15	12	16	22	27	35	47	57
	τa	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	145	145	145	145	145	145	145	120	120	120
	Combined	0.09	0.04	0.06	0.16	0.06	0.14	0.53	0.89	0.90	0.92	0.98	0.94	0.67	0.22	0.27	0.49	0.73	0.71	0.68	0.67	0.67	0.66	0.70	0.73	0.75	0.42	0.22
Calculated points		Left	Left	J-16	J-16	Left	Left	J-17	J-18	J-19	Max Left	Max Right	J-20	J-21	J-22	Right	J-23	J-24	J-25	J-26	J-27		J-28	J-29	J-30	J-31	J-32	Right
Deck Plate σspl					42			79	138	194			193	123	45													
Bottom flange σspl				70													179	203	249	251	250		248	253	251	203	160	

Grade
(1):SM400
(2):SM490
(3):SM490Y
(4):SM570
(5):SM400-H
(6):SM490-H
(7):SM520-H
(8):SM570-H

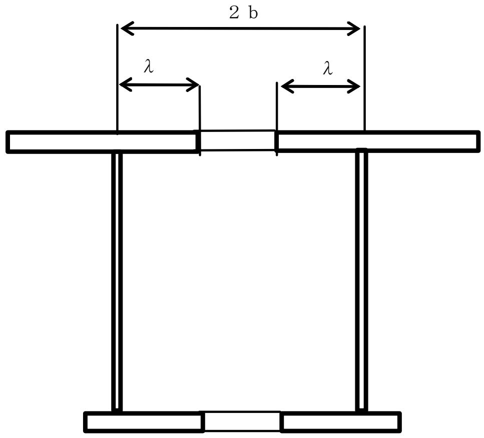
PROJECT NAME	FINANCED BY	COUNTERPART	JICA STUDY TEAM
DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	JAPAN INTERNATIONAL COOPERATION AGENCY	REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.

	NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
PREPARED BY	S. IMADA			STRESS DIAGRAM (8)	2
CHECKED BY	T. HAYAKAWA				DWG No.
APPROVED BY	Y. SANO				P2-SB-0015

４．３．Calculation of effective width

（１）Equivalent support length and Effective flange width

Calculation procedure of effective width (Unit: mm)



b : 1/2 interval of web plate

L : Equivalent span length

Simple beam L = SL

End span length L = 0.8 * SL

Mid span length L = 0.6 * SL

Intermediate support L = 0.2 (SL.R+SL.L)

λ : One-side effective width

SL: Span length

Calculation formula of effective width

Span length

$\lambda = b$ ($b/L \leqq 0.05$)

$= \{ 1.1 - 2 (b/L) \} b$ ($0.05 < b/L < 0.30$)

$= 0.15 L$ ($0.30 \leqq b/L$)

Intermediate support

$\lambda = b$ ($b/L \leqq 0.02$)

$= \{ 1.06 - 3.2 (b/L) + 4.5 (b/L)^2 \} b$ ($0.02 < b/L < 0.30$)

$= 0.15 L$ ($0.30 \leqq b/L$)

Effective width of one side(b) Upper flange Lower flange

	Upper flange	Lower flange
G1	1500	750
G2	1350	1350
G3	1350	1350
G4	1500	750

1st span

G1

Span length 75887

		General part	Intermediate support area
Additional length		0to 60710	60710to 75887
Equivalent span length(L)		60710	60710to 30535
One-side effective width(λ)			
UFLG	1500	1500～ 1371	
LFLG	750	750～ 738	

G2

Span length 75715

	General part	Intermediate support area
Additional length	0to 60572	60572to 75715
Equivalent span length(L)	60572	60572to 30466
One-side effective width(λ)	1350	1350～ 1252

G3

Span length 75485

	General part	Intermediate support area
Additional length	0to 60388	60388to 75485
Equivalent span length(L)	60388	60388to 30374
One-side effective width(λ)	1350	1350～ 1251

G4

Span length 75185

		General part	Intermediate support area
Additional length		0to 60148	60148to 75185
Equivalent span length(L)		60148	60148to 30274
One-side effective width(λ)			
UFLG	1500	1500～ 1369	
LFLG	750	750～ 738	

2nd span

G1

Span length 76787

	Intermediate support area	General part	Intermediate support area
Additional length	0to 15357	15357to 61429	61429to 76787
Equivalent span length(L)	30535to 46072	46072	46072to 35996
One-side effective width(λ)			
UFLG	1371～ 1500	1500	1500～ 1402
LFLG	738～ 750	750	750～ 747

G2

Span length 76615

	Intermediate support area	General part	Intermediate support area
Additional length	0to 15323	15323to 61292	61292to 76615
Equivalent span length(L)	30466to 45969	45969	45969to 35917
One-side effective width(λ)	1252～ 1350	1350	1350～ 1277

G3

Span length 76385

	Intermediate support area	General part	Intermediate support area
Additional length	0to 15277	15277to 61108	61108to 76385
Equivalent span length(L)	30374to 45831	45831	45831to 35807
One-side effective width(λ)	1251～ 1350	1350	1350～ 1277

G4

Span length 76184

	Intermediate support area	General part	Intermediate support area
Additional length	0to 15237	15237to 60947	60947to 76184
Equivalent span length(L)	30274to 45710	45710	45710to 35730
One-side effective width(λ)			
UFLG	1369～ 1500	1500	1500～ 1400
LFLG	738～ 750	750	750～ 746

3rd span

G1

Span length 103191

	Intermediate support area	General part
Additional length	0to 20638	20638to103191
Equivalent span length(L)	35996to 82553	82553
One-side effective width(λ)		
UFLG	1402～ 1500	1500
LFLG	747～ 750	750

G2

Span length 102972

	Intermediate support area	General part
Additional length	0to 20594	20594to102972
Equivalent span length(L)	35917to 82378	82378
One-side effective width(λ)	1277～ 1350	1350

G3

Span length 102651

	Intermediate support area	General part
Additional length	0to 20530	20530to102651
Equivalent span length(L)	35807to 82121	82121
One-side effective width(λ)	1277～ 1350	1350

G4

Span length 102467

	Intermediate support area	General part
Additional length	0to 20493	20493to102467
Equivalent span length(L)	35730to 81973	81973
One-side effective width(λ)		
UFLG	1400～ 1500	1500
LFLG	746～ 750	750

Where λ：Effective width (inner side)

（2）Effective width of overhang

Description of codes (unit：mm)

L	:	additional distance
BgL ,BgR	:	Length towards transversal line(left overhang、right overhang)
AgL ,AgR	:	Angle of transversal line(rad) (〃)
BL ,BR	:	Length right angle to main girder (〃)
λL , λR	:	unilateral effective width (〃)

＊ Main girder G1

・Location of panel point

	L	BgL	AgL	BL	λL	BgR	AgR	BR	λR
panel point1△	0	1350	1.57241	1350	1350	825	1.57241	825	825
panel point2	4671	1350	1.56963	1350	1350	825	1.56963	825	825
panel point3	9338	1350	1.56963	1350	1350	825	1.56963	825	825
panel point4	14106	1350	1.56961	1350	1350	825	1.56961	825	825
panel point5	18874	1350	1.56961	1350	1350	825	1.56961	825	825
panel point6	23642	1350	1.56961	1350	1350	825	1.56961	825	825
panel point7	28410	1350	1.56961	1350	1350	825	1.56961	825	825
panel point8	33177	1350	1.56961	1350	1350	825	1.56961	825	825
panel point9	37945	1350	1.56961	1350	1350	825	1.56961	825	825
panel point10	42713	1350	1.56961	1350	1350	825	1.56961	825	825
panel point11	47481	1350	1.56961	1350	1350	825	1.56961	825	825
panel point12	52249	1350	1.56961	1350	1350	825	1.56961	825	825
panel point13	57016	1350	1.56961	1350	1350	825	1.56961	825	825
panel point14	61784	1350	1.56961	1350	1343	825	1.56961	825	824
panel point15	66552	1350	1.56961	1350	1312	825	1.56961	825	818
panel point16	71219	1350	1.56963	1350	1282	825	1.56963	825	812
panel point17△	75887	1350	1.56963	1350	1252	825	1.56963	825	806
panel point18	80630	1350	1.56962	1350	1282	825	1.56962	825	812
panel point19	85372	1350	1.56962	1350	1313	825	1.56962	825	818
panel point20	90190	1350	1.56960	1350	1343	825	1.56960	825	824
panel point21	95008	1350	1.56960	1350	1350	825	1.56960	825	825
panel point22	99826	1350	1.56960	1350	1350	825	1.56960	825	825
panel point23	104644	1350	1.56960	1350	1350	825	1.56960	825	825
panel point24	109462	1350	1.56960	1350	1350	825	1.56960	825	825
panel point25	114280	1350	1.56960	1350	1350	825	1.56960	825	825
panel point26	119098	1350	1.56960	1350	1350	825	1.56960	825	825
panel point27	123916	1350	1.56960	1350	1350	825	1.56960	825	825
panel point28	128734	1350	1.56960	1350	1350	825	1.56960	825	825
panel point29	133552	1350	1.56960	1350	1350	825	1.56960	825	825
panel point30	138370	1350	1.56960	1350	1345	825	1.56960	825	824
panel point31	143188	1350	1.56960	1350	1322	825	1.56960	825	822
panel point32	147931	1350	1.56962	1350	1300	825	1.56962	825	819
panel point33△	152674	1350	1.56962	1350	1278	825	1.56962	825	816
panel point34	157140	1350	1.56968	1350	1293	825	1.56968	825	818
panel point35	161607	1350	1.56968	1350	1309	825	1.56968	825	820
panel point36	166325	1350	1.56962	1350	1326	825	1.56962	825	822
panel point37	171042	1350	1.56962	1350	1342	825	1.56962	825	824
panel point38	175760	1350	1.56962	1350	1350	825	1.56962	825	825
panel point39	180478	1350	1.56962	1350	1350	825	1.56962	825	825
panel point40	185195	1350	1.56962	1350	1350	825	1.56962	825	825
panel point41	189913	1350	1.56962	1350	1350	825	1.56962	825	825
panel point42	194631	1350	1.56962	1350	1350	825	1.56962	825	825
panel point43	199418	1350	1.55839	1350	1350	825	1.55839	825	825
panel point44	204030	1350	1.57866	1350	1350	825	1.57866	825	825
panel point45	208684	1350	1.57316	1350	1350	825	1.57316	825	825
panel point46	213389	1350	1.57080	1350	1350	825	1.57080	825	825
panel point47	218094	1350	1.57080	1350	1350	825	1.57080	825	825
panel point48	222800	1350	1.57080	1350	1350	825	1.57080	825	825
panel point49	227506	1350	1.57080	1350	1350	825	1.57080	825	825
panel point50	232213	1350	1.57080	1350	1350	825	1.57080	825	825
panel point51	236920	1350	1.57080	1350	1350	825	1.57080	825	825
panel point52	241629	1350	1.57080	1350	1350	825	1.57080	825	825
panel point53	246406	1350	1.56348	1350	1350	825	1.56348	825	825
panel point54	251215	1350	1.55412	1350	1350	825	1.55412	825	825
panel point55△	255865	1350	1.57080	1350	1350	825	1.57080	825	825

・Location of cross-section investigation

	L	BgL	AgL	BL	λL	BgR	AgR	BR	λR
Sec-1	0	1350	1.57241	1350	1350	825	1.57241	825	825
Sec-1	7588	1350	1.57051	1350	1350	825	1.57051	825	825
Sec-2	15894	1350	1.57109	1350	1350	825	1.57109	825	825
Sec-3	24238	1350	1.57169	1350	1350	825	1.57169	825	825
Sec-4	32516	1350	1.56994	1350	1350	825	1.56994	825	825
Sec-5	32531	1350	1.56993	1350	1350	825	1.56993	825	825
Sec-6	40925	1350	1.57050	1350	1350	825	1.57050	825	825
Sec-7	49269	1350	1.57109	1350	1350	825	1.57109	825	825
Sec-7	57016	1350	1.56961	1350	1350	825	1.56961	825	825
Sec-8	57612	1350	1.57169	1350	1350	825	1.57169	825	825
Sec-8	65956	1350	1.56991	1350	1316	825	1.56991	825	818
Sec-9	72970	1350	1.57109	1350	1271	825	1.57109	825	810
Sec-10	75887	1350	1.56963	1350	1252	825	1.56963	825	806
Sec-10	75887	1350	1.57198	1350	1252	825	1.57198	825	806
Sec-11	78851	1350	1.57050	1350	1271	825	1.57050	825	810
Sec-12	85975	1350	1.57170	1350	1316	825	1.57170	825	818
Sec-12	94406	1350	1.56990	1350	1350	825	1.56990	825	825
Sec-13	94406	1350	1.56990	1350	1350	825	1.56990	825	825
Sec-13	102838	1350	1.57050	1350	1350	825	1.57050	825	825
Sec-14	102838	1350	1.57050	1350	1350	825	1.57050	825	825
Sec-14	109669	1350	1.57189	1350	1350	825	1.57189	825	825
Sec-14	110065	1350	1.57170	1350	1350	825	1.57170	825	825
Sec-15	110065	1350	1.57170	1350	1350	825	1.57170	825	825
Sec-15	118496	1350	1.56990	1350	1350	825	1.56990	825	825
Sec-16	118496	1350	1.56990	1350	1350	825	1.56990	825	825
Sec-16	125723	1350	1.57110	1350	1350	825	1.57110	825	825
Sec-17	125723	1350	1.57110	1350	1350	825	1.57110	825	825
Sec-17	134155	1350	1.57170	1350	1350	825	1.57170	825	825
Sec-18	142586	1350	1.56990	1350	1325	825	1.56990	825	822
Sec-19	149459	1350	1.57122	1350	1293	825	1.57122	825	818
Sec-20	152674	1350	1.56962	1350	1278	825	1.56962	825	816
Sec-20	152674	1350	1.57191	1350	1278	825	1.57191	825	816
Sec-21	155676	1350	1.57041	1350	1288	825	1.57041	825	817
Sec-22	162197	1350	1.57168	1350	1311	825	1.57168	825	820
Sec-22	169273	1350	1.57050	1350	1336	825	1.57050	825	823
Sec-23	169273	1350	1.57050	1350	1336	825	1.57050	825	823
Sec-23	175760	1350	1.56962	1350	1350	825	1.56962	825	825
Sec-23	177529	1350	1.57109	1350	1350	825	1.57109	825	825
Sec-24	185785	1350	1.57168	1350	1350	825	1.57168	825	825
Sec-25	193961	1350	1.56996	1350	1350	825	1.56996	825	825
Sec-26	202429	1350	1.57320	1350	1350	825	1.57320	825	825
Sec-27	210268	1350	1.57080	1350	1350	825	1.57080	825	825
Sec-28	212598	1350	1.57080	1350	1350	825	1.57080	825	825
Sec-29	217386	1350	1.57080	1350	1350	825	1.57080	825	825
Sec-30	224484	1350	1.57080	1350	1350	825	1.57080	825	825
Sec-31	232881	1350	1.57080	1350	1350	825	1.57080	825	825
Sec-32	241040	1350	1.57080	1350	1350	825	1.57080	825	825
Sec-33	249377	1350	1.56412	1350	1350	825	1.56412	825	825
Sec-33	255865	1350	1.57080	1350	1350	825	1.57080	825	825

＊ Main girder G2

・Location of panel point

	L	BgL	AgL	BL	λL	BgR	AgR	BR	λR
panel point1△	0	825	1.57241	825	825	1650	1.57241	1650	1650
panel point2	4658	825	1.56963	825	825	1650	1.56963	1650	1650
panel point3	9315	825	1.56963	825	825	1650	1.56963	1650	1650
panel point4	14072	825	1.56961	825	825	1650	1.56961	1650	1650
panel point5	18830	825	1.56961	825	825	1650	1.56961	1650	1650
panel point6	23587	825	1.56961	825	825	1650	1.56961	1650	1650
panel point7	28344	825	1.56961	825	825	1650	1.56961	1650	1650
panel point8	33101	825	1.56961	825	825	1650	1.56961	1650	1650
panel point9	37858	825	1.56961	825	825	1650	1.56961	1650	1650
panel point10	42615	825	1.56961	825	825	1650	1.56961	1650	1650
panel point11	47372	825	1.56961	825	825	1650	1.56961	1650	1650
panel point 12	52129	825	1.56961	825	825	1650	1.56961	1650	1650
panel point13	56887	825	1.56961	825	825	1650	1.56961	1650	1650
panel point14	61644	825	1.56961	825	824	1650	1.56961	1650	1638
panel point15	66401	825	1.56961	825	818	1650	1.56961	1650	1586
panel point16	71058	825	1.56963	825	812	1650	1.56963	1650	1536
panel point17△	75715	825	1.56963	825	806	1650	1.56963	1650	1485
panel point18	80447	825	1.56962	825	812	1650	1.56962	1650	1536
panel point19	85179	825	1.56962	825	818	1650	1.56962	1650	1587
panel point20	89986	825	1.56960	825	824	1650	1.56960	1650	1639
panel point21	94793	825	1.56960	825	825	1650	1.56960	1650	1650
panel point22	99601	825	1.56960	825	825	1650	1.56960	1650	1650
panel point23	104408	825	1.56960	825	825	1650	1.56960	1650	1650
panel point24	109215	825	1.56960	825	825	1650	1.56960	1650	1650
panel point25	114022	825	1.56960	825	825	1650	1.56960	1650	1650
panel point26	118829	825	1.56960	825	825	1650	1.56960	1650	1650
panel point27	123637	825	1.56960	825	825	1650	1.56960	1650	1650
panel point28	128444	825	1.56960	825	825	1650	1.56960	1650	1650
panel point29	133251	825	1.56960	825	825	1650	1.56960	1650	1650
panel point30	138058	825	1.56960	825	824	1650	1.56960	1650	1641
panel point31	142865	825	1.56960	825	822	1650	1.56960	1650	1601
panel point32	147597	825	1.56962	825	819	1650	1.56962	1650	1562
panel point33△	152330	825	1.56962	825	816	1650	1.56962	1650	1522
panel point34	156786	825	1.56968	825	818	1650	1.56968	1650	1550
panel point35	161243	825	1.56968	825	820	1650	1.56968	1650	1578
panel point36	165950	825	1.56962	825	822	1650	1.56962	1650	1607
panel point37	170657	825	1.56962	825	824	1650	1.56962	1650	1636
panel point38	175364	825	1.56962	825	825	1650	1.56962	1650	1650
panel point39	180071	825	1.56962	825	825	1650	1.56962	1650	1650
panel point40	184778	825	1.56962	825	825	1650	1.56962	1650	1650
panel point41	189485	825	1.56962	825	825	1650	1.56962	1650	1650
panel point42	194192	825	1.56962	825	825	1650	1.56962	1650	1650
panel point43	198915	825	1.55831	825	825	1651	1.55831	1651	1651
panel point44	203598	825	1.57866	825	825	1692	1.57866	1692	1692
panel point45	208291	825	1.57317	825	825	1799	1.57317	1799	1799
panel point46	212996	825	1.57080	825	825	1917	1.57080	1917	1917
panel point47	217701	825	1.57080	825	825	2035	1.57080	2035	2035
panel point48	222407	825	1.57080	825	825	2153	1.57080	2153	2153
panel point49	227113	825	1.57080	825	825	2271	1.57080	2271	2271
panel point50	231820	825	1.57080	825	825	2389	1.57080	2388	2388
panel point51	236528	825	1.57080	825	825	2508	1.57080	2506	2506
panel point52	241236	825	1.57080	825	825	2626	1.57080	2624	2624
panel point53	245960	825	1.56346	825	825	2723	1.56346	2722	2722
panel point54	250652	825	1.55402	825	825	2750	1.55402	2750	2750
panel point55△	255302	825	1.57080	825	825	2750	1.57080	2750	2750

・Location of cross-section investigation

	L	BgL	AgL	BL	λL	BgR	AgR	BR	λR
Sec-1	0	825	1.57241	825	825	1650	1.57241	1650	1650
Sec-1	7569	825	1.57051	825	825	1650	1.57051	1650	1650
Sec-2	15856	825	1.57109	825	825	1650	1.57109	1650	1650
Sec-3	24181	825	1.57169	825	825	1650	1.57169	1650	1650
Sec-4	31157	825	1.57058	825	825	1650	1.57058	1650	1650
Sec-5	32456	825	1.56993	825	825	1650	1.56993	1650	1650
Sec-6	40831	825	1.57050	825	825	1650	1.57050	1650	1650
Sec-7	49156	825	1.57109	825	825	1650	1.57109	1650	1650
Sec-7	56887	825	1.56961	825	825	1650	1.56961	1650	1650
Sec-8	57481	825	1.57169	825	825	1650	1.57169	1650	1650
Sec-8	65806	825	1.56991	825	818	1650	1.56991	1650	1593
Sec-9	72804	825	1.57109	825	809	1650	1.57109	1650	1517
Sec-10	75715	825	1.56963	825	806	1650	1.56963	1650	1485
Sec-10	75715	825	1.57198	825	806	1650	1.57198	1650	1485
Sec-11	78672	825	1.57050	825	810	1650	1.57050	1650	1517
Sec-12	85780	825	1.57170	825	818	1650	1.57170	1650	1593
Sec-12	94192	825	1.56990	825	825	1650	1.56990	1650	1650
Sec-13	94192	825	1.56990	825	825	1650	1.56990	1650	1650
Sec-13	102605	825	1.57050	825	825	1650	1.57050	1650	1650
Sec-14	102605	825	1.57050	825	825	1650	1.57050	1650	1650
Sec-14	109816	825	1.57170	825	825	1650	1.57170	1650	1650
Sec-15	110833	825	1.57119	825	825	1650	1.57119	1650	1650
Sec-15	118228	825	1.56990	825	825	1650	1.56990	1650	1650
Sec-16	118228	825	1.56990	825	825	1650	1.56990	1650	1650
Sec-16	125439	825	1.57110	825	825	1650	1.57110	1650	1650
Sec-17	125439	825	1.57110	825	825	1650	1.57110	1650	1650
Sec-17	133852	825	1.57170	825	825	1650	1.57170	1650	1650
Sec-18	142264	825	1.56990	825	822	1650	1.56990	1650	1606
Sec-19	149122	825	1.57122	825	818	1650	1.57122	1650	1549
Sec-20	152329	825	1.56962	825	816	1650	1.56962	1650	1522
Sec-20	152330	825	1.57191	825	816	1650	1.57191	1650	1522
Sec-21	155325	825	1.57041	825	817	1650	1.57041	1650	1541
Sec-22	161831	825	1.57168	825	820	1650	1.57168	1650	1581
Sec-22	168892	825	1.57050	825	823	1650	1.57050	1650	1625
Sec-23	168892	825	1.57050	825	823	1650	1.57050	1650	1625
Sec-23	175364	825	1.56962	825	825	1650	1.56962	1650	1650
Sec-23	177129	825	1.57109	825	825	1650	1.57109	1650	1650
Sec-24	185366	825	1.57168	825	825	1650	1.57168	1650	1650
Sec-25	193524	825	1.56995	825	825	1650	1.56995	1650	1650
Sec-26	201972	825	1.57320	825	825	1677	1.57320	1677	1677
Sec-27	209875	825	1.57080	825	825	1839	1.57080	1838	1838
Sec-28	214604	825	1.57080	825	825	1957	1.57080	1957	1957
Sec-29	216993	825	1.57080	825	825	2017	1.57080	2017	2017
Sec-30	224092	825	1.57080	825	825	2195	1.57080	2195	2195
Sec-31	232488	825	1.57080	825	825	2406	1.57080	2405	2405
Sec-32	240647	825	1.57080	825	825	2611	1.57080	2610	2610
Sec-33	248887	825	1.56386	825	825	2740	1.56386	2740	2740
Sec-33	255302	825	1.57080	825	825	2750	1.57080	2750	2750

＊ Main girder G3

・Location of panel point

	L	BgL	AgL	BL	λL	BgR	AgR	BR	λR
panel point1△	0	1650	1.57241	1650	1650	4103	1.57241	4103	3956
panel point2	4642	1650	1.56963	1650	1650	3987	1.56963	3987	3859
panel point3	9285	1650	1.56963	1650	1650	3866	1.56963	3866	3757
panel point4	14028	1650	1.56961	1650	1650	3743	1.56961	3743	3653
panel point5	18770	1650	1.56961	1650	1650	3626	1.56961	3626	3553
panel point 6	23513	1650	1.56961	1650	1650	3515	1.56961	3515	3457
panel point7	28256	1650	1.56961	1650	1650	3409	1.56961	3409	3365
panel point8	32999	1650	1.56961	1650	1650	3308	1.56961	3308	3277
panel point9	37742	1650	1.56961	1650	1650	3213	1.56961	3213	3193
panel point10	42485	1650	1.56961	1650	1650	3124	1.56961	3124	3113
panel point11	47228	1650	1.56961	1650	1650	3040	1.56961	3040	3038
panel point12	51971	1650	1.56961	1650	1650	2962	1.56961	2962	2962
panel point13	56713	1650	1.56961	1650	1650	2890	1.56961	2890	2890
panel point14	61456	1650	1.56961	1650	1638	2823	1.56961	2823	2783
panel point15	66199	1650	1.56961	1650	1586	2761	1.56961	2761	2555
panel point16	70842	1650	1.56963	1650	1535	2706	1.56963	2706	2351
panel point17△	75485	1650	1.56963	1650	1484	2657	1.56963	2657	2164
panel point18	80203	1650	1.56962	1650	1535	2612	1.56962	2612	2272
panel point19	84921	1650	1.56962	1650	1587	2572	1.56962	2572	2377
panel point20	89714	1650	1.56960	1650	1639	2538	1.56960	2538	2482
panel point21	94507	1650	1.56960	1650	1650	2509	1.56960	2509	2485
panel point22	99299	1650	1.56960	1650	1650	2486	1.56960	2486	2465
panel point23	104092	1650	1.56960	1650	1650	2469	1.56960	2469	2450
panel point24	108885	1650	1.56960	1650	1650	2457	1.56960	2457	2439
panel point25	113678	1650	1.56960	1650	1650	2451	1.56960	2451	2434
panel point26	118471	1650	1.56960	1650	1650	2450	1.56960	2450	2433
panel point27	123263	1650	1.56960	1650	1650	2396	1.56960	2396	2385
panel point28	128056	1650	1.56960	1650	1650	2223	1.56960	2223	2223
panel point29	132849	1650	1.56960	1650	1650	2050	1.56960	2050	2050
panel point30	137642	1650	1.56960	1650	1641	1876	1.56960	1876	1864
panel point31	142435	1650	1.56960	1650	1601	1703	1.56960	1703	1650
panel point32	147153	1650	1.56962	1650	1561	1532	1.56962	1532	1460
panel point33△	151871	1650	1.56962	1650	1522	1362	1.56962	1362	1287
panel point34	156314	1650	1.56968	1650	1549	1201	1.56968	1201	1161
panel point35	160757	1650	1.56968	1650	1577	1040	1.56968	1040	1023
panel point36	165450	1650	1.56962	1650	1607	871	1.56962	871	866
panel point37	170143	1650	1.56962	1650	1636	825	1.56962	825	824
panel point38	174836	1650	1.56962	1650	1650	825	1.56962	825	825
panel point39	179529	1650	1.56962	1650	1650	825	1.56962	825	825
panel point40	184222	1650	1.56962	1650	1650	825	1.56962	825	825
panel point41	188915	1650	1.56962	1650	1650	825	1.56962	825	825
panel point42	193608	1650	1.56962	1650	1650	825	1.56962	825	825
panel point43	198282	1651	1.57049	1651	1651	825	1.57049	825	825
panel point44	202958	1692	1.59002	1691	1691	825	1.59002	825	825
panel point45	207645	1799	1.60167	1798	1798	825	1.60167	825	825
panel point46	212343	1917	1.60156	1916	1916	825	1.60156	825	825
panel point47	217040	2035	1.59921	2034	2034	825	1.59921	825	825
panel point48	221736	2153	1.59686	2152	2152	825	1.59686	825	825
panel point49	226432	2271	1.59451	2271	2271	825	1.59451	825	825
panel point50	231127	2389	1.59216	2389	2389	825	1.59216	825	825
panel point51	235822	2508	1.58981	2507	2507	825	1.58981	825	825
panel point52	240517	2626	1.58746	2625	2625	825	1.58746	825	825
panel point53	245226	2723	1.58069	2723	2723	825	1.58069	825	825
panel point54	249872	2750	1.56549	2750	2750	825	1.56549	825	825
panel point55△	254522	2750	1.57080	2750	2750	825	1.57080	825	825

・Location of cross-section investigation

	L	BgL	AgL	BL	λL	BgR	AgR	BR	λR
Sec-1	0	1650	1.57241	1650	1650	4103	1.57241	4103	3956
Sec-1	7544	1650	1.57051	1650	1650	3911	1.57051	3911	3796
Sec-2	15806	1650	1.57109	1650	1650	3699	1.57109	3699	3616
Sec-3	24106	1650	1.57169	1650	1650	3501	1.57169	3501	3446
Sec-4	32193	1650	1.57001	1650	1650	3325	1.57001	3325	3292
Sec-5	32356	1650	1.56993	1650	1650	3322	1.56993	3322	3289
Sec-6	40706	1650	1.57050	1650	1650	3158	1.57050	3158	3143
Sec-7	49006	1650	1.57109	1650	1650	3011	1.57109	3011	3011
Sec-7	56713	1650	1.56961	1650	1650	2890	1.56961	2890	2890
Sec-8	57306	1650	1.57169	1650	1650	2881	1.57169	2881	2881
Sec-8	65606	1650	1.56991	1650	1593	2769	1.56991	2769	2583
Sec-9	72583	1650	1.57109	1650	1516	2688	1.57109	2688	2280
Sec-10	75485	1650	1.56963	1650	1484	2657	1.56963	2657	2164
Sec-10	75485	1650	1.57198	1650	1484	2657	1.57198	2657	2164
Sec-11	78434	1650	1.57050	1650	1516	2629	1.57050	2629	2232
Sec-12	85520	1650	1.57170	1650	1593	2568	1.57170	2568	2390
Sec-12	93908	1650	1.56990	1650	1650	2513	1.56990	2513	2489
Sec-13	93908	1650	1.56990	1650	1650	2513	1.56990	2513	2489
Sec-13	102295	1650	1.57050	1650	1650	2475	1.57050	2475	2455
Sec-14	102295	1650	1.57050	1650	1650	2475	1.57050	2475	2455
Sec-14	109484	1650	1.57170	1650	1650	2456	1.57170	2456	2439
Sec-15	109793	1650	1.57154	1650	1650	2456	1.57154	2456	2438
Sec-15	117872	1650	1.56990	1650	1650	2450	1.56990	2450	2433
Sec-16	117872	1650	1.56990	1650	1650	2450	1.56990	2450	2433
Sec-16	125061	1650	1.57110	1650	1650	2331	1.57110	2331	2327
Sec-17	125061	1650	1.57110	1650	1650	2331	1.57110	2331	2327
Sec-17	133448	1650	1.57170	1650	1650	2028	1.57170	2028	2028
Sec-18	141836	1650	1.56990	1650	1606	1725	1.56990	1725	1675
Sec-19	148673	1650	1.57122	1650	1548	1477	1.57122	1477	1402
Sec-20	151870	1650	1.56962	1650	1522	1362	1.56962	1362	1287
Sec-20	151871	1650	1.57191	1650	1522	1362	1.57191	1362	1287
Sec-21	154857	1650	1.57041	1650	1540	1254	1.57041	1254	1204
Sec-22	161344	1650	1.57168	1650	1581	1019	1.57168	1019	1004
Sec-23	168383	1650	1.57050	1650	1625	842	1.57050	842	840
Sec-23	174836	1650	1.56962	1650	1650	825	1.56962	825	825
Sec-23	176596	1650	1.57109	1650	1650	825	1.57109	825	825
Sec-24	184809	1650	1.57168	1650	1650	825	1.57168	825	825
Sec-25	192941	1650	1.56996	1650	1650	825	1.56996	825	825
Sec-26	201336	1677	1.59083	1677	1677	825	1.59083	825	825
Sec-27	209227	1839	1.60309	1838	1838	825	1.60309	825	825
Sec-28	214446	1970	1.60048	1969	1969	825	1.60048	825	825
Sec-29	216333	2017	1.59955	2016	2016	825	1.59955	825	825
Sec-30	223417	2195	1.59599	2195	2195	825	1.59599	825	825
Sec-31	231794	2406	1.59182	2406	2406	825	1.59182	825	825
Sec-32	239930	2611	1.58775	2611	2611	825	1.58775	825	825
Sec-33	248137	2740	1.56624	2740	2740	825	1.56624	825	825
Sec-33	254522	2750	1.57080	2750	2750	825	1.57080	825	825

＊ Main girder G4

・Location of panel point

	L	BgL	AgL	BL	λL	BgR	AgR	BR	λR
panel point1△	0	4103	1.52223	4098	3950	1352	1.52223	1350	1350
panel point2	4694	3987	1.51945	3982	3853	1350	1.51945	1350	1350
panel point3	9321	3866	1.51717	3860	3751	1350	1.51717	1350	1350
panel point4	14042	3743	1.51774	3738	3647	1350	1.51774	1350	1350
panel point5	18763	3626	1.52009	3621	3548	1350	1.52009	1350	1350
panel point6	23484	3515	1.52244	3510	3452	1350	1.52244	1350	1350
panel point7	28205	3409	1.52478	3405	3360	1350	1.52478	1350	1350
panel point8	32926	3308	1.52713	3305	3272	1350	1.52713	1350	1350
panel point9	37647	3213	1.52948	3211	3189	1350	1.52948	1350	1350
panel point10	42367	3124	1.53183	3122	3110	1350	1.53183	1350	1350
panel point11	47088	3040	1.53418	3038	3035	1350	1.53418	1350	1350
panel point12	51809	2962	1.53653	2961	2961	1350	1.53653	1350	1350
panel point13	56530	2890	1.53888	2888	2888	1350	1.53888	1350	1350
panel point14	61251	2823	1.54123	2821	2780	1350	1.54123	1350	1343
panel point15	65972	2761	1.54357	2760	2552	1350	1.54357	1350	1311
panel point16	70594	2706	1.54592	2705	2348	1350	1.54592	1350	1281
panel point17△	75185	2657	1.54822	2656	2162	1350	1.54822	1350	1250
panel point18	79911	2612	1.55052	2611	2271	1350	1.55052	1350	1281
panel point19	84607	2572	1.55286	2572	2376	1350	1.55286	1350	1312
panel point20	89378	2538	1.55520	2538	2481	1350	1.55520	1350	1343
panel point21	94149	2509	1.55757	2509	2484	1350	1.55757	1350	1350
panel point22	98919	2486	1.55994	2486	2464	1350	1.55994	1350	1350
panel point23	103690	2469	1.56232	2469	2449	1350	1.56232	1350	1350
panel point24	108461	2457	1.56469	2457	2439	1350	1.56469	1350	1350
panel point25	113231	2451	1.56706	2451	2433	1350	1.56706	1350	1350
panel point26	118003	2450	1.56921	2450	2432	1350	1.56921	1350	1350
panel point27	122890	2396	1.54713	2396	2384	1350	1.54713	1348	1348
panel point28	127678	2223	1.49718	2217	2217	1350	1.49718	1350	1350
panel point29	132466	2050	1.49719	2044	2044	1350	1.49719	1350	1350
panel point30	137255	1876	1.49720	1871	1858	1350	1.49720	1350	1345
panel point31	142045	1703	1.49721	1698	1644	1350	1.49721	1350	1321
panel point32	146761	1532	1.49724	1528	1455	1350	1.49724	1350	1299
panel point33△	151369	1362	1.49726	1358	1283	1354	1.49726	1350	1276
panel point34	155920	1201	1.49734	1198	1159	1350	1.49734	1350	1293
panel point35	160364	1040	1.49735	1038	1021	1350	1.49735	1350	1309
panel point36	165058	871	1.49730	868	864	1350	1.49730	1350	1326
panel point37	169635	825	1.55015	825	824	1350	1.55015	1350	1342
panel point38	174317	825	1.56962	825	825	1350	1.56962	1350	1350
panel point39	179000	825	1.56962	825	825	1350	1.56962	1350	1350
panel point40	183682	825	1.56962	825	825	1350	1.56962	1350	1350
panel point41	188364	825	1.56962	825	825	1350	1.56962	1350	1350
panel point42	193047	825	1.56962	825	825	1350	1.56962	1350	1350
panel point43	197649	825	1.55667	825	825	1350	1.55667	1350	1350
panel point44	202254	825	1.56294	825	825	1350	1.56294	1350	1350
panel point45	206903	825	1.56857	825	825	1350	1.56857	1350	1350
panel point46	211601	825	1.57080	825	825	1350	1.57080	1350	1350
panel point47	216298	825	1.57080	825	825	1350	1.57080	1350	1350
panel point48	220994	825	1.57080	825	825	1350	1.57080	1350	1350
panel point49	225690	825	1.57080	825	825	1350	1.57080	1350	1350
panel point50	230386	825	1.57080	825	825	1350	1.57080	1350	1350
panel point51	235081	825	1.57080	825	825	1350	1.57080	1350	1350
panel point52	239775	825	1.57080	825	825	1350	1.57080	1350	1350
panel point53	244538	825	1.57810	825	825	1350	1.57810	1350	1350
panel point54	249185	825	1.56550	825	825	1350	1.56550	1350	1350
panel point55△	253835	825	1.57080	825	825	1350	1.57080	1350	1350

・Location of cross-section investigation

	L	BgL	AgL	BL	λL	BgR	AgR	BR	λR
Sec-1	0	4103	1.52223	4098	3950	1352	1.52223	1350	1350
Sec-1	7586	3911	1.51806	3906	3789	1350	1.51806	1350	1350
Sec-2	15812	3699	1.52159	3695	3610	1350	1.52159	1350	1350
Sec-3	24074	3501	1.52687	3498	3441	1350	1.52687	1350	1350
Sec-4	31797	3332	1.52771	3329	3294	1350	1.52771	1350	1350
Sec-5	32286	3322	1.52746	3319	3284	1350	1.52746	1350	1350
Sec-6	40597	3158	1.53274	3155	3140	1350	1.53274	1350	1350
Sec-7	48859	3011	1.53803	3009	3009	1350	1.53803	1350	1350
Sec-7	56530	2890	1.53888	2888	2888	1350	1.53888	1350	1350
Sec-8	57120	2881	1.54331	2880	2880	1350	1.54331	1350	1350
Sec-8	65382	2769	1.54388	2768	2580	1350	1.54388	1350	1315
Sec-9	72327	2687	1.54968	2687	2277	1350	1.54968	1350	1269
Sec-10	75185	2657	1.54822	2656	2162	1350	1.54822	1350	1250
Sec-10	75185	2657	1.55289	2656	2162	1350	1.55289	1350	1251
Sec-11	78150	2628	1.55141	2628	2231	1350	1.55141	1350	1270
Sec-12	85204	2568	1.55730	2568	2389	1350	1.55730	1350	1316
Sec-12	93552	2513	1.55787	2513	2488	1350	1.55787	1350	1350
Sec-13	93552	2513	1.55787	2513	2488	1350	1.55787	1350	1350
Sec-13	101901	2475	1.56322	2475	2455	1350	1.56322	1350	1350
Sec-14	101901	2475	1.56322	2475	2455	1350	1.56322	1350	1350
Sec-14	108962	2456	1.56921	2456	2438	1350	1.56921	1350	1350
Sec-14	109057	2456	1.56916	2456	2438	1350	1.56916	1350	1350
Sec-15	109057	2456	1.56916	2456	2438	1350	1.56916	1350	1350
Sec-15	117407	2450	1.56951	2450	2433	1350	1.56951	1350	1350
Sec-16	117407	2450	1.56951	2450	2433	1350	1.56951	1350	1350
Sec-16	124685	2331	1.49872	2325	2321	1350	1.49872	1350	1350
Sec-17	124685	2331	1.49872	2325	2321	1350	1.49872	1350	1350
Sec-17	133064	2028	1.49932	2023	2023	1350	1.49932	1350	1350
Sec-18	141446	1725	1.49754	1720	1670	1350	1.49754	1350	1324
Sec-19	148279	1476	1.49890	1472	1397	1350	1.49890	1350	1291
Sec-20	151369	1362	1.49726	1358	1283	1354	1.49726	1350	1276
Sec-20	151369	1362	1.49956	1358	1283	1354	1.49956	1350	1277
Sec-21	154464	1252	1.49811	1249	1200	1350	1.49811	1350	1288
Sec-22	160951	1019	1.49940	1017	1002	1350	1.49940	1350	1311
Sec-23	167879	842	1.55108	842	840	1349	1.55108	1349	1335
Sec-23	174317	825	1.56962	825	825	1350	1.56962	1350	1350
Sec-23	176073	825	1.57109	825	825	1350	1.57109	1350	1350
Sec-24	184267	825	1.57168	825	825	1350	1.57168	1350	1350
Sec-25	192382	825	1.56996	825	825	1350	1.56996	1350	1350
Sec-26	200657	825	1.56839	825	825	1350	1.56839	1350	1350
Sec-27	208485	825	1.57080	825	825	1350	1.57080	1350	1350
Sec-28	211276	825	1.57080	825	825	1350	1.57080	1350	1350
Sec-29	215591	825	1.57080	825	825	1350	1.57080	1350	1350
Sec-30	222675	825	1.57080	825	825	1350	1.57080	1350	1350
Sec-31	231053	825	1.57080	825	825	1350	1.57080	1350	1350
Sec-32	239188	825	1.57080	825	825	1350	1.57080	1350	1350
Sec-33	247491	825	1.56529	825	825	1350	1.56529	1350	1350
Sec-33	253835	825	1.57080	825	825	1350	1.57080	1350	1350

４．４．Conclusion of sections

Explanation of symbols

Section forces

Bending moment (In plane)	Mx
Shear force (In plane)	Sy
Torsion moment	T

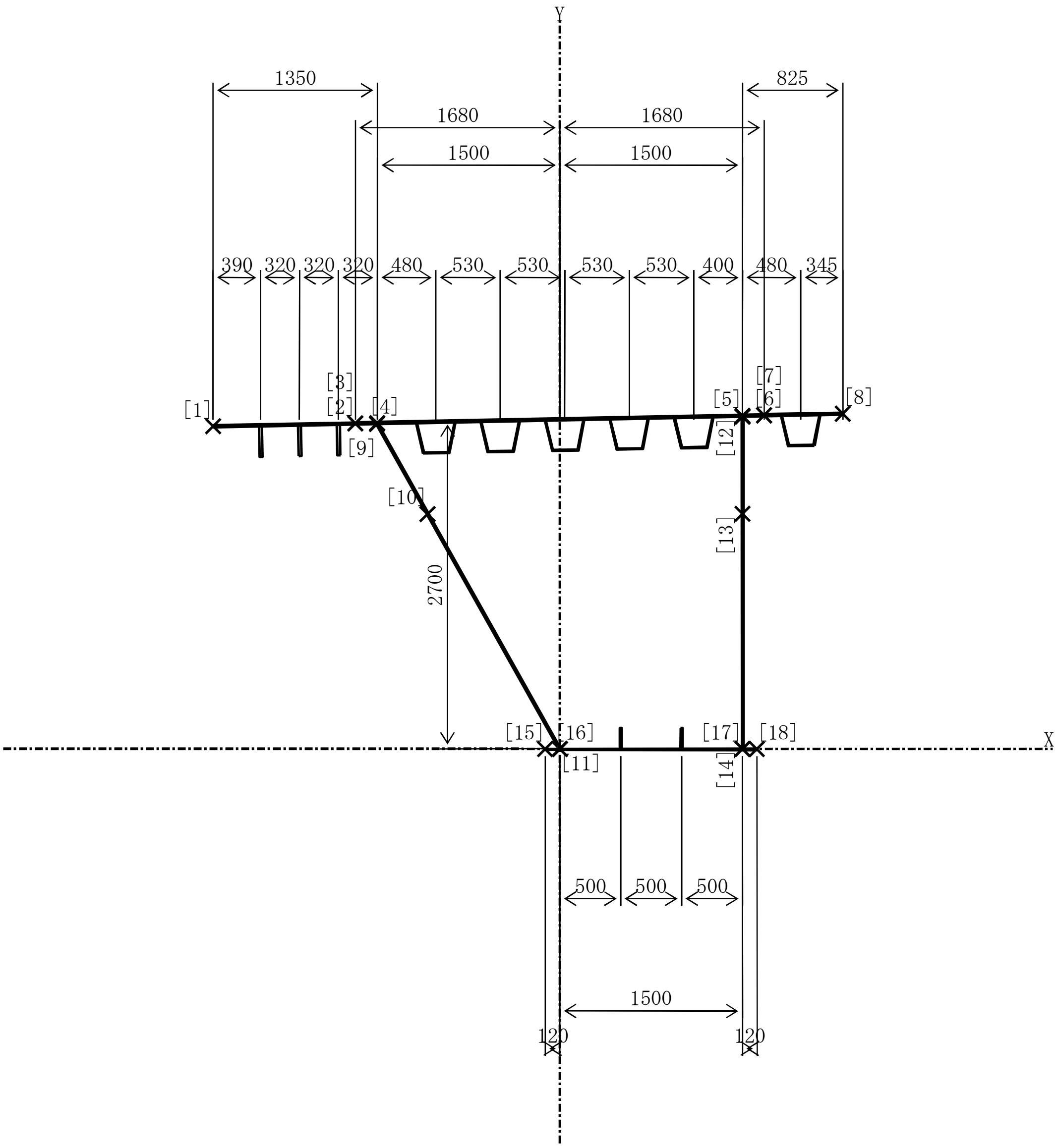
Stress

Vertical stress due to Mx	σmx
Allowable vertical stress	σa
Shear stress due to Sy	τsy
Shear stress due to T	τt
Total shear stress	$\Sigma \tau$
Allowable shear stress	τa
Combined stress	κ

Others

＊Girder numbers of each section and section numbers are serial.
＊The inclines assumes an upward slant to right plus.
＊Gravity center "ex" is distance from center of the box girder and "ey" is distance from bottom of web.

Girder Name：G1



Girder Name：G1　Section Name：Sec-1:Left　（Girder number=　1　Section number=　1）

Section force　Mx =　0 kN·m　Sy =　2455 kN　T =　-2075 kN·m

Effective buckling length　Lx =　4671 mmLy =　4671 mm
Radius of curvature　R =-2007. m
Inclination　DECK =　2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1350	1350
	Intermediate	3000	3000
	overhang	825	825
LFLG	Intermediate	1500	1500

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL 1170 * 16 (SM400)	187.2	187.2
3-RIB PL 250 * 24 (SM400)	180.0	180.0
1-DECK-C PL 3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 * 8 (SM400)	269.5	269.5
1-DECK-R PL 645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-LWEB PL 3062 * 15 (SM490Y)	459.4	459.4
1-RWEB PL 2730 * 15 (SM490Y)	409.5	409.5
1-LFLG PL 1740 * 10 (SM490Y)	174.0	174.0
2-RIB PL 170 * 17 (SM490Y)	57.8	57.8

Section property

		Total	In-plane
Section area	A (cm2)	2432.2	2432.2
Gravity center	ex (cm)	-1.6	-1.6
	ey (cm)	193.1	193.1
Moment of inertia	Ix (cm4)	23601041	23601041
	Iy (cm4)	45552865	45552865
Torsion Constant	J (cm4)	20872206	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	39673.5 kN·m	39673.5 kN·m
	Mxr(lower)=	25518.4 kN·m	10208.2 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	0	140	0	0	0	80	0.00
	[2]	0	140	16	0	16	80	0.04
DECK-C	[3]	0	140	16	0	16	80	0.04
	[4]	0	140	17	11	25	80	0.09
	[5]	0	140	21	11	32	80	0.16
	[6]	0	140	8	0	8	80	0.01
DECK-R	[7]	0	140	8	0	8	80	0.01
	[8]	0	140	0	0	0	80	0.00
LWEB	[9]	0	210	34	11	45	120	0.14
	[10]	0	210	37	11	48	120	0.16
	[11]	0	210	15	11	26	120	0.05
RWEB	[12]	0	210	32	11	44	120	0.13
	[13]	0	210	36	11	47	120	0.15
	[14]	0	210	16	11	28	120	0.05
LFLG	[15]	0	210	0	0	0	120	0.00
	[16]	0	210	19	17	36	120	0.09
	[17]	0	210	22	17	39	120	0.10
	[18]	0	210	0	0	0	120	0.00

Girder Name : G1 Section Name : Sec-1:J-1 (Girder number= 1 Section number= 1)

Section force Mx = 14779 kN·m Sy = 1720 kN T = -2054 kN·m

Effective buckling length Lx = 4667 mmLy = 4667 mm
Radius of curvature R =-2007. m
Inclination DECK = 2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	1350	1350
		Intermediate	3000	3000
		overhang	825	825
	LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1170 * 16 (SM400)	187.2	187.2
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-DECK-C PL	3361 * 16 (SM400)	537.7	537.7
5-U.RIB	320 * 240 * 8 (SM400)	269.5	269.5
1-DECK-R PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB	320 * 240 * 8 (SM400)	53.9	53.9
1-LWEB PL	3062 * 15 (SM490Y)	459.4	459.4
1-RWEB PL	2730 * 15 (SM490Y)	409.5	409.5
1-LFLG PL	1740 * 10 (SM490Y)	174.0	174.0
2-RIB PL	170 * 17 (SM490Y)	57.8	57.8

Section property			Total	In-plane
Section area	A	(cm2)	2432.2	2432.2
Gravity center	ex	(cm)	-1.6	-1.6
	ey	(cm)	193.1	193.1
Moment of inertia	Ix	(cm4)	23601041	23601041
	Iy	(cm4)	45552865	45552865
Torsion Constant	J	(cm4)	20872206	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	39673.5 kN·m	39673.5 kN·m
	Mxr(lower)=	25518.4 kN·m	10208.2 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-46	140	0	0	0	80	0.11
	[2]	-47	140	11	0	11	80	0.13
DECK-C	[3]	-47	140	11	0	11	80	0.13
	[4]	-47	140	12	10	20	80	0.18
	[5]	-51	140	15	10	25	80	0.23
	[6]	-51	140	5	0	6	80	0.14
DECK-R	[7]	-51	140	5	0	6	80	0.14
	[8]	-52	140	0	0	0	80	0.14
LWEB	[9]	-46	210	23	11	35	120	0.13
	[10]	0	210	26	11	37	120	0.09
	[11]	121	210	10	11	21	120	0.36
RWEB	[12]	-50	210	23	11	34	120	0.14
	[13]	0	210	25	11	36	120	0.09
	[14]	121	210	11	11	23	120	0.37
LFLG	[15]	122	210	0	0	0	120	0.33
	[16]	122	210	14	17	30	120	0.40
	[17]	122	210	15	17	32	120	0.41
	[18]	122	210	0	0	0	120	0.34

Girder Name : G1　Section Name : Sec-2:J-2　(Girder number= 1　Section number= 2)

Section force　Mx = 26617 kN·m　Sy = 1325 kN　T = -1609 kN·m

Effective buckling length　Lx = 4768 mmLy = 4768 mm
Radius of curvature　R =-2007. m
Inclination　DECK = 2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1350	1350
	Intermediate	3000	3000
	overhang	825	825
LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1170 * 16 (SM400)	187.2	187.2
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-DECK-C PL	3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 * 8	(SM400)	269.5	269.5
1-DECK-R PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 * 8	(SM400)	53.9	53.9
1-LWEB PL	3062 * 15 (SM490Y)	459.4	459.4
1-RWEB PL	2730 * 15 (SM490Y)	409.5	409.5
1-LFLG PL	1740 * 18 (SM490Y)	313.2	313.2
2-RIB PL	170 * 17 (SM490Y)	57.8	57.8

Section property			Total	In-plane
Section area	A	(cm2)	2571.4	2571.4
Gravity center	ex	(cm)	2.6	2.6
	ey	(cm)	182.5	182.5
Moment of inertia	Ix	(cm4)	28581311	28581311
	Iy	(cm4)	46675486	46675486
Torsion Constant	J	(cm4)	23036035	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	42647.5 kN·m	42647.5 kN·m
	Mxr(lower)=	32535.3 kN·m	28419.3 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-78	140	0	0	0	80	0.31
	[2]	-80	140	8	0	8	80	0.34
DECK-C	[3]	-80	140	8	0	8	80	0.34
	[4]	-80	140	9	8	15	80	0.36
	[5]	-86	140	11	8	19	80	0.43
	[6]	-86	140	4	0	4	80	0.38
DECK-R	[7]	-86	140	4	0	4	80	0.38
	[8]	-87	140	0	0	0	80	0.39
LWEB	[9]	-79	210	17	9	26	120	0.19
	[10]	0	210	19	9	28	120	0.05
	[11]	170	210	10	9	19	120	0.68
RWEB	[12]	-84	210	17	9	25	120	0.21
	[13]	0	210	19	9	27	120	0.05
	[14]	170	210	11	9	20	120	0.68
LFLG	[15]	172	210	0	0	0	120	0.67
	[16]	172	210	7	7	15	120	0.68
	[17]	172	210	8	7	15	120	0.69
	[18]	172	210	0	0	0	120	0.67

Girder Name：G1　Section Name：Sec-3:J-3　(Girder number=　1　Section number=　3)

Section force　Mx =　33364 kN·m　Sy =　759 kN　T =　-1113 kN·m

Effective buckling length　Lx =　4768 mmLy =　4768 mm
Radius of curvature　R　=-2007. m
Inclination　DECK =　2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	1350	1350
		Intermediate	3000	3000
		overhang	825	825
	LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1170 * 16 (SM400)	187.2	187.2
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-DECK-C PL	3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 *	8 (SM400)	269.5	269.5
1-DECK-R PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-LWEB PL	3062 * 15 (SM490Y)	459.4	459.4
1-RWEB PL	2730 * 15 (SM490Y)	409.5	409.5
1-LFLG PL	1740 * 27 (SM490Y)	469.8	469.8
2-RIB PL	200 * 22 (SM490Y)	88.0	88.0

Section property			Total	In-plane
Section area	A	(cm2)	2758.2	2758.2
Gravity center	ex	(cm)	7.5	7.5
	ey	(cm)	170.2	170.2
Moment of inertia	Ix	(cm4)	34379397	34379397
	Iy	(cm4)	48002206	48002206
Torsion Constant	J	(cm4)	24106092	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	45325.9 kN·m	45325.9 kN·m
	Mxr(lower)=	41729.2 kN·m	41729.2 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-93	140	0	0	0	80	0.44
	[2]	-95	140	5	0	5	80	0.46
DECK-C	[3]	-95	140	5	0	5	80	0.46
	[4]	-95	140	5	6	9	80	0.48
	[5]	-101	140	6	6	12	80	0.55
	[6]	-102	140	2	0	2	80	0.53
DECK-R	[7]	-102	140	2	0	2	80	0.53
	[8]	-103	140	0	0	0	80	0.54
LWEB	[9]	-94	210	9	6	15	120	0.22
	[10]	0	210	10	6	17	120	0.02
	[11]	166	210	7	6	13	120	0.63
RWEB	[12]	-100	210	9	6	15	120	0.24
	[13]	0	210	10	6	16	120	0.02
	[14]	165	210	7	6	13	120	0.63
LFLG	[15]	168	210	0	0	0	120	0.64
	[16]	168	210	3	3	7	120	0.64
	[17]	168	210	4	3	7	120	0.64
	[18]	168	210	0	0	0	120	0.64

Girder Name : G1　Section Name : Sec-4:Mx-Max　(Girder number= 1　Section number= 4)

Section force　Mx = 35375 kN·m　Sy = -417 kN　T = -529 kN·m

Effective buckling length　Lx = 4768 mmLy = 4768 mm
Radius of curvature　R =-2007. m
Inclination　DECK = 2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1350	1350
	Intermediate	3000	3000
	overhang	825	825
LFLG	Intermediate	1500	1500

Section dimensions

Section area(cm2)		Total	in plane
1-DECK-L PL 1170 * 16	(SM400)	187.2	187.2
3-RIB PL 250 * 24	(SM400)	180.0	180.0
1-DECK-C PL 3361 * 16	(SM400)	537.7	537.7
5-U.RIB 320 * 240 * 8	(SM400)	269.5	269.5
1-DECK-R PL 645 * 16	(SM400)	103.2	103.2
1-U.RIB 320 * 240 * 8	(SM400)	53.9	53.9
1-LWEB PL 3062 * 15	(SM490Y)	459.4	459.4
1-RWEB PL 2730 * 15	(SM490Y)	409.5	409.5
1-LFLG PL 1740 * 30	(SM490Y)	522.0	522.0
2-RIB PL 200 * 22	(SM490Y)	88.0	88.0

Section property

			Total	In-plane
Section area	A	(cm2)	2810.4	2810.4
Gravity center	ex	(cm)	8.7	8.7
	ey	(cm)	167.0	167.0
Moment of inertia	Ix	(cm4)	35913494	35913494
	Iy	(cm4)	48367273	48367273
Torsion Constant	J	(cm4)	24338682	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	45955.9 kN·m	45955.9 kN·m
	Mxr(lower)=	44339.1 kN·m	44339.1 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-97	140	0	0	0	80	0.48
	[2]	-100	140	2	0	3	80	0.51
DECK-C	[3]	-100	140	2	0	3	80	0.51
	[4]	-100	140	3	3	5	80	0.51
	[5]	-106	140	3	3	6	80	0.58
	[6]	-106	140	1	0	1	80	0.58
DECK-R	[7]	-106	140	1	0	1	80	0.58
	[8]	-108	140	0	0	0	80	0.59
LWEB	[9]	-99	210	5	3	8	120	0.23
	[10]	0	210	6	3	9	120	0.01
	[11]	165	210	4	3	7	120	0.62
RWEB	[12]	-105	210	5	3	8	120	0.25
	[13]	0	210	6	3	9	120	0.01
	[14]	165	210	4	3	7	120	0.62
LFLG	[15]	167	210	0	0	0	120	0.64
	[16]	167	210	2	1	3	120	0.64
	[17]	168	210	2	1	3	120	0.64
	[18]	168	210	0	0	0	120	0.64

Girder Name：G1　Section Name：Sec-5：J-4　（Girder number=　1　Section number=　5）

Section force　Mx =　35375 kN·m　Sy =　-418 kN　T =　-529 kN·m

Effective buckling length　Lx =　4768 mmLy =　4768 mm
Radius of curvature　R =-2007. m
Inclination　DECK =　2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1350	1350
	Intermediate	3000	3000
	overhang	825	825
LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1170 * 16 (SM400)	187.2	187.2
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-DECK-C PL	3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 *	8 (SM400)	269.5	269.5
1-DECK-R PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-LWEB PL	3062 * 15 (SM490Y)	459.4	459.4
1-RWEB PL	2730 * 15 (SM490Y)	409.5	409.5
1-LFLG PL	1740 * 30 (SM490Y)	522.0	522.0
2-RIB PL	200 * 22 (SM490Y)	88.0	88.0

Section property		Total	In-plane
Section area	A (cm2)	2810.4	2810.4
Gravity center	ex (cm)	8.7	8.7
	ey (cm)	167.0	167.0
Moment of inertia	Ix (cm4)	35913494	35913494
	Iy (cm4)	48367273	48367273
Torsion Constant	J (cm4)	24338682	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	45955.9 kN·m	45955.9 kN·m
	Mxr(lower)=	44339.1 kN·m	44339.1 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-97	140	0	0	0	80	0.48
	[2]	-100	140	2	0	3	80	0.51
DECK-C	[3]	-100	140	2	0	3	80	0.51
	[4]	-100	140	3	3	5	80	0.51
	[5]	-106	140	3	3	6	80	0.58
	[6]	-106	140	1	0	1	80	0.58
DECK-R	[7]	-106	140	1	0	1	80	0.58
	[8]	-108	140	0	0	0	80	0.59
LWEB	[9]	-99	210	5	3	8	120	0.23
	[10]	0	210	6	3	9	120	0.01
	[11]	165	210	4	3	7	120	0.62
RWEB	[12]	-105	210	5	3	8	120	0.25
	[13]	0	210	6	3	9	120	0.01
	[14]	165	210	4	3	7	120	0.62
LFLG	[15]	167	210	0	0	0	120	0.64
	[16]	167	210	2	1	3	120	0.64
	[17]	168	210	2	1	3	120	0.64
	[18]	168	210	0	0	0	120	0.64

Girder Name : G1　Section Name : Sec-6:J-5　(Girder number=　1　Section number=　6)

Section force　Mx =　32822 kN·m　Sy =　-893 kN　T =　799 kN·m

Effective buckling length　Lx =　4768 mmLy =　4768 mm
Radius of curvature　R =-2007. m
Inclination　DECK =　2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	1350	1350
		Intermediate	3000	3000
		overhang	825	825
	LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1170 * 16 (SM400)	187.2	187.2
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-DECK-C PL	3361 * 16 (SM400)	537.7	537.7
5-U.RIB	320 * 240 * 8 (SM400)	269.5	269.5
1-DECK-R PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB	320 * 240 * 8 (SM400)	53.9	53.9
1-LWEB PL	3062 * 15 (SM490Y)	459.4	459.4
1-RWEB PL	2730 * 15 (SM490Y)	409.5	409.5
1-LFLG PL	1740 * 26 (SM490Y)	452.4	452.4
2-RIB PL	200 * 22 (SM490Y)	88.0	88.0

Section property			Total	In-plane
Section area	A	(cm2)	2740.8	2740.8
Gravity center	ex	(cm)	7.1	7.1
	ey	(cm)	171.3	171.3
Moment of inertia	Ix	(cm4)	33856249	33856249
	Iy	(cm4)	47878541	47878541
Torsion Constant	J	(cm4)	24018628	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	45102.8 kN·m	45102.8 kN·m
	Mxr(lower)=	40858.3 kN·m	40858.3 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-92	140	0	0	0	80	0.43
	[2]	-94	140	5	0	5	80	0.45
DECK-C	[3]	-94	140	5	0	5	80	0.45
	[4]	-94	140	6	4	9	80	0.46
	[5]	-100	140	7	4	11	80	0.53
	[6]	-101	140	3	0	3	80	0.52
DECK-R	[7]	-101	140	3	0	3	80	0.52
	[8]	-102	140	0	0	0	80	0.53
LWEB	[9]	-93	210	11	4	15	120	0.21
	[10]	0	210	12	4	17	120	0.02
	[11]	167	210	8	4	12	120	0.64
RWEB	[12]	-99	210	11	4	15	120	0.24
	[13]	0	210	12	4	17	120	0.02
	[14]	166	210	8	4	13	120	0.64
LFLG	[15]	169	210	0	0	0	120	0.64
	[16]	169	210	4	2	7	120	0.65
	[17]	169	210	4	2	7	120	0.65
	[18]	169	210	0	0	0	120	0.65

Girder Name : G1   Section Name : Sec-7:J-6   (Girder number=   1   Section number=   7)

Section force Mx =   25506 kN·m   Sy =   -1398 kN   T =   1210 kN·m

Effective buckling length   Lx = 4768 mmLy = 4768 mm
Radius of curvature   R =-2007. m
Inclination   DECK =   2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1350	1350
	Intermediate	3000	3000
	overhang	825	825
LFLG	Intermediate	1500	1500

Section dimensions

Section area(cm2)	Total	in plane
1-DECK-L PL 1170 * 16 (SM400)	187.2	187.2
3-RIB PL 250 * 24 (SM400)	180.0	180.0
1-DECK-C PL 3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 * 8 (SM400)	269.5	269.5
1-DECK-R PL 645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-LWEB PL 3062 * 15 (SM490Y)	459.4	459.4
1-RWEB PL 2730 * 15 (SM490Y)	409.5	409.5
1-LFLG PL 1740 * 17 (SM490Y)	295.8	295.8
2-RIB PL 170 * 17 (SM490Y)	57.8	57.8

Section property

		Total	In-plane
Section area	A (cm2)	2554.0	2554.0
Gravity center	ex (cm)	2.1	2.1
	ey (cm)	183.8	183.8
Moment of inertia	Ix (cm4)	27986227	27986227
	Iy (cm4)	46539760	46539760
Torsion Constant	J (cm4)	22859790	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	42326.7 kN·m	42326.7 kN·m
	Mxr(lower)=	31659.3 kN·m	26520.9 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-75	140	0	0	0	80	0.28
	[2]	-77	140	9	0	9	80	0.31
DECK-C	[3]	-77	140	9	0	9	80	0.31
	[4]	-77	140	9	6	14	80	0.33
	[5]	-83	140	12	6	18	80	0.40
	[6]	-83	140	4	0	4	80	0.36
DECK-R	[7]	-83	140	4	0	4	80	0.36
	[8]	-84	140	0	0	0	80	0.36
LWEB	[9]	-76	210	18	7	25	120	0.17
	[10]	0	210	20	7	27	120	0.05
	[11]	168	210	10	7	17	120	0.66
RWEB	[12]	-81	210	18	7	24	120	0.19
	[13]	0	210	20	7	26	120	0.05
	[14]	168	210	11	7	18	120	0.66
LFLG	[15]	169	210	0	0	0	120	0.65
	[16]	169	210	8	6	14	120	0.66
	[17]	169	210	9	6	15	120	0.66
	[18]	169	210	0	0	0	120	0.65

Girder Name：G1　Section Name：Sec-7:Left　（Girder number=　1　Section number=　8）

Section force　Mx =　14331 kN·m　Sy =　-2093 kN　T =　1255 kN·m

Effective buckling length	Lx = 4768 mmLy = 4768 mm
Radius of curvature	R =-2007. m
Inclination	DECK = 2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	1350	1350
		Intermediate	3000	3000
		overhang	825	825
	LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1170 * 16 (SM400)	187.2	187.2
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-DECK-C PL	3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 *	8 (SM400)	269.5	269.5
1-DECK-R PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-LWEB PL	3062 * 15 (SM490Y)	459.4	459.4
1-RWEB PL	2730 * 15 (SM490Y)	409.5	409.5
1-LFLG PL	1740 * 17 (SM490Y)	295.8	295.8
5-RIB PL	170 * 17 (SM490Y)	144.5	144.5

Section property			Total	In-plane
	Section area	A (cm2)	2640.7	2640.7
	Gravity center	ex (cm)	4.5	4.5
		ey (cm)	178.0	178.0
	Moment of inertia	Ix (cm4)	30565372	30565372
		Iy (cm4)	47129770	47129770
	Torsion Constant	J (cm4)	22859517	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	43518.3 kN·m	43518.3 kN·m
	Mxr(lower)=	35684.9 kN·m	35684.9 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-41	140	0	0	0	80	0.09
	[2]	-42	140	13	0	13	80	0.12
DECK-C	[3]	-42	140	13	0	13	80	0.12
	[4]	-42	140	14	6	17	80	0.14
	[5]	-45	140	17	6	23	80	0.19
	[6]	-45	140	6	0	6	80	0.11
DECK-R	[7]	-45	140	6	0	6	80	0.11
	[8]	-46	140	0	0	0	80	0.11
LWEB	[9]	-42	210	26	7	33	120	0.12
	[10]	0	210	30	7	36	120	0.09
	[11]	84	210	17	7	24	120	0.20
RWEB	[12]	-45	210	26	7	33	120	0.12
	[13]	0	210	29	7	36	120	0.09
	[14]	84	210	18	7	25	120	0.20
LFLG	[15]	84	210	0	0	0	120	0.16
	[16]	84	210	14	6	20	120	0.19
	[17]	84	210	15	6	21	120	0.19
	[18]	84	210	0	0	0	120	0.16

Girder Name：G1　Section Name：Sec-8：J-7　（Girder number=　1　Section number=　9）

Section force　Mx =　13385 kN·m　Sy =　-1759 kN　T =　1617 kN·m

Effective buckling length　Lx =　4768 mmLy =　4768 mm
Radius of curvature　R =-2007. m
Inclination　DECK =　2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1350	1350
	Intermediate	3000	3000
	overhang	825	825
LFLG	Intermediate	1500	1500

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL 1170 * 16 (SM400)	187.2	187.2
3-RIB PL 250 * 24 (SM400)	180.0	180.0
1-DECK-C PL 3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 * 8 (SM400)	269.5	269.5
1-DECK-R PL 645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-LWEB PL 3062 * 15 (SM490Y)	459.4	459.4
1-RWEB PL 2730 * 15 (SM490Y)	409.5	409.5
1-LFLG PL 1740 * 10 (SM490Y)	174.0	174.0
5-RIB PL 170 * 17 (SM490Y)	144.5	144.5

Section property

		Total	In-plane
Section area	A (cm2)	2518.9	2518.9
Gravity center	ex (cm)	1.1	1.1
	ey (cm)	186.7	186.7
Moment of inertia	Ix (cm4)	26455504	26455504
	Iy (cm4)	46187830	46187830
Torsion Constant	J (cm4)	20871932	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	41316.2 kN·m	41316.2 kN·m
	Mxr(lower)=	29573.5 kN·m	26768.7 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-40	140	0	0	0	80	0.08
	[2]	-41	140	11	0	11	80	0.11
DECK-C	[3]	-41	140	11	0	11	80	0.11
	[4]	-41	140	12	8	18	80	0.14
	[5]	-45	140	15	8	23	80	0.18
	[6]	-45	140	5	0	6	80	0.11
DECK-R	[7]	-45	140	5	0	6	80	0.11
	[8]	-45	140	0	0	0	80	0.10
LWEB	[9]	-41	210	23	9	32	120	0.11
	[10]	0	210	26	9	34	120	0.08
	[11]	95	210	12	9	21	120	0.23
RWEB	[12]	-44	210	23	9	31	120	0.11
	[13]	0	210	25	9	34	120	0.08
	[14]	95	210	13	9	22	120	0.24
LFLG	[15]	95	210	0	0	0	120	0.20
	[16]	95	210	17	13	30	120	0.27
	[17]	95	210	19	13	32	120	0.28
	[18]	95	210	0	0	0	120	0.20

Girder Name：G1　Section Name：Sec-8:J-8　（Girder number=　1　Section number=　9）

Section force　Mx =　-8404 kN･m　Sy =　-2505 kN　T =　1628 kN･m

Effective buckling length　Lx =　4768 mmLy =　4768 mm
Radius of curvature　R　=-2007. m
Inclination　DECK =　2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	1350	1316
		Intermediate	3000	2910
		overhang	825	818
	LFLG	Intermediate	1500	1492

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1170 * 16 (SM400)	187.2	181.8
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-DECK-C PL	3361 * 16 (SM400)	537.7	523.4
5-U.RIB	320 * 240 * 8 (SM400)	269.5	215.6
1-DECK-R PL	645 * 16 (SM400)	103.2	102.2
1-U.RIB	320 * 240 * 8 (SM400)	53.9	53.9
1-LWEB PL	3062 * 15 (SM490Y)	459.4	459.4
1-RWEB PL	2730 * 15 (SM490Y)	409.5	409.5
1-LFLG PL	1740 * 10 (SM490Y)	174.0	173.2
5-RIB PL	170 * 17 (SM490Y)	144.5	115.6

Section property			Total	In-plane
Section area	A	(cm2)	2518.9	2414.5
Gravity center	ex	(cm)	1.1	0.6
	ey	(cm)	186.7	186.7
Moment of inertia	Ix	(cm4)	26455504	25111151
	Iy	(cm4)	46187825	45522474
Torsion Constant	J	(cm4)	20871932	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	39205.6 kN･m	39205.6 kN･m
	Mxr(lower)=	28076.4 kN･m	25413.5 kN･m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	27	140	0	0	0	80	0.04
	[2]	27	140	16	0	16	80	0.08
DECK-C	[3]	27	140	16	0	16	80	0.08
	[4]	27	140	17	8	22	80	0.11
	[5]	29	140	21	8	29	80	0.18
	[6]	30	140	8	0	8	80	0.05
DECK-R	[7]	30	140	8	0	8	80	0.05
	[8]	30	140	0	0	0	80	0.05
LWEB	[9]	27	210	33	9	42	120	0.14
	[10]	0	210	37	9	45	120	0.14
	[11]	-63	210	18	9	27	120	0.14
RWEB	[12]	29	210	32	9	41	120	0.14
	[13]	0	210	36	9	45	120	0.14
	[14]	-63	210	19	9	28	120	0.14
LFLG	[15]	-63	190	0	0	0	120	0.09
	[16]	-63	196	24	13	38	120	0.19
	[17]	-63	196	27	13	40	120	0.20
	[18]	-63	190	0	0	0	120	0.09

Girder Name : G1　Section Name : Sec-9:J-9　(Girder number=　1　Section number=　10)

Section force　Mx =　-24157 kN·m　Sy =　-3027 kN　T =　1591 kN·m

Effective buckling length　Lx =　4667 mmLy =　4667 mm
Radius of curvature　R =-2007. m
Inclination　DECK =　2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1350	1271
	Intermediate	3000	2791
	overhang	825	810
LFLG	Intermediate	1500	1481

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL 1170 * 16 (SM400)	187.2	174.5
3-RIB PL 250 * 24 (SM400)	180.0	180.0
1-DECK-C PL 3361 * 16 (SM400)	537.7	504.2
5-U.RIB 320 * 240 * 8 (SM400)	269.5	215.6
1-DECK-R PL 645 * 16 (SM400)	103.2	100.8
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-LWEB PL 3062 * 17 (SM490Y)	520.6	520.6
1-RWEB PL 2730 * 17 (SM490Y)	464.1	464.1
1-LFLG PL 1740 * 10 (SM490Y)	174.0	172.1
5-RIB PL 170 * 17 (SM490Y)	144.5	115.6

Section property

		Total	In-plane
Section area	A (cm2)	2634.8	2501.4
Gravity center	ex (cm)	2.4	2.7
	ey (cm)	184.4	183.4
Moment of inertia	Ix (cm4)	27459265	25871875
	Iy (cm4)	47890792	46571188
Torsion Constant	J (cm4)	22311866	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	38986.9 kN·m	38986.9 kN·m
	Mxr(lower)=	29437.1 kN·m	27504.3 kN·m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	77	140	1	0	1	80	0.30
	[2]	79	140	19	0	19	80	0.38
DECK-C	[3]	79	140	19	0	19	80	0.38
	[4]	79	140	21	8	25	80	0.42
	[5]	85	140	25	8	33	80	0.54
	[6]	86	140	9	0	9	80	0.39
DECK-R	[7]	86	140	9	0	9	80	0.39
	[8]	87	140	0	0	0	80	0.38
LWEB	[9]	78	210	35	8	43	120	0.27
	[10]	1	210	40	8	47	120	0.15
	[11]	-172	210	18	8	26	120	0.71
RWEB	[12]	84	210	34	8	41	120	0.28
	[13]	1	210	38	8	46	120	0.15
	[14]	-171	210	19	8	27	120	0.72
LFLG	[15]	-172	197	0	0	0	120	0.67
	[16]	-172	196	28	13	41	120	0.79
	[17]	-172	196	31	13	43	120	0.80
	[18]	-172	197	0	0	0	120	0.67

Girder Name：G1　Section Name：Sec-10:Mx-Min_L　（Girder number=　1　Section number=　11）

Section force　Mx =　-32242 kN·m　Sy =　-3309 kN　T =　1591 kN·m

Effective buckling length　Lx =　4667 mmLy =　4667 mm
Radius of curvature　R　=-2007. m
Inclination　DECK =　2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1350	1252
	Intermediate	3000	2741
	overhang	825	806
LFLG	Intermediate	1500	1476

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL　1170 * 16 (SM490Y)	187.2	171.5
3-RIB　PL　250 * 24 (SM490Y)	180.0	180.0
1-DECK-C PL　3361 * 16 (SM490Y)	537.7	496.3
5-U.RIB 320 * 240 *　8 (SM490Y)	269.5	215.6
1-DECK-R PL　645 * 16 (SM490Y)	103.2	100.2
1-U.RIB 320 * 240 *　8 (SM490Y)	53.9	53.9
1-LWEB　PL　3062 * 17 (SM490Y)	520.6	520.6
1-RWEB　PL　2730 * 17 (SM490Y)	464.1	464.1
1-LFLG　PL　1740 * 15 (SM490Y)	261.0	257.4
5-RIB　PL　200 * 22 (SM490Y)	220.0	176.0

Section property

		Total	In-plane
Section area	A　(cm2)	2797.3	2635.6
Gravity center	ex (cm)	6.6	7.0
	ey (cm)	174.0	173.1
Moment of inertia	Ix (cm4)	32381360	30178958
	Iy (cm4)	49011073	47332726
Torsion Constant	J　(cm4)	24117680	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	61424.4 kN·m	61424.4 kN·m
	Mxr(lower)=	36259.4 kN·m	36259.4 kN·m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[　1]	99	210	1	0	1	120	0.22
	[　2]	102	210	20	0	20	120	0.26
DECK-C	[　3]	102	210	20	0	20	120	0.26
	[　4]	102	210	22	8	25	120	0.28
	[　5]	108	210	26	8	35	120	0.35
	[　6]	109	210	10	0	10	120	0.28
DECK-R	[　7]	109	210	10	0	10	120	0.28
	[　8]	110	210	0	0	0	120	0.28
LWEB	[　9]	100	210	37	8	44	120	0.36
	[10]	1	210	42	8	49	120	0.17
	[11]	-186	210	24	8	32	120	0.85
RWEB	[12]	107	210	36	8	43	120	0.39
	[13]	1	210	41	8	48	120	0.16
	[14]	-185	210	25	8	33	120	0.85
LFLG	[15]	-187	210	0	0	0	120	0.79
	[16]	-187	210	25	9	34	120	0.87
	[17]	-187	210	26	9	35	120	0.88
	[18]	-187	210	0	0	0	120	0.79

Girder Name:G1　Section Name:Sec-10:Mx-Min_R　（Girder number=　1　Section number=　11）

Section force　Mx =　-32244 kN·m　Sy =　2764 kN　T =　1323 kN·m

Effective buckling length　Lx =　4743 mmLy =　4743 mm
Radius of curvature　R　=-2007. m
Inclination　DECK =　2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	1350	1252
		Intermediate	3000	2741
		overhang	825	806
	LFLG	Intermediate	1500	1476

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1170 * 16 (SM490Y)	187.2	171.5
3-RIB PL	250 * 24 (SM490Y)	180.0	180.0
1-DECK-C PL	3361 * 16 (SM490Y)	537.7	496.3
5-U.RIB	320 * 240 * 8 (SM490Y)	269.5	215.6
1-DECK-R PL	645 * 16 (SM490Y)	103.2	100.2
1-U.RIB	320 * 240 * 8 (SM490Y)	53.9	53.9
1-LWEB PL	3062 * 17 (SM490Y)	520.6	520.6
1-RWEB PL	2730 * 17 (SM490Y)	464.1	464.1
1-LFLG PL	1740 * 15 (SM490Y)	261.0	257.4
5-RIB PL	200 * 22 (SM490Y)	220.0	176.0

Section property			Total	In-plane
Section area	A	(cm2)	2797.3	2635.6
Gravity center	ex	(cm)	6.6	7.0
	ey	(cm)	174.0	173.1
Moment of inertia	Ix	(cm4)	32381360	30178958
	Iy	(cm4)	49011073	47332726
Torsion Constant	J	(cm4)	24117680	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	61424.4 kN·m	61424.4 kN·m
	Mxr(lower)=	36259.4 kN·m	36259.4 kN·m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	99	210	1	0	1	120	0.22
	[2]	102	210	17	0	17	120	0.25
DECK-C	[3]	102	210	17	0	17	120	0.25
	[4]	102	210	18	7	21	120	0.27
	[5]	108	210	22	7	29	120	0.32
	[6]	109	210	8	0	8	120	0.27
DECK-R	[7]	109	210	8	0	8	120	0.27
	[8]	110	210	0	0	0	120	0.28
LWEB	[9]	100	210	31	6	37	120	0.32
	[10]	1	210	35	6	41	120	0.12
	[11]	-186	210	20	6	26	120	0.83
RWEB	[12]	107	210	30	6	36	120	0.35
	[13]	1	210	34	6	40	120	0.11
	[14]	-185	210	21	6	27	120	0.83
LFLG	[15]	-187	210	0	0	0	120	0.79
	[16]	-187	210	21	7	28	120	0.84
	[17]	-187	210	22	7	29	120	0.85
	[18]	-187	210	0	0	0	120	0.79

Girder Name : G1　Section Name : Sec-11:J-10　 (Girder number=　1　Section number=　12)

Section force　Mx =　-25838 kN·m　Sy =　　2474 kN　T =　　1323 kN·m

Effective buckling length　　Lx =　4743 mmLy =　4743 mm
Radius of curvature　　　　　R　=-2007. m
Inclination　　　　　　　　　DECK =　2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1350	1271
	Intermediate	3000	2791
	overhang	825	810
LFLG	Intermediate	1500	1481

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL 1170 * 16 (SM400)	187.2	174.6
3-RIB PL 250 * 24 (SM400)	180.0	180.0
1-DECK-C PL 3361 * 16 (SM400)	537.7	504.3
5-U.RIB 320 * 240 * 8 (SM400)	269.5	215.6
1-DECK-R PL 645 * 16 (SM400)	103.2	100.8
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-LWEB PL 3062 * 17 (SM490Y)	520.6	520.6
1-RWEB PL 2730 * 17 (SM490Y)	464.1	464.1
1-LFLG PL 1740 * 12 (SM490Y)	208.8	206.5
5-RIB PL 170 * 17 (SM490Y)	144.5	115.6

Section property

		Total	In-plane
Section area	A (cm2)	2669.6	2535.9
Gravity center	ex (cm)	3.3	3.7
	ey (cm)	182.0	180.9
Moment of inertia	Ix (cm4)	28641663	27028421
	Iy (cm4)	48159563	46837618
Torsion Constant	J (cm4)	23177494	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	39660.0 kN·m	39660.0 kN·m
	Mxr(lower)=	31142.1 kN·m	31142.1 kN·m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	81	140	1	0	1	80	0.34
	[2]	83	140	15	0	16	80	0.39
DECK-C	[3]	83	140	15	0	16	80	0.39
	[4]	84	140	17	7	20	80	0.42
	[5]	90	140	20	7	27	80	0.52
	[6]	90	140	7	0	8	80	0.42
DECK-R	[7]	90	140	7	0	8	80	0.42
	[8]	91	140	0	0	0	80	0.42
LWEB	[9]	82	210	28	6	35	120	0.24
	[10]	1	210	32	6	38	120	0.10
	[11]	-174	210	16	6	22	120	0.72
RWEB	[12]	88	210	27	6	34	120	0.25
	[13]	1	210	31	6	37	120	0.10
	[14]	-173	210	17	6	23	120	0.72
LFLG	[15]	-174	210	0	0	0	120	0.69
	[16]	-174	210	20	9	29	120	0.75
	[17]	-174	210	22	9	31	120	0.75
	[18]	-174	210	0	0	0	120	0.69

Girder Name : G1   Section Name : Sec-12:J-11   (Girder number= 1   Section number= 13)

Section force Mx = -13800 kN·m   Sy =   1871 kN   T =   1095 kN·m

Effective buckling length   Lx = 4818 mmLy = 4818 mm
Radius of curvature   R =-2007. m
Inclination   DECK =   2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1350	1316
	Intermediate	3000	2911
	overhang	825	818
LFLG	Intermediate	1500	1492

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1170 * 16 (SM400)	187.2	181.8
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-DECK-C PL	3361 * 16 (SM400)	537.7	523.5
5-U.RIB	320 * 240 * 8 (SM400)	269.5	215.6
1-DECK-R PL	645 * 16 (SM400)	103.2	102.2
1-U.RIB	320 * 240 * 8 (SM400)	53.9	53.9
1-LWEB PL	3062 * 15 (SM490Y)	459.4	459.4
1-RWEB PL	2730 * 15 (SM490Y)	409.5	409.5
1-LFLG PL	1740 * 10 (SM490Y)	174.0	173.2
5-RIB PL	170 * 17 (SM490Y)	144.5	115.6

Section property		Total	In-plane
Section area	A (cm2)	2518.9	2414.7
Gravity center	ex (cm)	1.1	0.6
	ey (cm)	186.7	186.7
Moment of inertia	Ix (cm4)	26455504	25112254
	Iy (cm4)	46187825	45525024
Torsion Constant	J (cm4)	20871932	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	39209.8 kN·m	39209.8 kN·m
	Mxr(lower)=	28076.8 kN·m	25413.9 kN·m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	44	140	0	0	0	80	0.10
	[2]	45	140	12	0	12	80	0.12
DECK-C	[3]	45	140	12	0	12	80	0.12
	[4]	45	140	13	6	16	80	0.14
	[5]	48	140	16	6	21	80	0.19
	[6]	49	140	6	0	6	80	0.13
DECK-R	[7]	49	140	6	0	6	80	0.13
	[8]	49	140	0	0	0	80	0.12
LWEB	[9]	44	210	25	6	31	120	0.11
	[10]	0	210	27	6	33	120	0.08
	[11]	-103	210	13	6	19	120	0.27
RWEB	[12]	47	210	24	6	30	120	0.11
	[13]	0	210	27	6	33	120	0.07
	[14]	-103	210	14	6	20	120	0.27
LFLG	[15]	-103	190	0	0	0	120	0.24
	[16]	-103	196	18	9	27	120	0.29
	[17]	-103	196	20	9	29	120	0.30
	[18]	-103	190	0	0	0	120	0.24

Girder Name : G1　Section Name : Sec-12:J-12　(Girder number= 1　Section number= 13)

Section force	Mx-Max	Mx = 2060 kN·m	Sy = 1111 kN	T = 1085 kN·m
	Mx-Min	Mx = -6001 kN·m	Sy = 1111 kN	T = 1085 kN·m

Effective buckling length　Lx = 4818 mmLy = 4818 mm
Radius of curvature　R =-2007. m
Inclination　DECK = 2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	1350	1350
		Intermediate	3000	3000
		overhang	825	825
	LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1170 * 16 (SM400)	187.2	187.2
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-DECK-C PL	3361 * 16 (SM400)	537.7	537.7
5-U.RIB	320 * 240 * 8 (SM400)	269.5	269.5
1-DECK-R PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB	320 * 240 * 8 (SM400)	53.9	53.9
1-LWEB PL	3062 * 15 (SM490Y)	459.4	459.4
1-RWEB PL	2730 * 15 (SM490Y)	409.5	409.5
1-LFLG PL	1740 * 10 (SM490Y)	174.0	174.0
5-RIB PL	170 * 17 (SM490Y)	144.5	144.5

Section property			Total	In-plane
	Section area	A (cm2)	2518.9	2518.9
	Gravity center	ex (cm)	1.1	1.1
		ey (cm)	186.7	186.7
	Moment of inertia	Ix (cm4)	26455504	26455504
		Iy (cm4)	46187830	46187830
	Torsion Constant	J (cm4)	20871932	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	41316.2 kN·m	41316.2 kN·m
	Mxr(lower)=	29573.5 kN·m	26768.7 kN·m

Stress (N/mm²)

Mx-Max	[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	-6	140	0	0	0	80	0.00
		[2]	-6	140	7	0	7	80	0.01
	DECK-C	[3]	-6	140	7	0	7	80	0.01
		[4]	-6	140	8	6	12	80	0.02
		[5]	-7	140	9	6	15	80	0.04
		[6]	-7	140	3	0	3	80	0.00
	DECK-R	[7]	-7	140	3	0	3	80	0.00
		[8]	-7	140	0	0	0	80	0.00
	LWEB	[9]	-6	210	15	6	21	120	0.03
		[10]	0	210	16	6	22	120	0.03
		[11]	15	210	8	6	14	120	0.02
	RWEB	[12]	-7	210	14	6	20	120	0.03
		[13]	0	210	16	6	22	120	0.03
		[14]	15	210	8	6	14	120	0.02
	LFLG	[15]	15	210	0	0	0	120	0.00
		[16]	15	210	11	9	20	120	0.03
		[17]	15	210	12	9	21	120	0.03
		[18]	15	210	0	0	0	120	0.00

Mx-Min	[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	18	140	0	0	0	80	0.02
		[2]	18	140	7	0	7	80	0.03
	DECK-C	[3]	18	140	7	0	7	80	0.03
		[4]	19	140	8	6	12	80	0.04
		[5]	20	140	9	6	15	80	0.05
		[6]	20	140	3	0	3	80	0.02
	DECK-R	[7]	20	140	3	0	3	80	0.02
		[8]	20	140	0	0	0	80	0.02
	LWEB	[9]	18	210	15	6	21	120	0.04
		[10]	0	210	16	6	22	120	0.03
		[11]	-42	210	8	6	14	120	0.05
	RWEB	[12]	20	210	14	6	20	120	0.04
		[13]	0	210	16	6	22	120	0.03
		[14]	-42	210	8	6	14	120	0.06
	LFLG	[15]	-43	190	0	0	0	120	0.04
		[16]	-43	196	11	9	20	120	0.07
		[17]	-43	196	12	9	21	120	0.07
		[18]	-43	190	0	0	0	120	0.04

Girder Name : G1　Section Name : Sec-13:Left　(Girder number=　1　Section number=　14)

Section force	Mx-Max	Mx = 2060 kN·m	Sy = 1111 kN	T = 1085 kN·m
	Mx-Min	Mx = -6001 kN·m	Sy = 1111 kN	T = 1085 kN·m

Effective buckling length　　Lx = 4818 mmLy = 4818 mm
Radius of curvature　　R =-2007. m
Inclination　　DECK = 2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	1350	1350
		Intermediate	3000	3000
		overhang	825	825
	LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1170 * 16 (SM400)	187.2	187.2
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-DECK-C PL	3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 *	8 (SM400)	269.5	269.5
1-DECK-R PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-LWEB PL	3062 * 15 (SM490Y)	459.4	459.4
1-RWEB PL	2730 * 15 (SM490Y)	409.5	409.5
1-LFLG PL	1740 * 10 (SM490Y)	174.0	174.0
5-RIB PL	170 * 17 (SM490Y)	144.5	144.5

Section property		Total	In-plane
Section area	A (cm2)	2518.9	2518.9
Gravity center	ex (cm)	1.1	1.1
	ey (cm)	186.7	186.7
Moment of inertia	Ix (cm4)	26455504	26455504
	Iy (cm4)	46187830	46187830
Torsion Constant	J (cm4)	20871932	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	41316.2 kN·m	41316.2 kN·m
	Mxr(lower)=	29573.5 kN·m	26768.7 kN·m

Stress (N/mm²)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-6	140	0	0	0	80	0.00
	[2]	-6	140	7	0	7	80	0.01
DECK-C	[3]	-6	140	7	0	7	80	0.01
	[4]	-6	140	8	6	12	80	0.02
	[5]	-7	140	9	6	15	80	0.04
	[6]	-7	140	3	0	3	80	0.00
DECK-R	[7]	-7	140	3	0	3	80	0.00
	[8]	-7	140	0	0	0	80	0.00
LWEB	[9]	-6	210	15	6	21	120	0.03
	[10]	0	210	16	6	22	120	0.03
	[11]	15	210	8	6	14	120	0.02
RWEB	[12]	-7	210	14	6	20	120	0.03
	[13]	0	210	16	6	22	120	0.03
	[14]	15	210	8	6	14	120	0.02
LFLG	[15]	15	210	0	0	0	120	0.00
	[16]	15	210	11	9	20	120	0.03
	[17]	15	210	12	9	21	120	0.03
	[18]	15	210	0	0	0	120	0.00

Mx-Min	[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	18	140	0	0	0	80	0.02
		[2]	18	140	7	0	7	80	0.03
	DECK-C	[3]	18	140	7	0	7	80	0.03
		[4]	19	140	8	6	12	80	0.04
		[5]	20	140	9	6	15	80	0.05
		[6]	20	140	3	0	3	80	0.02
	DECK-R	[7]	20	140	3	0	3	80	0.02
		[8]	20	140	0	0	0	80	0.02
	LWEB	[9]	18	210	15	6	21	120	0.04
		[10]	0	210	16	6	22	120	0.03
		[11]	-42	210	8	6	14	120	0.05
	RWEB	[12]	20	210	14	6	20	120	0.04
		[13]	0	210	16	6	22	120	0.03
		[14]	-42	210	8	6	14	120	0.06
	LFLG	[15]	-43	190	0	0	0	120	0.04
		[16]	-43	196	11	9	20	120	0.07
		[17]	-43	196	12	9	21	120	0.07
		[18]	-43	190	0	0	0	120	0.04

Girder Name : G1 Section Name : Sec-13:J-13 (Girder number= 1 Section number= 14)

Section force	Mx-Max	Mx = 7676 kN·m	Sy = 632 kN	T = 883 kN·m
	Mx-Min	Mx = -2296 kN·m	Sy = 632 kN	T = 883 kN·m

Effective buckling length Lx = 4818 mmLy = 4818 mm
Radius of curvature R =-2007. m
Inclination DECK = 2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1350	1350
	Intermediate	3000	3000
	overhang	825	825
LFLG	Intermediate	1500	1500

Section dimensions Section area(cm2)

	Total	in plane
1-DECK-L PL 1170 * 16 (SM400)	187.2	187.2
3-RIB PL 250 * 24 (SM400)	180.0	180.0
1-DECK-C PL 3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 * 8 (SM400)	269.5	269.5
1-DECK-R PL 645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-LWEB PL 3062 * 15 (SM490Y)	459.4	459.4
1-RWEB PL 2730 * 15 (SM490Y)	409.5	409.5
1-LFLG PL 1740 * 10 (SM490Y)	174.0	174.0
5-RIB PL 170 * 17 (SM490Y)	144.5	144.5

Section property

		Total	In-plane
Section area	A (cm2)	2518.9	2518.9
Gravity center	ex (cm)	1.1	1.1
	ey (cm)	186.7	186.7
Moment of inertia	Ix (cm4)	26455504	26455504
	Iy (cm4)	46187830	46187830
Torsion Constant	J (cm4)	20871932	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	41316.2 kN·m	41316.2 kN·m
	Mxr(lower)=	29573.5 kN·m	26768.7 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-23	140	0	0	0	80	0.03
	[2]	-24	140	4	0	4	80	0.03
DECK-C	[3]	-24	140	4	0	4	80	0.03
	[4]	-24	140	4	4	8	80	0.04
	[5]	-26	140	5	4	10	80	0.05
	[6]	-26	140	2	0	2	80	0.03
DECK-R	[7]	-26	140	2	0	2	80	0.03
	[8]	-26	140	0	0	0	80	0.03
LWEB	[9]	-23	210	8	5	13	120	0.02
	[10]	0	210	9	5	14	120	0.01
	[11]	54	210	4	5	9	120	0.07
RWEB	[12]	-25	210	8	5	13	120	0.03
	[13]	0	210	9	5	14	120	0.01
	[14]	54	210	5	5	10	120	0.07
LFLG	[15]	54	210	0	0	0	120	0.07
	[16]	54	210	6	7	13	120	0.08
	[17]	55	210	7	7	14	120	0.08
	[18]	55	210	0	0	0	120	0.07

Mx-Min	[Check point]		σ mx	σ a	τ sy	τ t	Σ τ	τ a	κ
	DECK-L	[1]	7	140	0	0	0	80	0.00
		[2]	7	140	4	0	4	80	0.01
	DECK-C	[3]	7	140	4	0	4	80	0.01
		[4]	7	140	4	4	8	80	0.01
		[5]	8	140	5	4	10	80	0.02
		[6]	8	140	2	0	2	80	0.00
	DECK-R	[7]	8	140	2	0	2	80	0.00
		[8]	8	140	0	0	0	80	0.00
	LWEB	[9]	7	210	8	5	13	120	0.01
		[10]	0	210	9	5	14	120	0.01
		[11]	-16	210	4	5	9	120	0.01
	RWEB	[12]	7	210	8	5	13	120	0.01
		[13]	0	210	9	5	14	120	0.01
		[14]	-16	210	5	5	10	120	0.01
	LFLG	[15]	-16	190	0	0	0	120	0.01
		[16]	-16	196	6	7	13	120	0.02
		[17]	-16	196	7	7	14	120	0.02
		[18]	-16	190	0	0	0	120	0.01

Girder Name : G1   Section Name : Sec-14:Left   (Girder number= 1   Section number= 15)

Section force	Mx-Max	Mx = 7676 kN·m	Sy = 632 kN	T = 883 kN·m
	Mx-Min	Mx = -2296 kN·m	Sy = 632 kN	T = 883 kN·m

Effective buckling length   Lx = 4818 mmLy = 4818 mm
Radius of curvature   R =-2007. m
Inclination   DECK = 2.0 %

Effective width(mm)		Full width	In-plane
DECK	overhang	1350	1350
	Intermediate	3000	3000
	overhang	825	825
LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L	PL 1170 * 16 (SM400)	187.2	187.2
3-RIB	PL 250 * 24 (SM400)	180.0	180.0
1-DECK-C	PL 3361 * 16 (SM400)	537.7	537.7
5-U.RIB	320 * 240 * 8 (SM400)	269.5	269.5
1-DECK-R	PL 645 * 16 (SM400)	103.2	103.2
1-U.RIB	320 * 240 * 8 (SM400)	53.9	53.9
1-LWEB	PL 3062 * 15 (SM490Y)	459.4	459.4
1-RWEB	PL 2730 * 15 (SM490Y)	409.5	409.5
1-LFLG	PL 1740 * 10 (SM490Y)	174.0	174.0
5-RIB	PL 170 * 17 (SM490Y)	144.5	144.5

Section property		Total	In-plane
Section area	A (cm2)	2518.9	2518.9
Gravity center	ex (cm)	1.1	1.1
	ey (cm)	186.7	186.7
Moment of inertia	Ix (cm4)	26455504	26455504
	Iy (cm4)	46187830	46187830
Torsion Constant	J (cm4)	20871932	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	41316.2 kN·m	41316.2 kN·m
	Mxr(lower)=	29573.5 kN·m	26768.7 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-23	140	0	0	0	80	0.03
	[2]	-24	140	4	0	4	80	0.03
DECK-C	[3]	-24	140	4	0	4	80	0.03
	[4]	-24	140	4	4	8	80	0.04
	[5]	-26	140	5	4	10	80	0.05
	[6]	-26	140	2	0	2	80	0.03
DECK-R	[7]	-26	140	2	0	2	80	0.03
	[8]	-26	140	0	0	0	80	0.03
LWEB	[9]	-23	210	8	5	13	120	0.02
	[10]	0	210	9	5	14	120	0.01
	[11]	54	210	4	5	9	120	0.07
RWEB	[12]	-25	210	8	5	13	120	0.03
	[13]	0	210	9	5	14	120	0.01
	[14]	54	210	5	5	10	120	0.07
LFLG	[15]	54	210	0	0	0	120	0.07
	[16]	54	210	6	7	13	120	0.08
	[17]	55	210	7	7	14	120	0.08
	[18]	55	210	0	0	0	120	0.07

Mx-Min	[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	7	140	0	0	0	80	0.00
		[2]	7	140	4	0	4	80	0.01
	DECK-C	[3]	7	140	4	0	4	80	0.01
		[4]	7	140	4	4	8	80	0.01
		[5]	8	140	5	4	10	80	0.02
		[6]	8	140	2	0	2	80	0.00
	DECK-R	[7]	8	140	2	0	2	80	0.00
		[8]	8	140	0	0	0	80	0.00
	LWEB	[9]	7	210	8	5	13	120	0.01
		[10]	0	210	9	5	14	120	0.01
		[11]	-16	210	4	5	9	120	0.01
	RWEB	[12]	7	210	8	5	13	120	0.01
		[13]	0	210	9	5	14	120	0.01
		[14]	-16	210	5	5	10	120	0.01
	LFLG	[15]	-16	190	0	0	0	120	0.01
		[16]	-16	196	6	7	13	120	0.02
		[17]	-16	196	7	7	14	120	0.02
		[18]	-16	190	0	0	0	120	0.01

Girder Name : G1 Section Name : Sec-14:Mx-Max (Girder number= 1 Section number= 15)

Section force	Mx-Max	Mx = 9254 kN·m	Sy =	-434 kN	T =	663 kN·m
	Mx-Min	Mx = -1629 kN·m	Sy =	-434 kN	T =	663 kN·m

Effective buckling length Lx = 4818 mmLy = 4818 mm
Radius of curvature R =-2007. m
Inclination DECK = 2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	1350	1350
		Intermediate	3000	3000
		overhang	825	825
	LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L	PL 1170 * 16 (SM400)	187.2	187.2
3-RIB	PL 250 * 24 (SM400)	180.0	180.0
1-DECK-C	PL 3361 * 16 (SM400)	537.7	537.7
5-U.RIB	320 * 240 * 8 (SM400)	269.5	269.5
1-DECK-R	PL 645 * 16 (SM400)	103.2	103.2
1-U.RIB	320 * 240 * 8 (SM400)	53.9	53.9
1-LWEB	PL 3062 * 15 (SM490Y)	459.4	459.4
1-RWEB	PL 2730 * 15 (SM490Y)	409.5	409.5
1-LFLG	PL 1740 * 10 (SM490Y)	174.0	174.0
5-RIB	PL 170 * 17 (SM490Y)	144.5	144.5

Section property			Total	In-plane
	Section area	A (cm2)	2518.9	2518.9
	Gravity center	ex (cm)	1.1	1.1
		ey (cm)	186.7	186.7
	Moment of inertia	Ix (cm4)	26455504	26455504
		Iy (cm4)	46187830	46187830
	Torsion Constant	J (cm4)	20871932	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	41316.2 kN·m	41316.2 kN·m
	Mxr(lower)=	29573.5 kN·m	26768.7 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-28	140	0	0	0	80	0.04
	[2]	-28	140	3	0	3	80	0.04
DECK-C	[3]	-28	140	3	0	3	80	0.04
	[4]	-29	140	3	3	6	80	0.05
	[5]	-31	140	4	3	7	80	0.06
	[6]	-31	140	1	0	1	80	0.05
DECK-R	[7]	-31	140	1	0	1	80	0.05
	[8]	-31	140	0	0	0	80	0.05
LWEB	[9]	-28	210	6	4	9	120	0.02
	[10]	0	210	6	4	10	120	0.01
	[11]	65	210	3	4	7	120	0.10
RWEB	[12]	-30	210	6	4	9	120	0.03
	[13]	0	210	6	4	10	120	0.01
	[14]	65	210	3	4	7	120	0.10
LFLG	[15]	66	210	0	0	0	120	0.10
	[16]	66	210	4	5	10	120	0.10
	[17]	66	210	5	5	10	120	0.10
	[18]	66	210	0	0	0	120	0.10

Mx-Min	[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	5	140	0	0	0	80	0.00
		[2]	5	140	3	0	3	80	0.00
	DECK-C	[3]	5	140	3	0	3	80	0.00
		[4]	5	140	3	3	6	80	0.01
		[5]	5	140	4	3	7	80	0.01
		[6]	5	140	1	0	1	80	0.00
	DECK-R	[7]	5	140	1	0	1	80	0.00
		[8]	6	140	0	0	0	80	0.00
	LWEB	[9]	5	210	6	4	9	120	0.01
		[10]	0	210	6	4	10	120	0.01
		[11]	-12	210	3	4	7	120	0.01
	RWEB	[12]	5	210	6	4	9	120	0.01
		[13]	0	210	6	4	10	120	0.01
		[14]	-12	210	3	4	7	120	0.01
	LFLG	[15]	-12	190	0	0	0	120	0.00
		[16]	-12	196	4	5	10	120	0.01
		[17]	-12	196	5	5	10	120	0.01
		[18]	-12	190	0	0	0	120	0.00

Girder Name : G1   Section Name : Sec-14:J-14   (Girder number= 1   Section number= 15)

Section force	Mx-Max	Mx = 9245 kN·m	Sy =	-472 kN	T =	663 kN·m
	Mx-Min	Mx = -1687 kN·m	Sy =	-472 kN	T =	663 kN·m

Effective buckling length   Lx = 4818 mmLy = 4818 mm
Radius of curvature   R =-2007. m
Inclination   DECK = 2.0 %

Effective width(mm)		Full width	In-plane
DECK	overhang	1350	1350
	Intermediate	3000	3000
	overhang	825	825
LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1170 * 16 (SM400)	187.2	187.2
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-DECK-C PL	3361 * 16 (SM400)	537.7	537.7
5-U.RIB	320 * 240 * 8 (SM400)	269.5	269.5
1-DECK-R PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB	320 * 240 * 8 (SM400)	53.9	53.9
1-LWEB PL	3062 * 15 (SM490Y)	459.4	459.4
1-RWEB PL	2730 * 15 (SM490Y)	409.5	409.5
1-LFLG PL	1740 * 10 (SM490Y)	174.0	174.0
5-RIB PL	170 * 17 (SM490Y)	144.5	144.5

Section property		Total	In-plane
Section area	A (cm2)	2518.9	2518.9
Gravity center	ex (cm)	1.1	1.1
	ey (cm)	186.7	186.7
Moment of inertia	Ix (cm4)	26455504	26455504
	Iy (cm4)	46187830	46187830
Torsion Constant	J (cm4)	20871932	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	41316.2 kN·m	41316.2 kN·m
	Mxr(lower)=	29573.5 kN·m	26768.7 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-28	140	0	0	0	80	0.04
	[2]	-28	140	3	0	3	80	0.04
DECK-C	[3]	-28	140	3	0	3	80	0.04
	[4]	-29	140	3	3	6	80	0.05
	[5]	-31	140	4	3	7	80	0.06
	[6]	-31	140	1	0	2	80	0.05
DECK-R	[7]	-31	140	1	0	2	80	0.05
	[8]	-31	140	0	0	0	80	0.05
LWEB	[9]	-28	210	6	4	10	120	0.02
	[10]	0	210	7	4	10	120	0.01
	[11]	65	210	3	4	7	120	0.10
RWEB	[12]	-30	210	6	4	10	120	0.03
	[13]	0	210	7	4	10	120	0.01
	[14]	65	210	4	4	7	120	0.10
LFLG	[15]	66	210	0	0	0	120	0.10
	[16]	66	210	5	5	10	120	0.10
	[17]	66	210	5	5	10	120	0.11
	[18]	66	210	0	0	0	120	0.10

Mx-Min	[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	5	140	0	0	0	80	0.00
		[2]	5	140	3	0	3	80	0.00
	DECK-C	[3]	5	140	3	0	3	80	0.00
		[4]	5	140	3	3	6	80	0.01
		[5]	6	140	4	3	7	80	0.01
		[6]	6	140	1	0	2	80	0.00
	DECK-R	[7]	6	140	1	0	2	80	0.00
		[8]	6	140	0	0	0	80	0.00
	LWEB	[9]	5	210	6	4	10	120	0.01
		[10]	0	210	7	4	10	120	0.01
		[11]	-12	210	3	4	7	120	0.01
	RWEB	[12]	6	210	6	4	10	120	0.01
		[13]	0	210	7	4	10	120	0.01
		[14]	-12	210	4	4	7	120	0.01
	LFLG	[15]	-12	190	0	0	0	120	0.00
		[16]	-12	196	5	5	10	120	0.01
		[17]	-12	196	5	5	10	120	0.01
		[18]	-12	190	0	0	0	120	0.00

Girder Name : G1 Section Name : Sec-15:Left (Girder number= 1 Section number= 16)

Section force	Mx-Max	Mx = 9245 kN·m	Sy = -472 kN	T = 663 kN·m
	Mx-Min	Mx = -1687 kN·m	Sy = -472 kN	T = 663 kN·m

Effective buckling length Lx = 4818 mmLy = 4818 mm
Radius of curvature R =-2007. m
Inclination DECK = 2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	1350	1350
		Intermediate	3000	3000
		overhang	825	825
	LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1170 * 16 (SM400)	187.2	187.2
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-DECK-C PL	3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 *	8 (SM400)	269.5	269.5
1-DECK-R PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-LWEB PL	3062 * 15 (SM490Y)	459.4	459.4
1-RWEB PL	2730 * 15 (SM490Y)	409.5	409.5
1-LFLG PL	1740 * 10 (SM490Y)	174.0	174.0
5-RIB PL	170 * 17 (SM490Y)	144.5	144.5

Section property			Total	In-plane
	Section area	A (cm2)	2518.9	2518.9
	Gravity center	ex (cm)	1.1	1.1
		ey (cm)	186.7	186.7
	Moment of inertia	Ix (cm4)	26455504	26455504
		Iy (cm4)	46187830	46187830
	Torsion Constant	J (cm4)	20871932	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	41316.2 kN·m	41316.2 kN·m
	Mxr(lower)=	29573.5 kN·m	26768.7 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-28	140	0	0	0	80	0.04
	[2]	-28	140	3	0	3	80	0.04
DECK-C	[3]	-28	140	3	0	3	80	0.04
	[4]	-29	140	3	3	6	80	0.05
	[5]	-31	140	4	3	7	80	0.06
	[6]	-31	140	1	0	2	80	0.05
DECK-R	[7]	-31	140	1	0	2	80	0.05
	[8]	-31	140	0	0	0	80	0.05
LWEB	[9]	-28	210	6	4	10	120	0.02
	[10]	0	210	7	4	10	120	0.01
	[11]	65	210	3	4	7	120	0.10
RWEB	[12]	-30	210	6	4	10	120	0.03
	[13]	0	210	7	4	10	120	0.01
	[14]	65	210	4	4	7	120	0.10
LFLG	[15]	66	210	0	0	0	120	0.10
	[16]	66	210	5	5	10	120	0.10
	[17]	66	210	5	5	10	120	0.11
	[18]	66	210	0	0	0	120	0.10

Mx-Min	[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	5	140	0	0	0	80	0.00
		[2]	5	140	3	0	3	80	0.00
	DECK-C	[3]	5	140	3	0	3	80	0.00
		[4]	5	140	3	3	6	80	0.01
		[5]	6	140	4	3	7	80	0.01
		[6]	6	140	1	0	2	80	0.00
	DECK-R	[7]	6	140	1	0	2	80	0.00
		[8]	6	140	0	0	0	80	0.00
	LWEB	[9]	5	210	6	4	10	120	0.01
		[10]	0	210	7	4	10	120	0.01
		[11]	-12	210	3	4	7	120	0.01
	RWEB	[12]	6	210	6	4	10	120	0.01
		[13]	0	210	7	4	10	120	0.01
		[14]	-12	210	4	4	7	120	0.01
	LFLG	[15]	-12	190	0	0	0	120	0.00
		[16]	-12	196	5	5	10	120	0.01
		[17]	-12	196	5	5	10	120	0.01
		[18]	-12	190	0	0	0	120	0.00

Girder Name : G1　Section Name : Sec-15:J-15　(Girder number= 1　Section number= 16)

Section force	Mx-Max	Mx = 7093 kN・m	Sy = -871 kN	T = 703 kN・m
	Mx-Min	Mx = -4760 kN・m	Sy = -871 kN	T = 703 kN・m

Effective buckling length　Lx = 4818 mmLy = 4818 mm
Radius of curvature　R =-2007. m
Inclination　DECK = 2.0 %

Effective width(mm)		Full width	In-plane
DECK	overhang	1350	1350
	Intermediate	3000	3000
	overhang	825	825
LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1170 * 16 (SM400)	187.2	187.2
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-DECK-C PL	3361 * 16 (SM400)	537.7	537.7
5-U.RIB	320 * 240 * 8 (SM400)	269.5	269.5
1-DECK-R PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB	320 * 240 * 8 (SM400)	53.9	53.9
1-LWEB PL	3062 * 15 (SM490Y)	459.4	459.4
1-RWEB PL	2730 * 15 (SM490Y)	409.5	409.5
1-LFLG PL	1740 * 10 (SM490Y)	174.0	174.0
5-RIB PL	170 * 17 (SM490Y)	144.5	144.5

Section property			Total	In-plane
Section area	A	(cm2)	2518.9	2518.9
Gravity center	ex	(cm)	1.1	1.1
	ey	(cm)	186.7	186.7
Moment of inertia	Ix	(cm4)	26455504	26455504
	Iy	(cm4)	46187830	46187830
Torsion Constant	J	(cm4)	20871932	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	41316.2 kN・m	41316.2 kN・m
	Mxr(lower)=	29573.5 kN・m	26768.7 kN・m

Stress (N/mm²)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-21	140	0	0	0	80	0.02
	[2]	-22	140	6	0	6	80	0.03
DECK-C	[3]	-22	140	6	0	6	80	0.03
	[4]	-22	140	6	4	8	80	0.04
	[5]	-24	140	7	4	11	80	0.05
	[6]	-24	140	3	0	3	80	0.03
DECK-R	[7]	-24	140	3	0	3	80	0.03
	[8]	-24	140	0	0	0	80	0.03
LWEB	[9]	-22	210	12	4	15	120	0.03
	[10]	0	210	13	4	17	120	0.02
	[11]	50	210	6	4	10	120	0.06
RWEB	[12]	-23	210	11	4	15	120	0.03
	[13]	0	210	12	4	16	120	0.02
	[14]	50	210	7	4	10	120	0.06
LFLG	[15]	50	210	0	0	0	120	0.06
	[16]	50	210	8	6	14	120	0.07
	[17]	50	210	9	6	15	120	0.07
	[18]	50	210	0	0	0	120	0.06

Mx-Min	[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	14	140	0	0	0	80	0.01
		[2]	15	140	6	0	6	80	0.02
	DECK-C	[3]	15	140	6	0	6	80	0.02
		[4]	15	140	6	4	8	80	0.02
		[5]	16	140	7	4	11	80	0.03
		[6]	16	140	3	0	3	80	0.01
	DECK-R	[7]	16	140	3	0	3	80	0.01
		[8]	16	140	0	0	0	80	0.01
	LWEB	[9]	14	210	12	4	15	120	0.02
		[10]	0	210	13	4	17	120	0.02
		[11]	-34	210	6	4	10	120	0.03
	RWEB	[12]	16	210	11	4	15	120	0.02
		[13]	0	210	12	4	16	120	0.02
		[14]	-34	210	7	4	10	120	0.03
	LFLG	[15]	-34	190	0	0	0	120	0.03
		[16]	-34	196	8	6	14	120	0.04
		[17]	-34	196	9	6	15	120	0.04
		[18]	-34	190	0	0	0	120	0.03

Girder Name : G1　Section Name : Sec-16:Left　(Girder number=　1　Section number=　17)

Section force	Mx-Max	Mx = 7093 kN·m	Sy = -871 kN	T = 703 kN·m
	Mx-Min	Mx = -4760 kN·m	Sy = -871 kN	T = 703 kN·m

Effective buckling length　Lx = 4818 mmLy = 4818 mm
Radius of curvature　R =-2007. m
Inclination　DECK = 2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	1350	1350
		Intermediate	3000	3000
		overhang	825	825
	LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL 1170 * 16	(SM400)	187.2	187.2
3-RIB PL 250 * 24	(SM400)	180.0	180.0
1-DECK-C PL 3361 * 16	(SM400)	537.7	537.7
5-U.RIB 320 * 240 * 8	(SM400)	269.5	269.5
1-DECK-R PL 645 * 16	(SM400)	103.2	103.2
1-U.RIB 320 * 240 * 8	(SM400)	53.9	53.9
1-LWEB PL 3062 * 15	(SM490Y)	459.4	459.4
1-RWEB PL 2730 * 15	(SM490Y)	409.5	409.5
1-LFLG PL 1740 * 10	(SM490Y)	174.0	174.0
5-RIB PL 170 * 17	(SM490Y)	144.5	144.5

Section property			Total	In-plane
	Section area	A (cm2)	2518.9	2518.9
	Gravity center	ex (cm)	1.1	1.1
		ey (cm)	186.7	186.7
	Moment of inertia	Ix (cm4)	26455504	26455504
		Iy (cm4)	46187830	46187830
	Torsion Constant	J (cm4)	20871932	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	41316.2 kN·m	41316.2 kN·m
	Mxr(lower)=	29573.5 kN·m	26768.7 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-21	140	0	0	0	80	0.02
	[2]	-22	140	6	0	6	80	0.03
DECK-C	[3]	-22	140	6	0	6	80	0.03
	[4]	-22	140	6	4	8	80	0.04
	[5]	-24	140	7	4	11	80	0.05
	[6]	-24	140	3	0	3	80	0.03
DECK-R	[7]	-24	140	3	0	3	80	0.03
	[8]	-24	140	0	0	0	80	0.03
LWEB	[9]	-22	210	12	4	15	120	0.03
	[10]	0	210	13	4	17	120	0.02
	[11]	50	210	6	4	10	120	0.06
RWEB	[12]	-23	210	11	4	15	120	0.03
	[13]	0	210	12	4	16	120	0.02
	[14]	50	210	7	4	10	120	0.06
LFLG	[15]	50	210	0	0	0	120	0.06
	[16]	50	210	8	6	14	120	0.07
	[17]	50	210	9	6	15	120	0.07
	[18]	50	210	0	0	0	120	0.06

Mx-Min	[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	14	140	0	0	0	80	0.01
		[2]	15	140	6	0	6	80	0.02
	DECK-C	[3]	15	140	6	0	6	80	0.02
		[4]	15	140	6	4	8	80	0.02
		[5]	16	140	7	4	11	80	0.03
		[6]	16	140	3	0	3	80	0.01
	DECK-R	[7]	16	140	3	0	3	80	0.01
		[8]	16	140	0	0	0	80	0.01
	LWEB	[9]	14	210	12	4	15	120	0.02
		[10]	0	210	13	4	17	120	0.02
		[11]	-34	210	6	4	10	120	0.03
	RWEB	[12]	16	210	11	4	15	120	0.02
		[13]	0	210	12	4	16	120	0.02
		[14]	-34	210	7	4	10	120	0.03
	LFLG	[15]	-34	190	0	0	0	120	0.03
		[16]	-34	196	8	6	14	120	0.04
		[17]	-34	196	9	6	15	120	0.04
		[18]	-34	190	0	0	0	120	0.03

Girder Name : G1　Section Name : Sec-16:J-16　(Girder number=　1　Section number=　17)

Section force　Mx-Max　Mx =　1703 kN·m　Sy =　-1299 kN　T =　885 kN·m
　　　　　　　Mx-Min　Mx =　-10238 kN·m　Sy =　-1299 kN　T =　885 kN·m

Effective buckling length　Lx =　4818 mmLy =　4818 mm
Radius of curvature　R =-2007. m
Inclination　DECK =　2.0 %

Effective width(mm)		Full width	In-plane
DECK	overhang	1350	1350
	Intermediate	3000	3000
	overhang	825	825
LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L	PL 1170 * 16 (SM400)	187.2	187.2
3-RIB	PL 250 * 24 (SM400)	180.0	180.0
1-DECK-C	PL 3361 * 16 (SM400)	537.7	537.7
5-U.RIB	320 * 240 * 8 (SM400)	269.5	269.5
1-DECK-R	PL 645 * 16 (SM400)	103.2	103.2
1-U.RIB	320 * 240 * 8 (SM400)	53.9	53.9
1-LWEB	PL 3062 * 15 (SM490Y)	459.4	459.4
1-RWEB	PL 2730 * 15 (SM490Y)	409.5	409.5
1-LFLG	PL 1740 * 10 (SM490Y)	174.0	174.0
5-RIB	PL 170 * 17 (SM490Y)	144.5	144.5

Section property		Total	In-plane
Section area	A (cm2)	2518.9	2518.9
Gravity center	ex (cm)	1.1	1.1
	ey (cm)	186.7	186.7
Moment of inertia	Ix (cm4)	26455504	26455504
	Iy (cm4)	46187830	46187830
Torsion Constant	J (cm4)	20871932	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	41316.2 kN·m	41316.2 kN·m
	Mxr(lower)=	29573.5 kN·m	26768.7 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-5	140	0	0	0	80	0.00
	[2]	-5	140	8	0	8	80	0.01
DECK-C	[3]	-5	140	8	0	8	80	0.01
	[4]	-5	140	9	4	12	80	0.02
	[5]	-6	140	11	5	15	80	0.04
	[6]	-6	140	4	0	4	80	0.00
DECK-R	[7]	-6	140	4	0	4	80	0.00
	[8]	-6	140	0	0	0	80	0.00
LWEB	[9]	-5	210	17	5	22	120	0.03
	[10]	0	210	19	5	24	120	0.04
	[11]	12	210	9	5	14	120	0.02
RWEB	[12]	-6	210	17	5	21	120	0.03
	[13]	0	210	18	5	23	120	0.04
	[14]	12	210	10	5	15	120	0.02
LFLG	[15]	12	210	0	0	0	120	0.00
	[16]	12	210	13	7	20	120	0.03
	[17]	12	210	14	7	21	120	0.03
	[18]	12	210	0	0	0	120	0.00

Mx-Min	[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	31	140	0	0	0	80	0.05
		[2]	32	140	8	0	8	80	0.06
	DECK-C	[3]	32	140	8	0	8	80	0.06
		[4]	32	140	9	4	12	80	0.07
		[5]	34	140	11	5	15	80	0.10
		[6]	34	140	4	0	4	80	0.06
	DECK-R	[7]	34	140	4	0	4	80	0.06
		[8]	35	140	0	0	0	80	0.06
	LWEB	[9]	31	210	17	5	22	120	0.06
		[10]	0	210	19	5	24	120	0.04
		[11]	-72	210	9	5	14	120	0.13
	RWEB	[12]	33	210	17	5	21	120	0.06
		[13]	0	210	18	5	23	120	0.04
		[14]	-72	210	10	5	15	120	0.13
	LFLG	[15]	-73	190	0	0	0	120	0.12
		[16]	-73	196	13	7	20	120	0.15
		[17]	-73	196	14	7	21	120	0.15
		[18]	-73	190	0	0	0	120	0.12

Girder Name : G1　Section Name : Sec-17:Left　(Girder number= 1　Section number= 18)

Section force	Mx-Max	Mx = 1703 kN·m	Sy = -1299 kN	T = 885 kN·m
	Mx-Min	Mx = -10238 kN·m	Sy = -1299 kN	T = 885 kN·m

Effective buckling length　　Lx = 4818 mmLy = 4818 mm
Radius of curvature　　R =-2007. m
Inclination　　DECK = 2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	1350	1350
		Intermediate	3000	3000
		overhang	825	825
	LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1170 * 16 (SM400)	187.2	187.2
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-DECK-C PL	3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 *	8 (SM400)	269.5	269.5
1-DECK-R PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-LWEB PL	3062 * 15 (SM490Y)	459.4	459.4
1-RWEB PL	2730 * 15 (SM490Y)	409.5	409.5
1-LFLG PL	1740 * 12 (SM490Y)	208.8	208.8
5-RIB PL	170 * 17 (SM490Y)	144.5	144.5

Section property			Total	In-plane
	Section area	A (cm2)	2553.7	2553.7
	Gravity center	ex (cm)	2.1	2.1
		ey (cm)	184.1	184.1
	Moment of inertia	Ix (cm4)	27666558	27666558
		Iy (cm4)	46463137	46463137
	Torsion Constant	J (cm4)	21629695	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	42006.6 kN·m	42006.6 kN·m
	Mxr(lower)=	31321.3 kN·m	31321.3 kN·m

Stress (N/mm²)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-5	140	0	0	0	80	0.00
	[2]	-5	140	8	0	8	80	0.01
DECK-C	[3]	-5	140	8	0	8	80	0.01
	[4]	-5	140	9	4	12	80	0.02
	[5]	-6	140	11	5	15	80	0.04
	[6]	-6	140	4	0	4	80	0.00
DECK-R	[7]	-6	140	4	0	4	80	0.00
	[8]	-6	140	0	0	0	80	0.00
LWEB	[9]	-5	210	17	5	22	120	0.03
	[10]	0	210	19	5	24	120	0.04
	[11]	11	210	10	5	14	120	0.02
RWEB	[12]	-5	210	16	5	21	120	0.03
	[13]	0	210	18	5	23	120	0.04
	[14]	11	210	10	5	15	120	0.02
LFLG	[15]	11	210	0	0	0	120	0.00
	[16]	11	210	11	6	17	120	0.02
	[17]	11	210	12	6	18	120	0.03
	[18]	11	210	0	0	0	120	0.00

Mx-Min	[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	30	140	0	0	0	80	0.05
		[2]	31	140	8	0	8	80	0.06
	DECK-C	[3]	31	140	8	0	8	80	0.06
		[4]	31	140	9	4	12	80	0.07
		[5]	33	140	11	5	15	80	0.09
		[6]	34	140	4	0	4	80	0.06
	DECK-R	[7]	34	140	4	0	4	80	0.06
		[8]	34	140	0	0	0	80	0.06
	LWEB	[9]	31	210	17	5	22	120	0.05
		[10]	0	210	19	5	24	120	0.04
		[11]	-68	210	10	5	14	120	0.12
	RWEB	[12]	33	210	16	5	21	120	0.06
		[13]	0	210	18	5	23	120	0.04
		[14]	-68	210	10	5	15	120	0.12
	LFLG	[15]	-69	210	0	0	0	120	0.11
		[16]	-69	210	11	6	17	120	0.13
		[17]	-69	210	12	6	18	120	0.13
		[18]	-69	210	0	0	0	120	0.11

Girder Name : G1   Section Name : Sec-17:J-17   (Girder number= 1   Section number= 18)

Section force Mx = -20540 kN·m   Sy =   -1983 kN   T =   -1339 kN·m

Effective buckling length Lx = 4818 mmLy = 4818 mm
Radius of curvature R =-2007. m
Inclination DECK = 2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1350	1350
	Intermediate	3000	3000
	overhang	825	825
LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1170 * 16 (SM400)	187.2	187.2
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-DECK-C PL	3361 * 16 (SM400)	537.7	537.7
5-U.RIB	320 * 240 * 8 (SM400)	269.5	269.5
1-DECK-R PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB	320 * 240 * 8 (SM400)	53.9	53.9
1-LWEB PL	3062 * 15 (SM490Y)	459.4	459.4
1-RWEB PL	2730 * 15 (SM490Y)	409.5	409.5
1-LFLG PL	1740 * 12 (SM490Y)	208.8	208.8
5-RIB PL	170 * 17 (SM490Y)	144.5	144.5

Section property		Total	In-plane
Section area	A (cm2)	2553.7	2553.7
Gravity center	ex (cm)	2.1	2.1
	ey (cm)	184.1	184.1
Moment of inertia	Ix (cm4)	27666558	27666558
	Iy (cm4)	46463137	46463137
Torsion Constant	J (cm4)	21629695	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	42006.6 kN·m	42006.6 kN·m
	Mxr(lower)=	31321.3 kN·m	31321.3 kN·m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	61	140	0	0	0	80	0.19
	[2]	62	140	12	0	13	80	0.22
DECK-C	[3]	62	140	12	0	13	80	0.22
	[4]	63	140	14	7	18	80	0.25
	[5]	67	140	16	7	23	80	0.32
	[6]	67	140	6	0	6	80	0.24
DECK-R	[7]	67	140	6	0	6	80	0.24
	[8]	68	140	0	0	0	80	0.24
LWEB	[9]	62	210	26	7	33	120	0.16
	[10]	0	210	29	7	36	120	0.09
	[11]	-137	210	15	7	22	120	0.46
RWEB	[12]	66	210	25	7	32	120	0.17
	[13]	0	210	28	7	35	120	0.09
	[14]	-137	210	16	7	23	120	0.46
LFLG	[15]	-138	210	0	0	0	120	0.43
	[16]	-138	210	17	9	26	120	0.48
	[17]	-138	210	18	9	27	120	0.48
	[18]	-138	210	0	0	0	120	0.43

Girder Name：G1　Section Name：Sec-18:J-18　（Girder number=　1　Section number=　19）

Section force　Mx =　-36366 kN･m　Sy =　-2735 kN　T =　-1385 kN･m

Effective buckling length　Lx =　4818 mmLy =　4818 mm
Radius of curvature　R　=-2007. m
Inclination　DECK =　2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	1350	1325
		Intermediate	3000	2933
		overhang	825	822
	LFLG	Intermediate	1500	1498

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1170 * 16 (SM490Y)	187.2	183.3
3-RIB PL	250 * 24 (SM490Y)	180.0	180.0
1-DECK-C PL	3361 * 16 (SM490Y)	537.7	526.9
5-U.RIB 320 * 240 *	8 (SM490Y)	269.5	269.5
1-DECK-R PL	645 * 16 (SM490Y)	103.2	102.7
1-U.RIB 320 * 240 *	8 (SM490Y)	53.9	53.9
1-LWEB PL	3062 * 15 (SM490Y)	459.4	459.4
1-RWEB PL	2730 * 15 (SM490Y)	409.5	409.5
1-LFLG PL	1740 * 21 (SM490Y)	365.4	364.9
5-RIB PL	200 * 22 (SM490Y)	220.0	176.0

Section property			Total	In-plane
Section area	A	(cm2)	2785.8	2726.1
Gravity center	ex	(cm)	8.2	7.5
	ey	(cm)	169.1	171.1
Moment of inertia	Ix	(cm4)	34657638	33362850
	Iy	(cm4)	48083267	47518458
Torsion Constant	J	(cm4)	23477994	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	66556.5 kN･m	66556.5 kN･m
	Mxr(lower)=	40421.7 kN･m	40421.7 kN･m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	103	210	0	0	0	120	0.24
	[2]	106	210	16	0	17	120	0.27
DECK-C	[3]	106	210	16	0	17	120	0.27
	[4]	106	210	18	7	21	120	0.29
	[5]	113	210	22	7	29	120	0.35
	[6]	113	210	8	0	8	120	0.30
DECK-R	[7]	113	210	8	0	8	120	0.30
	[8]	115	210	0	0	0	120	0.30
LWEB	[9]	105	210	34	7	41	120	0.37
	[10]	-3	210	38	7	45	120	0.14
	[11]	-187	210	25	7	33	120	0.87
RWEB	[12]	111	210	33	8	41	120	0.40
	[13]	-2	210	37	8	45	120	0.14
	[14]	-187	210	26	8	34	120	0.87
LFLG	[15]	-189	210	0	0	0	120	0.81
	[16]	-189	210	16	5	22	120	0.84
	[17]	-189	210	17	5	22	120	0.84
	[18]	-189	210	0	0	0	120	0.81

Girder Name : G1　Section Name : Sec-19:J-19　(Girder number= 1　Section number= 20)

Section force Mx = -53123 kN·m　Sy = -3316 kN　T = -1785 kN·m

Effective buckling length　Lx = 4743 mmLy = 4743 mm
Radius of curvature　R =-2007. m
Inclination　DECK = 2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1350	1293
	Intermediate	3000	2845
	overhang	825	818
LFLG	Intermediate	1500	1494

Section dimensions　Section area(cm2)

		Total	in plane
1-DECK-L PL	1170 * 16 (SM490Y)	187.2	178.1
3-RIB PL	250 * 24 (SM490Y)	180.0	180.0
1-DECK-C PL	3361 * 16 (SM490Y)	537.7	512.8
5-U.RIB	320 * 240 * 8 (SM490Y)	269.5	215.6
1-DECK-R PL	645 * 16 (SM490Y)	103.2	102.1
1-U.RIB	320 * 240 * 8 (SM490Y)	53.9	53.9
1-LWEB PL	3062 * 17 (SM490Y)	520.6	520.6
1-RWEB PL	2730 * 17 (SM490Y)	464.1	464.1
1-LFLG PL	1740 * 41 (SM520-H)	713.4	711.1
5-RIB PL	200 * 22 (SM490Y)	220.0	176.0

Section property

		Total	In-plane
Section area	A (cm2)	3249.7	3114.3
Gravity center	ex (cm)	16.1	16.4
	ey (cm)	149.4	148.3
Moment of inertia	Ix (cm4)	44557084	42533346
	Iy (cm4)	51972596	50921602
Torsion Constant	J (cm4)	26997229	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	69734.9 kN·m	69734.9 kN·m
	Mxr(lower)=	58571.2 kN·m	58571.2 kN·m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	147	210	0	0	1	120	0.49
	[2]	150	210	19	0	19	120	0.53
DECK-C	[3]	150	210	19	0	19	120	0.53
	[4]	150	210	20	9	24	120	0.55
	[5]	158	210	25	9	34	120	0.65
	[6]	158	210	9	0	9	120	0.57
DECK-R	[7]	158	210	9	0	9	120	0.57
	[8]	160	210	0	0	0	120	0.58
LWEB	[9]	148	210	34	8	42	120	0.62
	[10]	2	210	40	8	48	120	0.16
	[11]	-186	210	30	8	39	120	0.89
RWEB	[12]	156	210	33	9	42	120	0.67
	[13]	1	210	39	9	47	120	0.16
	[14]	-185	210	31	9	39	120	0.89
LFLG	[15]	-190	210	0	0	0	120	0.82
	[16]	-190	210	11	4	15	120	0.84
	[17]	-190	210	11	4	15	120	0.84
	[18]	-190	210	0	0	0	120	0.82

Girder Name：G1　Section Name：Sec-20：Mx-Min_L　（Girder number=　1　Section number=　21）

Section force　Mx =　-62290 kN･m　Sy =　-3622 kN　T =　-1785 kN･m

Effective buckling length　Lx =　4743 mmLy =　4743 mm
Radius of curvature　R　=-2007. m
Inclination　DECK =　2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	1350	1278
		Intermediate	3000	2803
		overhang	825	816
	LFLG	Intermediate	1500	1493

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1170 * 16 (SM490Y)	187.2	175.6
3-RIB PL	250 * 24 (SM490Y)	180.0	180.0
1-DECK-C PL	3361 * 16 (SM490Y)	537.7	506.2
5-U.RIB	320 * 240 * 8 (SM490Y)	269.5	215.6
1-DECK-R PL	645 * 16 (SM490Y)	103.2	101.8
1-U.RIB	320 * 240 * 8 (SM490Y)	53.9	53.9
1-LWEB PL	3062 * 17 (SM490Y)	520.6	520.6
1-RWEB PL	2730 * 17 (SM490Y)	464.1	464.1
1-LFLG PL	1740 * 52 (SM520-H)	904.8	901.2
5-RIB PL	200 * 22 (SM490Y)	220.0	176.0

Section property			Total	In-plane
Section area	A	(cm2)	3441.1	3295.0
Gravity center	ex	(cm)	19.4	20.0
	ey	(cm)	140.8	139.1
Moment of inertia	Ix	(cm4)	48846408	46565692
	Iy	(cm4)	53081405	51786239
Torsion Constant	J	(cm4)	27446033	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	71245.0 kN･m	71245.0 kN･m
	Mxr(lower)=	67709.7 kN･m	67709.7 kN･m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	170	210	1	0	1	120	0.65
	[2]	173	210	20	0	20	120	0.70
DECK-C	[3]	173	210	20	0	20	120	0.70
	[4]	173	210	22	9	25	120	0.72
	[5]	181	210	27	9	36	120	0.83
	[6]	182	210	9	0	9	120	0.76
DECK-R	[7]	182	210	9	0	9	120	0.76
	[8]	184	210	0	0	0	120	0.76
LWEB	[9]	171	210	36	8	45	120	0.80
	[10]	3	210	43	8	51	120	0.18
	[11]	-187	210	34	8	43	120	0.92
RWEB	[12]	179	210	36	9	44	120	0.86
	[13]	2	210	42	9	51	120	0.18
	[14]	-186	210	35	9	43	120	0.92
LFLG	[15]	-193	210	0	0	0	120	0.84
	[16]	-193	210	10	3	13	120	0.86
	[17]	-193	210	10	3	13	120	0.86
	[18]	-193	210	0	0	0	120	0.85

Girder Name：G1　 Section Name：Sec-20：Mx-Min_R　 （Girder number=　 1　 Section number=　21）

Section force　Mx =　-62287 kN·m　 Sy =　　4429 kN　 T =　 -2062 kN·m

Effective buckling length　　　　Lx =　4467 mmLy =　4467 mm
Radius of curvature　　　　　　　R　=-2007. m
Inclination　　　　　　　　　　　DECK =　 2.0 %

Effective width(mm)

			Full width	In-plane
	DECK	overhang	1350	1278
		Intermediate	3000	2803
		overhang	825	816
	LFLG	Intermediate	1500	1493

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1170 * 16 (SM490Y)	187.2	175.6
3-RIB PL	250 * 24 (SM490Y)	180.0	180.0
1-DECK-C PL	3361 * 16 (SM490Y)	537.7	506.2
5-U.RIB	320 * 240 * 8 (SM490Y)	269.5	215.6
1-DECK-R PL	645 * 16 (SM490Y)	103.2	101.8
1-U.RIB	320 * 240 * 8 (SM490Y)	53.9	53.9
1-LWEB PL	3062 * 17 (SM490Y)	520.6	520.6
1-RWEB PL	2730 * 17 (SM490Y)	464.1	464.1
1-LFLG PL	1740 * 52 (SM520-H)	904.8	901.2
5-RIB PL	200 * 22 (SM490Y)	220.0	176.0

Section property			Total	In-plane
Section area	A	(cm2)	3441.1	3295.0
Gravity center	ex	(cm)	19.4	20.0
	ey	(cm)	140.8	139.1
Moment of inertia	Ix	(cm4)	48846408	46565692
	Iy	(cm4)	53081405	51786239
Torsion Constant	J	(cm4)	27446033	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	71245.0 kN·m	71245.0 kN·m
	Mxr(lower)=	67709.7 kN·m	67709.7 kN·m

Stress (N/mm²)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	170	210	1	0	1	120	0.65
	[2]	173	210	25	0	25	120	0.72
DECK-C	[3]	173	210	25	0	25	120	0.72
	[4]	173	210	27	10	30	120	0.74
	[5]	181	210	33	10	43	120	0.88
	[6]	182	210	11	0	12	120	0.76
DECK-R	[7]	182	210	11	0	12	120	0.76
	[8]	184	210	0	0	0	120	0.76
LWEB	[9]	171	210	44	10	54	120	0.87
	[10]	3	210	52	10	62	120	0.27
	[11]	-187	210	42	10	52	120	0.98
RWEB	[12]	179	210	44	10	53	120	0.93
	[13]	2	210	52	10	61	120	0.26
	[14]	-186	210	43	10	52	120	0.98
LFLG	[15]	-193	210	0	0	0	120	0.84
	[16]	-193	210	12	3	15	120	0.86
	[17]	-193	210	12	3	16	120	0.86
	[18]	-193	210	0	0	0	120	0.85

Girder Name : G1　Section Name : Sec-21:J-20　(Girder number=　1　Section number=　22)

Section force　Mx =　-50549 kN·m　Sy =　4143 kN　T =　-2062 kN·m

Effective buckling length　Lx =　4467 mmLy =　4467 mm
Radius of curvature　R　=-2007. m
Inclination　DECK =　2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1350	1288
	Intermediate	3000	2832
	overhang	825	817
LFLG	Intermediate	1500	1494

Section dimensions

Section area(cm2)	Total	in plane
1-DECK-L PL 1170 * 16 (SM490Y)	187.2	177.3
3-RIB PL 250 * 24 (SM490Y)	180.0	180.0
1-DECK-C PL 3361 * 16 (SM490Y)	537.7	510.8
5-U.RIB 320 * 240 * 8 (SM490Y)	269.5	215.6
1-DECK-R PL 645 * 16 (SM490Y)	103.2	102.0
1-U.RIB 320 * 240 * 8 (SM490Y)	53.9	53.9
1-LWEB PL 3062 * 17 (SM490Y)	520.6	520.6
1-RWEB PL 2730 * 17 (SM490Y)	464.1	464.1
1-LFLG PL 1740 * 38 (SM490Y)	661.2	658.9
5-RIB PL 200 * 22 (SM490Y)	220.0	176.0

Section property

		Total	In-plane
Section area	A (cm2)	3197.5	3059.3
Gravity center	ex (cm)	15.2	15.5
	ey (cm)	151.9	150.8
Moment of inertia	Ix (cm4)	43309516	41263330
	Iy (cm4)	51657181	50539584
Torsion Constant	J (cm4)	26840183	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	68993.0 kN·m	68993.0 kN·m
	Mxr(lower)=	56018.7 kN·m	56018.7 kN·m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	141	210	1	0	1	120	0.45
	[2]	144	210	24	0	24	120	0.51
DECK-C	[3]	144	210	24	0	24	120	0.51
	[4]	144	210	26	10	30	120	0.53
	[5]	152	210	31	10	42	120	0.64
	[6]	152	210	11	0	11	120	0.53
DECK-R	[7]	152	210	11	0	11	120	0.53
	[8]	154	210	0	0	0	120	0.54
LWEB	[9]	143	210	42	10	52	120	0.65
	[10]	2	210	50	10	60	120	0.25
	[11]	-185	210	37	10	47	120	0.93
RWEB	[12]	150	210	42	10	52	120	0.69
	[13]	1	210	49	10	59	120	0.24
	[14]	-185	210	38	10	48	120	0.93
LFLG	[15]	-189	210	0	0	0	120	0.81
	[16]	-189	210	15	4	19	120	0.84
	[17]	-189	210	15	4	20	120	0.84
	[18]	-189	210	0	0	0	120	0.81

Girder Name : G1 Section Name : Sec-22:J-21 (Girder number= 1 Section number= 23)

Section force Mx = -27867 kN·m Sy = 3615 kN T = -2119 kN·m

Effective buckling length Lx = 4718 mmLy = 4718 mm
Radius of curvature R =-2007. m
Inclination DECK = 2.0 %

Effective width(mm)

			Full width	In-plane
	DECK	overhang	1350	1311
		Intermediate	3000	2894
		overhang	825	820
	LFLG	Intermediate	1500	1496

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1170 * 16 (SM400)	187.2	181.0
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-DECK-C PL	3361 * 16 (SM400)	537.7	520.8
5-U.RIB 320	* 240 * 8 (SM400)	269.5	215.6
1-DECK-R PL	645 * 16 (SM400)	103.2	102.4
1-U.RIB 320	* 240 * 8 (SM400)	53.9	53.9
1-LWEB PL	3062 * 15 (SM490Y)	459.4	459.4
1-RWEB PL	2730 * 15 (SM490Y)	409.5	409.5
1-LFLG PL	1740 * 19 (SM490Y)	330.6	329.9
5-RIB PL	200 * 22 (SM490Y)	220.0	176.0

Section property			Total	In-plane
	Section area	A (cm2)	2751.0	2628.5
	Gravity center	ex (cm)	7.3	6.9
		ey (cm)	171.2	171.4
	Moment of inertia	Ix (cm4)	33626276	31847500
		Iy (cm4)	47838098	47058779
	Torsion Constant	J (cm4)	23196077	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	42463.5 kN·m	42463.5 kN·m
	Mxr(lower)=	38571.4 kN·m	38571.4 kN·m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	83	140	0	0	1	80	0.35
	[2]	85	140	22	0	22	80	0.44
DECK-C	[3]	85	140	22	0	22	80	0.44
	[4]	85	140	24	11	29	80	0.50
	[5]	90	140	29	11	40	80	0.66
	[6]	91	140	10	0	11	80	0.44
DECK-R	[7]	91	140	10	0	11	80	0.44
	[8]	92	140	0	0	0	80	0.43
LWEB	[9]	84	210	45	11	56	120	0.38
	[10]	-1	210	50	11	62	120	0.27
	[11]	-150	210	32	11	44	120	0.65
RWEB	[12]	89	210	44	11	56	120	0.39
	[13]	0	210	50	11	61	120	0.26
	[14]	-150	210	34	11	45	120	0.65
LFLG	[15]	-152	210	0	0	0	120	0.52
	[16]	-152	210	23	9	32	120	0.59
	[17]	-152	210	25	9	34	120	0.60
	[18]	-152	210	0	0	0	120	0.52

Girder Name：G1　Section Name：Sec-22:Right　（Girder number=　1　Section number=　23）

Section force　Mx-Max　　Mx =　　45 kN·m　Sy =　3022 kN　T =　-2144 kN·m
　　　　　　　Mx-Min　　Mx =　-8333 kN·m　Sy =　3022 kN　T =　-2144 kN·m

Effective buckling length　　Lx =　4718 mmLy =　4718 mm
Radius of curvature　　　　R　=-2007.　m
Inclination　　　　　　　　DECK =　2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1350	1336
	Intermediate	3000	2962
	overhang	825	823
LFLG	Intermediate	1500	1499

Section dimensions

	Section area(cm2)	Total	in plane
1-DECK-L	PL 1170 * 16 (SM400)	187.2	185.0
3-RIB	PL 250 * 24 (SM400)	180.0	180.0
1-DECK-C	PL 3361 * 16 (SM400)	537.7	531.6
5-U.RIB	320 * 240 * 8 (SM400)	269.5	269.5
1-DECK-R	PL 645 * 16 (SM400)	103.2	102.9
1-U.RIB	320 * 240 * 8 (SM400)	53.9	53.9
1-LWEB	PL 3062 * 15 (SM490Y)	459.4	459.4
1-RWEB	PL 2730 * 15 (SM490Y)	409.5	409.5
1-LFLG	PL 1740 * 19 (SM490Y)	330.6	330.3
5-RIB	PL 200 * 22 (SM490Y)	220.0	176.0

Section property

		Total	In-plane
Section area	A (cm2)	2751.0	2698.1
Gravity center	ex (cm)	7.3	6.4
	ey (cm)	171.2	173.6
Moment of inertia	Ix (cm4)	33626276	32374291
	Iy (cm4)	47838102	47425453
Torsion Constant	J (cm4)	23196077	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	44085.2 kN·m	44085.2 kN·m
	Mxr(lower)=	38719.1 kN·m	38719.1 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	0	140	0	0	0	80	0.00
	[2]	0	140	18	0	18	80	0.05
DECK-C	[3]	0	140	18	0	18	80	0.05
	[4]	0	140	20	11	26	80	0.11
	[5]	0	140	24	11	35	80	0.19
	[6]	0	140	9	0	9	80	0.01
DECK-R	[7]	0	140	9	0	9	80	0.01
	[8]	0	140	0	0	0	80	0.00
LWEB	[9]	0	210	37	12	49	120	0.17
	[10]	0	210	42	12	54	120	0.20
	[11]	0	210	27	12	39	120	0.10
RWEB	[12]	0	210	37	12	48	120	0.16
	[13]	0	210	42	12	53	120	0.20
	[14]	0	210	28	12	40	120	0.11
LFLG	[15]	0	210	0	0	0	120	0.00
	[16]	0	210	20	9	29	120	0.06
	[17]	0	210	21	9	30	120	0.06
	[18]	0	210	0	0	0	120	0.00

Mx-Min	[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	24	140	0	0	0	80	0.03
		[2]	24	140	18	0	18	80	0.08
	DECK-C	[3]	24	140	18	0	18	80	0.08
		[4]	24	140	20	11	26	80	0.14
		[5]	26	140	24	11	35	80	0.23
		[6]	26	140	9	0	9	80	0.05
	DECK-R	[7]	26	140	9	0	9	80	0.05
		[8]	26	140	0	0	0	80	0.04
	LWEB	[9]	24	210	37	12	49	120	0.18
		[10]	-1	210	42	12	54	120	0.20
		[11]	-45	210	27	12	39	120	0.15
	RWEB	[12]	26	210	37	12	48	120	0.18
		[13]	-1	210	42	12	53	120	0.20
		[14]	-45	210	28	12	40	120	0.16
	LFLG	[15]	-45	210	0	0	0	120	0.05
		[16]	-45	210	20	9	29	120	0.10
		[17]	-45	210	21	9	30	120	0.11
		[18]	-45	210	0	0	0	120	0.05

Girder Name : G1　Section Name : Sec-23:J-22　(Girder number= 1　Section number= 24)

Section force	Mx-Max	Mx = 45 kN·m	Sy = 3022 kN	T = -2144 kN·m
	Mx-Min	Mx = -8333 kN·m	Sy = 3022 kN	T = -2144 kN·m

Effective buckling length　　Lx = 4718 mmLy = 4718 mm
Radius of curvature　　R =-2007. m
Inclination　　DECK = 2.0 %

Effective width(mm)		Full width	In-plane
DECK	overhang	1350	1336
	Intermediate	3000	2962
	overhang	825	823
LFLG	Intermediate	1500	1499

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1170 * 16 (SM400)	187.2	185.0
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-DECK-C PL	3361 * 16 (SM400)	537.7	531.6
5-U.RIB	320 * 240 * 8 (SM400)	269.5	269.5
1-DECK-R PL	645 * 16 (SM400)	103.2	102.9
1-U.RIB	320 * 240 * 8 (SM400)	53.9	53.9
1-LWEB PL	3062 * 15 (SM490Y)	459.4	459.4
1-RWEB PL	2730 * 15 (SM490Y)	409.5	409.5
1-LFLG PL	1740 * 15 (SM490Y)	261.0	260.8
5-RIB PL	170 * 17 (SM490Y)	144.5	115.6

Section property		Total	In-plane
Section area	A (cm2)	2605.9	2568.1
Gravity center	ex (cm)	3.5	3.0
	ey (cm)	180.4	182.1
Moment of inertia	Ix (cm4)	29427190	28489041
	Iy (cm4)	46866699	46514088
Torsion Constant	J (cm4)	22449180	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	42307.1 kN·m	42307.1 kN·m
	Mxr(lower)=	32563.3 kN·m	32563.3 kN·m

Stress (N/mm²)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	0	140	0	0	0	80	0.00
	[2]	0	140	19	0	19	80	0.06
DECK-C	[3]	0	140	19	0	19	80	0.06
	[4]	0	140	20	11	27	80	0.11
	[5]	0	140	25	11	36	80	0.20
	[6]	0	140	9	0	9	80	0.01
DECK-R	[7]	0	140	9	0	9	80	0.01
	[8]	0	140	0	0	0	80	0.00
LWEB	[9]	0	210	39	12	50	120	0.18
	[10]	0	210	43	12	55	120	0.21
	[11]	0	210	24	12	36	120	0.09
RWEB	[12]	0	210	38	12	49	120	0.17
	[13]	0	210	42	12	54	120	0.20
	[14]	0	210	25	12	37	120	0.10
LFLG	[15]	0	210	0	0	0	120	0.00
	[16]	0	210	22	12	33	120	0.08
	[17]	0	210	23	12	35	120	0.08
	[18]	0	210	0	0	0	120	0.00

Mx-Min	[Check point]		σ mx	σ a	τ sy	τ t	Σ τ	τ a	κ
	DECK-L	[1]	24	140	0	0	0	80	0.03
		[2]	25	140	19	0	19	80	0.09
	DECK-C	[3]	25	140	19	0	19	80	0.09
		[4]	25	140	20	11	27	80	0.15
		[5]	27	140	25	11	36	80	0.24
		[6]	27	140	9	0	9	80	0.05
	DECK-R	[7]	27	140	9	0	9	80	0.05
		[8]	28	140	0	0	0	80	0.04
	LWEB	[9]	25	210	39	12	50	120	0.19
		[10]	-1	210	43	12	55	120	0.21
		[11]	-53	210	24	12	36	120	0.15
	RWEB	[12]	27	210	38	12	49	120	0.19
		[13]	0	210	42	12	54	120	0.20
		[14]	-53	210	25	12	37	120	0.16
	LFLG	[15]	-54	210	0	0	0	120	0.07
		[16]	-54	210	22	12	33	120	0.14
		[17]	-54	210	23	12	35	120	0.15
		[18]	-54	210	0	0	0	120	0.07

Girder Name : G1   Section Name : Sec-23:Right   (Girder number= 1   Section number= 24)

Section force Mx = 16733 kN·m   Sy =   2692 kN   T = -1680 kN·m

Effective buckling length   Lx = 4718 mmLy = 4718 mm
Radius of curvature   R =-2007. m
Inclination   DECK = 2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1350	1350
	Intermediate	3000	3000
	overhang	825	825
LFLG	Intermediate	1500	1500

Section dimensions   Section area(cm2)

	Total	in plane
1-DECK-L PL 1170 * 16 (SM400)	187.2	187.2
3-RIB PL 250 * 24 (SM400)	180.0	180.0
1-DECK-C PL 3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 * 8 (SM400)	269.5	269.5
1-DECK-R PL 645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-LWEB PL 3062 * 15 (SM490Y)	459.4	459.4
1-RWEB PL 2730 * 15 (SM490Y)	409.5	409.5
1-LFLG PL 1740 * 15 (SM490Y)	261.0	261.0
5-RIB PL 170 * 17 (SM490Y)	144.5	144.5

Section property

		Total	In-plane
Section area	A (cm2)	2605.9	2605.9
Gravity center	ex (cm)	3.5	3.5
	ey (cm)	180.4	180.4
Moment of inertia	Ix (cm4)	29427190	29427190
	Iy (cm4)	46866702	46866702
Torsion Constant	J (cm4)	22449180	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	42946.9 kN·m	42946.9 kN·m
	Mxr(lower)=	33940.5 kN·m	33940.5 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-49	140	0	0	0	80	0.12
	[2]	-50	140	17	0	17	80	0.17
DECK-C	[3]	-50	140	17	0	17	80	0.17
	[4]	-50	140	18	9	23	80	0.21
	[5]	-54	140	22	9	31	80	0.29
	[6]	-54	140	8	0	8	80	0.16
DECK-R	[7]	-54	140	8	0	8	80	0.16
	[8]	-55	140	0	0	0	80	0.15
LWEB	[9]	-49	210	34	9	44	120	0.19
	[10]	0	210	38	9	47	120	0.16
	[11]	103	210	21	9	30	120	0.30
RWEB	[12]	-53	210	34	9	43	120	0.19
	[13]	0	210	38	9	47	120	0.15
	[14]	103	210	23	9	32	120	0.31
LFLG	[15]	103	210	0	0	0	120	0.24
	[16]	103	210	19	9	28	120	0.30
	[17]	104	210	21	9	30	120	0.30
	[18]	104	210	0	0	0	120	0.24

Girder Name : G1　Section Name : Sec-23:J-23　(Girder number=　1　Section number=　25)

Section force　Mx =　20961 kN·m　Sy =　2558 kN　T =　-1647 kN·m

Effective buckling length　Lx =　4718 mmLy =　4718 mm
Radius of curvature　R =-2007. m
Inclination　DECK =　2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1350	1350
	Intermediate	3000	3000
	overhang	825	825
LFLG	Intermediate	1500	1500

Section dimensions

Section area(cm2)	Total	in plane
1-DECK-L PL 1170 * 16 (SM400)	187.2	187.2
3-RIB PL 250 * 24 (SM400)	180.0	180.0
1-DECK-C PL 3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 * 8 (SM400)	269.5	269.5
1-DECK-R PL 645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-LWEB PL 3062 * 15 (SM490Y)	459.4	459.4
1-RWEB PL 2730 * 15 (SM490Y)	409.5	409.5
1-LFLG PL 1740 * 15 (SM490Y)	261.0	261.0
2-RIB PL 170 * 17 (SM490Y)	57.8	57.8

Section property

		Total	In-plane
Section area	A (cm2)	2519.2	2519.2
Gravity center	ex (cm)	1.1	1.1
	ey (cm)	186.4	186.4
Moment of inertia	Ix (cm4)	26773341	26773341
	Iy (cm4)	46264501	46264501
Torsion Constant	J (cm4)	22449455	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	41646.0 kN·m	41646.0 kN·m
	Mxr(lower)=	29906.2 kN·m	22483.2 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-62	140	0	0	0	80	0.20
	[2]	-64	140	16	0	16	80	0.25
DECK-C	[3]	-64	140	16	0	16	80	0.25
	[4]	-64	140	17	8	22	80	0.29
	[5]	-69	140	21	8	30	80	0.38
	[6]	-69	140	8	0	8	80	0.26
DECK-R	[7]	-69	140	8	0	8	80	0.26
	[8]	-70	140	0	0	0	80	0.25
LWEB	[9]	-63	210	34	9	42	120	0.22
	[10]	0	210	37	9	46	120	0.15
	[11]	146	210	18	9	27	120	0.54
RWEB	[12]	-68	210	33	9	42	120	0.22
	[13]	0	210	36	9	45	120	0.14
	[14]	146	210	20	9	29	120	0.54
LFLG	[15]	147	210	0	0	0	120	0.49
	[16]	147	210	16	9	25	120	0.53
	[17]	147	210	17	9	26	120	0.54
	[18]	147	210	0	0	0	120	0.49

Girder Name：G1　Section Name：Sec-24:J-24　（Girder number=　1　Section number=　26）

Section force　Mx =　37280 kN·m　Sy =　1912 kN　T =　-1369 kN·m

Effective buckling length　Lx =　4718 mmLy =　4718 mm
Radius of curvature　R =-2007. m
Inclination　DECK =　2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1350	1350
	Intermediate	3000	3000
	overhang	825	825
LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1170 * 16 (SM400)	187.2	187.2
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-DECK-C PL	3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320	* 240 * 8 (SM400)	269.5	269.5
1-DECK-R PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB 320	* 240 * 8 (SM400)	53.9	53.9
1-LWEB PL	3062 * 15 (SM490Y)	459.4	459.4
1-RWEB PL	2730 * 15 (SM490Y)	409.5	409.5
1-LFLG PL	1740 * 29 (SM490Y)	504.6	504.6
2-RIB PL	200 * 22 (SM490Y)	88.0	88.0

Section property			Total	In-plane
Section area	A	(cm2)	2793.0	2793.0
Gravity center	ex	(cm)	8.3	8.3
	ey	(cm)	168.0	168.0
Moment of inertia	Ix	(cm4)	35407910	35407910
	Iy	(cm4)	48246554	48246554
Torsion Constant	J	(cm4)	24265648	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	45752.1 kN·m	45752.1 kN·m
	Mxr(lower)=	43469.5 kN·m	43469.5 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-103	140	0	0	0	80	0.54
	[2]	-105	140	11	0	11	80	0.59
DECK-C	[3]	-105	140	11	0	11	80	0.59
	[4]	-106	140	12	7	16	80	0.61
	[5]	-112	140	15	7	22	80	0.72
	[6]	-113	140	5	0	5	80	0.65
DECK-R	[7]	-113	140	5	0	5	80	0.65
	[8]	-114	140	0	0	0	80	0.66
LWEB	[9]	-104	210	23	7	31	120	0.31
	[10]	1	210	26	7	34	120	0.08
	[11]	177	210	18	7	25	120	0.76
RWEB	[12]	-111	210	23	7	30	120	0.34
	[13]	0	210	26	7	33	120	0.08
	[14]	177	210	18	7	26	120	0.76
LFLG	[15]	180	210	0	0	0	120	0.73
	[16]	180	210	8	4	12	120	0.74
	[17]	180	210	8	4	12	120	0.75
	[18]	180	210	0	0	0	120	0.74

Girder Name : G1 Section Name : Sec-25:J-25 (Girder number= 1 Section number= 27)

Section force Mx = 48520 kN·m Sy = 1405 kN T = -950 kN·m

Effective buckling length Lx = 4718 mmLy = 4718 mm
Radius of curvature R =-2007. m
Inclination DECK = 2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1350	1350
	Intermediate	3000	3000
	overhang	825	825
LFLG	Intermediate	1500	1500

Section dimensions Section area(cm2)

	Total	in plane
1-DECK-L PL 1170 * 16 (SM490Y)	187.2	187.2
3-RIB PL 250 * 24 (SM490Y)	180.0	180.0
1-DECK-C PL 3361 * 16 (SM490Y)	537.7	537.7
5-U.RIB 320 * 240 * 8 (SM490Y)	269.5	269.5
1-DECK-R PL 645 * 16 (SM490Y)	103.2	103.2
1-U.RIB 320 * 240 * 8 (SM490Y)	53.9	53.9
1-LWEB PL 3062 * 17 (SM570)	520.6	520.6
1-RWEB PL 2730 * 17 (SM570)	464.1	464.1
1-LFLG PL 1740 * 32 (SM570)	556.8	556.8
2-RIB PL 200 * 22 (SM570)	88.0	88.0

Section property

		Total	In-plane
Section area	A (cm2)	2961.1	2961.1
Gravity center	ex (cm)	10.4	10.4
	ey (cm)	163.7	163.7
Moment of inertia	Ix (cm4)	37713053	37713053
	Iy (cm4)	50260667	50260667
Torsion Constant	J (cm4)	26456282	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	70288.7 kN·m	70288.7 kN·m
	Mxr(lower)=	57576.8 kN·m	57576.8 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-131	210	0	0	0	120	0.39
	[2]	-134	210	8	0	8	120	0.41
DECK-C	[3]	-134	210	8	0	8	120	0.41
	[4]	-135	210	9	5	12	120	0.42
	[5]	-143	210	11	5	16	120	0.48
	[6]	-143	210	4	0	4	120	0.47
DECK-R	[7]	-143	210	4	0	4	120	0.47
	[8]	-145	210	0	0	0	120	0.48
LWEB	[9]	-133	255	15	5	19	145	0.29
	[10]	1	255	17	5	22	145	0.02
	[11]	211	255	11	5	16	145	0.70
RWEB	[12]	-141	255	15	5	19	145	0.32
	[13]	0	255	17	5	21	145	0.02
	[14]	211	255	12	5	16	145	0.70
LFLG	[15]	215	255	0	0	0	145	0.71
	[16]	215	255	5	2	8	145	0.71
	[17]	215	255	6	2	8	145	0.71
	[18]	215	255	0	0	0	145	0.71

Girder Name : G1　Section Name : Sec-26:J-26　(Girder number=　1　Section number=　28)

Section force　Mx =　55591 kN·m　Sy =　998 kN　T =　1190 kN·m

Effective buckling length　Lx =　4612 mmLy =　4612 mm
Radius of curvature　R　= 293.3 m
Inclination　DECK =　2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1350	1350
	Intermediate	3000	3000
	overhang	825	825
LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1170 * 16 (SM490Y)	187.2	187.2
3-RIB　PL	250 * 24 (SM490Y)	180.0	180.0
1-DECK-C PL	3361 * 16 (SM490Y)	537.7	537.7
5-U.RIB 320 * 240 *	8 (SM490Y)	269.5	269.5
1-DECK-R PL	645 * 16 (SM490Y)	103.2	103.2
1-U.RIB 320 * 240 *	8 (SM490Y)	53.9	53.9
1-LWEB　PL	3063 * 17 (SM570)	520.6	520.6
1-RWEB　PL	2730 * 17 (SM570)	464.1	464.1
1-LFLG　PL	1740 * 41 (SM570-H)	713.4	713.4
2-RIB　PL	200 * 22 (SM570)	88.0	88.0

Section property		Total	In-plane
Section area	A　(cm2)	3117.7	3117.7
Gravity center	ex (cm)	13.0	13.0
	ey (cm)	155.5	155.5
Moment of inertia	Ix (cm4)	41851500	41851500
	Iy (cm4)	51393809	51393809
Torsion Constant	J　(cm4)	26874750	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	73323.7 kN·m	73323.7 kN·m
	Mxr(lower)=	66815.5 kN·m	66815.5 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-148	210	0	0	0	120	0.50
	[2]	-151	210	6	0	6	120	0.52
DECK-C	[3]	-151	210	6	0	6	120	0.52
	[4]	-151	210	6	6	11	120	0.53
	[5]	-157	210	8	6	14	120	0.58
	[6]	-158	210	3	0	3	120	0.57
DECK-R	[7]	-158	210	3	0	3	120	0.57
	[8]	-159	210	0	0	0	120	0.57
LWEB	[9]	-149	255	10	6	16	145	0.35
	[10]	1	255	12	6	18	145	0.01
	[11]	207	255	9	6	14	145	0.67
RWEB	[12]	-155	255	10	6	16	145	0.38
	[13]	0	255	12	6	17	145	0.01
	[14]	206	255	9	6	15	145	0.66
LFLG	[15]	212	255	0	0	0	145	0.69
	[16]	212	255	3	2	5	145	0.69
	[17]	211	255	3	2	6	145	0.69
	[18]	211	255	0	0	0	145	0.68

Girder Name：G1　Section Name：Sec-27:J-27　(Girder number=　1　Section number=　29)

Section force　Mx =　58292 kN・m　Sy =　637 kN　T =　-778 kN・m

Effective buckling length　Lx =　4705 mmLy =　4705 mm
Radius of curvature　R　=　0.0 m
Inclination　DECK =　2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1350	1350
	Intermediate	3000	3000
	overhang	825	825
LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1170 * 16 (SM490Y)	187.2	187.2
3-RIB PL	250 * 24 (SM490Y)	180.0	180.0
1-DECK-C PL	3361 * 16 (SM490Y)	537.7	537.7
5-U.RIB	320 * 240 * 8 (SM490Y)	269.5	269.5
1-DECK-R PL	645 * 16 (SM490Y)	103.2	103.2
1-U.RIB	320 * 240 * 8 (SM490Y)	53.9	53.9
1-LWEB PL	3062 * 17 (SM570)	520.6	520.6
1-RWEB PL	2730 * 17 (SM570)	464.1	464.1
1-LFLG PL	1740 * 44 (SM570-H)	765.6	765.6
2-RIB PL	200 * 22 (SM570)	88.0	88.0

Section property			Total	In-plane
Section area	A	(cm2)	3169.9	3169.9
Gravity center	ex	(cm)	14.6	14.6
	ey	(cm)	152.7	152.7
Moment of inertia	Ix	(cm4)	43181997	43181997
	Iy	(cm4)	51616924	51616924
Torsion Constant	J	(cm4)	27122473	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	73376.4 kN・m	73376.4 kN・m
	Mxr(lower)=	70097.4 kN・m	70097.4 kN・m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-153	210	0	0	0	120	0.53
	[2]	-156	210	4	0	4	120	0.55
DECK-C	[3]	-156	210	4	0	4	120	0.55
	[4]	-156	210	4	4	7	120	0.56
	[5]	-165	210	5	4	9	120	0.62
	[6]	-165	210	2	0	2	120	0.62
DECK-R	[7]	-165	210	2	0	2	120	0.62
	[8]	-167	210	0	0	0	120	0.63
LWEB	[9]	-155	255	7	4	10	145	0.37
	[10]	1	255	8	4	11	145	0.01
	[11]	207	255	6	4	9	145	0.66
RWEB	[12]	-162	255	6	4	10	145	0.41
	[13]	0	255	7	4	11	145	0.01
	[14]	206	255	6	4	9	145	0.66
LFLG	[15]	212	255	0	0	0	145	0.69
	[16]	212	255	2	1	3	145	0.69
	[17]	212	255	2	1	3	145	0.69
	[18]	212	255	0	0	0	145	0.69

Girder Name : G1　Section Name : Sec-28:Mx-Max　（Girder number=　1　Section number=　30）

Section force　Mx =　58505 kN·m　Sy =　421 kN　T =　-778 kN·m

Effective buckling length　Lx =　4705 mmLy =　4705 mm
Radius of curvature　R　=　0.0 m
Inclination　DECK =　2.0 %

Effective width(mm)

			Full width	In-plane
	DECK	overhang	1350	1350
		Intermediate	3000	3000
		overhang	825	825
	LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1170 * 16 (SM490Y)	187.2	187.2
3-RIB　PL	250 * 24 (SM490Y)	180.0	180.0
1-DECK-C PL	3361 * 16 (SM490Y)	537.7	537.7
5-U.RIB 320	* 240 *　8 (SM490Y)	269.5	269.5
1-DECK-R PL	645 * 16 (SM490Y)	103.2	103.2
1-U.RIB 320	* 240 *　8 (SM490Y)	53.9	53.9
1-LWEB　PL	3062 * 17 (SM570)	520.6	520.6
1-RWEB　PL	2730 * 17 (SM570)	464.1	464.1
1-LFLG　PL	1740 * 44 (SM570-H)	765.6	765.6
2-RIB　PL	200 * 22 (SM570)	88.0	88.0

Section property			Total	In-plane
Section area	A	(cm2)	3169.9	3169.9
Gravity center	ex	(cm)	14.6	14.6
	ey	(cm)	152.7	152.7
Moment of inertia	Ix	(cm4)	43181970	43181970
	Iy	(cm4)	51616930	51616930
Torsion Constant	J	(cm4)	27122500	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	73375.9 kN·m	73375.9 kN·m
	Mxr(lower)=	70097.4 kN·m	70097.4 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[　1]	-153	210	0	0	0	120	0.53
	[　2]	-157	210	2	0	2	120	0.56
DECK-C	[　3]	-157	210	2	0	2	120	0.56
	[　4]	-157	210	3	4	6	120	0.56
	[　5]	-165	210	3	4	7	120	0.62
	[　6]	-166	210	1	0	1	120	0.62
DECK-R	[　7]	-166	210	1	0	1	120	0.62
	[　8]	-167	210	0	0	0	120	0.64
LWEB	[　9]	-155	255	4	4	8	145	0.37
	[10]	1	255	5	4	9	145	0.00
	[11]	208	255	4	4	7	145	0.67
RWEB	[12]	-163	255	4	4	8	145	0.41
	[13]	0	255	5	4	9	145	0.00
	[14]	207	255	4	4	8	145	0.66
LFLG	[15]	213	255	0	0	0	145	0.70
	[16]	213	255	1	1	3	145	0.70
	[17]	213	255	1	1	3	145	0.70
	[18]	213	255	0	0	0	145	0.70

Girder Name：G1　Section Name：Sec-29:J-28　（Girder number=　1　Section number=　31）

Section force　Mx =　57497 kN·m　Sy =　-771 kN　T =　-778 kN·m

Effective buckling length　Lx =　4705 mmLy =　4705 mm
Radius of curvature　R　=　0.0 m
Inclination　DECK =　2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1350	1350
	Intermediate	3000	3000
	overhang	825	825
LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1170 * 16 (SM490Y)	187.2	187.2
3-RIB PL	250 * 24 (SM490Y)	180.0	180.0
1-DECK-C PL	3361 * 16 (SM490Y)	537.7	537.7
5-U.RIB 320 * 240 *	8 (SM490Y)	269.5	269.5
1-DECK-R PL	645 * 16 (SM490Y)	103.2	103.2
1-U.RIB 320 * 240 *	8 (SM490Y)	53.9	53.9
1-LWEB PL	3062 * 17 (SM570)	520.6	520.6
1-RWEB PL	2730 * 17 (SM570)	464.1	464.1
1-LFLG PL	1740 * 44 (SM570-H)	765.6	765.6
2-RIB PL	200 * 22 (SM570)	88.0	88.0

Section property		Total	In-plane
Section area	A (cm2)	3169.9	3169.9
Gravity center	ex (cm)	14.6	14.6
	ey (cm)	152.7	152.7
Moment of inertia	Ix (cm4)	43181916	43181916
	Iy (cm4)	51616943	51616943
Torsion Constant	J (cm4)	27122555	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	73375.0 kN·m	73375.0 kN·m
	Mxr(lower)=	70097.3 kN·m	70097.3 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-151	210	0	0	0	120	0.51
	[2]	-154	210	4	0	4	120	0.54
DECK-C	[3]	-154	210	4	0	4	120	0.54
	[4]	-154	210	5	4	8	120	0.54
	[5]	-162	210	6	4	10	120	0.60
	[6]	-163	210	2	0	2	120	0.60
DECK-R	[7]	-163	210	2	0	2	120	0.60
	[8]	-165	210	0	0	0	120	0.61
LWEB	[9]	-153	255	8	4	12	145	0.36
	[10]	1	255	9	4	13	145	0.01
	[11]	204	255	7	4	11	145	0.65
RWEB	[12]	-160	255	8	4	11	145	0.40
	[13]	0	255	9	4	13	145	0.01
	[14]	203	255	7	4	11	145	0.64
LFLG	[15]	209	255	0	0	0	145	0.67
	[16]	209	255	2	1	4	145	0.67
	[17]	209	255	2	1	4	145	0.67
	[18]	209	255	0	0	0	145	0.67

Girder Name : G1 Section Name : Sec-30:J-29 (Girder number= 1 Section number= 32)

Section force Mx = 53345 kN·m Sy = -1107 kN T = -963 kN·m

Effective buckling length Lx = 4706 mmLy = 4706 mm
Radius of curvature R = 0.0 m
Inclination DECK = 2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	1350	1350
		Intermediate	3000	3000
		overhang	825	825
	LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1170 * 16 (SM490Y)	187.2	187.2
3-RIB PL	250 * 24 (SM490Y)	180.0	180.0
1-DECK-C PL	3361 * 16 (SM490Y)	537.7	537.7
5-U.RIB 320 * 240 * 8	(SM490Y)	269.5	269.5
1-DECK-R PL	645 * 16 (SM490Y)	103.2	103.2
1-U.RIB 320 * 240 * 8	(SM490Y)	53.9	53.9
1-LWEB PL	3062 * 17 (SM570)	520.6	520.6
1-RWEB PL	2730 * 17 (SM570)	464.1	464.1
1-LFLG PL	1740 * 38 (SM570)	661.2	661.2
2-RIB PL	200 * 22 (SM570)	88.0	88.0

Section property			Total	In-plane
Section area	A	(cm2)	3065.5	3065.5
Gravity center	ex	(cm)	12.5	12.5
	ey	(cm)	158.0	158.0
Moment of inertia	Ix	(cm4)	40528085	40528085
	Iy	(cm4)	50959463	50959463
Torsion Constant	J	(cm4)	26825995	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	71974.5 kN·m	71974.5 kN·m
	Mxr(lower)=	63862.5 kN·m	63862.5 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-142	210	0	0	0	120	0.46
	[2]	-145	210	6	0	6	120	0.48
DECK-C	[3]	-145	210	6	0	6	120	0.48
	[4]	-146	210	7	5	10	120	0.49
	[5]	-153	210	8	5	13	120	0.55
	[6]	-154	210	3	0	3	120	0.54
DECK-R	[7]	-154	210	3	0	3	120	0.54
	[8]	-156	210	0	0	0	120	0.55
LWEB	[9]	-144	255	11	5	16	145	0.33
	[10]	1	255	13	5	18	145	0.02
	[11]	209	255	9	5	14	145	0.68
RWEB	[12]	-151	255	11	5	16	145	0.36
	[13]	0	255	13	5	18	145	0.01
	[14]	208	255	10	5	14	145	0.68
LFLG	[15]	213	255	0	0	0	145	0.70
	[16]	213	255	4	2	6	145	0.70
	[17]	213	255	4	2	6	145	0.70
	[18]	213	255	0	0	0	145	0.70

Girder Name : G1 Section Name : Sec-31:J-30 (Girder number= 1 Section number= 33)

Section force Mx = 44755 kN·m Sy = -1462 kN T = 1400 kN·m

Effective buckling length Lx = 4708 mmLy = 4708 mm
Radius of curvature R = 0.0 m
Inclination DECK = 2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	1350	1350
		Intermediate	3000	3000
		overhang	825	825
	LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1170 * 16 (SM490Y)	187.2	187.2
3-RIB PL	250 * 24 (SM490Y)	180.0	180.0
1-DECK-C PL	3361 * 16 (SM490Y)	537.7	537.7
5-U.RIB	320 * 240 * 8 (SM490Y)	269.5	269.5
1-DECK-R PL	645 * 16 (SM490Y)	103.2	103.2
1-U.RIB	320 * 240 * 8 (SM490Y)	53.9	53.9
1-LWEB PL	3062 * 17 (SM570)	520.6	520.6
1-RWEB PL	2730 * 17 (SM570)	464.1	464.1
1-LFLG PL	1740 * 27 (SM570)	469.8	469.8
2-RIB PL	200 * 22 (SM570)	88.0	88.0

Section property			Total	In-plane
Section area	A	(cm2)	2874.1	2874.1
Gravity center	ex	(cm)	8.4	8.4
	ey	(cm)	168.8	168.8
Moment of inertia	Ix	(cm4)	35218171	35218171
	Iy	(cm4)	49679709	49679709
Torsion Constant	J	(cm4)	26016955	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	68792.5 kN·m	68792.5 kN·m
	Mxr(lower)=	52375.3 kN·m	52375.3 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-123	210	0	0	0	120	0.35
	[2]	-126	210	9	0	9	120	0.37
DECK-C	[3]	-126	210	9	0	9	120	0.37
	[4]	-127	210	9	7	14	120	0.38
	[5]	-135	210	11	7	19	120	0.43
	[6]	-135	210	4	0	4	120	0.41
DECK-R	[7]	-135	210	4	0	4	120	0.41
	[8]	-137	210	0	0	0	120	0.42
LWEB	[9]	-125	255	16	7	22	145	0.26
	[10]	1	255	18	7	25	145	0.03
	[11]	215	255	11	7	18	145	0.73
RWEB	[12]	-132	255	15	7	22	145	0.29
	[13]	0	255	18	7	24	145	0.03
	[14]	214	255	12	7	18	145	0.72
LFLG	[15]	218	255	0	0	0	145	0.73
	[16]	218	255	6	4	10	145	0.74
	[17]	218	255	7	4	11	145	0.74
	[18]	218	255	0	0	0	145	0.73

Girder Name：G1　Section Name：Sec-32:J-31　（Girder number=　1　Section number=　34）

Section force　Mx =　33271 kN·m　Sy =　-1695 kN　T =　1930 kN·m

Effective buckling length　Lx =　4708 mmLy =　4708 mm
Radius of curvature　R =　0.0 m
Inclination　DECK =　2.0 %

Effective width(mm)

			Full width	In-plane
	DECK	overhang	1350	1350
		Intermediate	3000	3000
		overhang	825	825
	LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1170 * 16 (SM400)	187.2	187.2
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-DECK-C PL	3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 * 8	(SM400)	269.5	269.5
1-DECK-R PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 * 8	(SM400)	53.9	53.9
1-LWEB PL	3062 * 15 (SM490Y)	459.4	459.4
1-RWEB PL	2730 * 15 (SM490Y)	409.5	409.5
1-LFLG PL	1740 * 24 (SM490Y)	417.6	417.6
2-RIB PL	200 * 22 (SM490Y)	88.0	88.0

Section property			Total	In-plane
Section area	A	(cm2)	2706.0	2706.0
Gravity center	ex	(cm)	6.1	6.1
	ey	(cm)	173.5	173.5
Moment of inertia	Ix	(cm4)	32786313	32786313
	Iy	(cm4)	47639617	47639617
Torsion Constant	J	(cm4)	23812609	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	44675.7 kN·m	44675.7 kN·m
	Mxr(lower)=	39134.9 kN·m	39134.9 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-94	140	0	0	0	80	0.45
	[2]	-96	140	10	0	10	80	0.49
DECK-C	[3]	-96	140	10	0	10	80	0.49
	[4]	-96	140	11	10	18	80	0.53
	[5]	-103	140	14	10	23	80	0.62
	[6]	-103	140	5	0	5	80	0.54
DECK-R	[7]	-103	140	5	0	5	80	0.54
	[8]	-104	140	0	0	0	80	0.55
LWEB	[9]	-95	210	21	10	31	120	0.27
	[10]	0	210	24	10	34	120	0.08
	[11]	177	210	15	10	25	120	0.75
RWEB	[12]	-101	210	21	10	31	120	0.30
	[13]	0	210	23	10	34	120	0.08
	[14]	176	210	15	10	26	120	0.75
LFLG	[15]	179	210	0	0	0	120	0.72
	[16]	179	210	8	7	15	120	0.74
	[17]	179	210	9	7	15	120	0.74
	[18]	179	210	0	0	0	120	0.72

Girder Name : G1 Section Name : Sec-33:J-32 (Girder number= 1 Section number= 35)

Section force Mx = 17350 kN·m Sy = -2462 kN T = 2116 kN·m

Effective buckling length Lx = 4809 mmLy = 4809 mm
Radius of curvature R =-306.8 m
Inclination DECK = 2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1350	1350
	Intermediate	3000	3000
	overhang	825	825
LFLG	Intermediate	1500	1500

Section dimensions Section area(cm2)

	Total	in plane
1-DECK-L PL 1170 * 16 (SM400)	187.2	187.2
3-RIB PL 250 * 24 (SM400)	180.0	180.0
1-DECK-C PL 3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 * 8 (SM400)	269.5	269.5
1-DECK-R PL 645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-LWEB PL 3062 * 15 (SM490Y)	459.4	459.4
1-RWEB PL 2730 * 15 (SM490Y)	409.5	409.5
1-LFLG PL 1740 * 12 (SM490Y)	208.8	208.8
2-RIB PL 170 * 17 (SM490Y)	57.8	57.8

Section property

		Total	In-plane
Section area	A (cm2)	2467.0	2467.0
Gravity center	ex (cm)	0.0	0.0
	ey (cm)	190.2	190.2
Moment of inertia	Ix (cm4)	24918289	24918289
	Iy (cm4)	45796587	45796587
Torsion Constant	J (cm4)	21695278	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	40241.0 kN·m	40241.0 kN·m
	Mxr(lower)=	27192.4 kN·m	15485.9 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-52	140	0	0	0	80	0.14
	[2]	-54	140	16	0	16	80	0.19
DECK-C	[3]	-54	140	16	0	16	80	0.19
	[4]	-54	140	17	11	24	80	0.24
	[5]	-59	140	21	11	32	80	0.33
	[6]	-59	140	8	0	8	80	0.19
DECK-R	[7]	-59	140	8	0	8	80	0.19
	[8]	-60	140	0	0	0	80	0.19
LWEB	[9]	-53	210	33	11	44	120	0.20
	[10]	0	210	36	11	48	120	0.16
	[11]	133	210	16	11	27	120	0.45
RWEB	[12]	-58	210	32	12	44	120	0.21
	[13]	0	210	35	12	47	120	0.15
	[14]	133	210	17	12	29	120	0.46
LFLG	[15]	133	210	0	0	0	120	0.40
	[16]	133	210	18	14	32	120	0.47
	[17]	134	210	19	14	34	120	0.49
	[18]	134	210	0	0	0	120	0.41

Girder Name : G1   Section Name : Sec-33:Right   (Girder number= 1   Section number= 35)

Section force Mx = 0 kN·m   Sy = -3075 kN   T = 2311 kN·m

Effective buckling length   Lx = 4650 mmLy = 4650 mm
Radius of curvature   R = 0.0 m
Inclination   DECK = 2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	1350	1350
		Intermediate	3000	3000
		overhang	825	825
	LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1170 * 16 (SM400)	187.2	187.2
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-DECK-C PL	3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 *	8 (SM400)	269.5	269.5
1-DECK-R PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-LWEB PL	3062 * 15 (SM490Y)	459.4	459.4
1-RWEB PL	2730 * 15 (SM490Y)	409.5	409.5
1-LFLG PL	1740 * 12 (SM490Y)	208.8	208.8
2-RIB PL	170 * 17 (SM490Y)	57.8	57.8

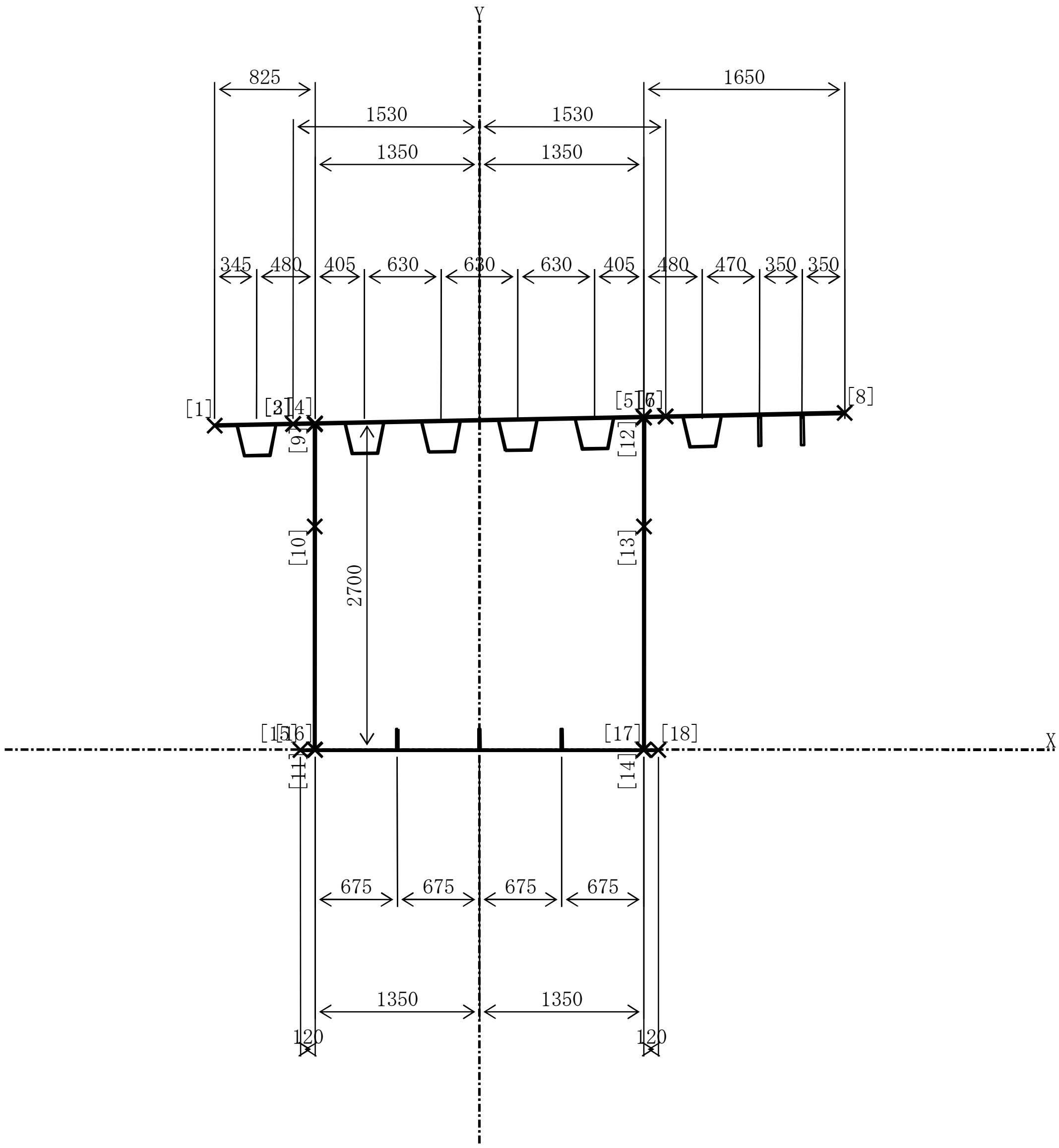
Section property			Total	In-plane
Section area	A	(cm2)	2467.0	2467.0
Gravity center	ex	(cm)	-0.6	-0.6
	ey	(cm)	190.3	190.3
Moment of inertia	Ix	(cm4)	24890489	24890489
	Iy	(cm4)	45849225	45849225
Torsion Constant	J	(cm4)	21618193	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	40562.8 kN·m	40562.8 kN·m
	Mxr(lower)=	27289.1 kN·m	15533.1 kN·m

Stress (N/mm^2)

Mx-Min		[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	0	140	0	0	0	80	0.00
		[2]	0	140	20	0	20	80	0.06
	DECK-C	[3]	0	140	20	0	20	80	0.06
		[4]	0	140	21	12	29	80	0.13
		[5]	0	140	26	12	38	80	0.22
		[6]	0	140	10	0	10	80	0.01
	DECK-R	[7]	0	140	10	0	10	80	0.01
		[8]	0	140	0	0	0	80	0.00
	LWEB	[9]	0	210	41	13	54	120	0.20
		[10]	0	210	45	13	58	120	0.23
		[11]	0	210	20	13	32	120	0.07
	RWEB	[12]	0	210	40	13	53	120	0.19
		[13]	0	210	44	13	57	120	0.22
		[14]	0	210	22	13	34	120	0.08
	LFLG	[15]	0	210	0	0	0	120	0.00
		[16]	0	210	22	16	37	120	0.10
		[17]	0	210	24	16	40	120	0.11
		[18]	0	210	0	0	0	120	0.00

Girder Name : G2



Girder Name：G2　Section Name：Sec-1:Left　（Girder number=　2　Section number=　1）

Section force　Mx =　　0 kN·m　Sy =　2234 kN　T =　-2545 kN·m

Effective buckling length　Lx =　4658 mmLy =　4658 mm
Radius of curvature　R　=-2003. m
Inclination　DECK =　2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	825	825
		Intermediate	2700	2700
		overhang	1650	1650
	LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB 320	* 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320	* 240 * 8 (SM400)	215.6	215.6
1-DECK-R PL	1470 * 16 (SM400)	235.2	235.2
1-U.RIB 320	* 240 * 8 (SM400)	53.9	53.9
2-RIB PL	250 * 24 (SM400)	120.0	120.0
1-LWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL	2940 * 10 (SM490Y)	294.0	294.0
3-RIB PL	170 * 17 (SM490Y)	86.7	86.7

Section property			Total	In-plane
Section area	A	(cm2)	2408.3	2408.3
Gravity center	ex	(cm)	27.1	27.1
	ey	(cm)	183.3	183.3
Moment of inertia	Ix	(cm4)	27841495	27841495
	Iy	(cm4)	46463659	46463659
Torsion Constant	J	(cm4)	26105348	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	41296.0 kN·m	41296.0 kN·m
	Mxr(lower)=	31697.8 kN·m	6957.6 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	0	140	0	0	0	80	0.00
	[2]	0	140	6	0	6	80	0.01
DECK-C	[3]	0	140	6	0	6	80	0.01
	[4]	0	140	18	11	29	80	0.13
	[5]	0	140	19	11	19	80	0.06
	[6]	0	140	18	0	18	80	0.05
DECK-R	[7]	0	140	18	0	18	80	0.05
	[8]	0	140	0	0	0	80	0.00
LWEB	[9]	0	210	29	12	42	120	0.12
	[10]	0	210	32	12	44	120	0.14
	[11]	0	210	19	12	31	120	0.07
RWEB	[12]	0	210	31	12	44	120	0.13
	[13]	0	210	35	12	47	120	0.15
	[14]	0	210	21	12	34	120	0.08
LFLG	[15]	0	210	0	0	0	120	0.00
	[16]	0	210	24	17	42	120	0.12
	[17]	0	210	28	17	45	120	0.14
	[18]	0	210	0	0	0	120	0.00

Girder Name : G2 Section Name : Sec-1:J-1 (Girder number= 2 Section number= 1)

Section force Mx = 14727 kN·m Sy = 1795 kN T = -2525 kN·m

Effective buckling length Lx = 4657 mmLy = 4657 mm
Radius of curvature R =-2003. m
Inclination DECK = 2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	825	825
		Intermediate	2700	2700
		overhang	1650	1650
	LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB 320	* 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320	* 240 * 8 (SM400)	215.6	215.6
1-DECK-R PL	1470 * 16 (SM400)	235.2	235.2
1-U.RIB 320	* 240 * 8 (SM400)	53.9	53.9
2-RIB PL	250 * 24 (SM400)	120.0	120.0
1-LWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL	2940 * 10 (SM490Y)	294.0	294.0
3-RIB PL	170 * 17 (SM490Y)	86.7	86.7

Section property			Total	In-plane
Section area	A	(cm2)	2408.3	2408.3
Gravity center	ex	(cm)	27.1	27.1
	ey	(cm)	183.3	183.3
Moment of inertia	Ix	(cm4)	27841495	27841495
	Iy	(cm4)	46463659	46463659
Torsion Constant	J	(cm4)	26105348	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	41296.0 kN·m	41296.0 kN·m
	Mxr(lower)=	31697.8 kN·m	6957.6 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-44	140	0	0	0	80	0.10
	[2]	-45	140	5	0	5	80	0.11
DECK-C	[3]	-45	140	5	0	5	80	0.11
	[4]	-45	140	15	11	25	80	0.20
	[5]	-48	140	15	11	18	80	0.17
	[6]	-48	140	14	0	14	80	0.15
DECK-R	[7]	-48	140	14	0	14	80	0.15
	[8]	-50	140	0	0	0	80	0.13
LWEB	[9]	-44	210	23	12	36	120	0.13
	[10]	0	210	26	12	38	120	0.10
	[11]	97	210	15	12	27	120	0.26
RWEB	[12]	-47	210	25	12	38	120	0.15
	[13]	0	210	28	12	40	120	0.11
	[14]	97	210	17	12	29	120	0.27
LFLG	[15]	97	210	0	0	0	120	0.22
	[16]	97	210	19	17	37	120	0.31
	[17]	98	210	22	17	40	120	0.32
	[18]	98	210	0	0	0	120	0.22

Girder Name：G2　Section Name：Sec-2:J-2　（Girder number=　2　Section number=　2）

Section force　Mx =　25150 kN·m　Sy =　1129 kN　T =　-1919 kN·m

Effective buckling length　Lx =　4757 mmLy =　4757 mm
Radius of curvature　R =-2003. m
Inclination　DECK =　2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	825
	Intermediate	2700	2700
	overhang	1650	1650
LFLG	Intermediate	2700	2700

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL　645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 *　8 (SM400)	53.9	53.9
1-DECK-C PL　3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 *　8 (SM400)	215.6	215.6
1-DECK-R PL　1470 * 16 (SM400)	235.2	235.2
1-U.RIB 320 * 240 *　8 (SM400)	53.9	53.9
2-RIB　PL　250 * 24 (SM400)	120.0	120.0
1-LWEB　PL　2673 * 14 (SM490Y)	374.2	374.2
1-RWEB　PL　2727 * 14 (SM490Y)	381.8	381.8
1-LFLG　PL　2940 * 10 (SM490Y)	294.0	294.0
3-RIB　PL　170 * 17 (SM490Y)	86.7	86.7

Section property

		Total	In-plane
Section area	A (cm2)	2408.3	2408.3
Gravity center	ex (cm)	27.1	27.1
	ey (cm)	183.3	183.3
Moment of inertia	Ix (cm4)	27841495	27841495
	Iy (cm4)	46463659	46463659
Torsion Constant	J (cm4)	26105348	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	41296.0 kN·m	41296.0 kN·m
	Mxr(lower)=	31697.8 kN·m	6957.6 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-76	140	0	0	0	80	0.29
	[2]	-77	140	3	0	3	80	0.30
DECK-C	[3]	-77	140	3	0	3	80	0.30
	[4]	-77	140	9	8	17	80	0.35
	[5]	-82	140	10	8	12	80	0.37
	[6]	-83	140	9	0	9	80	0.36
DECK-R	[7]	-83	140	9	0	9	80	0.36
	[8]	-85	140	0	0	0	80	0.37
LWEB	[9]	-76	210	15	9	24	120	0.17
	[10]	0	210	16	9	26	120	0.05
	[11]	165	210	9	9	19	120	0.65
RWEB	[12]	-81	210	16	9	25	120	0.19
	[13]	0	210	17	9	27	120	0.05
	[14]	166	210	11	9	20	120	0.65
LFLG	[15]	166	210	0	0	0	120	0.63
	[16]	166	210	12	13	25	120	0.67
	[17]	167	210	14	13	27	120	0.68
	[18]	167	210	0	0	0	120	0.63

Girder Name：G2　Section Name：Sec-3:J-3　（Girder number=　2　Section number=　3）

Section force　Mx =　31536 kN·m　Sy =　726 kN　T =　-1378 kN·m

Effective buckling length　Lx =　4757 mmLy =　4757 mm
Radius of curvature　R =-2003. m
Inclination　DECK =　2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	825	825
		Intermediate	2700	2700
		overhang	1650	1650
	LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 *	8 (SM400)	215.6	215.6
1-DECK-R PL	1470 * 16 (SM400)	235.2	235.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
2-RIB PL	250 * 24 (SM400)	120.0	120.0
1-LWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL	2940 * 16 (SM490Y)	470.4	470.4
3-RIB PL	170 * 17 (SM490Y)	86.7	86.7

Section property		Total	In-plane
Section area	A (cm2)	2584.7	2584.7
Gravity center	ex (cm)	25.2	25.2
	ey (cm)	170.7	170.7
Moment of inertia	Ix (cm4)	33444562	33444562
	Iy (cm4)	47854799	47854799
Torsion Constant	J (cm4)	29825937	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	43757.1 kN·m	43757.1 kN·m
	Mxr(lower)=	40727.8 kN·m	22719.7 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-91	140	0	0	0	80	0.42
	[2]	-92	140	2	0	2	80	0.43
DECK-C	[3]	-92	140	2	0	2	80	0.43
	[4]	-92	140	6	6	11	80	0.46
	[5]	-98	140	6	6	9	80	0.50
	[6]	-98	140	5	0	6	80	0.50
DECK-R	[7]	-98	140	5	0	6	80	0.50
	[8]	-101	140	0	0	0	80	0.52
LWEB	[9]	-91	210	9	7	16	120	0.20
	[10]	0	210	10	7	17	120	0.02
	[11]	161	210	7	7	14	120	0.60
RWEB	[12]	-96	210	10	7	17	120	0.23
	[13]	0	210	11	7	18	120	0.02
	[14]	161	210	8	7	14	120	0.60
LFLG	[15]	162	210	0	0	0	120	0.60
	[16]	162	210	6	6	11	120	0.61
	[17]	163	210	6	6	12	120	0.61
	[18]	163	210	0	0	0	120	0.60

Girder Name : G2　Section Name : Sec-4:Mx-Max　(Girder number=　2　Section number=　4)

Section force　Mx =　33682 kN・m　Sy =　322 kN　T =　-656 kN・m

Effective buckling length　Lx =　4757 mmLy =　4757 mm
Radius of curvature　R =-2003. m
Inclination　DECK =　2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	825
	Intermediate	2700	2700
	overhang	1650	1650
LFLG	Intermediate	2700	2700

Section dimensions

Section area(cm2)	Total	in plane
1-DECK-L PL 645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL 3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 * 8 (SM400)	215.6	215.6
1-DECK-R PL 1470 * 16 (SM400)	235.2	235.2
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
2-RIB PL 250 * 24 (SM400)	120.0	120.0
1-LWEB PL 2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL 2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL 2940 * 16 (SM490Y)	470.4	470.4
3-RIB PL 170 * 17 (SM490Y)	86.7	86.7

Section property

		Total	In-plane
Section area	A (cm2)	2584.7	2584.7
Gravity center	ex (cm)	25.2	25.2
	ey (cm)	170.7	170.7
Moment of inertia	Ix (cm4)	33444562	33444562
	Iy (cm4)	47854799	47854799
Torsion Constant	J (cm4)	29825937	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	43757.1 kN・m	43757.1 kN・m
	Mxr(lower)=	40727.8 kN・m	22719.7 kN・m

Stress (N/mm²)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-97	140	0	0	0	80	0.48
	[2]	-98	140	1	0	1	80	0.49
DECK-C	[3]	-98	140	1	0	1	80	0.49
	[4]	-99	140	2	3	5	80	0.50
	[5]	-104	140	3	3	4	80	0.56
	[6]	-105	140	2	0	2	80	0.56
DECK-R	[7]	-105	140	2	0	2	80	0.56
	[8]	-108	140	0	0	0	80	0.59
LWEB	[9]	-97	210	4	3	7	120	0.22
	[10]	0	210	4	3	8	120	0.00
	[11]	172	210	3	3	6	120	0.67
RWEB	[12]	-103	210	4	3	8	120	0.24
	[13]	0	210	5	3	8	120	0.00
	[14]	172	210	3	3	7	120	0.67
LFLG	[15]	173	210	0	0	0	120	0.68
	[16]	173	210	2	3	5	120	0.68
	[17]	174	210	3	3	6	120	0.69
	[18]	174	210	0	0	0	120	0.68

Girder Name : G2　Section Name : Sec-5:J-4　(Girder number= 2　Section number= 5)

Section force　Mx = 33643 kN·m　Sy = -346 kN　T = -656 kN·m

Effective buckling length　Lx = 4757 mmLy = 4757 mm
Radius of curvature　R =-2003. m
Inclination　DECK = 2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	825	825
		Intermediate	2700	2700
		overhang	1650	1650
	LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 *	8 (SM400)	215.6	215.6
1-DECK-R PL	1470 * 16 (SM400)	235.2	235.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
2-RIB PL	250 * 24 (SM400)	120.0	120.0
1-LWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL	2940 * 16 (SM490Y)	470.4	470.4
3-RIB PL	170 * 17 (SM490Y)	86.7	86.7

Section property			Total	In-plane
	Section area	A (cm2)	2584.7	2584.7
	Gravity center	ex (cm)	25.2	25.2
		ey (cm)	170.7	170.7
	Moment of inertia	Ix (cm4)	33444562	33444562
		Iy (cm4)	47854799	47854799
	Torsion Constant	J (cm4)	29825937	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	43757.1 kN·m	43757.1 kN·m
	Mxr(lower)=	40727.8 kN·m	22719.7 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-97	140	0	0	0	80	0.48
	[2]	-98	140	1	0	1	80	0.49
DECK-C	[3]	-98	140	1	0	1	80	0.49
	[4]	-99	140	3	3	5	80	0.50
	[5]	-104	140	3	3	4	80	0.56
	[6]	-105	140	3	0	3	80	0.56
DECK-R	[7]	-105	140	3	0	3	80	0.56
	[8]	-108	140	0	0	0	80	0.59
LWEB	[9]	-97	210	4	3	8	120	0.22
	[10]	0	210	5	3	8	120	0.00
	[11]	172	210	3	3	6	120	0.67
RWEB	[12]	-103	210	5	3	8	120	0.24
	[13]	0	210	5	3	8	120	0.00
	[14]	172	210	4	3	7	120	0.67
LFLG	[15]	173	210	0	0	0	120	0.68
	[16]	173	210	3	3	5	120	0.68
	[17]	173	210	3	3	6	120	0.68
	[18]	173	210	0	0	0	120	0.68

Girder Name：G2　Section Name：Sec-6:J-5　（Girder number=　2　Section number=　6）

Section force　Mx =　31386 kN·m　Sy =　-809 kN　T =　1007 kN·m

Effective buckling length　Lx =　4757 mmLy =　4757 mm
Radius of curvature　R　=-2003. m
Inclination　DECK =　2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	825	825
		Intermediate	2700	2700
		overhang	1650	1650
	LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 *	8 (SM400)	215.6	215.6
1-DECK-R PL	1470 * 16 (SM400)	235.2	235.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
2-RIB PL	250 * 24 (SM400)	120.0	120.0
1-LWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL	2940 * 16 (SM490Y)	470.4	470.4
3-RIB PL	170 * 17 (SM490Y)	86.7	86.7

Section property		Total	In-plane
Section area	A (cm2)	2584.7	2584.7
Gravity center	ex (cm)	25.2	25.2
	ey (cm)	170.7	170.7
Moment of inertia	Ix (cm4)	33444562	33444562
	Iy (cm4)	47854799	47854799
Torsion Constant	J (cm4)	29825937	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	43757.1 kN·m	43757.1 kN·m
	Mxr(lower)=	40727.8 kN·m	22719.7 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-90	140	0	0	0	80	0.42
	[2]	-92	140	2	0	2	80	0.43
DECK-C	[3]	-92	140	2	0	2	80	0.43
	[4]	-92	140	6	4	11	80	0.45
	[5]	-97	140	7	4	7	80	0.49
	[6]	-98	140	6	0	6	80	0.49
DECK-R	[7]	-98	140	6	0	6	80	0.49
	[8]	-100	140	0	0	0	80	0.51
LWEB	[9]	-91	210	10	5	15	120	0.20
	[10]	0	210	11	5	16	120	0.02
	[11]	160	210	8	5	13	120	0.59
RWEB	[12]	-96	210	11	5	16	120	0.23
	[13]	0	210	12	5	17	120	0.02
	[14]	160	210	9	5	14	120	0.60
LFLG	[15]	162	210	0	0	0	120	0.59
	[16]	162	210	6	4	11	120	0.60
	[17]	162	210	7	4	11	120	0.60
	[18]	162	210	0	0	0	120	0.59

Girder Name : G2 Section Name : Sec-7:J-6 (Girder number= 2 Section number= 7)

Section force Mx = 25004 kN·m Sy = -1297 kN T = 1459 kN·m

Effective buckling length Lx = 4757 mmLy = 4757 mm
Radius of curvature R =-2003. m
Inclination DECK = 2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	825
	Intermediate	2700	2700
	overhang	1650	1650
LFLG	Intermediate	2700	2700

Section dimensions Section area(cm2)

	Total	in plane
1-DECK-L PL 645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL 3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 * 8 (SM400)	215.6	215.6
1-DECK-R PL 1470 * 16 (SM400)	235.2	235.2
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
2-RIB PL 250 * 24 (SM400)	120.0	120.0
1-LWEB PL 2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL 2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL 2940 * 10 (SM490Y)	294.0	294.0
3-RIB PL 170 * 17 (SM490Y)	86.7	86.7

Section property

			Total	In-plane
Section area	A	(cm2)	2408.3	2408.3
Gravity center	ex	(cm)	27.1	27.1
	ey	(cm)	183.3	183.3
Moment of inertia	Ix	(cm4)	27841495	27841495
	Iy	(cm4)	46463659	46463659
Torsion Constant	J	(cm4)	26105348	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	41296.0 kN·m	41296.0 kN·m
	Mxr(lower)=	31697.8 kN·m	6957.6 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-75	140	0	0	0	80	0.29
	[2]	-76	140	4	0	4	80	0.30
DECK-C	[3]	-76	140	4	0	4	80	0.30
	[4]	-77	140	11	6	17	80	0.34
	[5]	-82	140	11	6	11	80	0.36
	[6]	-82	140	10	0	10	80	0.36
DECK-R	[7]	-82	140	10	0	10	80	0.36
	[8]	-85	140	0	0	0	80	0.37
LWEB	[9]	-75	210	17	7	24	120	0.17
	[10]	0	210	19	7	26	120	0.05
	[11]	165	210	11	7	18	120	0.64
RWEB	[12]	-80	210	18	7	25	120	0.19
	[13]	0	210	20	7	27	120	0.05
	[14]	165	210	12	7	19	120	0.64
LFLG	[15]	165	210	0	0	0	120	0.62
	[16]	165	210	14	10	24	120	0.66
	[17]	166	210	16	10	26	120	0.67
	[18]	166	210	0	0	0	120	0.62

Girder Name : G2 Section Name : Sec-7:Left (Girder number= 2 Section number= 8)

Section force Mx = 15499 kN·m Sy = -1732 kN T = 1502 kN·m

Effective buckling length Lx = 4757 mmLy = 4757 mm
Radius of curvature R =-2003. m
Inclination DECK = 2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	825
	Intermediate	2700	2700
	overhang	1650	1650
LFLG	Intermediate	2700	2700

Section dimensions Section area(cm2)

	Total	in plane
1-DECK-L PL 645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL 3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 * 8 (SM400)	215.6	215.6
1-DECK-R PL 1470 * 16 (SM400)	235.2	235.2
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
2-RIB PL 250 * 24 (SM400)	120.0	120.0
1-LWEB PL 2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL 2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL 2940 * 10 (SM490Y)	294.0	294.0
7-RIB PL 170 * 17 (SM490Y)	202.3	202.3

Section property

		Total	In-plane
Section area	A (cm2)	2523.9	2523.9
Gravity center	ex (cm)	25.8	25.8
	ey (cm)	175.3	175.3
Moment of inertia	Ix (cm4)	31216009	31216009
	Iy (cm4)	47202990	47202990
Torsion Constant	J (cm4)	26105509	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	42675.7 kN·m	42675.7 kN·m
	Mxr(lower)=	37153.3 kN·m	27592.5 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-46	140	0	0	0	80	0.11
	[2]	-46	140	5	0	5	80	0.11
DECK-C	[3]	-46	140	5	0	5	80	0.11
	[4]	-46	140	14	6	20	80	0.17
	[5]	-49	140	14	6	14	80	0.16
	[6]	-49	140	13	0	13	80	0.15
DECK-R	[7]	-49	140	13	0	13	80	0.15
	[8]	-51	140	0	0	0	80	0.13
LWEB	[9]	-46	210	22	7	29	120	0.11
	[10]	0	210	24	7	32	120	0.07
	[11]	87	210	16	7	23	120	0.21
RWEB	[12]	-48	210	24	7	31	120	0.12
	[13]	0	210	26	7	34	120	0.08
	[14]	87	210	18	7	25	120	0.22
LFLG	[15]	87	210	0	0	0	120	0.17
	[16]	87	210	21	10	31	120	0.24
	[17]	88	210	24	10	34	120	0.25
	[18]	88	210	0	0	0	120	0.17

Girder Name：G2　Section Name：Sec-8:J-7　（Girder number=　2　Section number=　9）

Section force　Mx =　14531 kN·m　Sy =　-2004 kN　T =　1994 kN·m

Effective buckling length　Lx =　4757 mmLy =　4757 mm
Radius of curvature　R　=-2003. m
Inclination　DECK =　2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	825
	Intermediate	2700	2700
	overhang	1650	1650
LFLG	Intermediate	2700	2700

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL 645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL 3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 * 8 (SM400)	215.6	215.6
1-DECK-R PL 1470 * 16 (SM400)	235.2	235.2
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
2-RIB PL 250 * 24 (SM400)	120.0	120.0
1-LWEB PL 2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL 2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL 2940 * 10 (SM490Y)	294.0	294.0
7-RIB PL 170 * 17 (SM490Y)	202.3	202.3

Section property

		Total	In-plane
Section area	A (cm2)	2523.9	2523.9
Gravity center	ex (cm)	25.8	25.8
	ey (cm)	175.3	175.3
Moment of inertia	Ix (cm4)	31216009	31216009
	Iy (cm4)	47202990	47202990
Torsion Constant	J (cm4)	26105509	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	42675.7 kN·m	42675.7 kN·m
	Mxr(lower)=	37153.3 kN·m	27592.5 kN·m

Stress (N/mm²)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-43	140	0	0	0	80	0.09
	[2]	-43	140	5	0	6	80	0.10
DECK-C	[3]	-43	140	5	0	6	80	0.10
	[4]	-44	140	16	8	24	80	0.19
	[5]	-46	140	17	9	17	80	0.15
	[6]	-46	140	15	0	16	80	0.15
DECK-R	[7]	-46	140	15	0	16	80	0.15
	[8]	-48	140	0	0	0	80	0.12
LWEB	[9]	-43	210	26	10	35	120	0.13
	[10]	0	210	28	10	38	120	0.10
	[11]	82	210	18	10	28	120	0.21
RWEB	[12]	-45	210	28	10	37	120	0.14
	[13]	0	210	31	10	40	120	0.11
	[14]	82	210	21	10	30	120	0.22
LFLG	[15]	82	210	0	0	0	120	0.15
	[16]	82	210	25	14	38	120	0.25
	[17]	82	210	28	14	41	120	0.27
	[18]	82	210	0	0	0	120	0.15

Girder Name：G2　Section Name：Sec-8:J-8　（Girder number=　2　Section number=　9）

Section force　Mx =　-9641 kN･m　Sy =　-2464 kN　T =　2005 kN･m

Effective buckling length　Lx =　4757 mmLy =　4757 mm
Radius of curvature　R　=-2003. m
Inclination　DECK =　2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	818
	Intermediate	2700	2632
	overhang	1650	1593
LFLG	Intermediate	2700	2632

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	645 ＊ 16 (SM400)	103.2	102.1
1-U.RIB 320 ＊ 240 ＊	8 (SM400)	53.9	53.9
1-DECK-C PL	3061 ＊ 16 (SM400)	489.7	478.8
4-U.RIB 320 ＊ 240 ＊	8 (SM400)	215.6	215.6
1-DECK-R PL	1470 ＊ 16 (SM400)	235.2	226.1
1-U.RIB 320 ＊ 240 ＊	8 (SM400)	53.9	53.9
2-RIB PL	250 ＊ 24 (SM400)	120.0	120.0
1-LWEB PL	2673 ＊ 14 (SM490Y)	374.2	374.2
1-RWEB PL	2727 ＊ 14 (SM490Y)	381.8	381.8
1-LFLG PL	2940 ＊ 10 (SM490Y)	294.0	287.2
7-RIB PL	170 ＊ 17 (SM490Y)	202.3	173.4

Section property			Total	In-plane
Section area	A	(cm2)	2523.9	2467.1
Gravity center	ex	(cm)	25.8	25.4
	ey	(cm)	175.3	176.9
Moment of inertia	Ix	(cm4)	31216009	29992384
	Iy	(cm4)	47202990	46434788
Torsion Constant	J	(cm4)	26105509	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	41703.8 kN･m	41703.8 kN･m
	Mxr(lower)=	35375.5 kN･m	26272.2 kN･m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	29	140	0	0	0	80	0.04
	[2]	29	140	7	0	7	80	0.05
DECK-C	[3]	29	140	7	0	7	80	0.05
	[4]	30	140	20	9	28	80	0.17
	[5]	31	140	20	9	21	80	0.12
	[6]	31	140	19	0	19	80	0.11
DECK-R	[7]	31	140	19	0	19	80	0.11
	[8]	32	140	0	0	1	80	0.05
LWEB	[9]	29	210	31	10	41	120	0.14
	[10]	-1	210	35	10	45	120	0.14
	[11]	-57	210	23	10	32	120	0.15
RWEB	[12]	31	210	34	10	44	120	0.15
	[13]	-1	210	38	10	47	120	0.16
	[14]	-57	210	25	10	35	120	0.16
LFLG	[15]	-57	187	0	0	0	120	0.07
	[16]	-57	156	30	14	44	120	0.21
	[17]	-57	156	34	14	48	120	0.23
	[18]	-57	187	0	0	0	120	0.07

Girder Name：G2　Section Name：Sec-9:J-9　（Girder number=　2　Section number=　10）

Section force　Mx =　-25457 kN·m　Sy =　-2904 kN　T =　1882 kN·m

Effective buckling length　Lx =　4657 mmLy =　4657 mm
Radius of curvature　R　=-2003. m
Inclination　DECK =　2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	809
	Intermediate	2700	2541
	overhang	1650	1517
LFLG	Intermediate	2700	2541

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	645 * 16 (SM400)	103.2	100.7
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	464.2
4-U.RIB 320 * 240 *	8 (SM400)	215.6	215.6
1-DECK-R PL	1470 * 16 (SM400)	235.2	213.9
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
2-RIB PL	250 * 24 (SM400)	120.0	120.0
1-LWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL	2940 * 12 (SM490Y)	352.8	333.7
7-RIB PL	170 * 17 (SM490Y)	202.3	173.4

Section property			Total	In-plane
Section area	A	(cm2)	2582.7	2485.3
Gravity center	ex	(cm)	25.3	23.9
	ey	(cm)	171.3	172.5
Moment of inertia	Ix	(cm4)	33004593	31158030
	Iy	(cm4)	47664891	45930702
Torsion Constant	J	(cm4)	27632961	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	41560.0 kN·m	41560.0 kN·m
	Mxr(lower)=	37644.0 kN·m	32595.4 kN·m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	77	140	0	0	0	80	0.31
	[2]	78	140	8	0	8	80	0.32
DECK-C	[3]	78	140	8	0	8	80	0.32
	[4]	79	140	23	8	31	80	0.46
	[5]	83	140	24	8	24	80	0.44
	[6]	84	140	22	0	22	80	0.43
DECK-R	[7]	84	140	22	0	22	80	0.43
	[8]	86	140	1	0	1	80	0.38
LWEB	[9]	77	210	37	9	46	120	0.28
	[10]	-1	210	41	9	50	120	0.17
	[11]	-141	210	28	9	37	120	0.54
RWEB	[12]	82	210	39	9	49	120	0.32
	[13]	-1	210	44	9	53	120	0.20
	[14]	-141	210	31	9	40	120	0.56
LFLG	[15]	-142	210	0	0	0	120	0.46
	[16]	-142	182	31	11	41	120	0.57
	[17]	-142	182	34	11	45	120	0.60
	[18]	-142	210	0	0	0	120	0.46

Girder Name：G2　Section Name：Sec-10：Mx-Min_L　（Girder number=　2　Section number=　11）

Section force　Mx =　-33064 kN･m　Sy =　-3088 kN　T =　1882 kN･m

Effective buckling length　Lx =　4657 mmLy =　4657 mm
Radius of curvature　R　=-2003. m
Inclination　DECK =　2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	806
	Intermediate	2700	2503
	overhang	1650	1485
LFLG	Intermediate	2700	2503

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL 645 ＊ 16 (SM490Y)	103.2	100.1
1-U.RIB 320 ＊ 240 ＊ 8 (SM490Y)	53.9	53.9
1-DECK-C PL 3061 ＊ 16 (SM490Y)	489.7	458.2
4-U.RIB 320 ＊ 240 ＊ 8 (SM490Y)	215.6	215.6
1-DECK-R PL 1470 ＊ 16 (SM490Y)	235.2	208.8
1-U.RIB 320 ＊ 240 ＊ 8 (SM490Y)	53.9	53.9
2-RIB PL 250 ＊ 24 (SM490Y)	120.0	120.0
1-LWEB PL 2673 ＊ 14 (SM490Y)	374.2	374.2
1-RWEB PL 2727 ＊ 14 (SM490Y)	381.8	381.8
1-LFLG PL 2940 ＊ 14 (SM490Y)	411.6	384.0
7-RIB PL 170 ＊ 17 (SM490Y)	202.3	173.4

Section property

		Total	In-plane
Section area	A (cm2)	2641.5	2523.9
Gravity center	ex (cm)	24.7	23.1
	ey (cm)	167.5	168.6
Moment of inertia	Ix (cm4)	34717534	32521569
	Iy (cm4)	48125082	45995293
Torsion Constant	J (cm4)	28842709	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	62751.8 kN･m	62751.8 kN･m
	Mxr(lower)=	40154.3 kN･m	38303.3 kN･m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	100	210	0	0	0	120	0.23
	[2]	102	210	8	0	8	120	0.24
DECK-C	[3]	102	210	8	0	8	120	0.24
	[4]	102	210	24	8	32	120	0.31
	[5]	108	210	25	8	25	120	0.31
	[6]	108	210	23	0	23	120	0.30
DECK-R	[7]	108	210	23	0	23	120	0.30
	[8]	111	210	2	0	2	120	0.28
LWEB	[9]	100	210	38	9	48	120	0.39
	[10]	-1	210	43	9	52	120	0.19
	[11]	-171	210	30	9	40	120	0.77
RWEB	[12]	106	210	42	9	51	120	0.43
	[13]	-1	210	47	9	56	120	0.22
	[14]	-171	210	34	9	43	120	0.80
LFLG	[15]	-173	210	0	0	0	120	0.68
	[16]	-173	200	29	9	38	120	0.77
	[17]	-173	200	32	9	41	120	0.80
	[18]	-173	210	0	0	0	120	0.68

Girder Name:G2　Section Name:Sec-10:Mx-Min_R　（Girder number=　2　Section number=　11）

Section force　Mx =　-33065 kN･m　Sy =　2422 kN　T =　1599 kN･m

Effective buckling length　Lx =　4732 mmLy =　4732 mm
Radius of curvature　R　=-2003. m
Inclination　DECK =　2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	806
	Intermediate	2700	2503
	overhang	1650	1485
LFLG	Intermediate	2700	2503

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL　645 * 16 (SM490Y)	103.2	100.1
1-U.RIB 320 * 240 *　8 (SM490Y)	53.9	53.9
1-DECK-C PL　3061 * 16 (SM490Y)	489.7	458.2
4-U.RIB 320 * 240 *　8 (SM490Y)	215.6	215.6
1-DECK-R PL　1470 * 16 (SM490Y)	235.2	208.8
1-U.RIB 320 * 240 *　8 (SM490Y)	53.9	53.9
2-RIB　PL　250 * 24 (SM490Y)	120.0	120.0
1-LWEB　PL　2673 * 14 (SM490Y)	374.2	374.2
1-RWEB　PL　2727 * 14 (SM490Y)	381.8	381.8
1-LFLG　PL　2940 * 14 (SM490Y)	411.6	384.0
7-RIB　PL　170 * 17 (SM490Y)	202.3	173.4

Section property

		Total	In-plane
Section area	A　(cm2)	2641.5	2523.9
Gravity center	ex (cm)	24.7	23.1
	ey (cm)	167.5	168.6
Moment of inertia	Ix (cm4)	34717534	32521569
	Iy (cm4)	48125082	45995293
Torsion Constant	J　(cm4)	28842709	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	62751.8 kN･m	62751.8 kN･m
	Mxr(lower)=	40154.3 kN･m	38303.3 kN･m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[　1]	100	210	0	0	0	120	0.23
	[　2]	102	210	6	0	7	120	0.24
DECK-C	[　3]	102	210	6	0	7	120	0.24
	[　4]	102	210	19	7	25	120	0.28
	[　5]	108	210	20	7	20	120	0.29
	[　6]	108	210	18	0	18	120	0.29
DECK-R	[　7]	108	210	18	0	18	120	0.29
	[　8]	111	210	1	0	1	120	0.28
LWEB	[　9]	100	210	30	8	38	120	0.33
	[10]	-1	210	34	8	41	120	0.12
	[11]	-171	210	24	8	32	120	0.73
RWEB	[12]	106	210	33	8	40	120	0.37
	[13]	-1	210	36	8	44	120	0.14
	[14]	-171	210	27	8	34	120	0.75
LFLG	[15]	-173	210	0	0	0	120	0.68
	[16]	-173	200	22	8	30	120	0.74
	[17]	-173	200	25	8	33	120	0.75
	[18]	-173	210	0	0	0	120	0.68

Girder Name：G2 Section Name：Sec-11:J-10 (Girder number= 2 Section number= 12)

Section force Mx = -27448 kN·m Sy = 2235 kN T = 1599 kN·m

Effective buckling length Lx = 4732 mmLy = 4732 mm
Radius of curvature R =-2003. m
Inclination DECK = 2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	810
	Intermediate	2700	2541
	overhang	1650	1517
LFLG	Intermediate	2700	2541

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	645 * 16 (SM400)	103.2	100.7
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	464.3
4-U.RIB 320 * 240 *	8 (SM400)	215.6	215.6
1-DECK-R PL	1470 * 16 (SM400)	235.2	213.9
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
2-RIB PL	250 * 24 (SM400)	120.0	120.0
1-LWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL	2940 * 12 (SM490Y)	352.8	333.7
7-RIB PL	170 * 17 (SM490Y)	202.3	173.4

Section property			Total	In-plane
Section area	A	(cm2)	2582.7	2485.4
Gravity center	ex	(cm)	25.3	23.9
	ey	(cm)	171.3	172.5
Moment of inertia	Ix	(cm4)	33004593	31159373
	Iy	(cm4)	47664891	45932763
Torsion Constant	J	(cm4)	27632961	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	41562.0 kN·m	41562.0 kN·m
	Mxr(lower)=	37645.4 kN·m	32596.7 kN·m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	83	140	0	0	0	80	0.35
	[2]	85	140	6	0	6	80	0.37
DECK-C	[3]	85	140	6	0	6	80	0.37
	[4]	85	140	17	7	24	80	0.46
	[5]	90	140	18	7	18	80	0.46
	[6]	90	140	17	0	17	80	0.46
DECK-R	[7]	90	140	17	0	17	80	0.46
	[8]	92	140	1	0	1	80	0.44
LWEB	[9]	83	210	28	8	36	120	0.25
	[10]	-1	210	31	8	39	120	0.11
	[11]	-152	210	21	8	29	120	0.58
RWEB	[12]	88	210	30	8	38	120	0.28
	[13]	-1	210	34	8	42	120	0.12
	[14]	-152	210	24	8	32	120	0.59
LFLG	[15]	-153	210	0	0	0	120	0.53
	[16]	-153	182	24	9	33	120	0.60
	[17]	-153	182	27	9	36	120	0.62
	[18]	-153	210	0	0	0	120	0.53

Girder Name : G2　Section Name : Sec-12:J-11　(Girder number=　2　Section number=　13)

Section force　Mx = -16166 kN·m　Sy = 1859 kN　T = 1407 kN·m

Effective buckling length　Lx = 4807 mmLy = 4807 mm
Radius of curvature　R =-2003. m
Inclination　DECK = 2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	818
	Intermediate	2700	2632
	overhang	1650	1593
LFLG	Intermediate	2700	2632

Section dimensions　Section area(cm2)

Section	Total	in plane
1-DECK-L PL 645 * 16 (SM400)	103.2	102.2
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL 3061 * 16 (SM400)	489.7	478.9
4-U.RIB 320 * 240 * 8 (SM400)	215.6	215.6
1-DECK-R PL 1470 * 16 (SM400)	235.2	226.2
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
2-RIB PL 250 * 24 (SM400)	120.0	120.0
1-LWEB PL 2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL 2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL 2940 * 10 (SM490Y)	294.0	287.2
7-RIB PL 170 * 17 (SM490Y)	202.3	173.4

Section property

		Total	In-plane
Section area	A (cm2)	2523.9	2467.3
Gravity center	ex (cm)	25.8	25.4
	ey (cm)	175.3	176.9
Moment of inertia	Ix (cm4)	31216009	29994972
	Iy (cm4)	47202990	46440427
Torsion Constant	J (cm4)	26105509	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	41708.2 kN·m	41708.2 kN·m
	Mxr(lower)=	35378.0 kN·m	26274.0 kN·m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	49	140	0	0	0	80	0.12
	[2]	49	140	5	0	5	80	0.13
DECK-C	[3]	49	140	5	0	5	80	0.13
	[4]	50	140	15	6	21	80	0.19
	[5]	53	140	15	6	15	80	0.18
	[6]	53	140	14	0	14	80	0.17
DECK-R	[7]	53	140	14	0	14	80	0.17
	[8]	54	140	0	0	0	80	0.15
LWEB	[9]	49	210	24	7	31	120	0.12
	[10]	-1	210	26	7	33	120	0.08
	[11]	-95	210	17	7	24	120	0.25
RWEB	[12]	52	210	26	7	32	120	0.13
	[13]	-1	210	28	7	35	120	0.09
	[14]	-95	210	19	7	26	120	0.25
LFLG	[15]	-96	187	0	0	0	120	0.21
	[16]	-96	156	23	10	32	120	0.28
	[17]	-96	156	26	10	35	120	0.29
	[18]	-96	187	0	0	0	120	0.21

Girder Name：G2　Section Name：Sec-12:J-12　（Girder number=　2　Section number=　13）

Section force	Mx-Max	Mx = 2344 kN·m	Sy = 1390 kN	T = 1394 kN·m
	Mx-Min	Mx = -7108 kN·m	Sy = 1390 kN	T = 1394 kN·m

Effective buckling length　Lx = 4807 mmLy = 4807 mm
Radius of curvature　R =-2003. m
Inclination　DECK = 2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	825
	Intermediate	2700	2700
	overhang	1650	1650
LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 *	8 (SM400)	215.6	215.6
1-DECK-R PL	1470 * 16 (SM400)	235.2	235.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
2-RIB PL	250 * 24 (SM400)	120.0	120.0
1-LWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL	2940 * 10 (SM490Y)	294.0	294.0
7-RIB PL	170 * 17 (SM490Y)	202.3	202.3

Section property		Total	In-plane
Section area	A (cm2)	2523.9	2523.9
Gravity center	ex (cm)	25.8	25.8
	ey (cm)	175.3	175.3
Moment of inertia	Ix (cm4)	31216009	31216009
	Iy (cm4)	47202990	47202990
Torsion Constant	J (cm4)	26105509	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	42675.7 kN·m	42675.7 kN·m
	Mxr(lower)=	37153.3 kN·m	27592.5 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-7	140	0	0	0	80	0.00
	[2]	-7	140	4	0	4	80	0.00
DECK-C	[3]	-7	140	4	0	4	80	0.00
	[4]	-7	140	11	6	17	80	0.05
	[5]	-7	140	12	6	12	80	0.02
	[6]	-7	140	11	0	11	80	0.02
DECK-R	[7]	-7	140	11	0	11	80	0.02
	[8]	-8	140	0	0	0	80	0.00
LWEB	[9]	-7	210	18	7	25	120	0.04
	[10]	0	210	20	7	26	120	0.05
	[11]	13	210	13	7	20	120	0.03
RWEB	[12]	-7	210	19	7	26	120	0.05
	[13]	0	210	21	7	28	120	0.05
	[14]	13	210	14	7	21	120	0.04

	LFLG	[15]	13	210	0	0	0	120	0.00
		[16]	13	210	17	9	27	120	0.05
		[17]	13	210	19	10	29	120	0.06
		[18]	13	210	0	0	0	120	0.00

Mx-Min	[Check	point]	σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	21	140	0	0	0	80	0.02
		[2]	21	140	4	0	4	80	0.03
	DECK-C	[3]	21	140	4	0	4	80	0.03
		[4]	21	140	11	6	17	80	0.07
		[5]	23	140	12	6	12	80	0.05
		[6]	23	140	11	0	11	80	0.04
	DECK-R	[7]	23	140	11	0	11	80	0.04
		[8]	23	140	0	0	0	80	0.03
	LWEB	[9]	21	210	18	7	25	120	0.05
		[10]	0	210	20	7	26	120	0.05
		[11]	-40	210	13	7	20	120	0.06
	RWEB	[12]	22	210	19	7	26	120	0.06
		[13]	0	210	21	7	28	120	0.05
		[14]	-40	210	14	7	21	120	0.07
	LFLG	[15]	-40	187	0	0	0	120	0.04
		[16]	-40	156	17	9	27	120	0.09
		[17]	-40	156	19	10	29	120	0.09
		[18]	-40	187	0	0	0	120	0.04

Girder Name : G2   Section Name : Sec-13:Left   (Girder number= 2 Section number= 14)

Section force Mx-Max   Mx = 2344 kN·m Sy = 1390 kN T = 1394 kN·m
               Mx-Min   Mx = -7108 kN·m Sy = 1390 kN T = 1394 kN·m

Effective buckling length   Lx = 4807 mmLy = 4807 mm
Radius of curvature   R =-2003. m
Inclination   DECK = 2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	825
	Intermediate	2700	2700
	overhang	1650	1650
LFLG	Intermediate	2700	2700

Section dimensions

Section area(cm2)	Total	in plane
1-DECK-L PL 645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL 3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 * 8 (SM400)	215.6	215.6
1-DECK-R PL 1470 * 16 (SM400)	235.2	235.2
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
2-RIB PL 250 * 24 (SM400)	120.0	120.0
1-LWEB PL 2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL 2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL 2940 * 10 (SM490Y)	294.0	294.0
7-RIB PL 170 * 17 (SM490Y)	202.3	202.3

Section property

		Total	In-plane
Section area	A (cm2)	2523.9	2523.9
Gravity center	ex (cm)	25.8	25.8
	ey (cm)	175.3	175.3
Moment of inertia	Ix (cm4)	31216009	31216009
	Iy (cm4)	47202990	47202990
Torsion Constant	J (cm4)	26105509	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	42675.7 kN·m	42675.7 kN·m
	Mxr(lower)=	37153.3 kN·m	27592.5 kN·m

Stress (N/mm²)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-7	140	0	0	0	80	0.00
	[2]	-7	140	4	0	4	80	0.00
DECK-C	[3]	-7	140	4	0	4	80	0.00
	[4]	-7	140	11	6	17	80	0.05
	[5]	-7	140	12	6	12	80	0.02
	[6]	-7	140	11	0	11	80	0.02
DECK-R	[7]	-7	140	11	0	11	80	0.02
	[8]	-8	140	0	0	0	80	0.00
LWEB	[9]	-7	210	18	7	25	120	0.04
	[10]	0	210	20	7	26	120	0.05
	[11]	13	210	13	7	20	120	0.03
RWEB	[12]	-7	210	19	7	26	120	0.05
	[13]	0	210	21	7	28	120	0.05
	[14]	13	210	14	7	21	120	0.04

	LFLG	[15]	13	210	0	0	0	120	0.00
		[16]	13	210	17	9	27	120	0.05
		[17]	13	210	19	10	29	120	0.06
		[18]	13	210	0	0	0	120	0.00

Mx-Min	[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	21	140	0	0	0	80	0.02
		[2]	21	140	4	0	4	80	0.03
	DECK-C	[3]	21	140	4	0	4	80	0.03
		[4]	21	140	11	6	17	80	0.07
		[5]	23	140	12	6	12	80	0.05
		[6]	23	140	11	0	11	80	0.04
	DECK-R	[7]	23	140	11	0	11	80	0.04
		[8]	23	140	0	0	0	80	0.03
	LWEB	[9]	21	210	18	7	25	120	0.05
		[10]	0	210	20	7	26	120	0.05
		[11]	-40	210	13	7	20	120	0.06
	RWEB	[12]	22	210	19	7	26	120	0.06
		[13]	0	210	21	7	28	120	0.05
		[14]	-40	210	14	7	21	120	0.07
	LFLG	[15]	-40	187	0	0	0	120	0.04
		[16]	-40	156	17	9	27	120	0.09
		[17]	-40	156	19	10	29	120	0.09
		[18]	-40	187	0	0	0	120	0.04

Girder Name：G2　Section Name：Sec-13:J-13　（Girder number=　2　Section number=　14）

Section force　Mx-Max　　Mx =　9000 kN･m　Sy =　822 kN　T =　1147 kN･m
　　　　　　　Mx-Min　　Mx =　-2747 kN･m　Sy =　822 kN　T =　1147 kN･m

Effective buckling length　　Lx =　4807 mmLy =　4807 mm
Radius of curvature　　　　R　=-2003. m
Inclination　　　　　　　　DECK =　2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	825
	Intermediate	2700	2700
	overhang	1650	1650
LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 *	8 (SM400)	215.6	215.6
1-DECK-R PL	1470 * 16 (SM400)	235.2	235.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
2-RIB PL	250 * 24 (SM400)	120.0	120.0
1-LWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL	2940 * 10 (SM490Y)	294.0	294.0
7-RIB PL	170 * 17 (SM490Y)	202.3	202.3

Section property		Total	In-plane
Section area	A (cm2)	2523.9	2523.9
Gravity center	ex (cm)	25.8	25.8
	ey (cm)	175.3	175.3
Moment of inertia	Ix (cm4)	31216009	31216009
	Iy (cm4)	47202990	47202990
Torsion Constant	J (cm4)	26105509	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	42675.7 kN･m	42675.7 kN･m
	Mxr(lower)=	37153.3 kN･m	27592.5 kN･m

Stress (N/mm²)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-26	140	0	0	0	80	0.04
	[2]	-27	140	2	0	2	80	0.04
DECK-C	[3]	-27	140	2	0	2	80	0.04
	[4]	-27	140	7	5	11	80	0.06
	[5]	-29	140	7	5	8	80	0.05
	[6]	-29	140	6	0	6	80	0.05
DECK-R	[7]	-29	140	6	0	6	80	0.05
	[8]	-30	140	0	0	0	80	0.04
LWEB	[9]	-26	210	11	6	16	120	0.03
	[10]	0	210	12	6	17	120	0.02
	[11]	51	210	8	6	13	120	0.07
RWEB	[12]	-28	210	11	6	17	120	0.04
	[13]	0	210	13	6	18	120	0.02
	[14]	51	210	8	6	14	120	0.07

LFLG	[15]	51	210	0	0	0	120	0.06
	[16]	51	210	10	8	18	120	0.08
	[17]	51	210	11	8	19	120	0.08
	[18]	51	210	0	0	0	120	0.06

Mx-Min

[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	8	140	0	0	0	80	0.00
	[2]	8	140	2	0	2	80	0.00
DECK-C	[3]	8	140	2	0	2	80	0.00
	[4]	8	140	7	5	11	80	0.02
	[5]	9	140	7	5	8	80	0.01
	[6]	9	140	6	0	6	80	0.01
DECK-R	[7]	9	140	6	0	6	80	0.01
	[8]	9	140	0	0	0	80	0.00
LWEB	[9]	8	210	11	6	16	120	0.02
	[10]	0	210	12	6	17	120	0.02
	[11]	-15	210	8	6	13	120	0.02
RWEB	[12]	9	210	11	6	17	120	0.02
	[13]	0	210	13	6	18	120	0.02
	[14]	-15	210	8	6	14	120	0.02
LFLG	[15]	-16	187	0	0	0	120	0.01
	[16]	-16	156	10	8	18	120	0.03
	[17]	-16	156	11	8	19	120	0.03
	[18]	-16	187	0	0	0	120	0.01

Girder Name：G2　Section Name：Sec-14:Left　 (Girder number=　2　Section number=　15)

Section force	Mx-Max	Mx = 9000 kN·m	Sy = 822 kN	T = 1147 kN·m
	Mx-Min	Mx = -2747 kN·m	Sy = 822 kN	T = 1147 kN·m

Effective buckling length　Lx = 4807 mmLy = 4807 mm
Radius of curvature　R =-2003. m
Inclination　DECK = 2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	825
	Intermediate	2700	2700
	overhang	1650	1650
LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 *	8 (SM400)	215.6	215.6
1-DECK-R PL	1470 * 16 (SM400)	235.2	235.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
2-RIB PL	250 * 24 (SM400)	120.0	120.0
1-LWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL	2940 * 10 (SM490Y)	294.0	294.0
7-RIB PL	170 * 17 (SM490Y)	202.3	202.3

Section property			Total	In-plane
	Section area	A (cm2)	2523.9	2523.9
	Gravity center	ex (cm)	25.8	25.8
		ey (cm)	175.3	175.3
	Moment of inertia	Ix (cm4)	31216009	31216009
		Iy (cm4)	47202990	47202990
	Torsion Constant	J (cm4)	26105509	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	42675.7 kN·m	42675.7 kN·m
	Mxr(lower)=	37153.3 kN·m	27592.5 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-26	140	0	0	0	80	0.04
	[2]	-27	140	2	0	2	80	0.04
DECK-C	[3]	-27	140	2	0	2	80	0.04
	[4]	-27	140	7	5	11	80	0.06
	[5]	-29	140	7	5	8	80	0.05
	[6]	-29	140	6	0	6	80	0.05
DECK-R	[7]	-29	140	6	0	6	80	0.05
	[8]	-30	140	0	0	0	80	0.04
LWEB	[9]	-26	210	11	6	16	120	0.03
	[10]	0	210	12	6	17	120	0.02
	[11]	51	210	8	6	13	120	0.07
RWEB	[12]	-28	210	11	6	17	120	0.04
	[13]	0	210	13	6	18	120	0.02
	[14]	51	210	8	6	14	120	0.07

	LFLG	[15]	51	210	0	0	0	120	0.06
		[16]	51	210	10	8	18	120	0.08
		[17]	51	210	11	8	19	120	0.08
		[18]	51	210	0	0	0	120	0.06

Mx-Min		[Check point]	σ_{mx}	σ_a	τ_{sy}	τ_t	$\Sigma\tau$	τ_a	κ
	DECK-L	[1]	8	140	0	0	0	80	0.00
		[2]	8	140	2	0	2	80	0.00
	DECK-C	[3]	8	140	2	0	2	80	0.00
		[4]	8	140	7	5	11	80	0.02
		[5]	9	140	7	5	8	80	0.01
		[6]	9	140	6	0	6	80	0.01
	DECK-R	[7]	9	140	6	0	6	80	0.01
		[8]	9	140	0	0	0	80	0.00
	LWEB	[9]	8	210	11	6	16	120	0.02
		[10]	0	210	12	6	17	120	0.02
		[11]	-15	210	8	6	13	120	0.02
	RWEB	[12]	9	210	11	6	17	120	0.02
		[13]	0	210	13	6	18	120	0.02
		[14]	-15	210	8	6	14	120	0.02
	LFLG	[15]	-16	187	0	0	0	120	0.01
		[16]	-16	156	10	8	18	120	0.03
		[17]	-16	156	11	8	19	120	0.03
		[18]	-16	187	0	0	0	120	0.01

Girder Name：G2　Section Name：Sec-14:J-14　（Girder number=　2　Section number=　15）

Section force	Mx-Max	Mx =	10648 kN･m	Sy =	-425 kN	T =	843 kN･m
	Mx-Min	Mx =	-2161 kN･m	Sy =	-425 kN	T =	843 kN･m

Effective buckling length　Lx =　4807 mmLy =　4807 mm
Radius of curvature　R　=-2003.　m
Inclination　DECK =　2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	825
	Intermediate	2700	2700
	overhang	1650	1650
LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 *	8 (SM400)	215.6	215.6
1-DECK-R PL	1470 * 16 (SM400)	235.2	235.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
2-RIB PL	250 * 24 (SM400)	120.0	120.0
1-LWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL	2940 * 10 (SM490Y)	294.0	294.0
7-RIB PL	170 * 17 (SM490Y)	202.3	202.3

Section property			Total	In-plane
Section area	A	(cm2)	2523.9	2523.9
Gravity center	ex	(cm)	25.8	25.8
	ey	(cm)	175.3	175.3
Moment of inertia	Ix	(cm4)	31216009	31216009
	Iy	(cm4)	47202990	47202990
Torsion Constant	J	(cm4)	26105509	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	42675.7 kN･m	42675.7 kN･m
	Mxr(lower)=	37153.3 kN･m	27592.5 kN･m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-31	140	0	0	0	80	0.05
	[2]	-32	140	1	0	1	80	0.05
DECK-C	[3]	-32	140	1	0	1	80	0.05
	[4]	-32	140	3	4	7	80	0.06
	[5]	-34	140	4	4	5	80	0.06
	[6]	-34	140	3	0	3	80	0.06
DECK-R	[7]	-34	140	3	0	3	80	0.06
	[8]	-35	140	0	0	0	80	0.06
LWEB	[9]	-31	210	5	4	10	120	0.03
	[10]	0	210	6	4	10	120	0.01
	[11]	60	210	4	4	8	120	0.09
RWEB	[12]	-33	210	6	4	10	120	0.03
	[13]	0	210	6	4	11	120	0.01
	[14]	60	210	4	4	9	120	0.09

	LFLG	[15]	60	210	0	0	0	120	0.08
		[16]	60	210	5	6	11	120	0.09
		[17]	60	210	6	6	12	120	0.09
		[18]	60	210	0	0	0	120	0.08

Mx-Min	[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	6	140	0	0	0	80	0.00
		[2]	6	140	1	0	1	80	0.00
	DECK-C	[3]	6	140	1	0	1	80	0.00
		[4]	6	140	3	4	7	80	0.01
		[5]	7	140	4	4	5	80	0.01
		[6]	7	140	3	0	3	80	0.00
	DECK-R	[7]	7	140	3	0	3	80	0.00
		[8]	7	140	0	0	0	80	0.00
	LWEB	[9]	6	210	5	4	10	120	0.01
		[10]	0	210	6	4	10	120	0.01
		[11]	-12	210	4	4	8	120	0.01
	RWEB	[12]	7	210	6	4	10	120	0.01
		[13]	0	210	6	4	11	120	0.01
		[14]	-12	210	4	4	9	120	0.01
	LFLG	[15]	-12	187	0	0	0	120	0.00
		[16]	-12	156	5	6	11	120	0.01
		[17]	-12	156	6	6	12	120	0.01
		[18]	-12	187	0	0	0	120	0.00

Girder Name：G2　Section Name：Sec-15:Mx-Max　（Girder number=　2　Section number=　16）

Section force　Mx-Max　　Mx =　10667 kN·m　Sy =　-488 kN　T =　843 kN·m
　　　　　　　Mx-Min　　Mx =　-2339 kN·m　Sy =　-488 kN　T =　843 kN·m

Effective buckling length　Lx =　4807 mmLy =　4807 mm
Radius of curvature　R =-2003. m
Inclination　DECK =　2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	825
	Intermediate	2700	2700
	overhang	1650	1650
LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 *	8 (SM400)	215.6	215.6
1-DECK-R PL	1470 * 16 (SM400)	235.2	235.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
2-RIB PL	250 * 24 (SM400)	120.0	120.0
1-LWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL	2940 * 10 (SM490Y)	294.0	294.0
7-RIB PL	170 * 17 (SM490Y)	202.3	202.3

Section property		Total	In-plane
Section area	A (cm2)	2523.9	2523.9
Gravity center	ex (cm)	25.8	25.8
	ey (cm)	175.3	175.3
Moment of inertia	Ix (cm4)	31216009	31216009
	Iy (cm4)	47202990	47202990
Torsion Constant	J (cm4)	26105509	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	42675.7 kN·m	42675.7 kN·m
	Mxr(lower)=	37153.3 kN·m	27592.5 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-31	140	0	0	0	80	0.05
	[2]	-32	140	1	0	1	80	0.05
DECK-C	[3]	-32	140	1	0	1	80	0.05
	[4]	-32	140	4	4	7	80	0.06
	[5]	-34	140	4	4	5	80	0.06
	[6]	-34	140	4	0	4	80	0.06
DECK-R	[7]	-34	140	4	0	4	80	0.06
	[8]	-35	140	0	0	0	80	0.06
LWEB	[9]	-31	210	6	4	10	120	0.03
	[10]	0	210	7	4	11	120	0.01
	[11]	60	210	5	4	9	120	0.09
RWEB	[12]	-33	210	7	4	11	120	0.03
	[13]	0	210	7	4	12	120	0.01
	[14]	60	210	5	4	9	120	0.09

	LFLG	[15]	60	210	0	0	0	120	0.08
		[16]	60	210	6	6	12	120	0.09
		[17]	60	210	7	6	12	120	0.09
		[18]	60	210	0	0	0	120	0.08

Mx-Min	[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	7	140	0	0	0	80	0.00
		[2]	7	140	1	0	1	80	0.00
	DECK-C	[3]	7	140	1	0	1	80	0.00
		[4]	7	140	4	4	7	80	0.01
		[5]	7	140	4	4	5	80	0.01
		[6]	7	140	4	0	4	80	0.01
	DECK-R	[7]	7	140	4	0	4	80	0.01
		[8]	8	140	0	0	0	80	0.00
	LWEB	[9]	7	210	6	4	10	120	0.01
		[10]	0	210	7	4	11	120	0.01
		[11]	-13	210	5	4	9	120	0.01
	RWEB	[12]	7	210	7	4	11	120	0.01
		[13]	0	210	7	4	12	120	0.01
		[14]	-13	210	5	4	9	120	0.01
	LFLG	[15]	-13	187	0	0	0	120	0.00
		[16]	-13	156	6	6	12	120	0.01
		[17]	-13	156	7	6	12	120	0.01
		[18]	-13	187	0	0	0	120	0.00

Girder Name：G2　Section Name：Sec-15:J-15　（Girder number=　2　Section number=　16）

Section force	Mx-Max	Mx = 8087 kN・m	Sy =	-979 kN	T =	864 kN・m
	Mx-Min	Mx = -5842 kN・m	Sy =	-979 kN	T =	864 kN・m

Effective buckling length　Lx = 4807 mmLy = 4807 mm
Radius of curvature　R =-2003. m
Inclination　DECK = 2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	825	825
		Intermediate	2700	2700
		overhang	1650	1650
	LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 *	8 (SM400)	215.6	215.6
1-DECK-R PL	1470 * 16 (SM400)	235.2	235.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
2-RIB PL	250 * 24 (SM400)	120.0	120.0
1-LWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL	2940 * 10 (SM490Y)	294.0	294.0
7-RIB PL	170 * 17 (SM490Y)	202.3	202.3

Section property			Total	In-plane
	Section area	A (cm2)	2523.9	2523.9
	Gravity center	ex (cm)	25.8	25.8
		ey (cm)	175.3	175.3
	Moment of inertia	Ix (cm4)	31216009	31216009
		Iy (cm4)	47202990	47202990
	Torsion Constant	J (cm4)	26105509	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	42675.7 kN・m	42675.7 kN・m
	Mxr(lower)=	37153.3 kN・m	27592.5 kN・m

Stress (N/mm^2)

Mx-Max	[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	-24	140	0	0	0	80	0.03
		[2]	-24	140	3	0	3	80	0.03
	DECK-C	[3]	-24	140	3	0	3	80	0.03
		[4]	-24	140	8	4	11	80	0.05
		[5]	-26	140	8	4	8	80	0.04
		[6]	-26	140	8	0	8	80	0.04
	DECK-R	[7]	-26	140	8	0	8	80	0.04
		[8]	-27	140	0	0	0	80	0.04
	LWEB	[9]	-24	210	13	4	17	120	0.03
		[10]	0	210	14	4	18	120	0.02
		[11]	45	210	9	4	13	120	0.06
	RWEB	[12]	-25	210	13	4	18	120	0.04
		[13]	0	210	15	4	19	120	0.03
		[14]	45	210	10	4	14	120	0.06

	LFLG	[15]	46	210	0	0	0	120	0.05
		[16]	46	210	12	6	18	120	0.07
		[17]	46	210	13	6	19	120	0.07
		[18]	46	210	0	0	0	120	0.05

Mx-Min	[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	17	140	0	0	0	80	0.02
		[2]	17	140	3	0	3	80	0.02
	DECK-C	[3]	17	140	3	0	3	80	0.02
		[4]	17	140	8	4	11	80	0.04
		[5]	19	140	8	4	8	80	0.03
		[6]	19	140	8	0	8	80	0.03
	DECK-R	[7]	19	140	8	0	8	80	0.03
		[8]	19	140	0	0	0	80	0.02
	LWEB	[9]	17	210	13	4	17	120	0.03
		[10]	0	210	14	4	18	120	0.02
		[11]	-33	210	9	4	13	120	0.04
	RWEB	[12]	18	210	13	4	18	120	0.03
		[13]	0	210	15	4	19	120	0.03
		[14]	-33	210	10	4	14	120	0.04
	LFLG	[15]	-33	187	0	0	0	120	0.02
		[16]	-33	156	12	6	18	120	0.05
		[17]	-33	156	13	6	19	120	0.05
		[18]	-33	187	0	0	0	120	0.02

Girder Name : G2 Section Name : Sec-16:Left (Girder number= 2 Section number= 17)

Section force	Mx-Max	Mx = 8087 kN·m	Sy = -979 kN	T =	864 kN·m
	Mx-Min	Mx = -5842 kN·m	Sy = -979 kN	T =	864 kN·m

Effective buckling length Lx = 4807 mmLy = 4807 mm
Radius of curvature R =-2003. m
Inclination DECK = 2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	825	825
		Intermediate	2700	2700
		overhang	1650	1650
	LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 *	8 (SM400)	215.6	215.6
1-DECK-R PL	1470 * 16 (SM400)	235.2	235.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
2-RIB PL	250 * 24 (SM400)	120.0	120.0
1-LWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL	2940 * 10 (SM490Y)	294.0	294.0
7-RIB PL	170 * 17 (SM490Y)	202.3	202.3

Section property			Total	In-plane
	Section area	A (cm2)	2523.9	2523.9
	Gravity center	ex (cm)	25.8	25.8
		ey (cm)	175.3	175.3
	Moment of inertia	Ix (cm4)	31216009	31216009
		Iy (cm4)	47202990	47202990
	Torsion Constant	J (cm4)	26105509	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	42675.7 kN·m	42675.7 kN·m
	Mxr(lower)=	37153.3 kN·m	27592.5 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-24	140	0	0	0	80	0.03
	[2]	-24	140	3	0	3	80	0.03
DECK-C	[3]	-24	140	3	0	3	80	0.03
	[4]	-24	140	8	4	11	80	0.05
	[5]	-26	140	8	4	8	80	0.04
	[6]	-26	140	8	0	8	80	0.04
DECK-R	[7]	-26	140	8	0	8	80	0.04
	[8]	-27	140	0	0	0	80	0.04
LWEB	[9]	-24	210	13	4	17	120	0.03
	[10]	0	210	14	4	18	120	0.02
	[11]	45	210	9	4	13	120	0.06
RWEB	[12]	-25	210	13	4	18	120	0.04
	[13]	0	210	15	4	19	120	0.03
	[14]	45	210	10	4	14	120	0.06

	LFLG	[15]	46	210	0	0	0	120	0.05
		[16]	46	210	12	6	18	120	0.07
		[17]	46	210	13	6	19	120	0.07
		[18]	46	210	0	0	0	120	0.05

Mx-Min		[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	17	140	0	0	0	80	0.02
		[2]	17	140	3	0	3	80	0.02
	DECK-C	[3]	17	140	3	0	3	80	0.02
		[4]	17	140	8	4	11	80	0.04
		[5]	19	140	8	4	8	80	0.03
		[6]	19	140	8	0	8	80	0.03
	DECK-R	[7]	19	140	8	0	8	80	0.03
		[8]	19	140	0	0	0	80	0.02
	LWEB	[9]	17	210	13	4	17	120	0.03
		[10]	0	210	14	4	18	120	0.02
		[11]	-33	210	9	4	13	120	0.04
	RWEB	[12]	18	210	13	4	18	120	0.03
		[13]	0	210	15	4	19	120	0.03
		[14]	-33	210	10	4	14	120	0.04
	LFLG	[15]	-33	187	0	0	0	120	0.02
		[16]	-33	156	12	6	18	120	0.05
		[17]	-33	156	13	6	19	120	0.05
		[18]	-33	187	0	0	0	120	0.02

Girder Name : G2　Section Name : Sec-16:J-16　(Girder number=　2　Section number=　17)

Section force　Mx-Max　　Mx =　2129 kN·m　Sy =　-1429 kN　T =　1096 kN·m
　　　　　　　Mx-Min　　Mx =　-11872 kN·m　Sy =　-1429 kN　T =　1096 kN·m

Effective buckling length　　Lx =　4807 mmLy =　4807 mm
Radius of curvature　　R =-2003. m
Inclination　　DECK =　2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	825
	Intermediate	2700	2700
	overhang	1650	1650
LFLG	Intermediate	2700	2700

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL 645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL 3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 * 8 (SM400)	215.6	215.6
1-DECK-R PL 1470 * 16 (SM400)	235.2	235.2
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
2-RIB PL 250 * 24 (SM400)	120.0	120.0
1-LWEB PL 2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL 2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL 2940 * 10 (SM490Y)	294.0	294.0
7-RIB PL 170 * 17 (SM490Y)	202.3	202.3

Section property

		Total	In-plane
Section area	A (cm2)	2523.9	2523.9
Gravity center	ex (cm)	25.8	25.8
	ey (cm)	175.3	175.3
Moment of inertia	Ix (cm4)	31216009	31216009
	Iy (cm4)	47202990	47202990
Torsion Constant	J (cm4)	26105509	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	42675.7 kN·m	42675.7 kN·m
	Mxr(lower)=	37153.3 kN·m	27592.5 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-6	140	0	0	0	80	0.00
	[2]	-6	140	4	0	4	80	0.00
DECK-C	[3]	-6	140	4	0	4	80	0.00
	[4]	-6	140	11	5	16	80	0.04
	[5]	-7	140	12	5	12	80	0.02
	[6]	-7	140	11	0	11	80	0.02
DECK-R	[7]	-7	140	11	0	11	80	0.02
	[8]	-7	140	0	0	0	80	0.00
LWEB	[9]	-6	210	18	5	24	120	0.04
	[10]	0	210	20	5	26	120	0.05
	[11]	12	210	13	5	19	120	0.03
RWEB	[12]	-7	210	20	5	25	120	0.04
	[13]	0	210	22	5	27	120	0.05
	[14]	12	210	15	5	20	120	0.03

	LFLG	[15]	12	210	0	0	0	120	0.00
		[16]	12	210	17	7	25	120	0.05
		[17]	12	210	20	7	27	120	0.05
		[18]	12	210	0	0	0	120	0.00

Mx-Min	[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	35	140	0	0	0	80	0.06
		[2]	35	140	4	0	4	80	0.07
	DECK-C	[3]	35	140	4	0	4	80	0.07
		[4]	36	140	11	5	16	80	0.10
		[5]	38	140	12	5	12	80	0.09
		[6]	38	140	11	0	11	80	0.09
	DECK-R	[7]	38	140	11	0	11	80	0.09
		[8]	39	140	0	0	0	80	0.08
	LWEB	[9]	35	210	18	5	24	120	0.07
		[10]	0	210	20	5	26	120	0.05
		[11]	-67	210	13	5	19	120	0.12
	RWEB	[12]	37	210	20	5	25	120	0.07
		[13]	0	210	22	5	27	120	0.05
		[14]	-67	210	15	5	20	120	0.13
	LFLG	[15]	-67	187	0	0	0	120	0.10
		[16]	-67	156	17	7	25	120	0.15
		[17]	-67	156	20	7	27	120	0.15
		[18]	-67	187	0	0	0	120	0.10

Girder Name : G2　Section Name : Sec-17:Left　(Girder number= 2　Section number= 18)

Section force	Mx-Max	Mx = 2129 kN･m	Sy = -1429 kN	T = 1096 kN･m
	Mx-Min	Mx = -11872 kN･m	Sy = -1429 kN	T = 1096 kN･m

Effective buckling length　Lx = 4807 mmLy = 4807 mm
Radius of curvature　R =-2003. m
Inclination　DECK = 2.0 %

Effective width(mm)		Full width	In-plane
DECK	overhang	825	825
	Intermediate	2700	2700
	overhang	1650	1650
LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 *	8 (SM400)	215.6	215.6
1-DECK-R PL	1470 * 16 (SM400)	235.2	235.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
2-RIB PL	250 * 24 (SM400)	120.0	120.0
1-LWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL	2940 * 10 (SM490Y)	294.0	294.0
7-RIB PL	170 * 17 (SM490Y)	202.3	202.3

Section property			Total	In-plane
	Section area	A (cm2)	2523.9	2523.9
	Gravity center	ex (cm)	25.8	25.8
		ey (cm)	175.3	175.3
	Moment of inertia	Ix (cm4)	31216009	31216009
		Iy (cm4)	47202990	47202990
	Torsion Constant	J (cm4)	26105509	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	42675.7 kN･m	42675.7 kN･m
	Mxr(lower)=	37153.3 kN･m	27592.5 kN･m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-6	140	0	0	0	80	0.00
	[2]	-6	140	4	0	4	80	0.00
DECK-C	[3]	-6	140	4	0	4	80	0.00
	[4]	-6	140	11	5	16	80	0.04
	[5]	-7	140	12	5	12	80	0.02
	[6]	-7	140	11	0	11	80	0.02
DECK-R	[7]	-7	140	11	0	11	80	0.02
	[8]	-7	140	0	0	0	80	0.00
LWEB	[9]	-6	210	18	5	24	120	0.04
	[10]	0	210	20	5	26	120	0.05
	[11]	12	210	13	5	19	120	0.03
RWEB	[12]	-7	210	20	5	25	120	0.04
	[13]	0	210	22	5	27	120	0.05
	[14]	12	210	15	5	20	120	0.03

	LFLG	[15]	12	210	0	0	0	120	0.00
		[16]	12	210	17	7	25	120	0.05
		[17]	12	210	20	7	27	120	0.05
		[18]	12	210	0	0	0	120	0.00

Mx-Min	[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	35	140	0	0	0	80	0.06
		[2]	35	140	4	0	4	80	0.07
	DECK-C	[3]	35	140	4	0	4	80	0.07
		[4]	36	140	11	5	16	80	0.10
		[5]	38	140	12	5	12	80	0.09
		[6]	38	140	11	0	11	80	0.09
	DECK-R	[7]	38	140	11	0	11	80	0.09
		[8]	39	140	0	0	0	80	0.08
	LWEB	[9]	35	210	18	5	24	120	0.07
		[10]	0	210	20	5	26	120	0.05
		[11]	-67	210	13	5	19	120	0.12
	RWEB	[12]	37	210	20	5	25	120	0.07
		[13]	0	210	22	5	27	120	0.05
		[14]	-67	210	15	5	20	120	0.13
	LFLG	[15]	-67	187	0	0	0	120	0.10
		[16]	-67	156	17	7	25	120	0.15
		[17]	-67	156	20	7	27	120	0.15
		[18]	-67	187	0	0	0	120	0.10

Girder Name：G2　Section Name：Sec-17:J-17　（Girder number=　2　Section number=　18）

Section force　Mx =　-21885 kN･m　Sy =　-1828 kN　T =　-1653 kN･m

Effective buckling length　Lx =　4807 mmLy =　4807 mm
Radius of curvature　R　=-2003. m
Inclination　DECK =　2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	825
	Intermediate	2700	2700
	overhang	1650	1650
LFLG	Intermediate	2700	2700

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL　645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 *　8 (SM400)	53.9	53.9
1-DECK-C PL　3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 *　8 (SM400)	215.6	215.6
1-DECK-R PL　1470 * 16 (SM400)	235.2	235.2
1-U.RIB 320 * 240 *　8 (SM400)	53.9	53.9
2-RIB　PL　250 * 24 (SM400)	120.0	120.0
1-LWEB　PL　2673 * 14 (SM490Y)	374.2	374.2
1-RWEB　PL　2727 * 14 (SM490Y)	381.8	381.8
1-LFLG　PL　2940 * 10 (SM490Y)	294.0	294.0
7-RIB　PL　170 * 17 (SM490Y)	202.3	202.3

Section property

		Total	In-plane
Section area	A　(cm2)	2523.9	2523.9
Gravity center	ex (cm)	25.8	25.8
	ey (cm)	175.3	175.3
Moment of inertia	Ix (cm4)	31216009	31216009
	Iy (cm4)	47202990	47202990
Torsion Constant	J　(cm4)	26105509	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	42675.7 kN･m	42675.7 kN･m
	Mxr(lower)=	37153.3 kN･m	27592.5 kN･m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[　1]	64	140	0	0	0	80	0.21
	[　2]	65	140	5	0	5	80	0.22
DECK-C	[　3]	65	140	5	0	5	80	0.22
	[　4]	66	140	15	7	22	80	0.29
	[　5]	69	140	15	7	15	80	0.28
	[　6]	70	140	14	0	14	80	0.28
DECK-R	[　7]	70	140	14	0	14	80	0.28
	[　8]	72	140	0	0	0	80	0.26
LWEB	[　9]	64	210	23	8	31	120	0.16
	[10]	0	210	26	8	34	120	0.08
	[11]	-123	210	17	8	25	120	0.39
RWEB	[12]	68	210	25	8	33	120	0.18
	[13]	0	210	28	8	36	120	0.09
	[14]	-123	210	19	8	27	120	0.39
LFLG	[15]	-124	187	0	0	0	120	0.35
	[16]	-124	156	22	11	34	120	0.42
	[17]	-124	156	25	11	36	120	0.44
	[18]	-124	187	0	0	0	120	0.35

Girder Name：G2　Section Name：Sec-18:J-18　（Girder number=　2　Section number=　19）

Section force　Mx =　-34875 kN･m　Sy =　-2299 kN　T =　-1698 kN･m

Effective buckling length　Lx =　4807 mmLy =　4807 mm
Radius of curvature　R　=-2003. m
Inclination　DECK =　2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	825	822
		Intermediate	2700	2650
		overhang	1650	1606
	LFLG	Intermediate	2700	2650

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	645 * 16 (SM490Y)	103.2	102.7
1-U.RIB 320	* 240 * 8 (SM490Y)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM490Y)	489.7	481.7
4-U.RIB 320	* 240 * 8 (SM490Y)	215.6	215.6
1-DECK-R PL	1470 * 16 (SM490Y)	235.2	228.2
1-U.RIB 320	* 240 * 8 (SM490Y)	53.9	53.9
2-RIB PL	250 * 24 (SM490Y)	120.0	120.0
1-LWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL	2940 * 14 (SM490Y)	411.6	404.6
7-RIB PL	170 * 17 (SM490Y)	202.3	173.4

Section property			Total	In-plane
Section area	A	(cm2)	2641.5	2590.0
Gravity center	ex	(cm)	24.7	24.4
	ey	(cm)	167.5	169.1
Moment of inertia	Ix	(cm4)	34717534	33607609
	Iy	(cm4)	48125079	47543487
Torsion Constant	J	(cm4)	28842709	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	64992.7 kN･m	64992.7 kN･m
	Mxr(lower)=	41375.9 kN･m	39468.6 kN･m

Stress (N/mm²)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	102	210	0	0	0	120	0.23
	[2]	103	210	6	0	6	120	0.24
DECK-C	[3]	103	210	6	0	6	120	0.24
	[4]	104	210	18	7	25	120	0.29
	[5]	109	210	19	7	19	120	0.29
	[6]	110	210	17	0	17	120	0.29
DECK-R	[7]	110	210	17	0	17	120	0.29
	[8]	113	210	0	0	0	120	0.29
LWEB	[9]	102	210	29	8	37	120	0.33
	[10]	-2	210	32	8	40	120	0.11
	[11]	-175	210	23	8	31	120	0.76
RWEB	[12]	108	210	31	8	39	120	0.37
	[13]	-2	210	35	8	43	120	0.13
	[14]	-176	210	25	8	34	120	0.78
LFLG	[15]	-177	210	0	0	0	120	0.71
	[16]	-177	200	21	8	30	120	0.77
	[17]	-177	200	24	8	32	120	0.78
	[18]	-177	210	0	0	0	120	0.71

Girder Name : G2　Section Name : Sec-19:J-19　(Girder number= 2　Section number= 20)

Section force　Mx = -49290 kN·m　Sy = -2705 kN　T = -2136 kN·m

Effective buckling length　Lx = 4732 mmLy = 4732 mm
Radius of curvature　R =-2003. m
Inclination　DECK = 2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	818
	Intermediate	2700	2585
	overhang	1650	1549
LFLG	Intermediate	2700	2585

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL 645 * 16 (SM490Y)	103.2	102.1
1-U.RIB 320 * 240 * 8 (SM490Y)	53.9	53.9
1-DECK-C PL 3061 * 16 (SM490Y)	489.7	471.3
4-U.RIB 320 * 240 * 8 (SM490Y)	215.6	215.6
1-DECK-R PL 1470 * 16 (SM490Y)	235.2	219.1
1-U.RIB 320 * 240 * 8 (SM490Y)	53.9	53.9
2-RIB PL 250 * 24 (SM490Y)	120.0	120.0
1-LWEB PL 2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL 2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL 2940 * 20 (SM490Y)	588.0	565.0
7-RIB PL 200 * 22 (SM490Y)	308.0	264.0

Section property

		Total	In-plane
Section area	A (cm2)	2923.6	2820.7
Gravity center	ex (cm)	22.3	21.5
	ey (cm)	151.7	153.6
Moment of inertia	Ix (cm4)	41566900	39604942
	Iy (cm4)	50032808	48717100
Torsion Constant	J (cm4)	31332387	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	67088.8 kN·m	67088.8 kN·m
	Mxr(lower)=	53420.4 kN·m	53420.4 kN·m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	141	210	0	0	0	120	0.45
	[2]	143	210	7	0	7	120	0.47
DECK-C	[3]	143	210	7	0	7	120	0.47
	[4]	143	210	20	9	29	120	0.53
	[5]	150	210	21	9	21	120	0.54
	[6]	151	210	20	0	20	120	0.54
DECK-R	[7]	151	210	20	0	20	120	0.54
	[8]	154	210	1	0	1	120	0.54
LWEB	[9]	141	210	32	10	43	120	0.58
	[10]	-2	210	37	10	47	120	0.15
	[11]	-191	210	29	10	40	120	0.94
RWEB	[12]	148	210	35	10	46	120	0.64
	[13]	-2	210	40	10	51	120	0.18
	[14]	-191	210	33	10	43	120	0.96
LFLG	[15]	-193	210	0	0	0	120	0.85
	[16]	-193	210	19	7	27	120	0.90
	[17]	-194	210	22	7	29	120	0.91
	[18]	-194	210	0	0	0	120	0.85

Girder Name：G2　Section Name：Sec-20:Mx-Min_L　（Girder number=　2　Section number=　21）

Section force　Mx =　-57039 kN･m　Sy =　-2910 kN　T =　-2136 kN･m

Effective buckling length　Lx =　4732 mmLy =　4732 mm
Radius of curvature　R　=-2003. m
Inclination　DECK =　2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	816
	Intermediate	2700	2554
	overhang	1650	1522
LFLG	Intermediate	2700	2554

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL　645 * 16 (SM490Y)	103.2	101.7
1-U.RIB 320 * 240 *　8 (SM490Y)	53.9	53.9
1-DECK-C PL　3061 * 16 (SM490Y)	489.7	466.4
4-U.RIB 320 * 240 *　8 (SM490Y)	215.6	215.6
1-DECK-R PL　1470 * 16 (SM490Y)	235.2	214.8
1-U.RIB 320 * 240 *　8 (SM490Y)	53.9	53.9
2-RIB　PL　250 * 24 (SM490Y)	120.0	120.0
1-LWEB　PL　2673 * 14 (SM490Y)	374.2	374.2
1-RWEB　PL　2727 * 14 (SM490Y)	381.8	381.8
1-LFLG　PL　2940 * 27 (SM490Y)	793.8	754.5
7-RIB　PL　200 * 22 (SM490Y)	308.0	264.0

Section property

		Total	In-plane
Section area	A　(cm2)	3129.4	3000.8
Gravity center	ex (cm)	20.9	19.8
	ey (cm)	141.6	143.4
Moment of inertia	Ix (cm4)	46128331	43766761
	Iy (cm4)	51610849	49952463
Torsion Constant	J　(cm4)	33093213	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	68508.7 kN･m	68508.7 kN･m
	Mxr(lower)=	62884.4 kN･m	62884.4 kN･m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[　1]	161	210	0	0	0	120	0.59
	[　2]	163	210	7	0	8	120	0.61
DECK-C	[　3]	163	210	7	0	8	120	0.61
	[　4]	163	210	21	9	30	120	0.67
	[　5]	171	210	22	9	22	120	0.70
	[　6]	171	210	21	0	21	120	0.69
DECK-R	[　7]	171	210	21	0	21	120	0.69
	[　8]	175	210	1	0	1	120	0.69
LWEB	[　9]	161	210	34	10	45	120	0.73
	[10]	-2	210	39	10	50	120	0.17
	[11]	-187	210	33	10	43	120	0.92
RWEB	[12]	169	210	37	10	48	120	0.80
	[13]	-2	210	43	10	53	120	0.20
	[14]	-187	210	37	10	47	120	0.95
LFLG	[15]	-190	210	0	0	0	120	0.82
	[16]	-190	210	16	5	21	120	0.85
	[17]	-190	210	18	5	23	120	0.86
	[18]	-190	210	0	0	0	120	0.82

Girder Name : G2 Section Name : Sec-20:Mx-Min_R (Girder number= 2 Section number= 21)

Section force Mx = -57037 kN·m Sy = 3771 kN T = -2447 kN·m

Effective buckling length Lx = 4457 mmLy = 4457 mm
Radius of curvature R =-2003. m
Inclination DECK = 2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	816
	Intermediate	2700	2554
	overhang	1650	1522
LFLG	Intermediate	2700	2554

Section dimensions Section area(cm2)

	Total	in plane
1-DECK-L PL 645 * 16 (SM490Y)	103.2	101.7
1-U.RIB 320 * 240 * 8 (SM490Y)	53.9	53.9
1-DECK-C PL 3061 * 16 (SM490Y)	489.7	466.4
4-U.RIB 320 * 240 * 8 (SM490Y)	215.6	215.6
1-DECK-R PL 1470 * 16 (SM490Y)	235.2	214.8
1-U.RIB 320 * 240 * 8 (SM490Y)	53.9	53.9
2-RIB PL 250 * 24 (SM490Y)	120.0	120.0
1-LWEB PL 2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL 2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL 2940 * 27 (SM490Y)	793.8	754.5
7-RIB PL 200 * 22 (SM490Y)	308.0	264.0

Section property

		Total	In-plane
Section area	A (cm2)	3129.4	3000.8
Gravity center	ex (cm)	20.9	19.8
	ey (cm)	141.6	143.4
Moment of inertia	Ix (cm4)	46128331	43766761
	Iy (cm4)	51610849	49952463
Torsion Constant	J (cm4)	33093213	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	68508.7 kN·m	68508.7 kN·m
	Mxr(lower)=	62884.4 kN·m	62884.4 kN·m

Stress (N/mm²)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	161	210	0	0	0	120	0.59
	[2]	163	210	10	0	10	120	0.61
DECK-C	[3]	163	210	10	0	10	120	0.61
	[4]	163	210	27	10	38	120	0.70
	[5]	171	210	29	10	29	120	0.72
	[6]	171	210	27	0	27	120	0.71
DECK-R	[7]	171	210	27	0	27	120	0.71
	[8]	175	210	1	0	2	120	0.69
LWEB	[9]	161	210	44	12	56	120	0.81
	[10]	-2	210	51	12	63	120	0.27
	[11]	-187	210	43	12	54	120	1.00
RWEB	[12]	169	210	48	12	60	120	0.90
	[13]	-2	210	56	12	67	120	0.32
	[14]	-187	210	47	12	59	120	1.04
LFLG	[15]	-190	210	0	0	0	120	0.82
	[16]	-190	210	21	6	27	120	0.87
	[17]	-190	210	23	6	29	120	0.88
	[18]	-190	210	0	0	0	120	0.82

Girder Name : G2 Section Name : Sec-21:J-20 (Girder number= 2 Section number= 22)

Section force Mx = -46772 kN·m Sy = 3579 kN T = -2447 kN·m

Effective buckling length Lx = 4457 mmLy = 4457 mm
Radius of curvature R =-2003. m
Inclination DECK = 2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	817
	Intermediate	2700	2576
	overhang	1650	1541
LFLG	Intermediate	2700	2576

Section dimensions Section area(cm2)

	Total	in plane
1-DECK-L PL 645 * 16 (SM490Y)	103.2	102.0
1-U.RIB 320 * 240 * 8 (SM490Y)	53.9	53.9
1-DECK-C PL 3061 * 16 (SM490Y)	489.7	469.8
4-U.RIB 320 * 240 * 8 (SM490Y)	215.6	215.6
1-DECK-R PL 1470 * 16 (SM490Y)	235.2	217.8
1-U.RIB 320 * 240 * 8 (SM490Y)	53.9	53.9
2-RIB PL 250 * 24 (SM490Y)	120.0	120.0
1-LWEB PL 2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL 2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL 2940 * 19 (SM490Y)	558.6	535.0
7-RIB PL 200 * 22 (SM490Y)	308.0	264.0

Section property

		Total	In-plane
Section area	A (cm2)	2894.2	2787.9
Gravity center	ex (cm)	22.5	21.7
	ey (cm)	153.2	155.1
Moment of inertia	Ix (cm4)	40865979	38832011
	Iy (cm4)	49806264	48391771
Torsion Constant	J (cm4)	31001364	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	66622.5 kN·m	66622.5 kN·m
	Mxr(lower)=	51894.3 kN·m	51894.3 kN·m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	135	210	0	0	0	120	0.41
	[2]	136	210	9	0	9	120	0.43
DECK-C	[3]	136	210	9	0	9	120	0.43
	[4]	137	210	27	10	37	120	0.52
	[5]	144	210	28	10	28	120	0.52
	[6]	144	210	26	0	26	120	0.52
DECK-R	[7]	144	210	26	0	26	120	0.52
	[8]	147	210	1	0	1	120	0.49
LWEB	[9]	135	210	43	12	55	120	0.62
	[10]	-2	210	49	12	61	120	0.26
	[11]	-187	210	39	12	50	120	0.97
RWEB	[12]	142	210	47	12	59	120	0.70
	[13]	-2	210	53	12	65	120	0.29
	[14]	-187	210	43	12	55	120	1.00
LFLG	[15]	-189	210	0	0	0	120	0.81
	[16]	-189	210	27	9	36	120	0.90
	[17]	-189	210	30	9	39	120	0.92
	[18]	-189	210	0	0	0	120	0.81

Girder Name：G2　Section Name：Sec-22:J-21　（Girder number=　2　Section number=　23）

Section force　Mx = -26444 kN·m　Sy = 3293 kN　T = -2483 kN·m

Effective buckling length　Lx = 4707 mmLy = 4707 mm
Radius of curvature　R =-2003. m
Inclination　DECK = 2.0 %

Effective width(mm)

			Full width	In-plane
	DECK	overhang	825	820
		Intermediate	2700	2622
		overhang	1650	1581
	LFLG	Intermediate	2700	2622

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL 645 * 16	(SM400)	103.2	102.4
1-U.RIB 320 * 240 * 8	(SM400)	53.9	53.9
1-DECK-C PL 3061 * 16	(SM400)	489.7	477.2
4-U.RIB 320 * 240 * 8	(SM400)	215.6	215.6
1-DECK-R PL 1470 * 16	(SM400)	235.2	224.2
1-U.RIB 320 * 240 * 8	(SM400)	53.9	53.9
2-RIB PL 250 * 24	(SM400)	120.0	120.0
1-LWEB PL 2673 * 14	(SM490Y)	374.2	374.2
1-RWEB PL 2727 * 14	(SM490Y)	381.8	381.8
1-LFLG PL 2940 * 11	(SM490Y)	323.4	314.8
7-RIB PL 170 * 17	(SM490Y)	202.3	173.4

Section property			Total	In-plane
	Section area	A (cm2)	2553.3	2491.4
	Gravity center	ex (cm)	25.5	24.9
		ey (cm)	173.3	174.8
	Moment of inertia	Ix (cm4)	32120083	30824000
		Iy (cm4)	47434161	46543533
	Torsion Constant	J (cm4)	26916456	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	41993.9 kN·m	41993.9 kN·m
	Mxr(lower)=	36769.2 kN·m	29778.5 kN·m

Stress (N/mm²)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	79	140	0	0	0	80	0.32
	[2]	80	140	9	0	9	80	0.34
DECK-C	[3]	80	140	9	0	9	80	0.34
	[4]	81	140	26	11	37	80	0.54
	[5]	85	140	27	11	27	80	0.49
	[6]	86	140	25	0	25	80	0.48
DECK-R	[7]	86	140	25	0	25	80	0.48
	[8]	88	140	1	0	1	80	0.40
LWEB	[9]	79	210	42	12	54	120	0.34
	[10]	-1	210	46	12	58	120	0.24
	[11]	-150	210	31	12	43	120	0.64
RWEB	[12]	84	210	45	12	57	120	0.39
	[13]	-1	210	50	12	62	120	0.27
	[14]	-150	210	35	12	47	120	0.66
LFLG	[15]	-151	210	0	0	0	120	0.52
	[16]	-151	170	37	15	53	120	0.71
	[17]	-151	170	42	15	57	120	0.75
	[18]	-151	210	0	0	0	120	0.52

Girder Name：G2　Section Name：Sec-22:J-22　(Girder number=　2　Section number=　23)

Section force　Mx-Max　Mx =　12 kN·m　Sy =　2893 kN　T =　-2507 kN·m
　　　　　　　Mx-Min　Mx =　-8506 kN·m　Sy =　2893 kN　T =　-2507 kN·m

Effective buckling length　Lx =　4707 mmLy =　4707 mm
Radius of curvature　R　=-2003.　m
Inclination　DECK =　2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	825	823
		Intermediate	2700	2671
		overhang	1650	1625
	LFLG	Intermediate	2700	2671

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	645 * 16 (SM400)	103.2	102.9
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	485.1
4-U.RIB 320 * 240 *	8 (SM400)	215.6	215.6
1-DECK-R PL	1470 * 16 (SM400)	235.2	231.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
2-RIB PL	250 * 24 (SM400)	120.0	120.0
1-LWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL	2940 * 11 (SM490Y)	323.4	320.3
7-RIB PL	170 * 17 (SM490Y)	202.3	173.4

Section property			Total	In-plane
Section area	A	(cm2)	2553.3	2512.4
Gravity center	ex	(cm)	25.5	25.5
	ey	(cm)	173.3	175.1
Moment of inertia	Ix	(cm4)	32120083	31142816
	Iy	(cm4)	47434158	47094269
Torsion Constant	J	(cm4)	26916456	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	42484.4 kN·m	42484.4 kN·m
	Mxr(lower)=	37102.1 kN·m	30048.1 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	0	140	0	0	0	80	0.00
	[2]	0	140	8	0	8	80	0.01
DECK-C	[3]	0	140	8	0	8	80	0.01
	[4]	0	140	23	11	33	80	0.17
	[5]	0	140	24	11	24	80	0.09
	[6]	0	140	22	0	22	80	0.08
DECK-R	[7]	0	140	22	0	22	80	0.08
	[8]	0	140	0	0	0	80	0.00
LWEB	[9]	0	210	37	12	49	120	0.17
	[10]	0	210	41	12	53	120	0.19
	[11]	0	210	27	12	39	120	0.11
RWEB	[12]	0	210	40	12	52	120	0.19
	[13]	0	210	44	12	56	120	0.22
	[14]	0	210	30	12	43	120	0.13

	LFLG	[15]	0	210	0	0	0	120	0.00
		[16]	0	210	33	16	48	120	0.16
		[17]	0	210	37	16	52	120	0.19
		[18]	0	210	0	0	0	120	0.00

Mx-Min	[Check	point]	σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	25	140	0	0	0	80	0.03
		[2]	26	140	8	0	8	80	0.04
	DECK-C	[3]	26	140	8	0	8	80	0.04
		[4]	26	140	23	11	33	80	0.21
		[5]	27	140	24	11	24	80	0.13
		[6]	27	140	22	0	22	80	0.12
	DECK-R	[7]	27	140	22	0	22	80	0.12
		[8]	28	140	0	0	0	80	0.04
	LWEB	[9]	25	210	37	12	49	120	0.18
		[10]	0	210	41	12	53	120	0.19
		[11]	-48	210	27	12	39	120	0.16
	RWEB	[12]	27	210	40	12	52	120	0.20
		[13]	0	210	44	12	56	120	0.22
		[14]	-48	210	30	12	43	120	0.18
	LFLG	[15]	-48	210	0	0	0	120	0.05
		[16]	-48	170	33	16	48	120	0.21
		[17]	-48	170	37	16	52	120	0.24
		[18]	-48	210	0	0	0	120	0.05

Girder Name：G2　Section Name：Sec-23:Left　（Girder number=　2　Section number=　24）

Section force	Mx-Max	Mx = 12 kN·m	Sy = 2893 kN	T = -2507 kN·m
	Mx-Min	Mx = -8506 kN·m	Sy = 2893 kN	T = -2507 kN·m

Effective buckling length　Lx = 4707 mmLy = 4707 mm
Radius of curvature　R =-2003. m
Inclination　DECK = 2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	825	823
		Intermediate	2700	2671
		overhang	1650	1625
	LFLG	Intermediate	2700	2671

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	645 * 16 (SM400)	103.2	102.9
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	485.1
4-U.RIB 320 * 240 *	8 (SM400)	215.6	215.6
1-DECK-R PL	1470 * 16 (SM400)	235.2	231.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
2-RIB PL	250 * 24 (SM400)	120.0	120.0
1-LWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL	2940 * 11 (SM490Y)	323.4	320.3
7-RIB PL	170 * 17 (SM490Y)	202.3	173.4

Section property			Total	In-plane
	Section area	A (cm2)	2553.3	2512.4
	Gravity center	ex (cm)	25.5	25.5
		ey (cm)	173.3	175.1
	Moment of inertia	Ix (cm4)	32120083	31142816
		Iy (cm4)	47434158	47094269
	Torsion Constant	J (cm4)	26916456	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	42484.4 kN·m	42484.4 kN·m
	Mxr(lower)=	37102.1 kN·m	30048.1 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	0	140	0	0	0	80	0.00
	[2]	0	140	8	0	8	80	0.01
DECK-C	[3]	0	140	8	0	8	80	0.01
	[4]	0	140	23	11	33	80	0.17
	[5]	0	140	24	11	24	80	0.09
	[6]	0	140	22	0	22	80	0.08
DECK-R	[7]	0	140	22	0	22	80	0.08
	[8]	0	140	0	0	0	80	0.00
LWEB	[9]	0	210	37	12	49	120	0.17
	[10]	0	210	41	12	53	120	0.19
	[11]	0	210	27	12	39	120	0.11
RWEB	[12]	0	210	40	12	52	120	0.19
	[13]	0	210	44	12	56	120	0.22
	[14]	0	210	30	12	43	120	0.13

	LFLG	[15]	0	210	0	0	0	120	0.00
		[16]	0	210	33	16	48	120	0.16
		[17]	0	210	37	16	52	120	0.19
		[18]	0	210	0	0	0	120	0.00

Mx-Min	[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	25	140	0	0	0	80	0.03
		[2]	26	140	8	0	8	80	0.04
	DECK-C	[3]	26	140	8	0	8	80	0.04
		[4]	26	140	23	11	33	80	0.21
		[5]	27	140	24	11	24	80	0.13
		[6]	27	140	22	0	22	80	0.12
	DECK-R	[7]	27	140	22	0	22	80	0.12
		[8]	28	140	0	0	0	80	0.04
	LWEB	[9]	25	210	37	12	49	120	0.18
		[10]	0	210	41	12	53	120	0.19
		[11]	-48	210	27	12	39	120	0.16
	RWEB	[12]	27	210	40	12	52	120	0.20
		[13]	0	210	44	12	56	120	0.22
		[14]	-48	210	30	12	43	120	0.18
	LFLG	[15]	-48	210	0	0	0	120	0.05
		[16]	-48	170	33	16	48	120	0.21
		[17]	-48	170	37	16	52	120	0.24
		[18]	-48	210	0	0	0	120	0.05

Girder Name : G2　Section Name : Sec-23:Right　(Girder number=　2　Section number=　24)

Section force　Mx =　15472 kN·m　Sy =　2535 kN　T =　-2031 kN·m

Effective buckling length　Lx =　4707 mmLy =　4707 mm
Radius of curvature　R =-2003. m
Inclination　DECK =　2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	825
	Intermediate	2700	2700
	overhang	1650	1650
LFLG	Intermediate	2700	2700

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL 645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL 3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 * 8 (SM400)	215.6	215.6
1-DECK-R PL 1470 * 16 (SM400)	235.2	235.2
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
2-RIB PL 250 * 24 (SM400)	120.0	120.0
1-LWEB PL 2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL 2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL 2940 * 11 (SM490Y)	323.4	323.4
7-RIB PL 170 * 17 (SM490Y)	202.3	202.3

Section property

		Total	In-plane
Section area	A (cm2)	2553.3	2553.3
Gravity center	ex (cm)	25.5	25.5
	ey (cm)	173.3	173.3
Moment of inertia	Ix (cm4)	32120083	32120083
	Iy (cm4)	47434160	47434160
Torsion Constant	J (cm4)	26916455	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	43056.6 kN·m	43056.6 kN·m
	Mxr(lower)=	38652.5 kN·m	31303.8 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-45	140	0	0	0	80	0.10
	[2]	-46	140	7	0	7	80	0.11
DECK-C	[3]	-46	140	7	0	7	80	0.11
	[4]	-46	140	20	9	29	80	0.24
	[5]	-49	140	21	9	21	80	0.19
	[6]	-49	140	19	0	20	80	0.18
DECK-R	[7]	-49	140	19	0	20	80	0.18
	[8]	-50	140	0	0	0	80	0.13
LWEB	[9]	-45	210	32	10	42	120	0.17
	[10]	0	210	36	10	46	120	0.14
	[11]	83	210	24	10	34	120	0.24
RWEB	[12]	-48	210	35	10	45	120	0.19
	[13]	0	210	39	10	48	120	0.16
	[14]	84	210	27	10	37	120	0.25
LFLG	[15]	84	210	0	0	0	120	0.16
	[16]	84	210	29	13	41	120	0.28
	[17]	84	210	32	13	45	120	0.30
	[18]	84	210	0	0	0	120	0.16

Girder Name：G2　Section Name：Sec-23:J-23　（Girder number=　2　Section number=　25）

Section force　Mx =　19406 kN·m　Sy =　2447 kN　T =　-2001 kN·m

Effective buckling length　Lx =　4707 mmLy =　4707 mm
Radius of curvature　R　=-2003. m
Inclination　DECK =　2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	825	825
		Intermediate	2700	2700
		overhang	1650	1650
	LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 *	8 (SM400)	215.6	215.6
1-DECK-R PL	1470 * 16 (SM400)	235.2	235.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
2-RIB PL	250 * 24 (SM400)	120.0	120.0
1-LWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL	2940 * 11 (SM490Y)	323.4	323.4
3-RIB PL	170 * 17 (SM490Y)	86.7	86.7

Section property			Total	In-plane
Section area	A	(cm2)	2437.7	2437.7
Gravity center	ex	(cm)	26.8	26.8
	ey	(cm)	181.1	181.1
Moment of inertia	Ix	(cm4)	28828958	28828958
	Iy	(cm4)	46696727	46696727
Torsion Constant	J	(cm4)	26916293	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	41775.1 kN·m	41775.1 kN·m
	Mxr(lower)=	33204.5 kN·m	8818.8 kN·m

Stress (N/mm²)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-58	140	0	0	0	80	0.17
	[2]	-59	140	7	0	7	80	0.18
DECK-C	[3]	-59	140	7	0	7	80	0.18
	[4]	-59	140	20	9	28	80	0.30
	[5]	-63	140	21	9	21	80	0.27
	[6]	-63	140	19	0	19	80	0.26
DECK-R	[7]	-63	140	19	0	19	80	0.26
	[8]	-65	140	0	0	0	80	0.22
LWEB	[9]	-58	210	32	10	41	120	0.20
	[10]	0	210	35	10	45	120	0.14
	[11]	122	210	21	10	31	120	0.40
RWEB	[12]	-62	210	34	10	44	120	0.22
	[13]	0	210	38	10	47	120	0.16
	[14]	122	210	24	10	34	120	0.42
LFLG	[15]	123	210	0	0	0	120	0.34
	[16]	123	210	25	12	37	120	0.44
	[17]	123	210	28	12	41	120	0.46
	[18]	123	210	0	0	0	120	0.34

Girder Name：G2　Section Name：Sec-24:J-24　（Girder number=　2　Section number=　26）

Section force　Mx =　36683 kN・m　Sy =　2155 kN　T =　-1655 kN・m

Effective buckling length　Lx =　4707 mmLy =　4707 mm
Radius of curvature　R　=-2003. m
Inclination　DECK =　2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	825
	Intermediate	2700	2700
	overhang	1650	1650
LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 *	8 (SM400)	215.6	215.6
1-DECK-R PL	1470 * 16 (SM400)	235.2	235.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
2-RIB PL	250 * 24 (SM400)	120.0	120.0
1-LWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL	2940 * 17 (SM490Y)	499.8	499.8
3-RIB PL	170 * 17 (SM490Y)	86.7	86.7

Section property		Total	In-plane
Section area	A (cm2)	2614.1	2614.1
Gravity center	ex (cm)	25.0	25.0
	ey (cm)	168.8	168.8
Moment of inertia	Ix (cm4)	34308408	34308408
	Iy (cm4)	48085075	48085075
Torsion Constant	J (cm4)	30252156	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	44087.5 kN・m	44087.5 kN・m
	Mxr(lower)=	42230.3 kN・m	25853.5 kN・m

Stress (N/mm²)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-105	140	0	0	0	80	0.56
	[2]	-107	140	6	0	6	80	0.58
DECK-C	[3]	-107	140	6	0	6	80	0.58
	[4]	-107	140	17	7	24	80	0.67
	[5]	-113	140	17	7	17	80	0.70
	[6]	-113	140	16	0	16	80	0.70
DECK-R	[7]	-113	140	16	0	16	80	0.70
	[8]	-116	140	0	0	0	80	0.69
LWEB	[9]	-105	210	27	8	35	120	0.33
	[10]	0	210	30	8	38	120	0.10
	[11]	180	210	21	8	29	120	0.80
RWEB	[12]	-111	210	29	8	37	120	0.38
	[13]	0	210	32	8	40	120	0.11
	[14]	181	210	23	8	32	120	0.81
LFLG	[15]	182	210	0	0	0	120	0.75
	[16]	182	210	16	7	22	120	0.79
	[17]	182	210	18	7	25	120	0.80
	[18]	182	210	0	0	0	120	0.75

Girder Name : G2　Section Name : Sec-25:J-25　(Girder number=　2　Section number=　27)

Section force　Mx =　50689 kN･m　Sy =　1748 kN　T =　-1154 kN･m

Effective buckling length　Lx =　4707 mmLy =　4707 mm
Radius of curvature　R　=-2003. m
Inclination　DECK =　2.0 %

Effective width(mm)

			Full width	In-plane
	DECK	overhang	825	825
		Intermediate	2700	2700
		overhang	1650	1650
	LFLG	Intermediate	2700	2700

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL　645 * 16 (SM490Y)	103.2	103.2
1-U.RIB 320 * 240 *　8 (SM490Y)	53.9	53.9
1-DECK-C PL　3061 * 16 (SM490Y)	489.7	489.7
4-U.RIB 320 * 240 *　8 (SM490Y)	215.6	215.6
1-DECK-R PL　1470 * 16 (SM490Y)	235.2	235.2
1-U.RIB 320 * 240 *　8 (SM490Y)	53.9	53.9
2-RIB　PL　250 * 24 (SM490Y)	120.0	120.0
1-LWEB　PL　2673 * 14 (SM490Y)	374.2	374.2
1-RWEB　PL　2727 * 14 (SM490Y)	381.8	381.8
1-LFLG　PL　2940 * 26 (SM490Y)	764.4	764.4
3-RIB　PL　200 * 22 (SM490Y)	132.0	132.0

Section property

		Total	In-plane
Section area	A　(cm2)	2924.0	2924.0
Gravity center	ex (cm)	22.3	22.3
	ey (cm)	150.9	150.9
Moment of inertia	Ix (cm4)	42208802	42208802
	Iy (cm4)	50301130	50301130
Torsion Constant	J　(cm4)	32887547	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	69872.9 kN･m	69872.9 kN･m
	Mxr(lower)=	57701.9 kN･m	52698.3 kN･m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[　1]	-140	210	0	0	0	120	0.44
	[　2]	-141	210	4	0	5	120	0.45
DECK-C	[　3]	-141	210	4	0	5	120	0.45
	[　4]	-142	210	13	5	18	120	0.48
	[　5]	-148	210	13	5	14	120	0.51
	[　6]	-149	210	13	0	13	120	0.51
DECK-R	[　7]	-149	210	13	0	13	120	0.51
	[　8]	-152	210	0	0	0	120	0.53
LWEB	[　9]	-140	210	21	6	26	120	0.49
	[10]	0	210	24	6	29	120	0.06
	[11]	181	210	19	6	24	120	0.79
RWEB	[12]	-146	210	23	6	28	120	0.54
	[13]	0	210	26	6	31	120	0.07
	[14]	181	210	21	6	27	120	0.80
LFLG	[15]	184	210	0	0	0	120	0.77
	[16]	184	210	9	3	12	120	0.78
	[17]	184	210	11	3	14	120	0.78
	[18]	184	210	0	0	0	120	0.77

Girder Name：G2　Section Name：Sec-26:J-26　（Girder number=　2　Section number=　28）

Section force　Mx =　60562 kN·m　Sy =　1068 kN　T =　1398 kN·m

Effective buckling length　Lx =　4683 mmLy =　4683 mm
Radius of curvature　R　= 297.8 m
Inclination　DECK =　2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	825
	Intermediate	2700	2700
	overhang	1677	1677
LFLG	Intermediate	2700	2700

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL 645 ＊ 16 (SM490Y)	103.2	103.2
1-U.RIB 320 ＊ 240 ＊ 8 (SM490Y)	53.9	53.9
1-DECK-C PL 3061 ＊ 16 (SM490Y)	489.7	489.7
4-U.RIB 320 ＊ 240 ＊ 8 (SM490Y)	215.6	215.6
1-DECK-R PL 1498 ＊ 16 (SM490Y)	239.6	239.6
1-U.RIB 320 ＊ 240 ＊ 8 (SM490Y)	53.9	53.9
3-RIB PL 250 ＊ 24 (SM490Y)	180.0	180.0
1-LWEB PL 2673 ＊ 14 (SM490Y)	374.2	374.2
1-RWEB PL 2727 ＊ 14 (SM490Y)	381.8	381.8
1-LFLG PL 2940 ＊ 35 (SM490Y)	1029.0	1029.0
3-RIB PL 200 ＊ 22 (SM490Y)	132.0	132.0

Section property

		Total	In-plane
Section area	A (cm2)	3252.9	3252.9
Gravity center	ex (cm)	25.3	25.3
	ey (cm)	140.5	140.5
Moment of inertia	Ix (cm4)	48963138	48963138
	Iy (cm4)	57198418	57198418
Torsion Constant	J (cm4)	34423972	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	75674.9 kN·m	75674.9 kN·m
	Mxr(lower)=	70984.3 kN·m	70984.3 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-158	210	0	0	0	120	0.57
	[2]	-159	210	3	0	3	120	0.58
DECK-C	[3]	-159	210	3	0	3	120	0.58
	[4]	-160	210	8	6	14	120	0.59
	[5]	-165	210	9	6	9	120	0.62
	[6]	-165	210	8	0	8	120	0.62
DECK-R	[7]	-165	210	8	0	8	120	0.62
	[8]	-168	210	0	0	0	120	0.64
LWEB	[9]	-158	210	12	7	19	120	0.59
	[10]	0	210	14	7	21	120	0.03
	[11]	175	210	12	7	19	120	0.72
RWEB	[12]	-163	210	14	7	21	120	0.63
	[13]	0	210	16	7	22	120	0.03
	[14]	173	210	14	7	20	120	0.71
LFLG	[15]	179	210	0	0	0	120	0.73
	[16]	179	210	4	3	7	120	0.73
	[17]	177	210	5	3	8	120	0.72
	[18]	177	210	0	0	0	120	0.71

Girder Name：G2　Section Name：Sec-27:J-27　（Girder number=　2　Section number=　29）

Section force　Mx =　64586 kN·m　Sy =　639 kN　T =　-953 kN·m

Effective buckling length　Lx =　4705 mmLy =　4705 mm
Radius of curvature　R　=　0.0 m
Inclination　DECK =　2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	825	825
		Intermediate	2700	2700
		overhang	1838	1838
	LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	645 * 16 (SM490Y)	103.2	103.2
1-U.RIB 320 * 240 *	8 (SM490Y)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM490Y)	489.7	489.7
4-U.RIB 320 * 240 *	8 (SM490Y)	215.6	215.6
1-DECK-R PL	1659 * 16 (SM490Y)	265.4	265.4
1-U.RIB 320 * 240 *	8 (SM490Y)	53.9	53.9
3-RIB PL	250 * 24 (SM490Y)	180.0	180.0
1-LWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL	2940 * 38 (SM490Y)	1117.2	1117.2
3-RIB PL	200 * 22 (SM490Y)	132.0	132.0

Section property			Total	In-plane
Section area	A	(cm2)	3366.9	3366.9
Gravity center	ex	(cm)	27.6	27.6
	ey	(cm)	137.9	137.9
Moment of inertia	Ix	(cm4)	51265083	51265083
	Iy	(cm4)	60341796	60341796
Torsion Constant	J	(cm4)	34768432	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	76837.9 kN·m	76837.9 kN·m
	Mxr(lower)=	75975.8 kN·m	75975.8 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-163	210	0	0	0	120	0.60
	[2]	-165	210	2	0	2	120	0.61
DECK-C	[3]	-165	210	2	0	2	120	0.61
	[4]	-165	210	5	4	9	120	0.62
	[5]	-172	210	5	4	6	120	0.67
	[6]	-172	210	5	0	5	120	0.68
DECK-R	[7]	-172	210	5	0	5	120	0.68
	[8]	-177	210	0	0	0	120	0.71
LWEB	[9]	-163	210	7	5	12	120	0.61
	[10]	0	210	8	5	13	120	0.01
	[11]	174	210	7	5	12	120	0.69
RWEB	[12]	-170	210	8	5	13	120	0.67
	[13]	0	210	9	5	14	120	0.01
	[14]	174	210	8	5	13	120	0.70
LFLG	[15]	179	210	0	0	0	120	0.72
	[16]	179	210	2	2	4	120	0.72
	[17]	179	210	3	2	5	120	0.72
	[18]	179	210	0	0	0	120	0.72

Girder Name : G2　Section Name : Sec-28:Mx-Max　（Girder number=　2　Section number=　30）

Section force　Mx =　65084 kN·m　Sy =　357 kN　T =　-953 kN·m

Effective buckling length　Lx =　4705 mmLy =　4705 mm
Radius of curvature　R　=　0.0 m
Inclination　DECK =　2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	825
	Intermediate	2700	2700
	overhang	1957	1957
LFLG	Intermediate	2700	2700

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL　645 * 16 (SM490Y)	103.2	103.2
1-U.RIB 320 * 240 *　8 (SM490Y)	53.9	53.9
1-DECK-C PL　3061 * 16 (SM490Y)	489.7	489.7
4-U.RIB 320 * 240 *　8 (SM490Y)	215.6	215.6
1-DECK-R PL　1777 * 16 (SM490Y)	284.4	284.4
1-U.RIB 320 * 240 *　8 (SM490Y)	53.9	53.9
4-RIB　PL　250 * 24 (SM490Y)	240.0	240.0
1-LWEB　PL　2673 * 14 (SM490Y)	374.2	374.2
1-RWEB　PL　2727 * 14 (SM490Y)	381.8	381.8
1-LFLG　PL　2940 * 38 (SM490Y)	1117.2	1117.2
3-RIB　PL　200 * 22 (SM490Y)	132.0	132.0

Section property

		Total	In-plane
Section area	A　(cm2)	3445.9	3445.9
Gravity center	ex (cm)	33.9	33.9
	ey (cm)	140.9	140.9
Moment of inertia	Ix (cm4)	52553766	52553766
	Iy (cm4)	66304382	66304382
Torsion Constant	J　(cm4)	34768447	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	80325.8 kN·m	80325.8 kN·m
	Mxr(lower)=	76294.6 kN·m	76294.6 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-157	210	0	0	0	120	0.56
	[2]	-158	210	1	0	1	120	0.57
DECK-C	[3]	-158	210	1	0	1	120	0.57
	[4]	-159	210	3	4	7	120	0.57
	[5]	-165	210	3	4	5	120	0.62
	[6]	-166	210	3	0	3	120	0.62
DECK-R	[7]	-166	210	3	0	3	120	0.62
	[8]	-170	210	0	0	0	120	0.66
LWEB	[9]	-157	210	4	5	9	120	0.56
	[10]	0	210	5	5	9	120	0.01
	[11]	174	210	4	5	9	120	0.70
RWEB	[12]	-163	210	5	5	9	120	0.61
	[13]	0	210	5	5	10	120	0.01
	[14]	174	210	5	5	9	120	0.70
LFLG	[15]	179	210	0	0	0	120	0.73
	[16]	179	210	1	2	3	120	0.73
	[17]	179	210	2	2	3	120	0.73
	[18]	179	210	0	0	0	120	0.73

Girder Name : G2　Section Name : Sec-29:J-28　(Girder number=　2　Section number=　31)

Section force　Mx =　64900 kN・m　Sy =　-497 kN　T =　-953 kN・m

Effective buckling length　Lx =　4705 mmLy =　4705 mm
Radius of curvature　R　=　0.0 m
Inclination　DECK =　2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	825
	Intermediate	2700	2700
	overhang	2017	2017
LFLG	Intermediate	2700	2700

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL 645 * 16 (SM490Y)	103.2	103.2
1-U.RIB 320 * 240 * 8 (SM490Y)	53.9	53.9
1-DECK-C PL 3061 * 16 (SM490Y)	489.7	489.7
4-U.RIB 320 * 240 * 8 (SM490Y)	215.6	215.6
1-DECK-R PL 1837 * 16 (SM490Y)	294.0	294.0
1-U.RIB 320 * 240 * 8 (SM490Y)	53.9	53.9
4-RIB PL 250 * 24 (SM490Y)	240.0	240.0
1-LWEB PL 2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL 2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL 2940 * 38 (SM490Y)	1117.2	1117.2
3-RIB PL 200 * 22 (SM490Y)	132.0	132.0

Section property

		Total	In-plane
Section area	A (cm2)	3455.5	3455.5
Gravity center	ex (cm)	34.9	34.9
	ey (cm)	141.2	141.2
Moment of inertia	Ix (cm4)	52734616	52734616
	Iy (cm4)	67410336	67410336
Torsion Constant	J (cm4)	34768455	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	80755.3 kN・m	80755.3 kN・m
	Mxr(lower)=	76355.6 kN・m	76355.6 kN・m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-155	210	0	0	0	120	0.55
	[2]	-157	210	1	0	1	120	0.56
DECK-C	[3]	-157	210	1	0	1	120	0.56
	[4]	-157	210	4	4	8	120	0.56
	[5]	-164	210	5	4	5	120	0.61
	[6]	-164	210	4	0	4	120	0.61
DECK-R	[7]	-164	210	4	0	4	120	0.61
	[8]	-169	210	0	0	0	120	0.65
LWEB	[9]	-155	210	6	5	10	120	0.55
	[10]	0	210	6	5	11	120	0.01
	[11]	174	210	5	5	10	120	0.69
RWEB	[12]	-162	210	7	5	11	120	0.60
	[13]	0	210	7	5	12	120	0.01
	[14]	174	210	6	5	11	120	0.69
LFLG	[15]	178	210	0	0	0	120	0.72
	[16]	178	210	2	2	4	120	0.72
	[17]	178	210	2	2	4	120	0.72
	[18]	178	210	0	0	0	120	0.72

Girder Name：G2　Section Name：Sec-30:J-29　（Girder number=　2　Section number=　32）

Section force　Mx =　61886 kN·m　Sy =　-904 kN　T =　1220 kN·m

Effective buckling length　Lx =　4706 mmLy =　4706 mm
Radius of curvature　R　=　0.0 m
Inclination　DECK =　2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	825
	Intermediate	2700	2700
	overhang	2195	2195
LFLG	Intermediate	2700	2700

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL　645 * 16 (SM490Y)	103.2	103.2
1-U.RIB 320 * 240 *　8 (SM490Y)	53.9	53.9
1-DECK-C PL　3061 * 16 (SM490Y)	489.7	489.7
4-U.RIB 320 * 240 *　8 (SM490Y)	215.6	215.6
1-DECK-R PL　2015 * 16 (SM490Y)	322.4	322.4
1-U.RIB 320 * 240 *　8 (SM490Y)	53.9	53.9
4-RIB　PL　250 * 24 (SM490Y)	240.0	240.0
1-LWEB　PL　2673 * 14 (SM490Y)	374.2	374.2
1-RWEB　PL　2727 * 14 (SM490Y)	381.8	381.8
1-LFLG　PL　2940 * 35 (SM490Y)	1029.0	1029.0
3-RIB　PL　200 * 22 (SM490Y)	132.0	132.0

Section property

		Total	In-plane
Section area	A　(cm2)	3395.8	3395.8
Gravity center	ex (cm)	38.8	38.8
	ey (cm)	146.2	146.2
Moment of inertia	Ix (cm4)	51338780	51338780
	Iy (cm4)	70159103	70159103
Torsion Constant	J　(cm4)	34395315	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	81320.0 kN·m	81320.0 kN·m
	Mxr(lower)=	72041.5 kN·m	72041.5 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[　1]	-146	210	0	0	0	120	0.48
	[　2]	-148	210	2	0	2	120	0.49
DECK-C	[　3]	-148	210	2	0	2	120	0.49
	[　4]	-148	210	7	5	12	120	0.51
	[　5]	-154	210	9	5	9	120	0.55
	[　6]	-155	210	8	0	8	120	0.55
DECK-R	[　7]	-155	210	8	0	8	120	0.55
	[　8]	-160	210	0	0	0	120	0.58
LWEB	[　9]	-146	210	10	6	16	120	0.50
	[10]	0	210	12	6	18	120	0.02
	[11]	176	210	10	6	16	120	0.72
RWEB	[12]	-153	210	12	6	18	120	0.55
	[13]	0	210	14	6	19	120	0.03
	[14]	176	210	12	6	18	120	0.73
LFLG	[15]	180	210	0	0	0	120	0.74
	[16]	180	210	4	2	6	120	0.74
	[17]	180	210	4	2	7	120	0.74
	[18]	180	210	0	0	0	120	0.74

Girder Name：G2　Section Name：Sec-31:J-30　（Girder number=　2　Section number=　33）

Section force　Mx =　53291 kN･m　Sy =　-1544 kN　T =　1750 kN･m

Effective buckling length　Lx =　4708 mmLy =　4708 mm
Radius of curvature　R　=　0.0 m
Inclination　DECK =　2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	825
	Intermediate	2700	2700
	overhang	2405	2405
LFLG	Intermediate	2700	2700

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL　645 * 16 (SM490Y)	103.2	103.2
1-U.RIB 320 * 240 *　8 (SM490Y)	53.9	53.9
1-DECK-C PL　3061 * 16 (SM490Y)	489.7	489.7
4-U.RIB 320 * 240 *　8 (SM490Y)	215.6	215.6
1-DECK-R PL　2226 * 16 (SM490Y)	356.1	356.1
1-U.RIB 320 * 240 *　8 (SM490Y)	53.9	53.9
5-RIB　PL　250 * 24 (SM490Y)	300.0	300.0
1-LWEB　PL　2673 * 14 (SM490Y)	374.2	374.2
1-RWEB　PL　2727 * 14 (SM490Y)	381.8	381.8
1-LFLG　PL　2940 * 28 (SM490Y)	823.2	823.2
3-RIB　PL　200 * 22 (SM490Y)	132.0	132.0

Section property

		Total	In-plane
Section area	A (cm2)	3283.6	3283.6
Gravity center	ex (cm)	50.4	50.4
	ey (cm)	159.0	159.0
Moment of inertia	Ix (cm4)	47638621	47638621
	Iy (cm4)	77472045	77472045
Torsion Constant	J (cm4)	33290529	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	83280.7 kN･m	83280.7 kN･m
	Mxr(lower)=	61819.7 kN･m	58966.3 kN･m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-121	210	0	0	0	120	0.33
	[2]	-122	210	3	0	3	120	0.34
DECK-C	[3]	-122	210	3	0	3	120	0.34
	[4]	-123	210	12	7	19	120	0.37
	[5]	-129	210	17	7	17	120	0.40
	[6]	-129	210	16	0	16	120	0.40
DECK-R	[7]	-129	210	16	0	16	120	0.40
	[8]	-134	210	0	0	0	120	0.41
LWEB	[9]	-121	210	18	8	26	120	0.38
	[10]	0	210	20	8	28	120	0.06
	[11]	178	210	16	8	24	120	0.76
RWEB	[12]	-127	210	21	8	30	120	0.43
	[13]	0	210	23	8	32	120	0.07
	[14]	178	210	19	8	28	120	0.77
LFLG	[15]	181	210	0	0	0	120	0.74
	[16]	181	210	7	4	12	120	0.75
	[17]	181	210	9	4	13	120	0.76
	[18]	181	210	0	0	0	120	0.74

Girder Name : G2　Section Name : Sec-32:J-31　(Girder number=　2　Section number=　34)

Section force　Mx =　38763 kN·m　Sy =　-2346 kN　T =　2364 kN·m

Effective buckling length　Lx =　4708 mmLy =　4708 mm
Radius of curvature　R　=　0.0 m
Inclination　DECK =　2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	825
	Intermediate	2700	2700
	overhang	2610	2610
LFLG	Intermediate	2700	2700

Section dimensions　Section area(cm2)

		Total	in plane
1-DECK-L PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 *	8 (SM400)	215.6	215.6
1-DECK-R PL	2430 * 16 (SM400)	388.8	388.8
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
6-RIB PL	250 * 24 (SM400)	360.0	360.0
1-LWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL	2940 * 18 (SM490Y)	529.2	529.2
3-RIB PL	170 * 17 (SM490Y)	86.7	86.7

Section property

		Total	In-plane
Section area	A (cm2)	3037.0	3037.0
Gravity center	ex (cm)	66.3	66.3
	ey (cm)	180.2	180.2
Moment of inertia	Ix (cm4)	38803064	38803064
	Iy (cm4)	84192035	84192035
Torsion Constant	J (cm4)	30646186	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	54679.4 kN·m	54679.4 kN·m
	Mxr(lower)=	44769.7 kN·m	29569.3 kN·m

Stress (N/mm²)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-87	140	0	0	0	80	0.39
	[2]	-88	140	5	0	5	80	0.40
DECK-C	[3]	-88	140	5	0	5	80	0.40
	[4]	-89	140	19	10	29	80	0.53
	[5]	-94	140	28	10	28	80	0.58
	[6]	-94	140	27	0	27	80	0.57
DECK-R	[7]	-94	140	27	0	27	80	0.57
	[8]	-99	140	0	0	0	80	0.50
LWEB	[9]	-87	210	28	11	40	120	0.28
	[10]	0	210	31	11	42	120	0.12
	[11]	180	210	21	11	32	120	0.81
RWEB	[12]	-92	210	34	11	46	120	0.34
	[13]	0	210	37	11	48	120	0.16
	[14]	180	210	27	11	38	120	0.84
LFLG	[15]	182	210	0	0	0	120	0.75
	[16]	182	210	15	9	24	120	0.79
	[17]	182	210	20	9	29	120	0.81
	[18]	182	210	0	0	0	120	0.75

Girder Name : G2　Section Name : Sec-33:J-32　(Girder number=　2　Section number=　35)

Section force　Mx =　18590 kN·m　Sy =　-2735 kN　T =　2579 kN·m

Effective buckling length　Lx =　4691 mmLy =　4691 mm
Radius of curvature　R　=-302.3 m
Inclination　DECK =　2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	825	825
		Intermediate	2700	2700
		overhang	2740	2740
	LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 *	8 (SM400)	215.6	215.6
1-DECK-R PL	2560 * 16 (SM400)	409.6	409.6
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
6-RIB PL	250 * 24 (SM400)	360.0	360.0
1-LWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL	2940 * 10 (SM490Y)	294.0	294.0
3-RIB PL	170 * 17 (SM490Y)	86.7	86.7

Section property			Total	In-plane
	Section area	A (cm2)	2822.6	2822.6
	Gravity center	ex (cm)	76.0	76.0
		ey (cm)	196.3	196.3
	Moment of inertia	Ix (cm4)	30504510	30504510
		Iy (cm4)	84900667	84900667
	Torsion Constant	J (cm4)	26044025	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	50566.9 kN·m	50566.9 kN·m
	Mxr(lower)=	32396.8 kN·m	7114.3 kN·m

Stress (N/mm²)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-43	140	0	0	0	80	0.09
	[2]	-44	140	6	0	6	80	0.10
DECK-C	[3]	-44	140	6	0	6	80	0.10
	[4]	-44	140	24	11	35	80	0.29
	[5]	-48	140	35	11	35	80	0.31
	[6]	-48	140	34	0	34	80	0.30
DECK-R	[7]	-48	140	34	0	34	80	0.30
	[8]	-51	140	0	0	0	80	0.14
LWEB	[9]	-43	210	35	12	48	120	0.20
	[10]	0	210	38	12	50	120	0.17
	[11]	119	210	20	12	33	120	0.40
RWEB	[12]	-47	210	42	13	54	120	0.25
	[13]	0	210	44	13	57	120	0.22
	[14]	120	210	27	13	39	120	0.43
LFLG	[15]	119	210	0	0	0	120	0.32
	[16]	119	210	27	17	44	120	0.46
	[17]	120	210	35	18	53	120	0.52
	[18]	121	210	0	0	0	120	0.33

Girder Name：G2　Section Name：Sec-33:Right　（Girder number=　2　Section number=　35）

Section force　Mx =　　0 kN･m　Sy =　-3206 kN　T =　2794 kN･m

Effective buckling length　Lx =　4650 mmLy =　4650 mm
Radius of curvature　R　=　0.0 m
Inclination　DECK =　2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	825	825
		Intermediate	2700	2700
		overhang	2750	2750
	LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB 320	* 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320	* 240 * 8 (SM400)	215.6	215.6
1-DECK-R PL	2571 * 16 (SM400)	411.3	411.3
1-U.RIB 320	* 240 * 8 (SM400)	53.9	53.9
5-RIB PL	250 * 24 (SM400)	300.0	300.0
1-LWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-RWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-LFLG PL	2940 * 10 (SM490Y)	294.0	294.0
3-RIB PL	170 * 17 (SM490Y)	86.7	86.7

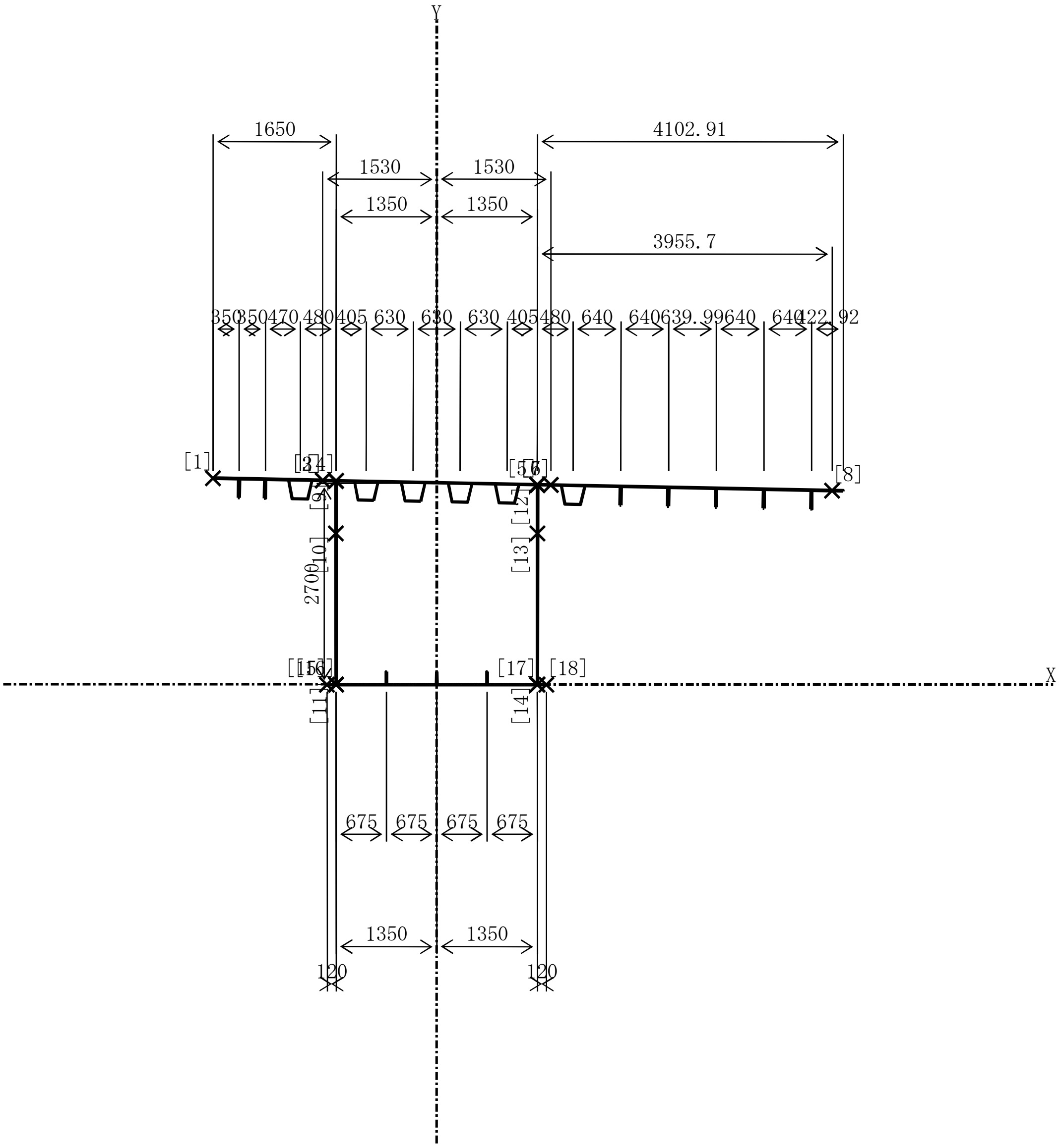
Section property			Total	In-plane
	Section area	A (cm2)	2764.3	2764.3
	Gravity center	ex (cm)	67.9	67.9
		ey (cm)	194.6	194.6
	Moment of inertia	Ix (cm4)	30251520	30251520
		Iy (cm4)	78190724	78190724
	Torsion Constant	J (cm4)	26108927	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	49719.5 kN･m	49719.5 kN･m
	Mxr(lower)=	32475.7 kN･m	7127.7 kN･m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	0	140	0	0	0	80	0.00
	[2]	0	140	7	0	7	80	0.01
DECK-C	[3]	0	140	7	0	7	80	0.01
	[4]	0	140	28	12	40	80	0.25
	[5]	0	140	40	12	40	80	0.25
	[6]	0	140	38	0	38	80	0.23
DECK-R	[7]	0	140	38	0	38	80	0.23
	[8]	0	140	0	0	0	80	0.00
LWEB	[9]	0	210	42	14	55	120	0.21
	[10]	0	210	44	14	58	120	0.23
	[11]	0	210	24	14	38	120	0.10
RWEB	[12]	0	210	48	14	62	120	0.27
	[13]	0	210	51	14	65	120	0.29
	[14]	0	210	31	14	45	120	0.14
LFLG	[15]	0	210	0	0	0	120	0.00
	[16]	0	210	32	19	51	120	0.18
	[17]	0	210	41	19	60	120	0.25
	[18]	0	210	0	0	0	120	0.00

Girder Name：G3



Girder Name：G3　Section Name：Sec-1:Left　（Girder number=　3　Section number=　1）

Section force　Mx =　0 kN·m　Sy =　2709 kN　T =　-2391 kN·m

Effective buckling length　Lx =　4642 mmLy =　4642 mm
Radius of curvature　R　=-1997. m
Inclination　DECK =　-2.0 %

Effective width(mm)		Full width	In-plane
DECK	overhang	1650	1650
	Intermediate	2700	2700
	overhang	4103	3956
LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1470 * 16 (SM400)	235.2	235.2
2-RIB　PL	250 * 24 (SM400)	120.0	120.0
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 *	8 (SM400)	215.6	215.6
1-DECK-R PL	3924 * 16 (SM490Y)	627.8	604.2
1-U.RIB 320 * 240 *	8 (SM490Y)	53.9	53.9
5-RIB　PL	250 * 24 (SM490Y)	300.0	300.0
1-LWEB　PL	2727 * 14 (SM490Y)	381.8	381.8
1-RWEB　PL	2673 * 14 (SM490Y)	374.2	374.2
1-LFLG　PL	2940 * 10 (SM490Y)	294.0	294.0
3-RIB　PL	170 * 17 (SM490Y)	86.7	86.7

Section property		Total	In-plane
Section area	A　(cm2)	3232.8	3209.3
Gravity center	ex (cm)	76.8	73.4
	ey (cm)	202.5	202.1
Moment of inertia	Ix (cm4)	31345368	31267113
	Iy (cm4)	154923790	149867512
Torsion Constant	J　(cm4)	26099084	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	58062.8 kN·m	58062.8 kN·m
	Mxr(lower)=	32322.5 kN·m	7094.7 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[　1]	0	140	0	0	0	80	0.00
	[　2]	0	140	15	0	15	80	0.03
DECK-C	[　3]	0	140	15	0	15	80	0.03
	[　4]	0	140	17	10	27	80	0.11
	[　5]	0	140	31	10	31	80	0.15
	[　6]	0	140	30	0	30	80	0.14
DECK-R	[　7]	0	210	30	0	30	120	0.06
	[　8]	0	210	1	0	1	120	0.00
LWEB	[　9]	0	210	37	12	49	120	0.17
	[10]	0	210	39	12	51	120	0.18
	[11]	0	210	22	12	33	120	0.08
RWEB	[12]	0	210	41	12	53	120	0.20
	[13]	0	210	43	12	55	120	0.21
	[14]	0	210	25	12	37	120	0.10

LFLG	[15]	0	210	0	0	0	120	0.00
	[16]	0	210	28	16	45	120	0.14
	[17]	0	210	34	16	50	120	0.17
	[18]	0	210	0	0	0	120	0.00

Girder Name：G3　Section Name：Sec-1:J-1　（Girder number=　3　Section number=　1）

Section force　Mx =　17055 kN･m　Sy =　2016 kN　T =　-2369 kN･m

Effective buckling length　Lx =　4643 mmLy =　4643 mm
Radius of curvature　R =-1997. m
Inclination　DECK =　-2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1650	1650
	Intermediate	2700	2700
	overhang	3911	3796
LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1470 * 16 (SM400)	235.2	235.2
2-RIB PL	250 * 24 (SM400)	120.0	120.0
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 *	8 (SM400)	215.6	215.6
1-DECK-R PL	3732 * 16 (SM490Y)	597.1	578.6
1-U.RIB 320 * 240 *	8 (SM490Y)	53.9	53.9
5-RIB PL	250 * 24 (SM490Y)	300.0	300.0
1-LWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL	2940 * 10 (SM490Y)	294.0	294.0
3-RIB PL	170 * 17 (SM490Y)	86.7	86.7

Section property			Total	In-plane
Section area	A	(cm2)	3202.2	3183.7
Gravity center	ex	(cm)	72.4	69.8
	ey	(cm)	201.9	201.6
Moment of inertia	Ix	(cm4)	31243052	31179803
	Iy	(cm4)	148386721	144650170
Torsion Constant	J	(cm4)	26099634	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	57541.7 kN･m	57541.7 kN･m
	Mxr(lower)=	32306.4 kN･m	7091.2 kN･m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-41	140	0	0	0	80	0.09
	[2]	-40	140	11	0	11	80	0.10
DECK-C	[3]	-40	140	11	0	11	80	0.10
	[4]	-40	140	12	10	22	80	0.16
	[5]	-37	140	23	10	23	80	0.15
	[6]	-37	140	22	0	22	80	0.14
DECK-R	[7]	-37	210	22	0	22	120	0.06
	[8]	-33	210	0	0	1	120	0.02
LWEB	[9]	-39	210	28	12	39	120	0.14
	[10]	0	210	29	12	41	120	0.12
	[11]	110	210	16	12	28	120	0.33
RWEB	[12]	-36	210	31	12	42	120	0.15
	[13]	0	210	32	12	44	120	0.13
	[14]	110	210	19	12	30	120	0.34

LFLG	[15]	111	210	0	0	0	120	0.28
	[16]	111	210	21	16	37	120	0.37
	[17]	111	210	25	16	41	120	0.40
	[18]	111	210	0	0	0	120	0.28

Girder Name：G3　Section Name：Sec-2:J-2　（Girder number=　3　Section number=　2）

Section force　Mx =　29772 kN·m　Sy =　1383 kN　T =　-2154 kN·m

Effective buckling length　Lx =　4743 mmLy =　4743 mm
Radius of curvature　R　=-1997. m
Inclination　DECK =　-2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1650	1650
	Intermediate	2700	2700
	overhang	3699	3616
LFLG	Intermediate	2700	2700

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL　1470 * 16 (SM400)	235.2	235.2
2-RIB　PL　250 * 24 (SM400)	120.0	120.0
1-U.RIB 320 * 240 *　8 (SM400)	53.9	53.9
1-DECK-C PL　3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 *　8 (SM400)	215.6	215.6
1-DECK-R PL　3520 * 16 (SM400)	563.2	549.9
1-U.RIB 320 * 240 *　8 (SM400)	53.9	53.9
5-RIB　PL　250 * 24 (SM400)	300.0	240.0
1-LWEB　PL　2727 * 14 (SM490Y)	381.8	381.8
1-RWEB　PL　2673 * 14 (SM490Y)	374.2	374.2
1-LFLG　PL　2940 * 13 (SM490Y)	382.2	382.2
3-RIB　PL　170 * 17 (SM490Y)	86.7	86.7

Section property

		Total	In-plane
Section area	A　(cm2)	3256.4	3183.1
Gravity center	ex (cm)	65.8	55.7
	ey (cm)	195.8	194.6
Moment of inertia	Ix (cm4)	34642548	34419627
	Iy (cm4)	142669638	128344273
Torsion Constant	J　(cm4)	28265307	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	58147.1 kN·m	58147.1 kN·m
	Mxr(lower)=	36883.8 kN·m	13682.0 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[　1]	-72	140	0	0	0	80	0.26
	[　2]	-69	140	7	0	8	80	0.25
DECK-C	[　3]	-69	140	7	0	8	80	0.25
	[　4]	-69	140	8	9	17	80	0.29
	[　5]	-64	140	15	9	15	80	0.25
	[　6]	-64	140	14	0	15	80	0.24
DECK-R	[　7]	-64	140	14	0	15	80	0.24
	[　8]	-58	140	1	0	1	80	0.17
LWEB	[　9]	-68	210	19	10	29	120	0.16
	[10]	-1	210	20	10	30	120	0.06
	[11]	168	210	12	10	23	120	0.68
RWEB	[12]	-63	210	21	10	31	120	0.16
	[13]	-1	210	22	10	32	120	0.07
	[14]	168	210	14	10	24	120	0.68

LFLG	[15]	169	210	0	0	0	120	0.65
	[16]	169	210	12	11	23	120	0.69
	[17]	169	210	14	11	25	120	0.70
	[18]	170	210	0	0	0	120	0.65

Girder Name：G3　Section Name：Sec-3：J-3　（Girder number=　3　Section number=　3）

Section force　Mx =　37114 kN·m　Sy =　806 kN　T =　-1396 kN·m

Effective buckling length　Lx =　4743 mmLy =　4743 mm
Radius of curvature　R =-1997. m
Inclination　DECK =　-2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1650	1650
	Intermediate	2700	2700
	overhang	3501	3446
LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1470 * 16 (SM400)	235.2	235.2
2-RIB PL	250 * 24 (SM400)	120.0	120.0
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 *	8 (SM400)	215.6	215.6
1-DECK-R PL	3322 * 16 (SM400)	531.5	522.6
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
4-RIB PL	250 * 24 (SM400)	240.0	240.0
1-LWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL	2940 * 18 (SM490Y)	529.2	529.2
3-RIB PL	170 * 17 (SM490Y)	86.7	86.7

Section property

		Total	In-plane
Section area	A (cm2)	3311.8	3302.8
Gravity center	ex (cm)	50.8	49.7
	ey (cm)	185.5	185.3
Moment of inertia	Ix (cm4)	39720136	39668974
	Iy (cm4)	126303621	124631905
Torsion Constant	J (cm4)	30638563	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	60277.4 kN·m	60277.4 kN·m
	Mxr(lower)=	44501.7 kN·m	29394.5 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-86	140	0	0	0	80	0.38
	[2]	-84	140	4	0	4	80	0.36
DECK-C	[3]	-84	140	4	0	4	80	0.36
	[4]	-83	140	5	6	10	80	0.37
	[5]	-78	140	8	6	8	80	0.32
	[6]	-78	140	8	0	8	80	0.32
DECK-R	[7]	-78	140	8	0	8	80	0.32
	[8]	-72	140	0	0	0	80	0.26
LWEB	[9]	-82	210	10	7	17	120	0.17
	[10]	0	210	11	7	18	120	0.02
	[11]	173	210	8	7	15	120	0.69
RWEB	[12]	-77	210	12	7	18	120	0.16
	[13]	0	210	12	7	19	120	0.03
	[14]	173	210	9	7	16	120	0.70

LFLG	[15]	175	210	0	0	0	120	0.69
	[16]	175	210	6	5	11	120	0.70
	[17]	175	210	6	5	12	120	0.70
	[18]	175	210	0	0	0	120	0.70

Girder Name：G3　Section Name：Sec-4:Mx-Max　（Girder number=　3　Section number=　4）

Section force　Mx =　39295 kN·m　Sy =　-390 kN　T =　-645 kN·m

Effective buckling length　Lx =　4743 mmLy =　4743 mm
Radius of curvature　R =-1997. m
Inclination　DECK =　-2.0 %

Effective width(mm)

			Full width	In-plane
	DECK	overhang	1650	1650
		Intermediate	2700	2700
		overhang	3325	3292
	LFLG	Intermediate	2700	2700

Section dimensions

Section area(cm2)	Total	in plane
1-DECK-L PL 1470 * 16 (SM400)	235.2	235.2
2-RIB PL 250 * 24 (SM400)	120.0	120.0
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL 3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 * 8 (SM400)	215.6	215.6
1-DECK-R PL 3146 * 16 (SM400)	503.4	498.0
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
4-RIB PL 250 * 24 (SM400)	240.0	240.0
1-LWEB PL 2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL 2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL 2940 * 20 (SM490Y)	588.0	588.0
3-RIB PL 170 * 17 (SM490Y)	86.7	86.7

Section property

		Total	In-plane
Section area	A (cm2)	3342.4	3337.0
Gravity center	ex (cm)	46.4	45.7
	ey (cm)	181.6	181.4
Moment of inertia	Ix (cm4)	41571887	41537429
	Iy (cm4)	121702384	120749279
Torsion Constant	J (cm4)	31328822	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	60581.4 kN·m	60581.4 kN·m
	Mxr(lower)=	47526.7 kN·m	35296.7 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-91	140	0	0	0	80	0.42
	[2]	-88	140	2	0	2	80	0.40
DECK-C	[3]	-88	140	2	0	2	80	0.40
	[4]	-88	140	2	3	5	80	0.40
	[5]	-83	140	4	3	4	80	0.35
	[6]	-82	140	4	0	4	80	0.35
DECK-R	[7]	-82	140	4	0	4	80	0.35
	[8]	-77	140	0	0	0	80	0.30
LWEB	[9]	-86	210	5	3	8	120	0.17
	[10]	0	210	5	3	9	120	0.01
	[11]	171	210	4	3	7	120	0.67
RWEB	[12]	-81	210	6	3	9	120	0.15
	[13]	0	210	6	3	9	120	0.01
	[14]	172	210	4	3	7	120	0.67

LFLG	[15]	173	210	0	0	0	120	0.68
	[16]	173	210	3	2	5	120	0.68
	[17]	174	210	3	2	5	120	0.69
	[18]	174	210	0	0	0	120	0.68

Girder Name：G3　Section Name：Sec-5:J-4　（Girder number=　3　Section number=　5）

Section force　Mx =　39294 kN·m　Sy =　-403 kN　T =　-645 kN·m

Effective buckling length　Lx =　4743 mmLy =　4743 mm
Radius of curvature　R　=-1997. m
Inclination　DECK =　-2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	1650	1650
		Intermediate	2700	2700
		overhang	3322	3289
	LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1470 * 16 (SM400)	235.2	235.2
2-RIB PL	250 * 24 (SM400)	120.0	120.0
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 *	8 (SM400)	215.6	215.6
1-DECK-R PL	3143 * 16 (SM400)	502.8	497.5
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
4-RIB PL	250 * 24 (SM400)	240.0	240.0
1-LWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL	2940 * 20 (SM490Y)	588.0	588.0
3-RIB PL	170 * 17 (SM490Y)	86.7	86.7

Section property			Total	In-plane
	Section area	A (cm2)	3341.8	3336.5
	Gravity center	ex (cm)	46.3	45.6
		ey (cm)	181.6	181.4
	Moment of inertia	Ix (cm4)	41568380	41534356
		Iy (cm4)	121604667	120665148
	Torsion Constant	J (cm4)	31328833	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	60569.6 kN·m	60569.6 kN·m
	Mxr(lower)=	47526.1 kN·m	35296.3 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-91	140	0	0	0	80	0.42
	[2]	-88	140	2	0	2	80	0.40
DECK-C	[3]	-88	140	2	0	2	80	0.40
	[4]	-88	140	2	3	5	80	0.40
	[5]	-83	140	4	3	4	80	0.35
	[6]	-82	140	4	0	4	80	0.35
DECK-R	[7]	-82	140	4	0	4	80	0.35
	[8]	-77	140	0	0	0	80	0.30
LWEB	[9]	-86	210	5	3	8	120	0.17
	[10]	0	210	6	3	9	120	0.01
	[11]	171	210	4	3	7	120	0.67
RWEB	[12]	-81	210	6	3	9	120	0.16
	[13]	0	210	6	3	9	120	0.01
	[14]	172	210	4	3	8	120	0.67

LFLG	[15]	173	210	0	0	0	120	0.68
	[16]	173	210	3	2	5	120	0.68
	[17]	174	210	3	2	5	120	0.69
	[18]	174	210	0	0	0	120	0.68

Girder Name：G3　Section Name：Sec-6：J-5　（Girder number=　3　Section number=　6）

Section force　Mx =　36497 kN·m　Sy =　-959 kN　T =　1083 kN·m

Effective buckling length　Lx =　4743 mmLy =　4743 mm
Radius of curvature　R =-1997. m
Inclination　DECK =　-2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1650	1650
	Intermediate	2700	2700
	overhang	3158	3143
LFLG	Intermediate	2700	2700

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL 1470 * 16 (SM400)	235.2	235.2
2-RIB PL 250 * 24 (SM400)	120.0	120.0
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL 3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 * 8 (SM400)	215.6	215.6
1-DECK-R PL 2978 * 16 (SM400)	476.5	474.2
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
4-RIB PL 250 * 24 (SM400)	240.0	240.0
1-LWEB PL 2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL 2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL 2940 * 18 (SM490Y)	529.2	529.2
3-RIB PL 170 * 17 (SM490Y)	86.7	86.7

Section property

		Total	In-plane
Section area	A (cm2)	3256.8	3254.5
Gravity center	ex (cm)	43.8	43.5
	ey (cm)	184.2	184.2
Moment of inertia	Ix (cm4)	39398332	39384443
	Iy (cm4)	116549529	116167210
Torsion Constant	J (cm4)	30639600	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	59116.1 kN·m	59116.1 kN·m
	Mxr(lower)=	44450.9 kN·m	29360.9 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-86	140	0	0	0	80	0.38
	[2]	-84	140	5	0	5	80	0.36
DECK-C	[3]	-84	140	5	0	5	80	0.36
	[4]	-83	140	6	5	10	80	0.37
	[5]	-79	140	9	5	9	80	0.33
	[6]	-78	140	9	0	9	80	0.32
DECK-R	[7]	-78	140	9	0	9	80	0.32
	[8]	-73	140	0	0	0	80	0.27
LWEB	[9]	-82	210	12	5	18	120	0.17
	[10]	0	210	13	5	19	120	0.02
	[11]	171	210	9	5	15	120	0.67
RWEB	[12]	-77	210	14	5	19	120	0.16
	[13]	0	210	14	5	20	120	0.03
	[14]	171	210	10	5	16	120	0.68

LFLG	[15]	172	210	0	0	0	120	0.67
	[16]	172	210	7	4	11	120	0.68
	[17]	172	210	8	4	12	120	0.68
	[18]	172	210	0	0	0	120	0.67

Girder Name：G3　Section Name：Sec-7:J-6　（Girder number=　3　Section number=　7）

Section force　Mx =　28689 kN·m　Sy =　-1511 kN　T =　1665 kN·m

Effective buckling length　Lx =　4743 mmLy =　4743 mm
Radius of curvature　R　=-1997. m
Inclination　DECK =　-2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1650	1650
	Intermediate	2700	2700
	overhang	3011	3011
LFLG	Intermediate	2700	2700

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL 1470 * 16 (SM400)	235.2	235.2
2-RIB PL 250 * 24 (SM400)	120.0	120.0
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL 3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 * 8 (SM400)	215.6	215.6
1-DECK-R PL 2832 * 16 (SM400)	453.1	453.1
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
3-RIB PL 250 * 24 (SM400)	180.0	180.0
1-LWEB PL 2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL 2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL 2940 * 12 (SM490Y)	352.8	352.8
3-RIB PL 170 * 17 (SM490Y)	86.7	86.7

Section property

		Total	In-plane
Section area	A (cm2)	2996.9	2996.9
Gravity center	ex (cm)	35.3	35.3
	ey (cm)	193.2	193.2
Moment of inertia	Ix (cm4)	32677145	32677145
	Iy (cm4)	101597697	101597697
Torsion Constant	J (cm4)	27631677	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	54327.2 kN·m	54327.2 kN·m
	Mxr(lower)=	35270.6 kN·m	11148.2 kN·m

Stress (N/mm²)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-74	140	0	0	0	80	0.28
	[2]	-71	140	9	0	9	80	0.27
DECK-C	[3]	-71	140	9	0	9	80	0.27
	[4]	-71	140	10	7	15	80	0.29
	[5]	-66	140	14	7	14	80	0.26
	[6]	-66	140	13	0	13	80	0.25
DECK-R	[7]	-66	140	13	0	13	80	0.25
	[8]	-61	140	0	0	0	80	0.19
LWEB	[9]	-70	210	21	8	29	120	0.17
	[10]	0	210	22	8	30	120	0.06
	[11]	170	210	13	8	21	120	0.68
RWEB	[12]	-65	210	22	8	30	120	0.16
	[13]	0	210	23	8	31	120	0.07
	[14]	170	210	15	8	23	120	0.69

LFLG	[15]	171	210	0	0	0	120	0.66
	[16]	171	210	15	9	24	120	0.70
	[17]	171	210	16	9	25	120	0.71
	[18]	171	210	0	0	0	120	0.66

Girder Name：G3　Section Name：Sec-7:Left　（Girder number=　3　Section number=　8）

Section force　Mx =　17230 kN·m　Sy =　-2113 kN　T =　1713 kN·m

Effective buckling length　Lx =　4743 mmLy =　4743 mm
Radius of curvature　R =-1997. m
Inclination　DECK =　-2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1650	1650
	Intermediate	2700	2700
	overhang	2890	2890
LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L	PL 1470 * 16 (SM400)	235.2	235.2
2-RIB	PL 250 * 24 (SM400)	120.0	120.0
1-U.RIB	320 * 240 * 8 (SM400)	53.9	53.9
1-DECK-C	PL 3061 * 16 (SM400)	489.7	489.7
4-U.RIB	320 * 240 * 8 (SM400)	215.6	215.6
1-DECK-R	PL 2710 * 16 (SM400)	433.6	433.6
1-U.RIB	320 * 240 * 8 (SM400)	53.9	53.9
3-RIB	PL 250 * 24 (SM400)	180.0	180.0
1-LWEB	PL 2727 * 14 (SM490Y)	381.8	381.8
1-RWEB	PL 2673 * 14 (SM490Y)	374.2	374.2
1-LFLG	PL 2940 * 12 (SM490Y)	352.8	352.8
7-RIB	PL 170 * 17 (SM490Y)	202.3	202.3

Section property		Total	In-plane
Section area	A (cm2)	3093.1	3093.1
Gravity center	ex (cm)	31.5	31.5
	ey (cm)	185.9	185.9
Moment of inertia	Ix (cm4)	36366475	36366475
	Iy (cm4)	99320688	99320688
Torsion Constant	J (cm4)	27632187	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	55620.9 kN·m	55620.9 kN·m
	Mxr(lower)=	40791.3 kN·m	35320.7 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-43	140	0	0	0	80	0.10
	[2]	-42	140	12	0	12	80	0.11
DECK-C	[3]	-42	140	12	0	12	80	0.11
	[4]	-42	140	13	7	19	80	0.14
	[5]	-39	140	19	7	19	80	0.14
	[6]	-39	140	18	0	18	80	0.13
DECK-R	[7]	-39	140	18	0	18	80	0.13
	[8]	-37	140	0	0	0	80	0.07
LWEB	[9]	-41	210	28	8	36	120	0.13
	[10]	0	210	30	8	39	120	0.10
	[11]	88	210	20	8	29	120	0.23
RWEB	[12]	-39	210	30	8	38	120	0.14
	[13]	0	210	32	8	40	120	0.11
	[14]	88	210	22	8	30	120	0.24

LFLG	[15]	89	210	0	0	0	120	0.18
	[16]	89	210	22	10	32	120	0.25
	[17]	89	210	24	10	34	120	0.26
	[18]	89	210	0	0	0	120	0.18

Girder Name：G3　Section Name：Sec-8:J-7　（Girder number=　3　Section number=　9）

Section force　Mx =　16160 kN･m　Sy =　-2112 kN　T =　1931 kN･m

Effective buckling length　Lx = 4743 mmLy = 4743 mm
Radius of curvature　R =-1997. m
Inclination　DECK = -2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1650	1650
	Intermediate	2700	2700
	overhang	2881	2881
LFLG	Intermediate	2700	2700

Section dimensions

Section area(cm2)	Total	in plane
1-DECK-L PL 1470 * 16 (SM400)	235.2	235.2
2-RIB PL 250 * 24 (SM400)	120.0	120.0
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL 3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 * 8 (SM400)	215.6	215.6
1-DECK-R PL 2702 * 16 (SM400)	432.3	432.3
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
3-RIB PL 250 * 24 (SM400)	180.0	180.0
1-LWEB PL 2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL 2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL 2940 * 10 (SM490Y)	294.0	294.0
7-RIB PL 170 * 17 (SM490Y)	202.3	202.3

Section property

		Total	In-plane
Section area	A (cm2)	3032.9	3032.9
Gravity center	ex (cm)	31.9	31.9
	ey (cm)	189.5	189.5
Moment of inertia	Ix (cm4)	34263314	34263314
	Iy (cm4)	98631462	98631462
Torsion Constant	J (cm4)	26104783	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	54540.6 kN･m	54540.6 kN･m
	Mxr(lower)=	37748.2 kN･m	28034.3 kN･m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-41	140	0	0	0	80	0.09
	[2]	-40	140	13	0	13	80	0.11
DECK-C	[3]	-40	140	13	0	13	80	0.11
	[4]	-40	140	13	8	20	80	0.14
	[5]	-37	140	19	8	19	80	0.13
	[6]	-37	140	18	0	18	80	0.12
DECK-R	[7]	-37	140	18	0	18	80	0.12
	[8]	-35	140	0	0	0	80	0.06
LWEB	[9]	-39	210	29	9	38	120	0.13
	[10]	0	210	31	9	40	120	0.11
	[11]	89	210	20	9	29	120	0.24
RWEB	[12]	-37	210	30	9	40	120	0.14
	[13]	0	210	32	9	42	120	0.12
	[14]	89	210	21	9	30	120	0.25

LFLG	[15]	90	210	0	0	0	120	0.18
	[16]	90	210	26	13	39	120	0.29
	[17]	90	210	28	13	41	120	0.30
	[18]	90	210	0	0	0	120	0.18

Girder Name : G3   Section Name : Sec-8:J-8   (Girder number= 3   Section number= 9)

Section force Mx = -10218 kN·m   Sy = -2746 kN   T = 1943 kN·m

Effective buckling length   Lx = 4743 mmLy = 4743 mm
Radius of curvature   R =-1997. m
Inclination   DECK = -2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	1650	1593
		Intermediate	2700	2632
		overhang	2769	2583
	LFLG	Intermediate	2700	2632

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1470 * 16 (SM400)	235.2	226.1
2-RIB PL	250 * 24 (SM400)	120.0	120.0
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	478.8
4-U.RIB 320 * 240 *	8 (SM400)	215.6	215.6
1-DECK-R PL	2589 * 16 (SM400)	414.3	384.5
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-LWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL	2940 * 10 (SM490Y)	294.0	287.2
7-RIB PL	170 * 17 (SM490Y)	202.3	173.4

Section property			Total	In-plane
	Section area	A (cm2)	3014.9	2929.3
	Gravity center	ex (cm)	29.6	27.3
		ey (cm)	189.1	190.0
	Moment of inertia	Ix (cm4)	34167100	32671185
		Iy (cm4)	95933329	90752211
	Torsion Constant	J (cm4)	26105070	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	52343.6 kN·m	52343.6 kN·m
	Mxr(lower)=	35907.0 kN·m	26666.9 kN·m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	27	140	0	0	1	80	0.04
	[2]	26	140	16	0	17	80	0.08
DECK-C	[3]	26	140	16	0	17	80	0.08
	[4]	26	140	18	8	23	80	0.12
	[5]	25	140	24	8	24	80	0.12
	[6]	25	140	23	0	23	80	0.12
DECK-R	[7]	25	140	23	0	23	80	0.12
	[8]	23	140	1	0	1	80	0.03
LWEB	[9]	26	210	37	9	47	120	0.17
	[10]	0	210	40	9	49	120	0.17
	[11]	-59	210	26	9	35	120	0.17
RWEB	[12]	24	210	39	9	49	120	0.18
	[13]	0	210	42	9	51	120	0.18
	[14]	-59	210	27	9	37	120	0.17

LFLG	[15]	-60	187	0	0	0	120	0.08
	[16]	-60	156	34	13	47	120	0.24
	[17]	-60	156	36	13	50	120	0.25
	[18]	-60	187	0	0	0	120	0.08

Girder Name：G3　Section Name：Sec-9:J-9　（Girder number=　3　Section number=　10）

Section force　Mx =　-27081 kN·m　Sy =　-3187 kN　T =　1718 kN·m

Effective buckling length　Lx =　4643 mmLy =　4643 mm
Radius of curvature　R　=-1997. m
Inclination　DECK =　-2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1650	1516
	Intermediate	2700	2540
	overhang	2688	2280
LFLG	Intermediate	2700	2540

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL　1470 * 16 (SM400)	235.2	213.8
2-RIB　PL　250 * 24 (SM400)	120.0	120.0
1-U.RIB 320 * 240 *　8 (SM400)	53.9	53.9
1-DECK-C PL　3061 * 16 (SM400)	489.7	464.1
4-U.RIB 320 * 240 *　8 (SM400)	215.6	215.6
1-DECK-R PL　2508 * 16 (SM400)	401.3	336.0
1-U.RIB 320 * 240 *　8 (SM400)	53.9	53.9
3-RIB　PL　250 * 24 (SM400)	180.0	120.0
1-LWEB　PL　2727 * 14 (SM490Y)	381.8	381.8
1-RWEB　PL　2673 * 14 (SM490Y)	374.2	374.2
1-LFLG　PL　2940 * 12 (SM490Y)	352.8	333.6
7-RIB　PL　170 * 17 (SM490Y)	202.3	173.4

Section property

		Total	In-plane
Section area	A　(cm2)	3060.7	2840.3
Gravity center	ex (cm)	27.4	15.0
	ey (cm)	185.1	183.5
Moment of inertia	Ix (cm4)	36175026	33584025
	Iy (cm4)	94534106	76297892
Torsion Constant	J　(cm4)	27632719	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	50194.8 kN·m	50194.8 kN·m
	Mxr(lower)=	38155.0 kN·m	33037.9 kN·m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[　1]	76	140	1	0	1	80	0.29
	[　2]	73	140	19	0	19	80	0.33
DECK-C	[　3]	73	140	19	0	19	80	0.33
	[　4]	73	140	20	7	24	80	0.36
	[　5]	69	140	28	7	28	80	0.36
	[　6]	69	140	26	0	26	80	0.35
DECK-R	[　7]	69	140	26	0	26	80	0.35
	[　8]	65	140	5	0	5	80	0.22
LWEB	[　9]	72	210	43	8	51	120	0.30
	[10]	1	210	46	8	54	120	0.20
	[11]	-148	210	31	8	39	120	0.60
RWEB	[12]	68	210	45	8	53	120	0.30
	[13]	1	210	48	8	56	120	0.22
	[14]	-148	210	33	8	41	120	0.62

LFLG	[15]	-149	210	0	0	0	120	0.50
	[16]	-149	182	34	10	44	120	0.64
	[17]	-149	182	36	10	46	120	0.65
	[18]	-149	210	0	0	0	120	0.50

Girder Name：G3　Section Name：Sec-10:Mx-Min_L　（Girder number=　3　Section number=　11）

Section force　Mx =　-35299 kN･m　Sy =　-3425 kN　T =　1718 kN･m

Effective buckling length　Lx =　4643 mmLy =　4643 mm
Radius of curvature　R　=-1997. m
Inclination　DECK =　-2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	1650	1484
		Intermediate	2700	2502
		overhang	2657	2164
	LFLG	Intermediate	2700	2502

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1470 ＊ 16 (SM490Y)	235.2	208.7
2-RIB PL	250 ＊ 24 (SM490Y)	120.0	120.0
1-U.RIB 320 ＊ 240 ＊	8 (SM490Y)	53.9	53.9
1-DECK-C PL	3061 ＊ 16 (SM490Y)	489.7	458.0
4-U.RIB 320 ＊ 240 ＊	8 (SM490Y)	215.6	215.6
1-DECK-R PL	2477 ＊ 16 (SM490Y)	396.3	317.5
1-U.RIB 320 ＊ 240 ＊	8 (SM490Y)	53.9	53.9
3-RIB PL	250 ＊ 24 (SM490Y)	180.0	120.0
1-LWEB PL	2727 ＊ 14 (SM490Y)	381.8	381.8
1-RWEB PL	2673 ＊ 14 (SM490Y)	374.2	374.2
1-LFLG PL	2940 ＊ 14 (SM490Y)	411.6	383.9
7-RIB PL	200 ＊ 22 (SM490Y)	308.0	264.0

Section property			Total	In-plane
	Section area	A (cm2)	3220.3	2951.5
	Gravity center	ex (cm)	25.5	12.7
		ey (cm)	175.9	174.3
	Moment of inertia	Ix (cm4)	41056170	37483627
		Iy (cm4)	94853745	74586919
	Torsion Constant	J (cm4)	28842671	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	76551.6 kN･m	76551.6 kN･m
	Mxr(lower)=	44774.0 kN･m	42710.0 kN･m

Stress (N/mm^2)

Mx-Min		[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	97	210	1	0	1	120	0.21
		[2]	94	210	20	0	20	120	0.23
	DECK-C	[3]	94	210	20	0	20	120	0.23
		[4]	94	210	21	7	25	120	0.24
		[5]	89	210	29	7	29	120	0.24
		[6]	89	210	28	0	28	120	0.23
	DECK-R	[7]	89	210	28	0	28	120	0.23
		[8]	85	210	6	0	6	120	0.17
	LWEB	[9]	93	210	45	8	53	120	0.39
		[10]	2	210	49	8	57	120	0.23
		[11]	-164	210	36	8	44	120	0.75
	RWEB	[12]	88	210	47	8	56	120	0.39
		[13]	2	210	51	8	59	120	0.24
		[14]	-164	210	38	8	46	120	0.76

LFLG	[15]	-165	210	0	0	0	120	0.62
	[16]	-165	200	34	8	42	120	0.74
	[17]	-166	200	36	8	45	120	0.76
	[18]	-166	210	0	0	0	120	0.62

Girder Name：G3　 Section Name：Sec-10：Mx-Min_R　 （Girder number=　 3　 Section number=　11）

Section force　Mx =　-35300 kN・m　 Sy =　　2665 kN　 T =　　1617 kN・m

Effective buckling length　　　Lx =　4718 mmLy =　4718 mm
Radius of curvature　　　　　　R　=-1997. m
Inclination　　　　　　　　　　DECK =　-2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	1650	1484
		Intermediate	2700	2502
		overhang	2657	2164
	LFLG	Intermediate	2700	2502

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1470 * 16 (SM490Y)	235.2	208.7
2-RIB PL	250 * 24 (SM490Y)	120.0	120.0
1-U.RIB 320 * 240 *	8 (SM490Y)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM490Y)	489.7	458.0
4-U.RIB 320 * 240 *	8 (SM490Y)	215.6	215.6
1-DECK-R PL	2477 * 16 (SM490Y)	396.3	317.5
1-U.RIB 320 * 240 *	8 (SM490Y)	53.9	53.9
3-RIB PL	250 * 24 (SM490Y)	180.0	120.0
1-LWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL	2940 * 14 (SM490Y)	411.6	383.9
7-RIB PL	200 * 22 (SM490Y)	308.0	264.0

Section property			Total	In-plane
	Section area	A (cm2)	3220.3	2951.5
	Gravity center	ex (cm)	25.5	12.7
		ey (cm)	175.9	174.3
	Moment of inertia	Ix (cm4)	41056170	37483627
		Iy (cm4)	94853745	74586919
	Torsion Constant	J (cm4)	28842671	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	76551.6 kN・m	76551.6 kN・m
	Mxr(lower)=	44774.0 kN・m	42710.0 kN・m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	97	210	1	0	1	120	0.21
	[2]	94	210	15	0	16	120	0.22
DECK-C	[3]	94	210	15	0	16	120	0.22
	[4]	94	210	17	7	21	120	0.23
	[5]	89	210	23	7	23	120	0.22
	[6]	89	210	22	0	22	120	0.21
DECK-R	[7]	89	210	22	0	22	120	0.21
	[8]	85	210	5	0	5	120	0.17
LWEB	[9]	93	210	35	8	43	120	0.32
	[10]	2	210	38	8	46	120	0.15
	[11]	-164	210	28	8	36	120	0.70
RWEB	[12]	88	210	37	8	45	120	0.31
	[13]	2	210	40	8	48	120	0.16
	[14]	-164	210	30	8	37	120	0.71

LFLG	[15]	-165	210	0	0	0	120	0.62
	[16]	-165	200	26	8	34	120	0.70
	[17]	-166	200	28	8	36	120	0.71
	[18]	-166	210	0	0	0	120	0.62

Girder Name：G3　Section Name：Sec-11:J-10　（Girder number=　3　Section number=　12）

Section force　Mx =　-29268 kN·m　Sy =　2423 kN　T =　1617 kN·m

Effective buckling length　Lx =　4718 mmLy =　4718 mm
Radius of curvature　R　=-1997. m
Inclination　DECK =　-2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	1650	1516
		Intermediate	2700	2540
		overhang	2629	2232
	LFLG	Intermediate	2700	2540

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1470 * 16 (SM400)	235.2	213.8
2-RIB PL	250 * 24 (SM400)	120.0	120.0
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	464.1
4-U.RIB 320 * 240 *	8 (SM400)	215.6	215.6
1-DECK-R PL	2449 * 16 (SM400)	391.8	328.4
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
3-RIB PL	250 * 24 (SM400)	180.0	120.0
1-LWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL	2940 * 12 (SM490Y)	352.8	333.6
7-RIB PL	170 * 17 (SM490Y)	202.3	173.4

Section property			Total	In-plane
	Section area	A (cm2)	3051.3	2832.8
	Gravity center	ex (cm)	26.3	14.1
		ey (cm)	184.9	183.3
	Moment of inertia	Ix (cm4)	36117942	33536736
		Iy (cm4)	93211139	75393602
	Torsion Constant	J (cm4)	27632871	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	50009.7 kN·m	50009.7 kN·m
	Mxr(lower)=	38145.3 kN·m	33029.5 kN·m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	82	140	1	0	1	80	0.34
	[2]	80	140	14	0	15	80	0.36
DECK-C	[3]	80	140	14	0	15	80	0.36
	[4]	79	140	16	7	20	80	0.38
	[5]	75	140	21	7	21	80	0.35
	[6]	74	140	20	0	20	80	0.34
DECK-R	[7]	74	140	20	0	20	80	0.34
	[8]	71	140	4	0	4	80	0.26
LWEB	[9]	78	210	32	8	40	120	0.25
	[10]	1	210	35	8	43	120	0.13
	[11]	-160	210	23	8	31	120	0.65
RWEB	[12]	73	210	34	8	42	120	0.24
	[13]	1	210	36	8	44	120	0.14
	[14]	-160	210	25	8	33	120	0.66

LFLG	[15]	-161	210	0	0	0	120	0.59
	[16]	-161	182	26	9	35	120	0.67
	[17]	-161	182	28	9	37	120	0.68
	[18]	-161	210	0	0	0	120	0.59

Girder Name：G3　Section Name：Sec-12:J-11　（Girder number=　3　Section number=　13）

Section force　Mx =　-17498 kN･m　Sy =　　2051 kN　T =　　1600 kN･m

Effective buckling length　　Lx =　4793 mmLy =　4793 mm
Radius of curvature　　R =-1997. m
Inclination　　DECK =　-2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1650	1593
	Intermediate	2700	2632
	overhang	2568	2390
LFLG	Intermediate	2700	2632

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1470 * 16 (SM400)	235.2	226.1
2-RIB PL	250 * 24 (SM400)	120.0	120.0
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	478.8
4-U.RIB 320 * 240 *	8 (SM400)	215.6	215.6
1-DECK-R PL	2388 * 16 (SM400)	382.2	353.7
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
3-RIB PL	250 * 24 (SM400)	180.0	120.0
1-LWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL	2940 * 10 (SM490Y)	294.0	287.2
7-RIB PL	170 * 17 (SM490Y)	202.3	173.4

Section property		Total	In-plane
Section area	A (cm2)	2982.8	2838.7
Gravity center	ex (cm)	25.6	16.1
	ey (cm)	188.3	187.9
Moment of inertia	Ix (cm4)	33991132	32278399
	Iy (cm4)	91427793	79233907
Torsion Constant	J (cm4)	26105567	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	50519.1 kN･m	50519.1 kN･m
	Mxr(lower)=	35861.1 kN･m	26632.8 kN･m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	48	140	0	0	0	80	0.12
	[2]	47	140	12	0	13	80	0.14
DECK-C	[3]	47	140	12	0	13	80	0.14
	[4]	47	140	13	7	18	80	0.16
	[5]	44	140	18	7	18	80	0.15
	[6]	44	140	17	0	17	80	0.14
DECK-R	[7]	44	140	17	0	17	80	0.14
	[8]	41	140	2	0	2	80	0.09
LWEB	[9]	46	210	28	8	36	120	0.14
	[10]	0	210	30	8	38	120	0.10
	[11]	-102	210	19	8	27	120	0.29
RWEB	[12]	43	210	29	8	37	120	0.14
	[13]	0	210	31	8	39	120	0.10
	[14]	-102	210	20	8	28	120	0.29

LFLG	[15]	-102	187	0	0	0	120	0.24
	[16]	-102	156	26	11	36	120	0.33
	[17]	-102	156	27	11	38	120	0.34
	[18]	-102	187	0	0	0	120	0.24

Girder Name : G3　Section Name : Sec-12:J-12　(Girder number=　3　Section number=　13)

Section force	Mx-Max	Mx = 2345 kN·m	Sy = 1433 kN	T = 1587 kN·m
	Mx-Min	Mx = -8008 kN·m	Sy = 1433 kN	T = 1587 kN·m

Effective buckling length　Lx =　4793 mmLy =　4793 mm
Radius of curvature　R =-1997. m
Inclination　DECK =　-2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	1650	1650
		Intermediate	2700	2700
		overhang	2513	2489
	LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1470 * 16 (SM400)	235.2	235.2
2-RIB PL	250 * 24 (SM400)	120.0	120.0
1-U.RIB 320	* 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320	* 240 * 8 (SM400)	215.6	215.6
1-DECK-R PL	2333 * 16 (SM400)	373.3	369.4
1-U.RIB 320	* 240 * 8 (SM400)	53.9	53.9
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-LWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL	2940 * 10 (SM490Y)	294.0	294.0
7-RIB PL	170 * 17 (SM490Y)	202.3	202.3

Section property			Total	In-plane
	Section area	A (cm2)	2974.0	2970.1
	Gravity center	ex (cm)	24.5	24.1
		ey (cm)	188.0	188.0
	Moment of inertia	Ix (cm4)	33941685	33919855
		Iy (cm4)	90254928	89749480
	Torsion Constant	J (cm4)	26105701	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	53056.8 kN·m	53056.8 kN·m
	Mxr(lower)=	37675.4 kN·m	27980.2 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	-6	140	0	0	0	80	0.00
		[2]	-6	140	9	0	9	80	0.01
	DECK-C	[3]	-6	140	9	0	9	80	0.01
		[4]	-6	140	9	7	14	80	0.03
		[5]	-6	140	12	7	12	80	0.03
		[6]	-6	140	12	0	12	80	0.02
	DECK-R	[7]	-6	140	12	0	12	80	0.02
		[8]	-5	140	0	0	0	80	0.00
	LWEB	[9]	-6	210	19	8	27	120	0.05
		[10]	0	210	21	8	29	120	0.06
		[11]	13	210	13	8	21	120	0.03
	RWEB	[12]	-5	210	20	8	28	120	0.06
		[13]	0	210	22	8	29	120	0.06
		[14]	13	210	14	8	22	120	0.04

	LFLG	[15]	13	210	0	0	0	120	0.00
		[16]	13	210	18	11	29	120	0.06
		[17]	13	210	19	11	30	120	0.07
		[18]	13	210	0	0	0	120	0.00

Mx-Min	[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	21	140	0	0	0	80	0.02
		[2]	20	140	9	0	9	80	0.03
	DECK-C	[3]	20	140	9	0	9	80	0.03
		[4]	20	140	9	7	14	80	0.05
		[5]	19	140	12	7	12	80	0.04
		[6]	19	140	12	0	12	80	0.04
	DECK-R	[7]	19	140	12	0	12	80	0.04
		[8]	18	140	0	0	0	80	0.02
	LWEB	[9]	20	210	19	8	27	120	0.06
		[10]	0	210	21	8	29	120	0.06
		[11]	-44	210	13	8	21	120	0.08
	RWEB	[12]	19	210	20	8	28	120	0.06
		[13]	0	210	22	8	29	120	0.06
		[14]	-44	210	14	8	22	120	0.08
	LFLG	[15]	-45	187	0	0	0	120	0.05
		[16]	-45	156	18	11	29	120	0.10
		[17]	-45	156	19	11	30	120	0.11
		[18]	-45	187	0	0	0	120	0.05

Girder Name : G3　Section Name : Sec-13:Left　(Girder number=　3　Section number=　14)

Section force	Mx-Max	Mx = 2345 kN·m	Sy = 1433 kN	T = 1587 kN·m
	Mx-Min	Mx = -8008 kN·m	Sy = 1433 kN	T = 1587 kN·m

Effective buckling length　Lx = 4793 mmLy = 4793 mm
Radius of curvature　R =-1997. m
Inclination　DECK = -2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	1650	1650
		Intermediate	2700	2700
		overhang	2513	2489
	LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L	PL 1470 * 16 (SM400)	235.2	235.2
2-RIB	PL 250 * 24 (SM400)	120.0	120.0
1-U.RIB	320 * 240 * 8 (SM400)	53.9	53.9
1-DECK-C	PL 3061 * 16 (SM400)	489.7	489.7
4-U.RIB	320 * 240 * 8 (SM400)	215.6	215.6
1-DECK-R	PL 2333 * 16 (SM400)	373.3	369.4
1-U.RIB	320 * 240 * 8 (SM400)	53.9	53.9
3-RIB	PL 250 * 24 (SM400)	180.0	180.0
1-LWEB	PL 2727 * 14 (SM490Y)	381.8	381.8
1-RWEB	PL 2673 * 14 (SM490Y)	374.2	374.2
1-LFLG	PL 2940 * 10 (SM490Y)	294.0	294.0
7-RIB	PL 170 * 17 (SM490Y)	202.3	202.3

Section property			Total	In-plane
Section area	A	(cm2)	2974.0	2970.1
Gravity center	ex	(cm)	24.5	24.1
	ey	(cm)	188.0	188.0
Moment of inertia	Ix	(cm4)	33941685	33919855
	Iy	(cm4)	90254928	89749480
Torsion Constant	J	(cm4)	26105701	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	53056.8 kN·m	53056.8 kN·m
	Mxr(lower)=	37675.4 kN·m	27980.2 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-6	140	0	0	0	80	0.00
	[2]	-6	140	9	0	9	80	0.01
DECK-C	[3]	-6	140	9	0	9	80	0.01
	[4]	-6	140	9	7	14	80	0.03
	[5]	-6	140	12	7	12	80	0.03
	[6]	-6	140	12	0	12	80	0.02
DECK-R	[7]	-6	140	12	0	12	80	0.02
	[8]	-5	140	0	0	0	80	0.00
LWEB	[9]	-6	210	19	8	27	120	0.05
	[10]	0	210	21	8	29	120	0.06
	[11]	13	210	13	8	21	120	0.03
RWEB	[12]	-5	210	20	8	28	120	0.06
	[13]	0	210	22	8	29	120	0.06
	[14]	13	210	14	8	22	120	0.04

	LFLG	[15]	13	210	0	0	0	120	0.00
		[16]	13	210	18	11	29	120	0.06
		[17]	13	210	19	11	30	120	0.07
		[18]	13	210	0	0	0	120	0.00

Mx-Min	[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	21	140	0	0	0	80	0.02
		[2]	20	140	9	0	9	80	0.03
	DECK-C	[3]	20	140	9	0	9	80	0.03
		[4]	20	140	9	7	14	80	0.05
		[5]	19	140	12	7	12	80	0.04
		[6]	19	140	12	0	12	80	0.04
	DECK-R	[7]	19	140	12	0	12	80	0.04
		[8]	18	140	0	0	0	80	0.02
	LWEB	[9]	20	210	19	8	27	120	0.06
		[10]	0	210	21	8	29	120	0.06
		[11]	-44	210	13	8	21	120	0.08
	RWEB	[12]	19	210	20	8	28	120	0.06
		[13]	0	210	22	8	29	120	0.06
		[14]	-44	210	14	8	22	120	0.08
	LFLG	[15]	-45	187	0	0	0	120	0.05
		[16]	-45	156	18	11	29	120	0.10
		[17]	-45	156	19	11	30	120	0.11
		[18]	-45	187	0	0	0	120	0.05

Girder Name : G3   Section Name : Sec-13:J-13   (Girder number= 3   Section number= 14)

```
Section force  Mx-Max       Mx =    9909 kN·m   Sy =     904 kN   T =    1346 kN·m
               Mx-Min       Mx =   -3042 kN·m   Sy =     904 kN   T =    1346 kN·m

Effective buckling length        Lx =  4793 mmLy =  4793 mm
Radius of curvature             R  =-1997.  m
Inclination                      DECK =  -2.0 %

Effective width(mm)                          Full width  In-plane
                    DECK  overhang                 1650      1650
                          Intermediate             2700      2700
                          overhang                 2475      2455
                    LFLG  Intermediate             2700      2700

Section dimensions   Section area(cm2)      Total   in plane
        1-DECK-L PL  1470 * 16 (SM400)       235.2     235.2
        2-RIB    PL   250 * 24 (SM400)       120.0     120.0
        1-U.RIB 320 * 240 *  8 (SM400)        53.9      53.9
        1-DECK-C PL  3061 * 16 (SM400)       489.7     489.7
        4-U.RIB 320 * 240 *  8 (SM400)       215.6     215.6
        1-DECK-R PL  2296 * 16 (SM400)       367.3     364.1
        1-U.RIB 320 * 240 *  8 (SM400)        53.9      53.9
        3-RIB    PL   250 * 24 (SM400)       180.0     180.0
        1-LWEB   PL  2727 * 14 (SM490Y)      381.8     381.8
        1-RWEB   PL  2673 * 14 (SM490Y)      374.2     374.2
        1-LFLG   PL  2940 * 10 (SM490Y)      294.0     294.0
        7-RIB    PL   170 * 17 (SM490Y)      202.3     202.3

Section property                                 Total  In-plane
              Section area      A  (cm2)     2968.0    2964.8
              Gravity center  ex  (cm )        23.8      23.4
                              ey  (cm )       187.9     187.8
              Moment of inertia Ix (cm4)   33907837  33889896
                              Iy  (cm4)    89474359  89067820
           Torsion Constant   J  (cm4)     26105791

Resisting bending moment                    (+)           (-)
               In-plane  Mxr(upper)=  52930.3 kN·m  52930.3 kN·m
                         Mxr(lower)=  37668.8 kN·m  27975.3 kN·m
```

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-26	140	0	0	0	80	0.04
	[2]	-25	140	6	0	6	80	0.04
DECK-C	[3]	-25	140	6	0	6	80	0.04
	[4]	-25	140	6	6	10	80	0.05
	[5]	-24	140	8	6	9	80	0.04
	[6]	-24	140	7	0	7	80	0.04
DECK-R	[7]	-24	140	7	0	7	80	0.04
	[8]	-22	140	0	0	0	80	0.03
LWEB	[9]	-25	210	12	7	19	120	0.04
	[10]	0	210	13	7	20	120	0.03
	[11]	55	210	9	7	15	120	0.08
RWEB	[12]	-23	210	13	7	19	120	0.04
	[13]	0	210	14	7	20	120	0.03
	[14]	55	210	9	7	16	120	0.09

	LFLG	[15]	55	210	0	0	0	120	0.07
		[16]	55	210	11	9	20	120	0.10
		[17]	55	210	12	9	21	120	0.10
		[18]	55	210	0	0	0	120	0.07

Mx-Min	[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	8	140	0	0	0	80	0.00
		[2]	8	140	6	0	6	80	0.01
	DECK-C	[3]	8	140	6	0	6	80	0.01
		[4]	8	140	6	6	10	80	0.02
		[5]	7	140	8	6	9	80	0.02
		[6]	7	140	7	0	7	80	0.01
	DECK-R	[7]	7	140	7	0	7	80	0.01
		[8]	7	140	0	0	0	80	0.00
	LWEB	[9]	8	210	12	7	19	120	0.03
		[10]	0	210	13	7	20	120	0.03
		[11]	-17	210	9	7	15	120	0.02
	RWEB	[12]	7	210	13	7	19	120	0.03
		[13]	0	210	14	7	20	120	0.03
		[14]	-17	210	9	7	16	120	0.02
	LFLG	[15]	-17	187	0	0	0	120	0.01
		[16]	-17	156	11	9	20	120	0.04
		[17]	-17	156	12	9	21	120	0.04
		[18]	-17	187	0	0	0	120	0.01

Girder Name : G3 Section Name : Sec-14:Left (Girder number= 3 Section number= 15)

Section force	Mx-Max	Mx = 9909 kN·m	Sy =	904 kN	T =	1346 kN·m
	Mx-Min	Mx = -3042 kN·m	Sy =	904 kN	T =	1346 kN·m

Effective buckling length Lx = 4793 mmLy = 4793 mm
Radius of curvature R =-1997. m
Inclination DECK = -2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	1650	1650
		Intermediate	2700	2700
		overhang	2475	2455
	LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1470 * 16 (SM400)	235.2	235.2
2-RIB PL	250 * 24 (SM400)	120.0	120.0
1-U.RIB	320 * 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	489.7
4-U.RIB	320 * 240 * 8 (SM400)	215.6	215.6
1-DECK-R PL	2296 * 16 (SM400)	367.3	364.1
1-U.RIB	320 * 240 * 8 (SM400)	53.9	53.9
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-LWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL	2940 * 10 (SM490Y)	294.0	294.0
7-RIB PL	170 * 17 (SM490Y)	202.3	202.3

Section property			Total	In-plane
	Section area	A (cm2)	2968.0	2964.8
	Gravity center	ex (cm)	23.8	23.4
		ey (cm)	187.9	187.8
	Moment of inertia	Ix (cm4)	33907837	33889896
		Iy (cm4)	89474359	89067820
	Torsion Constant	J (cm4)	26105791	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	52930.3 kN·m	52930.3 kN·m
	Mxr(lower)=	37668.8 kN·m	27975.3 kN·m

Stress (N/mm²)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-26	140	0	0	0	80	0.04
	[2]	-25	140	6	0	6	80	0.04
DECK-C	[3]	-25	140	6	0	6	80	0.04
	[4]	-25	140	6	6	10	80	0.05
	[5]	-24	140	8	6	9	80	0.04
	[6]	-24	140	7	0	7	80	0.04
DECK-R	[7]	-24	140	7	0	7	80	0.04
	[8]	-22	140	0	0	0	80	0.03
LWEB	[9]	-25	210	12	7	19	120	0.04
	[10]	0	210	13	7	20	120	0.03
	[11]	55	210	9	7	15	120	0.08
RWEB	[12]	-23	210	13	7	19	120	0.04
	[13]	0	210	14	7	20	120	0.03
	[14]	55	210	9	7	16	120	0.09

	LFLG	[15]	55	210	0	0	0	120	0.07
		[16]	55	210	11	9	20	120	0.10
		[17]	55	210	12	9	21	120	0.10
		[18]	55	210	0	0	0	120	0.07

Mx-Min	[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	8	140	0	0	0	80	0.00
		[2]	8	140	6	0	6	80	0.01
	DECK-C	[3]	8	140	6	0	6	80	0.01
		[4]	8	140	6	6	10	80	0.02
		[5]	7	140	8	6	9	80	0.02
		[6]	7	140	7	0	7	80	0.01
	DECK-R	[7]	7	140	7	0	7	80	0.01
		[8]	7	140	0	0	0	80	0.00
	LWEB	[9]	8	210	12	7	19	120	0.03
		[10]	0	210	13	7	20	120	0.03
		[11]	-17	210	9	7	15	120	0.02
	RWEB	[12]	7	210	13	7	19	120	0.03
		[13]	0	210	14	7	20	120	0.03
		[14]	-17	210	9	7	16	120	0.02
	LFLG	[15]	-17	187	0	0	0	120	0.01
		[16]	-17	156	11	9	20	120	0.04
		[17]	-17	156	12	9	21	120	0.04
		[18]	-17	187	0	0	0	120	0.01

Girder Name : G3 Section Name : Sec-14:J-14 (Girder number= 3 Section number= 15)

Section force Mx-Max Mx = 11947 kN・m Sy = -477 kN T = 889 kN・m
               Mx-Min Mx = -2271 kN・m Sy = -477 kN T = 889 kN・m

Effective buckling length Lx = 4793 mmLy = 4793 mm
Radius of curvature R =-1997. m
Inclination DECK = -2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1650	1650
	Intermediate	2700	2700
	overhang	2456	2439
LFLG	Intermediate	2700	2700

Section dimensions

Section area(cm2)	Total	in plane
1-DECK-L PL 1470 * 16 (SM400)	235.2	235.2
2-RIB PL 250 * 24 (SM400)	120.0	120.0
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL 3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 * 8 (SM400)	215.6	215.6
1-DECK-R PL 2277 * 16 (SM400)	364.3	361.4
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
3-RIB PL 250 * 24 (SM400)	180.0	180.0
1-LWEB PL 2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL 2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL 2940 * 10 (SM490Y)	294.0	294.0
7-RIB PL 170 * 17 (SM490Y)	202.3	202.3

Section property

		Total	In-plane
Section area	A (cm2)	2964.9	2962.1
Gravity center	ex (cm)	23.4	23.1
	ey (cm)	187.8	187.7
Moment of inertia	Ix (cm4)	33890622	33874629
	Iy (cm4)	89084133	88725679
Torsion Constant	J (cm4)	26105837	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	52866.0 kN・m	52866.0 kN・m
	Mxr(lower)=	37665.4 kN・m	27972.8 kN・m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-32	140	0	0	0	80	0.05
	[2]	-31	140	3	0	3	80	0.05
DECK-C	[3]	-31	140	3	0	3	80	0.05
	[4]	-31	140	3	4	6	80	0.05
	[5]	-29	140	4	4	6	80	0.05
	[6]	-29	140	4	0	4	80	0.04
DECK-R	[7]	-29	140	4	0	4	80	0.04
	[8]	-27	140	0	0	0	80	0.04
LWEB	[9]	-30	210	6	4	11	120	0.03
	[10]	0	210	7	4	11	120	0.01
	[11]	66	210	4	4	9	120	0.10
RWEB	[12]	-28	210	7	4	11	120	0.03
	[13]	0	210	7	4	12	120	0.01
	[14]	66	210	5	4	9	120	0.11

	LFLG	[15]	67	210	0	0	0	120	0.10
		[16]	67	210	6	6	12	120	0.11
		[17]	67	210	6	6	12	120	0.11
		[18]	67	210	0	0	0	120	0.10

Mx-Min	[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	6	140	0	0	0	80	0.00
		[2]	6	140	3	0	3	80	0.00
	DECK-C	[3]	6	140	3	0	3	80	0.00
		[4]	6	140	3	4	6	80	0.01
		[5]	5	140	4	4	6	80	0.01
		[6]	5	140	4	0	4	80	0.00
	DECK-R	[7]	5	140	4	0	4	80	0.00
		[8]	5	140	0	0	0	80	0.00
	LWEB	[9]	6	210	6	4	11	120	0.01
		[10]	0	210	7	4	11	120	0.01
		[11]	-13	210	4	4	9	120	0.01
	RWEB	[12]	5	210	7	4	11	120	0.01
		[13]	0	210	7	4	12	120	0.01
		[14]	-13	210	5	4	9	120	0.01
	LFLG	[15]	-13	187	0	0	0	120	0.00
		[16]	-13	156	6	6	12	120	0.01
		[17]	-13	156	6	6	12	120	0.01
		[18]	-13	187	0	0	0	120	0.00

Girder Name : G3　Section Name : Sec-15:Mx-Max　（Girder number=　3　Section number=　16）

```
Section force  Mx-Max       Mx =    11950 kN·m   Sy =     -500 kN   T =      889 kN·m
               Mx-Min       Mx =    -2330 kN·m   Sy =     -500 kN   T =      889 kN·m

Effective buckling length        Lx =  4793 mmLy =  4793 mm
Radius of curvature             R  =-1997.  m
Inclination                      DECK =  -2.0 %
```

Effective width(mm)			Full width	In-plane
	DECK	overhang	1650	1650
		Intermediate	2700	2700
		overhang	2456	2438
	LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1470 * 16 (SM400)	235.2	235.2
2-RIB PL	250 * 24 (SM400)	120.0	120.0
1-U.RIB	320 * 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	489.7
4-U.RIB	320 * 240 * 8 (SM400)	215.6	215.6
1-DECK-R PL	2276 * 16 (SM400)	364.2	361.4
1-U.RIB	320 * 240 * 8 (SM400)	53.9	53.9
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-LWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL	2940 * 10 (SM490Y)	294.0	294.0
7-RIB PL	170 * 17 (SM490Y)	202.3	202.3

Section property			Total	In-plane
	Section area	A (cm2)	2964.8	2962.0
	Gravity center	ex (cm)	23.4	23.1
		ey (cm)	187.8	187.7
	Moment of inertia	Ix (cm4)	33890277	33874265
		Iy (cm4)	89076406	88717607
	Torsion Constant	J (cm4)	26105838	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	52864.4 kN·m	52864.4 kN·m
	Mxr(lower)=	37665.4 kN·m	27972.8 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-32	140	0	0	0	80	0.05
	[2]	-31	140	3	0	3	80	0.05
DECK-C	[3]	-31	140	3	0	3	80	0.05
	[4]	-31	140	3	4	6	80	0.05
	[5]	-29	140	4	4	6	80	0.05
	[6]	-29	140	4	0	4	80	0.04
DECK-R	[7]	-29	140	4	0	4	80	0.04
	[8]	-27	140	0	0	0	80	0.04
LWEB	[9]	-30	210	7	4	11	120	0.03
	[10]	0	210	7	4	12	120	0.01
	[11]	66	210	5	4	9	120	0.10
RWEB	[12]	-28	210	7	4	11	120	0.03
	[13]	0	210	8	4	12	120	0.01
	[14]	66	210	5	4	9	120	0.11

	LFLG	[15]	67	210	0	0	0	120	0.10
		[16]	67	210	6	6	12	120	0.11
		[17]	67	210	7	6	13	120	0.11
		[18]	67	210	0	0	0	120	0.10

Mx-Min	[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	6	140	0	0	0	80	0.00
		[2]	6	140	3	0	3	80	0.00
	DECK-C	[3]	6	140	3	0	3	80	0.00
		[4]	6	140	3	4	6	80	0.01
		[5]	6	140	4	4	6	80	0.01
		[6]	6	140	4	0	4	80	0.00
	DECK-R	[7]	6	140	4	0	4	80	0.00
		[8]	5	140	0	0	0	80	0.00
	LWEB	[9]	6	210	7	4	11	120	0.01
		[10]	0	210	7	4	12	120	0.01
		[11]	-13	210	5	4	9	120	0.01
	RWEB	[12]	5	210	7	4	11	120	0.01
		[13]	0	210	8	4	12	120	0.01
		[14]	-13	210	5	4	9	120	0.01
	LFLG	[15]	-13	187	0	0	0	120	0.00
		[16]	-13	156	6	6	12	120	0.01
		[17]	-13	156	7	6	13	120	0.01
		[18]	-13	187	0	0	0	120	0.00

Girder Name : G3   Section Name : Sec-15:J-15   (Girder number= 3   Section number= 16)

Section force	Mx-Max	Mx = 9204 kN･m	Sy = -1062 kN	T = 716 kN･m
	Mx-Min	Mx = -6140 kN･m	Sy = -1062 kN	T = 716 kN･m

Effective buckling length   Lx = 4793 mmLy = 4793 mm
Radius of curvature   R =-1997. m
Inclination   DECK = -2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	1650	1650
		Intermediate	2700	2700
		overhang	2450	2433
	LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1470 * 16 (SM400)	235.2	235.2
2-RIB PL	250 * 24 (SM400)	120.0	120.0
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 *	8 (SM400)	215.6	215.6
1-DECK-R PL	2271 * 16 (SM400)	363.3	360.6
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-LWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL	2940 * 10 (SM490Y)	294.0	294.0
7-RIB PL	170 * 17 (SM490Y)	202.3	202.3

Section property			Total	In-plane
	Section area	A (cm2)	2963.9	2961.2
	Gravity center	ex (cm)	23.3	23.0
		ey (cm)	187.8	187.7
	Moment of inertia	Ix (cm4)	33885093	33869713
		Iy (cm4)	88959819	88616313
	Torsion Constant	J (cm4)	26105851	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	52845.3 kN･m	52845.3 kN･m
	Mxr(lower)=	37664.4 kN･m	27972.0 kN･m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-24	140	0	0	0	80	0.03
	[2]	-24	140	7	0	7	80	0.04
DECK-C	[3]	-24	140	7	0	7	80	0.04
	[4]	-24	140	7	3	9	80	0.04
	[5]	-22	140	9	3	9	80	0.04
	[6]	-22	140	8	0	8	80	0.04
DECK-R	[7]	-22	140	8	0	8	80	0.04
	[8]	-21	140	0	0	0	80	0.02
LWEB	[9]	-23	210	14	3	18	120	0.03
	[10]	0	210	16	3	19	120	0.03
	[11]	51	210	10	3	13	120	0.07
RWEB	[12]	-22	210	15	3	19	120	0.03
	[13]	0	210	16	3	20	120	0.03
	[14]	51	210	11	3	14	120	0.07

	LFLG	[15]	51	210	0	0	0	120	0.06
		[16]	51	210	13	5	18	120	0.08
		[17]	51	210	14	5	19	120	0.08
		[18]	51	210	0	0	0	120	0.06

Mx-Min	[Check	point]	σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	16	140	0	0	0	80	0.01
		[2]	16	140	7	0	7	80	0.02
	DECK-C	[3]	16	140	7	0	7	80	0.02
		[4]	16	140	7	3	9	80	0.02
		[5]	15	140	9	3	9	80	0.02
		[6]	15	140	8	0	8	80	0.02
	DECK-R	[7]	15	140	8	0	8	80	0.02
		[8]	14	140	0	0	0	80	0.01
	LWEB	[9]	15	210	14	3	18	120	0.03
		[10]	0	210	16	3	19	120	0.03
		[11]	-34	210	10	3	13	120	0.04
	RWEB	[12]	14	210	15	3	19	120	0.03
		[13]	0	210	16	3	20	120	0.03
		[14]	-34	210	11	3	14	120	0.04
	LFLG	[15]	-34	187	0	0	0	120	0.03
		[16]	-34	156	13	5	18	120	0.05
		[17]	-34	156	14	5	19	120	0.05
		[18]	-34	187	0	0	0	120	0.03

Girder Name : G3 Section Name : Sec-16:Left (Girder number= 3 Section number= 17)

Section force Mx-Max Mx = 9204 kN·m Sy = -1062 kN T = 716 kN·m
Mx-Min Mx = -6140 kN·m Sy = -1062 kN T = 716 kN·m

Effective buckling length Lx = 4793 mmLy = 4793 mm
Radius of curvature R =-1997. m
Inclination DECK = -2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1650	1650
	Intermediate	2700	2700
	overhang	2450	2433
LFLG	Intermediate	2700	2700

Section dimensions

Section area(cm2)	Total	in plane
1-DECK-L PL 1470 * 16 (SM400)	235.2	235.2
2-RIB PL 250 * 24 (SM400)	120.0	120.0
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL 3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 * 8 (SM400)	215.6	215.6
1-DECK-R PL 2271 * 16 (SM400)	363.3	360.6
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
3-RIB PL 250 * 24 (SM400)	180.0	180.0
1-LWEB PL 2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL 2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL 2940 * 10 (SM490Y)	294.0	294.0
7-RIB PL 170 * 17 (SM490Y)	202.3	202.3

Section property

		Total	In-plane
Section area	A (cm2)	2963.9	2961.2
Gravity center	ex (cm)	23.3	23.0
	ey (cm)	187.8	187.7
Moment of inertia	Ix (cm4)	33885093	33869713
	Iy (cm4)	88959819	88616313
Torsion Constant	J (cm4)	26105851	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	52845.3 kN·m	52845.3 kN·m
	Mxr(lower)=	37664.4 kN·m	27972.0 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-24	140	0	0	0	80	0.03
	[2]	-24	140	7	0	7	80	0.04
DECK-C	[3]	-24	140	7	0	7	80	0.04
	[4]	-24	140	7	3	9	80	0.04
	[5]	-22	140	9	3	9	80	0.04
	[6]	-22	140	8	0	8	80	0.04
DECK-R	[7]	-22	140	8	0	8	80	0.04
	[8]	-21	140	0	0	0	80	0.02
LWEB	[9]	-23	210	14	3	18	120	0.03
	[10]	0	210	16	3	19	120	0.03
	[11]	51	210	10	3	13	120	0.07
RWEB	[12]	-22	210	15	3	19	120	0.03
	[13]	0	210	16	3	20	120	0.03
	[14]	51	210	11	3	14	120	0.07

	LFLG	[15]	51	210	0	0	0	120	0.06
		[16]	51	210	13	5	18	120	0.08
		[17]	51	210	14	5	19	120	0.08
		[18]	51	210	0	0	0	120	0.06

Mx-Min	[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	16	140	0	0	0	80	0.01
		[2]	16	140	7	0	7	80	0.02
	DECK-C	[3]	16	140	7	0	7	80	0.02
		[4]	16	140	7	3	9	80	0.02
		[5]	15	140	9	3	9	80	0.02
		[6]	15	140	8	0	8	80	0.02
	DECK-R	[7]	15	140	8	0	8	80	0.02
		[8]	14	140	0	0	0	80	0.01
	LWEB	[9]	15	210	14	3	18	120	0.03
		[10]	0	210	16	3	19	120	0.03
		[11]	-34	210	10	3	13	120	0.04
	RWEB	[12]	14	210	15	3	19	120	0.03
		[13]	0	210	16	3	20	120	0.03
		[14]	-34	210	11	3	14	120	0.04
	LFLG	[15]	-34	187	0	0	0	120	0.03
		[16]	-34	156	13	5	18	120	0.05
		[17]	-34	156	14	5	19	120	0.05
		[18]	-34	187	0	0	0	120	0.03

Girder Name : G3　Section Name : Sec-16:J-16　(Girder number= 3　Section number= 17)

Section force	Mx-Max	Mx = 2627 kN·m	Sy = -1480 kN	T = -1199 kN·m
	Mx-Min	Mx = -12483 kN·m	Sy = -1480 kN	T = -1199 kN·m

Effective buckling length　Lx = 4793 mmLy = 4793 mm
Radius of curvature　R =-1997. m
Inclination　DECK = -2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	1650	1650
		Intermediate	2700	2700
		overhang	2331	2327
	LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1470 * 16 (SM400)	235.2	235.2
2-RIB PL	250 * 24 (SM400)	120.0	120.0
1-U.RIB 320	* 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320	* 240 * 8 (SM400)	215.6	215.6
1-DECK-R PL	2152 * 16 (SM400)	344.3	343.6
1-U.RIB 320	* 240 * 8 (SM400)	53.9	53.9
2-RIB PL	250 * 24 (SM400)	120.0	120.0
1-LWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL	2940 * 10 (SM490Y)	294.0	294.0
7-RIB PL	170 * 17 (SM490Y)	202.3	202.3

Section property			Total	In-plane
	Section area	A (cm2)	2884.9	2884.3
	Gravity center	ex (cm)	13.7	13.6
		ey (cm)	186.0	186.0
	Moment of inertia	Ix (cm4)	33533055	33529212
		Iy (cm4)	78928183	78847508
	Torsion Constant	J (cm4)	26107095	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	51316.4 kN·m	51316.4 kN·m
	Mxr(lower)=	37631.5 kN·m	27947.6 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	-7	140	0	0	0	80	0.00
		[2]	-7	140	9	0	9	80	0.02
	DECK-C	[3]	-7	140	9	0	9	80	0.02
		[4]	-7	140	10	5	13	80	0.03
		[5]	-6	140	11	5	12	80	0.02
		[6]	-6	140	11	0	11	80	0.02
	DECK-R	[7]	-6	140	11	0	11	80	0.02
		[8]	-6	140	0	0	0	80	0.00
	LWEB	[9]	-7	210	20	6	26	120	0.05
		[10]	0	210	22	6	28	120	0.05
		[11]	15	210	14	6	20	120	0.03
	RWEB	[12]	-6	210	21	6	27	120	0.05
		[13]	0	210	22	6	28	120	0.05
		[14]	15	210	15	6	20	120	0.03

	LFLG	[15]	15	210	0	0	0	120	0.00
		[16]	15	210	19	8	27	120	0.06
		[17]	15	210	19	8	27	120	0.06
		[18]	15	210	0	0	0	120	0.00

Mx-Min		[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	34	140	0	0	0	80	0.06
		[2]	33	140	9	0	9	80	0.07
	DECK-C	[3]	33	140	9	0	9	80	0.07
		[4]	33	140	10	5	13	80	0.08
		[5]	31	140	11	5	12	80	0.07
		[6]	31	140	11	0	11	80	0.07
	DECK-R	[7]	31	140	11	0	11	80	0.07
		[8]	29	140	0	0	0	80	0.04
	LWEB	[9]	32	210	20	6	26	120	0.07
		[10]	0	210	22	6	28	120	0.05
		[11]	-69	210	14	6	20	120	0.14
	RWEB	[12]	30	210	21	6	27	120	0.07
		[13]	0	210	22	6	28	120	0.05
		[14]	-69	210	15	6	20	120	0.14
	LFLG	[15]	-70	187	0	0	0	120	0.11
		[16]	-70	156	19	8	27	120	0.16
		[17]	-70	156	19	8	27	120	0.16
		[18]	-70	187	0	0	0	120	0.11

Girder Name：G3　Section Name：Sec-17:Left　（Girder number=　3　Section number=　18）

Section force　Mx-Max　　Mx =　2627 kN・m　Sy =　-1480 kN　T =　-1199 kN・m
　　　　　　　Mx-Min　　Mx =　-12483 kN・m　Sy =　-1480 kN　T =　-1199 kN・m

Effective buckling length　　Lx =　4793 mmLy =　4793 mm
Radius of curvature　　　　R　=-1997.　m
Inclination　　　　　　　　DECK =　-2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1650	1650
	Intermediate	2700	2700
	overhang	2331	2327
LFLG	Intermediate	2700	2700

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL　1470 ＊ 16 (SM400)	235.2	235.2
2-RIB　PL　250 ＊ 24 (SM400)	120.0	120.0
1-U.RIB 320 ＊ 240 ＊　8 (SM400)	53.9	53.9
1-DECK-C PL　3061 ＊ 16 (SM400)	489.7	489.7
4-U.RIB 320 ＊ 240 ＊　8 (SM400)	215.6	215.6
1-DECK-R PL　2152 ＊ 16 (SM400)	344.3	343.6
1-U.RIB 320 ＊ 240 ＊　8 (SM400)	53.9	53.9
2-RIB　PL　250 ＊ 24 (SM400)	120.0	120.0
1-LWEB　PL　2727 ＊ 14 (SM490Y)	381.8	381.8
1-RWEB　PL　2673 ＊ 14 (SM490Y)	374.2	374.2
1-LFLG　PL　2940 ＊ 10 (SM490Y)	294.0	294.0
7-RIB　PL　170 ＊ 17 (SM490Y)	202.3	202.3

Section property

		Total	In-plane
Section area	A　(cm2)	2884.9	2884.3
Gravity center	ex (cm)	13.7	13.6
	ey (cm)	186.0	186.0
Moment of inertia	Ix (cm4)	33533055	33529212
	Iy (cm4)	78928183	78847508
Torsion Constant	J　(cm4)	26107095	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	51316.4 kN・m	51316.4 kN・m
	Mxr(lower)=	37631.5 kN・m	27947.6 kN・m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[　1]	-7	140	0	0	0	80	0.00
	[　2]	-7	140	9	0	9	80	0.02
DECK-C	[　3]	-7	140	9	0	9	80	0.02
	[　4]	-7	140	10	5	13	80	0.03
	[　5]	-6	140	11	5	12	80	0.02
	[　6]	-6	140	11	0	11	80	0.02
DECK-R	[　7]	-6	140	11	0	11	80	0.02
	[　8]	-6	140	0	0	0	80	0.00
LWEB	[　9]	-7	210	20	6	26	120	0.05
	[10]	0	210	22	6	28	120	0.05
	[11]	15	210	14	6	20	120	0.03
RWEB	[12]	-6	210	21	6	27	120	0.05
	[13]	0	210	22	6	28	120	0.05
	[14]	15	210	15	6	20	120	0.03

	LFLG	[15]	15	210	0	0	0	120	0.00
		[16]	15	210	19	8	27	120	0.06
		[17]	15	210	19	8	27	120	0.06
		[18]	15	210	0	0	0	120	0.00

Mx-Min		[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	34	140	0	0	0	80	0.06
		[2]	33	140	9	0	9	80	0.07
	DECK-C	[3]	33	140	9	0	9	80	0.07
		[4]	33	140	10	5	13	80	0.08
		[5]	31	140	11	5	12	80	0.07
		[6]	31	140	11	0	11	80	0.07
	DECK-R	[7]	31	140	11	0	11	80	0.07
		[8]	29	140	0	0	0	80	0.04
	LWEB	[9]	32	210	20	6	26	120	0.07
		[10]	0	210	22	6	28	120	0.05
		[11]	-69	210	14	6	20	120	0.14
	RWEB	[12]	30	210	21	6	27	120	0.07
		[13]	0	210	22	6	28	120	0.05
		[14]	-69	210	15	6	20	120	0.14
	LFLG	[15]	-70	187	0	0	0	120	0.11
		[16]	-70	156	19	8	27	120	0.16
		[17]	-70	156	19	8	27	120	0.16
		[18]	-70	187	0	0	0	120	0.11

Girder Name：G3　Section Name：Sec-17:J-17　（Girder number=　3　Section number=　18）

Section force　Mx =　-22933 kN・m　Sy =　-1874 kN　T =　-1699 kN・m

Effective buckling length　Lx =　4793 mmLy =　4793 mm
Radius of curvature　R =-1997. m
Inclination　DECK =　-2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1650	1650
	Intermediate	2700	2700
	overhang	2028	2028
LFLG	Intermediate	2700	2700

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL 1470 * 16 (SM400)	235.2	235.2
2-RIB PL 250 * 24 (SM400)	120.0	120.0
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL 3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 * 8 (SM400)	215.6	215.6
1-DECK-R PL 1848 * 16 (SM400)	295.7	295.7
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
2-RIB PL 250 * 24 (SM400)	120.0	120.0
1-LWEB PL 2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL 2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL 2940 * 10 (SM490Y)	294.0	294.0
7-RIB PL 170 * 17 (SM490Y)	202.3	202.3

Section property

		Total	In-plane
Section area	A (cm2)	2836.4	2836.4
Gravity center	ex (cm)	7.9	7.9
	ey (cm)	184.7	184.7
Moment of inertia	Ix (cm4)	33235101	33235101
	Iy (cm4)	73232348	73232348
Torsion Constant	J (cm4)	26107814	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	50144.7 kN・m	50144.7 kN・m
	Mxr(lower)=	37564.6 kN・m	27897.9 kN・m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	64	140	0	0	0	80	0.21
	[2]	62	140	12	0	12	80	0.22
DECK-C	[3]	62	140	12	0	12	80	0.22
	[4]	62	140	13	7	16	80	0.24
	[5]	58	140	13	7	17	80	0.22
	[6]	58	140	13	0	13	80	0.20
DECK-R	[7]	58	140	13	0	13	80	0.20
	[8]	55	140	0	0	0	80	0.16
LWEB	[9]	61	210	25	8	34	120	0.16
	[10]	0	210	28	8	36	120	0.09
	[11]	-127	210	18	8	26	120	0.42
RWEB	[12]	57	210	26	8	34	120	0.16
	[13]	0	210	28	8	36	120	0.09
	[14]	-128	210	18	8	27	120	0.42

LFLG	[15]	-128	187	0	0	0	120	0.37
	[16]	-128	156	24	12	36	120	0.46
	[17]	-128	156	24	12	36	120	0.46
	[18]	-128	187	0	0	0	120	0.37

Girder Name：G3　Section Name：Sec-18:J-18　（Girder number=　3　Section number=　19）

Section force　Mx =　-36248 kN·m　Sy =　-2444 kN　T =　-1744 kN·m

Effective buckling length　Lx =　4793 mmLy =　4793 mm
Radius of curvature　R =-1997. m
Inclination　DECK =　-2.0 %

Effective width(mm)

			Full width	In-plane
	DECK	overhang	1650	1606
		Intermediate	2700	2650
		overhang	1725	1675
	LFLG	Intermediate	2700	2650

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1470 * 16 (SM490Y)	235.2	228.2
2-RIB PL	250 * 24 (SM490Y)	120.0	120.0
1-U.RIB 320 * 240 *	8 (SM490Y)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM490Y)	489.7	481.7
4-U.RIB 320 * 240 *	8 (SM490Y)	215.6	215.6
1-DECK-R PL	1545 * 16 (SM490Y)	247.2	239.3
1-U.RIB 320 * 240 *	8 (SM490Y)	53.9	53.9
1-RIB PL	250 * 24 (SM490Y)	60.0	60.0
1-LWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL	2940 * 14 (SM490Y)	411.6	404.6
7-RIB PL	170 * 17 (SM490Y)	202.3	173.4

Section property			Total	In-plane
	Section area	A (cm2)	2845.4	2786.5
	Gravity center	ex (cm)	-4.2	-4.5
		ey (cm)	174.2	175.6
	Moment of inertia	Ix (cm4)	36410607	35181995
		Iy (cm4)	63338976	61971351
	Torsion Constant	J (cm4)	28846836	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	72588.5 kN·m	72588.5 kN·m
	Mxr(lower)=	41714.2 kN·m	39791.3 kN·m

Stress (N/mm²)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	105	210	0	0	0	120	0.25
	[2]	102	210	16	0	16	120	0.25
DECK-C	[3]	102	210	16	0	16	120	0.25
	[4]	102	210	18	7	18	120	0.26
	[5]	96	210	14	7	21	120	0.24
	[6]	96	210	13	0	13	120	0.22
DECK-R	[7]	96	210	13	0	13	120	0.22
	[8]	93	210	0	0	0	120	0.20
LWEB	[9]	100	210	33	8	41	120	0.34
	[10]	-1	210	36	8	44	120	0.14
	[11]	-181	210	26	8	34	120	0.82
RWEB	[12]	95	210	32	8	41	120	0.32
	[13]	-1	210	35	8	44	120	0.13
	[14]	-181	210	25	8	33	120	0.82

LFLG	[15]	-182	210	0	0	0	120	0.75
	[16]	-182	200	24	8	33	120	0.83
	[17]	-182	200	24	8	32	120	0.83
	[18]	-182	210	0	0	0	120	0.76

Girder Name：G3　Section Name：Sec-19:J-19　（Girder number=　3　Section number=　20）

Section force　Mx =　-50713 kN・m　Sy =　-2789 kN　T =　-2234 kN・m

Effective buckling length　Lx =　4718 mmLy =　4718 mm
Radius of curvature　R　=-1997. m
Inclination　DECK =　-2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	1650	1548
		Intermediate	2700	2584
		overhang	1477	1402
	LFLG	Intermediate	2700	2584

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1470 * 16 (SM490Y)	235.2	219.0
2-RIB　PL	250 * 24 (SM490Y)	120.0	120.0
1-U.RIB 320 * 240 *	8 (SM490Y)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM490Y)	489.7	471.2
4-U.RIB 320 * 240 *	8 (SM490Y)	215.6	215.6
1-DECK-R PL	1298 * 16 (SM490Y)	207.6	195.6
1-U.RIB 320 * 240 *	8 (SM490Y)	53.9	53.9
1-RIB　PL	250 * 24 (SM490Y)	60.0	60.0
1-LWEB　PL	2727 * 14 (SM490Y)	381.8	381.8
1-RWEB　PL	2673 * 14 (SM490Y)	374.2	374.2
1-LFLG　PL	2940 * 21 (SM490Y)	617.4	593.1
7-RIB　PL	200 * 22 (SM490Y)	308.0	264.0

Section property			Total	In-plane
	Section area	A　(cm2)	3117.4	3002.2
	Gravity center	ex (cm)	-7.6	-7.4
		ey (cm)	156.0	157.6
	Moment of inertia	Ix (cm4)	44176582	42005229
		Iy (cm4)	61720739	59384970
	Torsion Constant	J　(cm4)	31643601	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	73730.1 kN・m	73730.1 kN・m
	Mxr(lower)=	55197.2 kN・m	55197.2 kN・m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[　1]	144	210	1	0	1	120	0.47
	[　2]	141	210	18	0	18	120	0.48
DECK-C	[　3]	141	210	18	0	18	120	0.48
	[　4]	141	210	20	9	21	120	0.48
	[　5]	134	210	16	10	26	120	0.46
	[　6]	134	210	13	0	13	120	0.42
DECK-R	[　7]	134	210	13	0	13	120	0.42
	[　8]	131	210	1	0	1	120	0.39
LWEB	[　9]	139	210	36	11	47	120	0.59
	[10]	-2	210	40	11	51	120	0.18
	[11]	-190	210	33	11	43	120	0.95
RWEB	[12]	133	210	35	11	46	120	0.55
	[13]	-2	210	39	11	50	120	0.17
	[14]	-190	210	31	11	42	120	0.95

LFLG	[15]	-193	210	0	0	0	120	0.84
	[16]	-193	210	21	7	28	120	0.90
	[17]	-193	210	20	7	27	120	0.89
	[18]	-193	210	0	0	0	120	0.84

Girder Name：G3　Section Name：Sec-20:Mx-Min_L　（Girder number=　3　Section number=　21）

Section force　Mx =　-58582 kN･m　Sy =　-3016 kN　T =　-2234 kN･m

Effective buckling length　Lx =　4718 mmLy =　4718 mm
Radius of curvature　R　=-1997. m
Inclination　DECK =　-2.0 %

Effective width(mm)

			Full width	In-plane
	DECK	overhang	1650	1522
		Intermediate	2700	2554
		overhang	1362	1287
	LFLG	Intermediate	2700	2554

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1470 * 16 (SM490Y)	235.2	214.7
2-RIB　PL	250 * 24 (SM490Y)	120.0	120.0
1-U.RIB 320	* 240 *　8 (SM490Y)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM490Y)	489.7	466.3
4-U.RIB 320	* 240 *　8 (SM490Y)	215.6	215.6
1-DECK-R PL	1182 * 16 (SM490Y)	189.1	177.1
1-U.RIB 320	* 240 *　8 (SM490Y)	53.9	53.9
1-RIB　PL	250 * 24 (SM490Y)	60.0	60.0
1-LWEB　PL	2727 * 14 (SM490Y)	381.8	381.8
1-RWEB　PL	2673 * 14 (SM490Y)	374.2	374.2
1-LFLG　PL	2940 * 28 (SM490Y)	823.2	782.2
7-RIB　PL	200 * 22 (SM490Y)	308.0	264.0

Section property			Total	In-plane
Section area	A	(cm2)	3304.7	3163.7
Gravity center	ex	(cm)	-8.7	-8.2
	ey	(cm)	145.5	147.0
Moment of inertia	Ix	(cm4)	48758075	46161953
	Iy	(cm4)	61709944	59115113
Torsion Constant	J	(cm4)	33291927	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	74504.7 kN･m	74504.7 kN･m
	Mxr(lower)=	64641.9 kN･m	64641.9 kN･m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[　1]	165	210	1	0	1	120	0.62
	[　2]	162	210	20	0	20	120	0.62
DECK-C	[　3]	162	210	20	0	20	120	0.62
	[　4]	161	210	21	9	22	120	0.62
	[　5]	155	210	18	9	27	120	0.59
	[　6]	154	210	14	0	14	120	0.55
DECK-R	[　7]	154	210	14	0	14	120	0.55
	[　8]	152	210	1	0	1	120	0.52
LWEB	[　9]	159	210	38	11	49	120	0.74
	[10]	-2	210	43	11	54	120	0.20
	[11]	-186	210	37	11	48	120	0.95
RWEB	[12]	153	210	37	11	48	120	0.69
	[13]	-2	210	42	11	53	120	0.19
	[14]	-187	210	35	11	46	120	0.94

LFLG	[15]	-190	210	0	0	0	120	0.82
	[16]	-190	210	17	5	23	120	0.85
	[17]	-190	210	16	5	22	120	0.85
	[18]	-190	210	0	0	0	120	0.82

Girder Name：G3　 Section Name：Sec-20：Mx-Min_R　 （Girder number=　 3　 Section number=　21）

Section force　Mx =　-58580 kN·m　 Sy =　　3853 kN　 T =　 -2519 kN·m

Effective buckling length　　　 Lx =　4443 mmLy =　4443 mm
Radius of curvature　　　　　　R　=-1997. m
Inclination　　　　　　　　　　 DECK =　-2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	1650	1522
		Intermediate	2700	2554
		overhang	1362	1287
	LFLG	Intermediate	2700	2554

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1470 * 16 (SM490Y)	235.2	214.7
2-RIB PL	250 * 24 (SM490Y)	120.0	120.0
1-U.RIB 320	* 240 * 8 (SM490Y)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM490Y)	489.7	466.3
4-U.RIB 320	* 240 * 8 (SM490Y)	215.6	215.6
1-DECK-R PL	1182 * 16 (SM490Y)	189.1	177.1
1-U.RIB 320	* 240 * 8 (SM490Y)	53.9	53.9
1-RIB PL	250 * 24 (SM490Y)	60.0	60.0
1-LWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL	2940 * 28 (SM490Y)	823.2	782.2
7-RIB PL	200 * 22 (SM490Y)	308.0	264.0

Section property			Total	In-plane
	Section area	A (cm2)	3304.7	3163.7
	Gravity center	ex (cm)	-8.7	-8.2
		ey (cm)	145.5	147.0
	Moment of inertia	Ix (cm4)	48758075	46161953
		Iy (cm4)	61709944	59115113
	Torsion Constant	J (cm4)	33291927	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	74504.7 kN·m	74504.7 kN·m
	Mxr(lower)=	64641.9 kN·m	64641.9 kN·m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	165	210	1	0	1	120	0.62
	[2]	162	210	25	0	25	120	0.64
DECK-C	[3]	162	210	25	0	25	120	0.64
	[4]	161	210	27	11	27	120	0.64
	[5]	155	210	22	11	33	120	0.62
	[6]	154	210	17	0	17	120	0.56
DECK-R	[7]	154	210	17	0	17	120	0.56
	[8]	152	210	1	0	1	120	0.52
LWEB	[9]	159	210	49	12	61	120	0.83
	[10]	-2	210	55	12	67	120	0.32
	[11]	-186	210	47	12	59	120	1.03
RWEB	[12]	153	210	47	12	60	120	0.78
	[13]	-2	210	53	12	66	120	0.30
	[14]	-187	210	45	12	57	120	1.02

LFLG	[15]	-190	210	0	0	0	120	0.82
	[16]	-190	210	22	6	28	120	0.87
	[17]	-190	210	21	6	27	120	0.87
	[18]	-190	210	0	0	0	120	0.82

Girder Name：G3　Section Name：Sec-21:J-20　（Girder number=　3　Section number=　22）

Section force　Mx =　-48149 kN･m　Sy =　3643 kN　T =　-2519 kN･m

Effective buckling length　Lx =　4443 mmLy =　4443 mm
Radius of curvature　R　=-1997. m
Inclination　DECK =　-2.0 %

Effective width(mm)

			Full width	In-plane
	DECK	overhang	1650	1540
		Intermediate	2700	2575
		overhang	1254	1204
	LFLG	Intermediate	2700	2575

Section dimensions　Section area(cm2)　Total　in plane

	Total	in plane
1-DECK-L PL 1470 * 16 (SM490Y)	235.2	217.7
2-RIB PL 250 * 24 (SM490Y)	120.0	120.0
1-U.RIB 320 * 240 * 8 (SM490Y)	53.9	53.9
1-DECK-C PL 3061 * 16 (SM490Y)	489.7	469.7
4-U.RIB 320 * 240 * 8 (SM490Y)	215.6	215.6
1-DECK-R PL 1074 * 16 (SM490Y)	171.8	163.9
1-U.RIB 320 * 240 * 8 (SM490Y)	53.9	53.9
1-RIB PL 250 * 24 (SM490Y)	60.0	60.0
1-LWEB PL 2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL 2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL 2940 * 20 (SM490Y)	588.0	563.0
7-RIB PL 200 * 22 (SM490Y)	308.0	264.0

Section property

		Total	In-plane
Section area	A (cm2)	3052.2	2937.6
Gravity center	ex (cm)	-11.3	-10.7
	ey (cm)	156.2	158.0
Moment of inertia	Ix (cm4)	43017722	40834222
	Iy (cm4)	58197883	56198502
Torsion Constant	J (cm4)	31337585	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	71901.7 kN･m	71901.7 kN･m
	Mxr(lower)=	53568.9 kN･m	53568.9 kN･m

Stress (N/mm²)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	141	210	1	0	1	120	0.45
	[2]	138	210	24	0	25	120	0.47
DECK-C	[3]	138	210	24	0	25	120	0.47
	[4]	137	210	26	11	26	120	0.47
	[5]	131	210	22	11	33	120	0.46
	[6]	131	210	16	0	16	120	0.40
DECK-R	[7]	131	210	16	0	16	120	0.40
	[8]	128	210	0	0	1	120	0.37
LWEB	[9]	135	210	47	12	59	120	0.66
	[10]	-2	210	53	12	65	120	0.30
	[11]	-186	210	43	12	55	120	0.99
RWEB	[12]	129	210	46	12	58	120	0.61
	[13]	-2	210	51	12	63	120	0.28
	[14]	-186	210	41	12	53	120	0.98

LFLG	[15]	-188	210	0	0	0	120	0.81
	[16]	-188	210	28	9	37	120	0.90
	[17]	-189	210	27	9	35	120	0.89
	[18]	-189	210	0	0	0	120	0.81

Girder Name：G3　Section Name：Sec-22:J-21　（Girder number=　3　Section number=　23）

Section force　Mx =　-27554 kN·m　Sy =　3359 kN　T =　-2412 kN·m

Effective buckling length　Lx =　4693 mmLy =　4693 mm
Radius of curvature　R =-1997. m
Inclination　DECK =　-2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	1650	1581
		Intermediate	2700	2621
		overhang	1019	1004
	LFLG	Intermediate	2700	2621

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1470 * 16 (SM400)	235.2	224.2
2-RIB PL	250 * 24 (SM400)	120.0	120.0
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	477.1
4-U.RIB 320 * 240 *	8 (SM400)	215.6	215.6
1-DECK-R PL	839 * 16 (SM400)	134.3	131.9
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-RIB PL	250 * 24 (SM400)	60.0	60.0
1-LWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL	2940 * 12 (SM490Y)	352.8	343.3
7-RIB PL	170 * 17 (SM490Y)	202.3	173.4

Section property			Total	In-plane
	Section area	A (cm2)	2673.7	2609.3
	Gravity center	ex (cm)	-16.4	-15.8
		ey (cm)	174.2	175.7
	Moment of inertia	Ix (cm4)	33665490	32321925
		Iy (cm4)	53295517	52259173
	Torsion Constant	J (cm4)	27638565	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	44535.5 kN·m	44535.5 kN·m
	Mxr(lower)=	38335.4 kN·m	33194.1 kN·m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	87	140	1	0	1	80	0.38
	[2]	84	140	24	0	24	80	0.46
DECK-C	[3]	84	140	24	0	24	80	0.46
	[4]	84	140	26	10	26	80	0.47
	[5]	79	140	23	10	33	80	0.50
	[6]	79	140	13	0	13	80	0.35
DECK-R	[7]	79	140	13	0	13	80	0.35
	[8]	78	140	0	0	0	80	0.31
LWEB	[9]	83	210	45	12	57	120	0.38
	[10]	-1	210	50	12	62	120	0.27
	[11]	-150	210	35	12	47	120	0.66
RWEB	[12]	78	210	44	12	55	120	0.35
	[13]	-1	210	48	12	60	120	0.25
	[14]	-150	210	33	12	44	120	0.65

LFLG	[15]	-151	210	0	0	0	120	0.52
	[16]	-151	182	39	14	53	120	0.71
	[17]	-151	182	36	14	50	120	0.69
	[18]	-151	210	0	0	0	120	0.52

Girder Name：G3　Section Name：Sec-23:J-22　（Girder number=　3　Section number=　24）

Section force　Mx =　-9107 kN·m　Sy =　2951 kN　T =　-2438 kN·m

Effective buckling length　Lx =　4693 mmLy =　4693 mm
Radius of curvature　R　=-1997. m
Inclination　DECK =　-2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1650	1625
	Intermediate	2700	2671
	overhang	842	840
LFLG	Intermediate	2700	2671

Section dimensions

Section area(cm2)	Total	in plane
1-DECK-L PL 1470 * 16 (SM400)	235.2	231.2
2-RIB PL 250 * 24 (SM400)	120.0	120.0
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL 3061 * 16 (SM400)	489.7	485.1
4-U.RIB 320 * 240 * 8 (SM400)	215.6	215.6
1-DECK-R PL 662 * 16 (SM400)	106.0	105.6
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-LWEB PL 2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL 2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL 2940 * 10 (SM490Y)	294.0	291.1
7-RIB PL 170 * 17 (SM490Y)	202.3	173.4

Section property

		Total	In-plane
Section area	A (cm2)	2526.6	2485.9
Gravity center	ex (cm)	-25.4	-25.4
	ey (cm)	175.4	177.2
Moment of inertia	Ix (cm4)	31240350	30252127
	Iy (cm4)	47360699	47016144
Torsion Constant	J (cm4)	26111999	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	42262.3 kN·m	42262.3 kN·m
	Mxr(lower)=	35620.2 kN·m	26453.9 kN·m

Stress (N/mm²)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	30	140	0	0	0	80	0.05
	[2]	29	140	23	0	23	80	0.13
DECK-C	[3]	29	140	23	0	23	80	0.13
	[4]	29	140	24	10	24	80	0.14
	[5]	28	140	23	10	34	80	0.22
	[6]	28	140	8	0	8	80	0.05
DECK-R	[7]	28	140	8	0	8	80	0.05
	[8]	27	140	0	0	0	80	0.04
LWEB	[9]	29	210	41	12	52	120	0.21
	[10]	-1	210	45	12	57	120	0.22
	[11]	-53	210	30	12	42	120	0.19
RWEB	[12]	27	210	38	12	50	120	0.19
	[13]	-1	210	42	12	54	120	0.20
	[14]	-53	210	27	12	39	120	0.17
LFLG	[15]	-54	187	0	0	0	120	0.07
	[16]	-54	156	41	17	57	120	0.29
	[17]	-54	156	36	17	53	120	0.26
	[18]	-54	187	0	0	0	120	0.07

Girder Name：G3　Section Name：Sec-23:Right　（Girder number=　3　Section number=　24）

Section force　Mx =　14944 kN·m　Sy =　2548 kN　T =　-2142 kN·m

Effective buckling length　Lx =　4693 mmLy =　4693 mm
Radius of curvature　R =-1997. m
Inclination　DECK =　-2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1650	1650
	Intermediate	2700	2700
	overhang	825	825
LFLG	Intermediate	2700	2700

Section dimensions

Section area(cm2)	Total	in plane
1-DECK-L PL 1470 * 16 (SM400)	235.2	235.2
2-RIB PL 250 * 24 (SM400)	120.0	120.0
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL 3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 * 8 (SM400)	215.6	215.6
1-DECK-R PL 645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-LWEB PL 2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL 2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL 2940 * 10 (SM490Y)	294.0	294.0
7-RIB PL 170 * 17 (SM490Y)	202.3	202.3

Section property

		Total	In-plane
Section area	A (cm2)	2523.9	2523.9
Gravity center	ex (cm)	-25.7	-25.7
	ey (cm)	175.3	175.3
Moment of inertia	Ix (cm4)	31217651	31217651
	Iy (cm4)	47197676	47197676
Torsion Constant	J (cm4)	26112031	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	42784.5 kN·m	42784.5 kN·m
	Mxr(lower)=	37151.0 kN·m	27590.8 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-49	140	0	0	0	80	0.12
	[2]	-48	140	20	0	20	80	0.18
DECK-C	[3]	-48	140	20	0	20	80	0.18
	[4]	-47	140	21	9	21	80	0.18
	[5]	-45	140	20	9	29	80	0.24
	[6]	-45	140	7	0	7	80	0.11
DECK-R	[7]	-45	140	7	0	7	80	0.11
	[8]	-44	140	0	0	0	80	0.10
LWEB	[9]	-47	210	35	10	45	120	0.19
	[10]	0	210	39	10	49	120	0.17
	[11]	84	210	26	10	37	120	0.25
RWEB	[12]	-44	210	33	10	43	120	0.17
	[13]	0	210	36	10	46	120	0.15
	[14]	84	210	23	10	34	120	0.24
LFLG	[15]	84	210	0	0	0	120	0.16
	[16]	84	210	35	15	50	120	0.33
	[17]	84	210	31	15	46	120	0.31
	[18]	84	210	0	0	0	120	0.16

Girder Name：G3　Section Name：Sec-23:J-23　（Girder number=　3　Section number=　25）

Section force　Mx =　18895 kN･m　Sy =　2461 kN　T =　-2115 kN･m

Effective buckling length　Lx =　4693 mmLy =　4693 mm
Radius of curvature　R =-1997. m
Inclination　DECK =　-2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1650	1650
	Intermediate	2700	2700
	overhang	825	825
LFLG	Intermediate	2700	2700

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL 1470 * 16 (SM400)	235.2	235.2
2-RIB PL 250 * 24 (SM400)	120.0	120.0
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL 3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 * 8 (SM400)	215.6	215.6
1-DECK-R PL 645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-LWEB PL 2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL 2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL 2940 * 10 (SM490Y)	294.0	294.0
3-RIB PL 170 * 17 (SM490Y)	86.7	86.7

Section property

		Total	In-plane
Section area	A (cm2)	2408.3	2408.3
Gravity center	ex (cm)	-26.9	-26.9
	ey (cm)	183.3	183.3
Moment of inertia	Ix (cm4)	27843603	27843603
	Iy (cm4)	46459490	46459490
Torsion Constant	J (cm4)	26112193	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	41401.2 kN･m	41401.2 kN･m
	Mxr(lower)=	31695.8 kN･m	6957.1 kN･m

Stress (N/mm²)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-64	140	0	0	0	80	0.21
	[2]	-62	140	19	0	20	80	0.26
DECK-C	[3]	-62	140	19	0	20	80	0.26
	[4]	-62	140	21	9	21	80	0.26
	[5]	-58	140	20	9	29	80	0.30
	[6]	-58	140	7	0	7	80	0.18
DECK-R	[7]	-58	140	7	0	7	80	0.18
	[8]	-57	140	0	0	0	80	0.17
LWEB	[9]	-61	210	35	10	45	120	0.22
	[10]	0	210	38	10	48	120	0.16
	[11]	124	210	23	10	34	120	0.43
RWEB	[12]	-57	210	32	10	42	120	0.20
	[13]	0	210	35	10	46	120	0.14
	[14]	125	210	20	10	31	120	0.42
LFLG	[15]	125	210	0	0	0	120	0.35
	[16]	125	210	31	14	45	120	0.50
	[17]	125	210	27	14	41	120	0.47
	[18]	125	210	0	0	0	120	0.36

Girder Name : G3　Section Name : Sec-24:J-24　(Girder number=　3　Section number=　26)

Section force　Mx =　35844 kN·m　Sy =　2105 kN　T =　-1566 kN·m

Effective buckling length　Lx =　4693 mmLy =　4693 mm
Radius of curvature　R =-1997. m
Inclination　DECK =　-2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	1650	1650
		Intermediate	2700	2700
		overhang	825	825
	LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1470 * 16 (SM400)	235.2	235.2
2-RIB PL	250 * 24 (SM400)	120.0	120.0
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 *	8 (SM400)	215.6	215.6
1-DECK-R PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-LWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL	2940 * 16 (SM490Y)	470.4	470.4
3-RIB PL	170 * 17 (SM490Y)	86.7	86.7

Section property			Total	In-plane
Section area	A	(cm2)	2584.7	2584.7
Gravity center	ex	(cm)	-25.1	-25.1
	ey	(cm)	170.7	170.7
Moment of inertia	Ix	(cm4)	33445970	33445970
	Iy	(cm4)	47849029	47849029
Torsion Constant	J	(cm4)	29833288	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	43868.7 kN·m	43868.7 kN·m
	Mxr(lower)=	40725.4 kN·m	22718.3 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-114	140	0	0	0	80	0.67
	[2]	-111	140	16	0	16	80	0.67
DECK-C	[3]	-111	140	16	0	16	80	0.67
	[4]	-111	140	17	7	17	80	0.67
	[5]	-105	140	16	7	23	80	0.65
	[6]	-105	140	6	0	6	80	0.57
DECK-R	[7]	-105	140	6	0	6	80	0.57
	[8]	-104	140	0	0	0	80	0.55
LWEB	[9]	-109	210	28	8	36	120	0.36
	[10]	0	210	32	8	39	120	0.11
	[11]	183	210	23	8	30	120	0.82
RWEB	[12]	-104	210	26	8	34	120	0.32
	[13]	0	210	29	8	37	120	0.09
	[14]	183	210	20	8	28	120	0.81
LFLG	[15]	185	210	0	0	0	120	0.77
	[16]	185	210	18	7	25	120	0.82
	[17]	185	210	16	7	23	120	0.81
	[18]	185	210	0	0	0	120	0.77

Girder Name：G3　Section Name：Sec-25:J-25　（Girder number=　3　Section number=　27）

Section force　Mx =　48818 kN·m　Sy =　1571 kN　T =　-1275 kN·m

Effective buckling length　Lx =　4693 mmLy =　4693 mm
Radius of curvature　R =-1997. m
Inclination　DECK =　-2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1650	1650
	Intermediate	2700	2700
	overhang	825	825
LFLG	Intermediate	2700	2700

Section dimensions

Section area(cm2)	Total	in plane
1-DECK-L PL 1470 * 16 (SM490Y)	235.2	235.2
2-RIB PL 250 * 24 (SM490Y)	120.0	120.0
1-U.RIB 320 * 240 * 8 (SM490Y)	53.9	53.9
1-DECK-C PL 3061 * 16 (SM490Y)	489.7	489.7
4-U.RIB 320 * 240 * 8 (SM490Y)	215.6	215.6
1-DECK-R PL 645 * 16 (SM490Y)	103.2	103.2
1-U.RIB 320 * 240 * 8 (SM490Y)	53.9	53.9
1-LWEB PL 2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL 2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL 2940 * 25 (SM490Y)	735.0	735.0
3-RIB PL 200 * 22 (SM490Y)	132.0	132.0

Section property

		Total	In-plane
Section area	A (cm2)	2894.6	2894.6
Gravity center	ex (cm)	-22.4	-22.4
	ey (cm)	152.4	152.4
Moment of inertia	Ix (cm4)	41508990	41508990
	Iy (cm4)	50066339	50066339
Torsion Constant	J (cm4)	32676533	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	69748.5 kN·m	69748.5 kN·m
	Mxr(lower)=	56208.4 kN·m	50055.6 kN·m

Stress (N/mm²)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-147	210	0	0	0	120	0.49
	[2]	-144	210	11	0	11	120	0.48
DECK-C	[3]	-144	210	11	0	11	120	0.48
	[4]	-143	210	12	5	12	120	0.48
	[5]	-137	210	12	5	17	120	0.45
	[6]	-137	210	4	0	4	120	0.42
DECK-R	[7]	-137	210	4	0	4	120	0.42
	[8]	-135	210	0	0	0	120	0.41
LWEB	[9]	-141	210	20	6	27	120	0.50
	[10]	0	210	23	6	29	120	0.06
	[11]	179	210	19	6	25	120	0.77
RWEB	[12]	-135	210	19	6	25	120	0.46
	[13]	0	210	21	6	27	120	0.05
	[14]	179	210	17	6	23	120	0.77
LFLG	[15]	182	210	0	0	0	120	0.75
	[16]	182	210	10	3	13	120	0.76
	[17]	182	210	9	3	12	120	0.76
	[18]	182	210	0	0	0	120	0.75

Girder Name：G3　Section Name：Sec-26:J-26　(Girder number=　3　Section number=　28)

Section force　Mx = 57859 kN･m　Sy = 1148 kN　T = 1157 kN･m

Effective buckling length　Lx = 4676 mmLy = 4676 mm
Radius of curvature　R =-297.8 m
Inclination　DECK = -2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1677	1677
	Intermediate	2700	2700
	overhang	825	825
LFLG	Intermediate	2700	2700

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL 1497 * 16 (SM490Y)	239.6	239.6
2-RIB PL 250 * 24 (SM490Y)	120.0	120.0
1-U.RIB 320 * 240 * 8 (SM490Y)	53.9	53.9
1-DECK-C PL 3061 * 16 (SM490Y)	489.7	489.7
4-U.RIB 320 * 240 * 8 (SM490Y)	215.6	215.6
1-DECK-R PL 645 * 16 (SM490Y)	103.2	103.2
1-U.RIB 320 * 240 * 8 (SM490Y)	53.9	53.9
1-LWEB PL 2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL 2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL 2940 * 32 (SM490Y)	940.8	940.8
3-RIB PL 200 * 22 (SM490Y)	132.0	132.0

Section property

		Total	In-plane
Section area	A (cm2)	3104.7	3104.7
Gravity center	ex (cm)	-20.8	-20.8
	ey (cm)	142.3	142.3
Moment of inertia	Ix (cm4)	46219034	46219034
	Iy (cm4)	51956855	51956855
Torsion Constant	J (cm4)	33991589	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	72338.6 kN･m	72338.6 kN･m
	Mxr(lower)=	66354.5 kN･m	66354.5 kN･m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-168	210	0	0	0	120	0.64
	[2]	-165	210	8	0	8	120	0.62
DECK-C	[3]	-165	210	8	0	8	120	0.62
	[4]	-165	210	9	5	9	120	0.62
	[5]	-159	210	8	5	13	120	0.59
	[6]	-159	210	3	0	3	120	0.57
DECK-R	[7]	-159	210	3	0	3	120	0.57
	[8]	-158	210	0	0	0	120	0.56
LWEB	[9]	-163	210	15	6	20	120	0.63
	[10]	0	210	17	6	22	120	0.03
	[11]	177	210	14	6	20	120	0.74
RWEB	[12]	-157	210	13	6	19	120	0.59
	[13]	0	210	15	6	21	120	0.03
	[14]	179	210	13	6	18	120	0.75
LFLG	[15]	181	210	0	0	0	120	0.75
	[16]	181	210	6	2	8	120	0.75
	[17]	183	210	5	2	8	120	0.76
	[18]	183	210	0	0	0	120	0.76

Girder Name：G3　Section Name：Sec-27:J-27　（Girder number=　3　Section number=　29）

Section force　Mx =　62603 kN·m　Sy =　661 kN　T =　1849 kN·m

Effective buckling length　Lx =　4698 mmLy =　4698 mm
Radius of curvature　R　=　0.0 m
Inclination　DECK =　-2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	1838	1838
		Intermediate	2700	2700
		overhang	825	825
	LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1658 * 16 (SM490Y)	265.3	265.3
3-RIB PL	250 * 24 (SM490Y)	180.0	180.0
1-U.RIB 320 * 240 *	8 (SM490Y)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM490Y)	489.7	489.7
4-U.RIB 320 * 240 *	8 (SM490Y)	215.6	215.6
1-DECK-R PL	645 * 16 (SM490Y)	103.2	103.2
1-U.RIB 320 * 240 *	8 (SM490Y)	53.9	53.9
1-LWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL	2940 * 36 (SM490Y)	1058.4	1058.4
3-RIB PL	200 * 22 (SM490Y)	132.0	132.0

Section property			Total	In-plane
	Section area	A (cm2)	3308.0	3308.0
	Gravity center	ex (cm)	-27.7	-27.7
		ey (cm)	140.4	140.4
	Moment of inertia	Ix (cm4)	50059246	50059246
		Iy (cm4)	59207388	59207388
	Torsion Constant	J (cm4)	34525019	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	76383.7 kN·m	76383.7 kN·m
	Mxr(lower)=	73000.0 kN·m	73000.0 kN·m

Stress (N/mm²)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-172	210	0	0	0	120	0.67
	[2]	-168	210	5	0	5	120	0.64
DECK-C	[3]	-168	210	5	0	5	120	0.64
	[4]	-167	210	6	8	10	120	0.64
	[5]	-161	210	5	8	13	120	0.60
	[6]	-160	210	2	0	2	120	0.58
DECK-R	[7]	-160	210	2	0	2	120	0.58
	[8]	-159	210	0	0	0	120	0.57
LWEB	[9]	-165	210	9	9	18	120	0.64
	[10]	0	210	10	9	19	120	0.02
	[11]	176	210	8	9	17	120	0.72
RWEB	[12]	-159	210	8	9	17	120	0.59
	[13]	0	210	9	9	18	120	0.02
	[14]	176	210	7	9	16	120	0.72
LFLG	[15]	180	210	0	0	0	120	0.74
	[16]	180	210	3	3	7	120	0.74
	[17]	180	210	3	3	6	120	0.74
	[18]	180	210	0	0	0	120	0.74

Girder Name：G3　Section Name：Sec-28:Mx-Max　（Girder number=　3　Section number=　30）

Section force　Mx =　63231 kN·m　Sy =　352 kN　T =　1849 kN·m

Effective buckling length　Lx =　4697 mmLy =　4697 mm
Radius of curvature　R　=　0.0 m
Inclination　DECK =　-2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1969	1969
	Intermediate	2700	2700
	overhang	825	825
LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1789 * 16 (SM490Y)	286.3	286.3
3-RIB PL	250 * 24 (SM490Y)	180.0	180.0
1-U.RIB 320	* 240 * 8 (SM490Y)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM490Y)	489.7	489.7
4-U.RIB 320	* 240 * 8 (SM490Y)	215.6	215.6
1-DECK-R PL	645 * 16 (SM490Y)	103.2	103.2
1-U.RIB 320	* 240 * 8 (SM490Y)	53.9	53.9
1-LWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL	2940 * 36 (SM490Y)	1058.4	1058.4
3-RIB PL	200 * 22 (SM490Y)	132.0	132.0

Section property			Total	In-plane
Section area	A	(cm2)	3329.0	3329.0
Gravity center	ex	(cm)	-29.9	-29.9
	ey	(cm)	141.3	141.3
Moment of inertia	Ix	(cm4)	50455436	50455436
	Iy	(cm4)	61623636	61623636
Torsion Constant	J	(cm4)	34525042	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	77333.3 kN·m	77333.3 kN·m
	Mxr(lower)=	73135.9 kN·m	73135.9 kN·m

Stress (N/mm²)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-172	210	0	0	0	120	0.67
	[2]	-167	210	3	0	3	120	0.63
DECK-C	[3]	-167	210	3	0	3	120	0.63
	[4]	-167	210	3	8	9	120	0.64
	[5]	-160	210	3	8	10	120	0.59
	[6]	-159	210	1	0	1	120	0.58
DECK-R	[7]	-159	210	1	0	1	120	0.58
	[8]	-158	210	0	0	0	120	0.56
LWEB	[9]	-165	210	5	9	14	120	0.63
	[10]	0	210	5	9	14	120	0.01
	[11]	177	210	5	9	13	120	0.72
RWEB	[12]	-158	210	4	9	13	120	0.58
	[13]	0	210	5	9	14	120	0.01
	[14]	177	210	4	9	13	120	0.72
LFLG	[15]	182	210	0	0	0	120	0.75
	[16]	182	210	2	3	5	120	0.75
	[17]	182	210	1	3	5	120	0.75
	[18]	182	210	0	0	0	120	0.75

Girder Name：G3　Section Name：Sec-29:J-28　（Girder number=　3　Section number=　31）

Section force　Mx =　63112 kN･m　Sy =　-465 kN　T =　1849 kN･m

Effective buckling length　Lx =　4697 mmLy =　4697 mm
Radius of curvature　R　=　0.0 m
Inclination　DECK =　-2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	2016	2016
	Intermediate	2700	2700
	overhang	825	825
LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1837 * 16 (SM490Y)	293.9	293.9
4-RIB PL	250 * 24 (SM490Y)	240.0	240.0
1-U.RIB	320 * 240 * 8 (SM490Y)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM490Y)	489.7	489.7
4-U.RIB	320 * 240 * 8 (SM490Y)	215.6	215.6
1-DECK-R PL	645 * 16 (SM490Y)	103.2	103.2
1-U.RIB	320 * 240 * 8 (SM490Y)	53.9	53.9
1-LWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL	2940 * 36 (SM490Y)	1058.4	1058.4
3-RIB PL	200 * 22 (SM490Y)	132.0	132.0

Section property		Total	In-plane
Section area	A (cm2)	3396.6	3396.6
Gravity center	ex (cm)	-35.2	-35.2
	ey (cm)	143.7	143.7
Moment of inertia	Ix (cm4)	51473976	51473976
	Iy (cm4)	66432207	66432207
Torsion Constant	J (cm4)	34525050	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	80282.8 kN･m	80282.8 kN･m
	Mxr(lower)=	73365.4 kN･m	73365.4 kN･m

Stress (N/mm²)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-165	210	0	0	0	120	0.62
	[2]	-161	210	4	0	4	120	0.59
DECK-C	[3]	-161	210	4	0	4	120	0.59
	[4]	-160	210	4	8	9	120	0.59
	[5]	-153	210	3	8	11	120	0.54
	[6]	-153	210	1	0	1	120	0.53
DECK-R	[7]	-153	210	1	0	1	120	0.53
	[8]	-151	210	0	0	0	120	0.52
LWEB	[9]	-158	210	6	9	15	120	0.58
	[10]	0	210	7	9	16	120	0.02
	[11]	176	210	6	9	15	120	0.72
RWEB	[12]	-151	210	5	9	14	120	0.53
	[13]	0	210	6	9	15	120	0.02
	[14]	176	210	5	9	14	120	0.72
LFLG	[15]	181	210	0	0	0	120	0.74
	[16]	181	210	2	3	6	120	0.74
	[17]	181	210	2	3	5	120	0.74
	[18]	181	210	0	0	0	120	0.74

Girder Name：G3　Section Name：Sec-30:J-29　（Girder number=　3　Section number=　32）

Section force　Mx =　60440 kN·m　Sy =　-857 kN　T =　2187 kN·m

Effective buckling length　Lx =　4696 mmLy =　4696 mm
Radius of curvature　R　=　0.0 m
Inclination　DECK =　-2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	2195	2195
		Intermediate	2700	2700
		overhang	825	825
	LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	2015 * 16 (SM490Y)	322.4	322.4
4-RIB PL	250 * 24 (SM490Y)	240.0	240.0
1-U.RIB 320 * 240 *	8 (SM490Y)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM490Y)	489.7	489.7
4-U.RIB 320 * 240 *	8 (SM490Y)	215.6	215.6
1-DECK-R PL	645 * 16 (SM490Y)	103.2	103.2
1-U.RIB 320 * 240 *	8 (SM490Y)	53.9	53.9
1-LWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL	2940 * 34 (SM490Y)	999.6	999.6
3-RIB PL	200 * 22 (SM490Y)	132.0	132.0

Section property			Total	In-plane
Section area	A	(cm2)	3366.4	3366.4
Gravity center	ex	(cm)	-39.0	-39.0
	ey	(cm)	147.5	147.5
Moment of inertia	Ix	(cm4)	50672785	50672785
	Iy	(cm4)	69617650	69617650
Torsion Constant	J	(cm4)	34259616	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	81061.8 kN·m	81061.8 kN·m
	Mxr(lower)=	70539.6 kN·m	70539.6 kN·m

Stress (N/mm²)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-157	210	0	0	0	120	0.56
	[2]	-152	210	8	0	8	120	0.53
DECK-C	[3]	-152	210	8	0	8	120	0.53
	[4]	-151	210	8	9	11	120	0.53
	[5]	-145	210	6	9	16	120	0.49
	[6]	-144	210	2	0	2	120	0.47
DECK-R	[7]	-144	210	2	0	2	120	0.47
	[8]	-143	210	0	0	0	120	0.46
LWEB	[9]	-149	210	11	11	22	120	0.54
	[10]	0	210	13	11	23	120	0.04
	[11]	176	210	11	11	22	120	0.73
RWEB	[12]	-143	210	10	11	20	120	0.49
	[13]	0	210	11	11	22	120	0.03
	[14]	176	210	9	11	20	120	0.73
LFLG	[15]	180	210	0	0	0	120	0.73
	[16]	180	210	4	4	9	120	0.74
	[17]	180	210	3	4	8	120	0.74
	[18]	180	210	0	0	0	120	0.73

Girder Name：G3　Section Name：Sec-31:J-30　（Girder number=　3　Section number=　33）

Section force　Mx =　52005 kN·m　Sy =　-1541 kN　T =　2524 kN·m

Effective buckling length　Lx =　4695 mmLy =　4695 mm
Radius of curvature　R　=　0.0 m
Inclination　DECK =　-2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	2406	2406
	Intermediate	2700	2700
	overhang	825	825
LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	2226 * 16 (SM490Y)	356.2	356.2
5-RIB PL	250 * 24 (SM490Y)	300.0	300.0
1-U.RIB 320 * 240 *	8 (SM490Y)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM490Y)	489.7	489.7
4-U.RIB 320 * 240 *	8 (SM490Y)	215.6	215.6
1-DECK-R PL	645 * 16 (SM490Y)	103.2	103.2
1-U.RIB 320 * 240 *	8 (SM490Y)	53.9	53.9
1-LWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL	2940 * 27 (SM490Y)	793.8	793.8
3-RIB PL	200 * 22 (SM490Y)	132.0	132.0

Section property			Total	In-plane
Section area	A	(cm2)	3254.3	3254.3
Gravity center	ex	(cm)	-50.5	-50.5
	ey	(cm)	160.5	160.5
Moment of inertia	Ix	(cm4)	46858194	46858194
	Iy	(cm4)	76639039	76639039
Torsion Constant	J	(cm4)	33096709	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	82930.1 kN·m	82930.1 kN·m
	Mxr(lower)=	60301.3 kN·m	56338.6 kN·m

Stress (N/mm²)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-132	210	0	0	0	120	0.39
	[2]	-127	210	16	0	16	120	0.38
DECK-C	[3]	-127	210	16	0	16	120	0.38
	[4]	-126	210	17	11	17	120	0.38
	[5]	-120	210	12	11	23	120	0.36
	[6]	-120	210	3	0	3	120	0.33
DECK-R	[7]	-120	210	3	0	3	120	0.33
	[8]	-118	210	0	0	0	120	0.32
LWEB	[9]	-125	210	21	12	34	120	0.43
	[10]	0	210	23	12	36	120	0.09
	[11]	178	210	19	12	31	120	0.79
RWEB	[12]	-119	210	18	12	30	120	0.38
	[13]	0	210	20	12	32	120	0.07
	[14]	178	210	16	12	28	120	0.77
LFLG	[15]	181	210	0	0	0	120	0.74
	[16]	181	210	9	6	16	120	0.76
	[17]	181	210	7	6	14	120	0.76
	[18]	181	210	0	0	0	120	0.74

Girder Name : G3　Section Name : Sec-32:J-31　(Girder number=　3　Section number=　34)

Section force　Mx =　37707 kN·m　Sy =　-2307 kN　T =　2582 kN·m

Effective buckling length　Lx =　4694 mmLy =　4694 mm
Radius of curvature　R =　0.0 m
Inclination　DECK =　-2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	2611	2611
		Intermediate	2700	2700
		overhang	825	825
	LFLG	Intermediate	2700	2700

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	2431 * 16 (SM400)	389.0	389.0
5-RIB PL	250 * 24 (SM400)	300.0	300.0
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 *	8 (SM400)	215.6	215.6
1-DECK-R PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-LWEB PL	2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL	2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL	2940 * 17 (SM490Y)	499.8	499.8
3-RIB PL	170 * 17 (SM490Y)	86.7	86.7

Section property		Total	In-plane
Section area	A (cm2)	2947.8	2947.8
Gravity center	ex (cm)	-60.5	-60.5
	ey (cm)	180.3	180.3
Moment of inertia	Ix (cm4)	37392764	37392764
	Iy (cm4)	77738720	77738720
Torsion Constant	J (cm4)	30255980	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	52749.3 kN·m	52749.3 kN·m
	Mxr(lower)=	43145.6 kN·m	26411.9 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-100	140	0	0	0	80	0.51
	[2]	-95	140	26	0	26	80	0.57
DECK-C	[3]	-95	140	26	0	26	80	0.57
	[4]	-95	140	27	11	27	80	0.57
	[5]	-89	140	19	11	30	80	0.55
	[6]	-89	140	5	0	5	80	0.41
DECK-R	[7]	-89	140	5	0	5	80	0.41
	[8]	-88	140	0	0	0	80	0.39
LWEB	[9]	-93	210	33	13	46	120	0.34
	[10]	0	210	36	13	49	120	0.16
	[11]	182	210	26	13	38	120	0.85
RWEB	[12]	-88	210	28	13	41	120	0.29
	[13]	0	210	31	13	43	120	0.13
	[14]	182	210	21	13	33	120	0.83
LFLG	[15]	184	210	0	0	0	120	0.76
	[16]	184	210	20	10	30	120	0.83
	[17]	184	210	16	10	26	120	0.81
	[18]	184	210	0	0	0	120	0.76

Girder Name：G3　Section Name：Sec-33:J-32　（Girder number=　3　Section number=　35）

Section force　Mx =　18060 kN･m　Sy =　-2665 kN　T =　2543 kN･m

Effective buckling length　Lx =　4645 mmLy =　4645 mm
Radius of curvature　R　= 302.3 m
Inclination　DECK =　-2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	2740	2740
	Intermediate	2700	2700
	overhang	825	825
LFLG	Intermediate	2700	2700

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL　2560 * 16 (SM400)	409.7	409.7
5-RIB　PL　250 * 24 (SM400)	300.0	300.0
1-U.RIB 320 * 240 *　8 (SM400)	53.9	53.9
1-DECK-C PL　3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 *　8 (SM400)	215.6	215.6
1-DECK-R PL　645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 *　8 (SM400)	53.9	53.9
1-LWEB　PL　2727 * 14 (SM490Y)	381.8	381.8
1-RWEB　PL　2673 * 14 (SM490Y)	374.2	374.2
1-LFLG　PL　2940 * 10 (SM490Y)	294.0	294.0
3-RIB　PL　170 * 17 (SM490Y)	86.7	86.7

Section property

		Total	In-plane
Section area	A　(cm2)	2762.7	2762.7
Gravity center	ex (cm)	-68.7	-68.7
	ey (cm)	194.7	194.7
Moment of inertia	Ix (cm4)	30209711	30209711
	Iy (cm4)	78078201	78078201
Torsion Constant	J　(cm4)	26050331	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	49174.5 kN･m	49174.5 kN･m
	Mxr(lower)=	32325.7 kN･m	7098.7 kN･m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[　1]	-51	140	0	0	0	80	0.13
	[　2]	-48	140	32	0	32	80	0.28
DECK-C	[　3]	-48	140	32	0	32	80	0.28
	[　4]	-48	140	33	11	33	80	0.29
	[　5]	-44	140	23	11	34	80	0.28
	[　6]	-44	140	6	0	6	80	0.10
DECK-R	[　7]	-44	140	6	0	6	80	0.10
	[　8]	-43	140	0	0	0	80	0.09
LWEB	[　9]	-47	210	40	12	53	120	0.24
	[10]	0	210	43	12	55	120	0.21
	[11]	117	210	26	12	38	120	0.41
RWEB	[12]	-43	210	34	12	47	120	0.19
	[13]	0	210	37	12	49	120	0.17
	[14]	116	210	20	12	32	120	0.38
LFLG	[15]	117	210	0	0	0	120	0.31
	[16]	117	210	34	17	52	120	0.50
	[17]	116	210	26	17	44	120	0.44
	[18]	116	210	0	0	0	120	0.31

Girder Name : G3　Section Name : Sec-33:Right　(Girder number=　3　Section number=　35)

Section force　Mx =　　0 kN·m　Sy =　-3143 kN　T =　2605 kN·m

Effective buckling length　Lx =　4650 mmLy =　4650 mm
Radius of curvature　R =　0.0 m
Inclination　DECK =　-2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	2750	2750
	Intermediate	2700	2700
	overhang	825	825
LFLG	Intermediate	2700	2700

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL 2571 * 16 (SM400)	411.3	411.3
5-RIB PL 250 * 24 (SM400)	300.0	300.0
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL 3061 * 16 (SM400)	489.7	489.7
4-U.RIB 320 * 240 * 8 (SM400)	215.6	215.6
1-DECK-R PL 645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-LWEB PL 2727 * 14 (SM490Y)	381.8	381.8
1-RWEB PL 2673 * 14 (SM490Y)	374.2	374.2
1-LFLG PL 2940 * 10 (SM490Y)	294.0	294.0
3-RIB PL 170 * 17 (SM490Y)	86.7	86.7

Section property

		Total	In-plane
Section area	A (cm2)	2764.3	2764.3
Gravity center	ex (cm)	-67.9	-67.9
	ey (cm)	194.6	194.6
Moment of inertia	Ix (cm4)	30251520	30251520
	Iy (cm4)	78190724	78190724
Torsion Constant	J (cm4)	26108927	

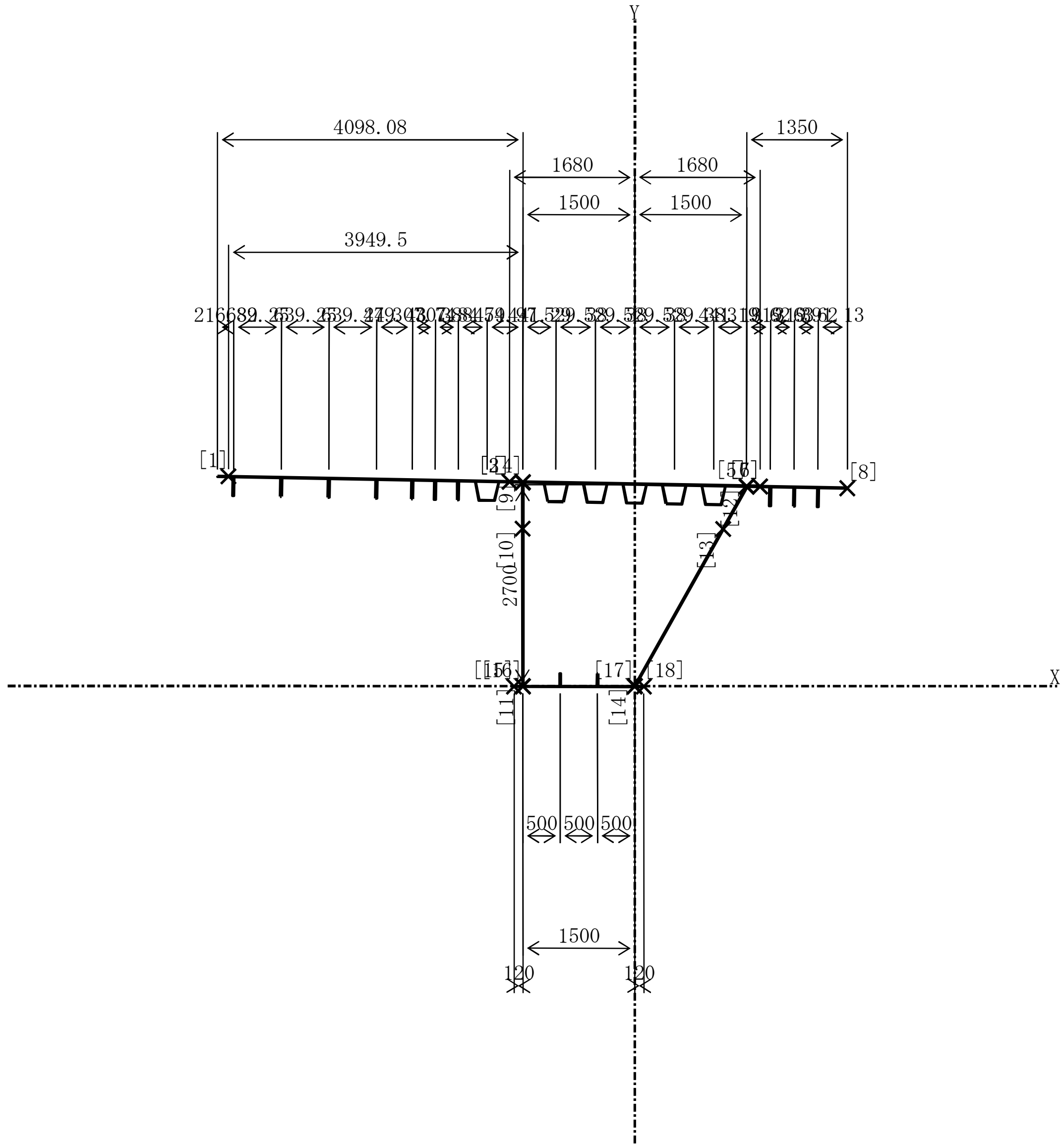
Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	49719.5 kN·m	49719.5 kN·m
	Mxr(lower)=	32475.7 kN·m	7127.7 kN·m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	0	140	0	0	0	80	0.00
	[2]	0	140	38	0	38	80	0.22
DECK-C	[3]	0	140	38	0	38	80	0.22
	[4]	0	140	39	11	39	80	0.24
	[5]	0	140	27	11	39	80	0.23
	[6]	0	140	7	0	7	80	0.01
DECK-R	[7]	0	140	7	0	7	80	0.01
	[8]	0	140	0	0	0	80	0.00
LWEB	[9]	0	210	47	13	60	120	0.25
	[10]	0	210	50	13	63	120	0.28
	[11]	0	210	31	13	43	120	0.13
RWEB	[12]	0	210	41	13	53	120	0.20
	[13]	0	210	43	13	56	120	0.22
	[14]	0	210	24	13	36	120	0.09
LFLG	[15]	0	210	0	0	0	120	0.00
	[16]	0	210	41	18	58	120	0.24
	[17]	0	210	31	18	49	120	0.16
	[18]	0	210	0	0	0	120	0.00

Girder Name : G4



Girder Name：G4　Section Name：Sec-1:Left　（Girder number=　4　Section number=　1）

Section force　Mx-Max　Mx =　40 kN·m　Sy =　3245 kN　T =　-1795 kN·m
　　　　　　　Mx-Min　Mx =　-87 kN·m　Sy =　3245 kN　T =　-1795 kN·m

Effective buckling length　Lx =　4694 mmLy =　4694 mm
Radius of curvature　R　=　0.0 m
Inclination　DECK =　-1.9 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	4098	3950
	Intermediate	3000	3000
	overhang	1350	1350
LFLG	Intermediate	1500	1500

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL 3919 * 16 (SM490Y)	627.0	603.2
7-RIB PL 250 * 24 (SM490Y)	420.0	420.0
1-U.RIB 320 * 240 * 8 (SM490Y)	53.9	53.9
1-DECK-C PL 3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 * 8 (SM400)	269.5	269.5
1-DECK-R PL 1170 * 16 (SM400)	187.2	187.2
3-RIB PL 250 * 24 (SM400)	180.0	180.0
1-LWEB PL 2728 * 15 (SM490Y)	409.3	409.3
1-RWEB PL 3064 * 15 (SM490Y)	459.6	459.6
1-LFLG PL 1740 * 14 (SM490Y)	243.6	243.6
2-RIB PL 170 * 17 (SM490Y)	57.8	57.8

Section property

		Total	In-plane
Section area	A (cm2)	3445.6	3421.8
Gravity center	ex (cm)	-105.1	-101.9
	ey (cm)	210.8	210.3
Moment of inertia	Ix (cm4)	31111744	30992934
	Iy (cm4)	156202848	151411938
Torsion Constant	J (cm4)	22188490	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	67324.6 kN·m	67324.6 kN·m
	Mxr(lower)=	30739.2 kN·m	21504.9 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	0	210	1	0	1	120	0.00
	[2]	0	210	44	0	44	120	0.13
DECK-C	[3]	0	140	44	0	44	80	0.30
	[4]	0	140	45	9	45	80	0.32
	[5]	0	140	24	9	33	80	0.17
	[6]	0	140	12	0	12	80	0.02
DECK-R	[7]	0	140	12	0	12	80	0.02
	[8]	0	140	0	0	0	80	0.00
LWEB	[9]	0	210	50	10	60	120	0.25
	[10]	0	210	52	10	62	120	0.27
	[11]	0	210	29	10	39	120	0.11
RWEB	[12]	0	210	39	10	49	120	0.17
	[13]	0	210	41	10	51	120	0.18
	[14]	0	210	15	10	24	120	0.04

LFLG	[15]	0	210	0	0	0	120	0.00
	[16]	0	210	29	10	39	120	0.11
	[17]	0	210	13	10	24	120	0.04
	[18]	0	210	0	0	0	120	0.00

Mx-Min	[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	0	210	1	0	1	120	0.00
		[2]	0	210	44	0	44	120	0.13
	DECK-C	[3]	0	140	44	0	44	80	0.30
		[4]	0	140	45	9	45	80	0.32
		[5]	0	140	24	9	33	80	0.17
		[6]	0	140	12	0	12	80	0.02
	DECK-R	[7]	0	140	12	0	12	80	0.02
		[8]	0	140	0	0	0	80	0.00
	LWEB	[9]	0	210	50	10	60	120	0.25
		[10]	0	210	52	10	62	120	0.27
		[11]	-1	210	29	10	39	120	0.11
	RWEB	[12]	0	210	39	10	49	120	0.17
		[13]	0	210	41	10	51	120	0.18
		[14]	-1	210	15	10	24	120	0.04
	LFLG	[15]	-1	210	0	0	0	120	0.00
		[16]	-1	147	29	10	39	120	0.11
		[17]	-1	147	13	10	24	120	0.04
		[18]	-1	210	0	0	0	120	0.00

Girder Name：G4　Section Name：Sec-1:J-1　（Girder number=　4　Section number=　1）

Section force　Mx =　20519 kN·m　Sy =　2403 kN　T =　-1794 kN·m

Effective buckling length　Lx =　4627 mmLy =　4627 mm
Radius of curvature　R =-999.4 m
Inclination　DECK =　-1.9 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	3906	3789
		Intermediate	3000	3000
		overhang	1350	1350
	LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	3726 * 16 (SM490Y)	596.2	577.6
6-RIB PL	250 * 24 (SM490Y)	360.0	360.0
1-U.RIB 320 * 240 *	8 (SM490Y)	53.9	53.9
1-DECK-C PL	3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 *	8 (SM400)	269.5	269.5
1-DECK-R PL	1170 * 16 (SM400)	187.2	187.2
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-LWEB PL	2728 * 15 (SM490Y)	409.3	409.3
1-RWEB PL	3064 * 15 (SM490Y)	459.6	459.6
1-LFLG PL	1740 * 14 (SM490Y)	243.6	243.6
2-RIB PL	170 * 17 (SM490Y)	57.8	57.8

Section property			Total	In-plane
	Section area	A (cm2)	3354.8	3336.1
	Gravity center	ex (cm)	-94.2	-91.7
		ey (cm)	209.2	208.8
	Moment of inertia	Ix (cm4)	30764025	30667062
		Iy (cm4)	141377884	137747908
	Torsion Constant	J (cm4)	22184083	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	65076.8 kN·m	65076.8 kN·m
	Mxr(lower)=	30613.3 kN·m	21419.9 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-49	210	1	0	1	120	0.05
	[2]	-44	210	31	0	31	120	0.11
DECK-C	[3]	-44	140	31	0	31	80	0.25
	[4]	-44	140	32	9	32	80	0.26
	[5]	-40	140	18	9	27	80	0.19
	[6]	-40	140	9	0	9	80	0.10
DECK-R	[7]	-40	140	9	0	9	80	0.10
	[8]	-39	140	0	0	0	80	0.08
LWEB	[9]	-43	210	37	10	47	120	0.19
	[10]	0	210	39	10	48	120	0.16
	[11]	140	210	21	10	31	120	0.51
RWEB	[12]	-39	210	29	10	39	120	0.14
	[13]	0	210	31	10	41	120	0.12
	[14]	140	210	11	10	21	120	0.48
LFLG	[15]	141	210	0	0	0	120	0.45
	[16]	141	210	21	10	31	120	0.52
	[17]	141	210	10	10	20	120	0.48
	[18]	141	210	0	0	0	120	0.45

Girder Name : G4　Section Name : Sec-2:J-2　(Girder number= 4　Section number= 2)

Section force　Mx = 35597 kN·m　Sy = 1700 kN　T = -1995 kN·m

Effective buckling length　Lx = 4721 mmLy = 4721 mm
Radius of curvature　R =-999.4 m
Inclination　DECK = -1.9 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	3695	3610
	Intermediate	3000	3000
	overhang	1350	1350
LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	3515 * 16 (SM400)	562.5	548.9
6-RIB PL	250 * 24 (SM400)	360.0	360.0
1-U.RIB	320 * 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL	3361 * 16 (SM400)	537.7	537.7
5-U.RIB	320 * 240 * 8 (SM400)	269.5	269.5
1-DECK-R PL	1170 * 16 (SM400)	187.2	187.2
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-LWEB PL	2728 * 15 (SM490Y)	409.3	409.3
1-RWEB PL	3064 * 15 (SM490Y)	459.6	459.6
1-LFLG PL	1740 * 28 (SM490Y)	487.2	487.2
2-RIB PL	200 * 22 (SM490Y)	88.0	88.0

Section property		Total	In-plane
Section area	A (cm2)	3594.8	3581.3
Gravity center	ex (cm)	-86.0	-84.4
	ey (cm)	192.5	192.1
Moment of inertia	Ix (cm4)	41608819	41503305
	Iy (cm4)	129866290	127376069
Torsion Constant	J (cm4)	24157192	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	65445.0 kN·m	65445.0 kN·m
	Mxr(lower)=	44666.3 kN·m	44666.3 kN·m

Stress (N/mm²)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-76	140	0	0	0	80	0.30
	[2]	-71	140	20	0	20	80	0.32
DECK-C	[3]	-71	140	20	0	20	80	0.32
	[4]	-71	140	20	10	20	80	0.32
	[5]	-66	140	11	10	21	80	0.29
	[6]	-66	140	6	0	7	80	0.23
DECK-R	[7]	-66	140	6	0	7	80	0.23
	[8]	-64	140	0	0	0	80	0.21
LWEB	[9]	-69	210	25	11	35	120	0.20
	[10]	0	210	26	11	37	120	0.09
	[11]	165	210	18	11	29	120	0.67
RWEB	[12]	-65	210	19	11	30	120	0.16
	[13]	0	210	20	11	31	120	0.07
	[14]	165	210	12	11	23	120	0.66
LFLG	[15]	167	210	0	0	0	120	0.63
	[16]	167	210	9	6	15	120	0.65
	[17]	167	210	5	6	11	120	0.64
	[18]	167	210	0	0	0	120	0.64

Girder Name：G4　Section Name：Sec-3:J-3　（Girder number=　4　Section number=　3）

Section force　Mx =　44144 kN·m　Sy =　1029 kN　T =　-1353 kN·m

Effective buckling length　Lx =　4721 mmLy =　4721 mm
Radius of curvature　R　=-999.4 m
Inclination　DECK =　-1.9 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	3498	3441
		Intermediate	3000	3000
		overhang	1350	1350
	LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	3319 * 16 (SM400)	531.0	521.8
6-RIB PL	250 * 24 (SM400)	360.0	360.0
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 *	8 (SM400)	269.5	269.5
1-DECK-R PL	1170 * 16 (SM400)	187.2	187.2
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-LWEB PL	2729 * 15 (SM490Y)	409.3	409.3
1-RWEB PL	3064 * 15 (SM490Y)	459.6	459.6
1-LFLG PL	1740 * 41 (SM520-H)	713.4	713.4
2-RIB PL	200 * 22 (SM490Y)	88.0	88.0

Section property			Total	In-plane
	Section area	A (cm2)	3789.6	3780.4
	Gravity center	ex (cm)	-83.1	-82.1
		ey (cm)	180.1	179.8
	Moment of inertia	Ix (cm4)	49483231	49391157
		Iy (cm4)	127749884	126186791
	Torsion Constant	J (cm4)	24907953	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	68608.2 kN·m	68608.2 kN·m
	Mxr(lower)=	56336.6 kN·m	56336.6 kN·m

Stress (N/mm²)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-90	140	0	0	0	80	0.41
	[2]	-85	140	11	0	11	80	0.39
DECK-C	[3]	-85	140	11	0	11	80	0.39
	[4]	-85	140	12	7	12	80	0.39
	[5]	-80	140	6	7	13	80	0.35
	[6]	-79	140	4	0	4	80	0.32
DECK-R	[7]	-79	140	4	0	4	80	0.32
	[8]	-77	140	0	0	0	80	0.31
LWEB	[9]	-83	210	14	7	22	120	0.19
	[10]	0	210	15	7	23	120	0.04
	[11]	161	210	12	7	19	120	0.61
RWEB	[12]	-78	210	11	7	18	120	0.16
	[13]	0	210	12	7	19	120	0.03
	[14]	161	210	8	7	15	120	0.61
LFLG	[15]	164	210	0	0	0	120	0.61
	[16]	164	210	4	3	7	120	0.62
	[17]	165	210	3	3	5	120	0.62
	[18]	165	210	0	0	0	120	0.61

Girder Name：G4　Section Name：Sec-4:Mx-Max　（Girder number=　4　Section number=　4）

Section force　Mx =　46541 kN·m　Sy =　-534 kN　T =　-864 kN·m

Effective buckling length　Lx =　4721 mmLy =　4721 mm
Radius of curvature　R　=-999.4 m
Inclination　DECK =　-1.9 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	3329	3294
	Intermediate	3000	3000
	overhang	1350	1350
LFLG	Intermediate	1500	1500

Section dimensions　Section area(cm2)

		Total	in plane
1-DECK-L	PL 3150 * 16 (SM400)	504.0	498.3
6-RIB	PL 250 * 24 (SM400)	360.0	360.0
1-U.RIB	320 * 240 * 8 (SM400)	53.9	53.9
1-DECK-C	PL 3361 * 16 (SM400)	537.7	537.7
5-U.RIB	320 * 240 * 8 (SM400)	269.5	269.5
1-DECK-R	PL 1170 * 16 (SM400)	187.2	187.2
3-RIB	PL 250 * 24 (SM400)	180.0	180.0
1-LWEB	PL 2729 * 15 (SM490Y)	409.3	409.3
1-RWEB	PL 3064 * 15 (SM490Y)	459.5	459.5
1-LFLG	PL 1740 * 45 (SM520-H)	783.0	783.0
2-RIB	PL 200 * 22 (SM490Y)	88.0	88.0

Section property

		Total	In-plane
Section area	A (cm2)	3832.1	3826.5
Gravity center	ex (cm)	-78.2	-77.6
	ey (cm)	176.0	175.8
Moment of inertia	Ix (cm4)	51494911	51433107
	Iy (cm4)	119055506	118132470
Torsion Constant	J (cm4)	25065386	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	68878.0 kN·m	68878.0 kN·m
	Mxr(lower)=	59837.3 kN·m	59837.3 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-95	140	0	0	0	80	0.46
	[2]	-89	140	6	0	6	80	0.41
DECK-C	[3]	-89	140	6	0	6	80	0.41
	[4]	-89	140	6	4	6	80	0.41
	[5]	-84	140	3	4	8	80	0.37
	[6]	-84	140	2	0	2	80	0.36
DECK-R	[7]	-84	140	2	0	2	80	0.36
	[8]	-82	140	0	0	0	80	0.34
LWEB	[9]	-88	210	7	5	12	120	0.18
	[10]	0	210	8	5	13	120	0.01
	[11]	159	210	6	5	11	120	0.58
RWEB	[12]	-83	210	6	5	10	120	0.16
	[13]	0	210	6	5	11	120	0.01
	[14]	160	210	4	5	9	120	0.58
LFLG	[15]	163	210	0	0	0	120	0.60
	[16]	163	210	2	2	3	120	0.60
	[17]	163	210	1	2	3	120	0.61
	[18]	163	210	0	0	0	120	0.60

Girder Name：G4 Section Name：Sec-5：J-4 (Girder number= 4 Section number= 5)

Section force Mx = 46530 kN·m Sy = -579 kN T = -864 kN·m

Effective buckling length Lx = 4721 mmLy = 4721 mm
Radius of curvature R =-999.4 m
Inclination DECK = -1.9 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	3319	3284
	Intermediate	3000	3000
	overhang	1350	1350
LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L	PL 3139 * 16 (SM400)	502.3	496.8
6-RIB	PL 250 * 24 (SM400)	360.0	360.0
1-U.RIB	320 * 240 * 8 (SM400)	53.9	53.9
1-DECK-C	PL 3361 * 16 (SM400)	537.7	537.7
5-U.RIB	320 * 240 * 8 (SM400)	269.5	269.5
1-DECK-R	PL 1170 * 16 (SM400)	187.2	187.2
3-RIB	PL 250 * 24 (SM400)	180.0	180.0
1-LWEB	PL 2729 * 15 (SM490Y)	409.3	409.3
1-RWEB	PL 3064 * 15 (SM490Y)	459.5	459.5
1-LFLG	PL 1740 * 45 (SM520-H)	783.0	783.0
2-RIB	PL 200 * 22 (SM490Y)	88.0	88.0

Section property		Total	In-plane
Section area	A (cm2)	3830.5	3825.0
Gravity center	ex (cm)	-77.9	-77.3
	ey (cm)	176.0	175.8
Moment of inertia	Ix (cm4)	51475211	51415476
	Iy (cm4)	118486585	117597888
Torsion Constant	J (cm4)	25065364	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	68835.6 kN·m	68835.6 kN·m
	Mxr(lower)=	59831.0 kN·m	59831.0 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-95	140	0	0	0	80	0.46
	[2]	-90	140	6	0	6	80	0.41
DECK-C	[3]	-90	140	6	0	6	80	0.41
	[4]	-89	140	6	4	6	80	0.41
	[5]	-84	140	3	4	8	80	0.37
	[6]	-84	140	2	0	2	80	0.36
DECK-R	[7]	-84	140	2	0	2	80	0.36
	[8]	-82	140	0	0	0	80	0.34
LWEB	[9]	-88	210	8	5	13	120	0.19
	[10]	0	210	9	5	13	120	0.01
	[11]	159	210	7	5	11	120	0.58
RWEB	[12]	-83	210	6	5	11	120	0.16
	[13]	0	210	7	5	11	120	0.01
	[14]	160	210	5	5	9	120	0.58
LFLG	[15]	163	210	0	0	0	120	0.60
	[16]	163	210	2	2	4	120	0.60
	[17]	163	210	1	2	3	120	0.61
	[18]	163	210	0	0	0	120	0.60

Girder Name：G4　Section Name：Sec-6:J-5　（Girder number=　4　Section number=　6）

Section force　Mx =　43127 kN·m　Sy =　-1198 kN　T =　-718 kN·m

Effective buckling length　Lx =　4721 mmLy =　4721 mm
Radius of curvature　R　=-999.4 m
Inclination　DECK =　-1.9 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	3155	3140
	Intermediate	3000	3000
	overhang	1350	1350
LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	2976 * 16 (SM400)	476.1	473.7
6-RIB PL	250 * 24 (SM400)	360.0	360.0
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 *	8 (SM400)	269.5	269.5
1-DECK-R PL	1170 * 16 (SM400)	187.2	187.2
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-LWEB PL	2729 * 15 (SM490Y)	409.3	409.3
1-RWEB PL	3063 * 15 (SM490Y)	459.5	459.5
1-LFLG PL	1740 * 40 (SM490Y)	696.0	696.0
2-RIB PL	200 * 22 (SM490Y)	88.0	88.0

Section property		Total	In-plane
Section area	A (cm2)	3717.3	3714.8
Gravity center	ex (cm)	-73.8	-73.6
	ey (cm)	179.4	179.4
Moment of inertia	Ix (cm4)	48309216	48284092
	Iy (cm4)	111119725	110740148
Torsion Constant	J (cm4)	24864069	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	67051.5 kN·m	67051.5 kN·m
	Mxr(lower)=	55254.0 kN·m	55254.0 kN·m

Stress (N/mm²)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-90	140	0	0	0	80	0.41
	[2]	-85	140	13	0	13	80	0.40
DECK-C	[3]	-85	140	13	0	13	80	0.40
	[4]	-85	140	13	4	13	80	0.39
	[5]	-80	140	7	4	11	80	0.35
	[6]	-80	140	5	0	5	80	0.33
DECK-R	[7]	-80	140	5	0	5	80	0.33
	[8]	-78	140	0	0	0	80	0.31
LWEB	[9]	-83	210	17	4	21	120	0.19
	[10]	0	210	18	4	22	120	0.03
	[11]	160	210	14	4	18	120	0.60
RWEB	[12]	-79	210	13	4	17	120	0.16
	[13]	0	210	14	4	18	120	0.02
	[14]	161	210	10	4	13	120	0.60
LFLG	[15]	164	210	0	0	0	120	0.61
	[16]	164	210	5	1	6	120	0.61
	[17]	164	210	3	1	4	120	0.61
	[18]	164	210	0	0	0	120	0.61

Girder Name : G4　Section Name : Sec-7:J-6　(Girder number= 4　Section number= 7)

Section force Mx = 33754 kN·m　Sy = -1809 kN　T = 1282 kN·m

Effective buckling length　Lx = 4721 mmLy = 4721 mm
Radius of curvature　R =-999.4 m
Inclination　DECK = -1.9 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	3009	3009
	Intermediate	3000	3000
	overhang	1350	1350
LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	2830 * 16 (SM400)	452.8	452.8
6-RIB PL	250 * 24 (SM400)	360.0	360.0
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 *	8 (SM400)	269.5	269.5
1-DECK-R PL	1170 * 16 (SM400)	187.2	187.2
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-LWEB PL	2729 * 15 (SM490Y)	409.4	409.4
1-RWEB PL	3063 * 15 (SM490Y)	459.5	459.5
1-LFLG PL	1740 * 26 (SM490Y)	452.4	452.4
2-RIB PL	200 * 22 (SM490Y)	88.0	88.0

Section property			Total	In-plane
Section area	A	(cm2)	3450.4	3450.4
Gravity center	ex	(cm)	-72.8	-72.7
	ey	(cm)	191.7	191.7
Moment of inertia	Ix	(cm4)	39445167	39444931
	Iy	(cm4)	110382286	110377950
Torsion Constant	J	(cm4)	23988186	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	62511.1 kN·m	62511.1 kN·m
	Mxr(lower)=	42600.9 kN·m	42600.9 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-76	140	0	0	0	80	0.29
	[2]	-71	140	19	0	20	80	0.32
DECK-C	[3]	-71	140	19	0	20	80	0.32
	[4]	-71	140	20	6	20	80	0.32
	[5]	-66	140	12	7	18	80	0.27
	[6]	-66	140	7	0	7	80	0.23
DECK-R	[7]	-66	140	7	0	7	80	0.23
	[8]	-64	140	0	0	0	80	0.21
LWEB	[9]	-69	210	26	7	33	120	0.18
	[10]	0	210	27	7	34	120	0.08
	[11]	164	210	19	7	26	120	0.66
RWEB	[12]	-65	210	21	7	28	120	0.15
	[13]	0	210	22	7	29	120	0.06
	[14]	165	210	13	7	19	120	0.64
LFLG	[15]	166	210	0	0	0	120	0.63
	[16]	166	210	10	4	14	120	0.64
	[17]	166	210	6	4	10	120	0.63
	[18]	166	210	0	0	0	120	0.63

Girder Name : G4　Section Name : Sec-7:Left　(Girder number=　4　Section number=　8)

Section force　Mx =　19879 kN·m　Sy =　-2525 kN　T =　1387 kN·m

Effective buckling length　Lx =　4721 mmLy =　4721 mm
Radius of curvature　R　=-999.4 m
Inclination　DECK =　-1.9 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	2889	2889
		Intermediate	3000	3000
		overhang	1350	1350
	LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	2709 * 16 (SM400)	433.4	433.4
5-RIB PL	250 * 24 (SM400)	300.0	300.0
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 *	8 (SM400)	269.5	269.5
1-DECK-R PL	1170 * 16 (SM400)	187.2	187.2
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-LWEB PL	2729 * 15 (SM490Y)	409.4	409.4
1-RWEB PL	3063 * 15 (SM490Y)	459.5	459.5
1-LFLG PL	1740 * 26 (SM490Y)	452.4	452.4
5-RIB PL	200 * 22 (SM490Y)	220.0	220.0

Section property			Total	In-plane
Section area	A	(cm2)	3503.0	3503.0
Gravity center	ex	(cm)	-66.2	-66.2
	ey	(cm)	183.1	183.1
Moment of inertia	Ix	(cm4)	43083123	43083123
	Iy	(cm4)	102869928	102869928
Torsion Constant	J	(cm4)	23987300	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	62388.2 kN·m	62388.2 kN·m
	Mxr(lower)=	48678.4 kN·m	48678.4 kN·m

Stress (N/mm²)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-45	140	0	0	0	80	0.10
	[2]	-42	140	25	0	25	80	0.19
DECK-C	[3]	-42	140	25	0	25	80	0.19
	[4]	-42	140	26	7	26	80	0.20
	[5]	-40	140	16	7	23	80	0.16
	[6]	-39	140	10	0	10	80	0.10
DECK-R	[7]	-39	140	10	0	10	80	0.10
	[8]	-38	140	0	0	0	80	0.08
LWEB	[9]	-41	210	35	7	43	120	0.17
	[10]	0	210	38	7	45	120	0.14
	[11]	84	210	28	7	35	120	0.25
RWEB	[12]	-39	210	29	8	36	120	0.13
	[13]	0	210	31	8	39	120	0.10
	[14]	85	210	20	8	27	120	0.21
LFLG	[15]	86	210	0	0	0	120	0.17
	[16]	86	210	15	4	19	120	0.19
	[17]	86	210	10	4	14	120	0.18
	[18]	86	210	0	0	0	120	0.17

Girder Name：G4　Section Name：Sec-8:J-7　（Girder number=　4　Section number=　9）

Section force　Mx =　18640 kN·m　Sy =　-2381 kN　T =　1476 kN·m

Effective buckling length　Lx =　4721 mmLy =　4721 mm
Radius of curvature　R =-999.4 m
Inclination　DECK =　-2.0 %

Effective width(mm)

			Full width	In-plane
	DECK	overhang	2880	2880
		Intermediate	3000	3000
		overhang	1350	1350
	LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	2701 * 16 (SM400)	432.1	432.1
5-RIB PL	250 * 24 (SM400)	300.0	300.0
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 *	8 (SM400)	269.5	269.5
1-DECK-R PL	1170 * 16 (SM400)	187.2	187.2
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-LWEB PL	2729 * 15 (SM490Y)	409.4	409.4
1-RWEB PL	3063 * 15 (SM490Y)	459.5	459.5
1-LFLG PL	1740 * 13 (SM490Y)	226.2	226.2
5-RIB PL	170 * 17 (SM490Y)	144.5	144.5

Section property			Total	In-plane
Section area	A	(cm2)	3200.0	3200.0
Gravity center	ex	(cm)	-65.1	-65.1
	ey	(cm)	200.2	200.2
Moment of inertia	Ix	(cm4)	32201285	32201285
	Iy	(cm4)	101795750	101795750
Torsion Constant	J	(cm4)	21911752	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	56582.8 kN·m	56582.8 kN·m
	Mxr(lower)=	33538.6 kN·m	33538.6 kN·m

Stress (N/mm²)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-46	140	0	0	0	80	0.11
	[2]	-43	140	25	0	26	80	0.20
DECK-C	[3]	-43	140	25	0	26	80	0.20
	[4]	-43	140	26	7	27	80	0.20
	[5]	-40	140	16	8	24	80	0.17
	[6]	-40	140	10	0	10	80	0.10
DECK-R	[7]	-40	140	10	0	10	80	0.10
	[8]	-38	140	0	0	0	80	0.07
LWEB	[9]	-42	210	35	8	43	120	0.17
	[10]	0	210	37	8	45	120	0.14
	[11]	116	210	22	8	30	120	0.37
RWEB	[12]	-39	210	29	8	37	120	0.13
	[13]	0	210	31	8	39	120	0.11
	[14]	116	210	14	8	22	120	0.34
LFLG	[15]	117	210	0	0	0	120	0.31
	[16]	117	210	24	9	33	120	0.38
	[17]	117	210	14	9	24	120	0.35
	[18]	117	210	0	0	0	120	0.31

Girder Name : G4 Section Name : Sec-8:J-8 (Girder number= 4 Section number= 9)

Section force Mx = -10149 kN·m Sy = -3162 kN T = 1504 kN·m

Effective buckling length Lx = 4721 mmLy = 4721 mm
Radius of curvature R =-999.4 m
Inclination DECK = -2.0 %

Effective width(mm)

			Full width	In-plane
	DECK	overhang	2768	2580
		Intermediate	3000	2909
		overhang	1350	1315
	LFLG	Intermediate	1500	1491

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	2588 * 16 (SM400)	414.1	384.1
5-RIB PL	250 * 24 (SM400)	300.0	300.0
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3361 * 16 (SM400)	537.7	523.1
5-U.RIB 320 * 240 *	8 (SM400)	269.5	215.6
1-DECK-R PL	1170 * 16 (SM400)	187.2	181.7
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-LWEB PL	2729 * 15 (SM490Y)	409.4	409.4
1-RWEB PL	3063 * 15 (SM490Y)	459.5	459.5
1-LFLG PL	1740 * 13 (SM490Y)	226.2	225.1
5-RIB PL	170 * 17 (SM490Y)	144.5	115.6

Section property			Total	In-plane
	Section area	A (cm2)	3182.0	3047.9
	Gravity center	ex (cm)	-62.2	-60.6
		ey (cm)	199.7	199.4
	Moment of inertia	Ix (cm4)	32082552	30526691
		Iy (cm4)	97579294	92851370
	Torsion Constant	J (cm4)	21911742	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	53468.4 kN·m	53468.4 kN·m
	Mxr(lower)=	31920.5 kN·m	31920.5 kN·m

Stress (N/mm²)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	27	140	1	0	2	80	0.04
	[2]	25	140	33	0	33	80	0.21
DECK-C	[3]	25	140	33	0	33	80	0.21
	[4]	25	140	35	8	35	80	0.22
	[5]	23	140	22	8	29	80	0.16
	[6]	23	140	14	0	14	80	0.06
DECK-R	[7]	23	140	14	0	14	80	0.06
	[8]	22	140	0	0	0	80	0.03
LWEB	[9]	24	210	46	8	54	120	0.22
	[10]	0	210	49	8	57	120	0.23
	[11]	-66	210	29	8	37	120	0.20
RWEB	[12]	23	210	39	8	47	120	0.17
	[13]	0	210	41	8	50	120	0.17
	[14]	-66	210	19	8	27	120	0.15
LFLG	[15]	-67	210	0	0	0	120	0.10
	[16]	-67	210	31	9	41	120	0.22
	[17]	-67	210	19	9	29	120	0.16
	[18]	-67	210	0	0	0	120	0.10

Girder Name：G4　Section Name：Sec-9:J-9　（Girder number=　4　Section number=　10）

Section force　Mx =　-30152 kN･m　Sy =　-3800 kN　T =　1498 kN･m

Effective buckling length　Lx =　4591 mmLy =　4591 mm
Radius of curvature　R =-999.4 m
Inclination　DECK =　-2.0 %

Effective width(mm)

			Full width	In-plane
	DECK	overhang	2687	2277
		Intermediate	3000	2787
		overhang	1350	1269
	LFLG	Intermediate	1500	1480

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	2507 ＊ 16 (SM400)	401.2	335.5
5-RIB PL	250 ＊ 24 (SM400)	300.0	240.0
1-U.RIB 320	＊ 240 ＊ 8 (SM400)	53.9	53.9
1-DECK-C PL	3361 ＊ 16 (SM400)	537.7	503.7
5-U.RIB 320	＊ 240 ＊ 8 (SM400)	269.5	215.6
1-DECK-R PL	1170 ＊ 16 (SM400)	187.2	174.3
3-RIB PL	250 ＊ 24 (SM400)	180.0	180.0
1-LWEB PL	2729 ＊ 17 (SM490Y)	464.0	464.0
1-RWEB PL	3063 ＊ 17 (SM490Y)	520.7	520.7
1-LFLG PL	1740 ＊ 15 (SM490Y)	261.0	258.0
5-RIB PL	170 ＊ 17 (SM490Y)	144.5	115.6

Section property			Total	In-plane
Section area	A	(cm2)	3319.7	3061.3
Gravity center	ex	(cm)	-58.8	-48.1
	ey	(cm)	195.0	191.6
Moment of inertia	Ix	(cm4)	34521439	32152327
	Iy	(cm4)	95919957	79892003
Torsion Constant	J	(cm4)	24088813	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	51665.5 kN･m	51665.5 kN･m
	Mxr(lower)=	34943.1 kN･m	34943.1 kN･m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	82	140	7	0	7	80	0.35
	[2]	78	140	39	0	39	80	0.55
DECK-C	[3]	78	140	39	0	39	80	0.55
	[4]	78	140	40	8	41	80	0.56
	[5]	72	140	25	8	33	80	0.43
	[6]	72	140	16	0	17	80	0.31
DECK-R	[7]	72	140	16	0	17	80	0.31
	[8]	70	140	1	0	1	80	0.25
LWEB	[9]	76	210	49	7	56	120	0.35
	[10]	3	210	52	7	59	120	0.24
	[11]	-180	210	31	7	38	120	0.83
RWEB	[12]	71	210	40	7	48	120	0.27
	[13]	3	210	44	7	51	120	0.18
	[14]	-180	210	20	7	27	120	0.79
LFLG	[15]	-181	210	0	0	0	120	0.74
	[16]	-181	210	33	8	41	120	0.86
	[17]	-181	210	20	8	28	120	0.80
	[18]	-181	210	0	0	0	120	0.74

Girder Name：G4　 Section Name：Sec-10：Mx-Min_L　 （Girder number=　 4　 Section number=　11）

Section force　Mx =　-40082 kN・m　 Sy =　 -4081 kN　 T =　　1498 kN・m

Effective buckling length　　　　Lx =　4591 mmLy =　4591 mm
Radius of curvature　　　　　　R　=-999.4 m
Inclination　　　　　　　　　　 DECK =　-2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	2656	2162
	Intermediate	3000	2737
	overhang	1350	1250
LFLG	Intermediate	1500	1475

Section dimensions　Section area(cm2)

		Total	in plane
1-DECK-L	PL　2476 * 16 (SM490Y)	396.2	317.1
5-RIB	PL　 250 * 24 (SM490Y)	300.0	240.0
1-U.RIB	320 * 240 *　8 (SM490Y)	53.9	53.9
1-DECK-C	PL　3361 * 16 (SM490Y)	537.7	495.7
5-U.RIB	320 * 240 *　8 (SM490Y)	269.5	215.6
1-DECK-R	PL　1170 * 16 (SM490Y)	187.2	171.3
3-RIB	PL　 250 * 24 (SM490Y)	180.0	180.0
1-LWEB	PL　2730 * 17 (SM490Y)	464.0	464.0
1-RWEB	PL　3063 * 17 (SM490Y)	520.7	520.7
1-LFLG	PL　1740 * 25 (SM490Y)	435.0	428.8
5-RIB	PL　 200 * 22 (SM490Y)	220.0	176.0

Section property

		Total	In-plane
Section area	A　(cm2)	3564.3	3263.1
Gravity center	ex (cm)	-59.1	-48.4
	ey (cm)	181.4	177.4
Moment of inertia	Ix (cm4)	43084384	39621668
	Iy (cm4)	95232423	77896781
Torsion Constant	J　(cm4)	25787604	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	82327.0 kN・m	82327.0 kN・m
	Mxr(lower)=	46218.0 kN・m	46218.0 kN・m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	102	210	7	0	8	120	0.24
	[2]	99	210	39	0	39	120	0.33
DECK-C	[3]	99	210	39	0	39	120	0.33
	[4]	98	210	41	8	41	120	0.33
	[5]	92	210	25	8	32	120	0.27
	[6]	92	210	17	0	17	120	0.21
DECK-R	[7]	92	210	17	0	17	120	0.21
	[8]	90	210	1	0	1	120	0.18
LWEB	[9]	97	210	50	7	57	120	0.44
	[10]	4	210	54	7	61	120	0.26
	[11]	-179	210	38	7	46	120	0.87
RWEB	[12]	91	210	41	7	48	120	0.35
	[13]	4	210	45	7	52	120	0.19
	[14]	-180	210	27	7	34	120	0.82
LFLG	[15]	-182	210	0	0	0	120	0.75
	[16]	-182	210	24	5	29	120	0.81
	[17]	-182	210	16	5	21	120	0.78
	[18]	-182	210	0	0	0	120	0.75

Girder Name:G4 Section Name:Sec-10:Mx-Min_R (Girder number= 4 Section number= 11)

Section force Mx = -40060 kN·m Sy = 3312 kN T = 1494 kN·m

Effective buckling length Lx = 4726 mmLy = 4726 mm
Radius of curvature R =-999.4 m
Inclination DECK = -2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	2656	2162
	Intermediate	3000	2737
	overhang	1350	1251
LFLG	Intermediate	1500	1475

Section dimensions

	Section area(cm2)	Total	in plane
1-DECK-L	PL 2477 * 16 (SM490Y)	396.3	317.1
5-RIB	PL 250 * 24 (SM490Y)	300.0	240.0
1-U.RIB	320 * 240 * 8 (SM490Y)	53.9	53.9
1-DECK-C	PL 3361 * 16 (SM490Y)	537.7	495.7
5-U.RIB	320 * 240 * 8 (SM490Y)	269.5	215.6
1-DECK-R	PL 1170 * 16 (SM490Y)	187.2	171.3
3-RIB	PL 250 * 24 (SM490Y)	180.0	180.0
1-LWEB	PL 2730 * 17 (SM490Y)	464.0	464.0
1-RWEB	PL 3063 * 17 (SM490Y)	520.7	520.7
1-LFLG	PL 1740 * 25 (SM490Y)	435.0	428.8
5-RIB	PL 200 * 22 (SM490Y)	220.0	176.0

Section property

		Total	In-plane
Section area	A (cm2)	3564.3	3263.2
Gravity center	ex (cm)	-59.1	-48.4
	ey (cm)	181.4	177.4
Moment of inertia	Ix (cm4)	43084911	39622123
	Iy (cm4)	95242416	77903568
Torsion Constant	J (cm4)	25787605	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	82328.8 kN·m	82328.8 kN·m
	Mxr(lower)=	46218.2 kN·m	46218.2 kN·m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	102	210	6	0	6	120	0.24
	[2]	98	210	32	0	32	120	0.29
DECK-C	[3]	98	210	32	0	32	120	0.29
	[4]	98	210	33	8	33	120	0.29
	[5]	92	210	20	8	28	120	0.25
	[6]	92	210	14	0	14	120	0.21
DECK-R	[7]	92	210	14	0	14	120	0.21
	[8]	90	210	1	0	1	120	0.18
LWEB	[9]	96	210	41	7	48	120	0.37
	[10]	4	210	44	7	51	120	0.18
	[11]	-179	210	31	7	38	120	0.83
RWEB	[12]	91	210	33	7	40	120	0.30
	[13]	4	210	36	7	44	120	0.13
	[14]	-180	210	22	7	29	120	0.79
LFLG	[15]	-182	210	0	0	0	120	0.75
	[16]	-182	210	20	5	24	120	0.79
	[17]	-182	210	13	5	18	120	0.77
	[18]	-182	210	0	0	0	120	0.75

Girder Name : G4 Section Name : Sec-11:J-10 (Girder number= 4 Section number= 12)

Section force Mx = -32221 kN·m Sy = 3012 kN T = 1494 kN·m

Effective buckling length Lx = 4726 mmLy = 4726 mm
Radius of curvature R =-999.4 m
Inclination DECK = -2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	2628	2231
	Intermediate	3000	2789
	overhang	1350	1270
LFLG	Intermediate	1500	1480

Section dimensions Section area(cm2)

	Total	in plane
1-DECK-L PL 2448 * 16 (SM400)	391.7	328.2
4-RIB PL 250 * 24 (SM400)	240.0	240.0
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL 3361 * 16 (SM400)	537.7	503.9
5-U.RIB 320 * 240 * 8 (SM400)	269.5	215.6
1-DECK-R PL 1170 * 16 (SM400)	187.2	174.4
3-RIB PL 250 * 24 (SM400)	180.0	180.0
1-LWEB PL 2730 * 17 (SM490Y)	464.0	464.0
1-RWEB PL 3063 * 17 (SM490Y)	520.7	520.7
1-LFLG PL 1740 * 15 (SM490Y)	261.0	258.0
5-RIB PL 200 * 22 (SM490Y)	220.0	176.0

Section property

		Total	In-plane
Section area	A (cm2)	3325.8	3114.7
Gravity center	ex (cm)	-54.1	-49.8
	ey (cm)	189.4	188.0
Moment of inertia	Ix (cm4)	36576575	34007886
	Iy (cm4)	91444604	82377361
Torsion Constant	J (cm4)	24088116	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	52509.0 kN·m	52509.0 kN·m
	Mxr(lower)=	37665.7 kN·m	37665.7 kN·m

Stress (N/mm²)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	86	140	3	0	3	80	0.38
	[2]	82	140	29	0	29	80	0.47
DECK-C	[3]	82	140	29	0	29	80	0.47
	[4]	82	140	30	8	30	80	0.48
	[5]	77	140	19	8	27	80	0.41
	[6]	76	140	13	0	13	80	0.33
DECK-R	[7]	76	140	13	0	13	80	0.33
	[8]	74	140	1	0	1	80	0.28
LWEB	[9]	80	210	38	7	45	120	0.28
	[10]	1	210	40	7	47	120	0.16
	[11]	-178	210	26	7	33	120	0.79
RWEB	[12]	75	210	32	7	39	120	0.23
	[13]	2	210	35	7	42	120	0.12
	[14]	-179	210	18	7	25	120	0.77
LFLG	[15]	-179	210	0	0	0	120	0.73
	[16]	-179	210	27	8	35	120	0.82
	[17]	-180	210	18	8	26	120	0.78
	[18]	-180	210	0	0	0	120	0.73

Girder Name：G4　Section Name：Sec-12:J-11　（Girder number=　4　Section number=　13）

Section force　Mx =　-17260 kN･m　Sy =　2269 kN　T =　1404 kN･m

Effective buckling length　Lx =　4771 mmLy =　4771 mm
Radius of curvature　R =-999.4 m
Inclination　DECK =　-2.0 %

Effective width(mm)

			Full width	In-plane
	DECK	overhang	2568	2389
		Intermediate	3000	2910
		overhang	1350	1316
	LFLG	Intermediate	1500	1492

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L	PL　2388 * 16 (SM400)	382.1	353.6
4-RIB	PL　250 * 24 (SM400)	240.0	240.0
1-U.RIB	320 * 240 *　8 (SM400)	53.9	53.9
1-DECK-C	PL　3361 * 16 (SM400)	537.7	523.3
5-U.RIB	320 * 240 *　8 (SM400)	269.5	215.6
1-DECK-R	PL　1170 * 16 (SM400)	187.2	181.8
3-RIB	PL　250 * 24 (SM400)	180.0	180.0
1-LWEB	PL　2730 * 15 (SM490Y)	409.4	409.4
1-RWEB	PL　3063 * 15 (SM490Y)	459.4	459.4
1-LFLG	PL　1740 * 10 (SM490Y)	174.0	173.2
5-RIB	PL　170 * 17 (SM490Y)	144.5	115.6

Section property			Total	In-plane
Section area	A	(cm2)	3037.8	2905.8
Gravity center	ex	(cm)	-52.1	-50.4
	ey	(cm)	201.1	200.8
Moment of inertia	Ix	(cm4)	29515053	27985432
	Iy	(cm4)	87245461	83012180
Torsion Constant	J	(cm4)	20848951	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	50089.6 kN･m	50089.6 kN･m
	Mxr(lower)=	29103.4 kN･m	26343.1 kN･m

Stress (N/mm²)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	48	140	1	0	1	80	0.12
	[2]	46	140	22	0	23	80	0.19
DECK-C	[3]	46	140	22	0	23	80	0.19
	[4]	45	140	23	7	24	80	0.19
	[5]	42	140	16	7	23	80	0.17
	[6]	42	140	10	0	11	80	0.11
DECK-R	[7]	42	140	10	0	11	80	0.11
	[8]	40	140	0	0	0	80	0.08
LWEB	[9]	44	210	33	8	41	120	0.16
	[10]	0	210	35	8	43	120	0.13
	[11]	-124	210	19	8	27	120	0.40
RWEB	[12]	41	210	29	8	36	120	0.13
	[13]	0	210	31	8	38	120	0.10
	[14]	-124	210	13	8	20	120	0.38
LFLG	[15]	-124	190	0	0	0	120	0.35
	[16]	-124	196	27	11	39	120	0.46
	[17]	-125	196	17	11	29	120	0.41
	[18]	-125	190	0	0	0	120	0.35

Girder Name：G4　Section Name：Sec-12:J-12　（Girder number=　4　Section number=　13）

Section force	Mx-Max	Mx =	2601 kN·m	Sy =	1480 kN	T =	1382 kN·m
	Mx-Min	Mx =	-7048 kN·m	Sy =	1480 kN	T =	1382 kN·m

Effective buckling length　　Lx =　4771 mmLy =　4771 mm
Radius of curvature　　R　=-999.4 m
Inclination　　DECK =　-2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	2513	2488
		Intermediate	3000	3000
		overhang	1350	1350
	LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L	PL　2333 * 16 (SM400)	373.3	369.3
4-RIB	PL　250 * 24 (SM400)	240.0	240.0
1-U.RIB	320 * 240 *　8 (SM400)	53.9	53.9
1-DECK-C	PL　3361 * 16 (SM400)	537.7	537.7
5-U.RIB	320 * 240 *　8 (SM400)	269.5	269.5
1-DECK-R	PL　1170 * 16 (SM400)	187.2	187.2
3-RIB	PL　250 * 24 (SM400)	180.0	180.0
1-LWEB	PL　2730 * 15 (SM490Y)	409.5	409.5
1-RWEB	PL　3063 * 15 (SM490Y)	459.4	459.4
1-LFLG	PL　1740 * 10 (SM490Y)	174.0	174.0
5-RIB	PL　170 * 17 (SM490Y)	144.5	144.5

Section property		Total	In-plane
Section area	A (cm2)	3029.0	3025.0
Gravity center	ex (cm)	-50.6	-50.1
	ey (cm)	200.8	200.7
Moment of inertia	Ix (cm4)	29458372	29434079
	Iy (cm4)	85301553	84815285
Torsion Constant	J (cm4)	20849112	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	52481.6 kN·m	52481.6 kN·m
	Mxr(lower)=	30623.2 kN·m	27718.7 kN·m

Stress (N/mm²)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-7	140	0	0	0	80	0.00
	[2]	-7	140	14	0	15	80	0.04
DECK-C	[3]	-7	140	15	0	15	80	0.04
	[4]	-7	140	15	7	15	80	0.04
	[5]	-6	140	10	7	17	80	0.05
	[6]	-6	140	7	0	7	80	0.01
DECK-R	[7]	-6	140	7	0	7	80	0.01
	[8]	-6	140	0	0	0	80	0.00
LWEB	[9]	-6	210	22	7	29	120	0.06
	[10]	0	210	23	7	30	120	0.06
	[11]	18	210	13	7	20	120	0.04
RWEB	[12]	-6	210	19	8	26	120	0.05
	[13]	0	210	20	8	28	120	0.05
	[14]	18	210	8	8	16	120	0.02

	LFLG	[15]	18	210	0	0	0	120	0.01
		[16]	18	210	18	11	29	120	0.07
		[17]	18	210	11	11	23	120	0.04
		[18]	18	210	0	0	0	120	0.01

Mx-Min	[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	19	140	0	0	0	80	0.02
		[2]	18	140	14	0	15	80	0.05
	DECK-C	[3]	18	140	15	0	15	80	0.05
		[4]	18	140	15	7	15	80	0.05
		[5]	16	140	10	7	17	80	0.06
		[6]	16	140	7	0	7	80	0.02
	DECK-R	[7]	16	140	7	0	7	80	0.02
		[8]	16	140	0	0	0	80	0.01
	LWEB	[9]	17	210	22	7	29	120	0.07
		[10]	0	210	23	7	30	120	0.06
		[11]	-48	210	13	7	20	120	0.08
	RWEB	[12]	16	210	19	8	26	120	0.05
		[13]	0	210	20	8	28	120	0.05
		[14]	-48	210	8	8	16	120	0.07
	LFLG	[15]	-48	190	0	0	0	120	0.05
		[16]	-48	196	18	11	29	120	0.11
		[17]	-48	196	11	11	23	120	0.09
		[18]	-48	190	0	0	0	120	0.05

Girder Name : G4   Section Name : Sec-13:Left   (Girder number=   4   Section number= 14)

Section force	Mx-Max	Mx = 2601 kN·m	Sy = 1480 kN	T = 1382 kN·m
	Mx-Min	Mx = -7048 kN·m	Sy = 1480 kN	T = 1382 kN·m

Effective buckling length   Lx = 4771 mmLy = 4771 mm
Radius of curvature   R =-999.4 m
Inclination   DECK = -2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	2513	2488
		Intermediate	3000	3000
		overhang	1350	1350
	LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	2333 * 16 (SM400)	373.3	369.3
4-RIB PL	250 * 24 (SM400)	240.0	240.0
1-U.RIB 320	* 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL	3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320	* 240 * 8 (SM400)	269.5	269.5
1-DECK-R PL	1170 * 16 (SM400)	187.2	187.2
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-LWEB PL	2730 * 15 (SM490Y)	409.5	409.5
1-RWEB PL	3063 * 15 (SM490Y)	459.4	459.4
1-LFLG PL	1740 * 10 (SM490Y)	174.0	174.0
5-RIB PL	170 * 17 (SM490Y)	144.5	144.5

Section property			Total	In-plane
	Section area	A (cm2)	3029.0	3025.0
	Gravity center	ex (cm)	-50.6	-50.1
		ey (cm)	200.8	200.7
	Moment of inertia	Ix (cm4)	29458372	29434079
		Iy (cm4)	85301553	84815285
	Torsion Constant	J (cm4)	20849112	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	52481.6 kN·m	52481.6 kN·m
	Mxr(lower)=	30623.2 kN·m	27718.7 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-7	140	0	0	0	80	0.00
	[2]	-7	140	14	0	15	80	0.04
DECK-C	[3]	-7	140	15	0	15	80	0.04
	[4]	-7	140	15	7	15	80	0.04
	[5]	-6	140	10	7	17	80	0.05
	[6]	-6	140	7	0	7	80	0.01
DECK-R	[7]	-6	140	7	0	7	80	0.01
	[8]	-6	140	0	0	0	80	0.00
LWEB	[9]	-6	210	22	7	29	120	0.06
	[10]	0	210	23	7	30	120	0.06
	[11]	18	210	13	7	20	120	0.04
RWEB	[12]	-6	210	19	8	26	120	0.05
	[13]	0	210	20	8	28	120	0.05
	[14]	18	210	8	8	16	120	0.02

LFLG	[15]	18	210	0	0	0	120	0.01
	[16]	18	210	18	11	29	120	0.07
	[17]	18	210	11	11	23	120	0.04
	[18]	18	210	0	0	0	120	0.01

Mx-Min

[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	19	140	0	0	0	80	0.02
	[2]	18	140	14	0	15	80	0.05
DECK-C	[3]	18	140	15	0	15	80	0.05
	[4]	18	140	15	7	15	80	0.05
	[5]	16	140	10	7	17	80	0.06
	[6]	16	140	7	0	7	80	0.02
DECK-R	[7]	16	140	7	0	7	80	0.02
	[8]	16	140	0	0	0	80	0.01
LWEB	[9]	17	210	22	7	29	120	0.07
	[10]	0	210	23	7	30	120	0.06
	[11]	-48	210	13	7	20	120	0.08
RWEB	[12]	16	210	19	8	26	120	0.05
	[13]	0	210	20	8	28	120	0.05
	[14]	-48	210	8	8	16	120	0.07
LFLG	[15]	-48	190	0	0	0	120	0.05
	[16]	-48	196	18	11	29	120	0.11
	[17]	-48	196	11	11	23	120	0.09
	[18]	-48	190	0	0	0	120	0.05

Girder Name：G4　Section Name：Sec-13:J-13　（Girder number=　4　Section number=　14）

Section force	Mx-Max	Mx = 9246 kN·m	Sy = 816 kN	T = 1174 kN·m	
	Mx-Min	Mx = -2404 kN·m	Sy = 816 kN	T = 1174 kN·m	

Effective buckling length　　Lx = 4771 mmLy = 4771 mm
Radius of curvature　　R =-999.4 m
Inclination　　DECK = -2.0 %

Effective width(mm)		Full width	In-plane
DECK	overhang	2475	2455
	Intermediate	3000	3000
	overhang	1350	1350
LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	2296 * 16 (SM400)	367.3	364.0
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 *	8 (SM400)	269.5	269.5
1-DECK-R PL	1170 * 16 (SM400)	187.2	187.2
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-LWEB PL	2730 * 15 (SM490Y)	409.5	409.5
1-RWEB PL	3063 * 15 (SM490Y)	459.4	459.4
1-LFLG PL	1740 * 10 (SM490Y)	174.0	174.0
5-RIB PL	170 * 17 (SM490Y)	144.5	144.5

Section property		Total	In-plane
Section area	A (cm2)	2963.0	2959.7
Gravity center	ex (cm)	-45.5	-45.1
	ey (cm)	199.4	199.3
Moment of inertia	Ix (cm4)	29182828	29162116
	Iy (cm4)	81625713	81221693
Torsion Constant	J (cm4)	20848499	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	51120.9 kN·m	51120.9 kN·m
	Mxr(lower)=	30552.6 kN·m	27654.8 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-25	140	0	0	0	80	0.03
	[2]	-24	140	7	0	8	80	0.04
DECK-C	[3]	-24	140	7	0	8	80	0.04
	[4]	-24	140	8	6	9	80	0.04
	[5]	-22	140	5	6	11	80	0.05
	[6]	-22	140	4	0	4	80	0.03
DECK-R	[7]	-22	140	4	0	4	80	0.03
	[8]	-21	140	0	0	0	80	0.02
LWEB	[9]	-23	210	12	6	18	120	0.04
	[10]	0	210	12	6	19	120	0.02
	[11]	63	210	7	6	13	120	0.10
RWEB	[12]	-22	210	10	6	17	120	0.03
	[13]	0	210	11	6	18	120	0.02
	[14]	63	210	5	6	11	120	0.10

	LFLG	[15]	63	210	0	0	0	120	0.09
		[16]	63	210	10	10	19	120	0.12
		[17]	64	210	6	10	16	120	0.11
		[18]	64	210	0	0	0	120	0.09

Mx-Min	[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	7	140	0	0	0	80	0.00
		[2]	6	140	7	0	8	80	0.01
	DECK-C	[3]	6	140	7	0	8	80	0.01
		[4]	6	140	8	6	9	80	0.01
		[5]	6	140	5	6	11	80	0.02
		[6]	6	140	4	0	4	80	0.00
	DECK-R	[7]	6	140	4	0	4	80	0.00
		[8]	6	140	0	0	0	80	0.00
	LWEB	[9]	6	210	12	6	18	120	0.02
		[10]	0	210	12	6	19	120	0.02
		[11]	-16	210	7	6	13	120	0.02
	RWEB	[12]	6	210	10	6	17	120	0.02
		[13]	0	210	11	6	18	120	0.02
		[14]	-16	210	5	6	11	120	0.01
	LFLG	[15]	-16	190	0	0	0	120	0.01
		[16]	-16	196	10	10	19	120	0.03
		[17]	-17	196	6	10	16	120	0.02
		[18]	-17	190	0	0	0	120	0.01

Girder Name：G4　Section Name：Sec-14:Left　（Girder number=　4　Section number=　15）

Section force　Mx-Max　Mx =　9246 kN･m　Sy =　816 kN　T =　1174 kN･m
　　　　　　　Mx-Min　Mx =　-2404 kN･m　Sy =　816 kN　T =　1174 kN･m

Effective buckling length　Lx =　4771 mmLy =　4771 mm
Radius of curvature　R　=-999.4 m
Inclination　DECK =　-2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	2475	2455
	Intermediate	3000	3000
	overhang	1350	1350
LFLG	Intermediate	1500	1500

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL　2296 * 16 (SM400)	367.3	364.0
3-RIB　PL　250 * 24 (SM400)	180.0	180.0
1-U.RIB 320 * 240 *　8 (SM400)	53.9	53.9
1-DECK-C PL　3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 *　8 (SM400)	269.5	269.5
1-DECK-R PL　1170 * 16 (SM400)	187.2	187.2
3-RIB　PL　250 * 24 (SM400)	180.0	180.0
1-LWEB　PL　2730 * 15 (SM490Y)	409.5	409.5
1-RWEB　PL　3063 * 15 (SM490Y)	459.4	459.4
1-LFLG　PL　1740 * 10 (SM490Y)	174.0	174.0
5-RIB　PL　170 * 17 (SM490Y)	144.5	144.5

Section property

		Total	In-plane
Section area	A (cm2)	2963.0	2959.7
Gravity center	ex (cm)	-45.5	-45.1
	ey (cm)	199.4	199.3
Moment of inertia	Ix (cm4)	29182828	29162116
	Iy (cm4)	81625713	81221693
Torsion Constant	J (cm4)	20848499	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	51120.9 kN･m	51120.9 kN･m
	Mxr(lower)=	30552.6 kN･m	27654.8 kN･m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-25	140	0	0	0	80	0.03
	[2]	-24	140	7	0	8	80	0.04
DECK-C	[3]	-24	140	7	0	8	80	0.04
	[4]	-24	140	8	6	9	80	0.04
	[5]	-22	140	5	6	11	80	0.05
	[6]	-22	140	4	0	4	80	0.03
DECK-R	[7]	-22	140	4	0	4	80	0.03
	[8]	-21	140	0	0	0	80	0.02
LWEB	[9]	-23	210	12	6	18	120	0.04
	[10]	0	210	12	6	19	120	0.02
	[11]	63	210	7	6	13	120	0.10
RWEB	[12]	-22	210	10	6	17	120	0.03
	[13]	0	210	11	6	18	120	0.02
	[14]	63	210	5	6	11	120	0.10

	LFLG	[15]	63	210	0	0	0	120	0.09
		[16]	63	210	10	10	19	120	0.12
		[17]	64	210	6	10	16	120	0.11
		[18]	64	210	0	0	0	120	0.09

Mx-Min	[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	7	140	0	0	0	80	0.00
		[2]	6	140	7	0	8	80	0.01
	DECK-C	[3]	6	140	7	0	8	80	0.01
		[4]	6	140	8	6	9	80	0.01
		[5]	6	140	5	6	11	80	0.02
		[6]	6	140	4	0	4	80	0.00
	DECK-R	[7]	6	140	4	0	4	80	0.00
		[8]	6	140	0	0	0	80	0.00
	LWEB	[9]	6	210	12	6	18	120	0.02
		[10]	0	210	12	6	19	120	0.02
		[11]	-16	210	7	6	13	120	0.02
	RWEB	[12]	6	210	10	6	17	120	0.02
		[13]	0	210	11	6	18	120	0.02
		[14]	-16	210	5	6	11	120	0.01
	LFLG	[15]	-16	190	0	0	0	120	0.01
		[16]	-16	196	10	10	19	120	0.03
		[17]	-17	196	6	10	16	120	0.02
		[18]	-17	190	0	0	0	120	0.01

Girder Name : G4　Section Name : Sec-14:Mx-Max　（Girder number=　4　Section number=　15）

Section force	Mx-Max	Mx = 11172 kN·m	Sy = -517 kN	T =	761 kN·m
	Mx-Min	Mx = -1519 kN·m	Sy = -517 kN	T =	761 kN·m

Effective buckling length　Lx = 4771 mmLy = 4771 mm
Radius of curvature　R =-999.4 m
Inclination　DECK = -2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	2456	2438
		Intermediate	3000	3000
		overhang	1350	1350
	LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	2277 * 16 (SM400)	364.3	361.4
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 *	8 (SM400)	269.5	269.5
1-DECK-R PL	1170 * 16 (SM400)	187.2	187.2
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-LWEB PL	2730 * 15 (SM490Y)	409.5	409.5
1-RWEB PL	3063 * 15 (SM490Y)	459.4	459.4
1-LFLG PL	1740 * 10 (SM490Y)	174.0	174.0
5-RIB PL	170 * 17 (SM490Y)	144.5	144.5

Section property			Total	In-plane
	Section area	A (cm2)	2960.0	2957.1
	Gravity center	ex (cm)	-45.0	-44.7
		ey (cm)	199.3	199.3
	Moment of inertia	Ix (cm4)	29163394	29144883
		Iy (cm4)	81018717	80660818
	Torsion Constant	J (cm4)	20848741	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	51052.6 kN·m	51052.6 kN·m
	Mxr(lower)=	30545.7 kN·m	27648.6 kN·m

Stress (N/mm²)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-31	140	0	0	0	80	0.05
	[2]	-29	140	5	0	5	80	0.05
DECK-C	[3]	-29	140	5	0	5	80	0.05
	[4]	-29	140	5	4	6	80	0.05
	[5]	-27	140	3	4	7	80	0.04
	[6]	-27	140	2	0	3	80	0.04
DECK-R	[7]	-27	140	2	0	3	80	0.04
	[8]	-26	140	0	0	0	80	0.03
LWEB	[9]	-28	210	7	4	12	120	0.03
	[10]	0	210	8	4	12	120	0.01
	[11]	76	210	4	4	9	120	0.14
RWEB	[12]	-26	210	7	4	11	120	0.02
	[13]	0	210	7	4	11	120	0.01
	[14]	77	210	3	4	7	120	0.14

LFLG	[15]	77	210	0	0	0	120	0.13
	[16]	77	210	6	6	12	120	0.14
	[17]	77	210	4	6	10	120	0.14
	[18]	77	210	0	0	0	120	0.13

Mx-Min		[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	4	140	0	0	0	80	0.00
		[2]	4	140	5	0	5	80	0.00
	DECK-C	[3]	4	140	5	0	5	80	0.00
		[4]	4	140	5	4	6	80	0.01
		[5]	4	140	3	4	7	80	0.01
		[6]	4	140	2	0	3	80	0.00
	DECK-R	[7]	4	140	2	0	3	80	0.00
		[8]	3	140	0	0	0	80	0.00
	LWEB	[9]	4	210	7	4	12	120	0.01
		[10]	0	210	8	4	12	120	0.01
		[11]	-10	210	4	4	9	120	0.01
	RWEB	[12]	4	210	7	4	11	120	0.01
		[13]	0	210	7	4	11	120	0.01
		[14]	-10	210	3	4	7	120	0.01
	LFLG	[15]	-10	190	0	0	0	120	0.00
		[16]	-10	196	6	6	12	120	0.01
		[17]	-10	196	4	6	10	120	0.01
		[18]	-10	190	0	0	0	120	0.00

Girder Name：G4　Section Name：Sec-14:J-14　（Girder number=　4　Section number=　15）

Section force　Mx-Max　Mx =　11172 kN·m　Sy =　-526 kN　T =　761 kN·m
　　　　　　　Mx-Min　Mx =　-1534 kN·m　Sy =　-526 kN　T =　761 kN·m

Effective buckling length　Lx =　4771 mmLy =　4771 mm
Radius of curvature　R　=-999.4 m
Inclination　DECK =　-2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	2456	2438
	Intermediate	3000	3000
	overhang	1350	1350
LFLG	Intermediate	1500	1500

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL 2277 * 16 (SM400)	364.3	361.3
3-RIB PL 250 * 24 (SM400)	180.0	180.0
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL 3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 * 8 (SM400)	269.5	269.5
1-DECK-R PL 1170 * 16 (SM400)	187.2	187.2
3-RIB PL 250 * 24 (SM400)	180.0	180.0
1-LWEB PL 2730 * 15 (SM490Y)	409.5	409.5
1-RWEB PL 3063 * 15 (SM490Y)	459.4	459.4
1-LFLG PL 1740 * 10 (SM490Y)	174.0	174.0
5-RIB PL 170 * 17 (SM490Y)	144.5	144.5

Section property

		Total	In-plane
Section area	A (cm2)	2960.0	2957.1
Gravity center	ex (cm)	-45.0	-44.7
	ey (cm)	199.3	199.3
Moment of inertia	Ix (cm4)	29163280	29144789
	Iy (cm4)	81014868	80657376
Torsion Constant	J (cm4)	20848748	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	51052.0 kN·m	51052.0 kN·m
	Mxr(lower)=	30545.7 kN·m	27648.6 kN·m

Stress (N/mm²)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-31	140	0	0	0	80	0.05
	[2]	-29	140	5	0	5	80	0.05
DECK-C	[3]	-29	140	5	0	5	80	0.05
	[4]	-29	140	5	4	6	80	0.05
	[5]	-27	140	4	4	7	80	0.04
	[6]	-27	140	3	0	3	80	0.04
DECK-R	[7]	-27	140	3	0	3	80	0.04
	[8]	-26	140	0	0	0	80	0.03
LWEB	[9]	-28	210	8	4	12	120	0.03
	[10]	0	210	8	4	12	120	0.01
	[11]	76	210	4	4	9	120	0.14
RWEB	[12]	-26	210	7	4	11	120	0.02
	[13]	0	210	7	4	11	120	0.01
	[14]	77	210	3	4	7	120	0.14

	LFLG	[15]	77	210	0	0	0	120	0.13
		[16]	77	210	6	6	12	120	0.14
		[17]	77	210	4	6	10	120	0.14
		[18]	77	210	0	0	0	120	0.13

Mx-Min		[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	4	140	0	0	0	80	0.00
		[2]	4	140	5	0	5	80	0.00
	DECK-C	[3]	4	140	5	0	5	80	0.00
		[4]	4	140	5	4	6	80	0.01
		[5]	4	140	4	4	7	80	0.01
		[6]	4	140	3	0	3	80	0.00
	DECK-R	[7]	4	140	3	0	3	80	0.00
		[8]	4	140	0	0	0	80	0.00
	LWEB	[9]	4	210	8	4	12	120	0.01
		[10]	0	210	8	4	12	120	0.01
		[11]	-10	210	4	4	9	120	0.01
	RWEB	[12]	4	210	7	4	11	120	0.01
		[13]	0	210	7	4	11	120	0.01
		[14]	-11	210	3	4	7	120	0.01
	LFLG	[15]	-11	190	0	0	0	120	0.00
		[16]	-11	196	6	6	12	120	0.01
		[17]	-11	196	4	6	10	120	0.01
		[18]	-11	190	0	0	0	120	0.00

Girder Name：G4　Section Name：Sec-15:Left　（Girder number=　4　Section number=　16）

Section force	Mx-Max	Mx =　11172 kN･m	Sy =　-526 kN	T =　761 kN･m
	Mx-Min	Mx =　-1534 kN･m	Sy =　-526 kN	T =　761 kN･m

Effective buckling length　Lx =　4771 mmLy =　4771 mm
Radius of curvature　R =-999.4 m
Inclination　DECK =　-2.0 %

Effective width(mm)		Full width	In-plane
DECK	overhang	2456	2438
	Intermediate	3000	3000
	overhang	1350	1350
LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	2277 * 16 (SM400)	364.3	361.3
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 *	8 (SM400)	269.5	269.5
1-DECK-R PL	1170 * 16 (SM400)	187.2	187.2
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-LWEB PL	2730 * 15 (SM490Y)	409.5	409.5
1-RWEB PL	3063 * 15 (SM490Y)	459.4	459.4
1-LFLG PL	1740 * 10 (SM490Y)	174.0	174.0
5-RIB PL	170 * 17 (SM490Y)	144.5	144.5

Section property		Total	In-plane
Section area	A (cm2)	2960.0	2957.1
Gravity center	ex (cm)	-45.0	-44.7
	ey (cm)	199.3	199.3
Moment of inertia	Ix (cm4)	29163280	29144789
	Iy (cm4)	81014868	80657376
Torsion Constant	J (cm4)	20848748	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	51052.0 kN･m	51052.0 kN･m
	Mxr(lower)=	30545.7 kN･m	27648.6 kN･m

Stress (N/mm²)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-31	140	0	0	0	80	0.05
	[2]	-29	140	5	0	5	80	0.05
DECK-C	[3]	-29	140	5	0	5	80	0.05
	[4]	-29	140	5	4	6	80	0.05
	[5]	-27	140	4	4	7	80	0.04
	[6]	-27	140	3	0	3	80	0.04
DECK-R	[7]	-27	140	3	0	3	80	0.04
	[8]	-26	140	0	0	0	80	0.03
LWEB	[9]	-28	210	8	4	12	120	0.03
	[10]	0	210	8	4	12	120	0.01
	[11]	76	210	4	4	9	120	0.14
RWEB	[12]	-26	210	7	4	11	120	0.02
	[13]	0	210	7	4	11	120	0.01
	[14]	77	210	3	4	7	120	0.14

LFLG	[15]	77	210	0	0	0	120	0.13
	[16]	77	210	6	6	12	120	0.14
	[17]	77	210	4	6	10	120	0.14
	[18]	77	210	0	0	0	120	0.13

Mx-Min		[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	4	140	0	0	0	80	0.00
		[2]	4	140	5	0	5	80	0.00
	DECK-C	[3]	4	140	5	0	5	80	0.00
		[4]	4	140	5	4	6	80	0.01
		[5]	4	140	4	4	7	80	0.01
		[6]	4	140	3	0	3	80	0.00
	DECK-R	[7]	4	140	3	0	3	80	0.00
		[8]	4	140	0	0	0	80	0.00
	LWEB	[9]	4	210	8	4	12	120	0.01
		[10]	0	210	8	4	12	120	0.01
		[11]	-10	210	4	4	9	120	0.01
	RWEB	[12]	4	210	7	4	11	120	0.01
		[13]	0	210	7	4	11	120	0.01
		[14]	-11	210	3	4	7	120	0.01
	LFLG	[15]	-11	190	0	0	0	120	0.00
		[16]	-11	196	6	6	12	120	0.01
		[17]	-11	196	4	6	10	120	0.01
		[18]	-11	190	0	0	0	120	0.00

Girder Name：G4　Section Name：Sec-15:J-15　（Girder number=　4　Section number=　16）

Section force　Mx-Max　Mx =　8905 kN·m　Sy =　-1024 kN　T =　-615 kN·m
　　　　　　　　Mx-Min　Mx =　-4974 kN·m　Sy =　-1024 kN　T =　-615 kN·m

Effective buckling length　Lx =　4772 mmLy =　4772 mm
Radius of curvature　R =-999.4 m
Inclination　DECK =　-2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	2450	2433
	Intermediate	3000	3000
	overhang	1350	1350
LFLG	Intermediate	1500	1500

Section dimensions

Section area(cm2)	Total	in plane
1-DECK-L PL 2271 * 16 (SM400)	363.3	360.5
3-RIB PL 250 * 24 (SM400)	180.0	180.0
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL 3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 * 8 (SM400)	269.5	269.5
1-DECK-R PL 1170 * 16 (SM400)	187.2	187.2
3-RIB PL 250 * 24 (SM400)	180.0	180.0
1-LWEB PL 2730 * 15 (SM490Y)	409.5	409.5
1-RWEB PL 3063 * 15 (SM490Y)	459.4	459.4
1-LFLG PL 1740 * 10 (SM490Y)	174.0	174.0
5-RIB PL 170 * 17 (SM490Y)	144.5	144.5

Section property

		Total	In-plane
Section area	A (cm2)	2959.0	2956.2
Gravity center	ex (cm)	-44.8	-44.5
	ey (cm)	199.3	199.2
Moment of inertia	Ix (cm4)	29157364	29139557
	Iy (cm4)	80819738	80476545
Torsion Constant	J (cm4)	20849014	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	51024.4 kN·m	51024.4 kN·m
	Mxr(lower)=	30543.8 kN·m	27646.8 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-24	140	0	0	0	80	0.03
	[2]	-23	140	9	0	9	80	0.04
DECK-C	[3]	-23	140	9	0	9	80	0.04
	[4]	-23	140	10	3	10	80	0.04
	[5]	-21	140	7	3	10	80	0.04
	[6]	-21	140	5	0	5	80	0.03
DECK-R	[7]	-21	140	5	0	5	80	0.03
	[8]	-20	140	0	0	0	80	0.02
LWEB	[9]	-23	210	15	3	18	120	0.03
	[10]	0	210	16	3	19	120	0.02
	[11]	61	210	9	3	12	120	0.09
RWEB	[12]	-21	210	13	3	16	120	0.03
	[13]	0	210	14	3	17	120	0.02
	[14]	61	210	6	3	9	120	0.09

	LFLG	[15]	61	210	0	0	0	120	0.08
		[16]	61	210	12	5	17	120	0.11
		[17]	61	210	8	5	13	120	0.10
		[18]	61	210	0	0	0	120	0.08

Mx-Min	[Check	point]	σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	14	140	0	0	0	80	0.01
		[2]	13	140	9	0	9	80	0.02
	DECK-C	[3]	13	140	9	0	9	80	0.02
		[4]	13	140	10	3	10	80	0.02
		[5]	12	140	7	3	10	80	0.02
		[6]	12	140	5	0	5	80	0.01
	DECK-R	[7]	12	140	5	0	5	80	0.01
		[8]	11	140	0	0	0	80	0.01
	LWEB	[9]	13	210	15	3	18	120	0.03
		[10]	0	210	16	3	19	120	0.02
		[11]	-34	210	9	3	12	120	0.04
	RWEB	[12]	12	210	13	3	16	120	0.02
		[13]	0	210	14	3	17	120	0.02
		[14]	-34	210	6	3	9	120	0.03
	LFLG	[15]	-34	190	0	0	0	120	0.03
		[16]	-34	196	12	5	17	120	0.05
		[17]	-34	196	8	5	13	120	0.04
		[18]	-34	190	0	0	0	120	0.03

Girder Name：G4　Section Name：Sec-16:Left　（Girder number=　4　Section number=　17）

Section force　Mx-Max　　Mx =　　8905 kN·m　Sy =　-1024 kN　T =　　-615 kN·m
　　　　　　　Mx-Min　　Mx =　-4974 kN·m　Sy =　-1024 kN　T =　　-615 kN·m

Effective buckling length　　Lx =　4772 mmLy =　4772 mm
Radius of curvature　　　　R　=-999.4 m
Inclination　　　　　　　　DECK =　-2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	2450	2433
	Intermediate	3000	3000
	overhang	1350	1350
LFLG	Intermediate	1500	1500

Section dimensions

Section area(cm2)	Total	in plane
1-DECK-L PL 2271 * 16 (SM400)	363.3	360.5
3-RIB PL 250 * 24 (SM400)	180.0	180.0
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL 3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 * 8 (SM400)	269.5	269.5
1-DECK-R PL 1170 * 16 (SM400)	187.2	187.2
3-RIB PL 250 * 24 (SM400)	180.0	180.0
1-LWEB PL 2730 * 15 (SM490Y)	409.5	409.5
1-RWEB PL 3063 * 15 (SM490Y)	459.4	459.4
1-LFLG PL 1740 * 10 (SM490Y)	174.0	174.0
5-RIB PL 170 * 17 (SM490Y)	144.5	144.5

Section property

		Total	In-plane
Section area	A (cm2)	2959.0	2956.2
Gravity center	ex (cm)	-44.8	-44.5
	ey (cm)	199.3	199.2
Moment of inertia	Ix (cm4)	29157364	29139557
	Iy (cm4)	80819738	80476545
Torsion Constant	J (cm4)	20849014	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	51024.4 kN·m	51024.4 kN·m
	Mxr(lower)=	30543.8 kN·m	27646.8 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-24	140	0	0	0	80	0.03
	[2]	-23	140	9	0	9	80	0.04
DECK-C	[3]	-23	140	9	0	9	80	0.04
	[4]	-23	140	10	3	10	80	0.04
	[5]	-21	140	7	3	10	80	0.04
	[6]	-21	140	5	0	5	80	0.03
DECK-R	[7]	-21	140	5	0	5	80	0.03
	[8]	-20	140	0	0	0	80	0.02
LWEB	[9]	-23	210	15	3	18	120	0.03
	[10]	0	210	16	3	19	120	0.02
	[11]	61	210	9	3	12	120	0.09
RWEB	[12]	-21	210	13	3	16	120	0.03
	[13]	0	210	14	3	17	120	0.02
	[14]	61	210	6	3	9	120	0.09

	LFLG	[15]	61	210	0	0	0	120	0.08
		[16]	61	210	12	5	17	120	0.11
		[17]	61	210	8	5	13	120	0.10
		[18]	61	210	0	0	0	120	0.08

Mx-Min	[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	14	140	0	0	0	80	0.01
		[2]	13	140	9	0	9	80	0.02
	DECK-C	[3]	13	140	9	0	9	80	0.02
		[4]	13	140	10	3	10	80	0.02
		[5]	12	140	7	3	10	80	0.02
		[6]	12	140	5	0	5	80	0.01
	DECK-R	[7]	12	140	5	0	5	80	0.01
		[8]	11	140	0	0	0	80	0.01
	LWEB	[9]	13	210	15	3	18	120	0.03
		[10]	0	210	16	3	19	120	0.02
		[11]	-34	210	9	3	12	120	0.04
	RWEB	[12]	12	210	13	3	16	120	0.02
		[13]	0	210	14	3	17	120	0.02
		[14]	-34	210	6	3	9	120	0.03
	LFLG	[15]	-34	190	0	0	0	120	0.03
		[16]	-34	196	12	5	17	120	0.05
		[17]	-34	196	8	5	13	120	0.04
		[18]	-34	190	0	0	0	120	0.03

Girder Name：G4　Section Name：Sec-16:J-16　（Girder number=　4　Section number=　17）

Section force	Mx-Max	Mx = 2827 kN･m	Sy = -1524 kN	T = -980 kN･m
	Mx-Min	Mx = -11223 kN･m	Sy = -1524 kN	T = -980 kN･m

Effective buckling length　Lx = 4787 mmLy = 4787 mm
Radius of curvature　R =-1989. m
Inclination　DECK = -1.9 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	2325	2321
		Intermediate	3000	3000
		overhang	1350	1350
	LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L	PL 2146 * 16 (SM400)	343.3	342.7
5-RIB	PL 250 * 24 (SM400)	300.0	300.0
1-U.RIB	320 * 240 * 8 (SM400)	53.9	53.9
1-DECK-C	PL 3361 * 16 (SM400)	537.7	537.7
5-U.RIB	320 * 240 * 8 (SM400)	269.5	269.5
1-DECK-R	PL 1170 * 16 (SM400)	187.2	187.2
3-RIB	PL 250 * 24 (SM400)	180.0	180.0
1-LWEB	PL 2729 * 15 (SM490Y)	409.3	409.3
1-RWEB	PL 3064 * 15 (SM490Y)	459.5	459.5
1-LFLG	PL 1740 * 10 (SM490Y)	174.0	174.0
5-RIB	PL 170 * 17 (SM490Y)	144.5	144.5

Section property			Total	In-plane
	Section area	A (cm2)	3059.0	3058.3
	Gravity center	ex (cm)	-52.7	-52.6
		ey (cm)	201.3	201.3
	Moment of inertia	Ix (cm4)	29507752	29503912
		Iy (cm4)	86442601	86372069
	Torsion Constant	J (cm4)	20849610	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	53286.3 kN･m	53286.3 kN･m
	Mxr(lower)=	30623.4 kN･m	27719.0 kN･m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-7	140	0	0	0	80	0.00
	[2]	-7	140	15	0	15	80	0.04
DECK-C	[3]	-7	140	15	0	15	80	0.04
	[4]	-7	140	16	5	16	80	0.04
	[5]	-6	140	10	5	15	80	0.04
	[6]	-6	140	7	0	7	80	0.01
DECK-R	[7]	-6	140	7	0	7	80	0.01
	[8]	-6	140	0	0	0	80	0.00
LWEB	[9]	-7	210	22	5	28	120	0.05
	[10]	0	210	24	5	29	120	0.06
	[11]	19	210	13	5	18	120	0.03
RWEB	[12]	-6	210	19	5	25	120	0.04
	[13]	0	210	21	5	26	120	0.05
	[14]	19	210	9	5	14	120	0.02

LFLG	[15]	19	210	0	0	0	120	0.01
	[16]	19	210	18	8	26	120	0.06
	[17]	19	210	12	8	20	120	0.04
	[18]	19	210	0	0	0	120	0.01

Mx-Min		[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	29	140	0	0	0	80	0.04
		[2]	28	140	15	0	15	80	0.08
	DECK-C	[3]	28	140	15	0	15	80	0.08
		[4]	28	140	16	5	16	80	0.08
		[5]	26	140	10	5	15	80	0.07
		[6]	26	140	7	0	7	80	0.04
	DECK-R	[7]	26	140	7	0	7	80	0.04
		[8]	25	140	0	0	0	80	0.03
	LWEB	[9]	27	210	22	5	28	120	0.07
		[10]	0	210	24	5	29	120	0.06
		[11]	-77	210	13	5	18	120	0.16
	RWEB	[12]	25	210	19	5	25	120	0.06
		[13]	0	210	21	5	26	120	0.05
		[14]	-77	210	9	5	14	120	0.15
	LFLG	[15]	-77	190	0	0	0	120	0.13
		[16]	-77	196	18	8	26	120	0.18
		[17]	-77	196	12	8	20	120	0.16
		[18]	-77	190	0	0	0	120	0.13

Girder Name : G4   Section Name : Sec-17:Left   (Girder number= 4   Section number= 18)

Section force	Mx-Max	Mx = 2827 kN·m	Sy = -1524 kN	T = -980 kN·m
	Mx-Min	Mx = -11223 kN·m	Sy = -1524 kN	T = -980 kN·m

Effective buckling length   Lx = 4787 mmLy = 4787 mm
Radius of curvature   R =-1989. m
Inclination   DECK = -1.9 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	2325	2321
		Intermediate	3000	3000
		overhang	1350	1350
	LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	2146 * 16 (SM400)	343.3	342.7
5-RIB PL	250 * 24 (SM400)	300.0	300.0
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 *	8 (SM400)	269.5	269.5
1-DECK-R PL	1170 * 16 (SM400)	187.2	187.2
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-LWEB PL	2729 * 15 (SM490Y)	409.3	409.3
1-RWEB PL	3064 * 15 (SM490Y)	459.5	459.5
1-LFLG PL	1740 * 12 (SM490Y)	208.8	208.8
5-RIB PL	170 * 17 (SM490Y)	144.5	144.5

Section property			Total	In-plane
	Section area	A (cm2)	3093.8	3093.1
	Gravity center	ex (cm)	-52.9	-52.8
		ey (cm)	199.0	199.0
	Moment of inertia	Ix (cm4)	30916823	30912752
		Iy (cm4)	86547666	86477242
	Torsion Constant	J (cm4)	21605715	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	54240.5 kN·m	54240.5 kN·m
	Mxr(lower)=	32418.5 kN·m	32418.5 kN·m

Stress (N/mm²)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-7	140	0	0	0	80	0.00
	[2]	-7	140	15	0	15	80	0.04
DECK-C	[3]	-7	140	15	0	15	80	0.04
	[4]	-7	140	16	5	16	80	0.04
	[5]	-6	140	10	5	15	80	0.04
	[6]	-6	140	7	0	7	80	0.01
DECK-R	[7]	-6	140	7	0	7	80	0.01
	[8]	-6	140	0	0	0	80	0.00
LWEB	[9]	-7	210	22	5	27	120	0.05
	[10]	0	210	23	5	29	120	0.06
	[11]	18	210	14	5	19	120	0.03
RWEB	[12]	-6	210	19	5	24	120	0.04
	[13]	0	210	20	5	26	120	0.05
	[14]	18	210	9	5	14	120	0.02

	LFLG	[15]	18	210	0	0	0	120	0.01
		[16]	18	210	16	7	23	120	0.04
		[17]	18	210	10	7	17	120	0.03
		[18]	18	210	0	0	0	120	0.01

Mx-Min	[Check point]		σmx	σa	τsy	τt	Στ	τa	κ
	DECK-L	[1]	29	140	0	0	0	80	0.04
		[2]	28	140	15	0	15	80	0.07
	DECK-C	[3]	28	140	15	0	15	80	0.07
		[4]	27	140	16	5	16	80	0.08
		[5]	25	140	10	5	15	80	0.07
		[6]	25	140	7	0	7	80	0.04
	DECK-R	[7]	25	140	7	0	7	80	0.04
		[8]	24	140	0	0	0	80	0.03
	LWEB	[9]	27	210	22	5	27	120	0.07
		[10]	0	210	23	5	29	120	0.06
		[11]	-72	210	14	5	19	120	0.14
	RWEB	[12]	25	210	19	5	24	120	0.06
		[13]	0	210	20	5	26	120	0.05
		[14]	-72	210	9	5	14	120	0.13
	LFLG	[15]	-73	210	0	0	0	120	0.12
		[16]	-73	210	16	7	23	120	0.16
		[17]	-73	210	10	7	17	120	0.14
		[18]	-73	210	0	0	0	120	0.12

Girder Name：G4　Section Name：Sec-17:J-17　（Girder number=　4　Section number=　18）

Section force　Mx =　-22461 kN･m　Sy =　-2220 kN　T =　1321 kN･m

Effective buckling length　Lx =　4789 mmLy =　4789 mm
Radius of curvature　R　=-1990. m
Inclination　DECK =　-1.9 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	2023	2023
	Intermediate	3000	3000
	overhang	1350	1350
LFLG	Intermediate	1500	1500

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL　1843 * 16 (SM400)	294.9	294.9
4-RIB　PL　250 * 24 (SM400)	240.0	240.0
1-U.RIB 320 * 240 *　8 (SM400)	53.9	53.9
1-DECK-C PL　3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 *　8 (SM400)	269.5	269.5
1-DECK-R PL　1170 * 16 (SM400)	187.2	187.2
3-RIB　PL　250 * 24 (SM400)	180.0	180.0
1-LWEB　PL　2729 * 15 (SM490Y)	409.3	409.3
1-RWEB　PL　3064 * 15 (SM490Y)	459.5	459.5
1-LFLG　PL　1740 * 12 (SM490Y)	208.8	208.8
5-RIB　PL　170 * 17 (SM490Y)	144.5	144.5

Section property

		Total	In-plane
Section area	A (cm2)	2985.4	2985.4
Gravity center	ex (cm)	-41.4	-41.4
	ey (cm)	196.4	196.4
Moment of inertia	Ix (cm4)	30334174	30334174
	Iy (cm4)	75209617	75209617
Torsion Constant	J (cm4)	21604768	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	51907.7 kN･m	51907.7 kN･m
	Mxr(lower)=	32228.1 kN･m	32228.1 kN･m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	61	140	0	0	0	80	0.19
	[2]	58	140	19	0	20	80	0.23
DECK-C	[3]	58	140	19	0	20	80	0.23
	[4]	58	140	21	7	21	80	0.24
	[5]	54	140	14	7	21	80	0.22
	[6]	53	140	11	0	11	80	0.16
DECK-R	[7]	53	140	11	0	11	80	0.16
	[8]	52	140	0	0	0	80	0.14
LWEB	[9]	57	210	32	7	39	120	0.18
	[10]	0	210	34	7	41	120	0.12
	[11]	-145	210	20	7	27	120	0.53
RWEB	[12]	53	210	28	7	35	120	0.15
	[13]	0	210	30	7	37	120	0.10
	[14]	-146	210	14	7	21	120	0.51
LFLG	[15]	-146	210	0	0	0	120	0.48
	[16]	-146	210	23	9	32	120	0.55
	[17]	-146	210	15	9	24	120	0.53
	[18]	-146	210	0	0	0	120	0.49

Girder Name：G4　Section Name：Sec-18:J-18　（Girder number=　4　Section number=　19）

Section force　Mx =　-39473 kN·m　Sy =　-2980 kN　T =　1271 kN·m

Effective buckling length　Lx =　4790 mmLy =　4790 mm
Radius of curvature　R　=-1990. m
Inclination　DECK =　-1.9 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	1720	1670
		Intermediate	3000	2931
		overhang	1350	1324
	LFLG	Intermediate	1500	1497

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	1540 * 16 (SM490Y)	246.4	238.4
4-RIB PL	250 * 24 (SM490Y)	240.0	180.0
1-U.RIB 320 * 240 *	8 (SM490Y)	53.9	53.9
1-DECK-C PL	3361 * 16 (SM490Y)	537.7	526.6
5-U.RIB 320 * 240 *	8 (SM490Y)	269.5	215.6
1-DECK-R PL	1170 * 16 (SM490Y)	187.2	183.1
3-RIB PL	250 * 24 (SM490Y)	180.0	180.0
1-LWEB PL	2729 * 15 (SM490Y)	409.3	409.3
1-RWEB PL	3064 * 15 (SM490Y)	459.5	459.5
1-LFLG PL	1740 * 24 (SM490Y)	417.6	416.9
5-RIB PL	200 * 22 (SM490Y)	220.0	176.0

Section property			Total	In-plane
	Section area	A (cm2)	3221.2	3039.4
	Gravity center	ex (cm)	-40.0	-34.6
		ey (cm)	178.0	176.8
	Moment of inertia	Ix (cm4)	39680566	37441110
		Iy (cm4)	72110660	66143556
	Torsion Constant	J (cm4)	23795567	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	78011.1 kN·m	78011.1 kN·m
	Mxr(lower)=	43877.2 kN·m	43877.2 kN·m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	106	210	3	0	3	120	0.26
	[2]	103	210	23	0	23	120	0.28
DECK-C	[3]	103	210	23	0	23	120	0.28
	[4]	103	210	24	6	24	120	0.28
	[5]	97	210	17	6	24	120	0.25
	[6]	97	210	14	0	14	120	0.23
DECK-R	[7]	97	210	14	0	14	120	0.23
	[8]	94	210	0	0	0	120	0.20
LWEB	[9]	101	210	40	7	47	120	0.38
	[10]	1	210	43	7	50	120	0.17
	[11]	-186	210	31	7	38	120	0.89
RWEB	[12]	96	210	35	7	42	120	0.33
	[13]	2	210	38	7	45	120	0.14
	[14]	-187	210	25	7	31	120	0.86
LFLG	[15]	-189	210	0	0	0	120	0.81
	[16]	-189	210	18	4	22	120	0.84
	[17]	-189	210	14	4	18	120	0.83
	[18]	-189	210	0	0	0	120	0.81

Girder Name：G4　Section Name：Sec-19:J-19　（Girder number=　4　Section number=　20）

Section force　Mx =　-57409 kN・m　Sy =　-3566 kN　T =　1412 kN・m

Effective buckling length　Lx =　4608 mmLy =　4608 mm
Radius of curvature　R =-1991. m
Inclination　DECK =　-1.9 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1472	1397
	Intermediate	3000	2841
	overhang	1350	1291
LFLG	Intermediate	1500	1494

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL 1293 * 16 (SM490Y)	206.8	194.7
3-RIB PL 250 * 24 (SM490Y)	180.0	180.0
1-U.RIB 320 * 240 * 8 (SM490Y)	53.9	53.9
1-DECK-C PL 3361 * 16 (SM490Y)	537.7	512.3
5-U.RIB 320 * 240 * 8 (SM490Y)	269.5	215.6
1-DECK-R PL 1170 * 16 (SM490Y)	187.2	177.8
3-RIB PL 250 * 24 (SM490Y)	180.0	180.0
1-LWEB PL 2729 * 17 (SM490Y)	463.9	463.9
1-RWEB PL 3063 * 17 (SM490Y)	520.8	520.8
1-LFLG PL 1740 * 45 (SM520-H)	783.0	780.2
5-RIB PL 200 * 22 (SM490Y)	220.0	176.0

Section property

		Total	In-plane
Section area	A (cm2)	3602.8	3455.3
Gravity center	ex (cm)	-36.1	-36.3
	ey (cm)	155.7	154.6
Moment of inertia	Ix (cm4)	50021518	47854425
	Iy (cm4)	68131509	66200586
Torsion Constant	J (cm4)	27145035	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	82105.5 kN・m	82105.5 kN・m
	Mxr(lower)=	63140.7 kN・m	63140.7 kN・m

Stress (N/mm²)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	147	210	1	0	1	120	0.49
	[2]	144	210	22	0	22	120	0.50
DECK-C	[3]	144	210	22	0	22	120	0.50
	[4]	144	210	24	7	25	120	0.51
	[5]	137	210	19	7	26	120	0.47
	[6]	137	210	17	0	17	120	0.44
DECK-R	[7]	137	210	17	0	17	120	0.44
	[8]	134	210	0	0	1	120	0.41
LWEB	[9]	142	210	39	7	46	120	0.60
	[10]	1	210	44	7	51	120	0.18
	[11]	-185	210	35	7	42	120	0.90
RWEB	[12]	135	210	35	7	42	120	0.54
	[13]	2	210	40	7	47	120	0.15
	[14]	-186	210	30	7	37	120	0.88
LFLG	[15]	-191	210	0	0	0	120	0.83
	[16]	-191	210	12	3	15	120	0.84
	[17]	-191	210	10	3	12	120	0.84
	[18]	-191	210	0	0	0	120	0.83

Girder Name:G4 Section Name:Sec-20:Mx-Min_L (Girder number= 4 Section number= 21)

Section force Mx = -66846 kN·m Sy = -3854 kN T = 1412 kN·m

Effective buckling length Lx = 4608 mmLy = 4608 mm
Radius of curvature R =-1991. m
Inclination DECK = -1.9 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1358	1283
	Intermediate	3000	2801
	overhang	1350	1276
LFLG	Intermediate	1500	1492

Section dimensions Section area(cm2)

		Total	in plane
1-DECK-L	PL 1178 * 16 (SM490Y)	188.5	176.5
3-RIB	PL 250 * 24 (SM490Y)	180.0	180.0
1-U.RIB	320 * 240 * 8 (SM490Y)	53.9	53.9
1-DECK-C	PL 3361 * 16 (SM490Y)	537.7	505.8
5-U.RIB	320 * 240 * 8 (SM490Y)	269.5	215.6
1-DECK-R	PL 1170 * 16 (SM490Y)	187.2	175.4
3-RIB	PL 250 * 24 (SM490Y)	180.0	180.0
1-LWEB	PL 2729 * 17 (SM490Y)	463.9	463.9
1-RWEB	PL 3063 * 17 (SM490Y)	520.8	520.8
1-LFLG	PL 1740 * 57 (SM520-H)	991.8	987.4
5-RIB	PL 200 * 22 (SM490Y)	220.0	176.0

Section property

		Total	In-plane
Section area	A (cm2)	3793.3	3635.4
Gravity center	ex (cm)	-36.5	-37.0
	ey (cm)	146.3	144.6
Moment of inertia	Ix (cm4)	54810161	52381152
	Iy (cm4)	66835667	64728856
Torsion Constant	J (cm4)	27569557	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	83222.5 kN·m	83222.5 kN·m
	Mxr(lower)=	73158.3 kN·m	73158.3 kN·m

Stress (N/mm²)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	169	210	1	0	1	120	0.65
	[2]	166	210	22	0	23	120	0.66
DECK-C	[3]	166	210	22	0	23	120	0.66
	[4]	166	210	24	7	27	120	0.67
	[5]	159	210	20	7	26	120	0.62
	[6]	158	210	18	0	18	120	0.59
DECK-R	[7]	158	210	18	0	18	120	0.59
	[8]	155	210	1	0	1	120	0.55
LWEB	[9]	164	210	41	7	48	120	0.77
	[10]	2	210	47	7	54	120	0.20
	[11]	-184	210	39	7	46	120	0.92
RWEB	[12]	157	210	37	7	44	120	0.69
	[13]	2	210	43	7	50	120	0.17
	[14]	-185	210	34	7	41	120	0.89
LFLG	[15]	-192	210	0	0	0	120	0.83
	[16]	-192	210	11	2	13	120	0.84
	[17]	-192	210	9	2	11	120	0.84
	[18]	-192	210	0	0	0	120	0.83

Girder Name：G4　Section Name：Sec-20：Mx-Min_R　（Girder number=　4　Section number=　21）

Section force　Mx =　-66835 kN･m　Sy =　4732 kN　T =　-1401 kN･m

Effective buckling length　Lx =　4552 mmLy =　4552 mm
Radius of curvature　R　=-1991. m
Inclination　DECK =　-1.9 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1358	1283
	Intermediate	3000	2801
	overhang	1350	1277
LFLG	Intermediate	1500	1492

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL　1178 * 16 (SM490Y)	188.6	176.6
2-RIB　PL　250 * 24 (SM490Y)	120.0	120.0
1-U.RIB 320 * 240 *　8 (SM490Y)	53.9	53.9
1-DECK-C PL　3361 * 16 (SM490Y)	537.7	505.8
5-U.RIB 320 * 240 *　8 (SM490Y)	269.5	215.6
1-DECK-R PL　1170 * 16 (SM490Y)	187.3	175.5
3-RIB　PL　250 * 24 (SM490Y)	180.0	180.0
1-LWEB　PL　2729 * 17 (SM490Y)	463.9	463.9
1-RWEB　PL　3063 * 17 (SM490Y)	520.8	520.8
1-LFLG　PL　1740 * 57 (SM520-H)	991.8	987.4
5-RIB　PL　200 * 22 (SM490Y)	220.0	176.0

Section property

		Total	In-plane
Section area	A　(cm2)	3733.4	3575.4
Gravity center	ex (cm)	-33.1	-33.5
	ey (cm)	144.4	142.7
Moment of inertia	Ix (cm4)	53988404	51534770
	Iy (cm4)	64129696	62034604
Torsion Constant	J　(cm4)	27569091	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	80678.1 kN･m	80678.1 kN･m
	Mxr(lower)=	72933.2 kN･m	72933.2 kN･m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[　1]	174	210	1	0	1	120	0.69
	[　2]	171	210	25	0	25	120	0.71
DECK-C	[　3]	171	210	25	0	25	120	0.71
	[　4]	171	210	27	7	33	120	0.74
	[　5]	164	210	25	7	30	120	0.67
	[　6]	163	210	23	0	23	120	0.64
DECK-R	[　7]	163	210	23	0	23	120	0.64
	[　8]	161	210	1	0	1	120	0.58
LWEB	[　9]	169	210	50	7	57	120	0.87
	[10]	2	210	57	7	64	120	0.28
	[11]	-185	210	48	7	55	120	0.98
RWEB	[12]	162	210	46	7	52	120	0.78
	[13]	3	210	53	7	60	120	0.25
	[14]	-186	210	43	7	49	120	0.95
LFLG	[15]	-192	210	0	0	0	120	0.84
	[16]	-192	210	13	2	15	120	0.85
	[17]	-192	210	11	2	13	120	0.85
	[18]	-192	210	0	0	0	120	0.84

Girder Name : G4 Section Name : Sec-21:J-20 (Girder number= 4 Section number= 22)

Section force Mx = -54021 kN·m Sy = 4431 kN T = -1401 kN·m

Effective buckling length Lx = 4552 mmLy = 4552 mm
Radius of curvature R =-1991. m
Inclination DECK = -1.9 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1249	1200
	Intermediate	3000	2831
	overhang	1350	1288
LFLG	Intermediate	1500	1493

Section dimensions Section area(cm2)

		Total	in plane
1-DECK-L	PL 1069 * 16 (SM490Y)	171.1	163.2
3-RIB	PL 250 * 24 (SM490Y)	180.0	120.0
1-U.RIB	320 * 240 * 8 (SM490Y)	53.9	53.9
1-DECK-C	PL 3361 * 16 (SM490Y)	537.7	510.6
5-U.RIB	320 * 240 * 8 (SM490Y)	269.5	215.6
1-DECK-R	PL 1170 * 16 (SM490Y)	187.2	177.2
3-RIB	PL 250 * 24 (SM490Y)	180.0	180.0
1-LWEB	PL 2729 * 17 (SM490Y)	463.9	463.9
1-RWEB	PL 3063 * 17 (SM490Y)	520.8	520.8
1-LFLG	PL 1740 * 42 (SM520-H)	730.8	728.0
5-RIB	PL 200 * 22 (SM490Y)	220.0	176.0

Section property

		Total	In-plane
Section area	A (cm2)	3514.9	3309.3
Gravity center	ex (cm)	-32.6	-28.9
	ey (cm)	156.9	153.9
Moment of inertia	Ix (cm4)	48155614	45329672
	Iy (cm4)	65114336	60002640
Torsion Constant	J (cm4)	27010470	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	77564.5 kN·m	77564.5 kN·m
	Mxr(lower)=	60187.2 kN·m	60187.2 kN·m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	146	210	4	0	4	120	0.49
	[2]	144	210	26	0	26	120	0.52
DECK-C	[3]	144	210	26	0	26	120	0.52
	[4]	144	210	28	7	31	120	0.53
	[5]	137	210	24	7	30	120	0.49
	[6]	137	210	22	0	22	120	0.46
DECK-R	[7]	137	210	22	0	22	120	0.46
	[8]	134	210	1	0	1	120	0.41
LWEB	[9]	142	210	48	7	55	120	0.67
	[10]	4	210	55	7	61	120	0.26
	[11]	-183	210	43	7	50	120	0.94
RWEB	[12]	135	210	44	7	50	120	0.59
	[13]	4	210	50	7	57	120	0.22
	[14]	-184	210	37	7	44	120	0.90
LFLG	[15]	-188	210	0	0	0	120	0.80
	[16]	-188	210	16	3	18	120	0.83
	[17]	-188	210	13	3	16	120	0.82
	[18]	-188	210	0	0	0	120	0.81

Girder Name：G4　Section Name：Sec-22:J-21　（Girder number=　4　Section number=　23）

Section force　Mx =　-29958 kN·m　Sy =　3701 kN　T =　-1533 kN·m

Effective buckling length　Lx =　4694 mmLy =　4694 mm
Radius of curvature　R　=-1992. m
Inclination　DECK =　-1.9 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	1017	1002
	Intermediate	3000	2894
	overhang	1350	1311
LFLG	Intermediate	1500	1496

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL　837 * 16 (SM400)	133.9	131.5
1-RIB　PL　250 * 24 (SM400)	60.0	60.0
1-U.RIB 320 * 240 *　8 (SM400)	53.9	53.9
1-DECK-C PL　3361 * 16 (SM400)	537.7	520.7
5-U.RIB 320 * 240 *　8 (SM400)	269.5	215.6
1-DECK-R PL　1170 * 16 (SM400)	187.2	181.0
3-RIB　PL　250 * 24 (SM400)	180.0	180.0
1-LWEB　PL　2729 * 15 (SM490Y)	409.3	409.3
1-RWEB　PL　3063 * 15 (SM490Y)	459.5	459.5
1-LFLG　PL　1740 * 21 (SM490Y)	365.4	364.5
5-RIB　PL　200 * 22 (SM490Y)	220.0	176.0

Section property

		Total	In-plane
Section area	A　(cm2)	2876.5	2752.1
Gravity center	ex (cm)	-14.8	-14.6
	ey (cm)	172.2	172.3
Moment of inertia	Ix (cm4)	35491339	33690330
	Iy (cm4)	52688418	51814044
Torsion Constant	J　(cm4)	23447048	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	45347.9 kN·m	45347.9 kN·m
	Mxr(lower)=	40562.9 kN·m	40562.9 kN·m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[　1]	92	140	0	0	0	80	0.44
	[　2]	91	140	15	0	16	80	0.46
DECK-C	[　3]	91	140	15	0	16	80	0.46
	[　4]	91	140	26	8	34	80	0.60
	[　5]	86	140	23	8	27	80	0.49
	[　6]	85	140	21	0	21	80	0.44
DECK-R	[　7]	85	140	21	0	21	80	0.44
	[　8]	84	140	0	0	0	80	0.36
LWEB	[　9]	89	210	46	8	55	120	0.39
	[10]	0	210	52	8	60	120	0.25
	[11]	-153	210	36	8	44	120	0.67
RWEB	[12]	85	210	45	8	53	120	0.36
	[13]	-1	210	50	8	59	120	0.24
	[14]	-154	210	33	8	41	120	0.65
LFLG	[15]	-155	210	0	0	0	120	0.54
	[16]	-155	210	24	6	30	120	0.61
	[17]	-155	210	21	6	27	120	0.60
	[18]	-155	210	0	0	0	120	0.55

Girder Name : G4　Section Name : Sec-23:J-22　(Girder number=　4　Section number=　24)

Section force　Mx =　-9632 kN·m　Sy =　3140 kN　T =　-2215 kN·m

Effective buckling length　Lx =　4577 mmLy =　4577 mm
Radius of curvature　R　=-1992. m
Inclination　DECK =　-2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	842	840
	Intermediate	3000	2961
	overhang	1349	1335
LFLG	Intermediate	1500	1498

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL 662 * 16 (SM400)	106.0	105.7
1-RIB PL 250 * 24 (SM400)	60.0	60.0
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL 3361 * 16 (SM400)	537.7	531.5
5-U.RIB 320 * 240 * 8 (SM400)	269.5	215.6
1-DECK-R PL 1169 * 16 (SM400)	187.1	184.8
3-RIB PL 250 * 24 (SM400)	180.0	180.0
1-LWEB PL 2730 * 15 (SM490Y)	409.4	409.4
1-RWEB PL 3063 * 15 (SM490Y)	459.4	459.4
1-LFLG PL 1740 * 14 (SM490Y)	243.6	243.4
5-RIB PL 170 * 17 (SM490Y)	144.5	115.6

Section property

		Total	In-plane
Section area	A (cm2)	2651.2	2559.3
Gravity center	ex (cm)	-7.9	-7.6
	ey (cm)	183.6	183.8
Moment of inertia	Ix (cm4)	29241947	28005882
	Iy (cm4)	49977917	49623009
Torsion Constant	J (cm4)	22182463	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	42472.2 kN·m	42472.2 kN·m
	Mxr(lower)=	31753.0 kN·m	31753.0 kN·m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	32	140	0	0	0	80	0.05
	[2]	31	140	12	0	12	80	0.07
DECK-C	[3]	31	140	12	0	13	80	0.07
	[4]	31	140	24	11	35	80	0.24
	[5]	29	140	20	11	29	80	0.17
	[6]	29	140	19	0	19	80	0.10
DECK-R	[7]	29	140	19	0	19	80	0.10
	[8]	28	140	0	0	0	80	0.04
LWEB	[9]	31	210	40	12	52	120	0.21
	[10]	0	210	45	12	57	120	0.22
	[11]	-63	210	27	12	39	120	0.19
RWEB	[12]	29	210	40	12	52	120	0.21
	[13]	0	210	45	12	57	120	0.22
	[14]	-63	210	24	12	36	120	0.18
LFLG	[15]	-64	210	0	0	0	120	0.09
	[16]	-64	210	26	13	39	120	0.20
	[17]	-64	210	23	13	36	120	0.18
	[18]	-64	210	0	0	0	120	0.09

Girder Name : G4　Section Name : Sec-23:Right　(Girder number= 4　Section number= 24)

Section force　Mx = 15157 kN·m　Sy = 2667 kN　T = -1791 kN·m

Effective buckling length　Lx = 4682 mmLy = 4682 mm
Radius of curvature　R =-1992. m
Inclination　DECK = -2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	825
	Intermediate	3000	3000
	overhang	1350	1350
LFLG	Intermediate	1500	1500

Section dimensions

Section area(cm2)	Total	in plane
1-DECK-L PL 645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL 3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 * 8 (SM400)	269.5	269.5
1-DECK-R PL 1170 * 16 (SM400)	187.2	187.2
3-RIB PL 250 * 24 (SM400)	180.0	180.0
1-LWEB PL 2730 * 15 (SM490Y)	409.5	409.5
1-RWEB PL 3062 * 15 (SM490Y)	459.4	459.4
1-LFLG PL 1740 * 14 (SM490Y)	243.6	243.6
5-RIB PL 170 * 17 (SM490Y)	144.5	144.5

Section property

		Total	In-plane
Section area	A (cm2)	2588.5	2588.5
Gravity center	ex (cm)	-2.5	-2.5
	ey (cm)	181.7	181.7
Moment of inertia	Ix (cm4)	28835354	28835354
	Iy (cm4)	46748041	46748041
Torsion Constant	J (cm4)	22183805	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	42740.1 kN·m	42740.1 kN·m
	Mxr(lower)=	33071.6 kN·m	33071.6 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-50	140	0	0	0	80	0.13
	[2]	-49	140	8	0	8	80	0.13
DECK-C	[3]	-49	140	8	0	8	80	0.13
	[4]	-49	140	22	9	31	80	0.27
	[5]	-46	140	18	9	23	80	0.19
	[6]	-46	140	17	0	17	80	0.15
DECK-R	[7]	-46	140	17	0	17	80	0.15
	[8]	-44	140	0	0	0	80	0.10
LWEB	[9]	-48	210	34	10	43	120	0.18
	[10]	0	210	37	10	47	120	0.15
	[11]	95	210	22	10	32	120	0.28
RWEB	[12]	-45	210	34	10	44	120	0.18
	[13]	0	210	38	10	48	120	0.16
	[14]	96	210	21	10	30	120	0.27
LFLG	[15]	96	210	0	0	0	120	0.21
	[16]	96	210	22	10	32	120	0.28
	[17]	96	210	20	10	31	120	0.27
	[18]	96	210	0	0	0	120	0.21

Girder Name：G4　Section Name：Sec-23:J-23　（Girder number=　4　Section number=　25）

Section force　Mx =　19304 kN･m　Sy =　2534 kN　T =　-1765 kN･m

Effective buckling length　Lx =　4682 mmLy =　4682 mm
Radius of curvature　R　=-1992. m
Inclination　DECK =　-2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	825	825
		Intermediate	3000	3000
		overhang	1350	1350
	LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 *	8 (SM400)	53.9	53.9
1-DECK-C PL	3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 *	8 (SM400)	269.5	269.5
1-DECK-R PL	1170 * 16 (SM400)	187.2	187.2
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-LWEB PL	2730 * 15 (SM490Y)	409.5	409.5
1-RWEB PL	3062 * 15 (SM490Y)	459.4	459.4
1-LFLG PL	1740 * 14 (SM490Y)	243.6	243.6
2-RIB PL	170 * 17 (SM490Y)	57.8	57.8

Section property			Total	In-plane
Section area	A	(cm2)	2501.8	2501.8
Gravity center	ex	(cm)	0.0	0.0
	ey	(cm)	187.7	187.7
Moment of inertia	Ix	(cm4)	26143401	26143401
	Iy	(cm4)	46131395	46131395
Torsion Constant	J	(cm4)	22183525	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	41375.6 kN･m	41375.6 kN･m
	Mxr(lower)=	29033.2 kN･m	20312.8 kN･m

Stress (N/mm²)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-65	140	0	0	0	80	0.22
	[2]	-64	140	8	0	8	80	0.22
DECK-C	[3]	-64	140	8	0	8	80	0.22
	[4]	-64	140	21	9	30	80	0.35
	[5]	-60	140	17	9	23	80	0.26
	[6]	-60	140	16	0	16	80	0.22
DECK-R	[7]	-60	140	16	0	16	80	0.22
	[8]	-58	140	0	0	0	80	0.17
LWEB	[9]	-63	210	32	10	42	120	0.21
	[10]	0	210	36	10	46	120	0.14
	[11]	138	210	19	10	29	120	0.49
RWEB	[12]	-59	210	34	10	43	120	0.21
	[13]	0	210	37	10	47	120	0.15
	[14]	139	210	17	10	27	120	0.49
LFLG	[15]	140	210	0	0	0	120	0.44
	[16]	140	210	18	10	28	120	0.50
	[17]	140	210	16	10	27	120	0.49
	[18]	140	210	0	0	0	120	0.44

Girder Name：G4　Section Name：Sec-24:J-24　（Girder number=　4　Section number=　26）

Section force　Mx =　35119 kN·m　Sy =　1858 kN　T =　-1267 kN·m

Effective buckling length　Lx =　4682 mmLy =　4682 mm
Radius of curvature　R　=-1992. m
Inclination　DECK =　-2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	825
	Intermediate	3000	3000
	overhang	1350	1350
LFLG	Intermediate	1500	1500

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL　645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 *　8 (SM400)	53.9	53.9
1-DECK-C PL　3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 *　8 (SM400)	269.5	269.5
1-DECK-R PL　1170 * 16 (SM400)	187.2	187.2
3-RIB　PL　250 * 24 (SM400)	180.0	180.0
1-LWEB　PL　2730 * 15 (SM490Y)	409.5	409.5
1-RWEB　PL　3062 * 15 (SM490Y)	459.4	459.4
1-LFLG　PL　1740 * 27 (SM490Y)	469.8	469.8
2-RIB　PL　200 * 22 (SM490Y)	88.0	88.0

Section property

		Total	In-plane
Section area	A　(cm2)	2758.2	2758.2
Gravity center	ex (cm)	-6.9	-6.9
	ey (cm)	170.2	170.2
Moment of inertia	Ix (cm4)	34366818	34366818
	Iy (cm4)	48031301	48031301
Torsion Constant	J　(cm4)	24078082	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	45428.2 kN·m	45428.2 kN·m
	Mxr(lower)=	41732.6 kN·m	41732.6 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-108	140	0	0	0	80	0.60
	[2]	-107	140	5	0	5	80	0.59
DECK-C	[3]	-107	140	5	0	5	80	0.59
	[4]	-107	140	15	6	21	80	0.65
	[5]	-101	140	12	6	16	80	0.56
	[6]	-100	140	11	0	11	80	0.53
DECK-R	[7]	-100	140	11	0	11	80	0.53
	[8]	-98	140	0	0	0	80	0.49
LWEB	[9]	-105	210	22	7	29	120	0.31
	[10]	0	210	25	7	32	120	0.07
	[11]	174	210	17	7	24	120	0.73
RWEB	[12]	-99	210	23	7	30	120	0.28
	[13]	1	210	26	7	33	120	0.07
	[14]	174	210	17	7	24	120	0.73
LFLG	[15]	177	210	0	0	0	120	0.71
	[16]	177	210	9	4	12	120	0.72
	[17]	177	210	8	4	12	120	0.72
	[18]	177	210	0	0	0	120	0.71

Girder Name：G4　Section Name：Sec-25:J-25　（Girder number=　4　Section number=　27）

Section force　Mx =　46082 kN·m　Sy =　1409 kN　T =　-1080 kN·m

Effective buckling length　Lx =　4682 mmLy =　4682 mm
Radius of curvature　R =-1992. m
Inclination　DECK =　-2.0 %

Effective width(mm)

			Full width	In-plane
	DECK	overhang	825	825
		Intermediate	3000	3000
		overhang	1350	1350
	LFLG	Intermediate	1500	1500

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL 645 * 16 (SM490Y)	103.2	103.2
1-U.RIB 320 * 240 * 8 (SM490Y)	53.9	53.9
1-DECK-C PL 3361 * 16 (SM490Y)	537.7	537.7
5-U.RIB 320 * 240 * 8 (SM490Y)	269.5	269.5
1-DECK-R PL 1170 * 16 (SM490Y)	187.2	187.2
3-RIB PL 250 * 24 (SM490Y)	180.0	180.0
1-LWEB PL 2730 * 17 (SM570)	464.1	464.1
1-RWEB PL 3062 * 17 (SM570)	520.6	520.6
1-LFLG PL 1740 * 29 (SM570)	504.6	504.6
2-RIB PL 200 * 22 (SM570)	88.0	88.0

Section property

		Total	In-plane
Section area	A (cm2)	2908.9	2908.9
Gravity center	ex (cm)	-8.7	-8.7
	ey (cm)	166.7	166.7
Moment of inertia	Ix (cm4)	36223105	36223105
	Iy (cm4)	49941521	49941521
Torsion Constant	J (cm4)	26185248	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	69536.0 kN·m	69536.0 kN·m
	Mxr(lower)=	54446.7 kN·m	54446.7 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-139	210	0	0	0	120	0.44
	[2]	-138	210	4	0	4	120	0.43
DECK-C	[3]	-138	210	4	0	4	120	0.43
	[4]	-137	210	11	5	16	120	0.45
	[5]	-130	210	9	5	12	120	0.39
	[6]	-129	210	8	0	8	120	0.38
DECK-R	[7]	-129	210	8	0	8	120	0.38
	[8]	-126	210	0	0	0	120	0.36
LWEB	[9]	-135	255	15	5	20	145	0.30
	[10]	0	255	17	5	22	145	0.02
	[11]	212	255	11	5	17	145	0.70
RWEB	[12]	-128	255	15	5	20	145	0.27
	[13]	1	255	17	5	22	145	0.02
	[14]	213	255	11	5	16	145	0.71
LFLG	[15]	216	255	0	0	0	145	0.72
	[16]	216	255	6	3	9	145	0.72
	[17]	216	255	6	3	9	145	0.72
	[18]	216	255	0	0	0	145	0.72

Girder Name：G4　Section Name：Sec-26:J-26　（Girder number=　4　Section number=　28）

Section force　Mx =　53303 kN·m　Sy =　1056 kN　T =　927 kN·m

Effective buckling length　Lx =　4605 mmLy =　4605 mm
Radius of curvature　R　=-293.3 m
Inclination　DECK =　-2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	825
	Intermediate	3000	3000
	overhang	1350	1350
LFLG	Intermediate	1500	1500

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL 645 * 16 (SM490Y)	103.2	103.2
1-U.RIB 320 * 240 * 8 (SM490Y)	53.9	53.9
1-DECK-C PL 3361 * 16 (SM490Y)	537.7	537.7
5-U.RIB 320 * 240 * 8 (SM490Y)	269.5	269.5
1-DECK-R PL 1170 * 16 (SM490Y)	187.2	187.2
3-RIB PL 250 * 24 (SM490Y)	180.0	180.0
1-LWEB PL 2730 * 17 (SM570)	464.1	464.1
1-RWEB PL 3062 * 17 (SM570)	520.6	520.6
1-LFLG PL 1740 * 38 (SM570)	661.2	661.2
2-RIB PL 200 * 22 (SM570)	88.0	88.0

Section property

		Total	In-plane
Section area	A (cm2)	3065.5	3065.5
Gravity center	ex (cm)	-11.6	-11.6
	ey (cm)	158.2	158.2
Moment of inertia	Ix (cm4)	40497926	40497926
	Iy (cm4)	51073267	51073267
Torsion Constant	J (cm4)	26719080	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	72559.0 kN·m	72559.0 kN·m
	Mxr(lower)=	63699.3 kN·m	63699.3 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-154	210	0	0	0	120	0.54
	[2]	-153	210	3	0	3	120	0.53
DECK-C	[3]	-153	210	3	0	3	120	0.53
	[4]	-153	210	8	5	13	120	0.54
	[5]	-146	210	7	5	10	120	0.49
	[6]	-146	210	6	0	6	120	0.48
DECK-R	[7]	-146	210	6	0	6	120	0.48
	[8]	-143	210	0	0	0	120	0.46
LWEB	[9]	-150	255	11	4	15	145	0.36
	[10]	0	255	12	4	17	145	0.01
	[11]	207	255	9	4	14	145	0.67
RWEB	[12]	-144	255	11	4	15	145	0.33
	[13]	1	255	13	4	17	145	0.01
	[14]	209	255	9	4	13	145	0.68
LFLG	[15]	212	255	0	0	0	145	0.69
	[16]	212	255	4	2	6	145	0.69
	[17]	213	255	3	2	5	145	0.70
	[18]	213	255	0	0	0	145	0.70

Girder Name：G4　Section Name：Sec-27:J-27　（Girder number=　4　Section number=　29）

Section force　Mx =　56550 kN·m　Sy =　673 kN　T =　1490 kN·m

Effective buckling length　Lx =　4698 mmLy =　4698 mm
Radius of curvature　R　=　0.0 m
Inclination　DECK =　-2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	825	825
		Intermediate	3000	3000
		overhang	1350	1350
	LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	645 * 16 (SM490Y)	103.2	103.2
1-U.RIB 320	* 240 *　8 (SM490Y)	53.9	53.9
1-DECK-C PL	3361 * 16 (SM490Y)	537.7	537.7
5-U.RIB 320	* 240 *　8 (SM490Y)	269.5	269.5
1-DECK-R PL	1170 * 16 (SM490Y)	187.2	187.2
3-RIB　PL	250 * 24 (SM490Y)	180.0	180.0
1-LWEB　PL	2730 * 17 (SM570)	464.1	464.1
1-RWEB　PL	3062 * 17 (SM570)	520.6	520.6
1-LFLG　PL	1740 * 42 (SM570-H)	730.8	730.8
2-RIB　PL	200 * 22 (SM570)	88.0	88.0

Section property			Total	In-plane
Section area	A	(cm2)	3135.1	3135.1
Gravity center	ex	(cm)	-13.6	-13.6
	ey	(cm)	154.4	154.4
Moment of inertia	Ix	(cm4)	42309721	42309721
	Iy	(cm4)	51420294	51420294
Torsion Constant	J	(cm4)	27031929	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	72905.7 kN·m	72905.7 kN·m
	Mxr(lower)=	68017.1 kN·m	68017.1 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-163	210	0	0	0	120	0.60
	[2]	-161	210	2	0	2	120	0.59
DECK-C	[3]	-161	210	2	0	2	120	0.59
	[4]	-161	210	5	8	13	120	0.60
	[5]	-153	210	4	8	11	120	0.54
	[6]	-152	210	4	0	4	120	0.53
DECK-R	[7]	-152	210	4	0	4	120	0.53
	[8]	-149	210	0	0	0	120	0.50
LWEB	[9]	-159	255	7	7	14	145	0.40
	[10]	0	255	8	7	15	145	0.01
	[11]	206	255	6	7	13	145	0.66
RWEB	[12]	-151	255	7	7	14	145	0.36
	[13]	1	255	8	7	15	145	0.01
	[14]	207	255	6	7	13	145	0.67
LFLG	[15]	212	255	0	0	0	145	0.69
	[16]	212	255	2	3	5	145	0.69
	[17]	212	255	2	3	5	145	0.69
	[18]	212	255	0	0	0	145	0.69

Girder Name：G4　Section Name：Sec-28:Mx-Max　（Girder number=　4　Section number=　30）

Section force　Mx =　56875 kN･m　Sy =　414 kN　T =　1490 kN･m

Effective buckling length　Lx =　4698 mmLy =　4698 mm
Radius of curvature　R　=　0.0 m
Inclination　DECK =　-2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	825
	Intermediate	3000	3000
	overhang	1350	1350
LFLG	Intermediate	1500	1500

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL　645 * 16 (SM490Y)	103.2	103.2
1-U.RIB 320 * 240 *　8 (SM490Y)	53.9	53.9
1-DECK-C PL　3361 * 16 (SM490Y)	537.7	537.7
5-U.RIB 320 * 240 *　8 (SM490Y)	269.5	269.5
1-DECK-R PL　1170 * 16 (SM490Y)	187.2	187.2
3-RIB　PL　250 * 24 (SM490Y)	180.0	180.0
1-LWEB　PL　2730 * 17 (SM570)	464.1	464.1
1-RWEB　PL　3062 * 17 (SM570)	520.6	520.6
1-LFLG　PL　1740 * 42 (SM570-H)	730.8	730.8
2-RIB　PL　200 * 22 (SM570)	88.0	88.0

Section property

		Total	In-plane
Section area	A　(cm2)	3135.1	3135.1
Gravity center	ex　(cm)	-13.6	-13.6
	ey　(cm)	154.4	154.4
Moment of inertia	Ix (cm4)	42309847	42309847
	Iy (cm4)	51420263	51420263
Torsion Constant	J　(cm4)	27031801	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	72908.0 kN･m	72908.0 kN･m
	Mxr(lower)=	68017.2 kN･m	68017.2 kN･m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[　1]	-164	210	0	0	0	120	0.61
	[　2]	-162	210	1	0	1	120	0.60
DECK-C	[　3]	-162	210	1	0	1	120	0.60
	[　4]	-162	210	3	8	11	120	0.60
	[　5]	-153	210	3	8	9	120	0.54
	[　6]	-153	210	2	0	2	120	0.53
DECK-R	[　7]	-153	210	2	0	2	120	0.53
	[　8]	-150	210	0	0	0	120	0.51
LWEB	[　9]	-159	255	4	7	11	145	0.40
	[10]	0	255	5	7	12	145	0.01
	[11]	208	255	4	7	11	145	0.67
RWEB	[12]	-152	255	4	7	11	145	0.36
	[13]	1	255	5	7	12	145	0.01
	[14]	208	255	4	7	11	145	0.67
LFLG	[15]	213	255	0	0	0	145	0.70
	[16]	213	255	1	3	4	145	0.70
	[17]	213	255	1	3	4	145	0.70
	[18]	213	255	0	0	0	145	0.70

Girder Name：G4　Section Name：Sec-29:J-28　（Girder number=　4　Section number=　31）

Section force　Mx =　56096 kN·m　Sy =　-729 kN　T =　1490 kN·m

Effective buckling length　Lx =　4697 mmLy =　4697 mm
Radius of curvature　R　=　0.0 m
Inclination　DECK =　-2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	825
	Intermediate	3000	3000
	overhang	1350	1350
LFLG	Intermediate	1500	1500

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL　645 * 16 (SM490Y)	103.2	103.2
1-U.RIB 320 * 240 *　8 (SM490Y)	53.9	53.9
1-DECK-C PL　3361 * 16 (SM490Y)	537.7	537.7
5-U.RIB 320 * 240 *　8 (SM490Y)	269.5	269.5
1-DECK-R PL　1170 * 16 (SM490Y)	187.2	187.2
3-RIB　PL　250 * 24 (SM490Y)	180.0	180.0
1-LWEB　PL　2730 * 17 (SM570)	464.1	464.1
1-RWEB　PL　3062 * 17 (SM570)	520.6	520.6
1-LFLG　PL　1740 * 42 (SM570-H)	730.8	730.8
2-RIB　PL　200 * 22 (SM570)	88.0	88.0

Section property

		Total	In-plane
Section area	A　(cm2)	3135.1	3135.1
Gravity center	ex (cm)	-13.6	-13.6
	ey (cm)	154.4	154.4
Moment of inertia	Ix (cm4)	42310045	42310045
	Iy (cm4)	51420214	51420214
Torsion Constant	J　(cm4)	27031600	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	72911.6 kN·m	72911.6 kN·m
	Mxr(lower)=	68017.4 kN·m	68017.4 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[　1]	-162	210	0	0	0	120	0.59
	[　2]	-160	210	2	0	2	120	0.58
DECK-C	[　3]	-160	210	2	0	2	120	0.58
	[　4]	-159	210	5	8	13	120	0.59
	[　5]	-151	210	5	8	11	120	0.53
	[　6]	-151	210	4	0	4	120	0.52
DECK-R	[　7]	-151	210	4	0	4	120	0.52
	[　8]	-148	210	0	0	0	120	0.49
LWEB	[　9]	-157	255	7	7	14	145	0.39
	[10]	0	255	9	7	16	145	0.01
	[11]	205	255	7	7	14	145	0.65
RWEB	[12]	-150	255	7	7	15	145	0.35
	[13]	1	255	9	7	16	145	0.01
	[14]	206	255	6	7	13	145	0.66
LFLG	[15]	210	255	0	0	0	145	0.68
	[16]	210	255	2	3	5	145	0.68
	[17]	210	255	2	3	5	145	0.68
	[18]	210	255	0	0	0	145	0.68

Girder Name：G4　Section Name：Sec-30：J-29　（Girder number=　4　Section number=　32）

Section force　Mx =　52103 kN·m　Sy =　-1089 kN　T =　1762 kN·m

Effective buckling length　Lx =　4696 mmLy =　4696 mm
Radius of curvature　R　=　0.0 m
Inclination　DECK =　-2.0 %

Effective width(mm)

			Full width	In-plane
	DECK	overhang	825	825
		Intermediate	3000	3000
		overhang	1350	1350
	LFLG	Intermediate	1500	1500

Section dimensions　Section area(cm2)

		Total	in plane
1-DECK-L	PL　645 * 16 (SM490Y)	103.2	103.2
1-U.RIB	320 * 240 *　8 (SM490Y)	53.9	53.9
1-DECK-C	PL　3361 * 16 (SM490Y)	537.7	537.7
5-U.RIB	320 * 240 *　8 (SM490Y)	269.5	269.5
1-DECK-R	PL　1170 * 16 (SM490Y)	187.2	187.2
3-RIB	PL　250 * 24 (SM490Y)	180.0	180.0
1-LWEB	PL　2730 * 17 (SM570)	464.1	464.1
1-RWEB	PL　3062 * 17 (SM570)	520.6	520.6
1-LFLG	PL　1740 * 36 (SM570)	626.4	626.4
2-RIB	PL　200 * 22 (SM570)	88.0	88.0

Section property

		Total	In-plane
Section area	A　(cm2)	3030.7	3030.7
Gravity center	ex (cm)	-11.4	-11.4
	ey (cm)	159.9	159.9
Moment of inertia	Ix (cm4)	39603272	39603272
	Iy (cm4)	50750861	50750861
Torsion Constant	J　(cm4)	26709721	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	71449.4 kN·m	71449.4 kN·m
	Mxr(lower)=	61775.4 kN·m	61775.4 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[　1]	-153	210	0	0	0	120	0.53
	[　2]	-151	210	3	0	3	120	0.52
DECK-C	[　3]	-151	210	3	0	3	120	0.52
	[　4]	-151	210	8	9	17	120	0.54
	[　5]	-143	210	7	9	14	120	0.48
	[　6]	-143	210	6	0	6	120	0.46
DECK-R	[　7]	-143	210	6	0	6	120	0.46
	[　8]	-139	210	0	0	0	120	0.44
LWEB	[　9]	-149	255	11	8	20	145	0.36
	[10]	0	255	13	8	21	145	0.02
	[11]	210	255	9	8	18	145	0.70
RWEB	[12]	-141	255	11	8	20	145	0.33
	[13]	1	255	13	8	22	145	0.02
	[14]	211	255	9	8	18	145	0.70
LFLG	[15]	215	255	0	0	0	145	0.71
	[16]	215	255	4	4	8	145	0.71
	[17]	215	255	4	4	8	145	0.71
	[18]	215	255	0	0	0	145	0.71

Girder Name：G4　Section Name：Sec-31:J-30　（Girder number=　4　Section number=　33）

Section force　Mx =　43740 kN·m　Sy =　-1435 kN　T =　2022 kN·m

Effective buckling length　Lx =　4695 mmLy =　4695 mm
Radius of curvature　R　=　0.0 m
Inclination　DECK =　-2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	825	825
		Intermediate	3000	3000
		overhang	1350	1350
	LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	645 * 16 (SM490Y)	103.2	103.2
1-U.RIB 320 * 240 *	8 (SM490Y)	53.9	53.9
1-DECK-C PL	3361 * 16 (SM490Y)	537.7	537.7
5-U.RIB 320 * 240 *	8 (SM490Y)	269.5	269.5
1-DECK-R PL	1170 * 16 (SM490Y)	187.2	187.2
3-RIB PL	250 * 24 (SM490Y)	180.0	180.0
1-LWEB PL	2730 * 17 (SM570)	464.1	464.1
1-RWEB PL	3062 * 17 (SM570)	520.6	520.6
1-LFLG PL	1740 * 26 (SM570)	452.4	452.4
2-RIB PL	200 * 22 (SM570)	88.0	88.0

Section property			Total	In-plane
	Section area	A (cm2)	2856.7	2856.7
	Gravity center	ex (cm)	-7.6	-7.6
		ey (cm)	169.8	169.8
	Moment of inertia	Ix (cm4)	34700325	34700325
		Iy (cm4)	49566234	49566234
	Torsion Constant	J (cm4)	25915463	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	68445.9 kN·m	68445.9 kN·m
	Mxr(lower)=	51324.7 kN·m	51324.7 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-134	210	0	0	0	120	0.41
	[2]	-133	210	4	0	4	120	0.40
DECK-C	[3]	-133	210	4	0	4	120	0.40
	[4]	-132	210	11	10	21	120	0.43
	[5]	-125	210	9	10	17	120	0.37
	[6]	-124	210	9	0	9	120	0.35
DECK-R	[7]	-124	210	9	0	9	120	0.35
	[8]	-121	210	0	0	0	120	0.33
LWEB	[9]	-130	255	15	10	25	145	0.29
	[10]	0	255	17	10	27	145	0.03
	[11]	214	255	11	10	21	145	0.73
RWEB	[12]	-123	255	16	10	25	145	0.26
	[13]	1	255	18	10	27	145	0.04
	[14]	215	255	11	10	21	145	0.73
LFLG	[15]	217	255	0	0	0	145	0.73
	[16]	217	255	7	6	13	145	0.73
	[17]	217	255	6	6	13	145	0.73
	[18]	217	255	0	0	0	145	0.73

Girder Name : G4　Section Name : Sec-32:J-31　(Girder number=　4　Section number=　34)

Section force　Mx =　32435 kN·m　Sy =　-1687 kN　T =　2047 kN·m

Effective buckling length　Lx =　4694 mmLy =　4694 mm
Radius of curvature　R　=　0.0 m
Inclination　DECK =　-2.0 %

Effective width(mm)			Full width	In-plane
	DECK	overhang	825	825
		Intermediate	3000	3000
		overhang	1350	1350
	LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB 320	* 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL	3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320	* 240 * 8 (SM400)	269.5	269.5
1-DECK-R PL	1170 * 16 (SM400)	187.2	187.2
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-LWEB PL	2730 * 15 (SM490Y)	409.5	409.5
1-RWEB PL	3062 * 15 (SM490Y)	459.4	459.4
1-LFLG PL	1740 * 23 (SM490Y)	400.2	400.2
2-RIB PL	200 * 22 (SM490Y)	88.0	88.0

Section property			Total	In-plane
Section area	A	(cm2)	2688.6	2688.6
Gravity center	ex	(cm)	-5.3	-5.3
	ey	(cm)	174.7	174.7
Moment of inertia	Ix	(cm4)	32241471	32241471
	Iy	(cm4)	47515708	47515708
Torsion Constant	J	(cm4)	23705081	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	44428.1 kN·m	44428.1 kN·m
	Mxr(lower)=	38260.3 kN·m	38260.3 kN·m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-102	140	0	0	0	80	0.53
	[2]	-101	140	5	0	5	80	0.52
DECK-C	[3]	-101	140	5	0	5	80	0.52
	[4]	-101	140	14	10	24	80	0.61
	[5]	-94	140	11	10	19	80	0.51
	[6]	-94	140	10	0	10	80	0.47
DECK-R	[7]	-94	140	10	0	10	80	0.47
	[8]	-92	140	0	0	0	80	0.43
LWEB	[9]	-99	210	21	11	32	120	0.29
	[10]	0	210	23	11	34	120	0.08
	[11]	176	210	15	11	26	120	0.75
RWEB	[12]	-93	210	21	11	32	120	0.27
	[13]	0	210	24	11	35	120	0.08
	[14]	176	210	14	11	26	120	0.75
LFLG	[15]	178	210	0	0	0	120	0.72
	[16]	178	210	9	7	16	120	0.74
	[17]	178	210	8	7	16	120	0.74
	[18]	178	210	0	0	0	120	0.72

Girder Name：G4　Section Name：Sec-33:J-32　（Girder number=　4　Section number=　35）

Section force　Mx =　16712 kN･m　Sy =　-2425 kN　T =　2106 kN･m

Effective buckling length　Lx =　4648 mmLy =　4648 mm
Radius of curvature　R　= 306.8 m
Inclination　DECK =　-2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	825
	Intermediate	3000	3000
	overhang	1350	1350
LFLG	Intermediate	1500	1500

Section dimensions　Section area(cm2)

	Total	in plane
1-DECK-L PL　645 * 16 (SM400)	103.2	103.2
1-U.RIB 320 * 240 *　8 (SM400)	53.9	53.9
1-DECK-C PL　3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320 * 240 *　8 (SM400)	269.5	269.5
1-DECK-R PL　1170 * 16 (SM400)	187.2	187.2
3-RIB　PL　250 * 24 (SM400)	180.0	180.0
1-LWEB　PL　2730 * 15 (SM490Y)	409.5	409.5
1-RWEB　PL　3062 * 15 (SM490Y)	459.4	459.4
1-LFLG　PL　1740 * 12 (SM490Y)	208.8	208.8
2-RIB　PL　170 * 17 (SM490Y)	57.8	57.8

Section property

		Total	In-plane
Section area	A　(cm2)	2467.0	2467.0
Gravity center	ex (cm)	0.4	0.4
	ey (cm)	190.2	190.2
Moment of inertia	Ix (cm4)	24916079	24916079
	Iy (cm4)	45790524	45790524
Torsion Constant	J　(cm4)	21695395	

Resisting bending moment

		(+)	(-)
In-plane	Mxr(upper)=	40235.7 kN･m	40235.7 kN･m
	Mxr(lower)=	27190.8 kN･m	15485.0 kN･m

Stress (N/mm^2)

Mx-Max	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	-58	140	0	0	0	80	0.17
	[2]	-57	140	8	0	8	80	0.18
DECK-C	[3]	-57	140	8	0	8	80	0.18
	[4]	-57	140	21	11	31	80	0.32
	[5]	-52	140	17	11	24	80	0.23
	[6]	-52	140	15	0	16	80	0.18
DECK-R	[7]	-52	140	15	0	16	80	0.18
	[8]	-50	140	0	0	0	80	0.13
LWEB	[9]	-56	210	31	11	43	120	0.20
	[10]	0	210	35	11	46	120	0.15
	[11]	128	210	17	11	29	120	0.43
RWEB	[12]	-51	210	32	11	44	120	0.19
	[13]	0	210	36	11	47	120	0.15
	[14]	128	210	16	11	27	120	0.42
LFLG	[15]	129	210	0	0	0	120	0.38
	[16]	129	210	19	14	33	120	0.45
	[17]	128	210	18	14	32	120	0.44
	[18]	128	210	0	0	0	120	0.37

Girder Name：G4　Section Name：Sec-33:Right　（Girder number=　4　Section number=　35）

Section force　Mx =　　　0 kN·m　Sy =　-3034 kN　T =　2161 kN·m

Effective buckling length　Lx = 4650 mmLy = 4650 mm
Radius of curvature　R = 0.0 m
Inclination　DECK = -2.0 %

Effective width(mm)

		Full width	In-plane
DECK	overhang	825	825
	Intermediate	3000	3000
	overhang	1350	1350
LFLG	Intermediate	1500	1500

Section dimensions	Section area(cm2)	Total	in plane
1-DECK-L PL	645 * 16 (SM400)	103.2	103.2
1-U.RIB 320	* 240 * 8 (SM400)	53.9	53.9
1-DECK-C PL	3361 * 16 (SM400)	537.7	537.7
5-U.RIB 320	* 240 * 8 (SM400)	269.5	269.5
1-DECK-R PL	1170 * 16 (SM400)	187.2	187.2
3-RIB PL	250 * 24 (SM400)	180.0	180.0
1-LWEB PL	2730 * 15 (SM490Y)	409.5	409.5
1-RWEB PL	3062 * 15 (SM490Y)	459.4	459.4
1-LFLG PL	1740 * 12 (SM490Y)	208.8	208.8
2-RIB PL	170 * 17 (SM490Y)	57.8	57.8

Section property		Total	In-plane
Section area	A (cm2)	2467.0	2467.0
Gravity center	ex (cm)	1.0	1.0
	ey (cm)	190.3	190.3
Moment of inertia	Ix (cm4)	24887703	24887703
	Iy (cm4)	45839010	45839010
Torsion Constant	J (cm4)	21618193	

Resisting bending moment		(+)	(-)
In-plane	Mxr(upper)=	40554.1 kN·m	40554.1 kN·m
	Mxr(lower)=	27287.3 kN·m	15532.1 kN·m

Stress (N/mm^2)

Mx-Min	[Check point]	σmx	σa	τsy	τt	Στ	τa	κ
DECK-L	[1]	0	140	0	0	0	80	0.00
	[2]	0	140	9	0	10	80	0.01
DECK-C	[3]	0	140	9	0	10	80	0.01
	[4]	0	140	26	11	37	80	0.21
	[5]	0	140	21	11	28	80	0.12
	[6]	0	140	19	0	20	80	0.06
DECK-R	[7]	0	140	19	0	20	80	0.06
	[8]	0	140	0	0	0	80	0.00
LWEB	[9]	0	210	39	12	51	120	0.18
	[10]	0	210	44	12	55	120	0.21
	[11]	0	210	21	12	33	120	0.08
RWEB	[12]	0	210	41	12	52	120	0.19
	[13]	0	210	45	12	57	120	0.22
	[14]	0	210	19	12	31	120	0.07
LFLG	[15]	0	210	0	0	0	120	0.00
	[16]	0	210	24	15	39	120	0.10
	[17]	0	210	22	15	36	120	0.09
	[18]	0	210	0	0	0	120	0.00

４．５．Investigations on superimposing stress acting on the main girder and floor system

（１）stress acting on floor system

(refer to paragraph concerning design of longitudinal rib)

（２）Investigations on superimposing

In order to calculate the stress intensity acting on the main girder, use proportion of stress intensity of the upper side of the deck and the down side of bottom flange.

Description of codes

σm N/mm^2 :stress intensity acting on main girder
σf N/mm^2 :stress intensity acting on floor system
$\Sigma\sigma$ N/mm^2 :stress intensity total
σa N/mm^2 :allowable stress intensity

location of investigation: S-xL= “no.X” left edge of cross-sectional area
S-xR= “no.X” right edge of cross-sectional area
S-xPn= “no.x” cross-section, “no.n” peak
P-x = “no.x” upon panel point

＊Main girder G1

investigation location	Upper side of deck plate σm	σf	Σσ	σa	(material)	down side of longitudinal rib σm	σf	Σσ	σa	(material)
S-1L	0	-49	-49	195	(SM400)	0	98	98	195	(SM400)
S-1R	-52	-49	-101	195	(SM400)	-37	-52	-89	195	(SM400)
S-2R	-87	-49	-136	195	(SM400)	-64	-52	-116	195	(SM400)
S-3R	-103	-49	-152	195	(SM400)	-79	-52	-131	195	(SM400)
S-4P1	-108	-49	-157	195	(SM400)	-84	-52	-136	195	(SM400)
S-4R	-108	-49	-157	195	(SM400)	-84	-52	-136	195	(SM400)
S-6L	-102	-49	-151	195	(SM400)	-78	-52	-130	195	(SM400)
S-7L	-84	-49	-133	195	(SM400)	-62	-52	-114	195	(SM400)
S-7R	-47	-49	-96	195	(SM400)	-35	-52	-87	195	(SM400)
S-9L	-45	-49	-94	195	(SM400)	-33	98	65	195	(SM400)
S-9R	30	26	56	195	(SM400)	22	98	120	195	(SM400)
S-10R	87	26	113	195	(SM400)	64	98	162	195	(SM400)
S-11P2	110	26	136	295	(SM490Y)	84	98	182	295	(SM490Y)
S-11P3	110	26	136	295	(SM490Y)	84	98	182	295	(SM490Y)
S-12L	91	26	117	195	(SM400)	68	98	166	195	(SM400)
S-13L	49	26	75	195	(SM400)	36	98	134	195	(SM400)
S-14L	20	26	46	195	(SM400)	15	98	113	195	(SM400)
S-14R	-26	-49	-75	195	(SM400)	-19	98	79	195	(SM400)
S-14R	8	26	34	195	(SM400)	6	98	104	195	(SM400)
S-15P4	-31	-49	-80	195	(SM400)	-23	98	75	195	(SM400)
S-15P4	6	26	32	195	(SM400)	4	98	102	195	(SM400)
S-15R	-31	-49	-80	195	(SM400)	-23	98	75	195	(SM400)
S-15R	6	-49	-43	195	(SM400)	4	98	102	195	(SM400)
S-16R	-24	-49	-73	195	(SM400)	-17	98	81	195	(SM400)
S-16R	16	-49	-33	195	(SM400)	12	98	110	195	(SM400)
S-18L	34	-49	-15	195	(SM400)	25	98	123	195	(SM400)
S-18R	68	26	94	195	(SM400)	50	98	148	195	(SM400)
S-19R	115	26	141	295	(SM490Y)	88	98	186	295	(SM490Y)
S-20R	160	26	186	295	(SM490Y)	129	98	227	295	(SM490Y)
S-21P5	184	26	210	295	(SM490Y)	151	98	249	295	(SM490Y)
S-21P6	184	26	210	295	(SM490Y)	151	98	249	295	(SM490Y)
S-22L	154	26	180	295	(SM490Y)	124	98	222	295	(SM490Y)
S-23L	92	26	118	195	(SM400)	70	98	168	195	(SM400)
S-24L	0	26	26	195	(SM400)	0	98	98	195	(SM400)
S-24L	28	26	54	195	(SM400)	20	98	118	195	(SM400)
S-25L	-56	-49	-105	195	(SM400)	-41	98	57	195	(SM400)
S-25R	-70	26	-44	195	(SM400)	-51	98	47	195	(SM400)
S-26R	-114	-49	-163	195	(SM400)	-88	-52	-140	195	(SM400)
S-27R	-145	-49	-194	295	(SM490Y)	-113	-52	-165	295	(SM490Y)
S-28R	-159	-49	-208	295	(SM490Y)	-127	-52	-179	295	(SM490Y)
S-29R	-167	-49	-216	295	(SM490Y)	-134	-52	-186	295	(SM490Y)
S-30P7	-167	-49	-216	295	(SM490Y)	-134	-52	-186	295	(SM490Y)
S-30R	-165	-49	-214	295	(SM490Y)	-132	-52	-184	295	(SM490Y)
S-32L	-156	-49	-205	295	(SM490Y)	-123	-52	-175	295	(SM490Y)
S-33L	-137	-49	-186	295	(SM490Y)	-105	-52	-157	295	(SM490Y)
S-34L	-104	-49	-153	195	(SM400)	-79	-52	-131	195	(SM400)
S-35L	-60	-49	-109	195	(SM400)	-43	-52	-95	195	(SM400)
S-35R	0	-49	-49	195	(SM400)	0	-52	-52	195	(SM400)

＊Main girder G2

investigation location	Upper side of deck plate σm	σf	Σσ	σa	(material)	down side of longitudinal rib σm	σf	Σσ	σa	(material)
S-1L	0	-49	-49	195	(SM400)	0	-52	-52	195	(SM400)
S-1R	-50	-49	-99	195	(SM400)	-37	98	61	195	(SM400)
S-2R	-85	-49	-134	195	(SM400)	-63	98	35	195	(SM400)
S-3R	-101	-49	-150	195	(SM400)	-78	-52	-130	195	(SM400)
S-4P1	-108	-49	-157	195	(SM400)	-83	-52	-135	195	(SM400)
S-4R	-108	-49	-157	195	(SM400)	-83	-52	-135	195	(SM400)
S-5R	-100	-49	-149	195	(SM400)	-77	-52	-129	195	(SM400)
S-7L	-85	-49	-134	195	(SM400)	-63	-52	-115	195	(SM400)
S-7R	-53	-49	-102	195	(SM400)	-39	-52	-91	195	(SM400)
S-8R	-48	-49	-97	195	(SM400)	-36	-52	-88	195	(SM400)
S-9R	32	-49	-17	195	(SM400)	24	-52	-28	195	(SM400)
S-10R	86	-49	37	195	(SM400)	66	-52	14	195	(SM400)
S-11P2	111	26	137	295	(SM490Y)	86	98	184	295	(SM490Y)
S-11P3	111	26	137	295	(SM490Y)	86	98	184	295	(SM490Y)
S-12L	92	26	118	195	(SM400)	71	98	169	195	(SM400)
S-13L	54	26	80	195	(SM400)	41	98	139	195	(SM400)
S-14L	23	26	49	195	(SM400)	18	98	116	195	(SM400)
S-14R	-30	26	-4	195	(SM400)	-22	98	76	195	(SM400)
S-14R	9	26	35	195	(SM400)	7	98	105	195	(SM400)
S-15R	-35	-49	-84	195	(SM400)	-26	98	72	195	(SM400)
S-15R	7	26	33	195	(SM400)	5	98	103	195	(SM400)
S-16P4	-35	-49	-84	195	(SM400)	-27	98	71	195	(SM400)
S-16P4	8	26	34	195	(SM400)	6	98	104	195	(SM400)
S-16R	-27	-49	-76	195	(SM400)	-20	98	78	195	(SM400)
S-16R	19	26	45	195	(SM400)	15	98	113	195	(SM400)
S-18L	39	-49	-10	195	(SM400)	30	98	128	195	(SM400)
S-18R	72	26	98	195	(SM400)	54	98	152	195	(SM400)
S-19R	113	26	139	295	(SM490Y)	87	98	185	295	(SM490Y)
S-20R	154	26	180	295	(SM490Y)	124	98	222	295	(SM490Y)
S-21P5	175	26	201	295	(SM490Y)	143	98	241	295	(SM490Y)
S-21P6	175	26	201	295	(SM490Y)	143	98	241	295	(SM490Y)
S-22L	147	26	173	295	(SM490Y)	118	98	216	295	(SM490Y)
S-23L	88	26	114	195	(SM400)	67	98	165	195	(SM400)
S-24L	28	26	54	195	(SM400)	21	98	119	195	(SM400)
S-25L	-52	26	-26	195	(SM400)	-39	98	59	195	(SM400)
S-25R	-65	26	-39	195	(SM400)	-48	98	50	195	(SM400)
S-26R	-116	-49	-165	195	(SM400)	-90	-52	-142	195	(SM400)
S-27R	-152	-49	-201	295	(SM490Y)	-123	-52	-175	295	(SM490Y)
S-28R	-168	-49	-217	295	(SM490Y)	-138	-52	-190	295	(SM490Y)
S-30L	-177	-49	-226	295	(SM490Y)	-145	-52	-197	295	(SM490Y)
S-30P7	-170	-49	-219	295	(SM490Y)	-139	-52	-191	295	(SM490Y)
S-30R	-169	-49	-218	295	(SM490Y)	-138	-52	-190	295	(SM490Y)
S-32L	-160	-49	-209	295	(SM490Y)	-130	-52	-182	295	(SM490Y)
S-33L	-134	-49	-183	295	(SM490Y)	-107	-52	-159	295	(SM490Y)
S-34L	-99	-49	-148	195	(SM400)	-74	-52	-126	195	(SM400)
S-35L	-51	-49	-100	195	(SM400)	-36	-52	-88	195	(SM400)
S-35R	0	-49	-49	195	(SM400)	0	-52	-52	195	(SM400)

＊Main girder G3

investigation location	Upper side of deck plate σm	σf	Σσ	σa	(material)	down side of longitudinal rib σm	σf	Σσ	σa	(material)
S-1L	0	-49	-49	195	(SM400)	0	98	98	195	(SM400)
S-1R	-41	-49	-90	195	(SM400)	-28	98	70	195	(SM400)
S-2R	-72	-64	-136	195	(SM400)	-50	159	109	195	(SM400)
S-3R	-86	-64	-150	195	(SM400)	-63	159	96	195	(SM400)
S-4P1	-91	-48	-139	195	(SM400)	-67	-80	-147	195	(SM400)
S-4R	-91	-48	-139	195	(SM400)	-67	-80	-147	195	(SM400)
S-6L	-86	-48	-134	195	(SM400)	-64	-80	-144	195	(SM400)
S-7L	-74	-48	-122	195	(SM400)	-52	-80	-132	195	(SM400)
S-7R	-45	-48	-93	195	(SM400)	-32	-80	-112	195	(SM400)
S-9L	-41	-48	-89	195	(SM400)	-30	-80	-110	195	(SM400)
S-9R	27	-48	-21	195	(SM400)	20	121	141	195	(SM400)
S-10R	76	-48	28	195	(SM400)	56	121	177	195	(SM400)
S-11P2	97	32	129	295	(SM490Y)	74	121	195	295	(SM490Y)
S-11P3	97	32	129	295	(SM490Y)	74	121	195	295	(SM490Y)
S-12L	82	32	114	195	(SM400)	60	121	181	195	(SM400)
S-13L	48	32	80	195	(SM400)	35	121	156	195	(SM400)
S-14L	21	32	53	195	(SM400)	15	121	136	195	(SM400)
S-14R	-26	25	-1	195	(SM400)	-19	118	99	195	(SM400)
S-14R	8	25	33	195	(SM400)	6	118	124	195	(SM400)
S-15R	-32	-47	-79	195	(SM400)	-23	118	95	195	(SM400)
S-15R	6	25	31	195	(SM400)	4	118	122	195	(SM400)
S-16P4	-32	-47	-79	195	(SM400)	-23	118	95	195	(SM400)
S-16P4	6	25	31	195	(SM400)	4	118	122	195	(SM400)
S-16R	-24	-47	-71	195	(SM400)	-18	118	100	195	(SM400)
S-16R	16	25	41	195	(SM400)	12	118	130	195	(SM400)
S-18L	34	-47	-13	195	(SM400)	25	118	143	195	(SM400)
S-18R	64	25	89	195	(SM400)	47	118	165	195	(SM400)
S-19R	105	25	130	295	(SM490Y)	79	118	197	295	(SM490Y)
S-20R	144	25	169	295	(SM490Y)	115	118	233	295	(SM490Y)
S-21P5	165	25	190	295	(SM490Y)	134	118	252	295	(SM490Y)
S-21P6	165	25	190	295	(SM490Y)	134	118	252	295	(SM490Y)
S-22L	141	25	166	295	(SM490Y)	111	118	229	295	(SM490Y)
S-23L	87	25	112	195	(SM400)	66	118	184	195	(SM400)
S-24L	30	25	55	195	(SM400)	23	118	141	195	(SM400)
S-25L	-51	25	-26	195	(SM400)	-37	118	81	195	(SM400)
S-25R	-64	-47	-111	195	(SM400)	-47	118	71	195	(SM400)
S-26R	-114	25	-89	195	(SM400)	-88	118	30	195	(SM400)
S-27R	-147	-47	-194	295	(SM490Y)	-118	-60	-178	295	(SM490Y)
S-28R	-168	-47	-215	295	(SM490Y)	-137	-60	-197	295	(SM490Y)
S-29R	-172	-47	-219	295	(SM490Y)	-141	-60	-201	295	(SM490Y)
S-30P7	-172	-47	-219	295	(SM490Y)	-141	-60	-201	295	(SM490Y)
S-30R	-165	-47	-212	295	(SM490Y)	-135	-60	-195	295	(SM490Y)
S-32L	-157	-47	-204	295	(SM490Y)	-127	-60	-187	295	(SM490Y)
S-33L	-132	-47	-179	295	(SM490Y)	-104	-60	-164	295	(SM490Y)
S-34L	-100	-47	-147	195	(SM400)	-75	-60	-135	195	(SM400)
S-35L	-51	-47	-98	195	(SM400)	-36	-60	-96	195	(SM400)
S-35R	0	-47	-47	195	(SM400)	0	-60	-60	195	(SM400)

＊Main girder G4

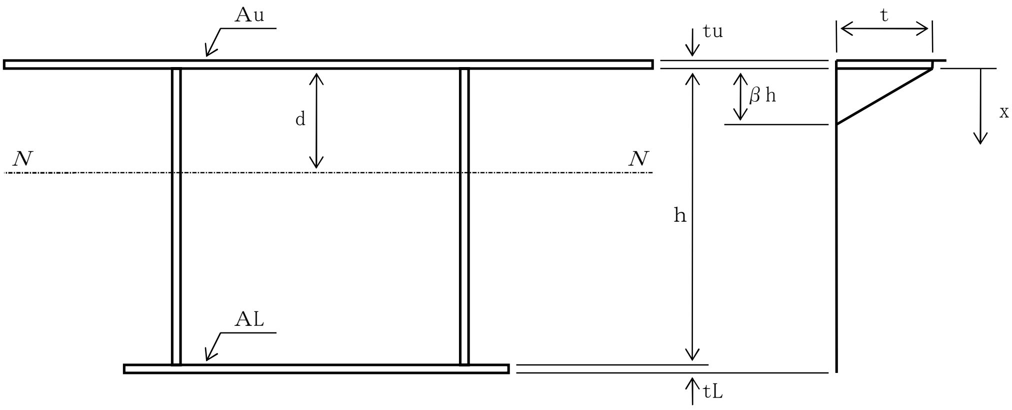
investigation location	Upper side of deck plate σm	σf	Σσ	σa (material)	down side of longitudinal rib σm	σf	Σσ	σa (material)
S-1L	0	-47	-47	195 (SM400)	0	-60	-60	195 (SM400)
S-1L	0	-47	-47	195 (SM400)	0	118	118	195 (SM400)
S-1R	-44	-47	-91	195 (SM400)	-28	118	90	195 (SM400)
S-2R	-76	-64	-140	195 (SM400)	-55	159	104	195 (SM400)
S-3R	-90	-64	-154	195 (SM400)	-68	159	91	195 (SM400)
S-4P1	-95	-64	-159	195 (SM400)	-72	159	87	195 (SM400)
S-4R	-95	-48	-143	195 (SM400)	-72	-80	-152	195 (SM400)
S-6L	-90	-48	-138	195 (SM400)	-68	-80	-148	195 (SM400)
S-7L	-76	-48	-124	195 (SM400)	-54	-80	-134	195 (SM400)
S-7R	-46	-48	-94	195 (SM400)	-33	-80	-113	195 (SM400)
S-9L	-46	-48	-94	195 (SM400)	-32	-80	-112	195 (SM400)
S-9R	27	-48	-21	195 (SM400)	18	-80	-62	195 (SM400)
S-10R	82	-48	34	195 (SM400)	58	121	179	195 (SM400)
S-11P2	102	-48	54	295 (SM490Y)	77	121	198	295 (SM490Y)
S-11P3	102	32	134	295 (SM490Y)	77	121	198	295 (SM490Y)
S-12L	86	32	118	195 (SM400)	62	121	183	195 (SM400)
S-13L	48	32	80	195 (SM400)	33	121	154	195 (SM400)
S-14L	19	32	51	195 (SM400)	13	121	134	195 (SM400)
S-14R	-25	25	0	195 (SM400)	-17	118	101	195 (SM400)
S-14R	7	25	32	195 (SM400)	5	118	123	195 (SM400)
S-15P4	-31	25	-6	195 (SM400)	-21	118	97	195 (SM400)
S-15P4	4	-47	-43	195 (SM400)	3	118	121	195 (SM400)
S-15R	-31	-47	-78	195 (SM400)	-21	118	97	195 (SM400)
S-15R	4	-47	-43	195 (SM400)	3	118	121	195 (SM400)
S-16R	-24	-47	-71	195 (SM400)	-17	118	101	195 (SM400)
S-16R	14	-47	-33	195 (SM400)	9	118	127	195 (SM400)
S-18L	29	-47	-18	195 (SM400)	20	118	138	195 (SM400)
S-18R	61	-47	14	195 (SM400)	42	118	160	195 (SM400)
S-19R	106	25	131	295 (SM490Y)	80	118	198	295 (SM490Y)
S-20R	147	25	172	295 (SM490Y)	117	118	235	295 (SM490Y)
S-21P5	169	25	194	295 (SM490Y)	137	118	255	295 (SM490Y)
S-21P6	174	25	199	295 (SM490Y)	142	118	260	295 (SM490Y)
S-22L	146	25	171	295 (SM490Y)	117	118	235	295 (SM490Y)
S-23L	92	25	117	195 (SM400)	71	118	189	195 (SM400)
S-24L	32	25	57	195 (SM400)	23	118	141	195 (SM400)
S-25L	-51	25	-26	195 (SM400)	-37	118	81	195 (SM400)
S-25R	-65	25	-40	195 (SM400)	-47	118	71	195 (SM400)
S-26R	-108	-47	-155	195 (SM400)	-83	118	35	195 (SM400)
S-27R	-139	25	-114	295 (SM490Y)	-108	118	10	295 (SM490Y)
S-28R	-154	-47	-201	295 (SM490Y)	-122	-60	-182	295 (SM490Y)
S-29R	-163	-47	-210	295 (SM490Y)	-130	-60	-190	295 (SM490Y)
S-30P7	-164	-47	-211	295 (SM490Y)	-131	-60	-191	295 (SM490Y)
S-30R	-162	-47	-209	295 (SM490Y)	-129	-60	-189	295 (SM490Y)
S-32L	-153	-47	-200	295 (SM490Y)	-121	-60	-181	295 (SM490Y)
S-33L	-134	-47	-181	295 (SM490Y)	-103	-60	-163	295 (SM490Y)
S-34L	-102	-47	-149	195 (SM400)	-77	-60	-137	195 (SM400)
S-35L	-58	-47	-105	195 (SM400)	-42	-60	-102	195 (SM400)
S-35R	0	-47	-47	195 (SM400)	0	-60	-60	195 (SM400)

4．6．Investigation on thermal difference stress

As for the steel deck plate girder, because of direct sunlight, a certain thermal difference emerges between the steel deck plate and the bottom flange. Within statically indeterminate structures such as continuous girders, deformation of the girder caused by thermal differences is constrained, therefore additional stress may emerge. Temperature distribution as described in the figure below can be assumed and thermal difference stress can be calculated by the following procedure.

（1） Calculate thermal difference stress within a statically determinate system.
（2） Calculate the bending moment that acts on the cross-section within a statically determinate system
（3） By deducting bending moment (2) from the bending moment that occurs by forcing the bending moment of (2) on a statically indeterminate structure, we can achieve statically indeterminate bending moment.
From this additional stress from a statically indeterminate structure can be calculated.
（4） Investigate the stress of (1), (3) and primary load by superimposing.

Temperature distribution



（1） Thermal difference stress within a statically determinate system

$-tu \leqq x \leqq 0$

$\sigma(x) = E\alpha t\{a + b(d - x) - 1\}$

$0 \leqq x \leqq \beta h$

$\sigma(x) = E\alpha t\{a + b(d - x) - 1 + x/(\beta h)\}$

$\beta h \leqq x \leqq h + tL$

$\sigma(x) = E\alpha t\{a + b(d - x)\}$

Therefore

Stress intensity of the top surface of the deck plate (X = −tu)

$\sigma odu = E\alpha t\{a + b(d + tu) - 1\}$ (N/mm^2)

Stress intensity of the top surface of the web (X = 0)

$\sigma odL = E\alpha t\{a + b * d - 1\}$ (N/mm^2)

Stress intensity of the location 30cm from the top surface of the web (X = 30)

$\sigma ow = E\alpha t\{a + b(d - 30)\}$ (N/mm^2)

Stress intensity of the downside of the bottom flange (X = h + tL)

$\sigma oL = E\alpha t\{a + b(d - (h + tL))\}$ (N/mm^2)

Codes are as follows

ａ = (Au + 1 / 2 * β * Aw) / A
ｂ = { Au(d + tu/2) + β/6 * Aw(3d - βh) } / I
Ｅαｔ = 200000 * 0.000012 * 15 = 36 (N/mm^2)
Au (cm^2): Cross-sectional area of deck plate (including longitudinal rib)
Aw (cm^2): Web cross-sectional area (total of right and left)
tu (cm) : Thickness of deck plate
tw (cm) : Web thickness(total of right and left)
tL (cm) : Bottom flange thickness
h (cm) : Web height (girder as center)
d (cm) : distance to the neutral axis
β : βh = 30 β = 30 / h
A (cm^2): Total cross-sectional area
I (cm^4): cross-sectional stiffness（assume figures within chart as m^4 ）

location of investigation: S-xL=”no. x” left edge of cross-sectional area
S-xR= “no. x” right edge of cross-sectional area
S-xPn= “no. x” cross-section, “no. n” peak
P-x = “no. x” upon panel point

＊Main Girder G1

Investigation location	Au	Aw	tu	tw	tL	h	d	A	I	σodu	σodL	σow	σoL
S-1L	1332	869	1.6	3.0	1.0	270.0	76.9	2432	0.2360	−3	−3	28	−11
S-1R	1332	869	1.6	3.0	1.0	270.0	76.9	2432	0.2360	−3	−3	28	−11
S-2R	1332	869	1.6	3.0	1.8	270.0	87.5	2571	0.2858	−3	−3	28	−9
S-3R	1332	869	1.6	3.0	2.7	270.0	99.8	2758	0.3438	−3	−4	28	−7
S-4P1	1332	869	1.6	3.0	3.0	270.0	103.0	2810	0.3591	−3	−4	28	−7
S-4R	1332	869	1.6	3.0	3.0	270.0	103.0	2810	0.3591	−3	−4	28	−7
S-6L	1332	869	1.6	3.0	2.6	270.0	98.7	2741	0.3386	−3	−4	28	−7
S-7L	1332	869	1.6	3.0	1.7	270.0	86.2	2554	0.2799	−3	−3	28	−9
S-7R	1332	869	1.6	3.0	1.7	270.0	86.2	2554	0.2799	−3	−3	28	−9
S-9L	1332	869	1.6	3.0	1.0	270.0	83.3	2519	0.2646	−3	−3	28	−10
S-10L	1257	985	1.6	3.4	1.0	270.0	85.7	2530	0.2611	−4	−4	27	−10
S-10R	1229	985	1.6	3.4	1.0	270.0	86.6	2501	0.2587	−4	−4	27	−10
S-11P2	1217	985	1.6	3.4	1.5	270.0	96.9	2636	0.3018	−4	−4	27	−8
S-11P3	1217	985	1.6	3.4	1.5	270.0	96.9	2636	0.3018	−4	−4	27	−8
S-12L	1229	985	1.6	3.4	1.2	270.0	89.1	2536	0.2703	−4	−4	27	−10
S-13L	1257	869	1.6	3.0	1.0	270.0	83.3	2415	0.2511	−3	−3	28	−10
S-13R	1332	869	1.6	3.0	1.0	270.0	83.3	2519	0.2646	−3	−3	28	−10
S-14R	1332	869	1.6	3.0	1.0	270.0	83.3	2519	0.2646	−3	−3	28	−10
S-15P4	1332	869	1.6	3.0	1.0	270.0	83.3	2519	0.2646	−3	−3	28	−10
S-15R	1332	869	1.6	3.0	1.0	270.0	83.3	2519	0.2646	−3	−3	28	−10
S-16R	1332	869	1.6	3.0	1.0	270.0	83.3	2519	0.2646	−3	−3	28	−10
S-17R	1332	869	1.6	3.0	1.0	270.0	83.3	2519	0.2646	−3	−3	28	−10
S-18R	1332	869	1.6	3.0	1.2	270.0	85.9	2554	0.2767	−3	−3	28	−9
S-19R	1316	869	1.6	3.0	2.1	270.0	98.9	2726	0.3336	−3	−4	28	−7
S-20R	1242	985	1.6	3.4	4.1	270.0	121.7	3114	0.4253	−4	−5	27	−5
S-21P5	1233	985	1.6	3.4	5.2	270.0	130.9	3295	0.4657	−5	−5	27	−5
S-21P6	1233	985	1.6	3.4	5.2	270.0	130.9	3295	0.4657	−5	−5	27	−5
S-22L	1240	985	1.6	3.4	3.8	270.0	119.2	3059	0.4126	−4	−5	27	−6
S-23L	1254	869	1.6	3.0	1.9	270.0	98.6	2628	0.3185	−4	−4	28	−7
S-24L	1323	869	1.6	3.0	1.5	270.0	87.9	2568	0.2849	−3	−3	28	−9
S-25L	1332	869	1.6	3.0	1.5	270.0	83.6	2519	0.2677	−3	−3	28	−10
S-25R	1332	869	1.6	3.0	1.5	270.0	83.6	2519	0.2677	−3	−3	28	−10
S-26R	1332	869	1.6	3.0	2.9	270.0	102.0	2793	0.3541	−3	−4	28	−7
S-27R	1332	985	1.6	3.4	3.2	270.0	106.3	2961	0.3771	−4	−4	28	−7
S-28R	1332	985	1.6	3.4	4.1	270.0	114.5	3118	0.4185	−4	−4	28	−6
S-29R	1332	985	1.6	3.4	4.4	270.0	117.3	3170	0.4318	−4	−4	28	−6
S-30P7	1332	985	1.6	3.4	4.4	270.0	117.3	3170	0.4318	−4	−4	28	−6
S-30R	1332	985	1.6	3.4	4.4	270.0	117.3	3170	0.4318	−4	−4	28	−6
S-32L	1332	985	1.6	3.4	3.8	270.0	112.0	3065	0.4053	−4	−4	28	−6
S-33L	1332	985	1.6	3.4	2.7	270.0	101.2	2874	0.3522	−4	−4	28	−7
S-34L	1332	869	1.6	3.0	2.4	270.0	96.5	2706	0.3279	−3	−3	28	−7
S-35L	1332	869	1.6	3.0	1.2	270.0	79.8	2467	0.2492	−3	−3	28	−10
S-35R	1332	869	1.6	3.0	1.2	270.0	79.7	2467	0.2489	−3	−3	28	−10

＊Main girder G2

investigation location	Au	Aw	tu	tw	tL	h	d	A	I	σodu	σodL	σow	σoL
S-1L	1272	756	1.6	2.8	1.0	270.0	86.7	2408	0.2784	-3	-4	28	-8
S-1R	1272	756	1.6	2.8	1.0	270.0	86.7	2408	0.2784	-3	-4	28	-8
S-2R	1272	756	1.6	2.8	1.0	270.0	86.7	2408	0.2784	-3	-4	28	-8
S-3R	1272	756	1.6	2.8	1.6	270.0	99.3	2585	0.3344	-3	-4	28	-6
S-4P1	1272	756	1.6	2.8	1.6	270.0	99.3	2585	0.3344	-3	-4	28	-6
S-4R	1272	756	1.6	2.8	1.6	270.0	99.3	2585	0.3344	-3	-4	28	-6
S-5R	1272	756	1.6	2.8	1.6	270.0	99.3	2585	0.3344	-3	-4	28	-6
S-7L	1272	756	1.6	2.8	1.0	270.0	86.7	2408	0.2784	-3	-4	28	-8
S-7R	1272	756	1.6	2.8	1.0	270.0	86.7	2408	0.2784	-3	-4	28	-8
S-8R	1272	756	1.6	2.8	1.0	270.0	94.7	2524	0.3122	-3	-4	28	-7
S-9R	1250	756	1.6	2.8	1.0	270.0	93.1	2467	0.2999	-3	-4	28	-7
S-10R	1222	756	1.6	2.8	1.2	270.0	97.5	2485	0.3116	-4	-4	28	-7
S-11P2	1211	756	1.6	2.8	1.4	270.0	101.4	2524	0.3252	-4	-4	28	-6
S-11P3	1211	756	1.6	2.8	1.4	270.0	101.4	2524	0.3252	-4	-4	28	-6
S-12L	1222	756	1.6	2.8	1.2	270.0	97.5	2485	0.3116	-4	-4	28	-7
S-13L	1251	756	1.6	2.8	1.0	270.0	93.1	2467	0.2999	-3	-4	28	-7
S-13R	1272	756	1.6	2.8	1.0	270.0	94.7	2524	0.3122	-3	-4	28	-7
S-14R	1272	756	1.6	2.8	1.0	270.0	94.7	2524	0.3122	-3	-4	28	-7
S-15R	1272	756	1.6	2.8	1.0	270.0	94.7	2524	0.3122	-3	-4	28	-7
S-16P4	1272	756	1.6	2.8	1.0	270.0	94.7	2524	0.3122	-3	-4	28	-7
S-16R	1272	756	1.6	2.8	1.0	270.0	94.7	2524	0.3122	-3	-4	28	-7
S-17R	1272	756	1.6	2.8	1.0	270.0	94.7	2524	0.3122	-3	-4	28	-7
S-18R	1272	756	1.6	2.8	1.0	270.0	94.7	2524	0.3122	-3	-4	28	-7
S-19R	1256	756	1.6	2.8	1.4	270.0	100.9	2590	0.3361	-4	-4	28	-6
S-20R	1236	756	1.6	2.8	2.0	270.0	116.4	2821	0.3960	-4	-4	28	-5
S-21P5	1226	756	1.6	2.8	2.7	270.0	126.6	3001	0.4377	-4	-4	28	-4
S-21P6	1226	756	1.6	2.8	2.7	270.0	126.6	3001	0.4377	-4	-4	28	-4
S-22L	1233	756	1.6	2.8	1.9	270.0	114.9	2788	0.3883	-4	-4	28	-5
S-23L	1247	756	1.6	2.8	1.1	270.0	95.2	2491	0.3082	-3	-4	28	-7
S-23R	1263	756	1.6	2.8	1.1	270.0	94.9	2512	0.3114	-3	-4	28	-7
S-25L	1272	756	1.6	2.8	1.1	270.0	88.9	2438	0.2883	-3	-4	28	-7
S-25R	1272	756	1.6	2.8	1.1	270.0	88.9	2438	0.2883	-3	-4	28	-7
S-26R	1272	756	1.6	2.8	1.7	270.0	101.2	2614	0.3431	-4	-4	28	-6
S-27R	1272	756	1.6	2.8	2.6	270.0	119.1	2924	0.4221	-4	-4	28	-4
S-28R	1336	756	1.6	2.8	3.5	270.0	129.5	3253	0.4896	-3	-4	28	-4
S-30L	1362	756	1.6	2.8	3.8	270.0	132.1	3367	0.5127	-4	-4	28	-4
S-30P7	1441	756	1.6	2.8	3.8	270.0	129.1	3446	0.5255	-3	-4	29	-4
S-30R	1450	756	1.6	2.8	3.8	270.0	128.8	3455	0.5273	-3	-3	29	-4
S-32L	1479	756	1.6	2.8	3.5	270.0	123.8	3396	0.5134	-3	-3	29	-4
S-33L	1572	756	1.6	2.8	2.8	270.0	111.0	3284	0.4764	-3	-3	29	-4
S-34L	1665	756	1.6	2.8	1.8	270.0	89.8	3037	0.3880	-3	-3	29	-6
S-35L	1686	756	1.6	2.8	1.0	270.0	73.7	2823	0.3050	-3	-3	29	-8
S-35R	1628	756	1.6	2.8	1.0	270.0	75.4	2764	0.3025	-3	-3	29	-8

＊Main girder G3

Investigation location	Au	Aw	tu	tw	tL	h	d	A	I	σodu	σodL	σow	σoL
S-1L	2073	756	1.6	2.8	1.0	270.0	67.9	3209	0.3127	−1	−1	30	−10
S-1R	2047	756	1.6	2.8	1.0	270.0	68.4	3184	0.3118	−1	−1	30	−10
S-2R	1958	756	1.6	2.8	1.3	270.0	75.4	3183	0.3442	−1	−1	30	−9
S-3R	1931	756	1.6	2.8	1.8	270.0	84.7	3303	0.3967	−1	−2	30	−7
S-4P1	1906	756	1.6	2.8	2.0	270.0	88.6	3337	0.4154	−1	−2	30	−7
S-4R	1906	756	1.6	2.8	2.0	270.0	88.6	3337	0.4153	−1	−2	30	−7
S-6L	1883	756	1.6	2.8	1.8	270.0	85.8	3254	0.3938	−1	−2	30	−7
S-7L	1801	756	1.6	2.8	1.2	270.0	76.8	2997	0.3268	−2	−2	29	−8
S-7R	1782	756	1.6	2.8	1.2	270.0	77.2	2977	0.3258	−2	−2	29	−8
S-9L	1781	756	1.6	2.8	1.0	270.0	80.5	3033	0.3426	−2	−2	29	−8
S-9R	1713	756	1.6	2.8	1.0	270.0	80.0	2929	0.3267	−2	−2	29	−8
S-10R	1577	756	1.6	2.8	1.2	270.0	86.5	2840	0.3358	−2	−2	29	−7
S-11P2	1548	756	1.6	2.8	1.4	270.0	95.7	2951	0.3748	−2	−3	29	−6
S-11P3	1548	756	1.6	2.8	1.4	270.0	95.7	2951	0.3748	−2	−3	29	−6
S-12L	1570	756	1.6	2.8	1.2	270.0	86.7	2833	0.3354	−2	−2	29	−7
S-13L	1622	756	1.6	2.8	1.0	270.0	82.1	2839	0.3228	−2	−2	29	−8
S-13R	1718	756	1.6	2.8	1.0	270.0	82.0	2970	0.3392	−2	−2	29	−8
S-14R	1712	756	1.6	2.8	1.0	270.0	82.2	2965	0.3389	−2	−2	29	−8
S-15R	1710	756	1.6	2.8	1.0	270.0	82.3	2962	0.3387	−2	−2	29	−8
S-16P4	1710	756	1.6	2.8	1.0	270.0	82.3	2962	0.3387	−2	−2	29	−8
S-16R	1709	756	1.6	2.8	1.0	270.0	82.3	2961	0.3387	−2	−2	29	−8
S-17R	1632	756	1.6	2.8	1.0	270.0	84.0	2884	0.3353	−2	−2	29	−8
S-18R	1584	756	1.6	2.8	1.0	270.0	85.3	2836	0.3324	−2	−2	29	−7
S-19R	1453	756	1.6	2.8	1.4	270.0	94.4	2786	0.3518	−3	−3	29	−6
S-20R	1389	756	1.6	2.8	2.1	270.0	112.4	3002	0.4201	−3	−3	29	−5
S-21P5	1361	756	1.6	2.8	2.8	270.0	123.0	3164	0.4616	−3	−3	29	−4
S-21P6	1361	756	1.6	2.8	2.8	270.0	123.0	3164	0.4616	−3	−3	29	−4
S-22L	1355	756	1.6	2.8	2.0	270.0	112.0	2938	0.4083	−3	−3	28	−5
S-23L	1337	756	1.6	2.8	1.2	270.0	94.3	2609	0.3232	−3	−3	28	−7
S-24L	1265	756	1.6	2.8	1.0	270.0	92.8	2486	0.3025	−3	−4	28	−7
S-25L	1272	756	1.6	2.8	1.0	270.0	86.7	2408	0.2784	−3	−4	28	−8
S-25R	1272	756	1.6	2.8	1.0	270.0	86.7	2408	0.2784	−3	−4	28	−8
S-26R	1272	756	1.6	2.8	1.6	270.0	99.3	2585	0.3345	−3	−4	28	−6
S-27R	1272	756	1.6	2.8	2.5	270.0	117.6	2895	0.4151	−4	−4	28	−4
S-28R	1276	756	1.6	2.8	3.2	270.0	127.7	3105	0.4622	−4	−4	28	−4
S-29R	1362	756	1.6	2.8	3.6	270.0	129.6	3308	0.5006	−4	−4	28	−4
S-30P7	1383	756	1.6	2.8	3.6	270.0	128.7	3329	0.5046	−3	−4	28	−4
S-30R	1450	756	1.6	2.8	3.6	270.0	126.3	3397	0.5147	−3	−3	29	−4
S-32L	1479	756	1.6	2.8	3.4	270.0	122.5	3366	0.5067	−3	−3	29	−4
S-33L	1573	756	1.6	2.8	2.7	270.0	109.5	3254	0.4686	−3	−3	29	−4
S-34L	1605	756	1.6	2.8	1.7	270.0	89.7	2948	0.3739	−3	−3	29	−6
S-35L	1626	756	1.6	2.8	1.0	270.0	75.3	2763	0.3021	−3	−3	29	−8
S-35R	1628	756	1.6	2.8	1.0	270.0	75.4	2764	0.3025	−3	−3	29	−8

＊Main girder G4

Investigation location	Au	Aw	tu	tw	tL	h	d	A	I	σodu	σodL	σow	σoL
S-1L	2252	869	1.6	3.0	1.4	270.0	59.7	3422	0.3099	−2	−2	29	−10
S-1R	2166	869	1.6	3.0	1.4	270.0	61.2	3336	0.3067	−2	−2	29	−10
S-2R	2137	869	1.6	3.0	2.8	270.0	77.9	3581	0.4150	−2	−2	29	−7
S-3R	2110	869	1.6	3.0	4.1	270.0	90.2	3780	0.4939	−2	−3	29	−6
S-4P1	2087	869	1.6	3.0	4.5	270.0	94.2	3826	0.5143	−2	−3	29	−5
S-4R	2085	869	1.6	3.0	4.5	270.0	94.2	3825	0.5142	−2	−3	29	−5
S-6L	2062	869	1.6	3.0	4.0	270.0	90.6	3715	0.4828	−2	−3	29	−6
S-7L	2041	869	1.6	3.0	2.6	270.0	78.3	3450	0.3944	−2	−2	29	−7
S-7R	1962	869	1.6	3.0	2.6	270.0	80.1	3371	0.3897	−2	−3	29	−7
S-9L	1960	869	1.6	3.0	1.3	270.0	69.8	3200	0.3220	−2	−2	29	−9
S-10L	1838	985	1.6	3.4	1.5	270.0	75.1	3198	0.3305	−3	−3	28	−9
S-10R	1703	985	1.6	3.4	1.5	270.0	78.4	3061	0.3215	−3	−3	28	−9
S-11P2	1674	985	1.6	3.4	2.5	270.0	92.6	3263	0.3962	−3	−3	28	−7
S-11P3	1674	985	1.6	3.4	2.5	270.0	92.6	3263	0.3962	−3	−3	28	−7
S-12L	1696	985	1.6	3.4	1.5	270.0	82.0	3115	0.3401	−3	−3	28	−9
S-13L	1748	869	1.6	3.0	1.0	270.0	69.2	2906	0.2799	−2	−3	29	−10
S-13R	1838	869	1.6	3.0	1.0	270.0	69.3	3025	0.2943	−2	−2	29	−10
S-14R	1772	869	1.6	3.0	1.0	270.0	70.7	2960	0.2916	−2	−3	29	−10
S-15P4	1770	869	1.6	3.0	1.0	270.0	70.7	2957	0.2914	−2	−3	29	−10
S-15R	1770	869	1.6	3.0	1.0	270.0	70.7	2957	0.2914	−2	−3	29	−10
S-16R	1769	869	1.6	3.0	1.0	270.0	70.8	2956	0.2914	−2	−3	29	−10
S-17R	1871	869	1.6	3.0	1.0	270.0	68.7	3058	0.2950	−2	−2	29	−10
S-18R	1763	869	1.6	3.0	1.2	270.0	73.6	2985	0.3033	−2	−2	29	−10
S-19R	1578	869	1.6	3.0	2.4	270.0	93.2	3039	0.3744	−3	−3	29	−7
S-20R	1514	985	1.6	3.4	4.5	270.0	115.4	3455	0.4785	−4	−4	28	−5
S-21P5	1487	985	1.6	3.4	5.7	270.0	125.4	3635	0.5238	−4	−4	28	−5
S-21P6	1427	985	1.6	3.4	5.7	270.0	127.3	3575	0.5153	−4	−4	28	−5
S-22L	1421	985	1.6	3.4	4.2	270.0	116.1	3309	0.4533	−4	−4	28	−6
S-23L	1343	869	1.6	3.0	2.1	270.0	97.7	2752	0.3369	−3	−4	28	−7
S-24L	1331	869	1.6	3.0	1.4	270.0	86.2	2559	0.2801	−3	−3	28	−9
S-25L	1332	869	1.6	3.0	1.4	270.0	82.3	2502	0.2614	−3	−3	28	−10
S-25R	1332	869	1.6	3.0	1.4	270.0	82.3	2502	0.2614	−3	−3	28	−10
S-26R	1332	869	1.6	3.0	2.7	270.0	99.8	2758	0.3437	−3	−4	28	−7
S-27R	1332	985	1.6	3.4	2.9	270.0	103.3	2909	0.3622	−4	−4	28	−7
S-28R	1332	985	1.6	3.4	3.8	270.0	111.8	3065	0.4050	−4	−4	28	−6
S-29R	1332	985	1.6	3.4	4.2	270.0	115.6	3135	0.4231	−4	−4	28	−6
S-30P7	1332	985	1.6	3.4	4.2	270.0	115.6	3135	0.4231	−4	−4	28	−6
S-30R	1332	985	1.6	3.4	4.2	270.0	115.6	3135	0.4231	−4	−4	28	−6
S-32L	1332	985	1.6	3.4	3.6	270.0	110.1	3031	0.3960	−4	−4	28	−6
S-33L	1332	985	1.6	3.4	2.6	270.0	100.2	2857	0.3470	−4	−4	28	−7
S-34L	1332	869	1.6	3.0	2.3	270.0	95.3	2689	0.3224	−3	−3	28	−8
S-35L	1332	869	1.6	3.0	1.2	270.0	79.8	2467	0.2492	−3	−3	28	−10
S-35R	1332	869	1.6	3.0	1.2	270.0	79.7	2467	0.2489	−3	−3	28	−10

（2） Bending moment reacting to each cross-section within a statically determinate system

$$Mo = \{Au\,(d + tu/2) + \beta Aw\,(3d - \beta h)/6\}\,E\alpha t$$

Calculation results are shown in within chart （3）

（3） Stress intensity according to bending moment within a statically indeterminate system

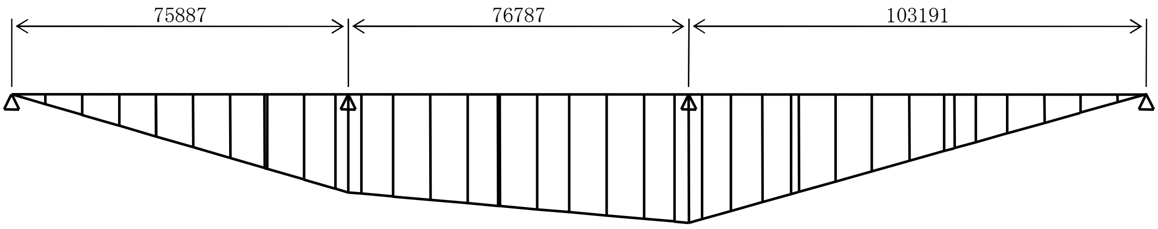
Analysis implemented by deformation method

Descriptions for codes

- Mo (kN・m) : Bending moment reacting to each cross-section within a statically determinate system
- Ls (m) : length of member
- I (m^4) : cross-sectional stiffness
- Mt (kN・m) : Bending moment within statically indeterminate system （results from analysis: value of right edge location of member used）
- σ tu (N/mm^2) : stress intensity of the top surface of deck plate
- σ tL (N/mm^2) : stress intensity of the downside of bottom flange

＊Main girder G1

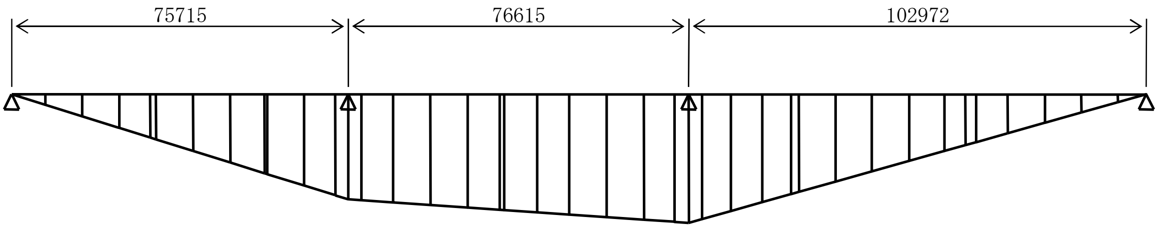
Figure of bending moment within statically indeterminate system



Member no.	Mo	Ls	I	Mt	σ tu	σ tL
1	3843	7.588	0.2360	478	-2	4
2	4366	8.306	0.2858	1002	-3	6
3	4979	8.344	0.3438	1528	-5	8
4	5139	8.278	0.3591	2050	-6	10
5	5139	0.015	0.3591	2051	-6	10
6	5139	8.394	0.3591	2580	-8	13
7	4925	8.344	0.3386	3106	-10	21
8	4303	7.748	0.2799	3595	-11	24
9	4589	0.596	0.3057	3632	-12	26
10	4048	8.344	0.2564	4158	-14	30
11	4040	7.014	0.2599	4600	-16	33
12	4463	2.917	0.3024	4784	-16	28
13	4463	2.964	0.3024	4841	-16	33
14	4157	7.123	0.2716	4979	-17	37
15	4048	8.431	0.2564	5141	-16	36
16	4158	8.431	0.2646	5304	-17	38
17	4158	6.832	0.2646	5435	-17	39
18	4158	0.395	0.2646	5443	-17	39
19	4158	8.431	0.2646	5606	-18	40
20	4158	7.227	0.2646	5745	-18	41
21	4286	8.432	0.2767	5907	-19	40
22	4930	8.432	0.3375	6070	-18	32
23	5791	6.873	0.4295	6202	-18	22
24	6098	3.215	0.4665	6264	-18	19
25	6094	3.002	0.4663	6082	-18	23
26	5590	6.521	0.4137	5686	-18	31
27	4735	7.076	0.3219	5257	-17	34
28	4403	6.487	0.2885	4863	-15	34
29	4176	1.769	0.2677	4756	-15	33
30	5087	8.256	0.3541	4254	-12	21
31	5324	8.176	0.3771	3758	-11	17
32	5737	8.468	0.4186	3244	-9	12
33	5865	7.839	0.4316	2768	-8	10
34	5873	2.330	0.4318	2627	-7	10
35	5873	4.788	0.4318	2336	-6	8
36	5873	7.099	0.4318	1905	-5	8
37	5607	8.397	0.4053	1395	-4	7
38	5071	8.159	0.3522	900	-3	5
39	4818	8.337	0.3281	394	-1	3

＊Main girder G2

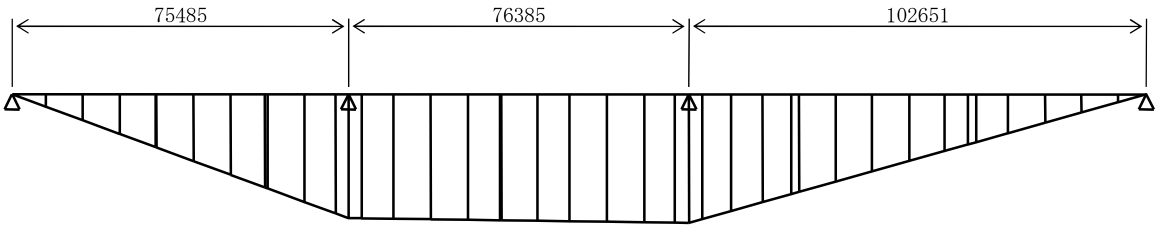
Figure of bending moment within statically indeterminate system



Member no.	Mo	Ls	I	Mt	σ tu	σ tL
1	4119	7.569	0.2784	516	-2	3
2	4119	8.287	0.2784	1081	-3	7
3	4715	8.325	0.3344	1648	-5	8
4	4715	6.975	0.3344	2124	-6	11
5	4715	1.300	0.3344	2213	-7	11
6	4715	8.375	0.3344	2783	-8	14
7	4715	8.325	0.3344	3351	-11	22
8	4119	7.730	0.2784	3878	-12	26
9	4498	0.595	0.3122	3919	-12	22
10	4410	8.325	0.3046	4486	-14	27
11	4498	6.998	0.3146	4963	-16	28
12	4612	2.911	0.3266	5162	-16	27
13	4612	2.958	0.3266	5206	-17	29
14	4499	7.108	0.3147	5313	-17	32
15	4410	8.413	0.3046	5440	-17	31
16	4498	8.413	0.3122	5566	-17	31
17	4498	7.211	0.3122	5675	-18	32
18	4498	1.017	0.3122	5690	-18	32
19	4498	7.395	0.3122	5802	-18	33
20	4498	7.211	0.3122	5910	-18	33
21	4498	8.413	0.3122	6037	-19	34
22	4790	8.413	0.3403	6163	-19	31
23	5415	6.858	0.3991	6267	-19	25
24	5824	3.208	0.4393	6315	-19	21
25	5817	2.995	0.4388	6131	-18	25
26	5319	6.506	0.3904	5732	-18	33
27	4459	7.061	0.3098	5299	-16	30
28	4527	6.472	0.3154	4902	-15	31
29	4225	1.765	0.2883	4794	-15	30
30	4807	8.237	0.3431	4289	-13	21
31	5653	8.157	0.4221	3789	-11	14
32	6373	8.448	0.4857	3270	-9	10
33	6666	7.903	0.5097	2786	-7	8
34	6839	4.729	0.5207	2496	-6	7
35	6932	2.389	0.5264	2349	-6	6
36	6980	7.099	0.5300	1914	-5	6
37	6901	8.397	0.5192	1399	-3	5
38	6542	8.159	0.4804	899	-2	4
39	5558	8.240	0.3891	393	-1	3

＊Main girder G3

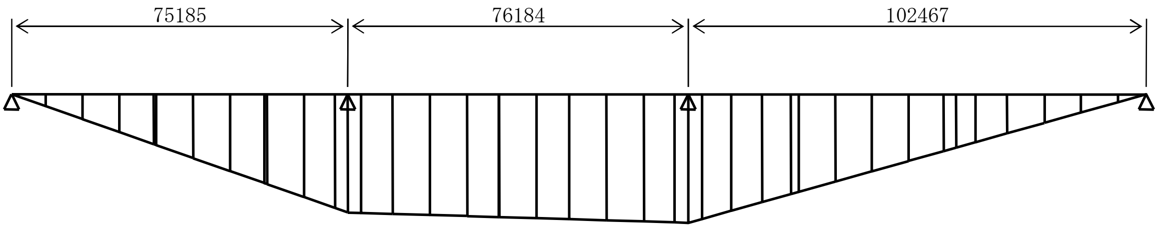
Figure of bending moment within statically indeterminate system



Member no.	Mo	Ls	I	Mt	σ tu	σ tL
1	5202	7.544	0.3122	629	-1	4
2	5535	8.263	0.3456	1319	-3	8
3	6075	8.300	0.3975	2012	-4	9
4	6270	8.087	0.4161	2686	-6	12
5	6251	0.163	0.4154	2700	-6	12
6	6232	8.350	0.4146	3397	-8	16
7	5917	8.300	0.3919	4089	-10	24
8	5118	7.707	0.3263	4732	-11	28
9	5557	0.593	0.3636	4782	-11	27
10	5188	8.300	0.3331	5474	-14	32
11	5188	6.977	0.3413	6057	-16	33
12	5540	2.902	0.3769	6299	-16	30
13	5534	2.949	0.3766	6308	-17	35
14	5118	7.086	0.3391	6330	-16	37
15	5100	8.387	0.3300	6356	-16	35
16	5228	8.387	0.3390	6382	-16	36
17	5223	7.189	0.3388	6404	-16	36
18	5221	0.309	0.3387	6405	-16	36
19	5220	8.079	0.3387	6430	-16	36
20	5153	7.189	0.3370	6453	-16	36
21	5061	8.387	0.3338	6479	-17	36
22	5296	8.387	0.3610	6505	-18	33
23	5903	6.837	0.4256	6526	-18	25
24	6281	3.198	0.4646	6536	-18	21
25	6234	2.986	0.4619	6346	-18	25
26	5649	6.487	0.4086	5933	-18	32
27	4671	7.039	0.3227	5485	-17	32
28	4432	6.453	0.3063	5074	-16	34
29	4121	1.760	0.2784	4962	-16	33
30	4717	8.213	0.3345	4439	-13	23
31	5580	8.133	0.4151	3921	-11	15
32	6072	8.395	0.4616	3386	-9	11
33	6451	7.890	0.4930	2884	-8	8
34	6600	5.219	0.5026	2552	-7	7
35	6718	1.887	0.5096	2432	-6	7
36	6844	7.085	0.5173	1980	-5	6
37	6828	8.377	0.5124	1447	-3	5
38	6426	8.136	0.4709	929	-2	5
39	5359	8.207	0.3750	407	-1	3

＊Main girder G4

Figure of bending moment within statically indeterminate system



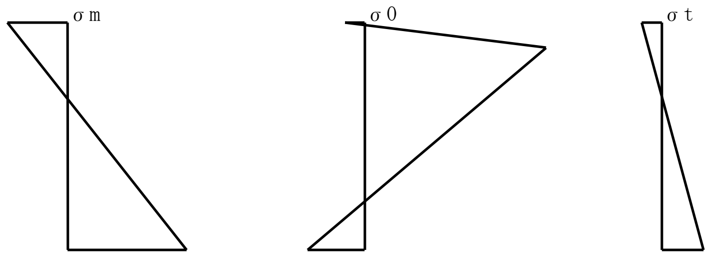
Member no.	Mo	Ls	I	Mt	σ tu	σ tL
1	4974	7.586	0.3088	606	−1	4
2	6211	8.226	0.4174	1264	−2	6
3	7068	8.262	0.4951	1924	−4	7
4	7343	7.723	0.5179	2541	−5	9
5	7278	0.489	0.5142	2580	−5	9
6	7215	8.312	0.5106	3245	−6	12
7	6877	8.262	0.4800	3905	−8	19
8	5900	7.671	0.3926	4518	−9	22
9	6325	0.590	0.4308	4565	−10	29
10	4918	8.262	0.3110	5226	−12	31
11	5065	6.945	0.3257	5781	−14	35
12	5813	2.858	0.3978	6009	−14	27
13	5807	2.965	0.3976	6030	−15	34
14	5234	7.053	0.3423	6078	−15	44
15	4581	8.349	0.2844	6136	−15	42
16	4725	8.349	0.2937	6194	−15	43
17	4664	7.062	0.2915	6242	−15	43
18	4664	0.094	0.2914	6243	−15	43
19	4663	8.350	0.2914	6301	−16	43
20	4708	7.279	0.2927	6351	−15	44
21	4866	8.379	0.3054	6409	−16	42
22	5630	8.382	0.3833	6467	−16	31
23	6666	6.833	0.4858	6514	−16	22
24	7018	3.089	0.5262	6535	−16	19
25	6808	3.095	0.5147	6338	−16	22
26	6228	6.487	0.4549	5924	−17	31
27	4900	6.929	0.3359	5482	−17	36
28	4293	6.438	0.2812	5072	−16	37
29	4110	1.756	0.2614	4960	−16	36
30	4978	8.194	0.3437	4437	−13	22
31	5172	8.114	0.3622	3920	−11	18
32	5601	8.275	0.4051	3392	−9	14
33	5779	7.828	0.4229	2892	−8	11
34	5787	2.791	0.4231	2714	−8	10
35	5787	4.315	0.4231	2439	−7	9
36	5787	7.085	0.4231	1987	−6	8
37	5514	8.377	0.3960	1453	−4	7
38	5019	8.136	0.3470	934	−3	5
39	4761	8.303	0.3226	405	−1	3

（4） Superimposing of thermal difference stress and stress caused by main load

Descriptions for codes

σm (N/mm^2): regular stress action
σo (N/mm^2): thermal difference stress within statically determinate system
σt (N/mm^2): thermal difference stress within statically indeterminate system
$\Sigma\sigma$ (N/mm^2): total of constant stress and thermal difference stress
σa (N/mm^2): 15% premium rate of allowable stress

Examples for stressed conditions(＊Main girder G1, S-2R)



＊Main girder G1

investigation location	Top surface of deck plate σm	σo	σt	Σσ	σa	Downside of bottom flange σm	σo	σt	Σσ	σa
S-1L	0	-3	0	-3	161	0	-11	0	-11	241
S-1R	-52	-3	-2	-57	161	122	-11	4	114	241
S-2R	-87	-3	-3	-94	161	172	-9	6	169	241
S-3R	-103	-3	-5	-111	161	168	-7	8	169	241
S-4P1	-108	-3	-6	-117	161	168	-7	10	171	241
S-4R	-108	-3	-6	-117	161	168	-7	10	171	241
S-6L	-102	-3	-8	-113	161	169	-7	13	175	241
S-7L	-84	-3	-10	-97	161	169	-9	21	181	241
S-7R	-47	-3	-11	-62	161	95	-9	24	110	241
S-9L	-45	-3	-12	-60	161	95	-10	26	111	241
S-10L	4	-4	-14	-13	161	-60	-10	30	-40	226
S-10R	87	-4	-16	67	161	-172	-10	33	-150	226
S-11P2	110	-4	-16	91	241	-187	-8	28	-167	241
S-11P3	110	-4	-16	91	241	-187	-8	28	-167	241
S-12L	91	-4	-16	71	161	-174	-10	33	-151	241
S-13L	49	-3	-17	29	161	-103	-10	37	-76	219
S-13R	-7	-3	-16	-26	161	15	-10	36	41	241
S-14R	-26	-3	-17	-46	161	55	-10	38	82	241
S-15P4	-31	-3	-17	-52	161	66	-10	39	94	241
S-15R	-31	-3	-17	-52	161	66	-10	39	94	241
S-16R	-24	-3	-18	-45	161	50	-10	40	80	241
S-17R	-6	-3	-18	-27	161	-73	-10	41	-42	219
S-18R	68	-3	-19	47	161	-138	-9	40	-107	241
S-19R	115	-3	-18	93	241	-189	-7	32	-165	241
S-20R	160	-4	-18	138	241	-190	-5	22	-174	241
S-21P5	184	-5	-18	161	241	-193	-5	19	-179	241
S-21P6	184	-5	-18	161	241	-193	-5	19	-179	241
S-22L	154	-4	-18	132	241	-189	-6	23	-172	241
S-23L	92	-4	-18	70	161	-152	-7	31	-128	241
S-24L	0	-3	-17	-20	161	-54	-9	34	-29	241
S-25L	-56	-3	-15	-75	161	118	-10	34	142	241
S-25R	-70	-3	-15	-89	161	147	-10	33	171	241
S-26R	-114	-3	-12	-130	161	180	-7	21	194	241
S-27R	-145	-4	-11	-160	241	215	-7	17	225	293
S-28R	-159	-4	-9	-172	241	212	-6	12	219	293
S-29R	-167	-4	-8	-179	241	212	-6	10	217	293
S-30P7	-167	-4	-7	-179	241	213	-6	10	217	293
S-30R	-165	-4	-6	-175	241	209	-6	8	212	293
S-32L	-156	-4	-5	-165	241	213	-6	8	215	293
S-33L	-137	-4	-4	-145	241	218	-7	7	217	293
S-34L	-104	-3	-3	-110	161	179	-7	5	176	241
S-35L	-60	-3	-1	-65	161	134	-10	3	127	241
S-35R	0	-3	0	-3	161	0	-10	0	-10	241

＊Main girder G2

investigation location	Top surface of deck plate σm	σo	σt	Σσ	σa	Downside of bottom flange σm	σo	σt	Σσ	σa
S-1L	0	-3	0	-3	161	0	-8	0	-8	241
S-1R	-50	-3	-2	-55	161	98	-8	3	93	241
S-2R	-85	-3	-3	-92	161	167	-8	7	166	241
S-3R	-101	-3	-5	-109	161	163	-6	8	165	241
S-4P1	-108	-3	-6	-118	161	174	-6	11	179	241
S-4R	-108	-3	-7	-118	161	173	-6	11	179	241
S-5R	-100	-3	-8	-112	161	162	-6	14	170	241
S-7L	-85	-3	-11	-99	161	166	-8	22	180	241
S-7R	-53	-3	-12	-68	161	103	-8	26	121	241
S-8R	-48	-3	-12	-63	161	82	-7	22	98	241
S-9R	32	-3	-14	15	161	-57	-7	27	-38	179
S-10R	86	-4	-16	66	161	-142	-7	28	-121	209
S-11P2	111	-4	-16	91	241	-173	-6	27	-152	230
S-11P3	111	-4	-16	91	241	-173	-6	27	-152	230
S-12L	92	-4	-17	72	161	-153	-7	29	-131	209
S-13L	54	-3	-17	34	161	-96	-7	32	-71	179
S-13R	-8	-3	-17	-28	161	-40	-7	31	-16	179
S-14R	-30	-3	-17	-50	161	51	-7	31	76	241
S-15R	-35	-3	-18	-56	161	60	-7	32	86	241
S-16P4	-35	-3	-18	-56	161	60	-7	32	86	241
S-16R	-27	-3	-18	-48	161	46	-7	33	72	241
S-17R	-7	-3	-18	-29	161	-67	-7	33	-40	179
S-18R	72	-3	-19	50	161	-124	-7	34	-96	179
S-19R	113	-4	-19	90	241	-177	-6	31	-152	230
S-20R	154	-4	-19	132	241	-194	-5	25	-174	241
S-21P5	175	-4	-19	153	241	-190	-4	21	-174	241
S-21P6	175	-4	-19	153	241	-190	-4	21	-174	241
S-22L	147	-4	-18	125	241	-189	-5	25	-169	241
S-23L	88	-3	-18	67	161	-151	-7	33	-125	196
S-23R	0	-3	-16	-20	161	-48	-7	30	-25	196
S-25L	-52	-3	-15	-71	161	98	-7	31	122	241
S-25R	-65	-3	-15	-83	161	123	-7	30	146	241
S-26R	-116	-4	-13	-133	161	182	-6	21	198	241
S-27R	-152	-4	-11	-167	241	184	-4	14	194	241
S-28R	-168	-3	-9	-180	241	179	-4	10	185	241
S-30L	-177	-4	-7	-187	241	179	-4	8	183	241
S-30P7	-170	-3	-6	-180	241	179	-4	7	182	241
S-30R	-169	-3	-6	-178	241	178	-4	6	181	241
S-32L	-160	-3	-5	-168	241	180	-4	6	182	241
S-33L	-134	-3	-3	-141	241	181	-4	5	181	241
S-34L	-99	-3	-2	-104	161	182	-6	4	180	241
S-35L	-51	-3	-1	-55	161	121	-8	3	115	241
S-35R	0	-3	0	-3	161	0	-8	0	-8	241

＊Main girder G3

investigation location	Top surface of deck plate σm	σo	σt	Σσ	σa	Downside of bottom flange σm	σo	σt	Σσ	σa
S-1L	0	-1	0	-1	161	0	-10	0	-10	241
S-1R	-41	-1	-1	-44	161	111	-10	4	105	241
S-2R	-72	-1	-3	-76	161	170	-9	8	168	241
S-3R	-86	-1	-4	-92	161	175	-7	9	178	241
S-4P1	-91	-1	-6	-98	161	174	-7	12	179	241
S-4R	-91	-1	-6	-98	161	174	-7	12	179	241
S-6L	-86	-1	-8	-95	161	172	-7	16	181	241
S-7L	-74	-2	-10	-85	161	171	-8	24	187	241
S-7R	-45	-2	-11	-58	161	103	-8	28	122	241
S-9L	-41	-2	-11	-55	161	90	-8	27	109	241
S-9R	3	-2	-14	-12	161	-60	-8	32	-36	179
S-10R	76	-2	-16	57	161	-149	-7	33	-123	209
S-11P2	97	-2	-16	78	241	-166	-6	30	-142	230
S-11P3	97	-2	-16	78	241	-166	-6	30	-142	230
S-12L	82	-2	-17	63	161	-161	-7	35	-134	209
S-13L	48	-2	-16	30	161	-102	-8	37	-73	179
S-13R	-6	-2	-16	-24	161	-45	-8	35	-17	179
S-14R	-26	-2	-16	-44	161	55	-8	36	83	241
S-15R	-32	-2	-16	-49	161	67	-8	36	94	241
S-16P4	-32	-2	-16	-49	161	67	-8	36	95	241
S-16R	-24	-2	-16	-42	161	51	-8	36	79	241
S-17R	-7	-2	-16	-26	161	-70	-8	36	-41	179
S-18R	64	-2	-17	45	161	-128	-7	36	-99	179
S-19R	105	-3	-18	84	241	-182	-6	33	-156	230
S-20R	144	-3	-18	124	241	-193	-5	25	-173	241
S-21P5	165	-3	-18	144	241	-190	-4	21	-173	241
S-21P6	165	-3	-18	144	241	-190	-4	21	-173	241
S-22L	141	-3	-18	120	241	-189	-5	25	-169	241
S-23L	87	-3	-18	66	161	-151	-7	32	-125	209
S-24L	2	-3	-17	-19	161	-54	-7	32	-28	179
S-25L	-51	-3	-16	-70	161	99	-8	34	125	241
S-25R	-64	-3	-16	-83	161	125	-8	33	150	241
S-26R	-114	-3	-13	-131	161	185	-6	23	202	241
S-27R	-147	-4	-11	-162	241	182	-4	15	193	241
S-28R	-168	-4	-9	-181	241	183	-4	11	190	241
S-29R	-172	-4	-8	-183	241	180	-4	8	185	241
S-30P7	-172	-3	-7	-182	241	182	-4	7	185	241
S-30R	-165	-3	-6	-174	241	181	-4	7	184	241
S-32L	-157	-3	-5	-165	241	180	-4	6	182	241
S-33L	-132	-3	-3	-138	241	181	-4	5	182	241
S-34L	-100	-3	-2	-105	161	184	-6	5	182	241
S-35L	-51	-3	-1	-55	161	117	-8	3	112	241
S-35R	0	-3	0	-3	161	0	-8	0	-8	241

＊Main girder G4

investigation location	Top surface of deck plate σm	σo	σt	Σσ	σa	Downside of bottom flange σm	σo	σt	Σσ	σa
S-1L	0	-2	0	-2	161	-1	-10	0	-10	169
S-1R	-44	-2	-1	-47	161	141	-10	4	135	241
S-2R	-76	-2	-2	-81	161	167	-7	6	166	241
S-3R	-90	-2	-4	-96	161	165	-6	7	166	241
S-4P1	-95	-2	-5	-102	161	163	-5	9	167	241
S-4R	-95	-2	-5	-102	161	163	-5	9	167	241
S-6L	-90	-2	-6	-99	161	164	-6	12	170	241
S-7L	-76	-2	-8	-86	161	166	-7	19	178	241
S-7R	-46	-2	-9	-58	161	98	-7	22	113	241
S-9L	-46	-2	-10	-58	161	117	-9	29	136	241
S-10L	1	-3	-12	-14	161	-60	-9	31	-39	241
S-10R	82	-3	-14	64	161	-181	-9	35	-156	241
S-11P2	102	-3	-14	85	241	-182	-7	27	-162	241
S-11P3	102	-3	-14	85	241	-182	-7	27	-162	241
S-12L	86	-3	-15	68	161	-180	-9	34	-155	241
S-13L	48	-2	-15	31	161	-125	-10	44	-91	219
S-13R	-7	-2	-15	-24	161	18	-10	42	50	241
S-14R	-25	-2	-15	-43	161	64	-10	43	96	241
S-15P4	-31	-2	-15	-48	161	77	-10	43	110	241
S-15R	-31	-2	-15	-48	161	77	-10	43	110	241
S-16R	-24	-2	-16	-42	161	61	-10	43	95	241
S-17R	-7	-2	-15	-25	161	-77	-10	44	-44	219
S-18R	61	-2	-16	43	161	-146	-10	42	-114	241
S-19R	106	-3	-16	87	241	-189	-7	31	-165	241
S-20R	147	-4	-16	127	241	-191	-5	22	-175	241
S-21P5	169	-4	-16	149	241	-192	-5	19	-178	241
S-21P6	174	-4	-16	154	241	-192	-5	19	-178	241
S-22L	146	-4	-16	126	241	-188	-6	22	-172	241
S-23L	92	-3	-17	72	161	-155	-7	31	-132	241
S-24L	4	-3	-17	-16	161	-64	-9	36	-36	241
S-25L	-51	-3	-16	-71	161	110	-10	37	136	241
S-25R	-65	-3	-16	-84	161	140	-10	36	166	241
S-26R	-108	-3	-13	-125	161	177	-7	22	192	241
S-27R	-139	-4	-11	-154	241	216	-7	18	227	293
S-28R	-154	-4	-9	-168	241	213	-6	14	221	293
S-29R	-163	-4	-8	-175	241	212	-6	11	217	293
S-30P7	-164	-4	-8	-175	241	213	-6	10	218	293
S-30R	-162	-4	-7	-172	241	210	-6	9	214	293
S-32L	-153	-4	-6	-163	241	215	-6	8	217	293
S-33L	-134	-4	-4	-142	241	217	-7	7	217	293
S-34L	-102	-3	-3	-108	161	178	-8	5	176	241
S-35L	-58	-3	-1	-62	161	129	-10	3	122	241
S-35R	0	-3	0	-3	161	0	-10	0	-10	241

4．7． Calculations for erection joints

4．7．1 Calculations for longitudinal joints of deck plate（bridge axial direction）

（1）Design principle

＊Calculate maximum pitch of bolt using shearing stress intensity acting on main girder

＊ Be sure to secure the number of necessary bolts according to each stress within the effective width of the upper flange of transverse rib and bracket.

（2）Calculating maximum pitch of bolt

Designed shearing stress intensity（maximum shearing stress intensity on deck surface）

τ = 45.0 N/mm^2 （active cross-section G4 : Sec-1）

Pitch of bolt

P = ρa * n / (td * τ)

= 108000 * 1 / (16 * 45) = 150.0 mm

（provided that the value if 150 mm and/or below 12*ts ）

P’ = 12*ts = 108 mm

Designed pitch of bolt = below 108 mm

Here,

P :maximum pitch of bolt caused by shearing force(mm)

ρa :high tensile bolt 2 face allowable friction ρa = 108000 N

n :rows of bolts

td :maximum thickness of deck plate(mm)

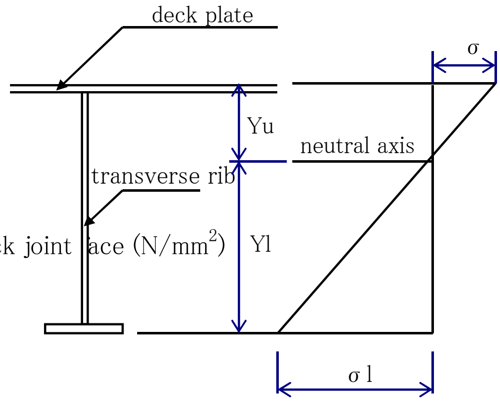
ts :thickness of splice plate(mm)

(3) Calculations for necessary number of bolts of transverse ribs and brackets

Calculate the number of bolts necessary for connection of the deck plate on the transverse rib and bracket using the following equation.
Also, figure 1 shows the stresed condition of the certain moment.

$$n_{req} = \frac{b_e \times t \times \sqrt{\sigma^2 + \tau^2}}{\rho a}$$

Here, t : thickness of deck plate (mm)
b_e : effective width of deck plate(mm)
σ : from figure 1 (N/mm^2)
τ : maximum shearing stress intensity on deck joint face (N/mm^2)
ρ a : high tensile bolt
2 face allowable friction $\rho a = 108000N$



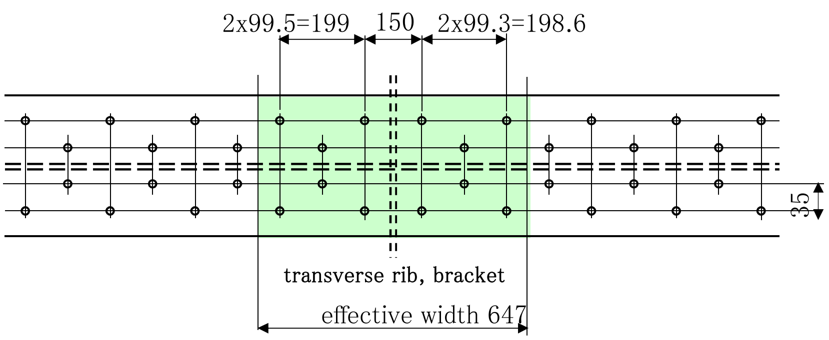
Here, σ l:actual stress intensity or 75% of full strentgh

figure 1

	ansverse r	bracket	
	point of support	edge	intermediate point
be	647	780	780
t	16	16	16
Yu	258.6	226.7	226.7
Yl	567.4	599.3	599.3
σ l	123	36	28
σ	56	14	11
τ	51	32	25
ρ a	108000	108000	108000
n_{req}	7.3	4.0	3.1

Install the above numbers within the effective width.

applied location		effective width	numbers necessary	numbers used	
on transverse ri	R1～R54	647 mm	7.3	12	OK



４．７．２　Calculations of transverse joints of deck plate（longitudinal and transverse direction to bridge）

（１）Design principle

＊Use the maximum value out of the following three types of stress intensity for calculation of stress intensity upon design

ａ．Main girder acting stress intensity
ｂ．Floor system acting stress intensity（refer to design of longitudinal rib）
ｃ．（main girder action force＋floor system action force）／1.40

(２) Stress intensity of transverse joint

unit (N/mm²)

		bending stress (tension) σt			bending stress (compress) σc		
		main girder	floor system	sum /1.4	main girder	floor system	sum /1.4
G1	J-1	0	0	0	-51	-64	-82
G1	J-2	0	0	0	-86	-64	-107
G1	J-3	0	0	0	-102	-64	-118
G1	J-4	0	0	0	-106	-64	-121
G1	J-5	0	0	0	-101	-64	-117
G1	J-6	0	0	0	-83	-64	-105
G1	J-7	0	0	0	-45	-64	-77
G1	J-8	30	0	21	0	-64	-45
G1	J-9	86	0	61	0	-64	-45
G1	J-10	90	0	64	0	-64	-45
G1	J-11	49	0	35	0	-64	-45
G1	J-12	20	0	14	-7	-64	-50
G1	J-13	8	0	5	-26	-64	-64
G1	J-14	6	0	4	-31	-64	-67
G1	J-15	16	0	11	-24	-64	-62
G1	J-16	34	0	24	-6	-64	-49
G1	J-17	67	0	48	0	-64	-45
G1	J-18	113	0	81	0	-64	-45
G1	J-19	158	0	113	0	-64	-45
G1	J-20	152	0	109	0	-64	-45
G1	J-21	91	0	65	0	-64	-45
G1	J-22	27	0	19	0	-64	-45
G1	J-23	0	0	0	-69	-64	-95
G1	J-24	0	0	0	-113	-64	-126
G1	J-25	0	0	0	-143	-64	-148
G1	J-26	0	0	0	-158	-64	-158
G1	J-27	0	0	0	-165	-64	-163
G1	J-28	0	0	0	-163	-64	-162
G1	J-29	0	0	0	-154	-64	-155
G1	J-30	0	0	0	-135	-64	-142
G1	J-31	0	0	0	-103	-64	-119
G1	J-32	0	0	0	-59	-64	-88
G2	J-1	0	0	0	-48	-64	-80
G2	J-2	0	0	0	-83	-64	-104
G2	J-3	0	0	0	-98	-64	-115
G2	J-4	0	0	0	-105	-64	-120
G2	J-5	0	0	0	-98	-64	-115
G2	J-6	0	0	0	-82	-64	-104
G2	J-7	0	0	0	-46	-64	-78
G2	J-8	31	0	22	0	-64	-45
G2	J-9	84	0	60	0	-64	-45
G2	J-10	90	0	64	0	-64	-45
G2	J-11	53	0	38	0	-64	-45
G2	J-12	23	0	16	-7	-64	-51
G2	J-13	9	0	6	-29	-64	-66
G2	J-14	7	0	5	-34	-64	-70
G2	J-15	19	0	13	-26	-64	-64
G2	J-16	38	0	27	-7	-64	-50
G2	J-17	70	0	50	0	-64	-45
G2	J-18	110	0	78	0	-64	-45
G2	J-19	151	0	108	0	-64	-45
G2	J-20	144	0	103	0	-64	-45
G2	J-21	86	0	61	0	-64	-45
G2	J-22	27	0	19	0	-64	-45
G2	J-23	0	0	0	-63	-64	-90

unit (N/mm^2)

		bending stress (tension) σt			bending stress (compress) σc		
		main girder	floor system	sum /1.4	main girder	floor system	sum /1.4
G2	J-24	0	0	0	-113	-64	-126
G2	J-25	0	0	0	-149	-64	-152
G2	J-26	0	0	0	-165	-64	-163
G2	J-27	0	0	0	-172	-64	-168
G2	J-28	0	0	0	-164	-64	-163
G2	J-29	0	0	0	-155	-64	-156
G2	J-30	0	0	0	-129	-64	-138
G2	J-31	0	0	0	-94	-64	-113
G2	J-32	0	0	0	-48	-64	-80
G3	J-1	0	0	0	-40	-64	-74
G3	J-2	0	0	0	-69	-64	-95
G3	J-3	0	0	0	-84	-64	-105
G3	J-4	0	0	0	-88	-64	-108
G3	J-5	0	0	0	-84	-64	-105
G3	J-6	0	0	0	-71	-64	-96
G3	J-7	0	0	0	-40	-64	-74
G3	J-8	26	0	19	0	-64	-45
G3	J-9	73	0	52	0	-64	-45
G3	J-10	80	0	57	0	-64	-45
G3	J-11	47	0	34	0	-64	-45
G3	J-12	20	0	15	-6	-64	-50
G3	J-13	8	0	6	-25	-64	-63
G3	J-14	6	0	4	-31	-64	-67
G3	J-15	16	0	11	-24	-64	-62
G3	J-16	33	0	24	-7	-64	-50
G3	J-17	62	0	44	0	-64	-45
G3	J-18	102	0	73	0	-64	-45
G3	J-19	141	0	101	0	-64	-45
G3	J-20	138	0	98	0	-64	-45
G3	J-21	84	0	60	0	-64	-45
G3	J-22	29	0	21	0	-64	-45
G3	J-23	0	0	0	-62	-64	-90
G3	J-24	0	0	0	-111	-64	-125
G3	J-25	0	0	0	-144	-64	-148
G3	J-26	0	0	0	-165	-64	-163
G3	J-27	0	0	0	-168	-64	-165
G3	J-28	0	0	0	-161	-64	-160
G3	J-29	0	0	0	-152	-64	-154
G3	J-30	0	0	0	-127	-64	-136
G3	J-31	0	0	0	-95	-64	-113
G3	J-32	0	0	0	-48	-64	-80
G4	J-1	0	0	0	-44	-64	-77
G4	J-2	0	0	0	-71	-64	-96
G4	J-3	0	0	0	-85	-64	-106
G4	J-4	0	0	0	-90	-64	-109
G4	J-5	0	0	0	-85	-64	-106
G4	J-6	0	0	0	-71	-64	-96
G4	J-7	0	0	0	-43	-64	-76
G4	J-8	25	0	18	0	-64	-45
G4	J-9	78	0	56	0	-64	-45
G4	J-10	82	0	59	0	-64	-45
G4	J-11	46	0	33	0	-64	-45
G4	J-12	18	0	13	-7	-64	-50
G4	J-13	6	0	4	-24	-64	-62
G4	J-14	4	0	3	-29	-64	-66

unit (N/mm^2)

		bending stress (tension) σt			bending stress (compress) σc		
		main girder	floor system	sum /1.4	main girder	floor system	sum /1.4
G4	J-15	13	0	9	-23	-64	-62
G4	J-16	28	0	20	-7	-64	-50
G4	J-17	58	0	41	0	-64	-45
G4	J-18	103	0	74	0	-64	-45
G4	J-19	144	0	103	0	-64	-45
G4	J-20	144	0	103	0	-64	-45
G4	J-21	91	0	65	0	-64	-45
G4	J-22	31	0	22	0	-64	-45
G4	J-23	0	0	0	-64	-64	-91
G4	J-24	0	0	0	-107	-64	-122
G4	J-25	0	0	0	-138	-64	-144
G4	J-26	0	0	0	-153	-64	-155
G4	J-27	0	0	0	-161	-64	-160
G4	J-28	0	0	0	-160	-64	-160
G4	J-29	0	0	0	-151	-64	-154
G4	J-30	0	0	0	-133	-64	-140
G4	J-31	0	0	0	-101	-64	-117
G4	J-32	0	0	0	-57	-64	-86
D-1	J-1	0	0	0	-47	-64	-79
D-1	J-2	0	0	0	-80	-64	-102
D-1	J-3	0	0	0	-95	-64	-113
D-1	J-4	0	0	0	-100	-64	-117
D-1	J-5	0	0	0	-94	-64	-112
D-1	J-6	0	0	0	-77	-64	-100
D-1	J-7	0	0	0	-41	-64	-75
D-1	J-8	27	0	19	0	-64	-45
D-1	J-9	79	0	57	0	-64	-45
D-1	J-10	83	0	60	0	-64	-45
D-1	J-11	45	0	32	0	-64	-45
D-1	J-12	18	0	13	-6	-64	-50
D-1	J-13	7	0	5	-24	-64	-62
D-1	J-14	5	0	4	-28	-64	-66
D-1	J-15	15	0	10	-22	-64	-61
D-1	J-16	32	0	23	-5	-64	-49
D-1	J-17	62	0	45	0	-64	-45
D-1	J-18	106	0	76	0	-64	-45
D-1	J-19	150	0	107	0	-64	-45
D-1	J-20	144	0	103	0	-64	-45
D-1	J-21	85	0	60	0	-64	-45
D-1	J-22	25	0	18	0	-64	-45
D-1	J-23	0	0	0	-64	-64	-91
D-1	J-24	0	0	0	-105	-64	-121
D-1	J-25	0	0	0	-134	-64	-141
D-1	J-26	0	0	0	-151	-64	-153
D-1	J-27	0	0	0	-156	-64	-157
D-1	J-28	0	0	0	-154	-64	-155
D-1	J-29	0	0	0	-145	-64	-149
D-1	J-30	0	0	0	-126	-64	-136
D-1	J-31	0	0	0	-96	-64	-114
D-1	J-32	0	0	0	-54	-64	-84
D-2	J-1	0	0	0	-52	-64	-83
D-2	J-2	0	0	0	-87	-64	-108
D-2	J-3	0	0	0	-103	-64	-119
D-2	J-4	0	0	0	-108	-64	-122
D-2	J-5	0	0	0	-102	-64	-118

unit (N/mm²)

		bending stress (tension) σt			bending stress (compress) σc		
		main girder	floor system	sum /1.4	main girder	floor system	sum /1.4
D-2	J-6	0	0	0	-84	-64	-106
D-2	J-7	0	0	0	-45	-64	-78
D-2	J-8	30	0	21	0	-64	-45
D-2	J-9	87	0	62	0	-64	-45
D-2	J-10	91	0	65	0	-64	-45
D-2	J-11	49	0	35	0	-64	-45
D-2	J-12	21	0	15	-7	-64	-50
D-2	J-13	8	0	6	-27	-64	-65
D-2	J-14	6	0	5	-32	-64	-68
D-2	J-15	17	0	12	-24	-64	-63
D-2	J-16	35	0	25	-6	-64	-50
D-2	J-17	68	0	49	0	-64	-45
D-2	J-18	115	0	82	0	-64	-45
D-2	J-19	160	0	114	0	-64	-45
D-2	J-20	154	0	110	0	-64	-45
D-2	J-21	92	0	66	0	-64	-45
D-2	J-22	28	0	20	0	-64	-45
D-2	J-23	0	0	0	-70	-64	-96
D-2	J-24	0	0	0	-114	-64	-127
D-2	J-25	0	0	0	-145	-64	-149
D-2	J-26	0	0	0	-159	-64	-159
D-2	J-27	0	0	0	-167	-64	-165
D-2	J-28	0	0	0	-165	-64	-163
D-2	J-29	0	0	0	-156	-64	-157
D-2	J-30	0	0	0	-137	-64	-143
D-2	J-31	0	0	0	-104	-64	-120
D-2	J-32	0	0	0	-60	-64	-88
D-3	J-1	0	0	0	-50	-64	-81
D-3	J-2	0	0	0	-85	-64	-106
D-3	J-3	0	0	0	-101	-64	-117
D-3	J-4	0	0	0	-108	-64	-122
D-3	J-5	0	0	0	-100	-64	-117
D-3	J-6	0	0	0	-85	-64	-106
D-3	J-7	0	0	0	-48	-64	-79
D-3	J-8	32	0	23	0	-64	-45
D-3	J-9	86	0	61	0	-64	-45
D-3	J-10	92	0	66	0	-64	-45
D-3	J-11	54	0	39	0	-64	-45
D-3	J-12	23	0	17	-8	-64	-51
D-3	J-13	9	0	6	-30	-64	-66
D-3	J-14	7	0	5	-35	-64	-70
D-3	J-15	19	0	14	-27	-64	-64
D-3	J-16	39	0	28	-7	-64	-50
D-3	J-17	72	0	51	0	-64	-45
D-3	J-18	113	0	80	0	-64	-45
D-3	J-19	154	0	110	0	-64	-45
D-3	J-20	147	0	105	0	-64	-45
D-3	J-21	88	0	63	0	-64	-45
D-3	J-22	30	0	22	0	-64	-45
D-3	J-23	0	0	0	-65	-64	-92
D-3	J-24	0	0	0	-116	-64	-129
D-3	J-25	0	0	0	-152	-64	-154
D-3	J-26	0	0	0	-168	-64	-165
D-3	J-27	0	0	0	-177	-64	-171
D-3	J-28	0	0	0	-169	-64	-166
D-3	J-29	0	0	0	-160	-64	-160

unit (N/mm²)

		bending stress (tension) σt			bending stress (compress) σc		
		main girder	floor system	sum /1.4	main girder	floor system	sum /1.4
D-3	J-30	0	0	0	-134	-64	-141
D-3	J-31	0	0	0	-100	-64	-117
D-3	J-32	0	0	0	-51	-64	-82
D-4	J-1	0	0	0	-49	-64	-80
D-4	J-2	0	0	0	-76	-64	-100
D-4	J-3	0	0	0	-90	-64	-110
D-4	J-4	0	0	0	-95	-64	-113
D-4	J-5	0	0	0	-90	-64	-110
D-4	J-6	0	0	0	-76	-64	-99
D-4	J-7	0	0	0	-46	-64	-78
D-4	J-8	27	0	19	0	-64	-45
D-4	J-9	82	0	58	0	-64	-45
D-4	J-10	86	0	61	0	-64	-45
D-4	J-11	48	0	34	0	-64	-45
D-4	J-12	19	0	14	-6	-64	-49
D-4	J-13	7	0	5	-25	-64	-63
D-4	J-14	4	0	3	-31	-64	-67
D-4	J-15	14	0	10	-24	-64	-63
D-4	J-16	31	0	22	-6	-64	-50
D-4	J-17	61	0	43	0	-64	-45
D-4	J-18	106	0	76	0	-64	-45
D-4	J-19	147	0	105	0	-64	-45
D-4	J-20	146	0	104	0	-64	-45
D-4	J-21	92	0	66	0	-64	-45
D-4	J-22	32	0	23	0	-64	-45
D-4	J-23	0	0	0	-65	-64	-92
D-4	J-24	0	0	0	-108	-64	-123
D-4	J-25	0	0	0	-139	-64	-145
D-4	J-26	0	0	0	-159	-64	-159
D-4	J-27	0	0	0	-163	-64	-162
D-4	J-28	0	0	0	-162	-64	-161
D-4	J-29	0	0	0	-153	-64	-155
D-4	J-30	0	0	0	-134	-64	-141
D-4	J-31	0	0	0	-102	-64	-118
D-4	J-32	0	0	0	-58	-64	-87
D-5	J-1	0	0	0	-40	-64	-74
D-5	J-2	0	0	0	-66	-64	-92
D-5	J-3	0	0	0	-79	-64	-102
D-5	J-4	0	0	0	-84	-64	-105
D-5	J-5	0	0	0	-80	-64	-102
D-5	J-6	0	0	0	-66	-64	-92
D-5	J-7	0	0	0	-40	-64	-74
D-5	J-8	23	0	16	0	-64	-45
D-5	J-9	72	0	51	0	-64	-45
D-5	J-10	76	0	54	0	-64	-45
D-5	J-11	42	0	30	0	-64	-45
D-5	J-12	16	0	12	-6	-64	-50
D-5	J-13	6	0	4	-22	-64	-61
D-5	J-14	4	0	3	-27	-64	-64
D-5	J-15	12	0	8	-21	-64	-60
D-5	J-16	26	0	18	-6	-64	-50
D-5	J-17	53	0	38	0	-64	-45
D-5	J-18	97	0	69	0	-64	-45
D-5	J-19	137	0	98	0	-64	-45
D-5	J-20	137	0	98	0	-64	-45

unit (N/mm^2)

		bending stress (tension) σt			bending stress (compress) σc		
		main girder	floor system	sum /1.4	main girder	floor system	sum /1.4
D-5	J-21	85	0	61	0	-64	-45
D-5	J-22	29	0	21	0	-64	-45
D-5	J-23	0	0	0	-60	-64	-88
D-5	J-24	0	0	0	-100	-64	-117
D-5	J-25	0	0	0	-129	-64	-138
D-5	J-26	0	0	0	-146	-64	-149
D-5	J-27	0	0	0	-152	-64	-154
D-5	J-28	0	0	0	-151	-64	-153
D-5	J-29	0	0	0	-143	-64	-147
D-5	J-30	0	0	0	-124	-64	-134
D-5	J-31	0	0	0	-94	-64	-113
D-5	J-32	0	0	0	-52	-64	-83

（３）Calculations for transverse joints of deck plate (transverse direction to bridge)

Design policy

Stress check method for joints on tensile flange and longitudinal ribs without bolt hole area

Checking formula：$\sigma tn=\sigma tmax*Ag/An \leqq \sigma ta$

Where
- σtn ：Acting stress without bolt hole area
- $\sigma tmax$：Acting stress
- Ag ：Gross section area (Flange section area + longitudinal rib section area)
- An ：Net section area (Flange section area without bolt hole area + longitudinal rib section area without bolt holes)
- σta ：Allowable tensile stress

Required number of bolts for tensile flange and longitudinal ribs

$\sigma tn=\sigma tmax*Ag/An$
When $\sigma tn \geqq 0.75\sigma ta$ 　$\sigma t=\sigma tn$
When $\sigma tn < 0.75\sigma ta$ 　$\sigma t=0.75\sigma ta$
Required number of bolts $\sigma t*AnS/\rho a$

Where
- $0.75\sigma ta$ ：75% of allowable stress
- σt :Design tensile stress for bolts
- AnS ：Net area of flange and longitudinal ribs respectively

※ Due to usage of the software, because the calculations will be done divided by forms of longitudinal rib, investigations will be implemented in the later section that required quantity and thickness of splice plate is fulfilled in each block as a total.

(1) D-1 J-1(Sec-1) DECK

(a) Acting stress

$\sigma cmax$ = -79 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 11 N/mm^2

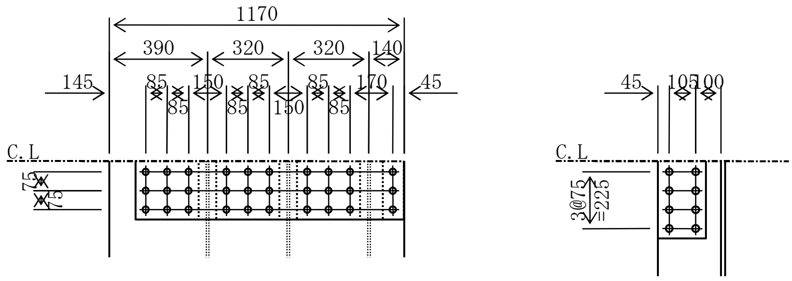
(b) Section area of main plate

1-DECK PL 1170 * 16 Ag = 187.2 cm^2 (SM400)

3-RIB PL 250 * 24 Agr = 180.0 cm^2 (SM400)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 18720 = 1965600 N

・Rib Pcr = σc * Agr = 105 * 18000 = 1890000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2

・Rib AgrR = Agr = 180.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1965600 / 108000 = 18.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 30 = 1965600 / 30 = 65520 N

ρs = τ * Ag / 30 = 11 * 18720 / 30 = 7058 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(65520^2 + 7058^2)}$ = 65899 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
1-SPL PL	1065 * 9	95.8
3-SPL PL	250 * 14	105.0
1-SPL PL	85 * 14	11.9
		116.9
6-SPL PL	185 * 18	199.8 ＞ AgrR = 180.0cm2

(2) D-1 J-2(Sec-2) DECK

(a) Acting stress

$\sigma cmax$ = -102 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

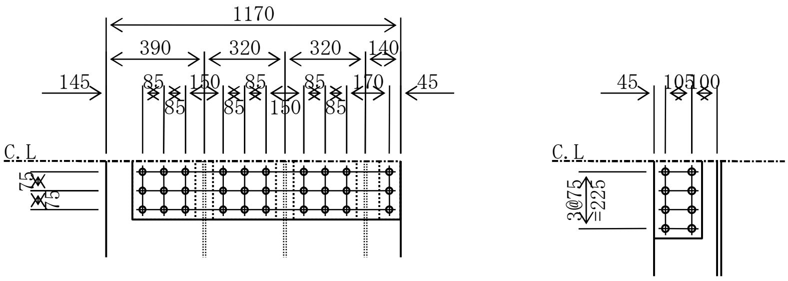
τmax = 8 N/mm^2

(b) Section area of main plate

1-DECK	PL	1170 * 16	Ag =	187.2 cm^2	(SM400)
3-RIB	PL	250 * 24	Agr =	180.0 cm^2	(SM400)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 18720 = 1965600 N

・Rib Pcr = σc * Agr = 105 * 18000 = 1890000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2

・Rib AgrR = Agr = 180.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1965600 / 108000 = 18.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 30 = 1965600 / 30 = 65520 N

ρs = τ * Ag / 30 = 8 * 18720 / 30 = 5196 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(65520^2 + 5196^2)}$ = 65726 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
1-SPL PL	1065 * 9	95.8
3-SPL PL	250 * 14	105.0
1-SPL PL	85 * 14	11.9
		116.9
6-SPL PL	185 * 18	199.8 ＞ AgrR = 180.0cm2

(3) D-1 J-3(Sec-3) DECK

(a) Acting stress

$\sigma cmax$ = -113 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 113 N/mm^2

τmax = 5 N/mm^2

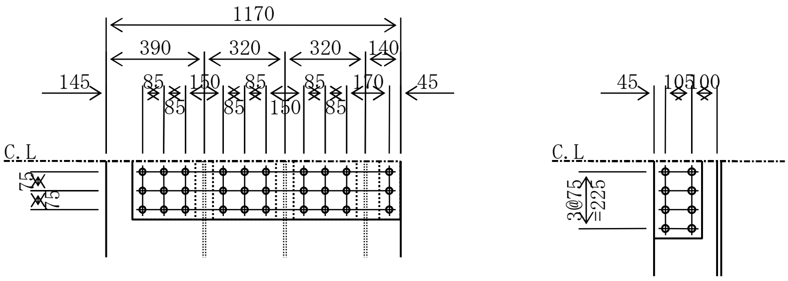
(b) Section area of main plate

1-DECK PL 1170 * 16   Ag = 187.2 cm^2 (SM400)

3-RIB PL 250 * 24   Agr = 180.0 cm^2 (SM400)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 113 * 18720 = 2120695 N

・Rib Pcr = σc * Agr = 113 * 18000 = 2039130 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2

・Rib AgrR = Agr = 180.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2120695 / 108000 = 19.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2039130 / 108000 = 18.9 pcs. (3 @ 8 = 24 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 30 = 2120695 / 30 = 70690 N

ρs = τ * Ag / 30 = 5 * 18720 / 30 = 2879 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(70690^2 + 2879^2) = 70748 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
1-SPL PL	1065 * 9	95.8
3-SPL PL	250 * 14	105.0
1-SPL PL	85 * 14	11.9
		116.9
6-SPL PL	185 * 18	199.8 ＞ AgrR = 180.0cm2

(4) D-1 J-4(Sec-5) DECK

(a) Acting stress

$\sigma cmax$ = -117 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 117 N/mm^2

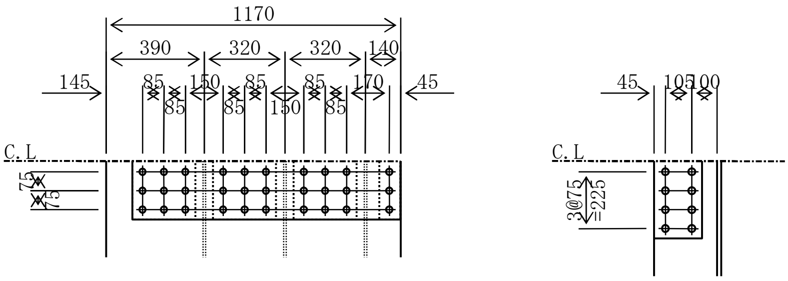
τmax = 3 N/mm^2

(b) Section area of main plate

1-DECK	PL	1170 * 16	Ag =	187.2 cm^2	(SM400)
3-RIB	PL	250 * 24	Agr =	180.0 cm^2	(SM400)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 117 * 18720 = 2182003 N

・Rib Pcr = σc * Agr = 117 * 18000 = 2098080 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2

・Rib AgrR = Agr = 180.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2182003 / 108000 = 20.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2098080 / 108000 = 19.4 pcs. (3 @ 8 = 24 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 30 = 2182003 / 30 = 72733 N

ρs = τ * Ag / 30 = 3 * 18720 / 30 = 1569 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(72733^2 + 1569^2)}$ = 72750 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
1-SPL PL	1065 * 9	95.8
3-SPL PL	250 * 14	105.0
1-SPL PL	85 * 14	11.9
		116.9
6-SPL PL	185 * 18	199.8 ＞ AgrR = 180.0cm2

(5) D-1　J-5(Sec-6)　DECK

(a) Acting stress

$\sigma cmax$ = -112 N/mm^2　　0.75σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 112 N/mm^2

τmax = 5 N/mm^2

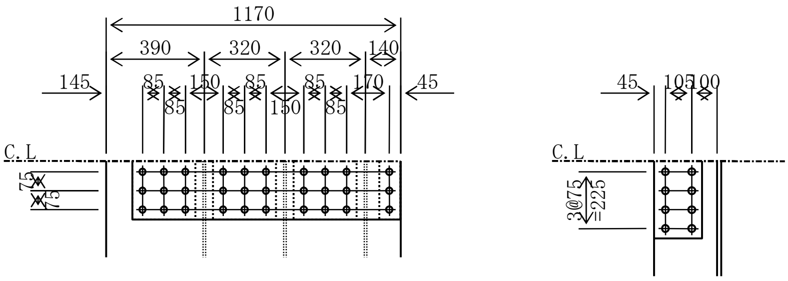
(b) Section area of main plate

1-DECK　PL　1170 * 16　　Ag = 187.2 cm^2　(SM400)

3-RIB　PL　250 * 24　　Agr = 180.0 cm^2　(SM400)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate　Pc = σc * Ag = 112 * 18720 = 2105139 N

・Rib　Pcr = σc * Agr = 112 * 18000 = 2024172 N

(e) Required section area of the splice plates

・Mother material(One side)　AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2

・Rib　AgrR = Agr = 180.0 cm^2

(f) Required bolt number

・Main plate　n = Pc / (108000 * 1.00) = 2105139 / 108000 = 19.5 pcs.

・Rib　nr = Pcr / (108000 * 1.00) = 2024172 / 108000 = 18.7 pcs. (3 @ 8 = 24 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 30 = 2105139 / 30 = 70171 N

ρs = τ * Ag / 30 = 5 * 18720 / 30 = 3372 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(70171^2 + 3372^2)}$ = 70252 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	1065 * 9	95.8	
3-SPL PL	250 * 14	105.0	
1-SPL PL	85 * 14	11.9	
		116.9	
6-SPL PL	185 * 18	199.8	＞ AgrR = 180.0cm2

(6) D-1 J-6(Sec-7) DECK

(a) Acting stress

$\sigma cmax$ = -100 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

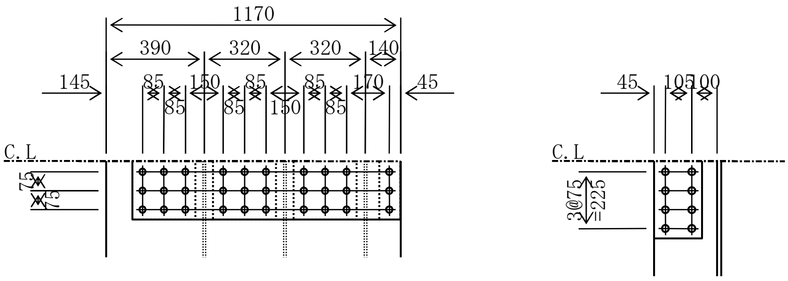
τmax = 9 N/mm^2

(b) Section area of main plate

1-DECK	PL	1170 * 16	Ag =	187.2 cm^2	(SM400)
3-RIB	PL	250 * 24	Agr =	180.0 cm^2	(SM400)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 18720 = 1965600 N

・Rib Pcr = σc * Agr = 105 * 18000 = 1890000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2

・Rib AgrR = Agr = 180.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1965600 / 108000 = 18.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 30 = 1965600 / 30 = 65520 N

ρs = τ * Ag / 30 = 9 * 18720 / 30 = 5488 N

ρ = $\sqrt{}(\rho p^2 + \rho s^2)$ = $\sqrt{}$(65520^2 + 5488^2) = 65749 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
1-SPL PL	1065 * 9	95.8
3-SPL PL	250 * 14	105.0
1-SPL PL	85 * 14	11.9
		116.9
6-SPL PL	185 * 18	199.8 ＞ AgrR = 180.0cm2

(7) D-1　J-7(Sec-8)　DECK

(a) Acting stress

$\sigma cmax$ = -75 N/mm^2　　0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 11 N/mm^2

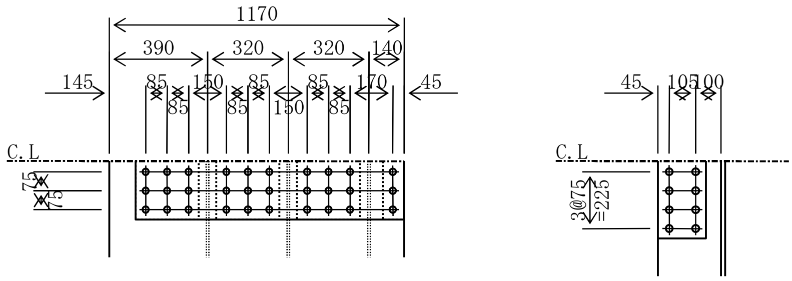
(b) Section area of main plate

1-DECK　PL　1170 * 16　　　Ag = 187.2 cm^2　(SM400)

3-RIB　PL　250 * 24　　　Agr = 180.0 cm^2　(SM400)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate　Pc = σc * Ag = 105 * 18720 = 1965600 N

・Rib　Pcr = σc * Agr = 105 * 18000 = 1890000 N

(e) Required section area of the splice plates

・Mother material(One side)　AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2

・Rib　　AgrR = Agr = 180.0 cm^2

(f) Required bolt number

・Main plate　n = Pc / (108000 * 1.00) = 1965600 / 108000 = 18.2 pcs.

・Rib　nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 30 = 1965600 / 30 = 65520 N

ρs = τ * Ag / 30 = 11 * 18720 / 30 = 7032 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(65520^2 + 7032^2)}$ = 65896 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
1-SPL PL	1065 * 9	95.8
3-SPL PL	250 * 14	105.0
1-SPL PL	85 * 14	11.9
		116.9
6-SPL PL	185 * 18	199.8 ＞ AgrR = 180.0cm2

(8) D-1 J-8(Sec-8) DECK

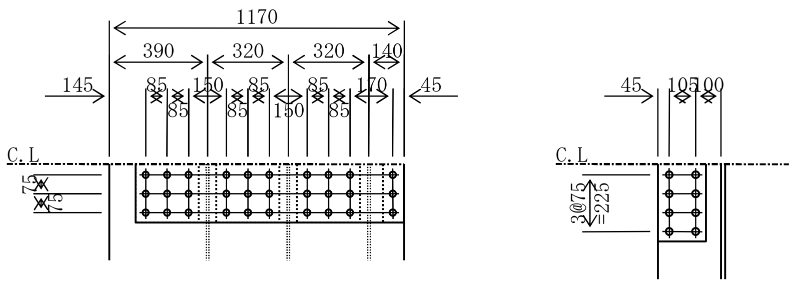
(a) Acting stress

$\sigma tmax$ = 27 N/mm^2 0.75σta = 0.75 * 140 = 105 N/mm^2
$\sigma cmax$ = -64 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2
∴ σc = 105 N/mm^2
τmax = 16 N/mm^2

(b) Section area of main plate

1-DECK PL 1170 * 16 Ag = 187.2 cm^2 (SM400)
3-RIB PL 250 * 24 Agr = 180.0 cm^2 (SM400)
ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 1170 * 16 A = 187.2
(187.2 - (10* 2.5)* 1.6) * 1.1 = 161.9 < 187.2 ∴An = 161.9 cm^2
3-RIB PL 250 * 24 Ar = 180.0
(180.0 - 3*(2* 2.7)* 2.4) * 1.1 = 155.2 < 180.0 ∴Anr = 155.2 cm^2
ΣAn = An + Anr = 161.9 + 155.2 = 317.2 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 27 * 367.2 / 317.2 = 32 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 105 * 16192 / 1.1 = 1545600 N
> σtn * An = 32 * 16192 = 511348 N
Pc = σc * Ag = 105 * 18720 = 1965600 N
・Rib Ptr = 0.75σta * Anr / 1.1 = 105 * 15523 / 1.1 = 1481760 N
> σtn * Anr = 32 * 15523 = 490227 N
Pcr = σc * Agr = 105 * 18000 = 1890000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 161.9 / 2 = 81.0 cm^2
AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2
・Rib AnrR = Anr = 155.2 cm^2
AgrR = Agr = 180.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1965600 / 108000 = 18.2 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 30 = 1965600 / 30 = 65520$ N

$\rho s = \tau * Ag / 30 = 16 * 18720 / 30 = 9983$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(65520^2 + 9983^2)} = 66276$ N

(i) Check of splice plates

	(SS400)	Ags(cm²)	deduction of bolt holes			Ans(cm²)
1-SPL PL	1065 * 9	(95.8 -	(10*2.5)* 0.9)*1.1=	80.7<	95.8	∴ 80.7
3-SPL PL	250 * 14	(105.0 -	3*(3*2.5)* 1.4)*1.1=	80.9<	105.0	∴ 80.9
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		116.9				90.1
6-SPL PL	185 * 18	(199.8 -	6*(2*2.7)* 1.8)*1.1=	155.6<	199.8	∴155.6
		> AgrR				>AnrR

(9) D-1 J-9(Sec-9) DECK

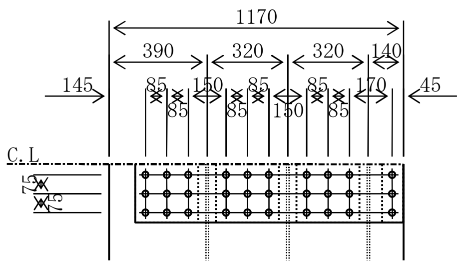
(a) Acting stress

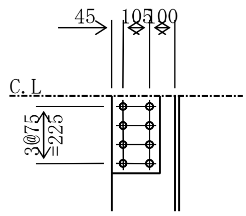
σ tmax = 79 N/mm^2 0.75σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2 0.75σ ca = 0.75 * 140 = 105 N/mm^2
$\therefore\sigma$ c = 105 N/mm^2
τ max = 19 N/mm^2

(b) Section area of main plate

1-DECK PL 1170 * 16 Ag = 187.2 cm^2 (SM400)
3-RIB PL 250 * 24 Agr = 180.0 cm^2 (SM400)
ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 1170 * 16 A = 187.2
(187.2 - (10* 2.5)* 1.6) * 1.1 = 161.9 < 187.2 $\therefore$An = 161.9 cm^2
3-RIB PL 250 * 24 Ar = 180.0
(180.0 - 3*(2* 2.7)* 2.4) * 1.1 = 155.2 < 180.0 $\therefore$Anr = 155.2 cm^2
ΣAn = An + Anr = 161.9 + 155.2 = 317.2 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 79 * 367.2 / 317.2 = 92 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σ ta * An / 1.1 = 105 * 16192 / 1.1 = 1545600 N
> σ tn * An = 92 * 16192 = 1483464 N
Pc = σ c * Ag = 105 * 18720 = 1965600 N
・Rib Ptr = 0.75σ ta * Anr / 1.1 = 105 * 15523 / 1.1 = 1481760 N
> σ tn * Anr = 92 * 15523 = 1422190 N
Pcr = σ c * Agr = 105 * 18000 = 1890000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 161.9 / 2 = 81.0 cm^2
AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2
・Rib AnrR = Anr = 155.2 cm^2
AgrR = Agr = 180.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1965600 / 108000 = 18.2 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 30 = 1965600 / 30 = 65520$ N

$\rho s = \tau * Ag / 30 = 19 * 18720 / 30 = 11964$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(65520^2 + 11964^2)} = 66603$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			$Ans(cm^2)$
1-SPL PL	1065 * 9	(95.8 -	(10*2.5)* 0.9)*1.1=	80.7＜	95.8	∴ 80.7
3-SPL PL	250 * 14	(105.0 -	3*(3*2.5)* 1.4)*1.1=	80.9＜	105.0	∴ 80.9
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2＜	11.9	∴ 9.2
		116.9				90.1
6-SPL PL	185 * 18	(199.8 -	6*(2*2.7)* 1.8)*1.1=	155.6＜	199.8	∴155.6
		＞ AgrR				＞AnrR

(10) D-1 J-10(Sec-11) DECK

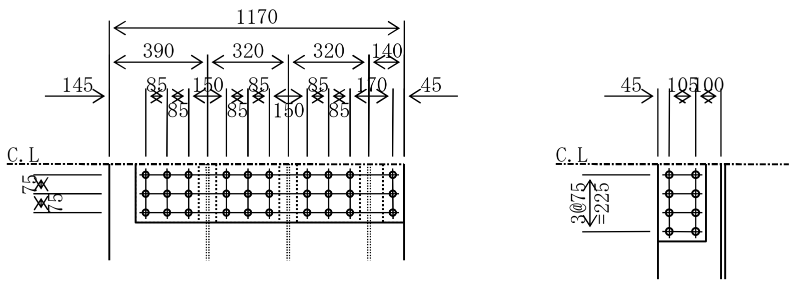
(a) Acting stress

$\sigma tmax$ = 83 N/mm² 0.75σta = 0.75 * 140 = 105 N/mm²
$\sigma cmax$ = -64 N/mm² 0.75σca = 0.75 * 140 = 105 N/mm²
∴σc = 105 N/mm²
τmax = 16 N/mm²

(b) Section area of main plate

1-DECK PL 1170 * 16 Ag = 187.2 cm² (SM400)
3-RIB PL 250 * 24 Agr = 180.0 cm² (SM400)
ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm²

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 1170 * 16 A = 187.2
(187.2 - (10* 2.5)* 1.6) * 1.1 = 161.9 < 187.2 ∴An = 161.9 cm²
3-RIB PL 250 * 24 Ar = 180.0
(180.0 - 3*(2* 2.7)* 2.4) * 1.1 = 155.2 < 180.0 ∴Anr = 155.2 cm²
ΣAn = An + Anr = 161.9 + 155.2 = 317.2 cm²
σtn = $\sigma tmax$ * ΣAg / ΣAn = 83 * 367.2 / 317.2 = 97 N/mm²
< σta = 140 N/mm²

(e) Design axial force

・Main plate Pt = σtn * An = 97 * 16192 = 1563608 N
> 0.75σta * An / 1.1 = 105 * 16192 / 1.1 = 1545600 N
Pc = σc * Ag = 105 * 18720 = 1965600 N
・Rib Ptr = σtn * Anr = 97 * 15523 = 1499024 N
> 0.75σta * Anr/ 1.1 = 105 * 15523 / 1.1 = 1481760 N
Pcr = σc * Agr = 105 * 18000 = 1890000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 161.9 / 2 = 81.0 cm²
AgR = Ag / 2 = 187.2 / 2 = 93.6 cm²
・Rib AnrR = Anr = 155.2 cm²
AgrR = Agr = 180.0 cm²

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1965600 / 108000 = 18.2 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 30 = 1965600 / 30 = 65520$ N

$\rho s = \tau * Ag / 30 = 16 * 18720 / 30 = 9674$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(65520^2 + 9674^2)} = 66230$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	1065 * 9	(95.8 -	(10*2.5)* 0.9)*1.1=	80.7<	95.8	∴ 80.7
3-SPL PL	250 * 14	(105.0 -	3*(3*2.5)* 1.4)*1.1=	80.9<	105.0	∴ 80.9
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		116.9				90.1
6-SPL PL	185 * 18	(199.8 -	6*(2*2.7)* 1.8)*1.1=	155.6<	199.8	∴155.6
		> AgrR				>AnrR

(11) D-1 J-11(Sec-12) DECK

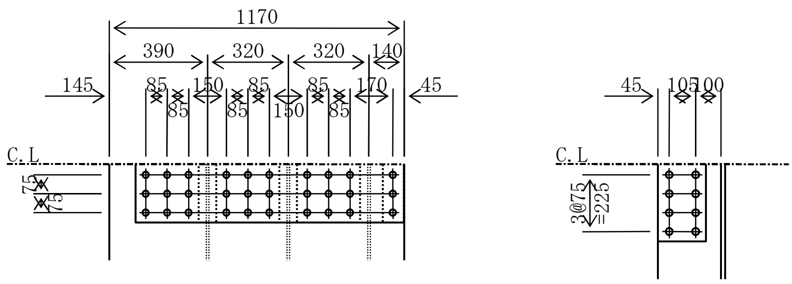
(a) Acting stress

$\sigma tmax$ = 45 N/mm^2 0.75 σta = 0.75 * 140 = 105 N/mm^2
$\sigma cmax$ = -64 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2
∴ σc = 105 N/mm^2
τmax = 12 N/mm^2

(b) Section area of main plate

1-DECK PL 1170 * 16 Ag = 187.2 cm^2 (SM400)
3-RIB PL 250 * 24 Agr = 180.0 cm^2 (SM400)
ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 1170 * 16 A = 187.2
(187.2 - (10* 2.5)* 1.6) * 1.1 = 161.9 < 187.2 ∴An = 161.9 cm^2
3-RIB PL 250 * 24 Ar = 180.0
(180.0 - 3*(2* 2.7)* 2.4) * 1.1 = 155.2 < 180.0 ∴Anr = 155.2 cm^2
ΣAn = An + Anr = 161.9 + 155.2 = 317.2 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 45 * 367.2 / 317.2 = 52 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σta * An / 1.1 = 105 * 16192 / 1.1 = 1545600 N
> σtn * An = 52 * 16192 = 839592 N
Pc = σc * Ag = 105 * 18720 = 1965600 N
・Rib Ptr = 0.75 σta * Anr / 1.1 = 105 * 15523 / 1.1 = 1481760 N
> σtn * Anr = 52 * 15523 = 804913 N
Pcr = σc * Agr = 105 * 18000 = 1890000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 161.9 / 2 = 81.0 cm^2
AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2
・Rib AnrR = Anr = 155.2 cm^2
AgrR = Agr = 180.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1965600 / 108000 = 18.2 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 30 = 1965600 / 30 = 65520$ N

$\rho s = \tau * Ag / 30 = 12 * 18720 / 30 = 7449$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(65520^2 + 7449^2)} = 65942$ N

(i) Check of splice plates

	(SS400)	Ags(cm²)	deduction of bolt holes		Ans(cm²)
1-SPL PL	1065 * 9	(95.8 -	(10*2.5)* 0.9)*1.1=	80.7< 95.8	∴ 80.7
3-SPL PL	250 * 14	(105.0 -	3*(3*2.5)* 1.4)*1.1=	80.9< 105.0	∴ 80.9
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2< 11.9	∴ 9.2
		116.9			90.1
6-SPL PL	185 * 18	(199.8 -	6*(2*2.7)* 1.8)*1.1=	155.6< 199.8	∴155.6
		> AgrR			>AnrR

(12) D-1 J-12(Sec-12) DECK

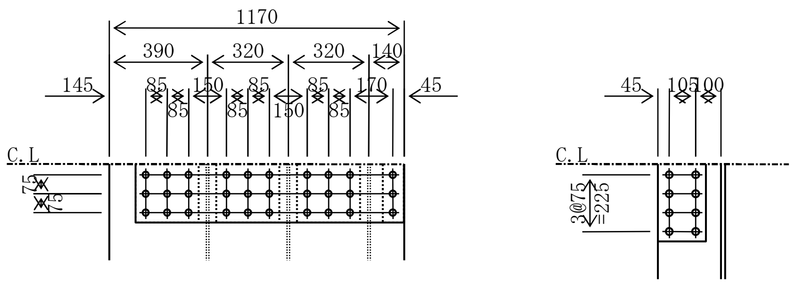
(a) Acting stress

σ tmax = 18 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2
∴ σ c = 105 N/mm^2
τ max = 7 N/mm^2

(b) Section area of main plate

1-DECK PL 1170 * 16 Ag = 187.2 cm^2 (SM400)
3-RIB PL 250 * 24 Agr = 180.0 cm^2 (SM400)
ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 1170 * 16 A = 187.2
(187.2 - (10* 2.5)* 1.6) * 1.1 = 161.9 < 187.2 ∴An = 161.9 cm^2
3-RIB PL 250 * 24 Ar = 180.0
(180.0 - 3*(2* 2.7)* 2.4) * 1.1 = 155.2 < 180.0 ∴Anr = 155.2 cm^2
ΣAn = An + Anr = 161.9 + 155.2 = 317.2 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 18 * 367.2 / 317.2 = 21 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 16192 / 1.1 = 1545600 N
> σ tn * An = 21 * 16192 = 346391 N
Pc = σ c * Ag = 105 * 18720 = 1965600 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 15523 / 1.1 = 1481760 N
> σ tn * Anr = 21 * 15523 = 332084 N
Pcr = σ c * Agr = 105 * 18000 = 1890000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 161.9 / 2 = 81.0 cm^2
AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2
・Rib AnrR = Anr = 155.2 cm^2
AgrR = Agr = 180.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1965600 / 108000 = 18.2 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 30 = 1965600 / 30 = 65520$ N

$\rho s = \tau * Ag / 30 = 7 * 18720 / 30 = 4443$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(65520^2 + 4443^2)} = 65670$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			$Ans(cm^2)$
1-SPL PL	1065 * 9	(95.8 -	(10*2.5)* 0.9)*1.1=	80.7<	95.8	∴ 80.7
3-SPL PL	250 * 14	(105.0 -	3*(3*2.5)* 1.4)*1.1=	80.9<	105.0	∴ 80.9
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		116.9				90.1
6-SPL PL	185 * 18	(199.8 -	6*(2*2.7)* 1.8)*1.1=	155.6<	199.8	∴155.6
		> AgrR				>AnrR

(13) D-1　J-13(Sec-13)　DECK

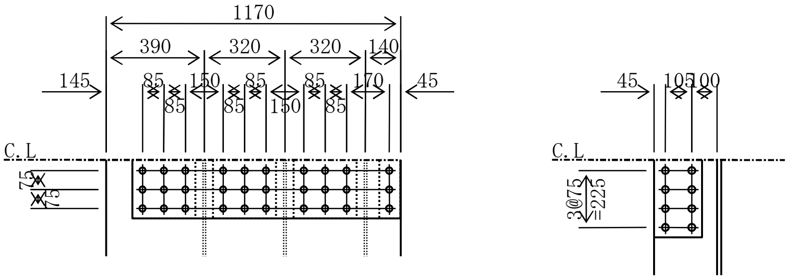
(a) Acting stress

σ tmax = 7 N/mm^2　　0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2　　0.75 σ ca = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma$ c = 105 N/mm^2
τ max = 4 N/mm^2

(b) Section area of main plate

1-DECK　PL　1170 * 16　　Ag = 187.2 cm^2　(SM400)
3-RIB　PL　250 * 24　　Agr = 180.0 cm^2　(SM400)
ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK　PL　1170 * 16　　A = 187.2
(187.2 - (10* 2.5)* 1.6) * 1.1 = 161.9 ＜ 187.2　∴An = 161.9 cm^2
3-RIB　PL　250 * 24　　Ar = 180.0
(180.0 - 3*(2* 2.7)* 2.4) * 1.1 = 155.2 ＜ 180.0　∴Anr = 155.2 cm^2
ΣAn = An + Anr = 161.9 + 155.2 = 317.2 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 7 * 367.2 / 317.2 = 8 N/mm^2
＜ σ ta = 140 N/mm^2

(e) Design axial force

・Main plate　Pt = 0.75 σ ta * An / 1.1 = 105 * 16192 / 1.1 = 1545600 N
＞ σ tn * An = 8 * 16192 = 132561 N
Pc = σ c * Ag = 105 * 18720 = 1965600 N
・Rib　Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 15523 / 1.1 = 1481760 N
＞ σ tn * Anr = 8 * 15523 = 127086 N
Pcr = σ c * Agr = 105 * 18000 = 1890000 N

(f) Required section area of the splice plates

・Mother material(One side)　AnR = An / 2 = 161.9 / 2 = 81.0 cm^2
AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2
・Rib　AnrR = Anr = 155.2 cm^2
AgrR = Agr = 180.0 cm^2

(g) Required bolt number

・Main plate　n = Pc / (108000 * 1.00) = 1965600 / 108000 = 18.2 pcs.
・Rib　nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.)　Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 30 = 1965600 / 30 = 65520$ N

$\rho s = \tau * Ag / 30 = 4 * 18720 / 30 = 2542$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(65520^2 + 2542^2)} = 65569$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	1065 * 9	(95.8 -	(10*2.5)* 0.9)*1.1=	80.7<	95.8	∴ 80.7
3-SPL PL	250 * 14	(105.0 -	3*(3*2.5)* 1.4)*1.1=	80.9<	105.0	∴ 80.9
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		116.9				90.1
6-SPL PL	185 * 18	(199.8 -	6*(2*2.7)* 1.8)*1.1=	155.6<	199.8	∴155.6
		> AgrR				>AnrR

(14) D-1 J-14(Sec-14) DECK

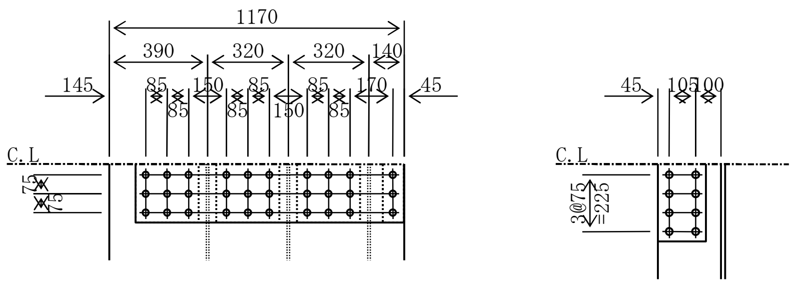
(a) Acting stress

σ tmax = 5 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -66 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma$ c = 105 N/mm^2
τ max = 3 N/mm^2

(b) Section area of main plate

1-DECK PL 1170 * 16 Ag = 187.2 cm^2 (SM400)
3-RIB PL 250 * 24 Agr = 180.0 cm^2 (SM400)
ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 1170 * 16 A = 187.2
(187.2 - (10* 2.5)* 1.6) * 1.1 = 161.9 < 187.2 $\therefore$An = 161.9 cm^2
3-RIB PL 250 * 24 Ar = 180.0
(180.0 - 3*(2* 2.7)* 2.4) * 1.1 = 155.2 < 180.0 $\therefore$Anr = 155.2 cm^2
ΣAn = An + Anr = 161.9 + 155.2 = 317.2 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 5 * 367.2 / 317.2 = 6 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 16192 / 1.1 = 1545600 N
> σ tn * An = 6 * 16192 = 97373 N
Pc = σ c * Ag = 105 * 18720 = 1965600 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 15523 / 1.1 = 1481760 N
> σ tn * Anr = 6 * 15523 = 93351 N
Pcr = σ c * Agr = 105 * 18000 = 1890000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 161.9 / 2 = 81.0 cm^2
AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2
・Rib AnrR = Anr = 155.2 cm^2
AgrR = Agr = 180.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1965600 / 108000 = 18.2 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 30 = 1965600 / 30 = 65520$ N

$\rho s = \tau * Ag / 30 = 3 * 18720 / 30 = 1899$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(65520^2 + 1899^2)} = 65548$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	1065 * 9	(95.8 -	(10*2.5)* 0.9)*1.1=	80.7<	95.8	∴ 80.7
3-SPL PL	250 * 14	(105.0 -	3*(3*2.5)* 1.4)*1.1=	80.9<	105.0	∴ 80.9
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		116.9				90.1
6-SPL PL	185 * 18	(199.8 -	6*(2*2.7)* 1.8)*1.1=	155.6<	199.8	∴155.6
		> AgrR				>AnrR

(15) D-1 J-15(Sec-15) DECK

(a) Acting stress

$\sigma tmax$ = 15 N/mm^2 $0.75\sigma ta$ = 0.75 * 140 = 105 N/mm^2

$\sigma cmax$ = -64 N/mm^2 $0.75\sigma ca$ = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 6 N/mm^2

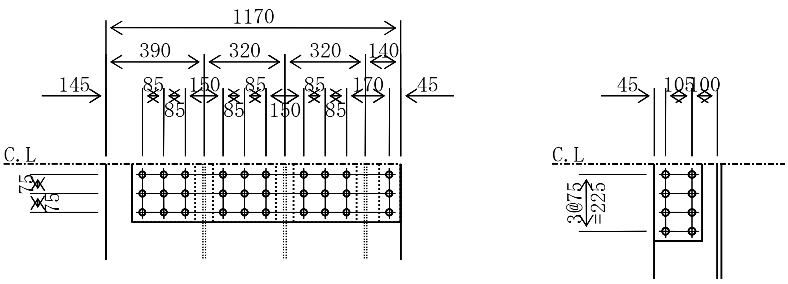
(b) Section area of main plate

1-DECK PL 1170 * 16   Ag = 187.2 cm^2 (SM400)

3-RIB PL 250 * 24   Agr = 180.0 cm^2 (SM400)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 1170 * 16   A = 187.2

(187.2 - (10* 2.5)* 1.6) * 1.1 = 161.9 < 187.2   ∴An = 161.9 cm^2

3-RIB PL 250 * 24   Ar = 180.0

(180.0 - 3*(2* 2.7)* 2.4) * 1.1 = 155.2 < 180.0   ∴Anr = 155.2 cm^2

ΣAn = An + Anr = 161.9 + 155.2 = 317.2 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 15 * 367.2 / 317.2 = 17 N/mm^2

< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = $0.75\sigma ta$ * An / 1.1 = 105 * 16192 / 1.1 = 1545600 N

> σtn * An = 17 * 16192 = 274759 N

Pc = σc * Ag = 105 * 18720 = 1965600 N

・Rib Ptr = $0.75\sigma ta$ * Anr / 1.1 = 105 * 15523 / 1.1 = 1481760 N

> σtn * Anr = 17 * 15523 = 263410 N

Pcr = σc * Agr = 105 * 18000 = 1890000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 161.9 / 2 = 81.0 cm^2

AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2

・Rib AnrR = Anr = 155.2 cm^2

AgrR = Agr = 180.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1965600 / 108000 = 18.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 30 = 1965600 / 30 = 65520$ N

$\rho s = \tau * Ag / 30 = 6 * 18720 / 30 = 3476$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(65520^2 + 3476^2)} = 65612$ N

(i) Check of splice plates

	(SS400)	Ags(cm²)	deduction of bolt holes		Ans(cm²)
1-SPL PL	1065 * 9	(95.8 -	(10*2.5)* 0.9)*1.1= 80.7<	95.8	∴ 80.7
3-SPL PL	250 * 14	(105.0 -	3*(3*2.5)* 1.4)*1.1= 80.9<	105.0	∴ 80.9
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1= 9.2<	11.9	∴ 9.2
		116.9			90.1
6-SPL PL	185 * 18	(199.8 -	6*(2*2.7)* 1.8)*1.1= 155.6<	199.8	∴155.6
		＞ AgrR			＞AnrR

(16) D-1 J-16(Sec-16) DECK

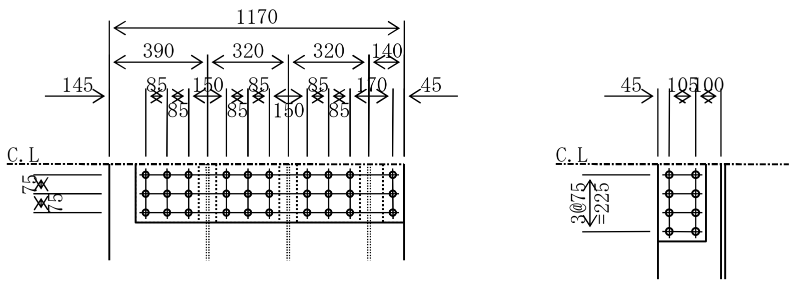
(a) Acting stress

σ tmax = 32 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2
∴ σ c = 105 N/mm^2
τ max = 8 N/mm^2

(b) Section area of main plate

1-DECK PL 1170 * 16   Ag = 187.2 cm^2 (SM400)
3-RIB PL 250 * 24   Agr = 180.0 cm^2 (SM400)
Σ Ag = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 1170 * 16   A = 187.2
(187.2 - (10* 2.5)* 1.6) * 1.1 = 161.9 < 187.2 ∴An = 161.9 cm^2
3-RIB PL 250 * 24   Ar = 180.0
(180.0 - 3*(2* 2.7)* 2.4) * 1.1 = 155.2 < 180.0 ∴Anr = 155.2 cm^2
Σ An = An + Anr = 161.9 + 155.2 = 317.2 cm^2
σ tn = σ tmax * Σ Ag / Σ An = 32 * 367.2 / 317.2 = 36 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 16192 / 1.1 = 1545600 N
> σ tn * An = 36 * 16192 = 591005 N
Pc = σ c * Ag = 105 * 18720 = 1965600 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 15523 / 1.1 = 1481760 N
> σ tn * Anr = 36 * 15523 = 566593 N
Pcr = σ c * Agr = 105 * 18000 = 1890000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 161.9 / 2 = 81.0 cm^2
AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2
・Rib AnrR = Anr = 155.2 cm^2
AgrR = Agr = 180.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1965600 / 108000 = 18.2 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 30 = 1965600 / 30 = 65520$ N

$\rho s = \tau * Ag / 30 = 8 * 18720 / 30 = 5178$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(65520^2 + 5178^2)} = 65724$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	1065 * 9	(95.8 -	(10*2.5)* 0.9)*1.1=	80.7＜	95.8	∴ 80.7
3-SPL PL	250 * 14	(105.0 -	3*(3*2.5)* 1.4)*1.1=	80.9＜	105.0	∴ 80.9
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2＜	11.9	∴ 9.2
		116.9				90.1
6-SPL PL	185 * 18	(199.8 -	6*(2*2.7)* 1.8)*1.1=	155.6＜	199.8	∴155.6
		＞ AgrR				＞AnrR

(17) D-1 J-17(Sec-17) DECK

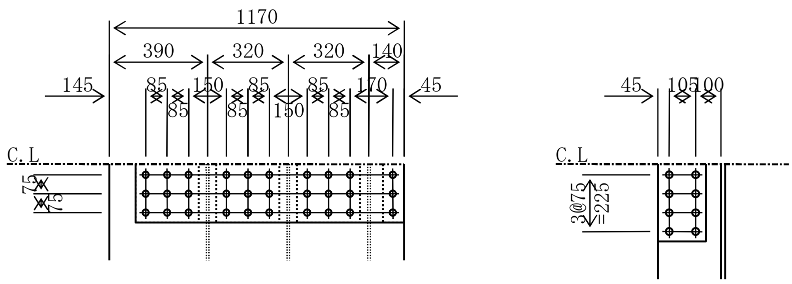
(a) Acting stress

$\sigma tmax$ = 62 N/mm² 0.75 σta = 0.75 * 140 = 105 N/mm²
$\sigma cmax$ = -64 N/mm² 0.75 σca = 0.75 * 140 = 105 N/mm²
∴ σc = 105 N/mm²
τmax = 13 N/mm²

(b) Section area of main plate

1-DECK PL 1170 * 16 Ag = 187.2 cm² (SM400)
3-RIB PL 250 * 24 Agr = 180.0 cm² (SM400)
ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm²

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 1170 * 16 A = 187.2
(187.2 - (10* 2.5)* 1.6) * 1.1 = 161.9 < 187.2 ∴An = 161.9 cm²
3-RIB PL 250 * 24 Ar = 180.0
(180.0 - 3*(2* 2.7)* 2.4) * 1.1 = 155.2 < 180.0 ∴Anr = 155.2 cm²
ΣAn = An + Anr = 161.9 + 155.2 = 317.2 cm²
σtn = $\sigma tmax$ * ΣAg / ΣAn = 62 * 367.2 / 317.2 = 72 N/mm²
< σta = 140 N/mm²

(e) Design axial force

・Main plate Pt = 0.75 σta * An / 1.1 = 105 * 16192 / 1.1 = 1545600 N
> σtn * An = 72 * 16192 = 1169392 N
Pc = σc * Ag = 105 * 18720 = 1965600 N
・Rib Ptr = 0.75 σta * Anr / 1.1 = 105 * 15523 / 1.1 = 1481760 N
> σtn * Anr = 72 * 15523 = 1121091 N
Pcr = σc * Agr = 105 * 18000 = 1890000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 161.9 / 2 = 81.0 cm²
AgR = Ag / 2 = 187.2 / 2 = 93.6 cm²
・Rib AnrR = Anr = 155.2 cm²
AgrR = Agr = 180.0 cm²

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1965600 / 108000 = 18.2 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 30 = 1965600 / 30 = 65520$ N

$\rho s = \tau * Ag / 30 = 13 * 18720 / 30 = 7821$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(65520^2 + 7821^2)} = 65985$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	1065 * 9	(95.8 -	(10*2.5)* 0.9)*1.1=	80.7<	95.8	∴ 80.7
3-SPL PL	250 * 14	(105.0 -	3*(3*2.5)* 1.4)*1.1=	80.9<	105.0	∴ 80.9
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		116.9				90.1
6-SPL PL	185 * 18	(199.8 -	6*(2*2.7)* 1.8)*1.1=	155.6<	199.8	∴155.6
		> AgrR				>AnrR

(18) D-1 J-18(Sec-18) DECK

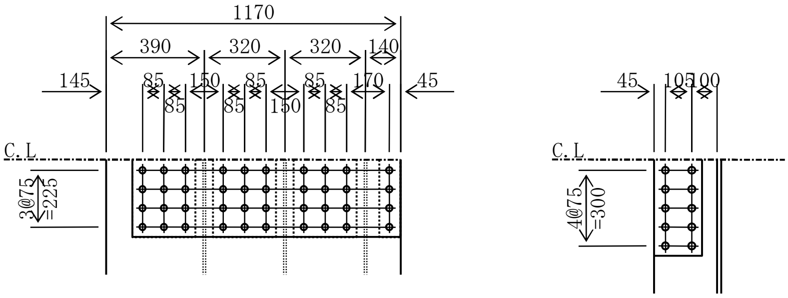
(a) Acting stress

σ tmax = 106 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 210 = 158 N/mm^2
∴ σ c = 158 N/mm^2
τ max = 17 N/mm^2

(b) Section area of main plate

1-DECK PL 1170 * 16   Ag = 187.2 cm^2 (SM490Y)
3-RIB PL 250 * 24   Agr = 180.0 cm^2 (SM490Y)
ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 1170 * 16   A = 187.2
(187.2 - (10* 2.5)* 1.6) * 1.1 = 161.9 < 187.2 ∴An = 161.9 cm^2
3-RIB PL 250 * 24   Ar = 180.0
(180.0 - 3*(2* 2.7)* 2.4) * 1.1 = 155.2 < 180.0 ∴Anr = 155.2 cm^2
ΣAn = An + Anr = 161.9 + 155.2 = 317.2 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 106 * 367.2 / 317.2 = 122 N/mm^2
< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 158 * 16192 / 1.1 = 2318400 N
> σ tn * An = 122 * 16192 = 1983432 N
Pc = σ c * Ag = 158 * 18720 = 2948400 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 158 * 15523 / 1.1 = 2222640 N
> σ tn * Anr = 122 * 15523 = 1901507 N
Pcr = σ c * Agr = 158 * 18000 = 2835000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 161.9 / 2 = 81.0 cm^2
AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2
・Rib AnrR = Anr = 155.2 cm^2
AgrR = Agr = 180.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2948400 / 108000 = 27.3 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 2835000 / 108000 = 26.3 pcs. (3 @ 10 = 30 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 40 = 2948400 / 40 = 73710$ N

$\rho s = \tau * Ag / 40 = 17 * 18720 / 40 = 7730$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(73710^2 + 7730^2)} = 74114$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm²)	deduction of bolt holes			Ans(cm²)
1-SPL PL	1065 * 9	(95.8 -	(10*2.5)* 0.9)*1.1=	80.7<	95.8	∴ 80.7
3-SPL PL	250 * 14	(105.0 -	3*(3*2.5)* 1.4)*1.1=	80.9<	105.0	∴ 80.9
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		116.9				90.1
6-SPL PL	185 * 18	(199.8 -	6*(2*2.7)* 1.8)*1.1=	155.6<	199.8	∴155.6
		> AgrR				>AnrR

(19) D-1 J-19(Sec-19) DECK

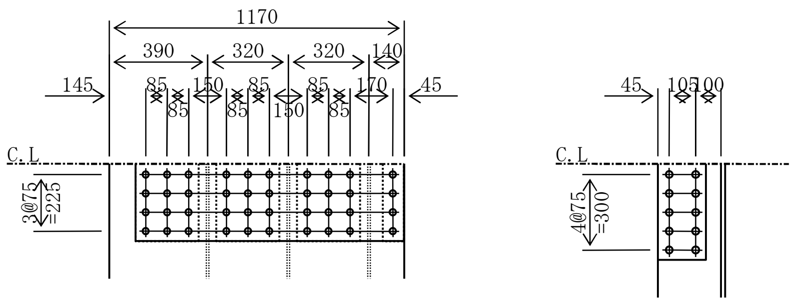
(a) Acting stress

σ tmax = 150 N/mm² 0.75 σ ta = 0.75 * 210 = 158 N/mm²
σ cmax = -64 N/mm² 0.75 σ ca = 0.75 * 210 = 158 N/mm²
∴ σ c = 158 N/mm²
τ max = 19 N/mm²

(b) Section area of main plate

1-DECK PL 1170 * 16 Ag = 187.2 cm² (SM490Y)
3-RIB PL 250 * 24 Agr = 180.0 cm² (SM490Y)
ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm²

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 1170 * 16 A = 187.2
(187.2 - (10* 2.5)* 1.6) * 1.1 = 161.9 < 187.2 ∴An = 161.9 cm²
3-RIB PL 250 * 24 Ar = 180.0
(180.0 - 3*(2* 2.7)* 2.4) * 1.1 = 155.2 < 180.0 ∴Anr = 155.2 cm²
ΣAn = An + Anr = 161.9 + 155.2 = 317.2 cm²
σ tn = σ tmax * ΣAg / ΣAn = 150 * 367.2 / 317.2 = 173 N/mm²
< σ ta = 210 N/mm²

(e) Design axial force

・Main plate Pt = σ tn * An = 173 * 16192 = 2806095 N
> 0.75 σ ta * An / 1.1 = 158 * 16192 / 1.1 = 2318400 N
Pc = σ c * Ag = 158 * 18720 = 2948400 N
・Rib Ptr = σ tn * Anr = 173 * 15523 = 2690191 N
> 0.75 σ ta * Anr/ 1.1 = 158 * 15523 / 1.1 = 2222640 N
Pcr = σ c * Agr = 158 * 18000 = 2835000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 161.9 / 2 = 81.0 cm²
AgR = Ag / 2 = 187.2 / 2 = 93.6 cm²
・Rib AnrR = Anr = 155.2 cm²
AgrR = Agr = 180.0 cm²

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2948400 / 108000 = 27.3 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 2835000 / 108000 = 26.3 pcs. (3 @ 10 = 30 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 40 = 2948400 / 40 = 73710$ N

$\rho s = \tau * Ag / 40 = 19 * 18720 / 40 = 8865$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(73710^2 + 8865^2)} = 74241$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm²)	deduction of bolt holes			Ans(cm²)
1-SPL PL	1065 * 9	(95.8 -	(10*2.5)* 0.9)*1.1=	80.7<	95.8	∴ 80.7
3-SPL PL	250 * 14	(105.0 -	3*(3*2.5)* 1.4)*1.1=	80.9<	105.0	∴ 80.9
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		116.9				90.1
6-SPL PL	185 * 18	(199.8 -	6*(2*2.7)* 1.8)*1.1=	155.6<	199.8	∴155.6
		> AgrR				>AnrR

(20) D-1 J-20(Sec-21) DECK

(a) Acting stress

σ tmax = 144 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 210 = 158 N/mm^2

$\therefore$ σ c = 158 N/mm^2

τ max = 24 N/mm^2

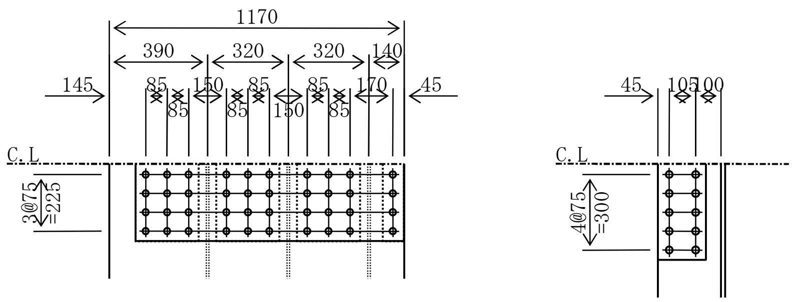
(b) Section area of main plate

1-DECK PL 1170 * 16 Ag = 187.2 cm^2 (SM490Y)

3-RIB PL 250 * 24 Agr = 180.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 1170 * 16 A = 187.2

(187.2 - (10* 2.5)* 1.6) * 1.1 = 161.9 < 187.2 $\therefore$An = 161.9 cm^2

3-RIB PL 250 * 24 Ar = 180.0

(180.0 - 3*(2* 2.7)* 2.4) * 1.1 = 155.2 < 180.0 $\therefore$Anr = 155.2 cm^2

ΣAn = An + Anr = 161.9 + 155.2 = 317.2 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 144 * 367.2 / 317.2 = 166 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 166 * 16192 = 2695281 N

> 0.75 σ ta * An / 1.1 = 158 * 16192 / 1.1 = 2318400 N

Pc = σ c * Ag = 158 * 18720 = 2948400 N

・Rib Ptr = σ tn * Anr = 166 * 15523 = 2583954 N

> 0.75 σ ta * Anr/ 1.1 = 158 * 15523 / 1.1 = 2222640 N

Pcr = σ c * Agr = 158 * 18000 = 2835000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 161.9 / 2 = 81.0 cm^2

AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2

・Rib AnrR = Anr = 155.2 cm^2

AgrR = Agr = 180.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2948400 / 108000 = 27.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2835000 / 108000 = 26.3 pcs. (3 @ 10 = 30 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 40 = 2948400 / 40 = 73710$ N

$\rho s = \tau * Ag / 40 = 24 * 18720 / 40 = 11131$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(73710^2 + 11131^2)} = 74546$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm²)	deduction of bolt holes			Ans(cm²)
1-SPL PL	1065 * 9	(95.8 -	(10*2.5)* 0.9)*1.1=	80.7＜	95.8	∴ 80.7
3-SPL PL	250 * 14	(105.0 -	3*(3*2.5)* 1.4)*1.1=	80.9＜	105.0	∴ 80.9
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2＜	11.9	∴ 9.2
		116.9				90.1
6-SPL PL	185 * 18	(199.8 -	6*(2*2.7)* 1.8)*1.1=	155.6＜	199.8	∴155.6
		＞ AgrR				＞AnrR

(21) D-1 J-21(Sec-22) DECK

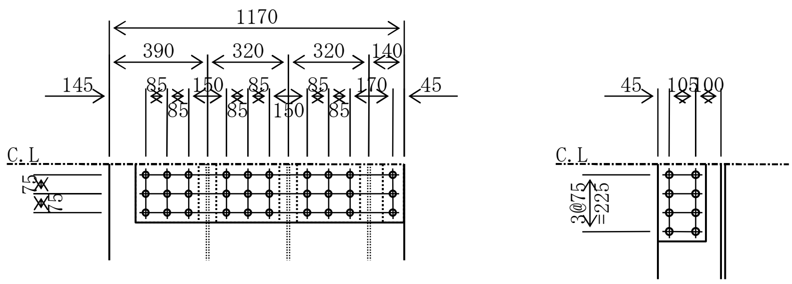
(a) Acting stress

σ tmax = 85 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2
∴ σ c = 105 N/mm^2
τ max = 22 N/mm^2

(b) Section area of main plate

1-DECK PL 1170 * 16 Ag = 187.2 cm^2 (SM400)
3-RIB PL 250 * 24 Agr = 180.0 cm^2 (SM400)
ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 1170 * 16 A = 187.2
(187.2 - (10* 2.5)* 1.6) * 1.1 = 161.9 < 187.2 ∴An = 161.9 cm^2
3-RIB PL 250 * 24 Ar = 180.0
(180.0 - 3*(2* 2.7)* 2.4) * 1.1 = 155.2 < 180.0 ∴Anr = 155.2 cm^2
ΣAn = An + Anr = 161.9 + 155.2 = 317.2 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 85 * 367.2 / 317.2 = 98 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 98 * 16192 = 1587848 N
> 0.75 σ ta * An / 1.1 = 105 * 16192 / 1.1 = 1545600 N
Pc = σ c * Ag = 105 * 18720 = 1965600 N
・Rib Ptr = σ tn * Anr = 98 * 15523 = 1522263 N
> 0.75 σ ta * Anr/ 1.1 = 105 * 15523 / 1.1 = 1481760 N
Pcr = σ c * Agr = 105 * 18000 = 1890000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 161.9 / 2 = 81.0 cm^2
AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2
・Rib AnrR = Anr = 155.2 cm^2
AgrR = Agr = 180.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1965600 / 108000 = 18.2 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 30 = 1965600 / 30 = 65520$ N

$\rho s = \tau * Ag / 30 = 22 * 18720 / 30 = 13716$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(65520^2 + 13716^2)} = 66940$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	1065 * 9	(95.8 -	(10*2.5)* 0.9)*1.1=	80.7<	95.8	∴ 80.7
3-SPL PL	250 * 14	(105.0 -	3*(3*2.5)* 1.4)*1.1=	80.9<	105.0	∴ 80.9
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		116.9				90.1
6-SPL PL	185 * 18	(199.8 -	6*(2*2.7)* 1.8)*1.1=	155.6<	199.8	∴155.6
		> AgrR				>AnrR

(22) D-1 J-22(Sec-23) DECK

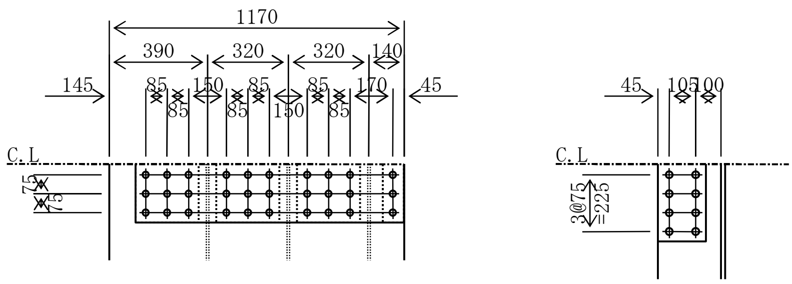
(a) Acting stress

$\sigma tmax$ = 25 N/mm^2 $0.75\sigma ta$ = 0.75 * 140 = 105 N/mm^2
$\sigma cmax$ = -64 N/mm^2 $0.75\sigma ca$ = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma c$ = 105 N/mm^2
τmax = 19 N/mm^2

(b) Section area of main plate

1-DECK PL 1170 * 16 Ag = 187.2 cm^2 (SM400)
3-RIB PL 250 * 24 Agr = 180.0 cm^2 (SM400)
ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 1170 * 16 A = 187.2
(187.2 - (10* 2.5)* 1.6) * 1.1 = 161.9 < 187.2 ∴An = 161.9 cm^2
3-RIB PL 250 * 24 Ar = 180.0
(180.0 - 3*(2* 2.7)* 2.4) * 1.1 = 155.2 < 180.0 ∴Anr = 155.2 cm^2
ΣAn = An + Anr = 161.9 + 155.2 = 317.2 cm^2
$\sigma tn = \sigma tmax * \Sigma Ag / \Sigma An$ = 25 * 367.2 / 317.2 = 29 N/mm^2
$< \sigma ta$ = 140 N/mm^2

(e) Design axial force

・Main plate Pt = $0.75\sigma ta$ * An / 1.1 = 105 * 16192 / 1.1 = 1545600 N
$> \sigma tn$ * An = 29 * 16192 = 472072 N
Pc = σc * Ag = 105 * 18720 = 1965600 N
・Rib Ptr = $0.75\sigma ta$ * Anr / 1.1 = 105 * 15523 / 1.1 = 1481760 N
$> \sigma tn$ * Anr = 29 * 15523 = 452574 N
Pcr = σc * Agr = 105 * 18000 = 1890000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 161.9 / 2 = 81.0 cm^2
AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2
・Rib AnrR = Anr = 155.2 cm^2
AgrR = Agr = 180.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1965600 / 108000 = 18.2 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

ρp = Pc / 30 = 1965600 / 30 = 65520 N

ρs = τ * Ag / 30 = 19 * 18720 / 30 = 11759 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(65520^2 + 11759^2)}$ = 66567 N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	1065 * 9	(95.8 -	(10*2.5)* 0.9)*1.1=	80.7<	95.8	∴ 80.7
3-SPL PL	250 * 14	(105.0 -	3*(3*2.5)* 1.4)*1.1=	80.9<	105.0	∴ 80.9
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		116.9				90.1
6-SPL PL	185 * 18	(199.8 -	6*(2*2.7)* 1.8)*1.1=	155.6<	199.8	∴155.6
		> AgrR				>AnrR

(23) D-1 J-23(Sec-23) DECK

(a) Acting stress

$\sigma cmax$ = -91 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 16 N/mm^2

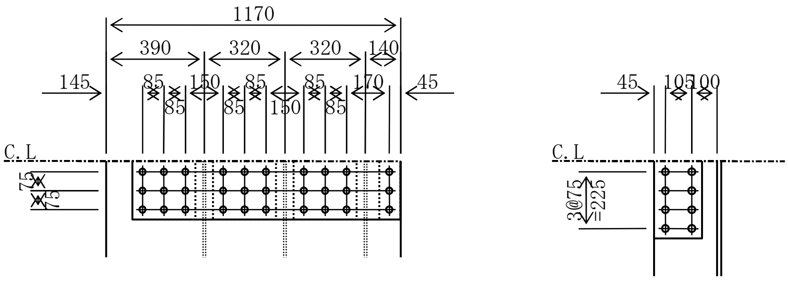
(b) Section area of main plate

1-DECK PL 1170 * 16 Ag = 187.2 cm^2 (SM400)

3-RIB PL 250 * 24 Agr = 180.0 cm^2 (SM400)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 18720 = 1965600 N

・Rib Pcr = σc * Agr = 105 * 18000 = 1890000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2

・Rib AgrR = Agr = 180.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1965600 / 108000 = 18.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 30 = 1965600 / 30 = 65520 N

ρs = τ * Ag / 30 = 16 * 18720 / 30 = 10118 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(65520^2 + 10118^2)}$ = 66297 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	1065 * 9	95.8	
3-SPL PL	250 * 14	105.0	
1-SPL PL	85 * 14	11.9	
		116.9	
6-SPL PL	185 * 18	199.8	＞ AgrR = 180.0cm2

(24) D-1 J-24(Sec-24) DECK

(a) Acting stress

σcmax = -121 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴σc = 121 N/mm^2

τmax = 11 N/mm^2

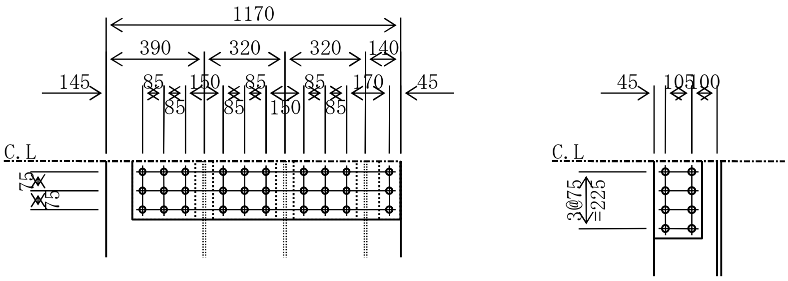
(b) Section area of main plate

1-DECK PL 1170 * 16 Ag = 187.2 cm^2 (SM400)

3-RIB PL 250 * 24 Agr = 180.0 cm^2 (SM400)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 121 * 18720 = 2258942 N

・Rib Pcr = σc * Agr = 121 * 18000 = 2172060 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2

・Rib AgrR = Agr = 180.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2258942 / 108000 = 20.9 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2172060 / 108000 = 20.1 pcs. (3 @ 8 = 24 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 30 = 2258942 / 30 = 75298 N

ρs = τ * Ag / 30 = 11 * 18720 / 30 = 7147 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(75298^2 + 7147^2) = 75637 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	1065 * 9	95.8	
3-SPL PL	250 * 14	105.0	
1-SPL PL	85 * 14	11.9	
		116.9	
6-SPL PL	185 * 18	199.8	＞ AgrR = 180.0cm2

(25) D-1　J-25(Sec-25)　DECK

(a) Acting stress

$\sigma cmax$ = -141 N/mm^2　　0.75 σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma c$ = 158 N/mm^2

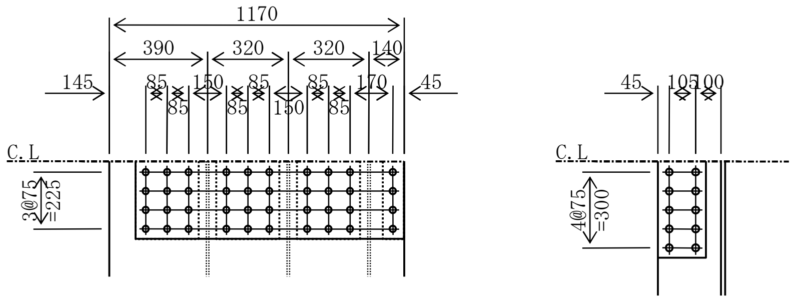
τmax = 8 N/mm^2

(b) Section area of main plate

1-DECK	PL	1170 * 16	Ag =	187.2 cm^2	(SM490Y)
3-RIB	PL	250 * 24	Agr =	180.0 cm^2	(SM490Y)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate　Pc = σc * Ag = 158 * 18720 = 2948400 N

・Rib　Pcr = σc * Agr = 158 * 18000 = 2835000 N

(e) Required section area of the splice plates

・Mother material(One side)　AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2

・Rib　AgrR = Agr = 180.0 cm^2

(f) Required bolt number

・Main plate　n = Pc / (108000 * 1.00) = 2948400 / 108000 = 27.3 pcs.

・Rib　nr = Pcr / (108000 * 1.00) = 2835000 / 108000 = 26.3 pcs. (3 @ 10 = 30 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 4,5 unites)

(g) Tensile force per one bolt

ρp = Pc / 40 = 2948400 / 40 = 73710 N

ρs = τ * Ag / 40 = 8 * 18720 / 40 = 3868 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(73710^2 + 3868^2)}$ = 73811 N

(h) Check of splice plates

(SM490Y)	Ags(cm^2)	
1-SPL PL 1065 * 9	95.8	
3-SPL PL 250 * 14	105.0	
1-SPL PL 85 * 14	11.9	
	116.9	
6-SPL PL 185 * 18	199.8	＞ AgrR = 180.0cm2

(26) D-1 J-26(Sec-26) DECK

(a) Acting stress

$\sigma cmax$ = -153 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma c$ = 158 N/mm^2

τmax = 6 N/mm^2

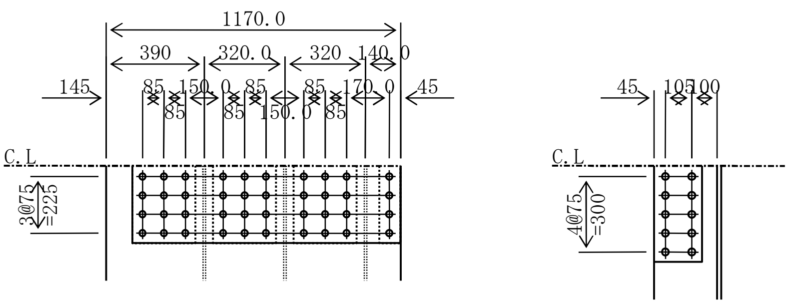
(b) Section area of main plate

1-DECK PL 1170 * 16   Ag = 187.2 cm^2 (SM490Y)

3-RIB PL 250 * 24   Agr = 180.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 18719 = 2948299 N

・Rib Pcr = σc * Agr = 158 * 18000 = 2835000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2

・Rib AgrR = Agr = 180.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2948299 / 108000 = 27.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2835000 / 108000 = 26.3 pcs. (3 @ 10 = 30 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(g) Tensile force per one bolt

ρp = Pc / 40 = 2948299 / 40 = 73707 N

ρs = τ * Ag / 40 = 6 * 18719 / 40 = 2741 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(73707^2 + 2741^2)}$ = 73758 N

(h) Check of splice plates

(SM490Y)	Ags(cm^2)
1-SPL PL 1065 * 9	95.8
3-SPL PL 250 * 14	105.0
1-SPL PL 85 * 14	11.9
	116.9
6-SPL PL 185 * 18	199.8 ＞ AgrR = 180.0cm2

(27) D-1 J-27(Sec-27) DECK

(a) Acting stress

$\sigma cmax$ = -157 N/mm² 0.75 σca = 0.75 * 210 = 158 N/mm²

∴ σc = 158 N/mm²

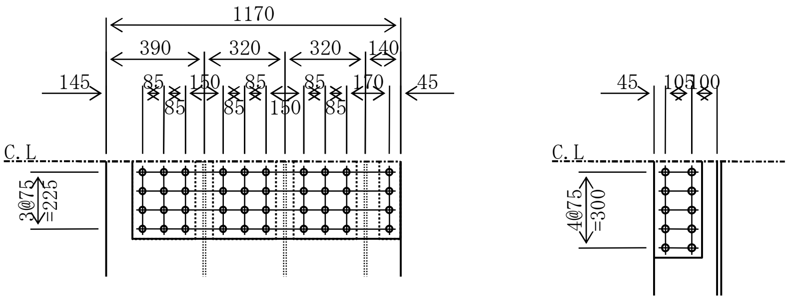
τmax = 4 N/mm²

(b) Section area of main plate

1-DECK	PL	1170 * 16	Ag =	187.2 cm²	(SM490Y)
3-RIB	PL	250 * 24	Agr =	180.0 cm²	(SM490Y)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm²

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 18720 = 2948400 N

・Rib Pcr = σc * Agr = 158 * 18000 = 2835000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 187.2 / 2 = 93.6 cm²

・Rib AgrR = Agr = 180.0 cm²

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2948400 / 108000 = 27.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2835000 / 108000 = 26.3 pcs. (3 @ 10 = 30 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(g) Tensile force per one bolt

ρp = Pc / 40 = 2948400 / 40 = 73710 N

ρs = τ * Ag / 40 = 4 * 18720 / 40 = 1719 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(73710^2 + 1719^2)}$ = 73730 N

(h) Check of splice plates

(SM490Y)	Ags(cm²)	
1-SPL PL 1065 * 9	95.8	
3-SPL PL 250 * 14	105.0	
1-SPL PL 85 * 14	11.9	
	116.9	
6-SPL PL 185 * 18	199.8	＞ AgrR = 180.0cm2

(28) D-1 J-28(Sec-29) DECK

(a) Acting stress

$\sigma cmax$ = -155 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 158 N/mm^2

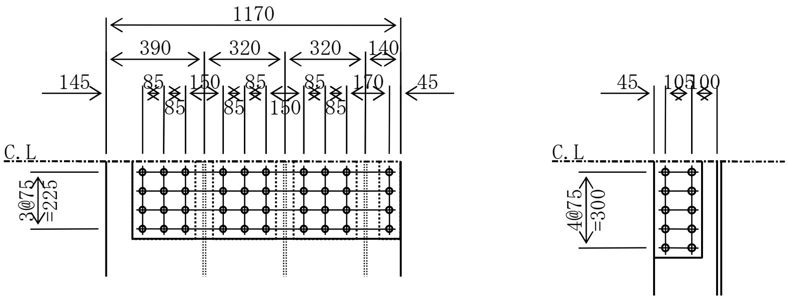
τmax = 4 N/mm^2

(b) Section area of main plate

1-DECK	PL	1170 * 16	Ag =	187.2 cm^2	(SM490Y)
3-RIB	PL	250 * 24	Agr =	180.0 cm^2	(SM490Y)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 18720 = 2948400 N

・Rib Pcr = σc * Agr = 158 * 18000 = 2835000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2

・Rib AgrR = Agr = 180.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2948400 / 108000 = 27.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2835000 / 108000 = 26.3 pcs. (3 @ 10 = 30 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(g) Tensile force per one bolt

ρp = Pc / 40 = 2948400 / 40 = 73710 N

ρs = τ * Ag / 40 = 4 * 18720 / 40 = 2077 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(73710^2 + 2077^2) = 73739 N

(h) Check of splice plates

(SM490Y)	Ags(cm^2)
1-SPL PL 1065 * 9	95.8
3-SPL PL 250 * 14	105.0
1-SPL PL 85 * 14	11.9
	116.9
6-SPL PL 185 * 18	199.8 ＞ AgrR = 180.0cm2

(29) D-1　J-29(Sec-30)　DECK

(a) Acting stress

σ cmax = -149 N/mm^2　　0.75 σ ca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma$ c = 158 N/mm^2

τ max = 6 N/mm^2

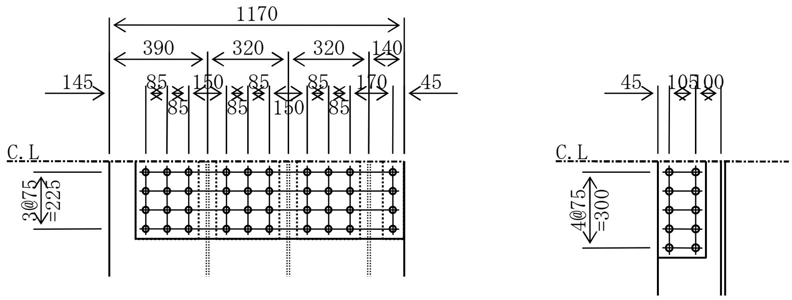
(b) Section area of main plate

1-DECK PL 1170 * 16　Ag = 187.2 cm^2 (SM490Y)

3-RIB PL 250 * 24　Agr = 180.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σ c * Ag = 158 * 18720 = 2948400 N

・Rib Pcr = σ c * Agr = 158 * 18000 = 2835000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2

・Rib AgrR = Agr = 180.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2948400 / 108000 = 27.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2835000 / 108000 = 26.3 pcs. (3 @ 10 = 30 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(g) Tensile force per one bolt

ρ p = Pc / 40 = 2948400 / 40 = 73710 N

ρ s = τ * Ag / 40 = 6 * 18720 / 40 = 3013 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(73710^2 + 3013^2)}$ = 73772 N

(h) Check of splice plates

(SM490Y)	Ags(cm^2)
1-SPL PL 1065 * 9	95.8
3-SPL PL 250 * 14	105.0
1-SPL PL 85 * 14	11.9
	116.9
6-SPL PL 185 * 18	199.8 ＞ AgrR = 180.0cm2

(30) D-1 J-30(Sec-31) DECK

(a) Acting stress

$\sigma cmax$ = -136 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 158 N/mm^2

τmax = 9 N/mm^2

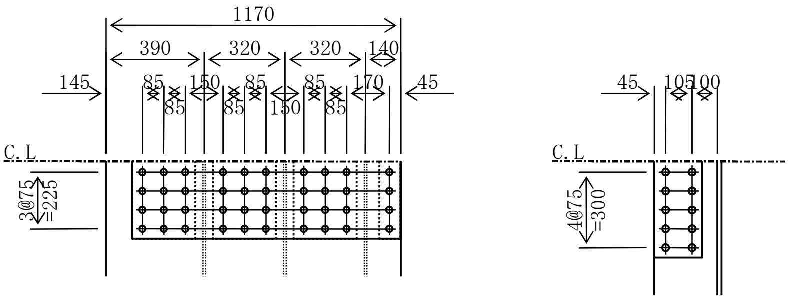
(b) Section area of main plate

1-DECK PL 1170 * 16   Ag = 187.2 cm^2 (SM490Y)

3-RIB PL 250 * 24   Agr = 180.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 18720 = 2948400 N

・Rib Pcr = σc * Agr = 158 * 18000 = 2835000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2

・Rib AgrR = Agr = 180.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2948400 / 108000 = 27.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2835000 / 108000 = 26.3 pcs. (3 @ 10 = 30 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(g) Tensile force per one bolt

ρp = Pc / 40 = 2948400 / 40 = 73710 N

ρs = τ * Ag / 40 = 9 * 18720 / 40 = 4101 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(73710^2 + 4101^2)}$ = 73824 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)
1-SPL PL	1065 * 9	95.8
3-SPL PL	250 * 14	105.0
1-SPL PL	85 * 14	11.9
		116.9
6-SPL PL	185 * 18	199.8 > AgrR = 180.0cm2

(31) D-1 J-31(Sec-32) DECK

(a) Acting stress

$\sigma cmax$ = -114 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 114 N/mm^2

τmax = 10 N/mm^2

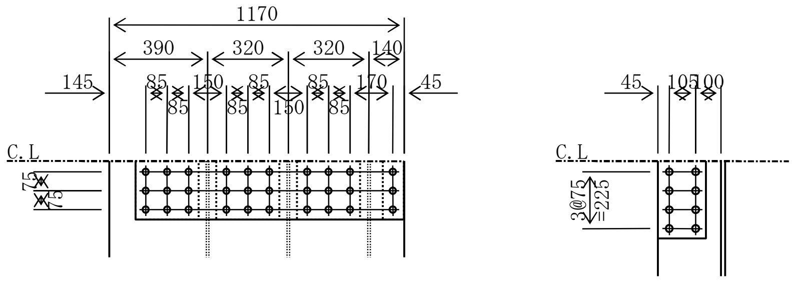
(b) Section area of main plate

1-DECK PL 1170 * 16   Ag = 187.2 cm^2 (SM400)

3-RIB PL 250 * 24   Agr = 180.0 cm^2 (SM400)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 114 * 18720 = 2134155 N

・Rib Pcr = σc * Agr = 114 * 18000 = 2052072 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2

・Rib AgrR = Agr = 180.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2134155 / 108000 = 19.8 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2052072 / 108000 = 19.0 pcs. (3 @ 8 = 24 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 30 = 2134155 / 30 = 71138 N

ρs = τ * Ag / 30 = 10 * 18720 / 30 = 6471 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(71138^2 + 6471^2)}$ = 71432 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
1-SPL PL	1065 * 9	95.8
3-SPL PL	250 * 14	105.0
1-SPL PL	85 * 14	11.9
		116.9
6-SPL PL	185 * 18	199.8 ＞ AgrR = 180.0cm2

(32) D-1 J-32(Sec-33) DECK

(a) Acting stress

$\sigma cmax$ = -84 N/mm² 0.75σca = 0.75 * 140 = 105 N/mm²

∴σc = 105 N/mm²

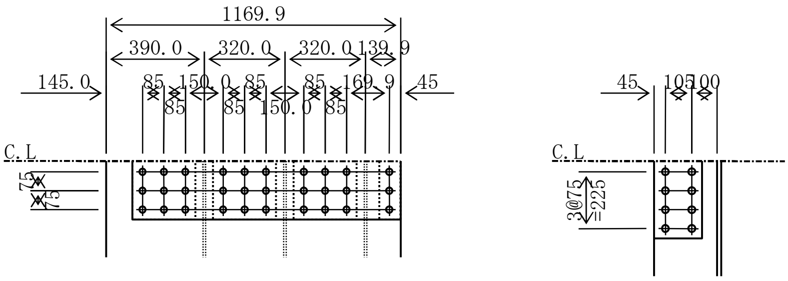
τmax = 16 N/mm²

(b) Section area of main plate

1-DECK	PL	1170 * 16	Ag =	187.2 cm²	(SM400)
3-RIB	PL	250 * 24	Agr =	180.0 cm²	(SM400)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm²

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 18718 = 1965382 N

・Rib Pcr = σc * Agr = 105 * 18000 = 1890000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 187.2 / 2 = 93.6 cm²

・Rib AgrR = Agr = 180.0 cm²

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1965382 / 108000 = 18.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 30 = 1965382 / 30 = 65513 N

ρs = τ * Ag / 30 = 16 * 18718 / 30 = 9838 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(65513^2 + 9838^2)}$ = 66247 N

(h) Check of splice plates

	(SS400)	Ags(cm²)
1-SPL	PL 1065 * 9	95.8
3-SPL	PL 250 * 14	105.0
1-SPL	PL 85 * 14	11.9
		116.9
6-SPL	PL 185 * 18	199.8 ＞ AgrR = 180.0cm2

(33) G1 J-1(Sec-1) DECK

(a) Acting stress

$\sigma cmax$ = -82 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 25 N/mm^2

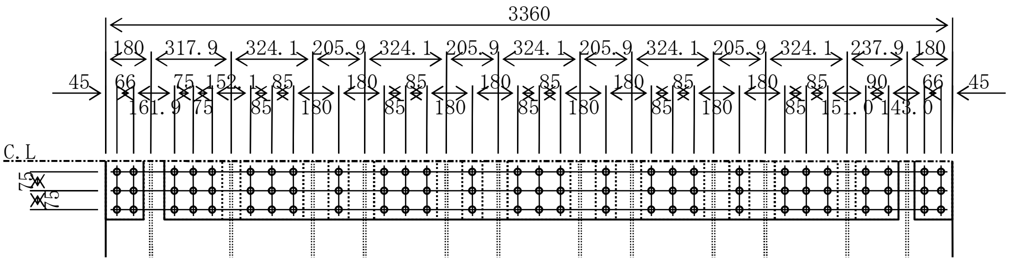
(b) Section area of main plate

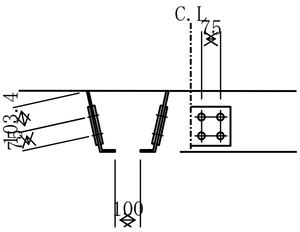
1-DECK PL 3360 * 16   Ag = 537.6 cm^2 (SM400)

5-U.RIB 320 * 240 * 8   Agr = 269.5 cm^2 (SM400)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 53760 = 5644800 N

・Rib Pcr = σc * Agr = 105 * 26950 = 2829750 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib   AgrR = Agr = 269.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5644800 / 108000 = 52.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2829750 / 108000 = 26.2 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 84 = 5644800 / 84 = 67200 N

ρs = τ * Ag / 84 = 25 * 53760 / 84 = 16113 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(67200^2 + 16113^2)}$ = 69105 N

(h) Check of splice plates

		Ags(cm^2)	
	(SS400)		
2-SPL PL	151 * 9	27.2	
1-SPL PL	2913 * 9	262.2	
		289.4	
2-SPL PL	151 * 14	42.3	
1-SPL PL	230 * 14	32.2	
5-SPL PL	250 * 14	175.0	
4-SPL PL	80 * 14	44.8	
1-SPL PL	170 * 14	23.8	
		318.1	
20-SPL PL	155 * 10	310.0	＞ AgrR = 269.5cm2

(34) G1 J-2(Sec-2) DECK

(a) Acting stress

$\sigma cmax$ = -107 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 107 N/mm^2

τmax = 19 N/mm^2

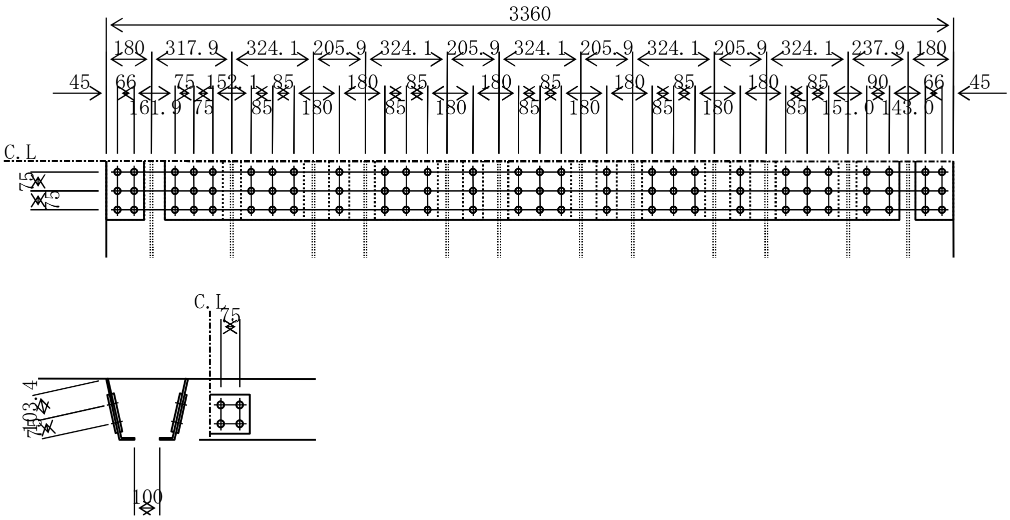
(b) Section area of main plate

1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM400)

5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM400)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 107 * 53760 = 5747052 N

・Rib Pcr = σc * Agr = 107 * 26950 = 2881009 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AgrR = Agr = 269.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5747052 / 108000 = 53.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2881009 / 108000 = 26.7 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 84 = 5747052 / 84 = 68417 N

ρs = τ * Ag / 84 = 19 * 53760 / 84 = 12214 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(68417^2 + 12214^2)}$ = 69499 N

(h) Check of splice plates

	(SS400)	Ags(cm²)
2-SPL PL	151 ＊ 9	27.2
1-SPL PL	2913 ＊ 9	262.2
		289.4
2-SPL PL	151 ＊ 14	42.3
1-SPL PL	230 ＊ 14	32.2
5-SPL PL	250 ＊ 14	175.0
4-SPL PL	80 ＊ 14	44.8
1-SPL PL	170 ＊ 14	23.8
		318.1
20-SPL PL	155 ＊ 10	310.0 ＞ AgrR = 269.5cm2

(35) G1 J-3(Sec-3) DECK

(a) Acting stress

$\sigma cmax$ = -118 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴σc = 118 N/mm^2

τmax = 12 N/mm^2

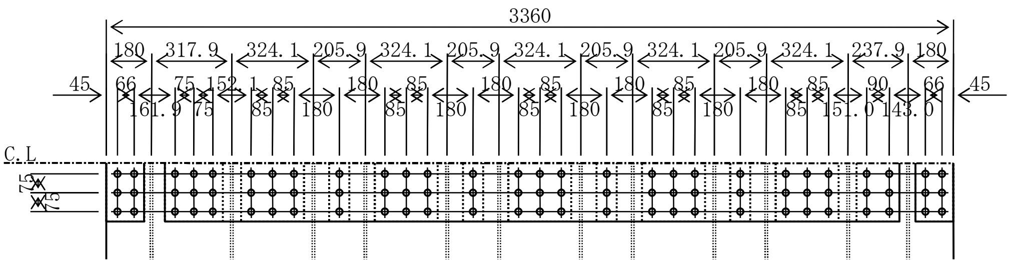
(b) Section area of main plate

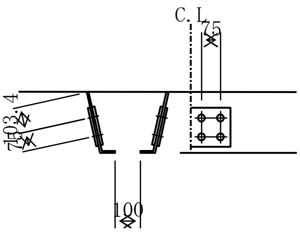
1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM400)

5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM400)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 118 * 53760 = 6346906 N

・Rib Pcr = σc * Agr = 118 * 26950 = 3181717 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AgrR = Agr = 269.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 6346906 / 108000 = 58.8 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 3181717 / 108000 = 29.5 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 84 = 6346906 / 84 = 75558 N

ρs = τ * Ag / 84 = 12 * 53760 / 84 = 7482 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(75558^2 + 7482^2)}$ = 75928 N

(h) Check of splice plates

		Ags(cm^2)
	(SS400)	
2-SPL PL	151 * 9	27.2
1-SPL PL	2913 * 9	262.2
		289.4
2-SPL PL	151 * 14	42.3
1-SPL PL	230 * 14	32.2
5-SPL PL	250 * 14	175.0
4-SPL PL	80 * 14	44.8
1-SPL PL	170 * 14	23.8
		318.1
20-SPL PL	155 * 10	310.0 ＞ AgrR = 269.5cm2

(36) G1　J-4(Sec-5)　DECK

(a) Acting stress

$\sigma cmax$ = -121 N/mm^2　　0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 121 N/mm^2

τmax = 6 N/mm^2

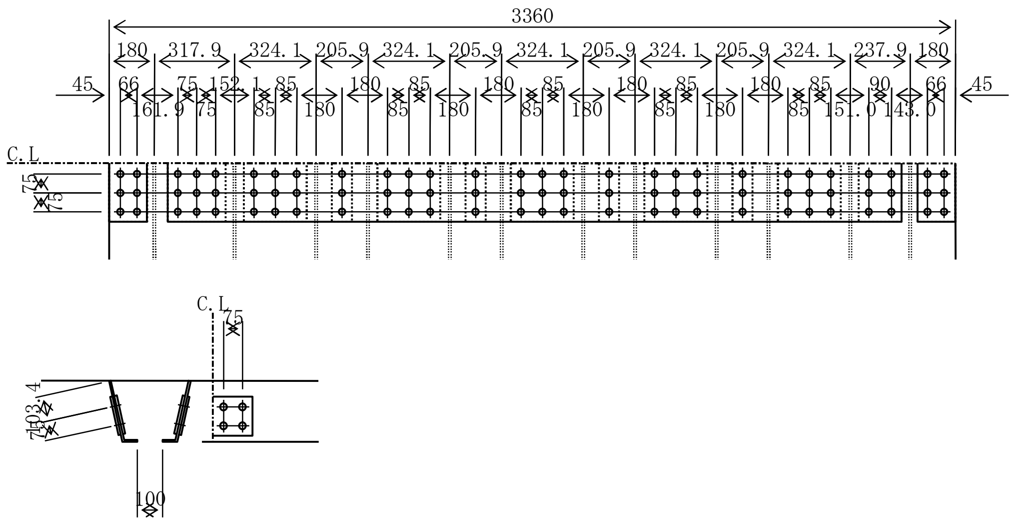
(b) Section area of main plate

1-DECK　PL　3360 * 16　　　Ag = 537.6 cm^2　(SM400)

5-U.RIB 320 * 240 * 8　　　Agr = 269.5 cm^2　(SM400)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate　Pc = σc * Ag = 121 * 53760 = 6527055 N

・Rib　Pcr = σc * Agr = 121 * 26950 = 3272026 N

(e) Required section area of the splice plates

・Mother material(One side)　AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib　　　AgrR = Agr = 269.5 cm^2

(f) Required bolt number

・Main plate　n = Pc / (108000 * 1.00) = 6527055 / 108000 = 60.4 pcs.

・Rib　nr = Pcr / (108000 * 1.00) = 3272026 / 108000 = 30.3 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 84　　　= 6527055 / 84　　　= 77703 N

ρs = τ * Ag / 84 = 6 * 53760 / 84 = 3831 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(77703^2 + 3831^2)}$ = 77797 N

(h) Check of splice plates

	(SS400)	A_{gs} (cm^2)
2-SPL PL	151 * 9	27.2
1-SPL PL	2913 * 9	262.2
		289.4
2-SPL PL	151 * 14	42.3
1-SPL PL	230 * 14	32.2
5-SPL PL	250 * 14	175.0
4-SPL PL	80 * 14	44.8
1-SPL PL	170 * 14	23.8
		318.1

20-SPL PL 155 * 10 310.0 ＞ AgrR = 269.5cm2

(37) G1 J-5(Sec-6) DECK

(a) Acting stress

σ cmax = -117 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma$ c = 117 N/mm^2

τ max = 11 N/mm^2

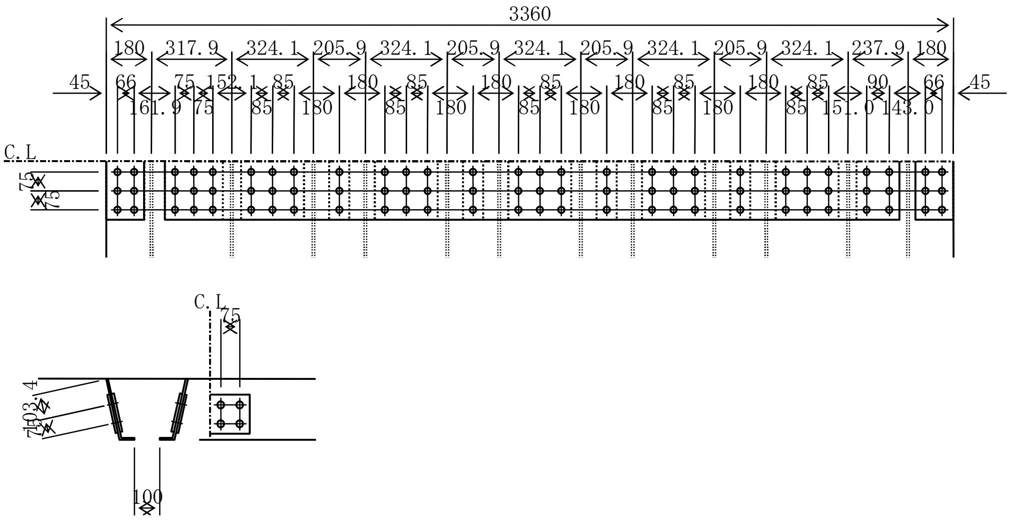
(b) Section area of main plate

1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM400)

5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM400)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σ c * Ag = 117 * 53760 = 6301908 N

・Rib Pcr = σ c * Agr = 117 * 26950 = 3159160 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AgrR = Agr = 269.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 6301908 / 108000 = 58.4 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 3159160 / 108000 = 29.3 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρ p = Pc / 84 = 6301908 / 84 = 75023 N

ρ s = τ * Ag / 84 = 11 * 53760 / 84 = 7153 N

$\rho = \sqrt{}(\rho p^2 + \rho s^2) = \sqrt{}(75023^2 + 7153^2) =$ 75363 N

(h) Check of splice plates

	(SS400)		Ags(cm^2)	
2-SPL PL	151 * 9		27.2	
1-SPL PL	2913 * 9		262.2	
			289.4	
2-SPL PL	151 * 14		42.3	
1-SPL PL	230 * 14		32.2	
5-SPL PL	250 * 14		175.0	
4-SPL PL	80 * 14		44.8	
1-SPL PL	170 * 14		23.8	
			318.1	
20-SPL PL	155 * 10		310.0	＞ AgrR = 269.5cm2

(38) G1 J-6(Sec-7) DECK

(a) Acting stress

$\sigma cmax$ = -105 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴σc = 105 N/mm^2

τmax = 18 N/mm^2

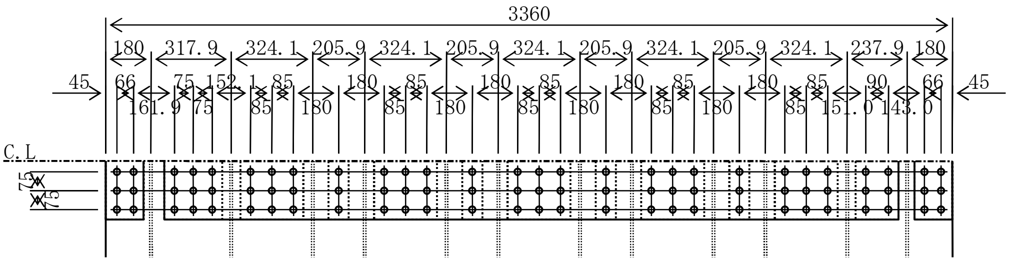
(b) Section area of main plate

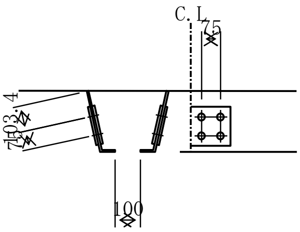
1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM400)

5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM400)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 53760 = 5644800 N

・Rib Pcr = σc * Agr = 105 * 26950 = 2829750 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AgrR = Agr = 269.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5644800 / 108000 = 52.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2829750 / 108000 = 26.2 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 84 = 5644800 / 84 = 67200 N

ρs = τ * Ag / 84 = 18 * 53760 / 84 = 11332 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(67200^2 + 11332^2)}$ = 68149 N

(h) Check of splice plates

	(SS400)	$Ags(cm^2)$	
2-SPL PL	151 * 9	27.2	
1-SPL PL	2913 * 9	262.2	
		289.4	
2-SPL PL	151 * 14	42.3	
1-SPL PL	230 * 14	32.2	
5-SPL PL	250 * 14	175.0	
4-SPL PL	80 * 14	44.8	
1-SPL PL	170 * 14	23.8	
		318.1	
20-SPL PL	155 * 10	310.0	＞ AgrR = 269.5cm2

(39) G1 J-7(Sec-8) DECK

(a) Acting stress

$\sigma cmax = -77\ N/mm^2 \quad 0.75\sigma ca = 0.75 * 140 = 105\ N/mm^2$

$\therefore \sigma c = 105\ N/mm^2$

$\tau max = 23\ N/mm^2$

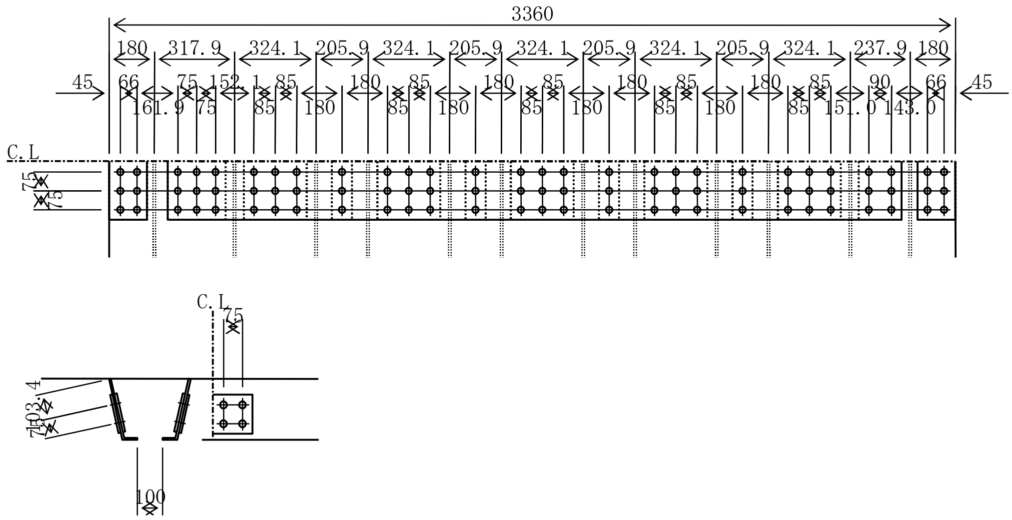
(b) Section area of main plate

1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM400)

5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM400)

$\Sigma Ag = Ag + Agr = 537.6 + 269.5 = 807.1\ cm^2$

(c) Bolt arrangement



(d) Design axial force

・Main plate $Pc = \sigma c * Ag = 105 * 53760 = 5644800$ N

・Rib $Pcr = \sigma c * Agr = 105 * 26950 = 2829750$ N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AgrR = Agr = 269.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5644800 / 108000 = 52.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2829750 / 108000 = 26.2 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

$\rho p = Pc / 84 = 5644800 / 84 = 67200$ N

$\rho s = \tau * Ag / 84 = 23 * 53760 / 84 = 14698$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(67200^2 + 14698^2)} = 68789$ N

(h) Check of splice plates

		Ags(cm^2)	
	(SS400)		
2-SPL PL	151 * 9	27.2	
1-SPL PL	2913 * 9	262.2	
		289.4	
2-SPL PL	151 * 14	42.3	
1-SPL PL	230 * 14	32.2	
5-SPL PL	250 * 14	175.0	
4-SPL PL	80 * 14	44.8	
1-SPL PL	170 * 14	23.8	
		318.1	
20-SPL PL	155 * 10	310.0	＞ AgrR = 269.5cm2

(40) G1 J-8(Sec-8) DECK

(a) Acting stress

$\sigma tmax$ = 30 N/mm^2 $0.75\sigma ta$ = 0.75 * 140 = 105 N/mm^2

$\sigma cmax$ = -64 N/mm^2 $0.75\sigma ca$ = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 29 N/mm^2

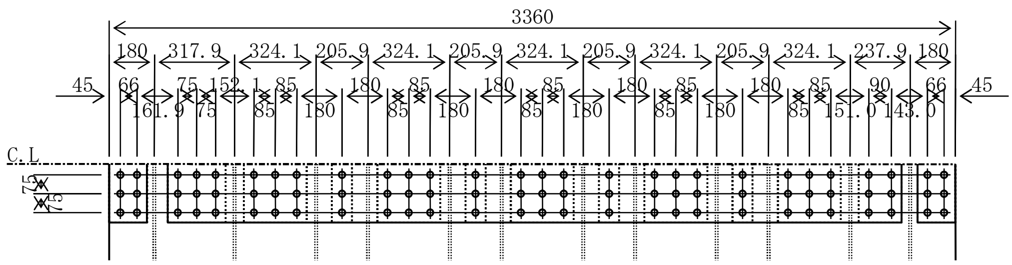
(b) Section area of main plate

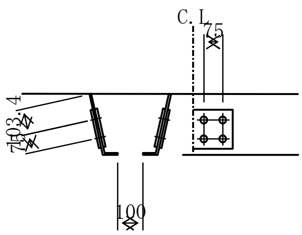
1-DECK PL 3360 * 16   Ag = 537.6 cm^2 (SM400)

5-U.RIB 320 * 240 * 8   Agr = 269.5 cm^2 (SM400)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3360 * 16   A = 537.6

(537.6 - (28* 2.5)* 1.6) * 1.1 = 468.2 < 537.6 $\therefore$An = 468.2 cm^2

5-U.RIB 320 * 240 * 8   Ar = 269.5

(269.5 - 5*(4* 2.7)* 0.8- 5*(10.0*0.8)) * 1.1 = 204.9

< 269.5 $\therefore$Anr = 204.9 cm^2

ΣAn = An + Anr = 468.2 + 204.9 = 673.1 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 30 * 807.1 / 673.1 = 35 N/mm^2

< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = $0.75\sigma ta$ * An / 1.1 = 105 * 46816 / 1.1 = 4468800 N

> σtn * An = 35 * 46816 = 1660081 N

Pc = σc * Ag = 105 * 53760 = 5644800 N

・Rib Ptr = $0.75\sigma ta$ * Anr / 1.1 = 105 * 20493 / 1.1 = 1956150 N

> σtn * Anr = 35 * 20493 = 726675 N

Pcr = σc * Agr = 105 * 26950 = 2829750 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 468.2 / 2 = 234.1 cm^2

AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AnrR = Anr = 204.9 cm^2

AgrR = Agr = 269.5 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5644800 / 108000 = 52.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2829750 / 108000 = 26.2 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 84 = 5644800 / 84 = 67200 N

ρs = τ * Ag / 84 = 29 * 53760 / 84 = 18735 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(67200^2 + 18735^2)}$ = 69763 N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2913 * 9	(262.2 -	(24*2.5)* 0.9)*1.1= 229.0<	262.2	∴229.0
		289.4			249.0
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
1-SPL PL	230 * 14	(32.2 -	(3*2.5)* 1.4)*1.1= 23.9<	32.2	∴ 23.9
5-SPL PL	250 * 14	(175.0 -	5*(3*2.5)* 1.4)*1.1= 134.8<	175.0	∴134.8
4-SPL PL	80 * 14	(44.8 -	4*(1*2.5)* 1.4)*1.1= 33.9<	44.8	∴ 33.9
1-SPL PL	170 * 14	(23.8 -	(2*2.5)* 1.4)*1.1= 18.5<	23.8	∴ 18.5
		318.1			242.1
20-SPL PL	155 * 10	(310.0 -	20*(2*2.7)* 1.0)*1.1= 222.2<	310.0	∴222.2
		> AgrR			>AnrR

(41) G1 J-9(Sec-9) DECK

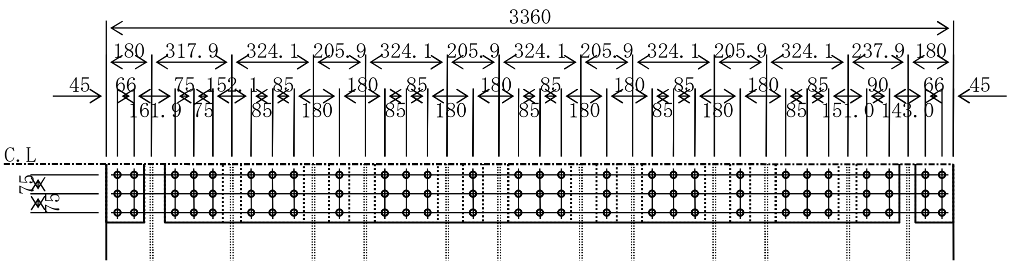
(a) Acting stress

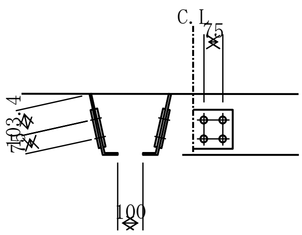
$\sigma tmax$ = 86 N/mm^2 0.75σta = 0.75 * 140 = 105 N/mm^2
$\sigma cmax$ = -64 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma c$ = 105 N/mm^2
τmax = 33 N/mm^2

(b) Section area of main plate

1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM400)
5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM400)
ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3360 * 16 A = 537.6
(537.6 - (28* 2.5)* 1.6) * 1.1 = 468.2 < 537.6 $\therefore$An = 468.2 cm^2
5-U.RIB 320 * 240 * 8 Ar = 269.5
(269.5 - 5*(4* 2.7)* 0.8- 5*(10.0*0.8)) * 1.1 = 204.9
< 269.5 $\therefore$Anr = 204.9 cm^2
ΣAn = An + Anr = 468.2 + 204.9 = 673.1 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 86 * 807.1 / 673.1 = 103 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 103 * 46816 = 4802064 N
> 0.75σta * An / 1.1 = 105 * 46816 / 1.1 = 4468800 N
Pc = σc * Ag = 105 * 53760 = 5644800 N
・Rib Ptr = σtn * Anr = 103 * 20493 = 2102031 N
> 0.75σta * Anr/ 1.1 = 105 * 20493 / 1.1 = 1956150 N
Pcr = σc * Agr = 105 * 26950 = 2829750 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 468.2 / 2 = 234.1 cm^2
AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2
・Rib AnrR = Anr = 204.9 cm^2
AgrR = Agr = 269.5 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5644800 / 108000 = 52.3 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 2829750 / 108000 = 26.2 pcs. (5 @ 8 = 40 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 84 = 5644800 / 84 = 67200$ N
$\rho s = \tau * Ag / 84 = 33 * 53760 / 84 = 21171$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(67200^2 + 21171^2)} = 70456$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2913 * 9	(262.2 -	(24*2.5)* 0.9)*1.1= 229.0<	262.2	∴229.0
		289.4			249.0
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
1-SPL PL	230 * 14	(32.2 -	(3*2.5)* 1.4)*1.1= 23.9<	32.2	∴ 23.9
5-SPL PL	250 * 14	(175.0 -	5*(3*2.5)* 1.4)*1.1= 134.8<	175.0	∴134.8
4-SPL PL	80 * 14	(44.8 -	4*(1*2.5)* 1.4)*1.1= 33.9<	44.8	∴ 33.9
1-SPL PL	170 * 14	(23.8 -	(2*2.5)* 1.4)*1.1= 18.5<	23.8	∴ 18.5
		318.1			242.1
20-SPL PL	155 * 10	(310.0 -	20*(2*2.7)* 1.0)*1.1= 222.2<	310.0	∴222.2
		> AgrR			>AnrR

(42) G1 J-10(Sec-11) DECK

(a) Acting stress

$\sigma tmax$ = 90 N/mm^2 0.75 σta = 0.75 * 140 = 105 N/mm^2

$\sigma cmax$ = -64 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 27 N/mm^2

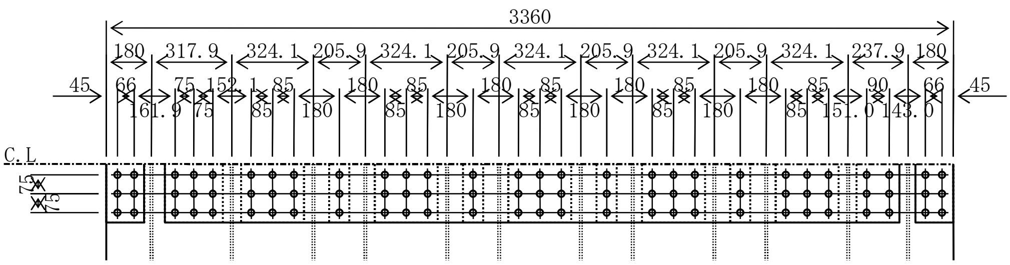
(b) Section area of main plate

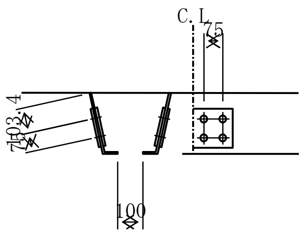
1-DECK PL 3360 * 16   Ag = 537.6 cm^2 (SM400)

5-U.RIB 320 * 240 * 8   Agr = 269.5 cm^2 (SM400)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3360 * 16   A = 537.6

(537.6 - (28* 2.5)* 1.6) * 1.1 = 468.2 < 537.6 $\therefore$An = 468.2 cm^2

5-U.RIB 320 * 240 * 8   Ar = 269.5

(269.5 - 5*(4* 2.7)* 0.8- 5*(10.0*0.8)) * 1.1 = 204.9

< 269.5 $\therefore$Anr = 204.9 cm^2

ΣAn = An + Anr = 468.2 + 204.9 = 673.1 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 90 * 807.1 / 673.1 = 108 N/mm^2

< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 108 * 46816 = 5050862 N

> 0.75 σta * An / 1.1 = 105 * 46816 / 1.1 = 4468800 N

Pc = σc * Ag = 105 * 53760 = 5644800 N

・Rib Ptr = σtn * Anr = 108 * 20493 = 2210939 N

> 0.75 σta * Anr/ 1.1 = 105 * 20493 / 1.1 = 1956150 N

Pcr = σc * Agr = 105 * 26950 = 2829750 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 468.2 / 2 = 234.1 cm^2

AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AnrR = Anr = 204.9 cm^2

AgrR = Agr = 269.5 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5644800 / 108000 = 52.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2829750 / 108000 = 26.2 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 84 = 5644800 / 84 = 67200$ N

$\rho s = \tau * Ag / 84 = 27 * 53760 / 84 = 17263$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(67200^2 + 17263^2)} = 69382$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2913 * 9	(262.2 -	(24*2.5)* 0.9)*1.1= 229.0<	262.2	∴229.0
		289.4			249.0
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
1-SPL PL	230 * 14	(32.2 -	(3*2.5)* 1.4)*1.1= 23.9<	32.2	∴ 23.9
5-SPL PL	250 * 14	(175.0 -	5*(3*2.5)* 1.4)*1.1= 134.8<	175.0	∴134.8
4-SPL PL	80 * 14	(44.8 -	4*(1*2.5)* 1.4)*1.1= 33.9<	44.8	∴ 33.9
1-SPL PL	170 * 14	(23.8 -	(2*2.5)* 1.4)*1.1= 18.5<	23.8	∴ 18.5
		318.1			242.1
20-SPL PL	155 * 10	(310.0 -	20*(2*2.7)* 1.0)*1.1= 222.2<	310.0	∴222.2
		> AgrR			>AnrR

(43) G1 J-11(Sec-12) DECK

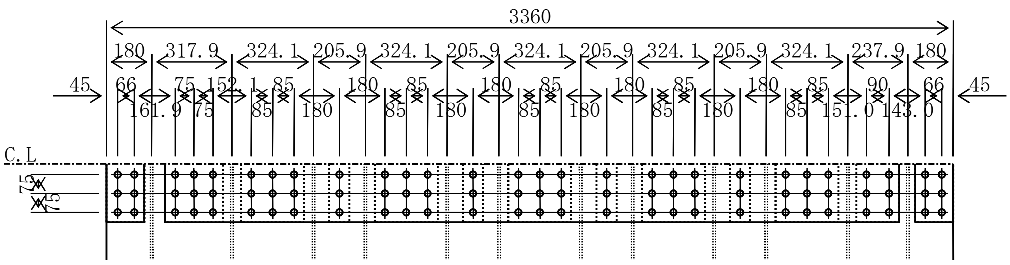
(a) Acting stress

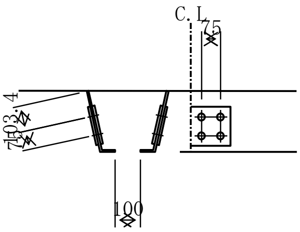
σtmax = 49 N/mm^2 0.75σta = 0.75 * 140 = 105 N/mm^2
σcmax = -64 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2
∴σc = 105 N/mm^2
τmax = 21 N/mm^2

(b) Section area of main plate

1-DECK PL 3360 * 16   Ag = 537.6 cm^2 (SM400)
5-U.RIB 320 * 240 * 8   Agr = 269.5 cm^2 (SM400)
ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3360 * 16   A = 537.6
(537.6 - (28* 2.5)* 1.6) * 1.1 = 468.2 < 537.6 ∴An = 468.2 cm^2
5-U.RIB 320 * 240 * 8   Ar = 269.5
(269.5 - 5*(4* 2.7)* 0.8- 5*(10.0*0.8)) * 1.1 = 204.9
< 269.5 ∴Anr = 204.9 cm^2
ΣAn = An + Anr = 468.2 + 204.9 = 673.1 cm^2
σtn = σtmax * ΣAg / ΣAn = 49 * 807.1 / 673.1 = 58 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 105 * 46816 / 1.1 = 4468800 N
> σtn * An = 58 * 46816 = 2725840 N
Pc = σc * Ag = 105 * 53760 = 5644800 N
・Rib Ptr = 0.75σta * Anr / 1.1 = 105 * 20493 / 1.1 = 1956150 N
> σtn * Anr = 58 * 20493 = 1193195 N
Pcr = σc * Agr = 105 * 26950 = 2829750 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 468.2 / 2 = 234.1 cm^2
AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2
・Rib AnrR = Anr = 204.9 cm^2
AgrR = Agr = 269.5 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5644800 / 108000 = 52.3 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 2829750 / 108000 = 26.2 pcs. (5 @ 8 = 40 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 84 = 5644800 / 84 = 67200 N
$\rho s = \tau * Ag / 84$ = 21 * 53760 / 84 = 13597 N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(67200^2 + 13597^2)}$ = 68562 N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes		$Ans(cm^2)$
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2913 * 9	(262.2 -	(24*2.5)* 0.9)*1.1= 229.0<	262.2	∴229.0
		289.4			249.0
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
1-SPL PL	230 * 14	(32.2 -	(3*2.5)* 1.4)*1.1= 23.9<	32.2	∴ 23.9
5-SPL PL	250 * 14	(175.0 -	5*(3*2.5)* 1.4)*1.1= 134.8<	175.0	∴134.8
4-SPL PL	80 * 14	(44.8 -	4*(1*2.5)* 1.4)*1.1= 33.9<	44.8	∴ 33.9
1-SPL PL	170 * 14	(23.8 -	(2*2.5)* 1.4)*1.1= 18.5<	23.8	∴ 18.5
		318.1			242.1
20-SPL PL	155 * 10	(310.0 -	20*(2*2.7)* 1.0)*1.1= 222.2<	310.0	∴222.2
		> AgrR			>AnrR

(44) G1 J-12(Sec-12) DECK

(a) Acting stress

$\sigma tmax$ = 20 N/mm^2 0.75σta = 0.75 * 140 = 105 N/mm^2

$\sigma cmax$ = -64 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 15 N/mm^2

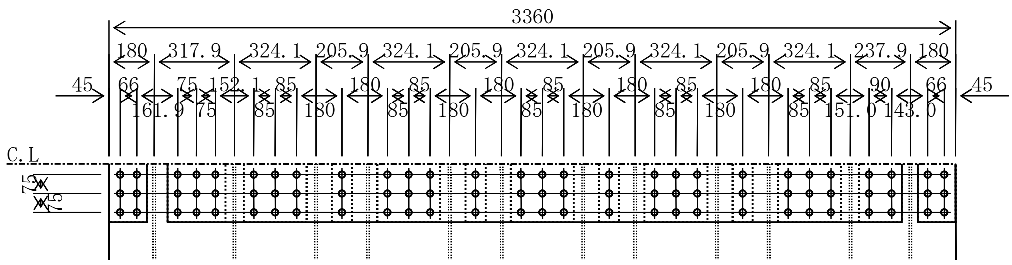
(b) Section area of main plate

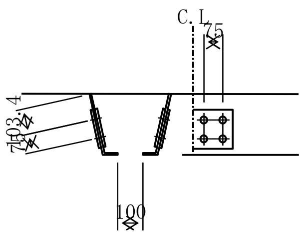
1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM400)

5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM400)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3360 * 16 A = 537.6

(537.6 - (28* 2.5)* 1.6) * 1.1 = 468.2 < 537.6 $\therefore$An = 468.2 cm^2

5-U.RIB 320 * 240 * 8 Ar = 269.5

(269.5 - 5*(4* 2.7)* 0.8- 5*(10.0*0.8)) * 1.1 = 204.9

< 269.5 $\therefore$Anr = 204.9 cm^2

ΣAn = An + Anr = 468.2 + 204.9 = 673.1 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 20 * 807.1 / 673.1 = 24 N/mm^2

< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 105 * 46816 / 1.1 = 4468800 N

> σtn * An = 24 * 46816 = 1124647 N

Pc = σc * Ag = 105 * 53760 = 5644800 N

・Rib Ptr = 0.75σta * Anr / 1.1 = 105 * 20493 / 1.1 = 1956150 N

> σtn * Anr = 24 * 20493 = 492297 N

Pcr = σc * Agr = 105 * 26950 = 2829750 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 468.2 / 2 = 234.1 cm^2

AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AnrR = Anr = 204.9 cm^2

AgrR = Agr = 269.5 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5644800 / 108000 = 52.3 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 2829750 / 108000 = 26.2 pcs. (5 @ 8 = 40 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 84 = 5644800 / 84 = 67200 N
ρs = τ * Ag / 84 = 15 * 53760 / 84 = 9487 N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(67200^2 + 9487^2)}$ = 67866 N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0＜	27.2	∴ 20.0
1-SPL PL	2913 * 9	(262.2 -	(24*2.5)* 0.9)*1.1= 229.0＜	262.2	∴229.0
		289.4			249.0
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1＜	42.3	∴ 31.1
1-SPL PL	230 * 14	(32.2 -	(3*2.5)* 1.4)*1.1= 23.9＜	32.2	∴ 23.9
5-SPL PL	250 * 14	(175.0 -	5*(3*2.5)* 1.4)*1.1= 134.8＜	175.0	∴134.8
4-SPL PL	80 * 14	(44.8 -	4*(1*2.5)* 1.4)*1.1= 33.9＜	44.8	∴ 33.9
1-SPL PL	170 * 14	(23.8 -	(2*2.5)* 1.4)*1.1= 18.5＜	23.8	∴ 18.5
		318.1			242.1
20-SPL PL	155 * 10	(310.0 -	20*(2*2.7)* 1.0)*1.1= 222.2＜	310.0	∴222.2
		＞ AgrR			＞AnrR

(45) G1 J-13(Sec-13) DECK

(a) Acting stress

$\sigma tmax$ = 8 N/mm^2 $0.75\sigma ta$ = 0.75 * 140 = 105 N/mm^2

$\sigma cmax$ = -64 N/mm^2 $0.75\sigma ca$ = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 10 N/mm^2

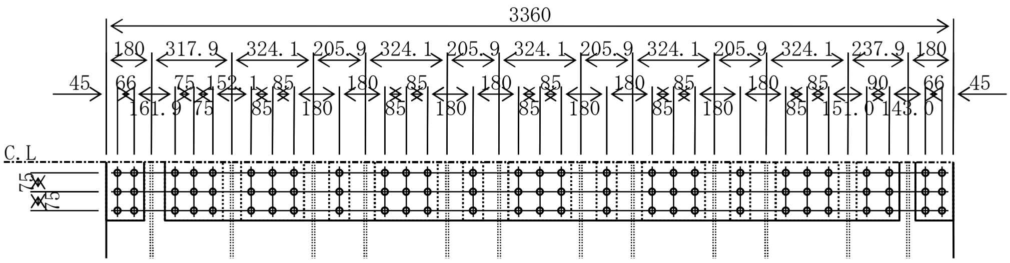
(b) Section area of main plate

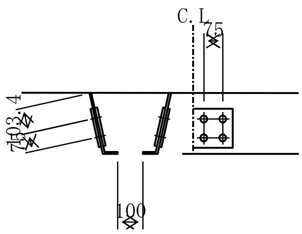
1-DECK PL 3360 * 16   Ag = 537.6 cm^2 (SM400)

5-U.RIB 320 * 240 * 8   Agr = 269.5 cm^2 (SM400)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3360 * 16   A = 537.6

(537.6 - (28* 2.5)* 1.6) * 1.1 = 468.2 < 537.6 $\therefore$An = 468.2 cm^2

5-U.RIB 320 * 240 * 8   Ar = 269.5

(269.5 - 5*(4* 2.7)* 0.8- 5*(10.0*0.8)) * 1.1 = 204.9

< 269.5 $\therefore$Anr = 204.9 cm^2

ΣAn = An + Anr = 468.2 + 204.9 = 673.1 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 8 * 807.1 / 673.1 = 9 N/mm^2

< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = $0.75\sigma ta$ * An / 1.1 = 105 * 46816 / 1.1 = 4468800 N

> σtn * An = 9 * 46816 = 430402 N

Pc = σc * Ag = 105 * 53760 = 5644800 N

・Rib Ptr = $0.75\sigma ta$ * Anr / 1.1 = 105 * 20493 / 1.1 = 1956150 N

> σtn * Anr = 9 * 20493 = 188402 N

Pcr = σc * Agr = 105 * 26950 = 2829750 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 468.2 / 2 = 234.1 cm^2

AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AnrR = Anr = 204.9 cm^2

AgrR = Agr = 269.5 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5644800 / 108000 = 52.3 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 2829750 / 108000 = 26.2 pcs. (5 @ 8 = 40 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 84 = 5644800 / 84 = 67200 N
ρs = τ * Ag / 84 = 10 * 53760 / 84 = 6266 N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(67200^2 + 6266^2)}$ = 67492 N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes		$Ans(cm^2)$
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0＜	27.2	∴ 20.0
1-SPL PL	2913 * 9	(262.2 -	(24*2.5)* 0.9)*1.1= 229.0＜	262.2	∴229.0
		289.4			249.0
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1＜	42.3	∴ 31.1
1-SPL PL	230 * 14	(32.2 -	(3*2.5)* 1.4)*1.1= 23.9＜	32.2	∴ 23.9
5-SPL PL	250 * 14	(175.0 -	5*(3*2.5)* 1.4)*1.1= 134.8＜	175.0	∴134.8
4-SPL PL	80 * 14	(44.8 -	4*(1*2.5)* 1.4)*1.1= 33.9＜	44.8	∴ 33.9
1-SPL PL	170 * 14	(23.8 -	(2*2.5)* 1.4)*1.1= 18.5＜	23.8	∴ 18.5
		318.1			242.1
20-SPL PL	155 * 10	(310.0 -	20*(2*2.7)* 1.0)*1.1= 222.2＜	310.0	∴222.2
		＞ AgrR			＞AnrR

(46) G1 J-14(Sec-14) DECK

(a) Acting stress

$\sigma tmax$ = 6 N/mm^2 $0.75\sigma ta$ = 0.75 ＊ 140 = 105 N/mm^2

$\sigma cmax$ = -67 N/mm^2 $0.75\sigma ca$ = 0.75 ＊ 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 7 N/mm^2

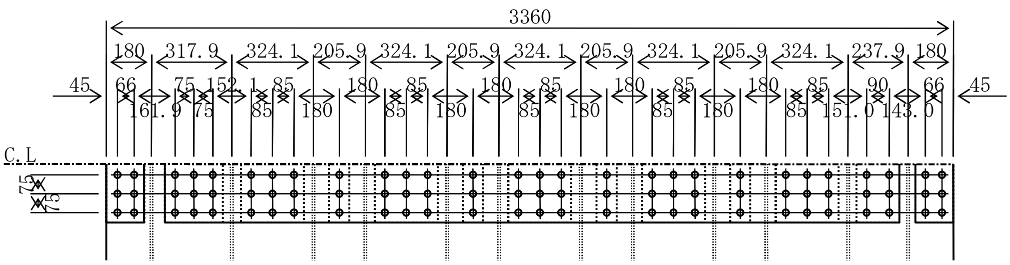
(b) Section area of main plate

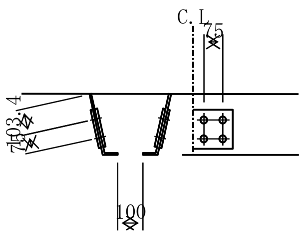
1-DECK PL 3360 ＊ 16   Ag = 537.6 cm^2 (SM400)

5-U.RIB 320 ＊ 240 ＊ 8   Agr = 269.5 cm^2 (SM400)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3360 ＊ 16   A = 537.6

(537.6 - (28＊ 2.5)＊ 1.6) ＊ 1.1 = 468.2 ＜ 537.6 ∴An = 468.2 cm^2

5-U.RIB 320 ＊ 240 ＊ 8   Ar = 269.5

(269.5 - 5＊(4＊ 2.7)＊ 0.8- 5＊(10.0＊0.8)) ＊ 1.1 = 204.9

＜ 269.5 ∴Anr = 204.9 cm^2

ΣAn = An + Anr = 468.2 + 204.9 = 673.1 cm^2

σtn = $\sigma tmax$ ＊ ΣAg / ΣAn = 6 ＊ 807.1 / 673.1 = 7 N/mm^2

＜ σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = $0.75\sigma ta$ ＊ An / 1.1 = 105 ＊ 46816 / 1.1 = 4468800 N

＞ σtn ＊ An = 7 ＊ 46816 = 316163 N

Pc = σc ＊ Ag = 105 ＊ 53760 = 5644800 N

・Rib Ptr = $0.75\sigma ta$ ＊ Anr / 1.1 = 105 ＊ 20493 / 1.1 = 1956150 N

＞ σtn ＊ Anr = 7 ＊ 20493 = 138396 N

Pcr = σc ＊ Agr = 105 ＊ 26950 = 2829750 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 468.2 / 2 = 234.1 cm^2

AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AnrR = Anr = 204.9 cm^2

AgrR = Agr = 269.5 cm^2

(g) Required bolt number

・Main plate $n = Pc / (108000 * 1.00) = 5644800 / 108000 = 52.3$ pcs.

・Rib $nr = Pcr / (108000 * 1.00) = 2829750 / 108000 = 26.2$ pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 84 = 5644800 / 84 = 67200$ N

$\rho s = \tau * Ag / 84 = 7 * 53760 / 84 = 4691$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(67200^2 + 4691^2)} = 67364$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0＜	27.2	∴ 20.0
1-SPL PL	2913 * 9	(262.2 -	(24*2.5)* 0.9)*1.1= 229.0＜	262.2	∴229.0
		289.4			249.0
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1＜	42.3	∴ 31.1
1-SPL PL	230 * 14	(32.2 -	(3*2.5)* 1.4)*1.1= 23.9＜	32.2	∴ 23.9
5-SPL PL	250 * 14	(175.0 -	5*(3*2.5)* 1.4)*1.1= 134.8＜	175.0	∴134.8
4-SPL PL	80 * 14	(44.8 -	4*(1*2.5)* 1.4)*1.1= 33.9＜	44.8	∴ 33.9
1-SPL PL	170 * 14	(23.8 -	(2*2.5)* 1.4)*1.1= 18.5＜	23.8	∴ 18.5
		318.1			242.1
20-SPL PL	155 * 10	(310.0 -	20*(2*2.7)* 1.0)*1.1= 222.2＜	310.0	∴222.2
		＞ AgrR			＞AnrR

(47) G1 J-15(Sec-15) DECK

(a) Acting stress

$\sigma tmax$ = 16 N/mm^2 0.75σta = 0.75 * 140 = 105 N/mm^2

$\sigma cmax$ = -64 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 11 N/mm^2

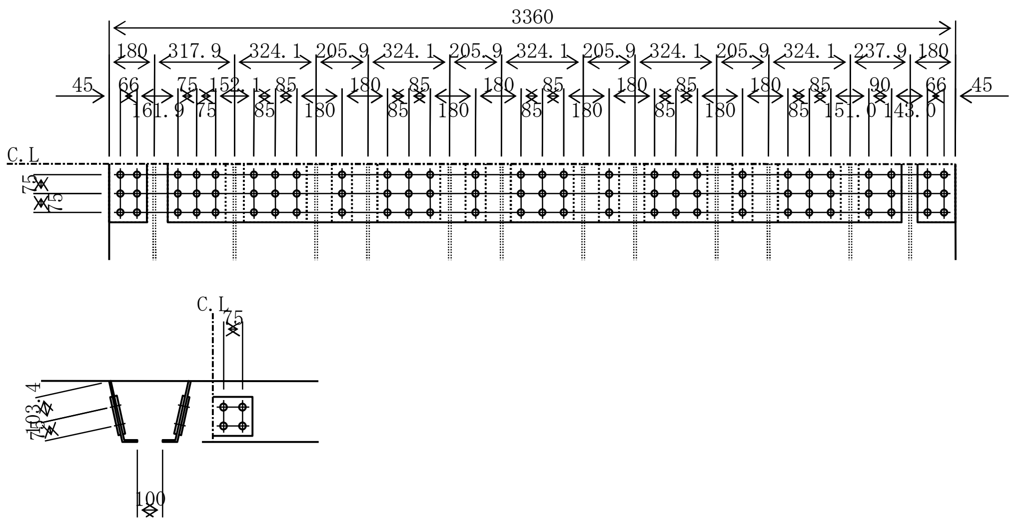
(b) Section area of main plate

1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM400)

5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM400)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 3360 * 16 A = 537.6

(537.6 - (28* 2.5)* 1.6) * 1.1 = 468.2 < 537.6 $\therefore$An = 468.2 cm^2

5-U.RIB 320 * 240 * 8 Ar = 269.5

(269.5 - 5*(4* 2.7)* 0.8- 5*(10.0*0.8)) * 1.1 = 204.9

< 269.5 $\therefore$Anr = 204.9 cm^2

ΣAn = An + Anr = 468.2 + 204.9 = 673.1 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 16 * 807.1 / 673.1 = 19 N/mm^2

< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 105 * 46816 / 1.1 = 4468800 N

> σtn * An = 19 * 46816 = 892016 N

Pc = σc * Ag = 105 * 53760 = 5644800 N

・Rib Ptr = 0.75σta * Anr / 1.1 = 105 * 20493 / 1.1 = 1956150 N

> σtn * Anr = 19 * 20493 = 390466 N

Pcr = σc * Agr = 105 * 26950 = 2829750 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 468.2 / 2 = 234.1 cm^2

AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AnrR = Anr = 204.9 cm^2

AgrR = Agr = 269.5 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5644800 / 108000 = 52.3 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 2829750 / 108000 = 26.2 pcs. (5 @ 8 = 40 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 84 = 5644800 / 84 = 67200 N
ρs = τ * Ag / 84 = 11 * 53760 / 84 = 6959 N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(67200^2 + 6959^2)}$ = 67559 N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes	Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0< 27.2	∴ 20.0
1-SPL PL	2913 * 9	(262.2 -	(24*2.5)* 0.9)*1.1= 229.0< 262.2	∴229.0
		289.4		249.0
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1< 42.3	∴ 31.1
1-SPL PL	230 * 14	(32.2 -	(3*2.5)* 1.4)*1.1= 23.9< 32.2	∴ 23.9
5-SPL PL	250 * 14	(175.0 -	5*(3*2.5)* 1.4)*1.1= 134.8< 175.0	∴134.8
4-SPL PL	80 * 14	(44.8 -	4*(1*2.5)* 1.4)*1.1= 33.9< 44.8	∴ 33.9
1-SPL PL	170 * 14	(23.8 -	(2*2.5)* 1.4)*1.1= 18.5< 23.8	∴ 18.5
		318.1		242.1
20-SPL PL	155 * 10	(310.0 -	20*(2*2.7)* 1.0)*1.1= 222.2< 310.0	∴222.2
		> AgrR		>AnrR

(48) G1 J-16(Sec-16) DECK

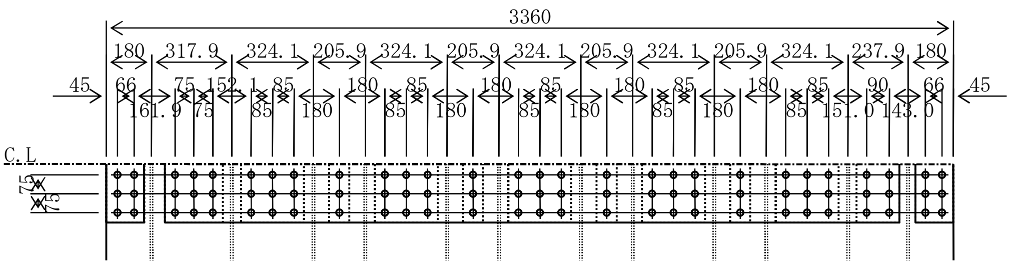
(a) Acting stress

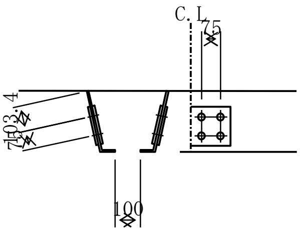
σtmax = 34 N/mm^2 0.75σta = 0.75 * 140 = 105 N/mm^2
σcmax = -64 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2
∴σc = 105 N/mm^2
τmax = 15 N/mm^2

(b) Section area of main plate

1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM400)
5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM400)
ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3360 * 16 A = 537.6
(537.6 - (28* 2.5)* 1.6) * 1.1 = 468.2 < 537.6 ∴An = 468.2 cm^2
5-U.RIB 320 * 240 * 8 Ar = 269.5
(269.5 - 5*(4* 2.7)* 0.8- 5*(10.0*0.8)) * 1.1 = 204.9
< 269.5 ∴Anr = 204.9 cm^2
ΣAn = An + Anr = 468.2 + 204.9 = 673.1 cm^2
σtn = σtmax * ΣAg / ΣAn = 34 * 807.1 / 673.1 = 41 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 105 * 46816 / 1.1 = 4468800 N
> σtn * An = 41 * 46816 = 1918760 N
Pc = σc * Ag = 105 * 53760 = 5644800 N
・Rib Ptr = 0.75σta * Anr / 1.1 = 105 * 20493 / 1.1 = 1956150 N
> σtn * Anr = 41 * 20493 = 839908 N
Pcr = σc * Agr = 105 * 26950 = 2829750 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 468.2 / 2 = 234.1 cm^2
AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2
・Rib AnrR = Anr = 204.9 cm^2
AgrR = Agr = 269.5 cm^2

(g) Required bolt number

- Main plate n = Pc / (108000 * 1.00) = 5644800 / 108000 = 52.3 pcs.
- Rib nr = Pcr / (108000 * 1.00) = 2829750 / 108000 = 26.2 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 84 = 5644800 / 84 = 67200 N
ρs = τ * Ag / 84 = 15 * 53760 / 84 = 9847 N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(67200^2 + 9847^2)}$ = 67918 N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2913 * 9	(262.2 -	(24*2.5)* 0.9)*1.1= 229.0<	262.2	∴229.0
		289.4			249.0
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
1-SPL PL	230 * 14	(32.2 -	(3*2.5)* 1.4)*1.1= 23.9<	32.2	∴ 23.9
5-SPL PL	250 * 14	(175.0 -	5*(3*2.5)* 1.4)*1.1= 134.8<	175.0	∴134.8
4-SPL PL	80 * 14	(44.8 -	4*(1*2.5)* 1.4)*1.1= 33.9<	44.8	∴ 33.9
1-SPL PL	170 * 14	(23.8 -	(2*2.5)* 1.4)*1.1= 18.5<	23.8	∴ 18.5
		318.1			242.1
20-SPL PL	155 * 10	(310.0 -	20*(2*2.7)* 1.0)*1.1= 222.2<	310.0	∴222.2
		＞ AgrR			＞AnrR

(49) G1 J-17(Sec-17) DECK

(a) Acting stress

σ_{tmax} = 67 N/mm^2 0.75σ_{ta} = 0.75 * 140 = 105 N/mm^2

σ_{cmax} = -64 N/mm^2 0.75σ_{ca} = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma_c$ = 105 N/mm^2

τ_{max} = 23 N/mm^2

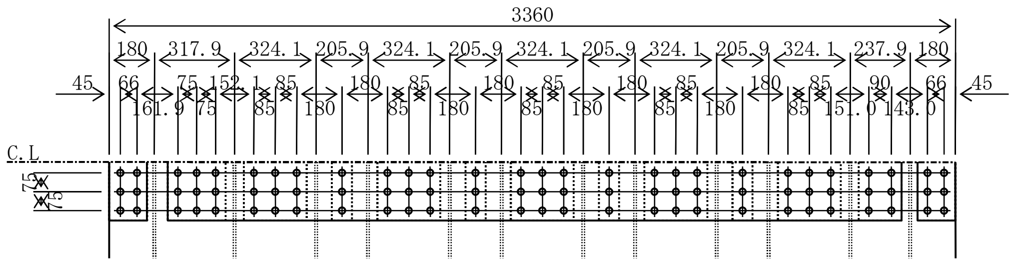
(b) Section area of main plate

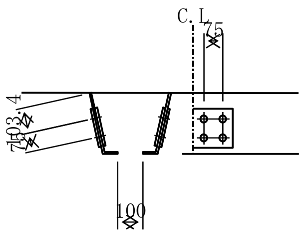
1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM400)

5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM400)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3360 * 16 A = 537.6

(537.6 - (28* 2.5)* 1.6) * 1.1 = 468.2 < 537.6 $\therefore$An = 468.2 cm^2

5-U.RIB 320 * 240 * 8 Ar = 269.5

(269.5 - 5*(4* 2.7)* 0.8- 5*(10.0*0.8)) * 1.1 = 204.9

< 269.5 $\therefore$Anr = 204.9 cm^2

ΣAn = An + Anr = 468.2 + 204.9 = 673.1 cm^2

σ_{tn} = σ_{tmax} * ΣAg / ΣAn = 67 * 807.1 / 673.1 = 81 N/mm^2

< σ_{ta} = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σ_{ta} * An / 1.1 = 105 * 46816 / 1.1 = 4468800 N

> σ_{tn} * An = 81 * 46816 = 3787782 N

Pc = σ_c * Ag = 105 * 53760 = 5644800 N

・Rib Ptr = 0.75σ_{ta} * Anr / 1.1 = 105 * 20493 / 1.1 = 1956150 N

> σ_{tn} * Anr = 81 * 20493 = 1658045 N

Pcr = σ_c * Agr = 105 * 26950 = 2829750 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 468.2 / 2 = 234.1 cm^2

AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AnrR = Anr = 204.9 cm^2

AgrR = Agr = 269.5 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5644800 / 108000 = 52.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2829750 / 108000 = 26.2 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 84 = 5644800 / 84 = 67200$ N

$\rho s = \tau * Ag / 84 = 23 * 53760 / 84 = 14900$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(67200^2 + 14900^2)} = 68832$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2913 * 9	(262.2 -	(24*2.5)* 0.9)*1.1= 229.0<	262.2	∴229.0
		289.4			249.0
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
1-SPL PL	230 * 14	(32.2 -	(3*2.5)* 1.4)*1.1= 23.9<	32.2	∴ 23.9
5-SPL PL	250 * 14	(175.0 -	5*(3*2.5)* 1.4)*1.1= 134.8<	175.0	∴134.8
4-SPL PL	80 * 14	(44.8 -	4*(1*2.5)* 1.4)*1.1= 33.9<	44.8	∴ 33.9
1-SPL PL	170 * 14	(23.8 -	(2*2.5)* 1.4)*1.1= 18.5<	23.8	∴ 18.5
		318.1			242.1
20-SPL PL	155 * 10	(310.0 -	20*(2*2.7)* 1.0)*1.1= 222.2<	310.0	∴222.2
		＞ AgrR			＞AnrR

(50) G1　J-18(Sec-18)　DECK

(a) Acting stress

$\sigma tmax$ = 113 N/mm^2　　0.75σta = 0.75 * 210 = 158 N/mm^2

$\sigma cmax$ = -64 N/mm^2　　0.75σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 158 N/mm^2

τmax = 29 N/mm^2

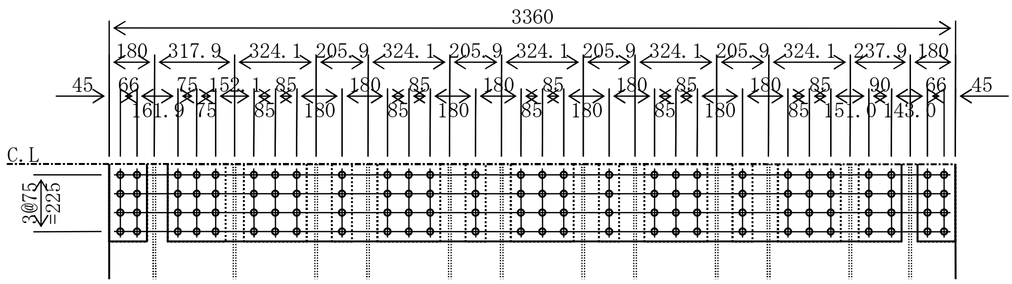
(b) Section area of main plate

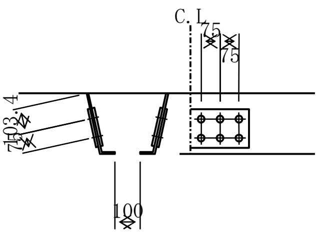
1-DECK　PL　3360 * 16　　Ag = 537.6 cm^2　(SM490Y)

5-U.RIB 320 * 240 * 8　　Agr = 269.5 cm^2　(SM490Y)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK　PL　3360 * 16　　A = 537.6

(537.6 - (28* 2.5)* 1.6) * 1.1 = 468.2 ＜ 537.6　∴An = 468.2 cm^2

5-U.RIB 320 * 240 * 8　　Ar = 269.5

(269.5 - 5*(4* 2.7)* 0.8- 5*(10.0*0.8)) * 1.1 = 204.9

＜ 269.5　∴Anr = 204.9 cm^2

ΣAn = An + Anr = 468.2 + 204.9 = 673.1 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 113 * 807.1 / 673.1 = 136 N/mm^2

＜ σta = 210 N/mm^2

(e) Design axial force

・Main plate　Pt = 0.75σta * An / 1.1 = 158 * 46816 / 1.1 = 6703200 N

＞ σtn * An = 136 * 46816 = 6360705 N

Pc = σc * Ag = 158 * 53760 = 8467200 N

・Rib　Ptr = 0.75σta * Anr / 1.1 = 158 * 20493 / 1.1 = 2934225 N

＞ σtn * Anr = 136 * 20493 = 2784303 N

Pcr = σc * Agr = 158 * 26950 = 4244625 N

(f) Required section area of the splice plates

・Mother material(One side)　AnR = An / 2 = 468.2 / 2 = 234.1 cm^2

AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib　AnrR = Anr = 204.9 cm^2

AgrR = Agr = 269.5 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 8467200 / 108000 = 78.4 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 4244625 / 108000 = 39.3 pcs. (5 @ 12 = 60 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(h) Tensile force per one bolt

ρp = Pc / 112 = 8467200 / 112 = 75600 N

ρs = τ * Ag / 112 = 29 * 53760 / 112 = 13859 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(75600^2 + 13859^2)}$ = 76860 N

(i) Check of splice plates

(SM490Y)	$Ags(cm^2)$	deduction of bolt holes		$Ans(cm^2)$
2-SPL PL 151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL 2913 * 9	(262.2 -	(24*2.5)* 0.9)*1.1= 229.0<	262.2	∴229.0
	289.4			249.0
2-SPL PL 151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
1-SPL PL 230 * 14	(32.2 -	(3*2.5)* 1.4)*1.1= 23.9<	32.2	∴ 23.9
5-SPL PL 250 * 14	(175.0 -	5*(3*2.5)* 1.4)*1.1= 134.8<	175.0	∴134.8
4-SPL PL 80 * 14	(44.8 -	4*(1*2.5)* 1.4)*1.1= 33.9<	44.8	∴ 33.9
1-SPL PL 170 * 14	(23.8 -	(2*2.5)* 1.4)*1.1= 18.5<	23.8	∴ 18.5
	318.1			242.1
20-SPL PL 155 * 10	(310.0 -	20*(2*2.7)* 1.0)*1.1= 222.2<	310.0	∴222.2
	> AgrR			>AnrR

(51) G1 J-19(Sec-19) DECK

(a) Acting stress

σtmax = 158 N/mm^2 0.75σta = 0.75 * 210 = 158 N/mm^2

σcmax = -64 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2

∴σc = 158 N/mm^2

τmax = 34 N/mm^2

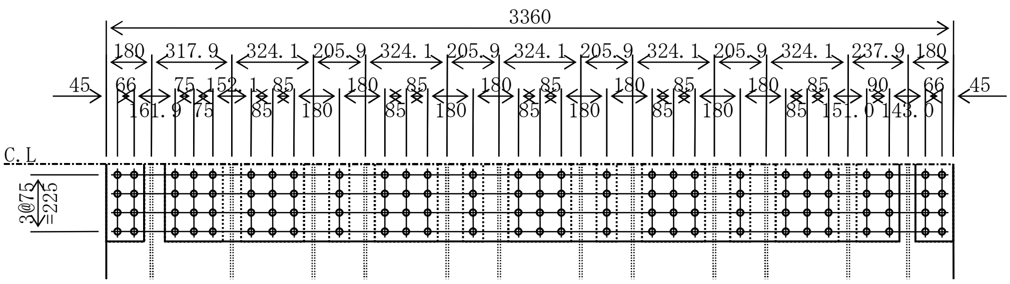
(b) Section area of main plate

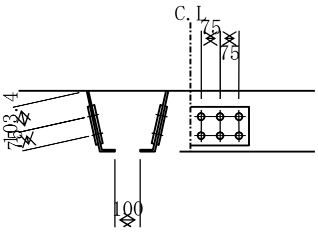
1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM490Y)

5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM490Y)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3360 * 16 A = 537.6

(537.6 - (28* 2.5)* 1.6) * 1.1 = 468.2 < 537.6 ∴An = 468.2 cm^2

5-U.RIB 320 * 240 * 8 Ar = 269.5

(269.5 - 5*(4* 2.7)* 0.8- 5*(10.0*0.8)) * 1.1 = 204.9

< 269.5 ∴Anr = 204.9 cm^2

ΣAn = An + Anr = 468.2 + 204.9 = 673.1 cm^2

σtn = σtmax * ΣAg / ΣAn = 158 * 807.1 / 673.1 = 190 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 190 * 46816 = 8888213 N

> 0.75σta * An / 1.1 = 158 * 46816 / 1.1 = 6703200 N

Pc = σc * Ag = 158 * 53760 = 8467200 N

・Rib Ptr = σtn * Anr = 190 * 20493 = 3890682 N

> 0.75σta * Anr/ 1.1 = 158 * 20493 / 1.1 = 2934225 N

Pcr = σc * Agr = 158 * 26950 = 4244625 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 468.2 / 2 = 234.1 cm^2

AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AnrR = Anr = 204.9 cm^2

AgrR = Agr = 269.5 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 8888213 / 108000 = 82.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 4244625 / 108000 = 39.3 pcs. (5 @ 12 = 60 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(h) Tensile force per one bolt

ρp = Pt / 112 = 8888213 / 112 = 79359 N

ρs = τ * Ag / 112 = 34 * 53760 / 112 = 16301 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(79359^2 + 16301^2)}$ = 81016 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2913 * 9	(262.2 -	(24*2.5)* 0.9)*1.1= 229.0<	262.2	∴229.0
		289.4			249.0
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
1-SPL PL	230 * 14	(32.2 -	(3*2.5)* 1.4)*1.1= 23.9<	32.2	∴ 23.9
5-SPL PL	250 * 14	(175.0 -	5*(3*2.5)* 1.4)*1.1= 134.8<	175.0	∴134.8
4-SPL PL	80 * 14	(44.8 -	4*(1*2.5)* 1.4)*1.1= 33.9<	44.8	∴ 33.9
1-SPL PL	170 * 14	(23.8 -	(2*2.5)* 1.4)*1.1= 18.5<	23.8	∴ 18.5
		318.1			242.1
20-SPL PL	155 * 10	(310.0 -	20*(2*2.7)* 1.0)*1.1= 222.2<	310.0	∴222.2
		> AgrR			>AnrR

(52) G1 J-20(Sec-21) DECK

(a) Acting stress

$\sigma tmax$ = 152 N/mm^2 0.75σta = 0.75 * 210 = 158 N/mm^2

$\sigma cmax$ = -64 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2

∴σc = 158 N/mm^2

τmax = 42 N/mm^2

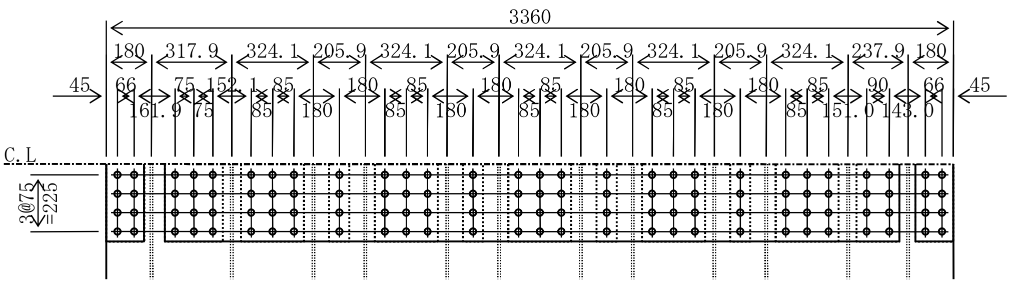
(b) Section area of main plate

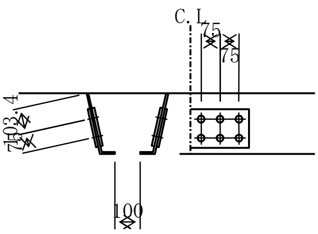
1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM490Y)

5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM490Y)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3360 * 16 A = 537.6

(537.6 - (28* 2.5)* 1.6) * 1.1 = 468.2 < 537.6 ∴An = 468.2 cm^2

5-U.RIB 320 * 240 * 8 Ar = 269.5

(269.5 - 5*(4* 2.7)* 0.8- 5*(10.0*0.8)) * 1.1 = 204.9

< 269.5 ∴Anr = 204.9 cm^2

ΣAn = An + Anr = 468.2 + 204.9 = 673.1 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 152 * 807.1 / 673.1 = 183 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 183 * 46816 = 8546845 N

> 0.75σta * An / 1.1 = 158 * 46816 / 1.1 = 6703200 N

Pc = σc * Ag = 158 * 53760 = 8467200 N

・Rib Ptr = σtn * Anr = 183 * 20493 = 3741253 N

> 0.75σta * Anr/ 1.1 = 158 * 20493 / 1.1 = 2934225 N

Pcr = σc * Agr = 158 * 26950 = 4244625 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 468.2 / 2 = 234.1 cm^2

AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AnrR = Anr = 204.9 cm^2

AgrR = Agr = 269.5 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 8546845 / 108000 = 79.1 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 4244625 / 108000 = 39.3 pcs. (5 @ 12 = 60 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(h) Tensile force per one bolt

ρp = Pt / 112 = 8546845 / 112 = 76311 N

ρs = τ * Ag / 112 = 42 * 53760 / 112 = 20037 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(76311^2 + 20037^2)}$ = 78898 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1=	20.0<	27.2	∴ 20.0
1-SPL PL	2913 * 9	(262.2 -	(24*2.5)* 0.9)*1.1=	229.0<	262.2	∴229.0
		289.4				249.0
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1=	31.1<	42.3	∴ 31.1
1-SPL PL	230 * 14	(32.2 -	(3*2.5)* 1.4)*1.1=	23.9<	32.2	∴ 23.9
5-SPL PL	250 * 14	(175.0 -	5*(3*2.5)* 1.4)*1.1=	134.8<	175.0	∴134.8
4-SPL PL	80 * 14	(44.8 -	4*(1*2.5)* 1.4)*1.1=	33.9<	44.8	∴ 33.9
1-SPL PL	170 * 14	(23.8 -	(2*2.5)* 1.4)*1.1=	18.5<	23.8	∴ 18.5
		318.1				242.1
20-SPL PL	155 * 10	(310.0 -	20*(2*2.7)* 1.0)*1.1=	222.2<	310.0	∴222.2
		> AgrR				>AnrR

(53) G1 J-21(Sec-22) DECK

(a) Acting stress

σtmax = 91 N/mm^2 0.75σta = 0.75 ∗ 140 = 105 N/mm^2

σcmax = -64 N/mm^2 0.75σca = 0.75 ∗ 140 = 105 N/mm^2

∴σc = 105 N/mm^2

τmax = 40 N/mm^2

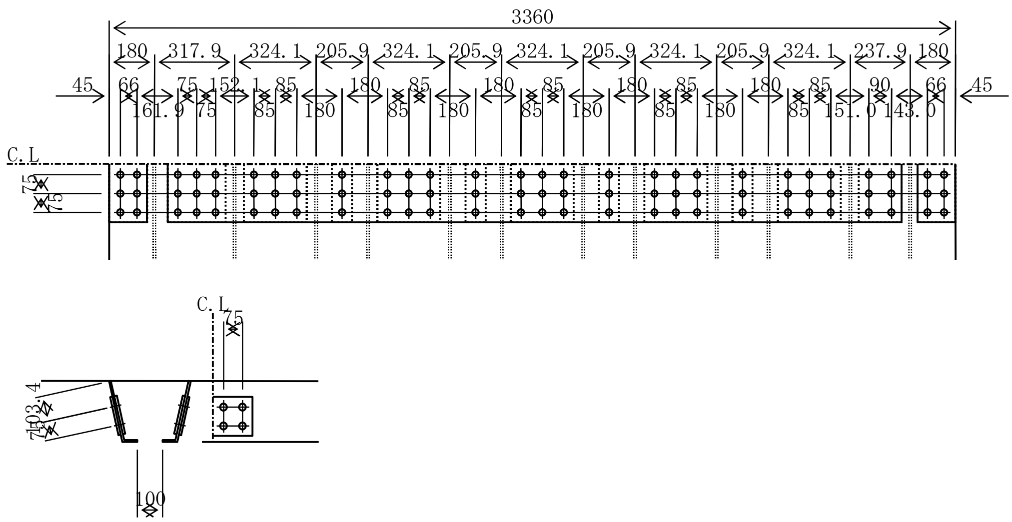
(b) Section area of main plate

1-DECK PL 3360 ∗ 16 Ag = 537.6 cm^2 (SM400)

5-U.RIB 320 ∗ 240 ∗ 8 Agr = 269.5 cm^2 (SM400)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 3360 ∗ 16 A = 537.6

(537.6 - (28∗ 2.5)∗ 1.6) ∗ 1.1 = 468.2 < 537.6 ∴An = 468.2 cm^2

5-U.RIB 320 ∗ 240 ∗ 8 Ar = 269.5

(269.5 - 5∗(4∗ 2.7)∗ 0.8- 5∗(10.0∗0.8)) ∗ 1.1 = 204.9

< 269.5 ∴Anr = 204.9 cm^2

ΣAn = An + Anr = 468.2 + 204.9 = 673.1 cm^2

σtn = σtmax ∗ ΣAg / ΣAn = 91 ∗ 807.1 / 673.1 = 109 N/mm^2

< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = σtn ∗ An = 109 ∗ 46816 = 5093021 N

> 0.75σta ∗ An / 1.1 = 105 ∗ 46816 / 1.1 = 4468800 N

Pc = σc ∗ Ag = 105 ∗ 53760 = 5644800 N

・Rib Ptr = σtn ∗ Anr = 109 ∗ 20493 = 2229393 N

> 0.75σta ∗ Anr/ 1.1 = 105 ∗ 20493 / 1.1 = 1956150 N

Pcr = σc ∗ Agr = 105 ∗ 26950 = 2829750 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 468.2 / 2 = 234.1 cm^2

AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AnrR = Anr = 204.9 cm^2

AgrR = Agr = 269.5 cm^2

(g) Required bolt number

- Main plate n = Pc / (108000 * 1.00) = 5644800 / 108000 = 52.3 pcs.
- Rib nr = Pcr / (108000 * 1.00) = 2829750 / 108000 = 26.2 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 84 = 5644800 / 84 = 67200 N
ρs = τ * Ag / 84 = 40 * 53760 / 84 = 25465 N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(67200^2 + 25465^2)}$ = 71863 N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2913 * 9	(262.2 -	(24*2.5)* 0.9)*1.1= 229.0<	262.2	∴229.0
		289.4			249.0
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
1-SPL PL	230 * 14	(32.2 -	(3*2.5)* 1.4)*1.1= 23.9<	32.2	∴ 23.9
5-SPL PL	250 * 14	(175.0 -	5*(3*2.5)* 1.4)*1.1= 134.8<	175.0	∴134.8
4-SPL PL	80 * 14	(44.8 -	4*(1*2.5)* 1.4)*1.1= 33.9<	44.8	∴ 33.9
1-SPL PL	170 * 14	(23.8 -	(2*2.5)* 1.4)*1.1= 18.5<	23.8	∴ 18.5
		318.1			242.1
20-SPL PL	155 * 10	(310.0 -	20*(2*2.7)* 1.0)*1.1= 222.2<	310.0	∴222.2
		> AgrR			>AnrR

(54) G1 J-22(Sec-23) DECK

(a) Acting stress

$\sigma tmax$ = 27 N/mm^2 $\quad$ $0.75\sigma ta$ = 0.75 * 140 = 105 N/mm^2

$\sigma cmax$ = -64 N/mm^2 $\quad$ $0.75\sigma ca$ = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 36 N/mm^2

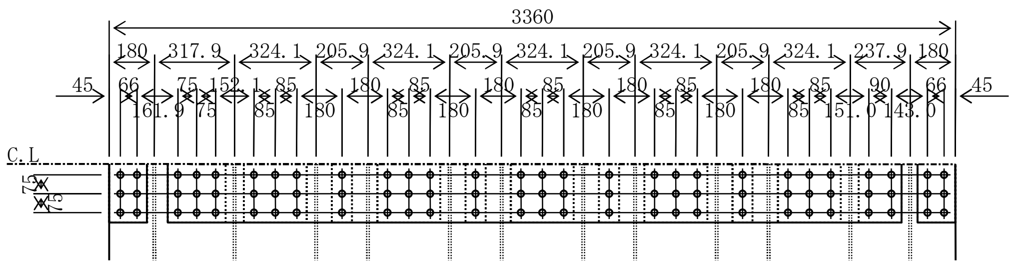
(b) Section area of main plate

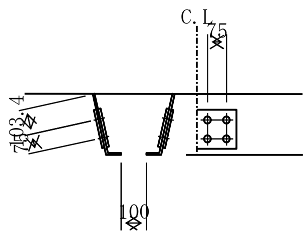
1-DECK PL 3360 * 16 $\quad$ Ag = 537.6 cm^2 (SM400)

5-U.RIB 320 * 240 * 8 $\quad$ Agr = 269.5 cm^2 (SM400)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3360 * 16 $\quad$ A = 537.6

(537.6 - (28* 2.5)* 1.6) * 1.1 = 468.2 < 537.6 $\quad\therefore$An = 468.2 cm^2

5-U.RIB 320 * 240 * 8 $\quad$ Ar = 269.5

(269.5 - 5*(4* 2.7)* 0.8- 5*(10.0*0.8)) * 1.1 = 204.9

< 269.5 $\quad\therefore$Anr = 204.9 cm^2

ΣAn = An + Anr = 468.2 + 204.9 = 673.1 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 27 * 807.1 / 673.1 = 33 N/mm^2

< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = $0.75\sigma ta$ * An / 1.1 = 105 * 46816 / 1.1 = 4468800 N

> σtn * An = 33 * 46816 = 1526419 N

Pc = σc * Ag = 105 * 53760 = 5644800 N

・Rib Ptr = $0.75\sigma ta$ * Anr / 1.1 = 105 * 20493 / 1.1 = 1956150 N

> σtn * Anr = 33 * 20493 = 668167 N

Pcr = σc * Agr = 105 * 26950 = 2829750 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 468.2 / 2 = 234.1 cm^2

AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AnrR = Anr = 204.9 cm^2

AgrR = Agr = 269.5 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5644800 / 108000 = 52.3 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 2829750 / 108000 = 26.2 pcs. (5 @ 8 = 40 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 84 = 5644800 / 84 = 67200$ N
$\rho s = \tau * Ag / 84 = 36 * 53760 / 84 = 22847$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(67200^2 + 22847^2)} = 70978$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2913 * 9	(262.2 -	(24*2.5)* 0.9)*1.1= 229.0<	262.2	∴229.0
		289.4			249.0
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
1-SPL PL	230 * 14	(32.2 -	(3*2.5)* 1.4)*1.1= 23.9<	32.2	∴ 23.9
5-SPL PL	250 * 14	(175.0 -	5*(3*2.5)* 1.4)*1.1= 134.8<	175.0	∴134.8
4-SPL PL	80 * 14	(44.8 -	4*(1*2.5)* 1.4)*1.1= 33.9<	44.8	∴ 33.9
1-SPL PL	170 * 14	(23.8 -	(2*2.5)* 1.4)*1.1= 18.5<	23.8	∴ 18.5
		318.1			242.1
20-SPL PL	155 * 10	(310.0 -	20*(2*2.7)* 1.0)*1.1= 222.2<	310.0	∴222.2
		＞ AgrR			＞AnrR

(55) G1 J-23(Sec-23) DECK

(a) Acting stress

$\sigma cmax$ = -95 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 30 N/mm^2

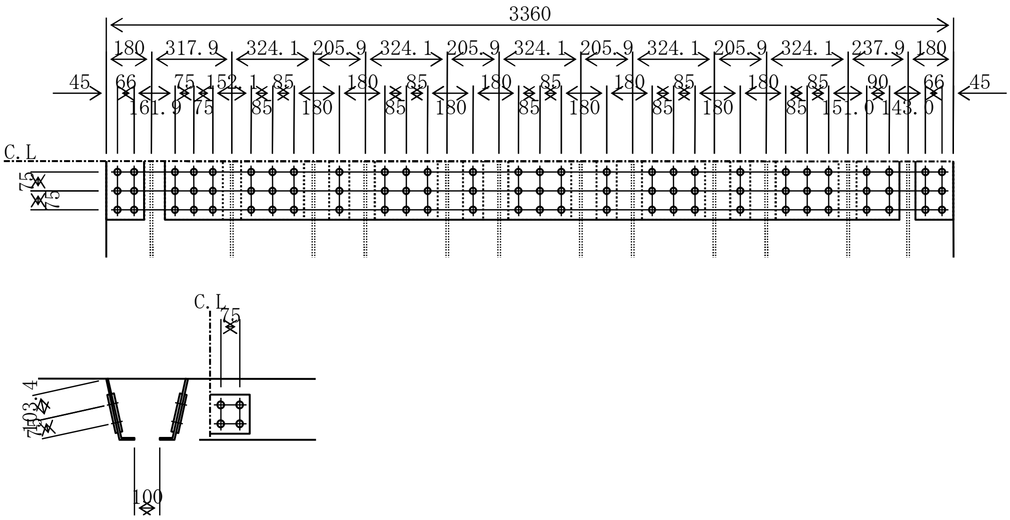
(b) Section area of main plate

1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM400)

5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM400)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 53760 = 5644800 N

・Rib Pcr = σc * Agr = 105 * 26950 = 2829750 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AgrR = Agr = 269.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5644800 / 108000 = 52.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2829750 / 108000 = 26.2 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 84 = 5644800 / 84 = 67200 N

ρs = τ * Ag / 84 = 30 * 53760 / 84 = 19014 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(67200^2 + 19014^2)}$ = 69838 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
2-SPL	PL 151 * 9	27.2	
1-SPL	PL 2913 * 9	262.2	
		289.4	
2-SPL	PL 151 * 14	42.3	
1-SPL	PL 230 * 14	32.2	
5-SPL	PL 250 * 14	175.0	
4-SPL	PL 80 * 14	44.8	
1-SPL	PL 170 * 14	23.8	
		318.1	
20-SPL	PL 155 * 10	310.0	＞ AgrR = 269.5cm2

(56) G1 J-24(Sec-24) DECK

(a) Acting stress

$\sigma cmax$ = -126 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 126 N/mm^2

τmax = 22 N/mm^2

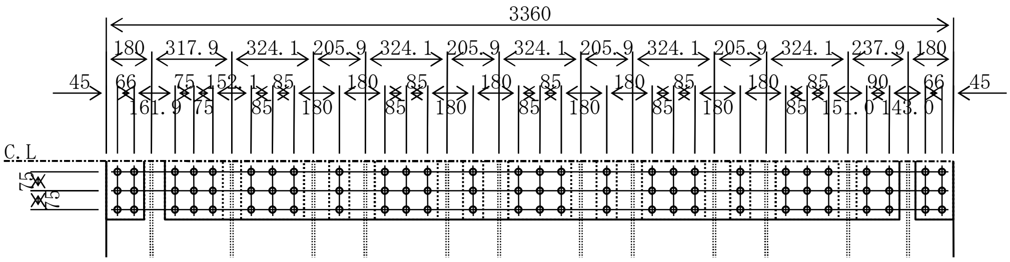
(b) Section area of main plate

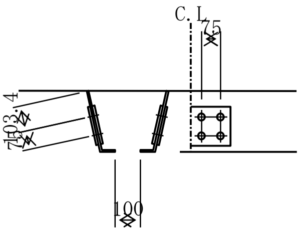
1-DECK PL 3360 * 16   Ag = 537.6 cm^2 (SM400)

5-U.RIB 320 * 240 * 8   Agr = 269.5 cm^2 (SM400)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 126 * 53760 = 6765911 N

・Rib Pcr = σc * Agr = 126 * 26950 = 3391765 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AgrR = Agr = 269.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 6765911 / 108000 = 62.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 3391765 / 108000 = 31.4 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 84 = 6765911 / 84 = 80547 N

ρs = τ * Ag / 84 = 22 * 53760 / 84 = 14127 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(80547^2 + 14127^2) = 81776 N

(h) Check of splice plates

	(SS400)	$A_{gs}(cm^2)$
2-SPL PL	151 * 9	27.2
1-SPL PL	2913 * 9	262.2
		289.4
2-SPL PL	151 * 14	42.3
1-SPL PL	230 * 14	32.2
5-SPL PL	250 * 14	175.0
4-SPL PL	80 * 14	44.8
1-SPL PL	170 * 14	23.8
		318.1
20-SPL PL	155 * 10	310.0 ＞ AgrR = 269.5cm2

(57) G1 J-25(Sec-25) DECK

(a) Acting stress

$\sigma cmax$ = -148 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma c$ = 158 N/mm^2

τmax = 16 N/mm^2

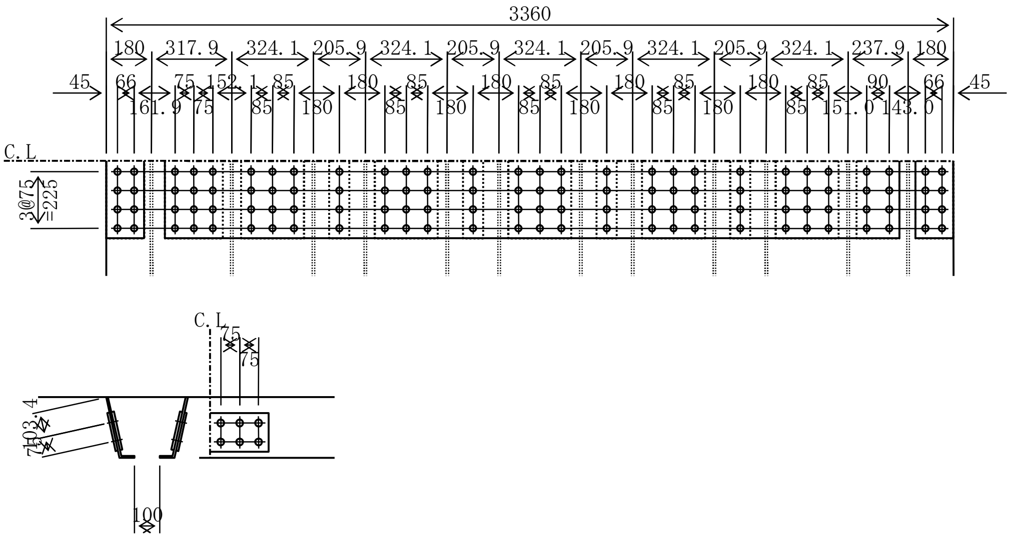
(b) Section area of main plate

1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM490Y)

5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM490Y)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 53760 = 8467200 N

・Rib Pcr = σc * Agr = 158 * 26950 = 4244625 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AgrR = Agr = 269.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 8467200 / 108000 = 78.4 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 4244625 / 108000 = 39.3 pcs. (5 @ 12 = 60 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 112 = 8467200 / 112 = 75600 N

ρs = τ * Ag / 112 = 16 * 53760 / 112 = 7516 N

ρ = $\sqrt{}(\rho p^2 + \rho s^2)$ = $\sqrt{}($ 75600^2 + 7516^2) = 75973 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)		
2-SPL PL	151 * 9	27.2		
1-SPL PL	2913 * 9	262.2		
		289.4		
2-SPL PL	151 * 14	42.3		
1-SPL PL	230 * 14	32.2		
5-SPL PL	250 * 14	175.0		
4-SPL PL	80 * 14	44.8		
1-SPL PL	170 * 14	23.8		
		318.1		
20-SPL PL	155 * 10	310.0	＞ AgrR =	269.5cm2

(58) G1 J-26(Sec-26) DECK

(a) Acting stress

σcmax = -158 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma$c = 158 N/mm^2

τmax = 14 N/mm^2

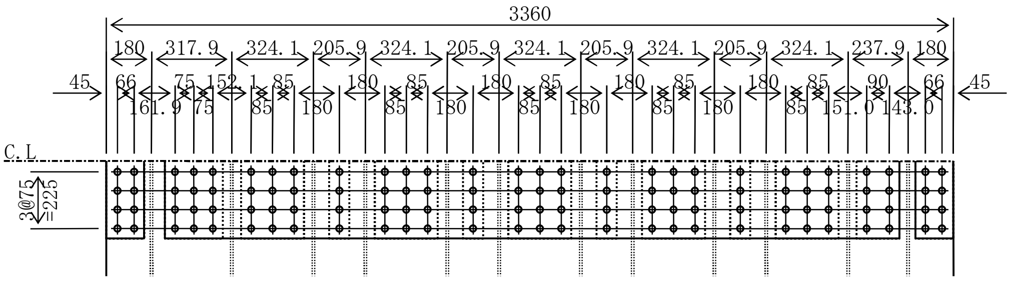
(b) Section area of main plate

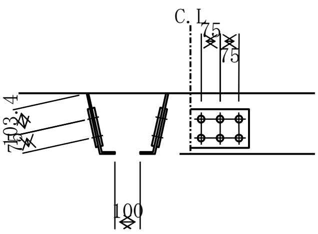
1-DECK PL 3360 * 16   Ag = 537.6 cm^2 (SM490Y)

5-U.RIB 320 * 240 * 8   Agr = 269.5 cm^2 (SM490Y)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 53760 = 8500746 N

・Rib Pcr = σc * Agr = 158 * 26950 = 4261442 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AgrR = Agr = 269.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 8500746 / 108000 = 78.7 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 4261442 / 108000 = 39.5 pcs. (5 @ 12 = 60 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 112 = 8500746 / 112 = 75900 N

ρs = τ * Ag / 112 = 14 * 53760 / 112 = 6497 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(75900^2 + 6497^2)}$ = 76177 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)
2-SPL PL	151 * 9	27.2
1-SPL PL	2913 * 9	262.2
		289.4
2-SPL PL	151 * 14	42.3
1-SPL PL	230 * 14	32.2
5-SPL PL	250 * 14	175.0
4-SPL PL	80 * 14	44.8
1-SPL PL	170 * 14	23.8
		318.1
20-SPL PL	155 * 10	310.0 ＞ AgrR = 269.5cm2

(59) G1 J-27(Sec-27) DECK

(a) Acting stress

$\sigma cmax$ = -165 N/mm^2 $0.75 \sigma ca$ = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma c$ = 165 N/mm^2

τmax = 9 N/mm^2

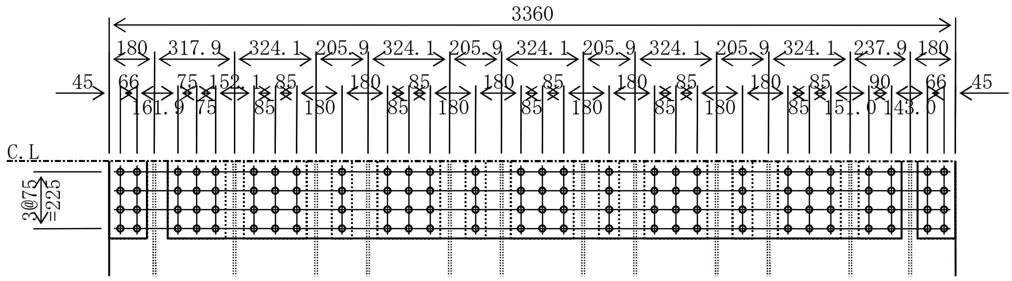
(b) Section area of main plate

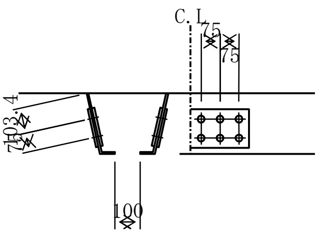
1-DECK PL 3360 * 16   Ag = 537.6 cm^2 (SM490Y)

5-U.RIB 320 * 240 * 8   Agr = 269.5 cm^2 (SM490Y)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 165 * 53760 = 8874701 N

・Rib Pcr = σc * Agr = 165 * 26950 = 4448906 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AgrR = Agr = 269.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 8874701 / 108000 = 82.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 4448906 / 108000 = 41.2 pcs. (5 @ 12 = 60 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 112 = 8874701 / 112 = 79238 N

ρs = τ * Ag / 112 = 9 * 53760 / 112 = 4190 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(79238^2 + 4190^2)}$ = 79349 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)
2-SPL PL	151 * 9	27.2
1-SPL PL	2913 * 9	262.2
		289.4
2-SPL PL	151 * 14	42.3
1-SPL PL	230 * 14	32.2
5-SPL PL	250 * 14	175.0
4-SPL PL	80 * 14	44.8
1-SPL PL	170 * 14	23.8
		318.1
20-SPL PL	155 * 10	310.0 ＞ AgrR = 269.5cm2

(60) G1 J-28(Sec-29) DECK

(a) Acting stress

σ_{cmax} = −163 N/mm² $0.75\sigma_{ca}$ = 0.75 * 210 = 158 N/mm²

$\therefore \sigma_c$ = 163 N/mm²

τ_{max} = 10 N/mm²

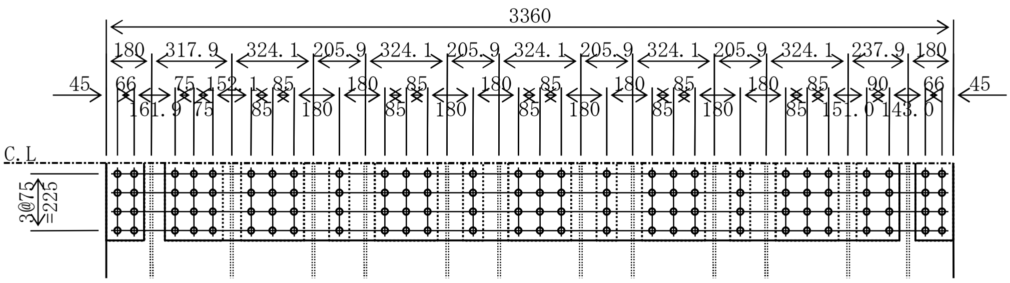
(b) Section area of main plate

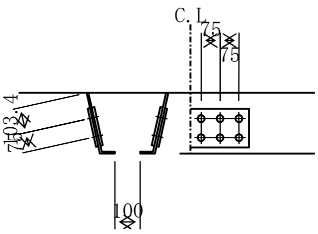
1-DECK PL 3360 * 16 Ag = 537.6 cm² (SM490Y)

5-U.RIB 320 * 240 * 8 Agr = 269.5 cm² (SM490Y)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm²

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σ_c * Ag = 163 * 53760 = 8753687 N

・Rib Pcr = σ_c * Agr = 163 * 26950 = 4388242 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 537.6 / 2 = 268.8 cm²

・Rib AgrR = Agr = 269.5 cm²

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 8753687 / 108000 = 81.1 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 4388242 / 108000 = 40.6 pcs. (5 @ 12 = 60 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ_a = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρ_p = Pc / 112 = 8753687 / 112 = 78158 N

ρ_s = τ * Ag / 112 = 10 * 53760 / 112 = 4675 N

$\rho = \sqrt{(\rho_p^2 + \rho_s^2)} = \sqrt{(78158^2 + 4675^2)}$ = 78298 N

(h) Check of splice plates

			Ags(cm^2)
		(SM490Y)	
2-SPL PL	151 * 9		27.2
1-SPL PL	2913 * 9		262.2
			289.4
2-SPL PL	151 * 14		42.3
1-SPL PL	230 * 14		32.2
5-SPL PL	250 * 14		175.0
4-SPL PL	80 * 14		44.8
1-SPL PL	170 * 14		23.8
			318.1
20-SPL PL	155 * 10		310.0 ＞ AgrR = 269.5cm2

(61) G1 J-29(Sec-30) DECK

(a) Acting stress

$\sigma cmax$ = -155 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma c$ = 158 N/mm^2

τmax = 13 N/mm^2

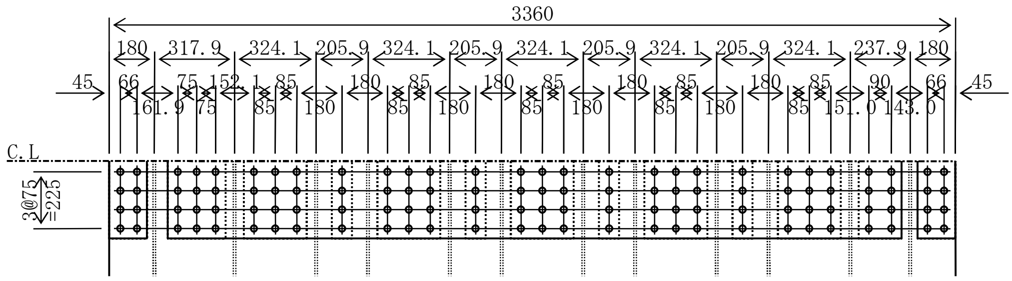
(b) Section area of main plate

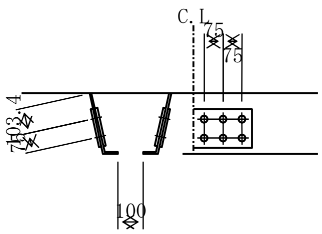
1-DECK PL 3360 * 16   Ag = 537.6 cm^2 (SM490Y)

5-U.RIB 320 * 240 * 8   Agr = 269.5 cm^2 (SM490Y)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 53760 = 8467200 N

・Rib Pcr = σc * Agr = 158 * 26950 = 4244625 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AgrR = Agr = 269.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 8467200 / 108000 = 78.4 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 4244625 / 108000 = 39.3 pcs. (5 @ 12 = 60 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 112 = 8467200 / 112 = 75600 N

ρs = τ * Ag / 112 = 13 * 53760 / 112 = 6382 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(75600^2 + 6382^2)}$ = 75869 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)
2-SPL PL	151 * 9	27.2
1-SPL PL	2913 * 9	262.2
		289.4
2-SPL PL	151 * 14	42.3
1-SPL PL	230 * 14	32.2
5-SPL PL	250 * 14	175.0
4-SPL PL	80 * 14	44.8
1-SPL PL	170 * 14	23.8
		318.1
20-SPL PL	155 * 10	310.0 ＞ AgrR = 269.5cm2

(62) G1 J-30(Sec-31) DECK

(a) Acting stress

$\sigma cmax$ = -142 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma c$ = 158 N/mm^2

τmax = 19 N/mm^2

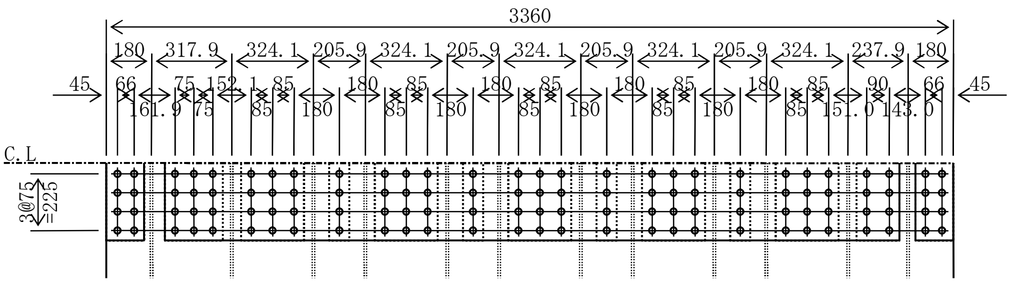
(b) Section area of main plate

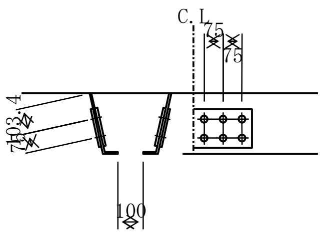
1-DECK PL 3360 * 16   Ag = 537.6 cm^2 (SM490Y)

5-U.RIB 320 * 240 * 8   Agr = 269.5 cm^2 (SM490Y)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 53760 = 8467200 N

・Rib Pcr = σc * Agr = 158 * 26950 = 4244625 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AgrR = Agr = 269.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 8467200 / 108000 = 78.4 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 4244625 / 108000 = 39.3 pcs. (5 @ 12 = 60 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 112 = 8467200 / 112 = 75600 N

ρs = τ * Ag / 112 = 19 * 53760 / 112 = 8896 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(75600^2 + 8896^2)}$ = 76122 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)
2-SPL PL	151 * 9	27.2
1-SPL PL	2913 * 9	262.2
		289.4
2-SPL PL	151 * 14	42.3
1-SPL PL	230 * 14	32.2
5-SPL PL	250 * 14	175.0
4-SPL PL	80 * 14	44.8
1-SPL PL	170 * 14	23.8
		318.1
20-SPL PL	155 * 10	310.0 ＞ AgrR = 269.5cm2

(63) G1 J-31(Sec-32) DECK

(a) Acting stress

σcmax = -119 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma$c = 119 N/mm^2

τmax = 23 N/mm^2

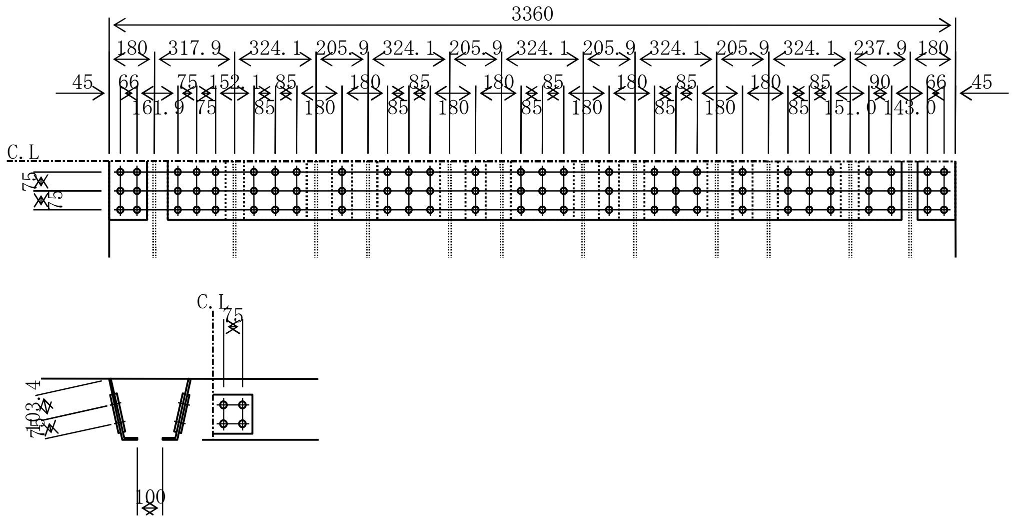
(b) Section area of main plate

1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM400)

5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM400)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 119 * 53760 = 6392172 N

・Rib Pcr = σc * Agr = 119 * 26950 = 3204409 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AgrR = Agr = 269.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 6392172 / 108000 = 59.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 3204409 / 108000 = 29.7 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 84 = 6392172 / 84 = 76097 N

ρs = τ * Ag / 84 = 23 * 53760 / 84 = 14970 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(76097^2 + 14970^2) = 77556 N

(h) Check of splice plates

		Ags(cm^2)
	(SS400)	
2-SPL PL	151 * 9	27.2
1-SPL PL	2913 * 9	262.2
		289.4
2-SPL PL	151 * 14	42.3
1-SPL PL	230 * 14	32.2
5-SPL PL	250 * 14	175.0
4-SPL PL	80 * 14	44.8
1-SPL PL	170 * 14	23.8
		318.1
20-SPL PL	155 * 10	310.0 ＞ AgrR = 269.5cm2

(64) G1 J-32(Sec-33) DECK

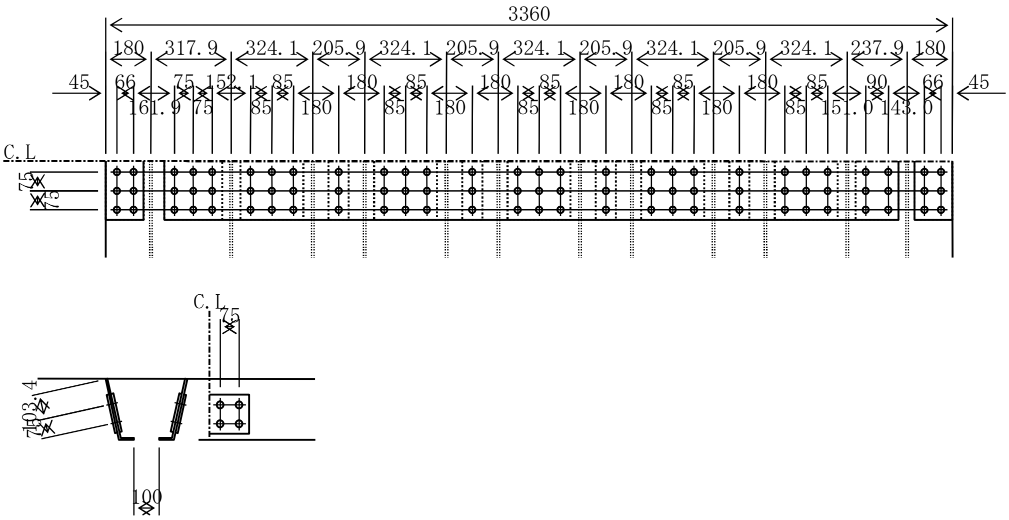
(a) Acting stress

$\sigma cmax$ = -88 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma c$ = 105 N/mm^2
τmax = 32 N/mm^2

(b) Section area of main plate

1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM400)
5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM400)
ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 53760 = 5644800 N
・Rib Pcr = σc * Agr = 105 * 26950 = 2829750 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2
・Rib AgrR = Agr = 269.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5644800 / 108000 = 52.3 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 2829750 / 108000 = 26.2 pcs. (5 @ 8 = 40 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 84 = 5644800 / 84 = 67200 N
ρs = τ * Ag / 84 = 32 * 53760 / 84 = 20285 N
ρ = $\sqrt{}(\rho p^2 + \rho s^2)$ = $\sqrt{}$(67200^2 + 20285^2) = 70195 N

(h) Check of splice plates

	(SS400)		Ags(cm^2)		
2-SPL PL	151	* 9	27.2		
1-SPL PL	2913	* 9	262.2		
			289.4		
2-SPL PL	151	* 14	42.3		
1-SPL PL	230	* 14	32.2		
5-SPL PL	250	* 14	175.0		
4-SPL PL	80	* 14	44.8		
1-SPL PL	170	* 14	23.8		
			318.1		
20-SPL PL	155	* 10	310.0	＞ AgrR =	269.5cm2

(65) D-2 J-1(Sec-1) DECK-1

(a) Acting stress

$\sigma cmax$ = -83 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 6 N/mm^2

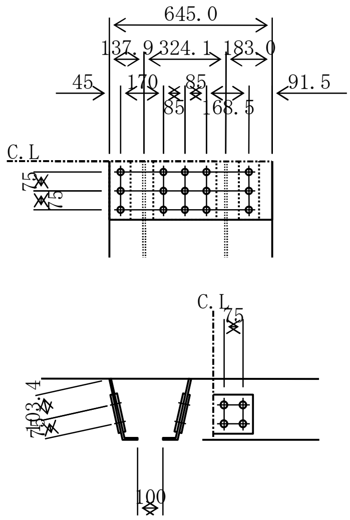
(b) Section area of main plate

1-DECK-1 PL 645 * 16 Ag = 103.2 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 10320 = 1083617 N

・Rib Pcr = σc * Agr = 105 * 5390 = 565950 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1083617 / 108000 = 10.0 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 15 = 1083617 / 15 = 72241 N

ρs = τ * Ag / 15 = 6 * 10320 / 15 = 3868 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(72241^2 + 3868^2) = 72345 N

(h) Check of splice plates

	(SS400)	A_{gs} (cm^2)	
1-SPL PL	645 * 9	58.1	
1-SPL PL	85 * 14	11.9	
1-SPL PL	250 * 14	35.0	
1-SPL PL	80 * 14	11.2	
		58.1	
4-SPL PL	155 * 10	62.0	> AgrR = 53.9cm2

(66) D-2 J-1(Sec-1) DECK-2

(a) Acting stress

$\sigma cmax$ = -83 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 6 N/mm^2

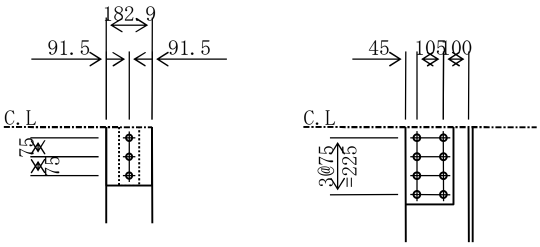
(b) Section area of main plate

1-DECK-2 PL 183 * 16   Ag = 29.3 cm^2 (SM400)

1-RIB PL 250 * 24   Agr = 60.0 cm^2 (SM400)

ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 2927 = 307339 N

・Rib Pcr = σc * Agr = 105 * 6000 = 630000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2

・Rib   AgrR = Agr = 60.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 307339 / 108000 = 2.8 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 630000 / 108000 = 5.8 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 3 = 307339 / 3 = 102446 N

ρs = τ * Ag / 3 = 6 * 2927 / 3 = 5485 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(102446^2 + 5485^2)}$ = 102593 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	183 * 9	16.5	
1-SPL PL	80 * 14	11.2	
2-SPL PL	185 * 18	66.6	> AgrR = 60.0cm2

(67) D-2 J-1(Sec-1) DECK-3

(a) Acting stress

$\sigma cmax$ = -83 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 6 N/mm^2

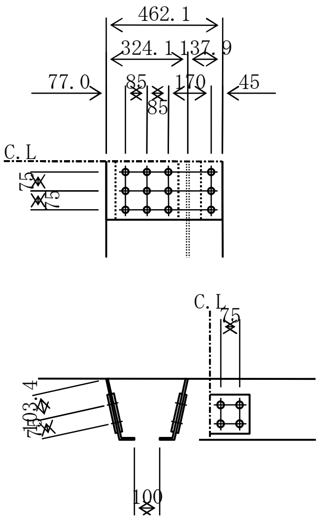
(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 7393 = 776244 N

・Rib Pcr = σc * Agr = 105 * 5390 = 565950 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 776244 / 108000 = 7.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 12 = 776244 / 12 = 64687 N

ρs = τ * Ag / 12 = 6 * 7393 / 12 = 3464 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64687^2 + 3464^2)}$ = 64780 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
1-SPL PL	462 * 9	41.6
1-SPL PL	250 * 14	35.0
1-SPL PL	85 * 14	11.9
		46.9

4-SPL PL 155 * 10 62.0 ＞ AgrR = 53.9cm2

(68) D-2 J-2(Sec-2) DECK-1

(a) Acting stress

$\sigma cmax$ = -108 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 108 N/mm^2

τmax = 4 N/mm^2

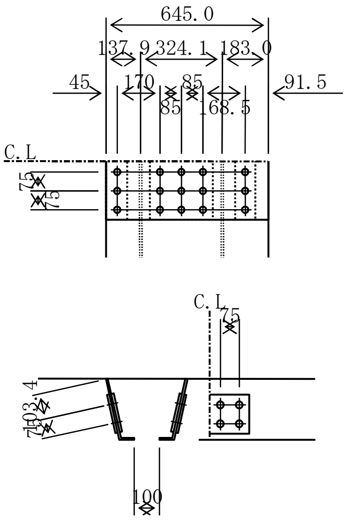
(b) Section area of main plate

1-DECK-1 PL 645 * 16   Ag = 103.2 cm^2 (SM400)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 108 * 10320 = 1112317 N

・Rib Pcr = σc * Agr = 108 * 5390 = 580940 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1112317 / 108000 = 10.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 580940 / 108000 = 5.4 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 15 = 1112317 / 15 = 74154 N

ρs = τ * Ag / 15 = 4 * 10320 / 15 = 2800 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(74154^2 + 2800^2)}$ = 74207 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	645 ＊ 9	58.1	
1-SPL PL	85 ＊ 14	11.9	
1-SPL PL	250 ＊ 14	35.0	
1-SPL PL	80 ＊ 14	11.2	
		58.1	
4-SPL PL	155 ＊ 10	62.0	＞ AgrR = 53.9cm2

(69) D-2 J-2(Sec-2) DECK-2

(a) Acting stress

$\sigma cmax$ = -108 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 108 N/mm^2

τmax = 4 N/mm^2

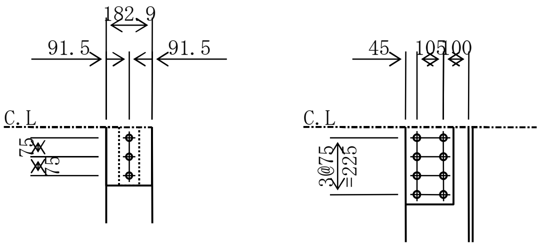
(b) Section area of main plate

1-DECK-2 PL 183 * 16 Ag = 29.3 cm^2 (SM400)

1-RIB PL 250 * 24 Agr = 60.0 cm^2 (SM400)

ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 108 * 2927 = 315479 N

・Rib Pcr = σc * Agr = 108 * 6000 = 646686 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2

・Rib AgrR = Agr = 60.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 315479 / 108000 = 2.9 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 646686 / 108000 = 6.0 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 3 = 315479 / 3 = 105160 N

ρs = τ * Ag / 3 = 4 * 2927 / 3 = 3970 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(105160^2 + 3970^2) = 105235 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	183 * 9	16.5	
1-SPL PL	80 * 14	11.2	
2-SPL PL	185 * 18	66.6	＞ AgrR = 60.0cm2

(70) D-2 J-2(Sec-2) DECK-3

(a) Acting stress

$\sigma cmax$ = -108 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 108 N/mm^2

τmax = 4 N/mm^2

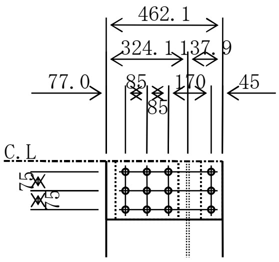
(b) Section area of main plate

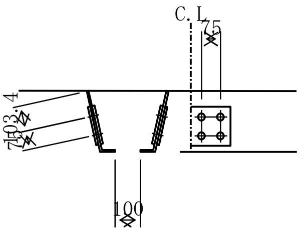
1-DECK-3 PL 462 * 16   Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 108 * 7393 = 796803 N

・Rib Pcr = σc * Agr = 108 * 5390 = 580940 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 796803 / 108000 = 7.4 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 580940 / 108000 = 5.4 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 12 = 796803 / 12 = 66400 N

ρs = τ * Ag / 12 = 4 * 7393 / 12 = 2507 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(66400^2 + 2507^2)}$ = 66448 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
1-SPL PL	462 * 9	41.6
1-SPL PL	250 * 14	35.0
1-SPL PL	85 * 14	11.9
		46.9
4-SPL PL	155 * 10	62.0 ＞ AgrR = 53.9cm2

(71) D-2 J-3(Sec-3) DECK-1

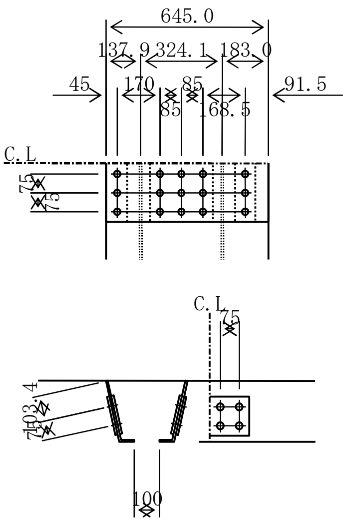
(a) Acting stress

$\sigma cmax$ = -119 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2
∴ σc = 119 N/mm^2
τmax = 2 N/mm^2

(b) Section area of main plate

1-DECK-1 PL 645 * 16   Ag = 103.2 cm^2 (SM400)
1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM400)
ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 119 * 10320 = 1227882 N
・Rib Pcr = σc * Agr = 119 * 5390 = 641297 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2
・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1227882 / 108000 = 11.4 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 641297 / 108000 = 5.9 pcs. (1 @ 8 = 8 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 15 = 1227882 / 15 = 81859 N
ρs = τ * Ag / 15 = 2 * 10320 / 15 = 1533 N
ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(81859^2 + 1533^2)}$ = 81873 N

(h) Check of splice plates

	(SS400)	Ags(cm²)		
1-SPL PL	645 ＊ 9	58.1		
1-SPL PL	85 ＊ 14	11.9		
1-SPL PL	250 ＊ 14	35.0		
1-SPL PL	80 ＊ 14	11.2		
		58.1		
4-SPL PL	155 ＊ 10	62.0	＞ AgrR =	53.9cm2

(72) D-2 J-3(Sec-3) DECK-2

(a) Acting stress

$\sigma cmax$ = -119 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴σc = 119 N/mm^2

τmax = 2 N/mm^2

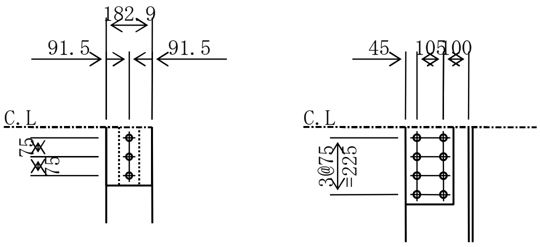
(b) Section area of main plate

1-DECK-2 PL 183 * 16   Ag = 29.3 cm^2 (SM400)

1-RIB PL 250 * 24   Agr = 60.0 cm^2 (SM400)

ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 119 * 2927 = 348256 N

・Rib Pcr = σc * Agr = 119 * 6000 = 713874 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2

・Rib AgrR = Agr = 60.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 348256 / 108000 = 3.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 713874 / 108000 = 6.6 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 3 = 348256 / 3 = 116085 N

ρs = τ * Ag / 3 = 2 * 2927 / 3 = 2174 N

ρ = $\sqrt{}(\rho p^2 + \rho s^2)$ = $\sqrt{}$(116085^2 + 2174^2) = 116106 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	183 * 9	16.5	
1-SPL PL	80 * 14	11.2	
2-SPL PL	185 * 18	66.6	＞ AgrR = 60.0cm2

(73) D-2 J-3(Sec-3) DECK-3

(a) Acting stress

σcmax = -119 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴σc = 119 N/mm^2

τmax = 2 N/mm^2

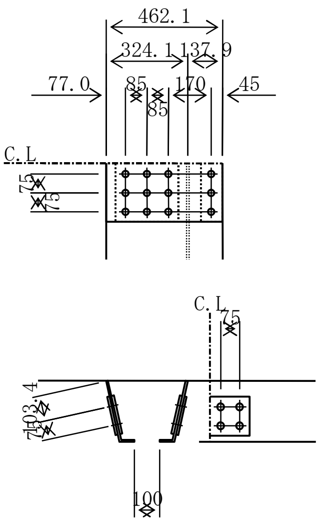
(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 119 * 7393 = 879588 N

・Rib Pcr = σc * Agr = 119 * 5390 = 641297 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 879588 / 108000 = 8.1 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 641297 / 108000 = 5.9 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 12 = 879588 / 12 = 73299 N

ρs = τ * Ag / 12 = 2 * 7393 / 12 = 1373 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(73299^2 + 1373^2) = 73312 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
1-SPL PL	462 * 9	41.6
1-SPL PL	250 * 14	35.0
1-SPL PL	85 * 14	11.9
		46.9
4-SPL PL	155 * 10	62.0 ＞ AgrR = 53.9cm2

(74) D-2 J-4(Sec-5) DECK-1

(a) Acting stress

$\sigma cmax$ = -122 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 122 N/mm^2

τmax = 1 N/mm^2

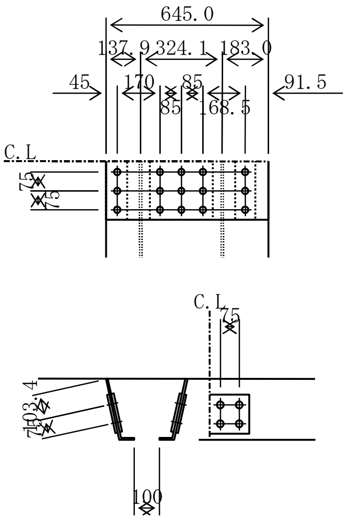
(b) Section area of main plate

1-DECK-1 PL 645 * 16 Ag = 103.2 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 122 * 10320 = 1262620 N

・Rib Pcr = σc * Agr = 122 * 5390 = 659440 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1262620 / 108000 = 11.7 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 659440 / 108000 = 6.1 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 15 = 1262620 / 15 = 84175 N

ρs = τ * Ag / 15 = 1 * 10320 / 15 = 830 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(84175^2 + 830^2)}$ = 84179 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)		
1-SPL PL	645 ＊ 9	58.1		
1-SPL PL	85 ＊ 14	11.9		
1-SPL PL	250 ＊ 14	35.0		
1-SPL PL	80 ＊ 14	11.2		
		58.1		
4-SPL PL	155 ＊ 10	62.0	＞ AgrR =	53.9cm2

(75) D-2　J-4(Sec-5)　DECK-2

(a) Acting stress

σ cmax = -122 N/mm^2　　0.75 σ ca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma$ c = 122 N/mm^2

τ max = 1 N/mm^2

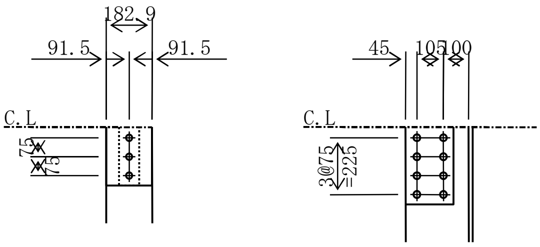
(b) Section area of main plate

1-DECK-2　PL　183 * 16　　Ag = 29.3 cm^2　(SM400)

1-RIB　PL　250 * 24　　Agr = 60.0 cm^2　(SM400)

ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate　Pc = σ c * Ag = 122 * 2927 = 358109 N

・Rib　Pcr = σ c * Agr = 122 * 6000 = 734070 N

(e) Required section area of the splice plates

・Mother material(One side)　AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2

・Rib　　AgrR = Agr = 60.0 cm^2

(f) Required bolt number

・Main plate　n = Pc / (108000 * 1.00) = 358109 / 108000 = 3.3 pcs.

・Rib　nr = Pcr / (108000 * 1.00) = 734070 / 108000 = 6.8 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.)　Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρ p = Pc / 3 = 358109 / 3 = 119370 N

ρ s = τ * Ag / 3 = 1 * 2927 / 3 = 1178 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(119370^2 + 1178^2)}$ = 119375 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	183 * 9	16.5	
1-SPL PL	80 * 14	11.2	
2-SPL PL	185 * 18	66.6	＞ AgrR = 60.0cm2

(76) D-2　J-4(Sec-5)　DECK-3

(a) Acting stress

$\sigma cmax$ = -122 N/mm^2　　0.75σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 122 N/mm^2

τmax = 1 N/mm^2

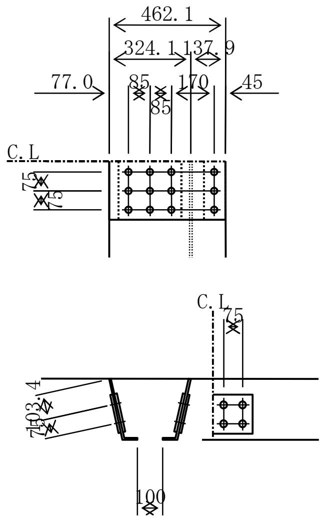
(b) Section area of main plate

1-DECK-3　PL　462 * 16　　Ag = 73.9 cm^2　(SM400)

1-U.RIB 320 * 240 * 8　　Agr = 53.9 cm^2　(SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate　Pc = σc * Ag = 122 * 7393 = 904472 N

・Rib　Pcr = σc * Agr = 122 * 5390 = 659440 N

(e) Required section area of the splice plates

・Mother material(One side)　AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib　　AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate　n = Pc / (108000 * 1.00) = 904472 / 108000 = 8.4 pcs.

・Rib　nr = Pcr / (108000 * 1.00) = 659440 / 108000 = 6.1 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 12 = 904472 / 12 = 75373 N

ρs = τ * Ag / 12 = 1 * 7393 / 12 = 744 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(75373^2 + 744^2)}$ = 75376 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	462 * 9	41.6	
1-SPL PL	250 * 14	35.0	
1-SPL PL	85 * 14	11.9	
		46.9	
4-SPL PL	155 * 10	62.0	> AgrR = 53.9cm2

(77) D-2 J-5(Sec-6) DECK-1

(a) Acting stress

$\sigma cmax$ = -118 N/mm² $0.75\sigma ca$ = 0.75 * 140 = 105 N/mm²

$\therefore \sigma c$ = 118 N/mm²

τmax = 3 N/mm²

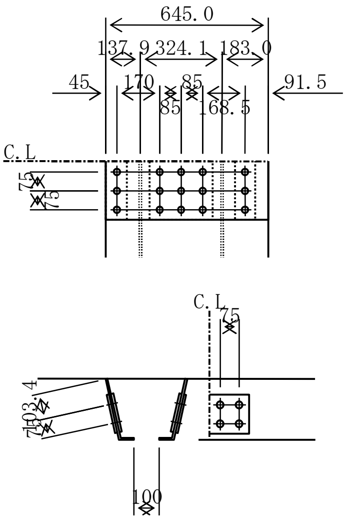
(b) Section area of main plate

1-DECK-1 PL 645 * 16   Ag = 103.2 cm² (SM400)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm² (SM400)

ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm²

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 118 * 10320 = 1219224 N

・Rib Pcr = σc * Agr = 118 * 5390 = 636775 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 103.2 / 2 = 51.6 cm²

・Rib AgrR = Agr = 53.9 cm²

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1219224 / 108000 = 11.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 636775 / 108000 = 5.9 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 15 = 1219224 / 15 = 81282 N

ρs = τ * Ag / 15 = 3 * 10320 / 15 = 1785 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(81282^2 + 1785^2)}$ = 81301 N

(h) Check of splice plates

	(SS400)	$Ags(cm^2)$		
1-SPL PL	645 ＊ 9	58.1		
1-SPL PL	85 ＊ 14	11.9		
1-SPL PL	250 ＊ 14	35.0		
1-SPL PL	80 ＊ 14	11.2		
		58.1		
4-SPL PL	155 ＊ 10	62.0	＞ AgrR =	53.9cm2

(78) D-2 J-5(Sec-6) DECK-2

(a) Acting stress

$\sigma cmax$ = -118 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 118 N/mm^2

τmax = 3 N/mm^2

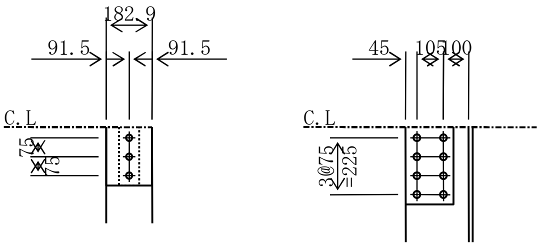
(b) Section area of main plate

1-DECK-2 PL 183 * 16   Ag = 29.3 cm^2 (SM400)

1-RIB PL 250 * 24   Agr = 60.0 cm^2 (SM400)

ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 118 * 2927 = 345801 N

・Rib Pcr = σc * Agr = 118 * 6000 = 708840 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2

・Rib   AgrR = Agr = 60.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 345801 / 108000 = 3.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 708840 / 108000 = 6.6 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 3 = 345801 / 3 = 115267 N

ρs = τ * Ag / 3 = 3 * 2927 / 3 = 2532 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(115267^2 + 2532^2)}$ = 115295 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	183 * 9	16.5	
1-SPL PL	80 * 14	11.2	
2-SPL PL	185 * 18	66.6	> AgrR = 60.0cm2

(79) D-2 J-5(Sec-6) DECK-3

(a) Acting stress

$\sigma cmax$ = -118 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 118 N/mm^2

τmax = 3 N/mm^2

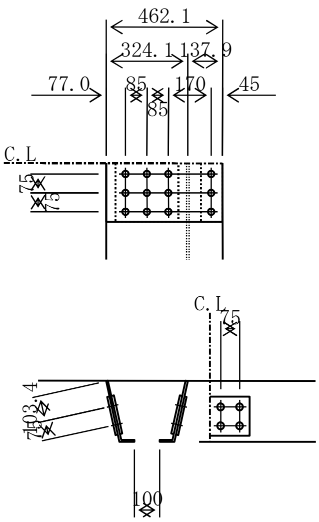
(b) Section area of main plate

1-DECK-3 PL 462 * 16   Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 118 * 7393 = 873385 N

・Rib Pcr = σc * Agr = 118 * 5390 = 636775 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib   AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 873385 / 108000 = 8.1 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 636775 / 108000 = 5.9 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 12 = 873385 / 12 = 72782 N

ρs = τ * Ag / 12 = 3 * 7393 / 12 = 1599 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(72782^2 + 1599^2)}$ = 72800 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	462 * 9	41.6	
1-SPL PL	250 * 14	35.0	
1-SPL PL	85 * 14	11.9	
		46.9	
4-SPL PL	155 * 10	62.0	＞ AgrR = 53.9cm2

(80) D-2 J-6(Sec-7) DECK-1

(a) Acting stress

$\sigma cmax$ = -106 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴σc = 106 N/mm^2

τmax = 4 N/mm^2

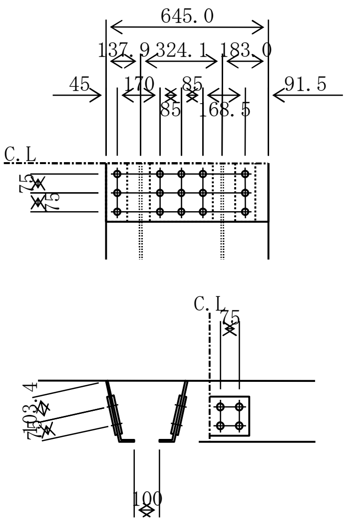
(b) Section area of main plate

1-DECK-1 PL 645 * 16 Ag = 103.2 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 106 * 10320 = 1090098 N

・Rib Pcr = σc * Agr = 106 * 5390 = 569335 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1090098 / 108000 = 10.1 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 569335 / 108000 = 5.3 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 15 = 1090098 / 15 = 72673 N

ρs = τ * Ag / 15 = 4 * 10320 / 15 = 2950 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(72673^2 + 2950^2)}$ = 72733 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)		
1-SPL PL	645 ＊ 9	58.1		
1-SPL PL	85 ＊ 14	11.9		
1-SPL PL	250 ＊ 14	35.0		
1-SPL PL	80 ＊ 14	11.2		
		58.1		
4-SPL PL	155 ＊ 10	62.0	＞ AgrR =	53.9cm2

(81) D-2 J-6(Sec-7) DECK-2

(a) Acting stress

$\sigma cmax$ = -106 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 106 N/mm^2

τmax = 4 N/mm^2

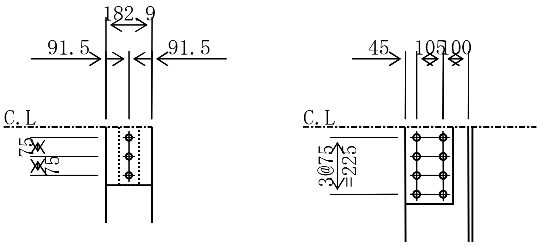
(b) Section area of main plate

1-DECK-2 PL 183 * 16 Ag = 29.3 cm^2 (SM400)

1-RIB PL 250 * 24 Agr = 60.0 cm^2 (SM400)

ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 106 * 2927 = 309177 N

・Rib Pcr = σc * Agr = 106 * 6000 = 633768 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2

・Rib AgrR = Agr = 60.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 309177 / 108000 = 2.9 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 633768 / 108000 = 5.9 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 3 = 309177 / 3 = 103059 N

ρs = τ * Ag / 3 = 4 * 2927 / 3 = 4184 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(103059^2 + 4184^2)}$ = 103144 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	183 * 9	16.5	
1-SPL PL	80 * 14	11.2	
2-SPL PL	185 * 18	66.6	＞ AgrR = 60.0cm2

(82) D-2 J-6(Sec-7) DECK-3

(a) Acting stress

σcmax = -106 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

$\therefore\sigma$c = 106 N/mm^2

τmax = 4 N/mm^2

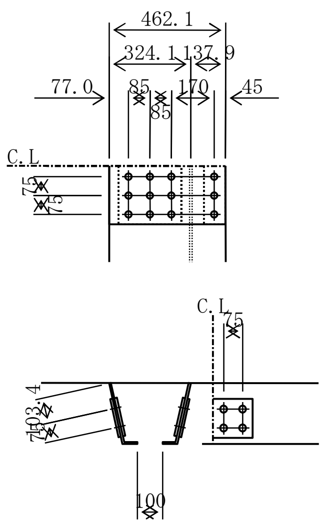
(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 106 * 7393 = 780887 N

・Rib Pcr = σc * Agr = 106 * 5390 = 569335 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 780887 / 108000 = 7.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 569335 / 108000 = 5.3 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 12 = 780887 / 12 = 65074 N

ρs = τ * Ag / 12 = 4 * 7393 / 12 = 2642 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(65074^2 + 2642^2)}$ = 65127 N

(h) Check of splice plates

	(SS400)	$Ags(cm^2)$	
1-SPL PL	462 ＊ 9	41.6	
1-SPL PL	250 ＊ 14	35.0	
1-SPL PL	85 ＊ 14	11.9	
		46.9	
4-SPL PL	155 ＊ 10	62.0	＞ AgrR = 53.9cm2

(83) D-2 J-7(Sec-8) DECK-1

(a) Acting stress

$\sigma cmax$ = -78 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 6 N/mm^2

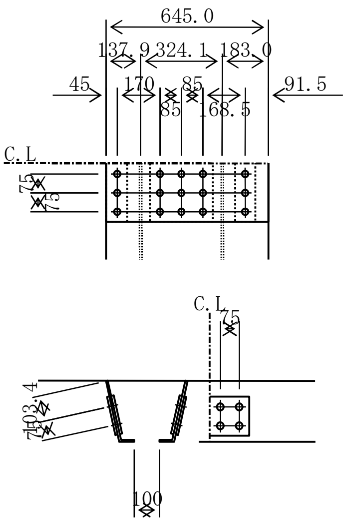
(b) Section area of main plate

1-DECK-1 PL 645 * 16   Ag = 103.2 cm^2 (SM400)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 10320 = 1083617 N

・Rib Pcr = σc * Agr = 105 * 5390 = 565950 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1083617 / 108000 = 10.0 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 15 = 1083617 / 15 = 72241 N

ρs = τ * Ag / 15 = 6 * 10320 / 15 = 3803 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(72241^2 + 3803^2)}$ = 72341 N

(h) Check of splice plates

	(SS400)	$Ags(cm^2)$	
1-SPL PL	645 * 9	58.1	
1-SPL PL	85 * 14	11.9	
1-SPL PL	250 * 14	35.0	
1-SPL PL	80 * 14	11.2	
		58.1	
4-SPL PL	155 * 10	62.0	＞ AgrR = 53.9cm2

(84) D-2　J-7(Sec-8)　DECK-2

(a) Acting stress

$\sigma cmax$ = -78 N/mm^2　　0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 6 N/mm^2

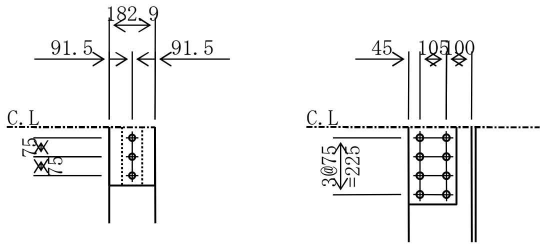
(b) Section area of main plate

1-DECK-2　PL　183 * 16　　Ag = 29.3 cm^2　(SM400)

1-RIB　PL　250 * 24　　Agr = 60.0 cm^2　(SM400)

ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate　Pc = σc * Ag = 105 * 2927 = 307339 N

・Rib　Pcr = σc * Agr = 105 * 6000 = 630000 N

(e) Required section area of the splice plates

・Mother material(One side)　AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2

・Rib　　AgrR = Agr = 60.0 cm^2

(f) Required bolt number

・Main plate　n = Pc / (108000 * 1.00) = 307339 / 108000 = 2.8 pcs.

・Rib　nr = Pcr / (108000 * 1.00) = 630000 / 108000 = 5.8 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 3 = 307339 / 3 = 102446 N

ρs = τ * Ag / 3 = 6 * 2927 / 3 = 5393 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(102446^2 + 5393^2)}$ = 102588 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	183 * 9	16.5	
1-SPL PL	80 * 14	11.2	
2-SPL PL	185 * 18	66.6	＞ AgrR = 60.0cm2

(85) D-2 J-7(Sec-8) DECK-3

(a) Acting stress

$\sigma cmax$ = -78 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 6 N/mm^2

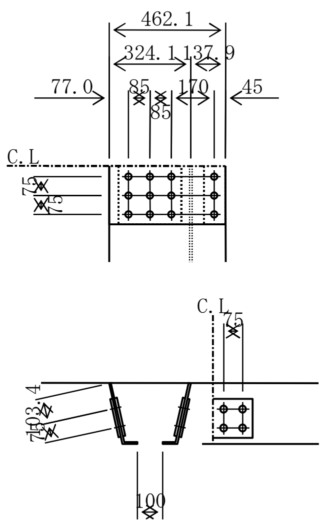
(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 7393 = 776244 N

・Rib Pcr = σc * Agr = 105 * 5390 = 565950 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 776244 / 108000 = 7.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 12 = 776244 / 12 = 64687 N

ρs = τ * Ag / 12 = 6 * 7393 / 12 = 3405 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64687^2 + 3405^2)}$ = 64777 N

(h) Check of splice plates

		Ags(cm^2)		
	(SS400)			
1-SPL PL	462 * 9	41.6		
1-SPL PL	250 * 14	35.0		
1-SPL PL	85 * 14	11.9		
		46.9		
4-SPL PL	155 * 10	62.0	> AgrR =	53.9cm2

(86) D-2 J-8(Sec-8) DECK-1

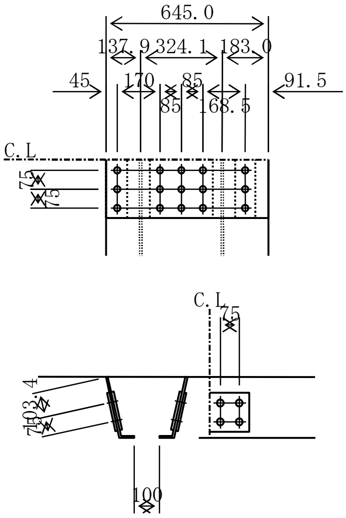
(a) Acting stress

σ_{tmax} = 30 N/mm^2 $0.75\sigma_{ta}$ = 0.75 * 140 = 105 N/mm^2
σ_{cmax} = −64 N/mm^2 $0.75\sigma_{ca}$ = 0.75 * 140 = 105 N/mm^2
∴ σ_c = 105 N/mm^2
τ_{max} = 8 N/mm^2

(b) Section area of main plate

1-DECK-1 PL 645 * 16   Ag = 103.2 cm^2 (SM400)
1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM400)
ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-1 PL 645 * 16   A = 103.2
(103.2 − (5* 2.5)* 1.6) * 1.1 = 91.5 < 103.2 ∴An = 91.5 cm^2
1-U.RIB 320 * 240 * 8   Ar = 53.9
(53.9 − (4* 2.7)* 0.8− 1*(10.0*0.8)) * 1.1 = 41.0
< 53.9 ∴Anr = 41.0 cm^2
ΣAn = An + Anr = 91.5 + 41.0 = 132.5 cm^2
σ_{tn} = σ_{tmax} * ΣAg / ΣAn = 30 * 157.1 / 132.5 = 36 N/mm^2
< σ_{ta} = 140 N/mm^2

(e) Design axial force

・Main plate Pt = $0.75\sigma_{ta}$ * An / 1.1 = 105 * 9152 / 1.1 = 873617 N
> σ_{tn} * An = 36 * 9152 = 325623 N
Pc = σ_c * Ag = 105 * 10320 = 1083617 N
・Rib Ptr = $0.75\sigma_{ta}$ * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N
> σ_{tn} * Anr = 36 * 4099 = 145823 N
Pcr = σ_c * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 91.5 / 2 = 45.8 cm^2
AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2
・Rib AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1083617 / 108000 = 10.0 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 15 = 1083617 / 15 = 72241 N
ρs = τ * Ag / 15 = 8 * 10320 / 15 = 5380 N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(72241^2 + 5380^2)}$ = 72441 N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	645 * 9	(58.1 -	(5*2.5)* 0.9)*1.1=	51.5<	58.1	∴ 51.5
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1=	8.5<	11.2	∴ 8.5
		58.1				44.7
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(87) D-2 J-8(Sec-8) DECK-2

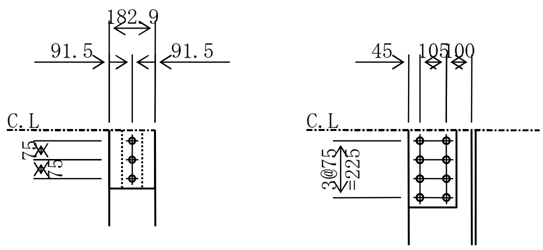
(a) Acting stress

σ tmax = 30 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2
∴ σ c = 105 N/mm^2
τ max = 8 N/mm^2

(b) Section area of main plate

1-DECK-2 PL 183 * 16 Ag = 29.3 cm^2 (SM400)
1-RIB PL 250 * 24 Agr = 60.0 cm^2 (SM400)
ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2 PL 183 * 16 A = 29.3
(29.3 - (1* 2.5)* 1.6) * 1.1 = 27.8 < 29.3 ∴An = 27.8 cm^2
1-RIB PL 250 * 24 Ar = 60.0
(60.0 - (2* 2.7)* 2.4) * 1.1 = 51.7 < 60.0 ∴Anr = 51.7 cm^2
ΣAn = An + Anr = 27.8 + 51.7 = 79.5 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 30 * 89.3 / 79.5 = 34 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 2780 / 1.1 = 265339 N
> σ tn * An = 34 * 2780 = 93620 N
Pc = σ c * Ag = 105 * 2927 = 307339 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 5174 / 1.1 = 493920 N
> σ tn * Anr = 34 * 5174 = 174271 N
Pcr = σ c * Agr = 105 * 6000 = 630000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 27.8 / 2 = 13.9 cm^2
AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2
・Rib AnrR = Anr = 51.7 cm^2
AgrR = Agr = 60.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 307339 / 108000 = 2.8 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 630000 / 108000 = 5.8 pcs. (1 @ 8 = 8 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 3 = 307339 / 3 = 102446$ N

$\rho s = \tau * Ag / 3 = 8 * 2927 / 3 = 7629$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(102446^2 + 7629^2)} = 102730$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
1-SPL PL	183 * 9	(16.5 -	(1*2.5)* 0.9)*1.1= 15.6<	16.5	∴ 15.6
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1= 8.5<	11.2	∴ 8.5
2-SPL PL	185 * 18	(66.6 -	2*(2*2.7)* 1.8)*1.1= 51.9<	66.6	∴ 51.9
		> AgrR			>AnrR

(88) D-2 J-8(Sec-8) DECK-3

(a) Acting stress

σ_{tmax} = 30 N/mm^2 $0.75\sigma_{ta}$ = 0.75 * 140 = 105 N/mm^2

σ_{cmax} = −64 N/mm^2 $0.75\sigma_{ca}$ = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma_c$ = 105 N/mm^2

τ_{max} = 8 N/mm^2

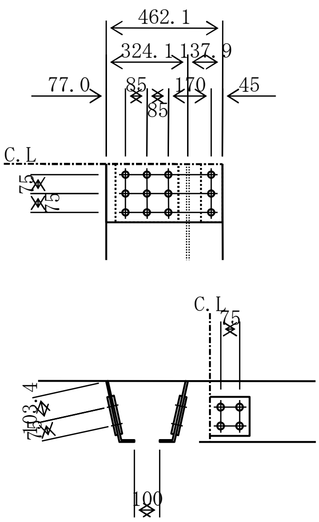
(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3 PL 462 * 16 A = 73.9

(73.9 − (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 $\therefore$An = 63.7 cm^2

1-U.RIB 320 * 240 * 8 Ar = 53.9

(53.9 − (4* 2.7)* 0.8− 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9 $\therefore$Anr = 41.0 cm^2

ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2

σ_{tn} = σ_{tmax} * ΣAg / ΣAn = 30 * 127.8 / 104.7 = 37 N/mm^2

< σ_{ta} = 140 N/mm^2

(e) Design axial force

・Main plate Pt = $0.75\sigma_{ta}$ * An / 1.1 = 105 * 6372 / 1.1 = 608244 N

> σ_{tn} * An = 37 * 6372 = 233445 N

Pc = σ_c * Ag = 105 * 7393 = 776244 N

・Rib Ptr = $0.75\sigma_{ta}$ * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N

> σ_{tn} * Anr = 37 * 4099 = 150154 N

Pcr = σ_c * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2

AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) =   776244 / 108000 = 7.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) =   565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 12 = 776244 / 12 = 64687$ N

$\rho s = \tau * Ag / 12 = 8 * 7393 / 12 = 4817$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64687^2 + 4817^2)} = 64866$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			$Ans(cm^2)$
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		46.9				36.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(89) D-2　J-9(Sec-9)　DECK-1

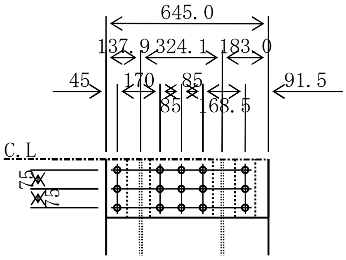
(a) Acting stress

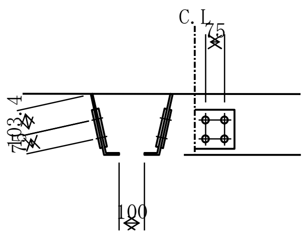
σtmax = 87 N/mm^2　　0.75σta = 0.75 ＊ 140 = 105 N/mm^2
σcmax = -64 N/mm^2　　0.75σca = 0.75 ＊ 140 = 105 N/mm^2
∴σc = 105 N/mm^2
τmax = 9 N/mm^2

(b) Section area of main plate

1-DECK-1　PL　645 ＊ 16　　　Ag = 103.2 cm^2　(SM400)
1-U.RIB 320 ＊ 240 ＊ 8　　　Agr = 53.9 cm^2　(SM400)
ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-1　PL　645 ＊ 16　　A = 103.2
(103.2 - (5＊ 2.5)＊ 1.6) ＊ 1.1 = 91.5 ＜ 103.2　∴An = 91.5 cm^2
1-U.RIB 320 ＊ 240 ＊ 8　　Ar = 53.9
(53.9 - (4＊ 2.7)＊ 0.8- 1＊(10.0＊0.8)) ＊ 1.1 = 41.0
＜ 53.9　∴Anr = 41.0 cm^2
ΣAn = An + Anr = 91.5 + 41.0 = 132.5 cm^2
σtn = σtmax ＊ ΣAg / ΣAn = 87 ＊ 157.1 / 132.5 = 103 N/mm^2
＜ σta = 140 N/mm^2

(e) Design axial force

・Main plate　Pt = σtn ＊ An = 103 ＊ 9152 = 941268 N
＞ 0.75σta ＊ An / 1.1 = 105 ＊ 9152 / 1.1 = 873617 N
Pc = σc ＊ Ag = 105 ＊ 10320 = 1083617 N
・Rib　Ptr = σtn ＊ Anr = 103 ＊ 4099 = 421526 N
＞ 0.75σta ＊ Anr/ 1.1 = 105 ＊ 4099 / 1.1 = 391230 N
Pcr = σc ＊ Agr = 105 ＊ 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side)　AnR = An / 2 = 91.5 / 2 = 45.8 cm^2
AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2
・Rib　AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1083617 / 108000 = 10.0 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 15 = 1083617 / 15 = 72241 N

ρs = τ * Ag / 15 = 9 * 10320 / 15 = 6412 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(72241^2 + 6412^2)}$ = 72525 N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			Ans(cm^2)
1-SPL PL	645 * 9	(58.1 -	(5*2.5)* 0.9)*1.1=	51.5<	58.1	∴ 51.5
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1=	8.5<	11.2	∴ 8.5
		58.1				44.7
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(90) D-2 J-9(Sec-9) DECK-2

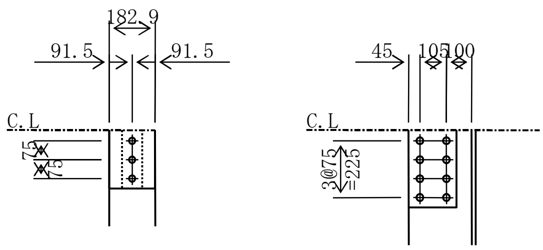
(a) Acting stress

σ tmax = 87 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma$ c = 105 N/mm^2
τ max = 9 N/mm^2

(b) Section area of main plate

1-DECK-2 PL 183 * 16 Ag = 29.3 cm^2 (SM400)
1-RIB PL 250 * 24 Agr = 60.0 cm^2 (SM400)
ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2 PL 183 * 16 A = 29.3
(29.3 - (1* 2.5)* 1.6) * 1.1 = 27.8 < 29.3 ∴An = 27.8 cm^2
1-RIB PL 250 * 24 Ar = 60.0
(60.0 - (2* 2.7)* 2.4) * 1.1 = 51.7 < 60.0 ∴Anr = 51.7 cm^2
ΣAn = An + Anr = 27.8 + 51.7 = 79.5 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 87 * 89.3 / 79.5 = 97 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 97 * 2780 = 270625 N
> 0.75 σ ta * An / 1.1 = 105 * 2780 / 1.1 = 265339 N
Pc = σ c * Ag = 105 * 2927 = 307339 N
・Rib Ptr = σ tn * Anr = 97 * 5174 = 503760 N
> 0.75 σ ta * Anr/ 1.1 = 105 * 5174 / 1.1 = 493920 N
Pcr = σ c * Agr = 105 * 6000 = 630000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 27.8 / 2 = 13.9 cm^2
AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2
・Rib AnrR = Anr = 51.7 cm^2
AgrR = Agr = 60.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 307339 / 108000 = 2.8 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 630000 / 108000 = 5.8 pcs. (1 @ 8 = 8 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 3 = 307339 / 3 = 102446$ N

$\rho s = \tau * Ag / 3 = 9 * 2927 / 3 = 9093$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(102446^2 + 9093^2)} = 102849$ N

(i) Check of splice plates

	(SS400)	Ags(cm²)	deduction of bolt holes			Ans(cm²)
1-SPL PL	183 * 9	(16.5 -	(1*2.5)* 0.9)*1.1=	15.6<	16.5	∴ 15.6
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1=	8.5<	11.2	∴ 8.5
2-SPL PL	185 * 18	(66.6 -	2*(2*2.7)* 1.8)*1.1=	51.9<	66.6	∴ 51.9
		> AgrR				>AnrR

(91) D-2 J-9(Sec-9) DECK-3

(a) Acting stress

$\sigma tmax$ = 87 N/mm^2 0.75σta = 0.75 * 140 = 105 N/mm^2

$\sigma cmax$ = -64 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 9 N/mm^2

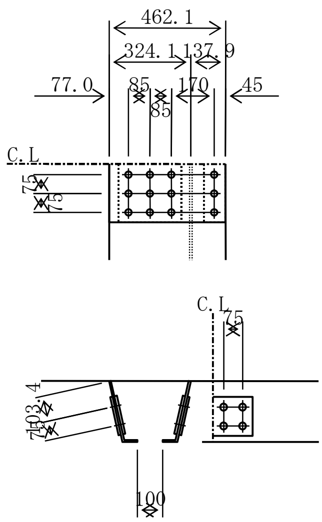
(b) Section area of main plate

1-DECK-3 PL 462 * 16   Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3 PL 462 * 16   A = 73.9

(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 ∴An = 63.7 cm^2

1-U.RIB 320 * 240 * 8   Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9 ∴Anr = 41.0 cm^2

ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 87 * 127.8 / 104.7 = 106 N/mm^2

< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 106 * 6372 = 674810 N

> 0.75σta * An / 1.1 = 105 * 6372 / 1.1 = 608244 N

Pc = σc * Ag = 105 * 7393 = 776244 N

・Rib Ptr = σtn * Anr = 106 * 4099 = 434046 N

> 0.75σta * Anr/ 1.1 = 105 * 4099 / 1.1 = 391230 N

Pcr = σc * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2

AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 776244 / 108000 = 7.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 12 = 776244 / 12 = 64687$ N

$\rho s = \tau * Ag / 12 = 9 * 7393 / 12 = 5742$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64687^2 + 5742^2)} = 64941$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			$Ans(cm^2)$
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8＜	41.6	∴ 35.8
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0＜	35.0	∴ 27.0
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2＜	11.9	∴ 9.2
		46.9				36.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4＜	62.0	∴ 44.4
		＞ AgrR				＞AnrR

(92) D-2 J-10(Sec-11) DECK-1

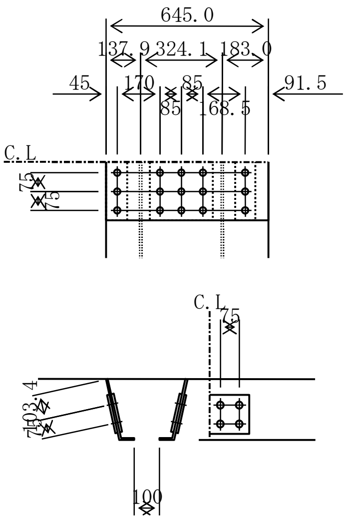
(a) Acting stress

$\sigma tmax$ = 91 N/mm^2 0.75 σta = 0.75 * 140 = 105 N/mm^2
$\sigma cmax$ = -64 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma c$ = 105 N/mm^2
τmax = 8 N/mm^2

(b) Section area of main plate

1-DECK-1 PL 645 * 16 Ag = 103.2 cm^2 (SM400)
1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)
ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-1 PL 645 * 16 A = 103.2
(103.2 - (5* 2.5)* 1.6) * 1.1 = 91.5 < 103.2 $\therefore$An = 91.5 cm^2
1-U.RIB 320 * 240 * 8 Ar = 53.9
(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0
< 53.9 $\therefore$Anr = 41.0 cm^2
ΣAn = An + Anr = 91.5 + 41.0 = 132.5 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 91 * 157.1 / 132.5 = 108 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 108 * 9152 = 989673 N
> 0.75 σta * An / 1.1 = 105 * 9152 / 1.1 = 873617 N
Pc = σc * Ag = 105 * 10320 = 1083617 N
・Rib Ptr = σtn * Anr = 108 * 4099 = 443203 N
> 0.75 σta * Anr/ 1.1 = 105 * 4099 / 1.1 = 391230 N
Pcr = σc * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 91.5 / 2 = 45.8 cm^2
AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2
・Rib AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate　n　= Pc　/ (108000 * 1.00) =　1083617 / 108000 = 10.0 pcs.

・Rib　nr = Pcr / (108000 * 1.00) =　 565950 / 108000 =　5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 15 = 1083617 / 15 = 72241$ N

$\rho s = \tau * Ag / 15 = 8 * 10320 / 15 = 5167$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(72241^2 + 5167^2)} = 72426$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	645 * 9	(58.1 -	(5*2.5)* 0.9)*1.1=	51.5＜	58.1	∴ 51.5
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2＜	11.9	∴ 9.2
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0＜	35.0	∴ 27.0
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1=	8.5＜	11.2	∴ 8.5
		58.1				44.7
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4＜	62.0	∴ 44.4
		＞ AgrR				＞AnrR

(93) D-2 J-10(Sec-11) DECK-2

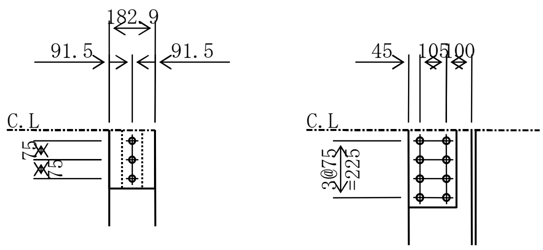
(a) Acting stress

σ_{tmax} = 91 N/mm^2 0.75σ_{ta} = 0.75 * 140 = 105 N/mm^2
σ_{cmax} = -64 N/mm^2 0.75σ_{ca} = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma_c$ = 105 N/mm^2
τ_{max} = 8 N/mm^2

(b) Section area of main plate

1-DECK-2 PL 183 * 16 Ag = 29.3 cm^2 (SM400)
1-RIB PL 250 * 24 Agr = 60.0 cm^2 (SM400)
ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2 PL 183 * 16 A = 29.3
(29.3 - (1* 2.5)* 1.6) * 1.1 = 27.8 < 29.3 $\therefore$An = 27.8 cm^2
1-RIB PL 250 * 24 Ar = 60.0
(60.0 - (2* 2.7)* 2.4) * 1.1 = 51.7 < 60.0 $\therefore$Anr = 51.7 cm^2
ΣAn = An + Anr = 27.8 + 51.7 = 79.5 cm^2
σ_{tn} = σ_{tmax} * ΣAg / ΣAn = 91 * 89.3 / 79.5 = 102 N/mm^2
< σ_{ta} = 140 N/mm^2

(e) Design axial force

・Main plate Pt = σ_{tn} * An = 102 * 2780 = 284542 N
> 0.75σ_{ta} * An / 1.1 = 105 * 2780 / 1.1 = 265339 N
Pc = σ_c * Ag = 105 * 2927 = 307339 N
・Rib Ptr = σ_{tn} * Anr = 102 * 5174 = 529666 N
> 0.75σ_{ta} * Anr/ 1.1 = 105 * 5174 / 1.1 = 493920 N
Pcr = σ_c * Agr = 105 * 6000 = 630000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 27.8 / 2 = 13.9 cm^2
AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2
・Rib AnrR = Anr = 51.7 cm^2
AgrR = Agr = 60.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 307339 / 108000 = 2.8 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 630000 / 108000 = 5.8 pcs. (1 @ 8 = 8 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ_a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 3 = 307339 / 3 = 102446$ N

$\rho s = \tau * Ag / 3 = 8 * 2927 / 3 = 7327$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(102446^2 + 7327^2)} = 102708$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			Ans(cm^2)
1-SPL PL	183 * 9	(16.5 -	(1*2.5)* 0.9)*1.1=	15.6<	16.5	∴ 15.6
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1=	8.5<	11.2	∴ 8.5
2-SPL PL	185 * 18	(66.6 -	2*(2*2.7)* 1.8)*1.1=	51.9<	66.6	∴ 51.9
		> AgrR				>AnrR

(94) D-2 J-10(Sec-11) DECK-3

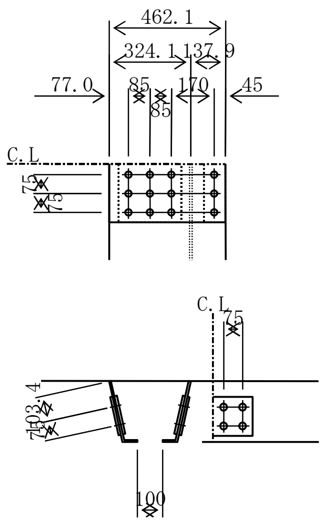
(a) Acting stress

σ tmax = 91 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma$ c = 105 N/mm^2
τ max = 8 N/mm^2

(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)
1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)
ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3 PL 462 * 16 A = 73.9
(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 $\therefore$An = 63.7 cm^2
1-U.RIB 320 * 240 * 8 Ar = 53.9
(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0
< 53.9 $\therefore$Anr = 41.0 cm^2
ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 91 * 127.8 / 104.7 = 111 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 111 * 6372 = 709513 N
> 0.75 σ ta * An / 1.1 = 105 * 6372 / 1.1 = 608244 N
Pc = σ c * Ag = 105 * 7393 = 776244 N
・Rib Ptr = σ tn * Anr = 111 * 4099 = 456368 N
> 0.75 σ ta * Anr/ 1.1 = 105 * 4099 / 1.1 = 391230 N
Pcr = σ c * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2
AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2
・Rib AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) =   776244 / 108000 = 7.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) =   565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 12 = 776244 / 12 = 64687$ N

$\rho s = \tau * Ag / 12 = 8 * 7393 / 12 = 4627$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64687^2 + 4627^2)} = 64852$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		46.9				36.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(95) D-2 J-11(Sec-12) DECK-1

(a) Acting stress

σ tmax = 49 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2

σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2

∴ σ c = 105 N/mm^2

τ max = 5 N/mm^2

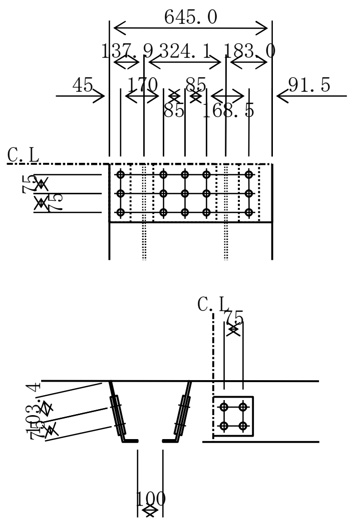
(b) Section area of main plate

1-DECK-1 PL 645 * 16   Ag = 103.2 cm^2 (SM400)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-1 PL 645 * 16   A = 103.2

(103.2 - (5* 2.5)* 1.6) * 1.1 = 91.5 < 103.2 ∴An = 91.5 cm^2

1-U.RIB 320 * 240 * 8   Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9 ∴Anr = 41.0 cm^2

ΣAn = An + Anr = 91.5 + 41.0 = 132.5 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 49 * 157.1 / 132.5 = 58 N/mm^2

< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 9152 / 1.1 = 873617 N

> σ tn * An = 58 * 9152 = 535229 N

Pc = σ c * Ag = 105 * 10320 = 1083617 N

・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N

> σ tn * Anr = 58 * 4099 = 239690 N

Pcr = σ c * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 91.5 / 2 = 45.8 cm^2

AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1083617 / 108000 = 10.0 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 15 = 1083617 / 15 = 72241$ N

$\rho s = \tau * Ag / 15 = 5 * 10320 / 15 = 3524$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(72241^2 + 3524^2)} = 72327$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	645 * 9	(58.1 -	(5*2.5)* 0.9)*1.1=	51.5<	58.1	∴ 51.5
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1=	8.5<	11.2	∴ 8.5
		58.1				44.7
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(96) D-2 J-11(Sec-12) DECK-2

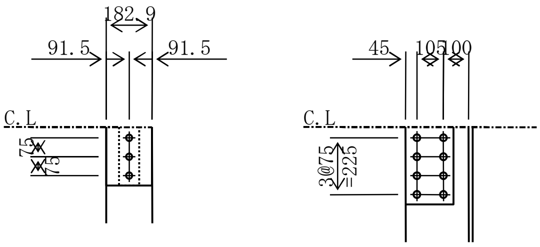
(a) Acting stress

σ tmax = 49 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2
∴ σ c = 105 N/mm^2
τ max = 5 N/mm^2

(b) Section area of main plate

1-DECK-2 PL 183 * 16 Ag = 29.3 cm^2 (SM400)
1-RIB PL 250 * 24 Agr = 60.0 cm^2 (SM400)
ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2 PL 183 * 16 A = 29.3
(29.3 - (1* 2.5)* 1.6) * 1.1 = 27.8 < 29.3 ∴An = 27.8 cm^2
1-RIB PL 250 * 24 Ar = 60.0
(60.0 - (2* 2.7)* 2.4) * 1.1 = 51.7 < 60.0 ∴Anr = 51.7 cm^2
ΣAn = An + Anr = 27.8 + 51.7 = 79.5 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 49 * 89.3 / 79.5 = 55 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 2780 / 1.1 = 265339 N
> σ tn * An = 55 * 2780 = 153884 N
Pc = σ c * Ag = 105 * 2927 = 307339 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 5174 / 1.1 = 493920 N
> σ tn * Anr = 55 * 5174 = 286451 N
Pcr = σ c * Agr = 105 * 6000 = 630000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 27.8 / 2 = 13.9 cm^2
AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2
・Rib AnrR = Anr = 51.7 cm^2
AgrR = Agr = 60.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 307339 / 108000 = 2.8 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 630000 / 108000 = 5.8 pcs. (1 @ 8 = 8 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 3 = 307339 / 3 = 102446$ N

$\rho s = \tau * Ag / 3 = 5 * 2927 / 3 = 4997$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(102446^2 + 4997^2)} = 102568$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			$Ans(cm^2)$
1-SPL PL	183 * 9	(16.5 -	(1*2.5)* 0.9)*1.1=	15.6＜	16.5	∴ 15.6
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1=	8.5＜	11.2	∴ 8.5
2-SPL PL	185 * 18	(66.6 -	2*(2*2.7)* 1.8)*1.1=	51.9＜	66.6	∴ 51.9
		＞ AgrR				＞AnrR

(97) D-2　J-11(Sec-12)　DECK-3

(a) Acting stress

σ tmax = 49 N/mm^2　　0.75 σ ta = 0.75 * 140 = 105 N/mm^2

σ cmax = -64 N/mm^2　　0.75 σ ca = 0.75 * 140 = 105 N/mm^2

∴ σ c = 105 N/mm^2

τ max = 5 N/mm^2

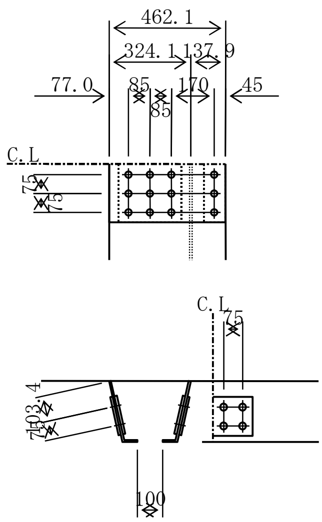
(b) Section area of main plate

1-DECK-3　PL　462 * 16　　　Ag = 73.9 cm^2　(SM400)

1-U.RIB 320 * 240 * 8　　　Agr = 53.9 cm^2　(SM400)

Σ Ag = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3　PL　462 * 16　　A = 73.9

(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 ＜ 73.9 ∴An = 63.7 cm^2

1-U.RIB 320 * 240 * 8　　Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

＜ 53.9 ∴Anr = 41.0 cm^2

Σ An = An + Anr = 63.7 + 41.0 = 104.7 cm^2

σ tn = σ tmax * Σ Ag / Σ An = 49 * 127.8 / 104.7 = 60 N/mm^2

＜ σ ta = 140 N/mm^2

(e) Design axial force

・Main plate　Pt = 0.75 σ ta * An / 1.1 = 105 * 6372 / 1.1 = 608244 N

＞ σ tn * An = 60 * 6372 = 383715 N

Pc = σ c * Ag = 105 * 7393 = 776244 N

・Rib　Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N

＞ σ tn * Anr = 60 * 4099 = 246810 N

Pcr = σ c * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side)　AnR = An / 2 = 63.7 / 2 = 31.9 cm^2

AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib　　AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

- Main plate n = Pc / (108000 * 1.00) = 776244 / 108000 = 7.2 pcs.
- Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 12 = 776244 / 12 = 64687 N
ρs = τ * Ag / 12 = 5 * 7393 / 12 = 3155 N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64687^2 + 3155^2)}$ = 64764 N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			$Ans(cm^2)$
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		46.9				36.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(98) D-2　J-12(Sec-12)　DECK-1

(a) Acting stress

$\sigma tmax$ = 21 N/mm^2　　$0.75\sigma ta$ = 0.75 ＊ 140 = 105 N/mm^2

$\sigma cmax$ = -64 N/mm^2　　$0.75\sigma ca$ = 0.75 ＊ 140 = 105 N/mm^2

∴σc = 105 N/mm^2

τmax = 4 N/mm^2

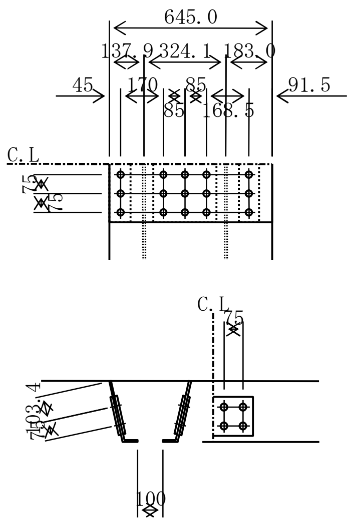
(b) Section area of main plate

1-DECK-1 PL 645 ＊ 16　　Ag = 103.2 cm^2　(SM400)

1-U.RIB 320 ＊ 240 ＊ 8　　Agr = 53.9 cm^2　(SM400)

ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-1 PL 645 ＊ 16　　A = 103.2

(103.2 - (5＊ 2.5)＊ 1.6) ＊ 1.1 = 91.5 ＜ 103.2 ∴An = 91.5 cm^2

1-U.RIB 320 ＊ 240 ＊ 8　　Ar = 53.9

(53.9 - (4＊ 2.7)＊ 0.8- 1＊(10.0＊0.8)) ＊ 1.1 = 41.0

＜ 53.9 ∴Anr = 41.0 cm^2

ΣAn = An + Anr = 91.5 + 41.0 = 132.5 cm^2

σtn = $\sigma tmax$ ＊ ΣAg / ΣAn = 21 ＊ 157.1 / 132.5 = 25 N/mm^2

＜ σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = $0.75\sigma ta$ ＊ An / 1.1 = 105 ＊ 9152 / 1.1 = 873617 N

＞ σtn ＊ An = 25 ＊ 9152 = 230092 N

Pc = σc ＊ Ag = 105 ＊ 10320 = 1083617 N

・Rib Ptr = $0.75\sigma ta$ ＊ Anr / 1.1 = 105 ＊ 4099 / 1.1 = 391230 N

＞ σtn ＊ Anr = 25 ＊ 4099 = 103042 N

Pcr = σc ＊ Agr = 105 ＊ 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 91.5 / 2 = 45.8 cm^2

AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate $n = Pc / (108000 * 1.00) = 1083617 / 108000 = 10.0$ pcs.

・Rib $nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2$ pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 15 = 1083617 / 15 = 72241$ N

$\rho s = \tau * Ag / 15 = 4 * 10320 / 15 = 2650$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(72241^2 + 2650^2)} = 72290$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			$Ans(cm^2)$
1-SPL PL	645 * 9	(58.1 -	(5*2.5)* 0.9)*1.1=	51.5<	58.1	∴ 51.5
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1=	8.5<	11.2	∴ 8.5
		58.1				44.7
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(99) D-2 J-12(Sec-12) DECK-2

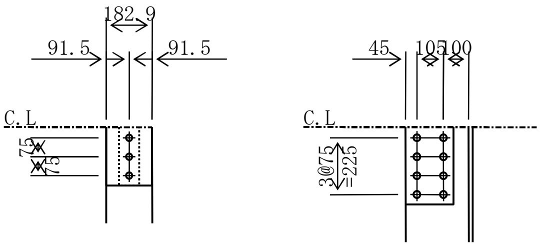
(a) Acting stress

σ tmax = 21 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2
∴ σ c = 105 N/mm^2
τ max = 4 N/mm^2

(b) Section area of main plate

1-DECK-2 PL 183 * 16 Ag = 29.3 cm^2 (SM400)
1-RIB PL 250 * 24 Agr = 60.0 cm^2 (SM400)
ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2 PL 183 * 16 A = 29.3
(29.3 - (1* 2.5)* 1.6) * 1.1 = 27.8 < 29.3 ∴An = 27.8 cm^2
1-RIB PL 250 * 24 Ar = 60.0
(60.0 - (2* 2.7)* 2.4) * 1.1 = 51.7 < 60.0 ∴Anr = 51.7 cm^2
ΣAn = An + Anr = 27.8 + 51.7 = 79.5 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 21 * 89.3 / 79.5 = 24 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 2780 / 1.1 = 265339 N
> σ tn * An = 24 * 2780 = 66154 N
Pc = σ c * Ag = 105 * 2927 = 307339 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 5174 / 1.1 = 493920 N
> σ tn * Anr = 24 * 5174 = 123144 N
Pcr = σ c * Agr = 105 * 6000 = 630000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 27.8 / 2 = 13.9 cm^2
AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2
・Rib AnrR = Anr = 51.7 cm^2
AgrR = Agr = 60.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 307339 / 108000 = 2.8 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 630000 / 108000 = 5.8 pcs. (1 @ 8 = 8 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 3 = 307339 / 3 = 102446$ N

$\rho s = \tau * Ag / 3 = 4 * 2927 / 3 = 3758$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(102446^2 + 3758^2)} = 102515$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
1-SPL PL	183 ＊ 9	(16.5 -	(1*2.5)＊ 0.9)*1.1= 15.6＜	16.5	∴ 15.6
1-SPL PL	80 ＊ 14	(11.2 -	(1*2.5)＊ 1.4)*1.1= 8.5＜	11.2	∴ 8.5
2-SPL PL	185 ＊ 18	(66.6 -	2*(2*2.7)＊ 1.8)*1.1= 51.9＜	66.6	∴ 51.9
		＞ AgrR			＞AnrR

(100) D-2 J-12(Sec-12) DECK-3

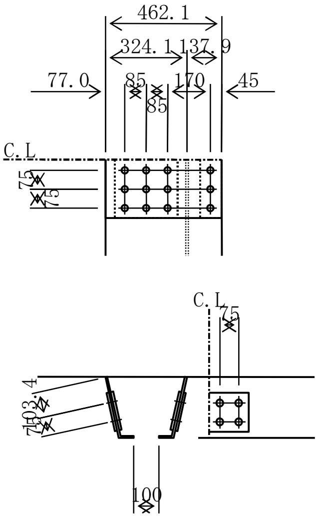
(a) Acting stress

σ tmax = 21 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2
∴ σ c = 105 N/mm^2
τ max = 4 N/mm^2

(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)
1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)
ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3 PL 462 * 16 A = 73.9
(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 ∴An = 63.7 cm^2
1-U.RIB 320 * 240 * 8 Ar = 53.9
(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0
< 53.9 ∴Anr = 41.0 cm^2
ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 21 * 127.8 / 104.7 = 26 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 6372 / 1.1 = 608244 N
> σ tn * An = 26 * 6372 = 164957 N
Pc = σ c * Ag = 105 * 7393 = 776244 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N
> σ tn * Anr = 26 * 4099 = 106102 N
Pcr = σ c * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2
AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2
・Rib AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 776244 / 108000 = 7.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 12 = 776244 / 12 = 64687$ N

$\rho s = \tau * Ag / 12 = 4 * 7393 / 12 = 2373$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64687^2 + 2373^2)} = 64731$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		46.9				36.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(101) D-2 J-13(Sec-13) DECK-1

(a) Acting stress

$\sigma tmax$ = 8 N/mm^2 0.75 σta = 0.75 * 140 = 105 N/mm^2

$\sigma cmax$ = -65 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 2 N/mm^2

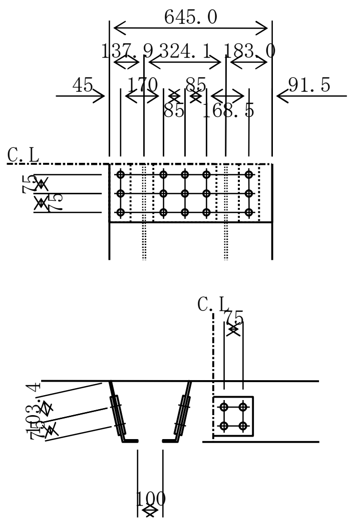
(b) Section area of main plate

1-DECK-1 PL 645 * 16   Ag = 103.2 cm^2 (SM400)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-1 PL 645 * 16   A = 103.2

(103.2 - (5* 2.5)* 1.6) * 1.1 = 91.5 < 103.2 ∴An = 91.5 cm^2

1-U.RIB 320 * 240 * 8   Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9 ∴Anr = 41.0 cm^2

ΣAn = An + Anr = 91.5 + 41.0 = 132.5 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 8 * 157.1 / 132.5 = 10 N/mm^2

< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σta * An / 1.1 = 105 * 9152 / 1.1 = 873617 N

> σtn * An = 10 * 9152 = 88901 N

Pc = σc * Ag = 105 * 10320 = 1083617 N

・Rib Ptr = 0.75 σta * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N

> σtn * Anr = 10 * 4099 = 39812 N

Pcr = σc * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 91.5 / 2 = 45.8 cm^2

AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1083617 / 108000 = 10.0 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 15 = 1083617 / 15 = 72241 N
ρs = τ * Ag / 15 = 2 * 10320 / 15 = 1580 N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(72241^2 + 1580^2)}$ = 72258 N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	645 * 9	(58.1 -	(5*2.5)* 0.9)*1.1=	51.5<	58.1	∴ 51.5
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1=	8.5<	11.2	∴ 8.5
		58.1				44.7
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(102) D-2 J-13(Sec-13) DECK-2

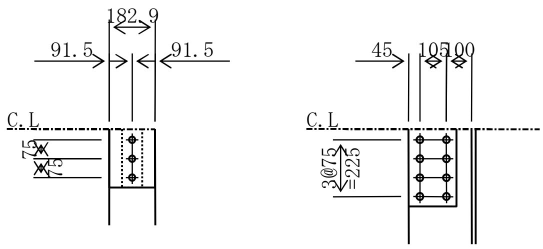
(a) Acting stress

σ_{tmax} = 8 N/mm^2 0.75 σ_{ta} = 0.75 * 140 = 105 N/mm^2
σ_{cmax} = -65 N/mm^2 0.75 σ_{ca} = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma_c$ = 105 N/mm^2
τ_{max} = 2 N/mm^2

(b) Section area of main plate

1-DECK-2 PL 183 * 16 Ag = 29.3 cm^2 (SM400)
1-RIB PL 250 * 24 Agr = 60.0 cm^2 (SM400)
ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2 PL 183 * 16 A = 29.3
(29.3 - (1* 2.5)* 1.6) * 1.1 = 27.8 < 29.3 $\therefore$An = 27.8 cm^2
1-RIB PL 250 * 24 Ar = 60.0
(60.0 - (2* 2.7)* 2.4) * 1.1 = 51.7 < 60.0 $\therefore$Anr = 51.7 cm^2
ΣAn = An + Anr = 27.8 + 51.7 = 79.5 cm^2
σ_{tn} = σ_{tmax} * ΣAg / ΣAn = 8 * 89.3 / 79.5 = 9 N/mm^2
< σ_{ta} = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ_{ta} * An / 1.1 = 105 * 2780 / 1.1 = 265339 N
> σ_{tn} * An = 9 * 2780 = 25560 N
Pc = σ_c * Ag = 105 * 2927 = 307339 N
・Rib Ptr = 0.75 σ_{ta} * Anr / 1.1 = 105 * 5174 / 1.1 = 493920 N
> σ_{tn} * Anr = 9 * 5174 = 47579 N
Pcr = σ_c * Agr = 105 * 6000 = 630000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 27.8 / 2 = 13.9 cm^2
AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2
・Rib AnrR = Anr = 51.7 cm^2
AgrR = Agr = 60.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 307339 / 108000 = 2.8 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 630000 / 108000 = 5.8 pcs. (1 @ 8 = 8 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ_a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 3 = 307339 / 3 = 102446$ N

$\rho s = \tau * Ag / 3 = 2 * 2927 / 3 = 2241$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(102446^2 + 2241^2)} = 102471$ N

(i) Check of splice plates

	(SS400)	Ags(cm²)	deduction of bolt holes			Ans(cm²)
1-SPL PL	183 * 9	(16.5 -	(1*2.5)* 0.9)*1.1=	15.6＜	16.5	∴ 15.6
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1=	8.5＜	11.2	∴ 8.5
2-SPL PL	185 * 18	(66.6 -	2*(2*2.7)* 1.8)*1.1=	51.9＜	66.6	∴ 51.9
		＞ AgrR				＞AnrR

(103) D-2 J-13(Sec-13) DECK-3

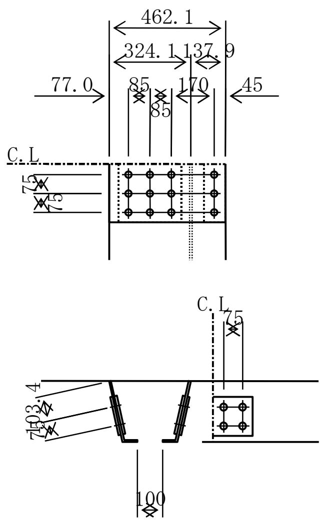
(a) Acting stress

σ tmax = 8 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -65 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2
∴ σ c = 105 N/mm^2
τ max = 2 N/mm^2

(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)
1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)
ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3 PL 462 * 16 A = 73.9
(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 ∴An = 63.7 cm^2
1-U.RIB 320 * 240 * 8 Ar = 53.9
(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0
< 53.9 ∴Anr = 41.0 cm^2
ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 8 * 127.8 / 104.7 = 10 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 6372 / 1.1 = 608244 N
> σ tn * An = 10 * 6372 = 63735 N
Pc = σ c * Ag = 105 * 7393 = 776244 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N
> σ tn * Anr = 10 * 4099 = 40995 N
Pcr = σ c * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2
AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2
・Rib AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 776244 / 108000 = 7.2 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 12 = 776244 / 12 = 64687 N
ρs = τ * Ag / 12 = 2 * 7393 / 12 = 1415 N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64687^2 + 1415^2)}$ = 64702 N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		46.9				36.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(104) D-2 J-14(Sec-14) DECK-1

(a) Acting stress

$\sigma tmax$ = 6 N/mm^2 0.75σta = 0.75 ＊ 140 = 105 N/mm^2

$\sigma cmax$ = −68 N/mm^2 0.75σca = 0.75 ＊ 140 = 105 N/mm^2

∴σc = 105 N/mm^2

τmax = 1 N/mm^2

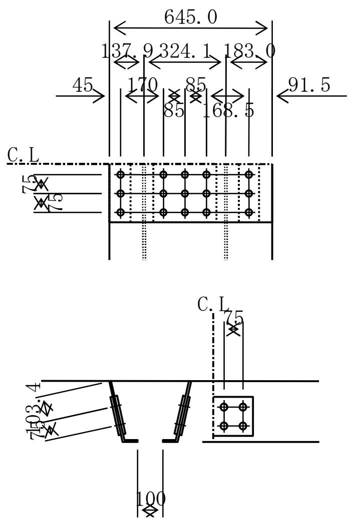
(b) Section area of main plate

1-DECK-1 PL 645 ＊ 16 Ag = 103.2 cm^2 (SM400)

1-U.RIB 320 ＊ 240 ＊ 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-1 PL 645 ＊ 16 A = 103.2

(103.2 - (5＊ 2.5)＊ 1.6) ＊ 1.1 = 91.5 ＜ 103.2 ∴An = 91.5 cm^2

1-U.RIB 320 ＊ 240 ＊ 8 Ar = 53.9

(53.9 - (4＊ 2.7)＊ 0.8- 1＊(10.0＊0.8)) ＊ 1.1 = 41.0

＜ 53.9 ∴Anr = 41.0 cm^2

ΣAn = An + Anr = 91.5 + 41.0 = 132.5 cm^2

σtn = $\sigma tmax$ ＊ ΣAg / ΣAn = 6 ＊ 157.1 / 132.5 = 8 N/mm^2

＜ σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta ＊ An / 1.1 = 105 ＊ 9152 / 1.1 = 873617 N

＞ σtn ＊ An = 8 ＊ 9152 = 69955 N

Pc = σc ＊ Ag = 105 ＊ 10320 = 1083617 N

・Rib Ptr = 0.75σta ＊ Anr / 1.1 = 105 ＊ 4099 / 1.1 = 391230 N

＞ σtn ＊ Anr = 8 ＊ 4099 = 31328 N

Pcr = σc ＊ Agr = 105 ＊ 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 91.5 / 2 = 45.8 cm^2

AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate $n = Pc / (108000 * 1.00) = 1083617 / 108000 = 10.0$ pcs.

・Rib $nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2$ pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 15 = 1083617 / 15 = 72241$ N

$\rho s = \tau * Ag / 15 = 1 * 10320 / 15 = 828$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(72241^2 + 828^2)} = 72246$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	645 * 9	(58.1 -	(5*2.5)* 0.9)*1.1=	51.5<	58.1	∴ 51.5
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1=	8.5<	11.2	∴ 8.5
		58.1				44.7
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(105) D-2 J-14(Sec-14) DECK-2

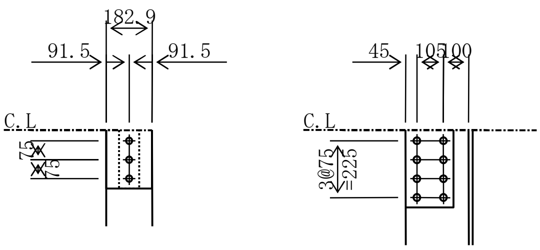
(a) Acting stress

$\sigma tmax$ = 6 N/mm^2 $0.75\sigma ta$ = 0.75 * 140 = 105 N/mm^2
$\sigma cmax$ = -68 N/mm^2 $0.75\sigma ca$ = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma c$ = 105 N/mm^2
τmax = 1 N/mm^2

(b) Section area of main plate

1-DECK-2 PL 183 * 16   Ag = 29.3 cm^2 (SM400)
1-RIB PL 250 * 24   Agr = 60.0 cm^2 (SM400)
ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2 PL 183 * 16   A = 29.3
(29.3 - (1* 2.5)* 1.6) * 1.1 = 27.8 < 29.3 $\therefore$An = 27.8 cm^2
1-RIB PL 250 * 24   Ar = 60.0
(60.0 - (2* 2.7)* 2.4) * 1.1 = 51.7 < 60.0 $\therefore$Anr = 51.7 cm^2
ΣAn = An + Anr = 27.8 + 51.7 = 79.5 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 6 * 89.3 / 79.5 = 7 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = $0.75\sigma ta$ * An / 1.1 = 105 * 2780 / 1.1 = 265339 N
> σtn * An = 7 * 2780 = 20113 N
Pc = σc * Ag = 105 * 2927 = 307339 N
・Rib Ptr = $0.75\sigma ta$ * Anr / 1.1 = 105 * 5174 / 1.1 = 493920 N
> σtn * Anr = 7 * 5174 = 37440 N
Pcr = σc * Agr = 105 * 6000 = 630000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 27.8 / 2 = 13.9 cm^2
AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2
・Rib AnrR = Anr = 51.7 cm^2
AgrR = Agr = 60.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 307339 / 108000 = 2.8 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 630000 / 108000 = 5.8 pcs. (1 @ 8 = 8 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 3 = 307339 / 3 = 102446$ N

$\rho s = \tau * Ag / 3 = 1 * 2927 / 3 = 1175$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(102446^2 + 1175^2)} = 102453$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	183 * 9	(16.5 -	(1*2.5)* 0.9)*1.1=	15.6＜	16.5	∴ 15.6
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1=	8.5＜	11.2	∴ 8.5
2-SPL PL	185 * 18	(66.6 -	2*(2*2.7)* 1.8)*1.1=	51.9＜	66.6	∴ 51.9
		＞ AgrR				＞AnrR

(106) D-2 J-14(Sec-14) DECK-3

(a) Acting stress

σ tmax = 6 N/mm^2 0.75 σ ta = 0.75 ＊ 140 = 105 N/mm^2

σ cmax = -68 N/mm^2 0.75 σ ca = 0.75 ＊ 140 = 105 N/mm^2

∴ σ c = 105 N/mm^2

τ max = 1 N/mm^2

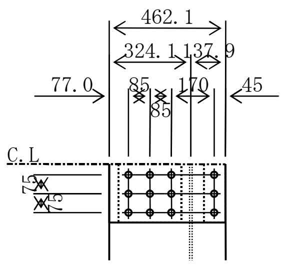
(b) Section area of main plate

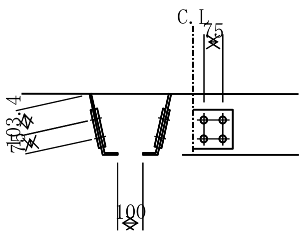
1-DECK-3 PL 462 ＊ 16 Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 ＊ 240 ＊ 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-3 PL 462 ＊ 16 A = 73.9

(73.9 - (4＊ 2.5)＊ 1.6) ＊ 1.1 = 63.7 ＜ 73.9 ∴An = 63.7 cm^2

1-U.RIB 320 ＊ 240 ＊ 8 Ar = 53.9

(53.9 - (4＊ 2.7)＊ 0.8- 1＊(10.0＊0.8)) ＊ 1.1 = 41.0

＜ 53.9 ∴Anr = 41.0 cm^2

ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2

σ tn = σ tmax ＊ ΣAg / ΣAn = 6 ＊ 127.8 / 104.7 = 8 N/mm^2

＜ σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta ＊ An / 1.1 = 105 ＊ 6372 / 1.1 = 608244 N

＞ σ tn ＊ An = 8 ＊ 6372 = 50152 N

Pc = σ c ＊ Ag = 105 ＊ 7393 = 776244 N

・Rib Ptr = 0.75 σ ta ＊ Anr / 1.1 = 105 ＊ 4099 / 1.1 = 391230 N

＞ σ tn ＊ Anr = 8 ＊ 4099 = 32259 N

Pcr = σ c ＊ Agr = 105 ＊ 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2

AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) =   776244 / 108000 = 7.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) =   565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 12 = 776244 / 12 = 64687 N

ρs = τ * Ag / 12 = 1 * 7393 / 12 = 742 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64687^2 + 742^2)}$ = 64691 N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		46.9				36.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(107) D-2　J-15(Sec-15)　DECK-1

(a) Acting stress

σ tmax = 17 N/mm^2　　0.75 σ ta = 0.75 * 140 = 105 N/mm^2

σ cmax = -64 N/mm^2　　0.75 σ ca = 0.75 * 140 = 105 N/mm^2

∴ σ c = 105 N/mm^2

τ max = 3 N/mm^2

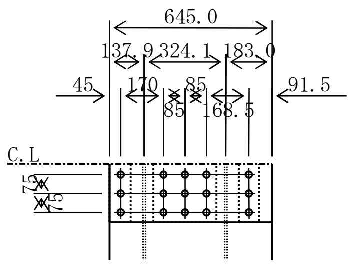
(b) Section area of main plate

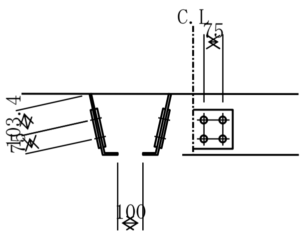
1-DECK-1　PL　645 * 16　　Ag = 103.2 cm^2　(SM400)

1-U.RIB 320 * 240 * 8　　Agr = 53.9 cm^2　(SM400)

ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-1　PL　645 * 16　　A = 103.2

(103.2 - (5* 2.5)* 1.6) * 1.1 = 91.5 ＜ 103.2　∴An = 91.5 cm^2

1-U.RIB 320 * 240 * 8　　Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

＜ 53.9　∴Anr = 41.0 cm^2

ΣAn = An + Anr = 91.5 + 41.0 = 132.5 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 17 * 157.1 / 132.5 = 21 N/mm^2

＜ σ ta = 140 N/mm^2

(e) Design axial force

・Main plate　Pt = 0.75 σ ta * An / 1.1 = 105 * 9152 / 1.1 = 873617 N

＞ σ tn * An = 21 * 9152 = 189109 N

Pc = σ c * Ag = 105 * 10320 = 1083617 N

・Rib　Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N

＞ σ tn * Anr = 21 * 4099 = 84688 N

Pcr = σ c * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side)　AnR = An / 2 = 91.5 / 2 = 45.8 cm^2

AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2

・Rib　AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1083617 / 108000 = 10.0 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 15 = 1083617 / 15 = 72241$ N

$\rho s = \tau * Ag / 15 = 3 * 10320 / 15 = 1861$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(72241^2 + 1861^2)} = 72265$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	645 * 9	(58.1 -	(5*2.5)* 0.9)*1.1=	51.5＜	58.1	∴ 51.5
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2＜	11.9	∴ 9.2
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0＜	35.0	∴ 27.0
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1=	8.5＜	11.2	∴ 8.5
		58.1				44.7
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4＜	62.0	∴ 44.4
		＞ AgrR				＞AnrR

(108) D-2 J-15(Sec-15) DECK-2

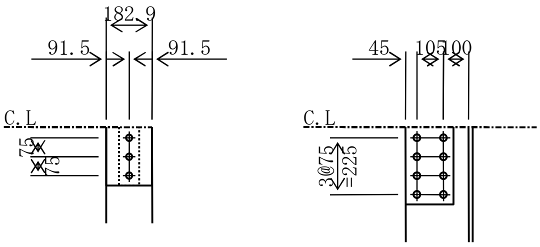
(a) Acting stress

σ tmax = 17 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2
$\therefore$ σ c = 105 N/mm^2
τ max = 3 N/mm^2

(b) Section area of main plate

1-DECK-2 PL 183 * 16 Ag = 29.3 cm^2 (SM400)
1-RIB PL 250 * 24 Agr = 60.0 cm^2 (SM400)
ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2 PL 183 * 16 A = 29.3
(29.3 - (1* 2.5)* 1.6) * 1.1 = 27.8 < 29.3 $\therefore$An = 27.8 cm^2
1-RIB PL 250 * 24 Ar = 60.0
(60.0 - (2* 2.7)* 2.4) * 1.1 = 51.7 < 60.0 $\therefore$Anr = 51.7 cm^2
ΣAn = An + Anr = 27.8 + 51.7 = 79.5 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 17 * 89.3 / 79.5 = 20 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 2780 / 1.1 = 265339 N
> σ tn * An = 20 * 2780 = 54371 N
Pc = σ c * Ag = 105 * 2927 = 307339 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 5174 / 1.1 = 493920 N
> σ tn * Anr = 20 * 5174 = 101210 N
Pcr = σ c * Agr = 105 * 6000 = 630000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 27.8 / 2 = 13.9 cm^2
AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2
・Rib AnrR = Anr = 51.7 cm^2
AgrR = Agr = 60.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 307339 / 108000 = 2.8 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 630000 / 108000 = 5.8 pcs. (1 @ 8 = 8 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 3 = 307339 / 3 = 102446$ N

$\rho s = \tau * Ag / 3 = 3 * 2927 / 3 = 2639$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(102446^2 + 2639^2)} = 102480$ N

(i) Check of splice plates

	(SS400)	Ags(cm²)	deduction of bolt holes			Ans(cm²)
1-SPL PL	183 * 9	(16.5 -	(1*2.5)* 0.9)*1.1=	15.6<	16.5	∴ 15.6
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1=	8.5<	11.2	∴ 8.5
2-SPL PL	185 * 18	(66.6 -	2*(2*2.7)* 1.8)*1.1=	51.9<	66.6	∴ 51.9
		> AgrR				>AnrR

(109) D-2 J-15(Sec-15) DECK-3

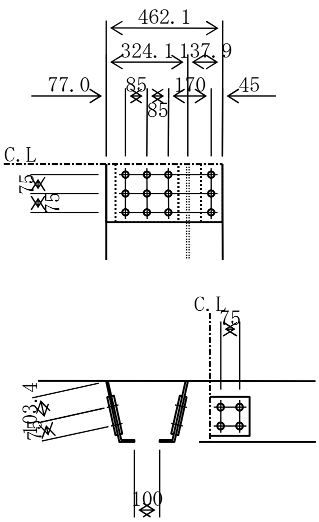
(a) Acting stress

$\sigma tmax$ = 17 N/mm^2 $0.75\sigma ta$ = 0.75 * 140 = 105 N/mm^2
$\sigma cmax$ = −64 N/mm^2 $0.75\sigma ca$ = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma c$ = 105 N/mm^2
τmax = 3 N/mm^2

(b) Section area of main plate

1-DECK-3 PL 462 * 16   Ag = 73.9 cm^2 (SM400)
1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM400)
ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3 PL 462 * 16   A = 73.9
(73.9 − (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 $\therefore$An = 63.7 cm^2
1-U.RIB 320 * 240 * 8   Ar = 53.9
(53.9 − (4* 2.7)* 0.8− 1*(10.0*0.8)) * 1.1 = 41.0
< 53.9 $\therefore$Anr = 41.0 cm^2
ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 17 * 127.8 / 104.7 = 21 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = $0.75\sigma ta$ * An / 1.1 = 105 * 6372 / 1.1 = 608244 N
> σtn * An = 21 * 6372 = 135575 N
Pc = σc * Ag = 105 * 7393 = 776244 N
・Rib Ptr = $0.75\sigma ta$ * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N
> σtn * Anr = 21 * 4099 = 87204 N
Pcr = σc * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2
AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2
・Rib AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 776244 / 108000 = 7.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 12 = 776244 / 12 = 64687$ N

$\rho s = \tau * Ag / 12 = 3 * 7393 / 12 = 1666$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64687^2 + 1666^2)} = 64708$ N

(i) Check of splice plates

	(SS400)	Ags(cm²)	deduction of bolt holes			Ans(cm²)
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		46.9				36.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(110) D-2 J-16(Sec-16) DECK-1

(a) Acting stress

σ tmax = 35 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2

σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2

∴ σ c = 105 N/mm^2

τ max = 4 N/mm^2

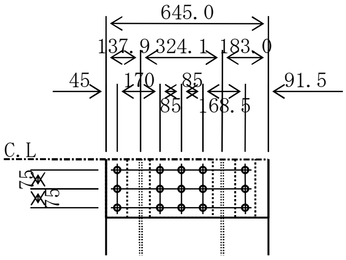
(b) Section area of main plate

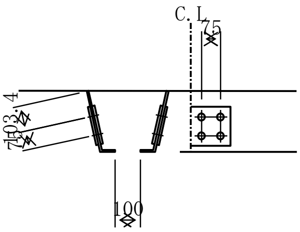
1-DECK-1 PL 645 * 16   Ag = 103.2 cm^2 (SM400)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-1 PL 645 * 16   A = 103.2

(103.2 - (5* 2.5)* 1.6) * 1.1 = 91.5 < 103.2 ∴An = 91.5 cm^2

1-U.RIB 320 * 240 * 8   Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9 ∴Anr = 41.0 cm^2

ΣAn = An + Anr = 91.5 + 41.0 = 132.5 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 35 * 157.1 / 132.5 = 42 N/mm^2

< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 9152 / 1.1 = 873617 N

> σ tn * An = 42 * 9152 = 384294 N

Pc = σ c * Ag = 105 * 10320 = 1083617 N

・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N

> σ tn * Anr = 42 * 4099 = 172097 N

Pcr = σ c * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 91.5 / 2 = 45.8 cm^2

AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1083617 / 108000 = 10.0 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 15 = 1083617 / 15 = 72241$ N

$\rho s = \tau * Ag / 15 = 4 * 10320 / 15 = 2709$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(72241^2 + 2709^2)} = 72292$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			$Ans(cm^2)$
1-SPL PL	645 * 9	(58.1 -	(5*2.5)* 0.9)*1.1=	51.5<	58.1	∴ 51.5
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1=	8.5<	11.2	∴ 8.5
		58.1				44.7
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		＞ AgrR				＞AnrR

(111) D-2 J-16(Sec-16) DECK-2

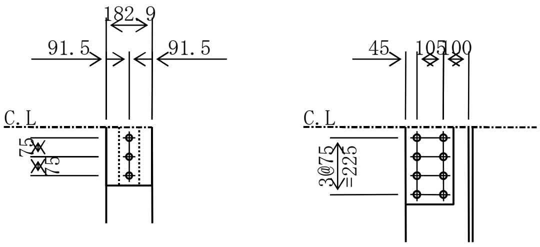
(a) Acting stress

$\sigma tmax$ = 35 N/mm^2 $0.75\sigma ta$ = 0.75 * 140 = 105 N/mm^2
$\sigma cmax$ = -64 N/mm^2 $0.75\sigma ca$ = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma c$ = 105 N/mm^2
τmax = 4 N/mm^2

(b) Section area of main plate

1-DECK-2 PL 183 * 16   Ag = 29.3 cm^2 (SM400)
1-RIB PL 250 * 24   Agr = 60.0 cm^2 (SM400)
ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2 PL 183 * 16   A = 29.3
(29.3 - (1* 2.5)* 1.6) * 1.1 = 27.8 < 29.3 $\therefore$An = 27.8 cm^2
1-RIB PL 250 * 24   Ar = 60.0
(60.0 - (2* 2.7)* 2.4) * 1.1 = 51.7 < 60.0 $\therefore$Anr = 51.7 cm^2
ΣAn = An + Anr = 27.8 + 51.7 = 79.5 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 35 * 89.3 / 79.5 = 40 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = $0.75\sigma ta$ * An / 1.1 = 105 * 2780 / 1.1 = 265339 N
> σtn * An = 40 * 2780 = 110489 N
Pc = σc * Ag = 105 * 2927 = 307339 N
・Rib Ptr = $0.75\sigma ta$ * Anr / 1.1 = 105 * 5174 / 1.1 = 493920 N
> σtn * Anr = 40 * 5174 = 205671 N
Pcr = σc * Agr = 105 * 6000 = 630000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 27.8 / 2 = 13.9 cm^2
AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2
・Rib AnrR = Anr = 51.7 cm^2
AgrR = Agr = 60.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 307339 / 108000 = 2.8 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 630000 / 108000 = 5.8 pcs. (1 @ 8 = 8 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 3 = 307339 / 3 = 102446$ N

$\rho s = \tau * Ag / 3 = 4 * 2927 / 3 = 3842$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(102446^2 + 3842^2)} = 102518$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	183 * 9	(16.5 -	(1*2.5)* 0.9)*1.1=	15.6<	16.5	∴ 15.6
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1=	8.5<	11.2	∴ 8.5
2-SPL PL	185 * 18	(66.6 -	2*(2*2.7)* 1.8)*1.1=	51.9<	66.6	∴ 51.9
		> AgrR				>AnrR

(112) D-2 J-16(Sec-16) DECK-3

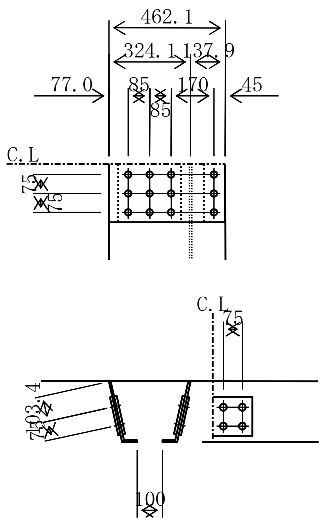
(a) Acting stress

σ tmax = 35 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma$ c = 105 N/mm^2
τ max = 4 N/mm^2

(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)
1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)
ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3 PL 462 * 16 A = 73.9
(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 ∴An = 63.7 cm^2
1-U.RIB 320 * 240 * 8 Ar = 53.9
(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0
< 53.9 ∴Anr = 41.0 cm^2
ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 35 * 127.8 / 104.7 = 43 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 6372 / 1.1 = 608244 N
> σ tn * An = 43 * 6372 = 275506 N
Pc = σ c * Ag = 105 * 7393 = 776244 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N
> σ tn * Anr = 43 * 4099 = 177209 N
Pcr = σ c * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2
AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2
・Rib AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate $n = Pc / (108000 * 1.00) = 776244 / 108000 = 7.2$ pcs.

・Rib $nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2$ pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 12 = 776244 / 12 = 64687$ N

$\rho s = \tau * Ag / 12 = 4 * 7393 / 12 = 2426$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64687^2 + 2426^2)} = 64732$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		46.9				36.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(113) D-2 J-17(Sec-17) DECK-1

(a) Acting stress

σ_{tmax} = 68 N/mm² 　 $0.75\sigma_{ta}$ = 0.75 * 140 = 105 N/mm²

σ_{cmax} = -64 N/mm² 　 $0.75\sigma_{ca}$ = 0.75 * 140 = 105 N/mm²

$\therefore \sigma_c$ = 105 N/mm²

τ_{max} = 6 N/mm²

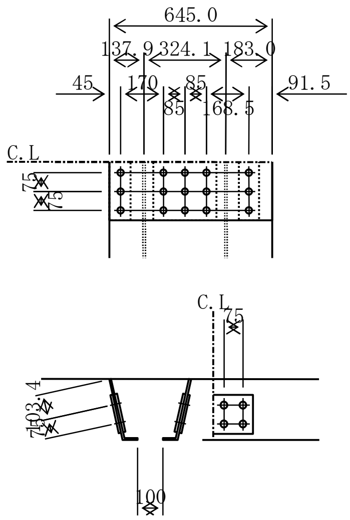
(b) Section area of main plate

1-DECK-1 PL 645 * 16 　 Ag = 103.2 cm² (SM400)

1-U.RIB 320 * 240 * 8 　 Agr = 53.9 cm² (SM400)

ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm²

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-1 PL 645 * 16 　 A = 103.2

(103.2 - (5* 2.5)* 1.6) * 1.1 = 91.5 ＜ 103.2 ∴An = 91.5 cm²

1-U.RIB 320 * 240 * 8 　 Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

＜ 53.9 ∴Anr = 41.0 cm²

ΣAn = An + Anr = 91.5 + 41.0 = 132.5 cm²

σ_{tn} = σ_{tmax} * ΣAg / ΣAn = 68 * 157.1 / 132.5 = 81 N/mm²

＜ σ_{ta} = 140 N/mm²

(e) Design axial force

・Main plate Pt = $0.75\sigma_{ta}$ * An / 1.1 = 105 * 9152 / 1.1 = 873617 N

＞ σ_{tn} * An = 81 * 9152 = 742795 N

Pc = σ_c * Ag = 105 * 10320 = 1083617 N

・Rib Ptr = $0.75\sigma_{ta}$ * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N

＞ σ_{tn} * Anr = 81 * 4099 = 332644 N

Pcr = σ_c * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 91.5 / 2 = 45.8 cm²

AgR = Ag / 2 = 103.2 / 2 = 51.6 cm²

・Rib AnrR = Anr = 41.0 cm²

AgrR = Agr = 53.9 cm²

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1083617 / 108000 = 10.0 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 15 = 1083617 / 15 = 72241$ N

$\rho s = \tau * Ag / 15 = 6 * 10320 / 15 = 4199$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(72241^2 + 4199^2)} = 72363$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	645 * 9	(58.1 -	(5*2.5)* 0.9)*1.1=	51.5<	58.1	∴ 51.5
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1=	8.5<	11.2	∴ 8.5
		58.1				44.7
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		＞ AgrR				＞AnrR

(114) D-2 J-17(Sec-17) DECK-2

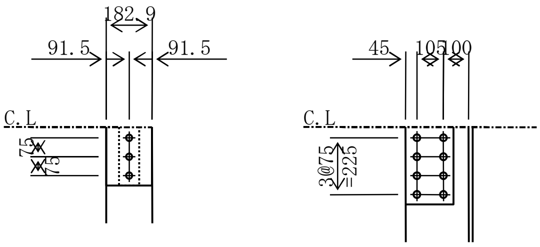
(a) Acting stress

σ tmax = 68 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2
∴ σ c = 105 N/mm^2
τ max = 6 N/mm^2

(b) Section area of main plate

1-DECK-2 PL 183 * 16 Ag = 29.3 cm^2 (SM400)
1-RIB PL 250 * 24 Agr = 60.0 cm^2 (SM400)
ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2 PL 183 * 16 A = 29.3
(29.3 - (1* 2.5)* 1.6) * 1.1 = 27.8 < 29.3 ∴An = 27.8 cm^2
1-RIB PL 250 * 24 Ar = 60.0
(60.0 - (2* 2.7)* 2.4) * 1.1 = 51.7 < 60.0 ∴Anr = 51.7 cm^2
ΣAn = An + Anr = 27.8 + 51.7 = 79.5 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 68 * 89.3 / 79.5 = 77 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 2780 / 1.1 = 265339 N
> σ tn * An = 77 * 2780 = 213562 N
Pc = σ c * Ag = 105 * 2927 = 307339 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 5174 / 1.1 = 493920 N
> σ tn * Anr = 77 * 5174 = 397539 N
Pcr = σ c * Agr = 105 * 6000 = 630000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 27.8 / 2 = 13.9 cm^2
AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2
・Rib AnrR = Anr = 51.7 cm^2
AgrR = Agr = 60.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 307339 / 108000 = 2.8 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 630000 / 108000 = 5.8 pcs. (1 @ 8 = 8 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 3 = 307339 / 3 = 102446$ N

$\rho s = \tau * Ag / 3 = 6 * 2927 / 3 = 5955$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(102446^2 + 5955^2)} = 102619$ N

(i) Check of splice plates

	(SS400)	Ags(cm²)	deduction of bolt holes			Ans(cm²)
1-SPL PL	183 * 9	(16.5 -	(1*2.5)* 0.9)*1.1=	15.6<	16.5	∴ 15.6
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1=	8.5<	11.2	∴ 8.5
2-SPL PL	185 * 18	(66.6 -	2*(2*2.7)* 1.8)*1.1=	51.9<	66.6	∴ 51.9
		> AgrR				>AnrR

(115) D-2 J-17(Sec-17) DECK-3

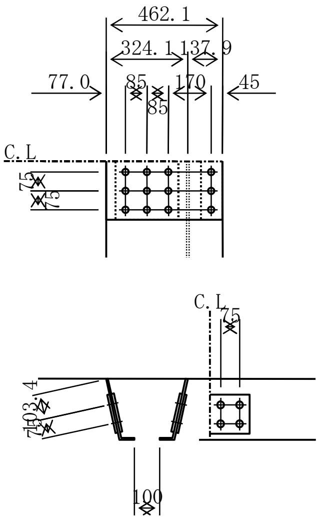
(a) Acting stress

σ_{tmax} = 68 N/mm^2 0.75 σ_{ta} = 0.75 * 140 = 105 N/mm^2
σ_{cmax} = -64 N/mm^2 0.75 σ_{ca} = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma_c$ = 105 N/mm^2
τ_{max} = 6 N/mm^2

(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)
1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)
ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3 PL 462 * 16 A = 73.9
(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 ∴An = 63.7 cm^2
1-U.RIB 320 * 240 * 8 Ar = 53.9
(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0
< 53.9 ∴Anr = 41.0 cm^2
ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2
σ_{tn} = σ_{tmax} * ΣAg / ΣAn = 68 * 127.8 / 104.7 = 84 N/mm^2
< σ_{ta} = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ_{ta} * An / 1.1 = 105 * 6372 / 1.1 = 608244 N
> σ_{tn} * An = 84 * 6372 = 532522 N
Pc = σ_c * Ag = 105 * 7393 = 776244 N
・Rib Ptr = 0.75 σ_{ta} * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N
> σ_{tn} * Anr = 84 * 4099 = 342525 N
Pcr = σ_c * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2
AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2
・Rib AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 776244 / 108000 = 7.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 12 = 776244 / 12 = 64687$ N

$\rho s = \tau * Ag / 12 = 6 * 7393 / 12 = 3760$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64687^2 + 3760^2)} = 64796$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			$Ans(cm^2)$
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		46.9				36.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(116) D-2 J-18(Sec-18) DECK-1

(a) Acting stress

$\sigma tmax$ = 115 N/mm^2 0.75 σta = 0.75 * 210 = 158 N/mm^2

$\sigma cmax$ = -64 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma c$ = 158 N/mm^2

τmax = 8 N/mm^2

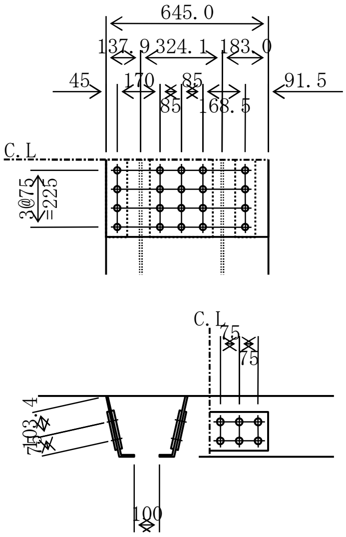
(b) Section area of main plate

1-DECK-1 PL 645 * 16 Ag = 103.2 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-1 PL 645 * 16 A = 103.2

(103.2 - (5* 2.5)* 1.6) * 1.1 = 91.5 < 103.2 $\therefore$An = 91.5 cm^2

1-U.RIB 320 * 240 * 8 Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9 $\therefore$Anr = 41.0 cm^2

ΣAn = An + Anr = 91.5 + 41.0 = 132.5 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 115 * 157.1 / 132.5 = 136 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σta * An / 1.1 = 158 * 9152 / 1.1 = 1310425 N

> σtn * An = 136 * 9152 = 1245070 N

Pc = σc * Ag = 158 * 10320 = 1625425 N

・Rib Ptr = 0.75 σta * Anr / 1.1 = 158 * 4099 / 1.1 = 586845 N

> σtn * Anr = 136 * 4099 = 557577 N

Pcr = σc * Agr = 158 * 5390 = 848925 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 91.5 / 2 = 45.8 cm^2

AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

- Main plate n = Pc / (108000 * 1.00) = 1625425 / 108000 = 15.1 pcs.
- Rib nr = Pcr / (108000 * 1.00) = 848925 / 108000 = 7.9 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(h) Tensile force per one bolt

ρp = Pc / 20 = 1625425 / 20 = 81271 N
ρs = τ * Ag / 20 = 8 * 10320 / 20 = 4065 N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(81271^2 + 4065^2)}$ = 81373 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	645 * 9	(58.1 -	(5*2.5)* 0.9)*1.1=	51.5<	58.1	∴ 51.5
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1=	8.5<	11.2	∴ 8.5
		58.1				44.7
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		＞ AgrR				＞AnrR

(117) D-2 J-18(Sec-18) DECK-2

(a) Acting stress

$\sigma tmax$ = 115 N/mm^2 0.75σta = 0.75 * 210 = 158 N/mm^2

$\sigma cmax$ = -64 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma c$ = 158 N/mm^2

τmax = 8 N/mm^2

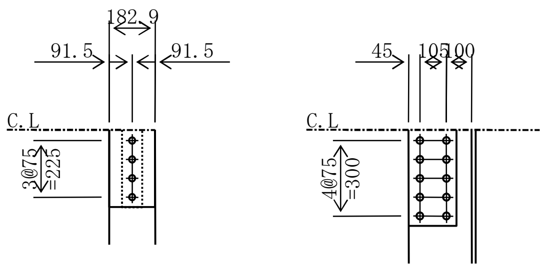
(b) Section area of main plate

1-DECK-2 PL 183 * 16 Ag = 29.3 cm^2 (SM490Y)

1-RIB PL 250 * 24 Agr = 60.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2 PL 183 * 16 A = 29.3

(29.3 - (1* 2.5)* 1.6) * 1.1 = 27.8 < 29.3 $\therefore$An = 27.8 cm^2

1-RIB PL 250 * 24 Ar = 60.0

(60.0 - (2* 2.7)* 2.4) * 1.1 = 51.7 < 60.0 $\therefore$Anr = 51.7 cm^2

ΣAn = An + Anr = 27.8 + 51.7 = 79.5 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 115 * 89.3 / 79.5 = 129 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 158 * 2780 / 1.1 = 398009 N

> σtn * An = 129 * 2780 = 357972 N

Pc = σc * Ag = 158 * 2927 = 461009 N

・Rib Ptr = 0.75σta * Anr / 1.1 = 158 * 5174 / 1.1 = 740880 N

> σtn * Anr = 129 * 5174 = 666352 N

Pcr = σc * Agr = 158 * 6000 = 945000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 27.8 / 2 = 13.9 cm^2

AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2

・Rib AnrR = Anr = 51.7 cm^2

AgrR = Agr = 60.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 461009 / 108000 = 4.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 945000 / 108000 = 8.8 pcs. (1 @ 10 = 10 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 4 = 461009 / 4 = 115252$ N

$\rho s = \tau * Ag / 4 = 8 * 2927 / 4 = 5765$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(115252^2 + 5765^2)} = 115396$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	183 * 9	(16.5 -	(1*2.5)* 0.9)*1.1=	15.6<	16.5	∴ 15.6
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1=	8.5<	11.2	∴ 8.5
2-SPL PL	185 * 18	(66.6 -	2*(2*2.7)* 1.8)*1.1=	51.9<	66.6	∴ 51.9
		> AgrR				>AnrR

(118) D-2 J-18(Sec-18) DECK-3

(a) Acting stress

σ tmax = 115 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 210 = 158 N/mm^2

∴ σ c = 158 N/mm^2

τ max = 8 N/mm^2

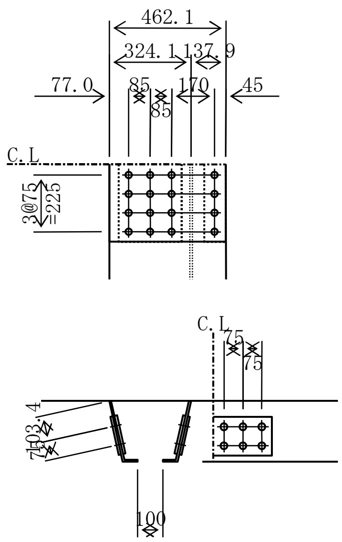
(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3 PL 462 * 16 A = 73.9

(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 ∴An = 63.7 cm^2

1-U.RIB 320 * 240 * 8 Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9 ∴Anr = 41.0 cm^2

ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 115 * 127.8 / 104.7 = 140 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 158 * 6372 / 1.1 = 912366 N

> σ tn * An = 140 * 6372 = 892611 N

Pc = σ c * Ag = 158 * 7393 = 1164366 N

・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 158 * 4099 / 1.1 = 586845 N

> σ tn * Anr = 140 * 4099 = 574138 N

Pcr = σ c * Agr = 158 * 5390 = 848925 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2

AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate $n = Pc / (108000 * 1.00) =$ 1164366 / 108000 = 10.8 pcs.

・Rib $nr = Pcr / (108000 * 1.00) =$ 848925 / 108000 = 7.9 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 16 = 1164366 / 16 = 72773$ N

$\rho s = \tau * Ag / 16 = 8 * 7393 / 16 = 3640$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(72773^2 + 3640^2)} = 72864$ N

(i) Check of splice plates

	(SM490Y)	$Ags(cm^2)$	deduction of bolt holes			$Ans(cm^2)$
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		46.9				36.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(119) D-2 J-19(Sec-19) DECK-1

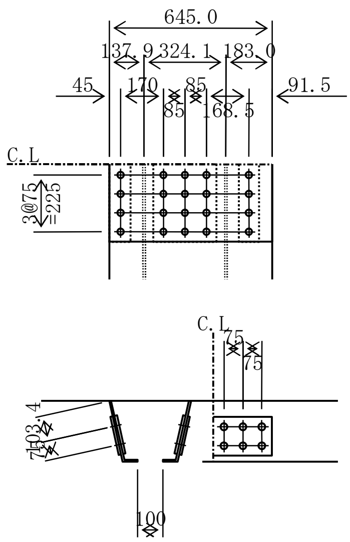
(a) Acting stress

$\sigma tmax$ = 160 N/mm^2 0.75σta = 0.75 * 210 = 158 N/mm^2
$\sigma cmax$ = -64 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2
∴ σc = 158 N/mm^2
τmax = 9 N/mm^2

(b) Section area of main plate

1-DECK-1 PL 645 * 16 Ag = 103.2 cm^2 (SM490Y)
1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM490Y)
ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-1 PL 645 * 16 A = 103.2
(103.2 - (5* 2.5)* 1.6) * 1.1 = 91.5 < 103.2 ∴An = 91.5 cm^2
1-U.RIB 320 * 240 * 8 Ar = 53.9
(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0
< 53.9 ∴Anr = 41.0 cm^2
ΣAn = An + Anr = 91.5 + 41.0 = 132.5 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 160 * 157.1 / 132.5 = 190 N/mm^2
< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 190 * 9152 = 1735875 N
> 0.75σta * An / 1.1 = 158 * 9152 / 1.1 = 1310425 N
Pc = σc * Ag = 158 * 10320 = 1625425 N
・Rib Ptr = σtn * Anr = 190 * 4099 = 777373 N
> 0.75σta * Anr/ 1.1 = 158 * 4099 / 1.1 = 586845 N
Pcr = σc * Agr = 158 * 5390 = 848925 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 91.5 / 2 = 45.8 cm^2
AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2
・Rib AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 1735875 / 108000 = 16.1 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 848925 / 108000 = 7.9 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(h) Tensile force per one bolt

ρp = Pt / 20 = 1735875 / 20 = 86794 N

ρs = τ * Ag / 20 = 9 * 10320 / 20 = 4584 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(86794^2 + 4584^2)}$ = 86915 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	645 * 9	(58.1 -	(5*2.5)* 0.9)*1.1=	51.5<	58.1	∴ 51.5
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1=	8.5<	11.2	∴ 8.5
		58.1				44.7
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(120) D-2 J-19(Sec-19) DECK-2

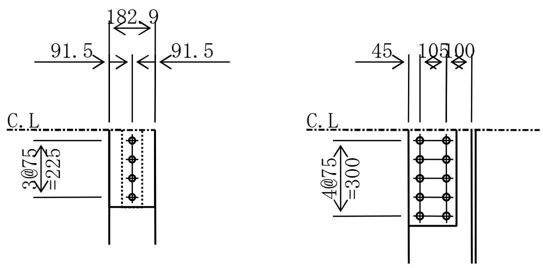
(a) Acting stress

σ tmax = 160 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 210 = 158 N/mm^2
$\therefore \sigma$ c = 158 N/mm^2
τ max = 9 N/mm^2

(b) Section area of main plate

1-DECK-2 PL 183 * 16 Ag = 29.3 cm^2 (SM490Y)
1-RIB PL 250 * 24 Agr = 60.0 cm^2 (SM490Y)
ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2 PL 183 * 16 A = 29.3
(29.3 - (1* 2.5)* 1.6) * 1.1 = 27.8 < 29.3 $\therefore$An = 27.8 cm^2
1-RIB PL 250 * 24 Ar = 60.0
(60.0 - (2* 2.7)* 2.4) * 1.1 = 51.7 < 60.0 $\therefore$Anr = 51.7 cm^2
ΣAn = An + Anr = 27.8 + 51.7 = 79.5 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 160 * 89.3 / 79.5 = 180 N/mm^2
< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 180 * 2780 = 499084 N
> 0.75 σ ta * An / 1.1 = 158 * 2780 / 1.1 = 398009 N
Pc = σ c * Ag = 158 * 2927 = 461009 N
・Rib Ptr = σ tn * Anr = 180 * 5174 = 929028 N
> 0.75 σ ta * Anr/ 1.1 = 158 * 5174 / 1.1 = 740880 N
Pcr = σ c * Agr = 158 * 6000 = 945000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 27.8 / 2 = 13.9 cm^2
AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2
・Rib AnrR = Anr = 51.7 cm^2
AgrR = Agr = 60.0 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 499084 / 108000 = 4.6 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 945000 / 108000 = 8.8 pcs. (1 @ 10 = 10 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(h) Tensile force per one bolt

$\rho p = Pt / 4 = 499084 / 4 = 124771$ N

$\rho s = \tau * Ag / 4 = 9 * 2927 / 4 = 6501$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(124771^2 + 6501^2)} = 124940$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm²)	deduction of bolt holes		Ans(cm²)
1-SPL PL	183 ＊ 9	(16.5 -	(1*2.5)＊ 0.9)*1.1= 15.6＜	16.5	∴ 15.6
1-SPL PL	80 ＊ 14	(11.2 -	(1*2.5)＊ 1.4)*1.1= 8.5＜	11.2	∴ 8.5
2-SPL PL	185 ＊ 18	(66.6 -	2*(2*2.7)＊ 1.8)*1.1= 51.9＜	66.6	∴ 51.9
		＞ AgrR			＞AnrR

(121) D-2 J-19(Sec-19) DECK-3

(a) Acting stress

$\sigma tmax$ = 160 N/mm^2 0.75 σta = 0.75 * 210 = 158 N/mm^2

$\sigma cmax$ = -64 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma c$ = 158 N/mm^2

τmax = 9 N/mm^2

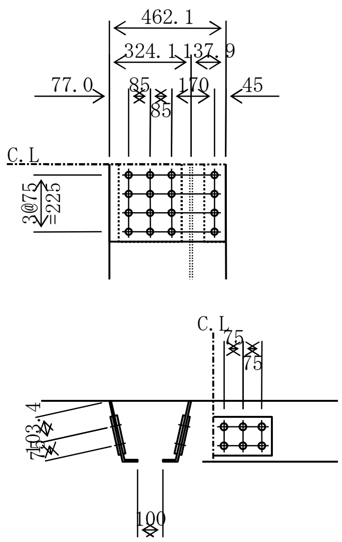
(b) Section area of main plate

1-DECK-3 PL 462 * 16   Ag = 73.9 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3 PL 462 * 16   A = 73.9

(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 $\therefore$An = 63.7 cm^2

1-U.RIB 320 * 240 * 8   Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9 $\therefore$Anr = 41.0 cm^2

ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 160 * 127.8 / 104.7 = 195 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 195 * 6372 = 1244478 N

> 0.75 σta * An / 1.1 = 158 * 6372 / 1.1 = 912366 N

Pc = σc * Ag = 158 * 7393 = 1164366 N

・Rib Ptr = σtn * Anr = 195 * 4099 = 800463 N

> 0.75 σta * Anr/ 1.1 = 158 * 4099 / 1.1 = 586845 N

Pcr = σc * Agr = 158 * 5390 = 848925 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2

AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib   AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 1244478 / 108000 = 11.5 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 848925 / 108000 = 7.9 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(h) Tensile force per one bolt

$\rho p = Pt / 16 = 1244478 / 16 = 77780$ N

$\rho s = \tau * Ag / 16 = 9 * 7393 / 16 = 4105$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(77780^2 + 4105^2)} = 77888$ N

(i) Check of splice plates

	(SM490Y)	$Ags(cm^2)$	deduction of bolt holes			$Ans(cm^2)$
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		46.9				36.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(122) D-2 J-20(Sec-21) DECK-1

(a) Acting stress

$\sigma tmax$ = 154 N/mm^2 0.75σta = 0.75 * 210 = 158 N/mm^2

$\sigma cmax$ = -64 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2

∴σc = 158 N/mm^2

τmax = 11 N/mm^2

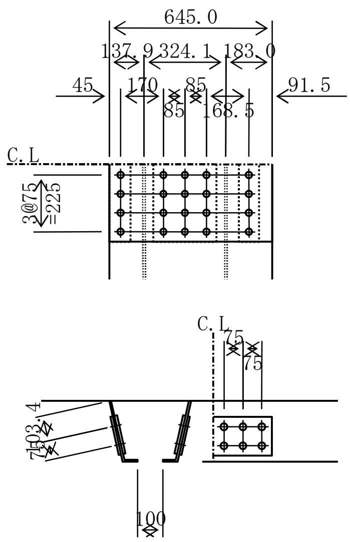
(b) Section area of main plate

1-DECK-1 PL 645 * 16   Ag = 103.2 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-1 PL 645 * 16   A = 103.2

(103.2 - (5* 2.5)* 1.6) * 1.1 = 91.5 < 103.2 ∴An = 91.5 cm^2

1-U.RIB 320 * 240 * 8   Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9 ∴Anr = 41.0 cm^2

ΣAn = An + Anr = 91.5 + 41.0 = 132.5 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 154 * 157.1 / 132.5 = 182 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 182 * 9152 = 1669522 N

> 0.75σta * An / 1.1 = 158 * 9152 / 1.1 = 1310425 N

Pc = σc * Ag = 158 * 10320 = 1625425 N

・Rib Ptr = σtn * Anr = 182 * 4099 = 747659 N

> 0.75σta * Anr/ 1.1 = 158 * 4099 / 1.1 = 586845 N

Pcr = σc * Agr = 158 * 5390 = 848925 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 91.5 / 2 = 45.8 cm^2

AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

- Main plate $n = Pt / (108000 * 1.00) = 1669522 / 108000 = 15.5$ pcs.
- Rib $nr = Pcr / (108000 * 1.00) = 848925 / 108000 = 7.9$ pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(h) Tensile force per one bolt

$\rho p = Pt / 20 = 1669522 / 20 = 83476$ N

$\rho s = \tau * Ag / 20 = 11 * 10320 / 20 = 5764$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(83476^2 + 5764^2)} = 83675$ N

(i) Check of splice plates

	(SM490Y)	$Ags(cm^2)$	deduction of bolt holes			$Ans(cm^2)$
1-SPL PL	645 * 9	(58.1 -	(5*2.5)* 0.9)*1.1=	51.5＜	58.1	∴ 51.5
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2＜	11.9	∴ 9.2
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0＜	35.0	∴ 27.0
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1=	8.5＜	11.2	∴ 8.5
		58.1				44.7
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4＜	62.0	∴ 44.4
		＞ AgrR				＞AnrR

(123) D-2 J-20(Sec-21) DECK-2

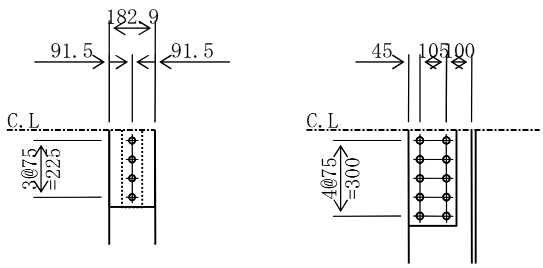
(a) Acting stress

σ tmax = 154 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 210 = 158 N/mm^2
∴ σ c = 158 N/mm^2
τ max = 11 N/mm^2

(b) Section area of main plate

1-DECK-2 PL 183 * 16 Ag = 29.3 cm^2 (SM490Y)
1-RIB PL 250 * 24 Agr = 60.0 cm^2 (SM490Y)
ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2 PL 183 * 16 A = 29.3
(29.3 - (1* 2.5)* 1.6) * 1.1 = 27.8 < 29.3 ∴An = 27.8 cm^2
1-RIB PL 250 * 24 Ar = 60.0
(60.0 - (2* 2.7)* 2.4) * 1.1 = 51.7 < 60.0 ∴Anr = 51.7 cm^2
ΣAn = An + Anr = 27.8 + 51.7 = 79.5 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 154 * 89.3 / 79.5 = 173 N/mm^2
< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 173 * 2780 = 480007 N
> 0.75 σ ta * An / 1.1 = 158 * 2780 / 1.1 = 398009 N
Pc = σ c * Ag = 158 * 2927 = 461009 N
・Rib Ptr = σ tn * Anr = 173 * 5174 = 893517 N
> 0.75 σ ta * Anr/ 1.1 = 158 * 5174 / 1.1 = 740880 N
Pcr = σ c * Agr = 158 * 6000 = 945000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 27.8 / 2 = 13.9 cm^2
AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2
・Rib AnrR = Anr = 51.7 cm^2
AgrR = Agr = 60.0 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 480007 / 108000 = 4.4 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 945000 / 108000 = 8.8 pcs. (1 @ 10 = 10 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(h) Tensile force per one bolt

$\rho p = Pt / 4 = 480007 / 4 = 120002$ N

$\rho s = \tau * Ag / 4 = 11 * 2927 / 4 = 8174$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(120002^2 + 8174^2)} = 120280$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	183 * 9	(16.5 -	(1*2.5)* 0.9)*1.1=	15.6<	16.5	∴ 15.6
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1=	8.5<	11.2	∴ 8.5
2-SPL PL	185 * 18	(66.6 -	2*(2*2.7)* 1.8)*1.1=	51.9<	66.6	∴ 51.9
		> AgrR				>AnrR

(124) D-2 J-20(Sec-21) DECK-3

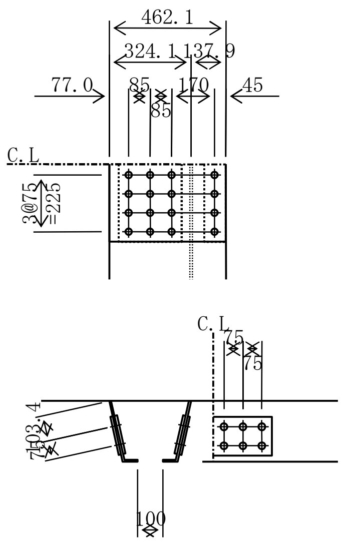
(a) Acting stress

$\sigma tmax$ = 154 N/mm^2 $0.75\sigma ta$ = 0.75 * 210 = 158 N/mm^2
$\sigma cmax$ = -64 N/mm^2 $0.75\sigma ca$ = 0.75 * 210 = 158 N/mm^2
$\therefore \sigma c$ = 158 N/mm^2
τmax = 11 N/mm^2

(b) Section area of main plate

1-DECK-3 PL 462 * 16   Ag = 73.9 cm^2 (SM490Y)
1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM490Y)
ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3 PL 462 * 16   A = 73.9
(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 $\therefore$An = 63.7 cm^2
1-U.RIB 320 * 240 * 8   Ar = 53.9
(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0
< 53.9 $\therefore$Anr = 41.0 cm^2
ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 154 * 127.8 / 104.7 = 188 N/mm^2
< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 188 * 6372 = 1196908 N
> $0.75\sigma ta$ * An / 1.1 = 158 * 6372 / 1.1 = 912366 N
Pc = σc * Ag = 158 * 7393 = 1164366 N
・Rib Ptr = σtn * Anr = 188 * 4099 = 769866 N
> $0.75\sigma ta$ * Anr/ 1.1 = 158 * 4099 / 1.1 = 586845 N
Pcr = σc * Agr = 158 * 5390 = 848925 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2
AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2
・Rib AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 1196908 / 108000 = 11.1 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 848925 / 108000 = 7.9 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(h) Tensile force per one bolt

ρp = Pt / 16 = 1196908 / 16 = 74807 N

ρs = τ * Ag / 16 = 11 * 7393 / 16 = 5161 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(74807^2 + 5161^2)}$ = 74985 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		46.9				36.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(125) D-2 J-21(Sec-22) DECK-1

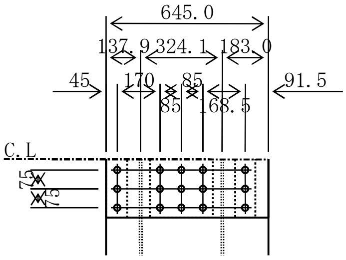
(a) Acting stress

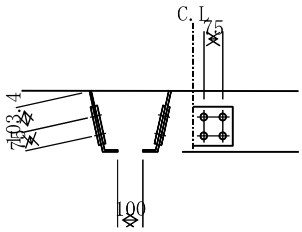
$\sigma tmax$ = 92 N/mm² 0.75 σta = 0.75 * 140 = 105 N/mm²
$\sigma cmax$ = -64 N/mm² 0.75 σca = 0.75 * 140 = 105 N/mm²
∴ σc = 105 N/mm²
τmax = 11 N/mm²

(b) Section area of main plate

1-DECK-1 PL 645 * 16 Ag = 103.2 cm² (SM400)
1-U.RIB 320 * 240 * 8 Agr = 53.9 cm² (SM400)
ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm²

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-1 PL 645 * 16 A = 103.2
(103.2 - (5* 2.5)* 1.6) * 1.1 = 91.5 < 103.2 ∴An = 91.5 cm²
1-U.RIB 320 * 240 * 8 Ar = 53.9
(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0
< 53.9 ∴Anr = 41.0 cm²
ΣAn = An + Anr = 91.5 + 41.0 = 132.5 cm²
σtn = $\sigma tmax$ * ΣAg / ΣAn = 92 * 157.1 / 132.5 = 109 N/mm²
< σta = 140 N/mm²

(e) Design axial force

・Main plate Pt = σtn * An = 109 * 9152 = 996922 N
> 0.75 σta * An / 1.1 = 105 * 9152 / 1.1 = 873617 N
Pc = σc * Ag = 105 * 10320 = 1083617 N
・Rib Ptr = σtn * Anr = 109 * 4099 = 446449 N
> 0.75 σta * Anr/ 1.1 = 105 * 4099 / 1.1 = 391230 N
Pcr = σc * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 91.5 / 2 = 45.8 cm²
AgR = Ag / 2 = 103.2 / 2 = 51.6 cm²
・Rib AnrR = Anr = 41.0 cm²
AgrR = Agr = 53.9 cm²

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1083617 / 108000 = 10.0 pcs.

・Rib nr = Pcr / (108000 * 1.00) =   565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 15 = 1083617 / 15 = 72241$ N

$\rho s = \tau * Ag / 15 = 11 * 10320 / 15 = 7236$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(72241^2 + 7236^2)} = 72603$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			Ans(cm^2)
1-SPL PL	645 * 9	(58.1 -	(5*2.5)* 0.9)*1.1=	51.5<	58.1	∴ 51.5
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1=	8.5<	11.2	∴ 8.5
		58.1				44.7
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(126) D-2 J-21(Sec-22) DECK-2

(a) Acting stress

σ tmax = 92 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2

σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2

$\therefore$ σ c = 105 N/mm^2

τ max = 11 N/mm^2

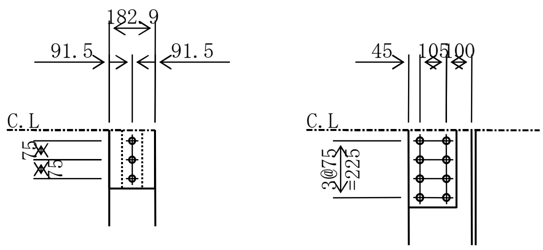
(b) Section area of main plate

1-DECK-2 PL 183 * 16 Ag = 29.3 cm^2 (SM400)

1-RIB PL 250 * 24 Agr = 60.0 cm^2 (SM400)

ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2 PL 183 * 16 A = 29.3

(29.3 - (1* 2.5)* 1.6) * 1.1 = 27.8 < 29.3 $\therefore$An = 27.8 cm^2

1-RIB PL 250 * 24 Ar = 60.0

(60.0 - (2* 2.7)* 2.4) * 1.1 = 51.7 < 60.0 $\therefore$Anr = 51.7 cm^2

ΣAn = An + Anr = 27.8 + 51.7 = 79.5 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 92 * 89.3 / 79.5 = 103 N/mm^2

< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 103 * 2780 = 286626 N

> 0.75 σ ta * An / 1.1 = 105 * 2780 / 1.1 = 265339 N

Pc = σ c * Ag = 105 * 2927 = 307339 N

・Rib Ptr = σ tn * Anr = 103 * 5174 = 533545 N

> 0.75 σ ta * Anr/ 1.1 = 105 * 5174 / 1.1 = 493920 N

Pcr = σ c * Agr = 105 * 6000 = 630000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 27.8 / 2 = 13.9 cm^2

AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2

・Rib AnrR = Anr = 51.7 cm^2

AgrR = Agr = 60.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 307339 / 108000 = 2.8 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 630000 / 108000 = 5.8 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 3 = 307339 / 3 = 102446$ N

$\rho s = \tau * Ag / 3 = 11 * 2927 / 3 = 10262$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(102446^2 + 10262^2)} = 102959$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	183 * 9	(16.5 -	(1*2.5)* 0.9)*1.1=	15.6＜	16.5	∴ 15.6
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1=	8.5＜	11.2	∴ 8.5
2-SPL PL	185 * 18	(66.6 -	2*(2*2.7)* 1.8)*1.1=	51.9＜	66.6	∴ 51.9
		＞ AgrR				＞AnrR

(127) D-2 J-21(Sec-22) DECK-3

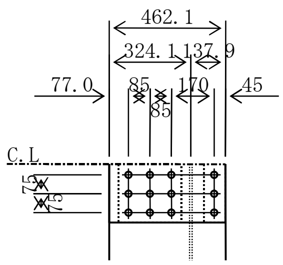
(a) Acting stress

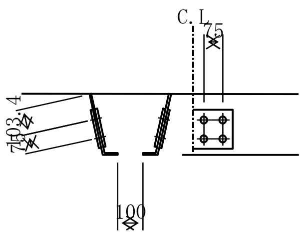
σ tmax = 92 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2
∴ σ c = 105 N/mm^2
τ max = 11 N/mm^2

(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)
1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)
ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-3 PL 462 * 16 A = 73.9
(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 ∴An = 63.7 cm^2
1-U.RIB 320 * 240 * 8 Ar = 53.9
(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0
< 53.9 ∴Anr = 41.0 cm^2
ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 92 * 127.8 / 104.7 = 112 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 112 * 6372 = 714710 N
> 0.75 σ ta * An / 1.1 = 105 * 6372 / 1.1 = 608244 N
Pc = σ c * Ag = 105 * 7393 = 776244 N
・Rib Ptr = σ tn * Anr = 112 * 4099 = 459710 N
> 0.75 σ ta * Anr/ 1.1 = 105 * 4099 / 1.1 = 391230 N
Pcr = σ c * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2
AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2
・Rib AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

- Main plate $n = Pc / (108000 * 1.00) = 776244 / 108000 = 7.2$ pcs.
- Rib $nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2$ pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 12 = 776244 / 12 = 64687$ N
$\rho s = \tau * Ag / 12 = 11 * 7393 / 12 = 6480$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64687^2 + 6480^2)} = 65011$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		46.9				36.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(128) D-2　J-22(Sec-23)　DECK-1

(a) Acting stress

σ tmax = 28 N/mm^2　0.75 σ ta = 0.75 ＊ 140 = 105 N/mm^2

σ cmax = -64 N/mm^2　0.75 σ ca = 0.75 ＊ 140 = 105 N/mm^2

∴ σ c = 105 N/mm^2

τ max = 9 N/mm^2

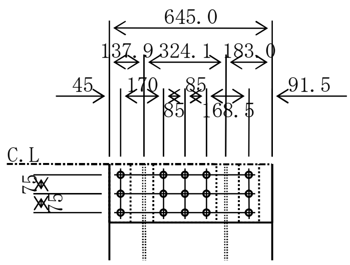
(b) Section area of main plate

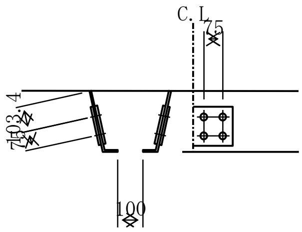
1-DECK-1 PL 645 ＊ 16　Ag = 103.2 cm^2　(SM400)

1-U.RIB 320 ＊ 240 ＊ 8　Agr = 53.9 cm^2　(SM400)

ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-1 PL 645 ＊ 16　A = 103.2

(103.2 - (5＊ 2.5)＊ 1.6) ＊ 1.1 = 91.5 ＜ 103.2 ∴An = 91.5 cm^2

1-U.RIB 320 ＊ 240 ＊ 8　Ar = 53.9

(53.9 - (4＊ 2.7)＊ 0.8- 1＊(10.0＊0.8)) ＊ 1.1 = 41.0

＜ 53.9 ∴Anr = 41.0 cm^2

ΣAn = An + Anr = 91.5 + 41.0 = 132.5 cm^2

σ tn = σ tmax ＊ ΣAg / ΣAn = 28 ＊ 157.1 / 132.5 = 33 N/mm^2

＜ σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta ＊ An / 1.1 = 105 ＊ 9152 / 1.1 = 873617 N

＞ σ tn ＊ An = 33 ＊ 9152 = 299223 N

Pc = σ c ＊ Ag = 105 ＊ 10320 = 1083617 N

・Rib Ptr = 0.75 σ ta ＊ Anr / 1.1 = 105 ＊ 4099 / 1.1 = 391230 N

＞ σ tn ＊ Anr = 33 ＊ 4099 = 134000 N

Pcr = σ c ＊ Agr = 105 ＊ 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 91.5 / 2 = 45.8 cm^2

AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1083617 / 108000 = 10.0 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 15 = 1083617 / 15 = 72241$ N

$\rho s = \tau * Ag / 15 = 9 * 10320 / 15 = 6282$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(72241^2 + 6282^2)} = 72514$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			$Ans(cm^2)$
1-SPL PL	645 * 9	(58.1 -	(5*2.5)* 0.9)*1.1=	51.5<	58.1	∴ 51.5
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1=	8.5<	11.2	∴ 8.5
		58.1				44.7
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(129) D-2　J-22(Sec-23)　DECK-2

(a) Acting stress

σ tmax = 28 N/mm^2　　0.75 σ ta = 0.75 * 140 = 105 N/mm^2

σ cmax = -64 N/mm^2　　0.75 σ ca = 0.75 * 140 = 105 N/mm^2

∴ σ c = 105 N/mm^2

τ max = 9 N/mm^2

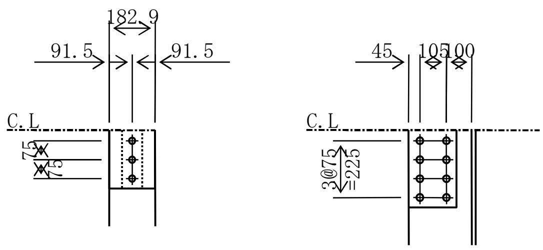
(b) Section area of main plate

1-DECK-2　PL　183 * 16　　　Ag = 29.3 cm^2　(SM400)

1-RIB　PL　250 * 24　　　Agr = 60.0 cm^2　(SM400)

ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2　PL　183 * 16　　A = 29.3

(29.3 - (1* 2.5)* 1.6) * 1.1 = 27.8 < 29.3　∴An = 27.8 cm^2

1-RIB　PL　250 * 24　　Ar = 60.0

(60.0 - (2* 2.7)* 2.4) * 1.1 = 51.7 < 60.0　∴Anr = 51.7 cm^2

ΣAn = An + Anr = 27.8 + 51.7 = 79.5 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 28 * 89.3 / 79.5 = 31 N/mm^2

< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate　Pt = 0.75 σ ta * An / 1.1 = 105 * 2780 / 1.1 = 265339 N

> σ tn * An = 31 * 2780 = 86030 N

Pc = σ c * Ag = 105 * 2927 = 307339 N

・Rib　Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 5174 / 1.1 = 493920 N

> σ tn * Anr = 31 * 5174 = 160142 N

Pcr = σ c * Agr = 105 * 6000 = 630000 N

(f) Required section area of the splice plates

・Mother material(One side)　AnR = An / 2 = 27.8 / 2 = 13.9 cm^2

AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2

・Rib　　AnrR = Anr = 51.7 cm^2

AgrR = Agr = 60.0 cm^2

(g) Required bolt number

・Main plate　n = Pc / (108000 * 1.00) = 307339 / 108000 = 2.8 pcs.

・Rib　nr = Pcr / (108000 * 1.00) = 630000 / 108000 = 5.8 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.)　Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 3 = 307339 / 3 = 102446$ N

$\rho s = \tau * Ag / 3 = 9 * 2927 / 3 = 8909$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(102446^2 + 8909^2)} = 102833$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	183 * 9	(16.5 -	(1*2.5)* 0.9)*1.1=	15.6<	16.5	∴ 15.6
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1=	8.5<	11.2	∴ 8.5
2-SPL PL	185 * 18	(66.6 -	2*(2*2.7)* 1.8)*1.1=	51.9<	66.6	∴ 51.9
		＞ AgrR				＞AnrR

(130) D-2 J-22(Sec-23) DECK-3

(a) Acting stress

$\sigma tmax$ = 28 N/mm^2 0.75 σta = 0.75 * 140 = 105 N/mm^2

$\sigma cmax$ = -64 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 9 N/mm^2

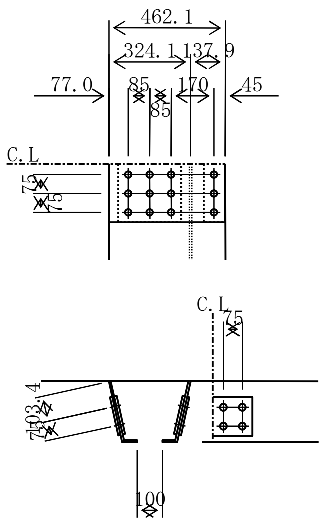
(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3 PL 462 * 16 A = 73.9

(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 $\therefore$An = 63.7 cm^2

1-U.RIB 320 * 240 * 8 Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9 $\therefore$Anr = 41.0 cm^2

ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 28 * 127.8 / 104.7 = 34 N/mm^2

< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σta * An / 1.1 = 105 * 6372 / 1.1 = 608244 N

> σtn * An = 34 * 6372 = 214518 N

Pc = σc * Ag = 105 * 7393 = 776244 N

・Rib Ptr = 0.75 σta * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N

> σtn * Anr = 34 * 4099 = 137981 N

Pcr = σc * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2

AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 776244 / 108000 = 7.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 12 = 776244 / 12 = 64687$ N

$\rho s = \tau * Ag / 12 = 9 * 7393 / 12 = 5625$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64687^2 + 5625^2)} = 64931$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		46.9				36.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(131) D-2 J-23(Sec-23) DECK-1

(a) Acting stress

$\sigma cmax$ = -96 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 8 N/mm^2

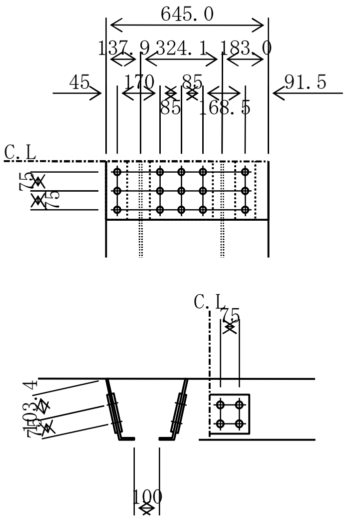
(b) Section area of main plate

1-DECK-1 PL 645 * 16 Ag = 103.2 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 10320 = 1083617 N

・Rib Pcr = σc * Agr = 105 * 5390 = 565950 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1083617 / 108000 = 10.0 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 15 = 1083617 / 15 = 72241 N

ρs = τ * Ag / 15 = 8 * 10320 / 15 = 5446 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(72241^2 + 5446^2)}$ = 72446 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
1-SPL PL	645 ＊ 9	58.1
1-SPL PL	85 ＊ 14	11.9
1-SPL PL	250 ＊ 14	35.0
1-SPL PL	80 ＊ 14	11.2
		58.1
4-SPL PL	155 ＊ 10	62.0 ＞ AgrR = 53.9cm2

(132) D-2 J-23(Sec-23) DECK-2

(a) Acting stress

$\sigma cmax$ = -96 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 8 N/mm^2

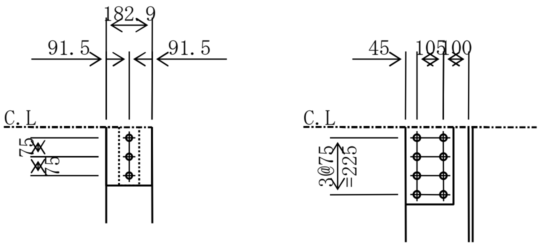
(b) Section area of main plate

1-DECK-2 PL 183 * 16 Ag = 29.3 cm^2 (SM400)

1-RIB PL 250 * 24 Agr = 60.0 cm^2 (SM400)

ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 2927 = 307339 N

・Rib Pcr = σc * Agr = 105 * 6000 = 630000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2

・Rib AgrR = Agr = 60.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 307339 / 108000 = 2.8 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 630000 / 108000 = 5.8 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 3 = 307339 / 3 = 102446 N

ρs = τ * Ag / 3 = 8 * 2927 / 3 = 7723 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(102446^2 + 7723^2)}$ = 102737 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	183 * 9	16.5	
1-SPL PL	80 * 14	11.2	
2-SPL PL	185 * 18	66.6	＞ AgrR = 60.0cm2

(133) D-2　J-23(Sec-23)　DECK-3

(a) Acting stress

$\sigma cmax$ = −96 N/mm^2　　0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 8 N/mm^2

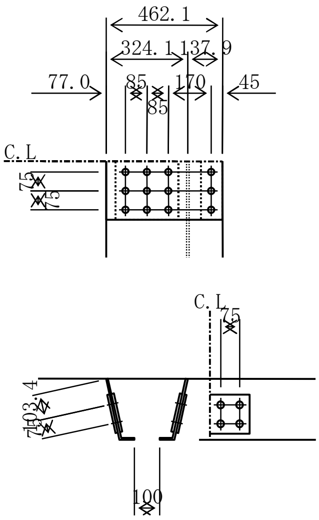
(b) Section area of main plate

1-DECK-3　PL　462 * 16　　　Ag = 73.9 cm^2　(SM400)

1-U.RIB 320 * 240 * 8　　　Agr = 53.9 cm^2　(SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate　Pc = σc * Ag = 105 * 7393 = 776244 N

・Rib　Pcr = σc * Agr = 105 * 5390 = 565950 N

(e) Required section area of the splice plates

・Mother material(One side)　AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib　　　AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate　n = Pc / (108000 * 1.00) = 776244 / 108000 = 7.2 pcs.

・Rib　nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 12 = 776244 / 12 = 64687 N

ρs = τ * Ag / 12 = 8 * 7393 / 12 = 4876 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64687^2 + 4876^2)}$ = 64871 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	462 * 9	41.6	
1-SPL PL	250 * 14	35.0	
1-SPL PL	85 * 14	11.9	
		46.9	
4-SPL PL	155 * 10	62.0	> AgrR = 53.9cm2

(134) D-2 J-24(Sec-24) DECK-1

(a) Acting stress

$\sigma cmax$ = -127 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 127 N/mm^2

τmax = 5 N/mm^2

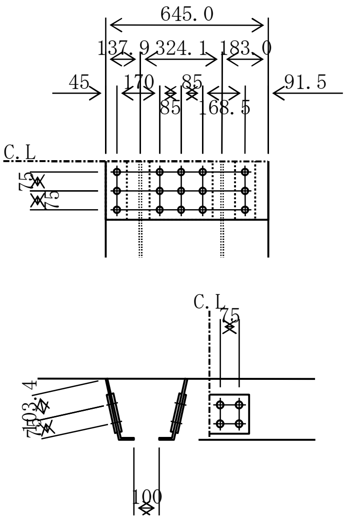
(b) Section area of main plate

1-DECK-1 PL 645 * 16 Ag = 103.2 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 127 * 10320 = 1309123 N

・Rib Pcr = σc * Agr = 127 * 5390 = 683727 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1309123 / 108000 = 12.1 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 683727 / 108000 = 6.3 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 15 = 1309123 / 15 = 87275 N

ρs = τ * Ag / 15 = 5 * 10320 / 15 = 3763 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(87275^2 + 3763^2)}$ = 87356 N

(h) Check of splice plates

	(SS400)	Ags(cm²)	
1-SPL PL	645 ＊ 9	58.1	
1-SPL PL	85 ＊ 14	11.9	
1-SPL PL	250 ＊ 14	35.0	
1-SPL PL	80 ＊ 14	11.2	
		58.1	
4-SPL PL	155 ＊ 10	62.0	＞ AgrR = 53.9cm2

(135) D-2 J-24(Sec-24) DECK-2

(a) Acting stress

$\sigma cmax$ = -127 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 127 N/mm^2

τmax = 5 N/mm^2

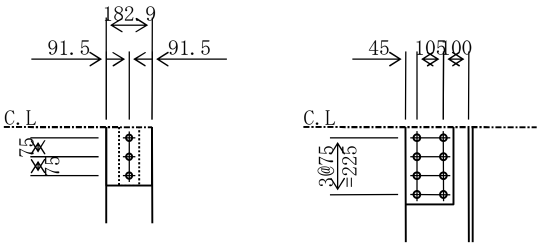
(b) Section area of main plate

1-DECK-2 PL 183 * 16 Ag = 29.3 cm^2 (SM400)

1-RIB PL 250 * 24 Agr = 60.0 cm^2 (SM400)

ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 127 * 2927 = 371298 N

・Rib Pcr = σc * Agr = 127 * 6000 = 761106 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2

・Rib AgrR = Agr = 60.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 371298 / 108000 = 3.4 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 761106 / 108000 = 7.0 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 3 = 371298 / 3 = 123766 N

ρs = τ * Ag / 3 = 5 * 2927 / 3 = 5337 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(123766^2 + 5337^2) = 123881 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	183 * 9	16.5	
1-SPL PL	80 * 14	11.2	
2-SPL PL	185 * 18	66.6	＞ AgrR = 60.0cm2

(136) D-2 J-24(Sec-24) DECK-3

(a) Acting stress

$\sigma cmax$ = -127 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 127 N/mm^2

τmax = 5 N/mm^2

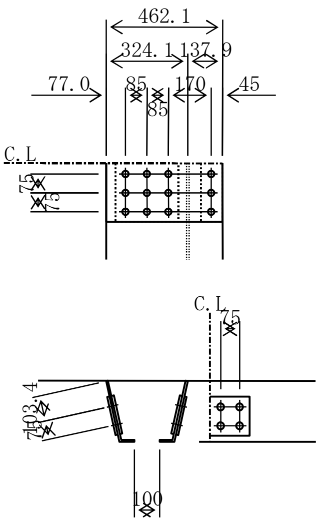
(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 127 * 7393 = 937784 N

・Rib Pcr = σc * Agr = 127 * 5390 = 683727 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 937784 / 108000 = 8.7 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 683727 / 108000 = 6.3 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 12 = 937784 / 12 = 78149 N

ρs = τ * Ag / 12 = 5 * 7393 / 12 = 3370 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(78149^2 + 3370^2)}$ = 78221 N

(h) Check of splice plates

	(SS400)	$Ags(cm^2)$	
1-SPL PL	462 * 9	41.6	
1-SPL PL	250 * 14	35.0	
1-SPL PL	85 * 14	11.9	
		46.9	
4-SPL PL	155 * 10	62.0	＞ AgrR = 53.9cm2

(137) D-2 J-25(Sec-25) DECK-1

(a) Acting stress

$\sigma cmax$ = -149 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma c$ = 158 N/mm^2

τmax = 4 N/mm^2

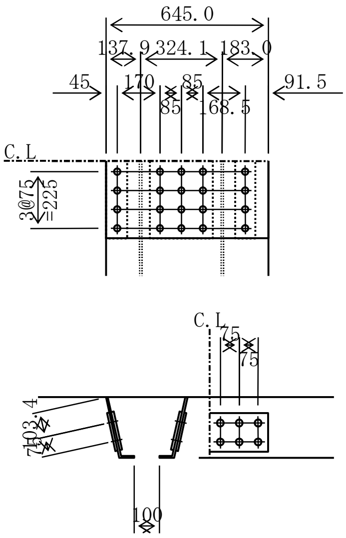
(b) Section area of main plate

1-DECK-1 PL 645 * 16   Ag = 103.2 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 10320 = 1625425 N

・Rib Pcr = σc * Agr = 158 * 5390 = 848925 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2

・Rib   AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1625425 / 108000 = 15.1 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 848925 / 108000 = 7.9 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 20 = 1625425 / 20 = 81271 N

ρs = τ * Ag / 20 = 4 * 10320 / 20 = 2026 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(81271^2 + 2026^2)}$ = 81297 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)		
1-SPL PL	645 ＊ 9	58.1		
1-SPL PL	85 ＊ 14	11.9		
1-SPL PL	250 ＊ 14	35.0		
1-SPL PL	80 ＊ 14	11.2		
		58.1		
4-SPL PL	155 ＊ 10	62.0	＞ AgrR =	53.9cm2

(138) D-2 J-25(Sec-25) DECK-2

(a) Acting stress

σ cmax = -149 N/mm^2 0.75 σ ca = 0.75 * 210 = 158 N/mm^2

∴ σ c = 158 N/mm^2

τ max = 4 N/mm^2

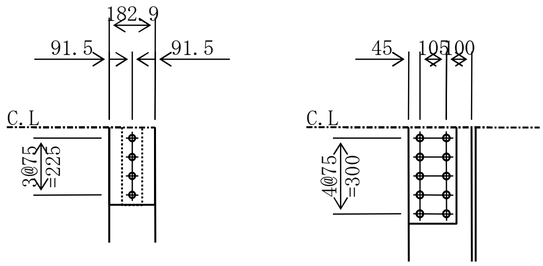
(b) Section area of main plate

1-DECK-2 PL 183 * 16 Ag = 29.3 cm^2 (SM490Y)

1-RIB PL 250 * 24 Agr = 60.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σ c * Ag = 158 * 2927 = 461009 N

・Rib Pcr = σ c * Agr = 158 * 6000 = 945000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2

・Rib AgrR = Agr = 60.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 461009 / 108000 = 4.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 945000 / 108000 = 8.8 pcs. (1 @ 10 = 10 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(g) Tensile force per one bolt

ρ p = Pc / 4 = 461009 / 4 = 115252 N

ρ s = τ * Ag / 4 = 4 * 2927 / 4 = 2873 N

ρ = $\sqrt{}$ (ρ p^2 + ρ s^2) = $\sqrt{}$ (115252^2 + 2873^2) = 115288 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
1-SPL PL	183 * 9	16.5	
1-SPL PL	80 * 14	11.2	
2-SPL PL	185 * 18	66.6	＞ AgrR = 60.0cm2

(139) D-2　J-25(Sec-25)　DECK-3

(a) Acting stress

$\sigma cmax$ = -149 N/mm^2　　0.75σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 158 N/mm^2

τmax = 4 N/mm^2

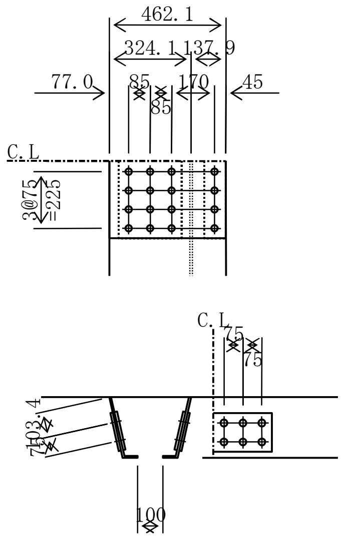
(b) Section area of main plate

1-DECK-3　PL　462 * 16　　　Ag = 73.9 cm^2　(SM490Y)

1-U.RIB 320 * 240 * 8　　　Agr = 53.9 cm^2　(SM490Y)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate　Pc = σc * Ag = 158 * 7393 = 1164366 N

・Rib　Pcr = σc * Agr = 158 * 5390 = 848925 N

(e) Required section area of the splice plates

・Mother material(One side)　AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib　　　AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate　n = Pc / (108000 * 1.00) = 1164366 / 108000 = 10.8 pcs.

・Rib　nr = Pcr / (108000 * 1.00) = 848925 / 108000 = 7.9 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 16 = 1164366 / 16 = 72773 N

ρs = τ * Ag / 16 = 4 * 7393 / 16 = 1814 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(72773^2 + 1814^2)}$ = 72795 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
1-SPL PL	462 * 9	41.6	
1-SPL PL	250 * 14	35.0	
1-SPL PL	85 * 14	11.9	
		46.9	
4-SPL PL	155 * 10	62.0	＞ AgrR = 53.9cm2

(140) D-2 J-26(Sec-26) DECK-1

(a) Acting stress

$\sigma cmax$ = -159 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 159 N/mm^2

τmax = 3 N/mm^2

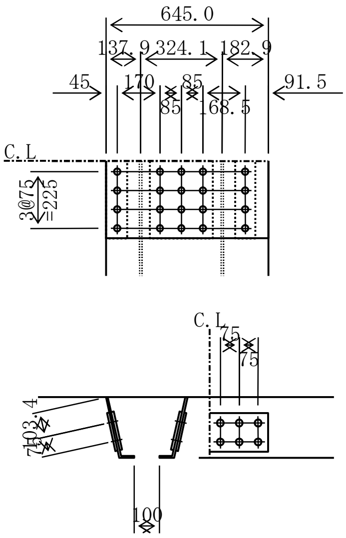
(b) Section area of main plate

1-DECK-1 PL 645 * 16   Ag = 103.2 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 159 * 10320 = 1644002 N

・Rib Pcr = σc * Agr = 159 * 5390 = 858654 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1644002 / 108000 = 15.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 858654 / 108000 = 8.0 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 20 = 1644002 / 20 = 82200 N

ρs = τ * Ag / 20 = 3 * 10320 / 20 = 1390 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(82200^2 + 1390^2)}$ = 82212 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)		
1-SPL PL	645 ＊ 9	58.0		
1-SPL PL	85 ＊ 14	11.9		
1-SPL PL	250 ＊ 14	35.0		
1-SPL PL	80 ＊ 14	11.2		
		58.1		
4-SPL PL	155 ＊ 10	62.0	＞ AgrR =	53.9cm2

(141) D-2 J-26(Sec-26) DECK-2

(a) Acting stress

σ cmax = -159 N/mm^2 0.75 σ ca = 0.75 * 210 = 158 N/mm^2

∴ σ c = 159 N/mm^2

τ max = 3 N/mm^2

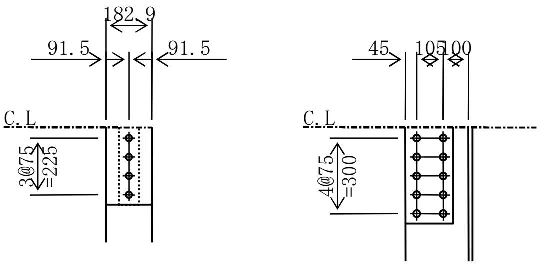
(b) Section area of main plate

1-DECK-2 PL 183 * 16 Ag = 29.3 cm^2 (SM490Y)

1-RIB PL 250 * 24 Agr = 60.0 cm^2 (SM490Y)

Σ Ag = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σ c * Ag = 159 * 2927 = 466318 N

・Rib Pcr = σ c * Agr = 159 * 6000 = 955830 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2

・Rib AgrR = Agr = 60.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 466318 / 108000 = 4.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 955830 / 108000 = 8.9 pcs. (1 @ 10 = 10 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(g) Tensile force per one bolt

ρ p = Pc / 4 = 466318 / 4 = 116579 N

ρ s = τ * Ag / 4 = 3 * 2927 / 4 = 1971 N

ρ = $\sqrt{}$ (ρ p^2 + ρ s^2) = $\sqrt{}$ (116579^2 + 1971^2) = 116596 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
1-SPL PL	183 * 9	16.5	
1-SPL PL	80 * 14	11.2	
2-SPL PL	185 * 18	66.6	＞ AgrR = 60.0cm2

(142) D-2 J-26(Sec-26) DECK-3

(a) Acting stress

σ cmax = -159 N/mm^2 0.75 σ ca = 0.75 * 210 = 158 N/mm^2

∴ σ c = 159 N/mm^2

τ max = 3 N/mm^2

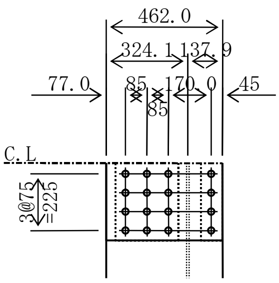
(b) Section area of main plate

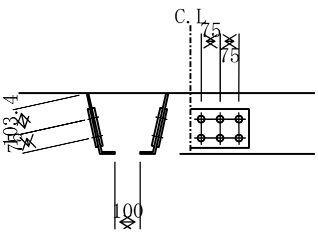
1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σ c * Ag = 159 * 7392 = 1177608 N

・Rib Pcr = σ c * Agr = 159 * 5390 = 858654 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1177608 / 108000 = 10.9 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 858654 / 108000 = 8.0 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρ p = Pc / 16 = 1177608 / 16 = 73601 N

ρ s = τ * Ag / 16 = 3 * 7392 / 16 = 1245 N

ρ = $\sqrt{}$ (ρ p^2 + ρ s^2) = $\sqrt{}$ (73601^2 + 1245^2) = 73611 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)		
1-SPL PL	462 ＊ 9	41.6		
1-SPL PL	250 ＊ 14	35.0		
1-SPL PL	85 ＊ 14	11.9		
		46.9		
4-SPL PL	155 ＊ 10	62.0	＞ AgrR =	53.9cm2

(143) D-2 J-27(Sec-27) DECK-1

(a) Acting stress

$\sigma cmax$ = -167 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 167 N/mm^2

τmax = 2 N/mm^2

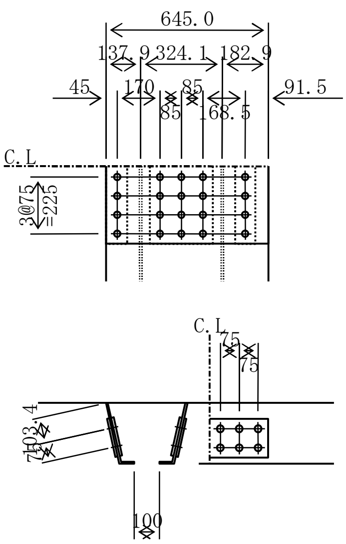
(b) Section area of main plate

1-DECK-1 PL 645 * 16 Ag = 103.2 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 167 * 10320 = 1721659 N

・Rib Pcr = σc * Agr = 167 * 5390 = 899214 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1721659 / 108000 = 15.9 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 899214 / 108000 = 8.3 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 20 = 1721659 / 20 = 86083 N

ρs = τ * Ag / 20 = 2 * 10320 / 20 = 895 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(86083^2 + 895^2)}$ = 86088 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)		
1-SPL PL	645 ＊ 9	58.0		
1-SPL PL	85 ＊ 14	11.9		
1-SPL PL	250 ＊ 14	35.0		
1-SPL PL	80 ＊ 14	11.2		
		58.1		
4-SPL PL	155 ＊ 10	62.0	＞ AgrR =	53.9cm2

(144) D-2 J-27(Sec-27) DECK-2

(a) Acting stress

σcmax = -167 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma$c = 167 N/mm^2

τmax = 2 N/mm^2

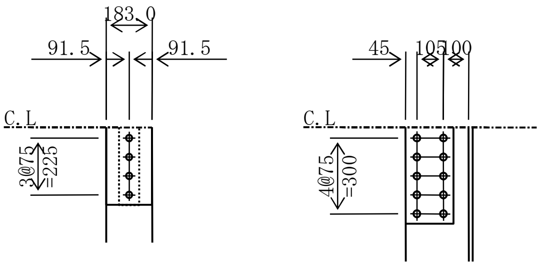
(b) Section area of main plate

1-DECK-2 PL 183 * 16 Ag = 29.3 cm^2 (SM490Y)

1-RIB PL 250 * 24 Agr = 60.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 167 * 2927 = 488371 N

・Rib Pcr = σc * Agr = 167 * 6000 = 1000980 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2

・Rib AgrR = Agr = 60.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 488371 / 108000 = 4.5 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 1000980 / 108000 = 9.3 pcs. (1 @ 10 = 10 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(g) Tensile force per one bolt

ρp = Pc / 4 = 488371 / 4 = 122093 N

ρs = τ * Ag / 4 = 2 * 2927 / 4 = 1270 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(122093^2 + 1270^2) = 122099 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
1-SPL PL	183 * 9	16.5	
1-SPL PL	80 * 14	11.2	
2-SPL PL	185 * 18	66.6	> AgrR = 60.0cm2

(145) D-2 J-27(Sec-27) DECK-3

(a) Acting stress

$\sigma cmax$ = -167 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 167 N/mm^2

τmax = 2 N/mm^2

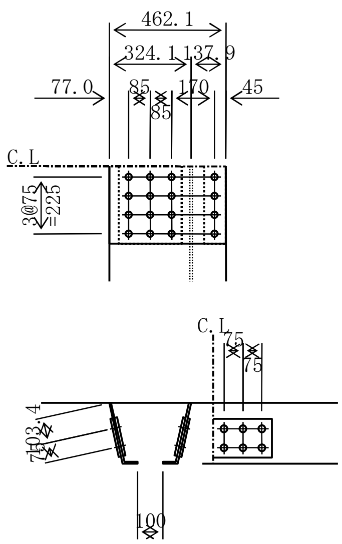
(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 167 * 7393 = 1233341 N

・Rib Pcr = σc * Agr = 167 * 5390 = 899214 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1233341 / 108000 = 11.4 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 899214 / 108000 = 8.3 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 16 = 1233341 / 16 = 77084 N

ρs = τ * Ag / 16 = 2 * 7393 / 16 = 802 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(77084^2 + 802^2)}$ = 77088 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)		
1-SPL PL	462 * 9	41.6		
1-SPL PL	250 * 14	35.0		
1-SPL PL	85 * 14	11.9		
		46.9		
4-SPL PL	155 * 10	62.0	> AgrR =	53.9cm2

(146) D-2　J-28(Sec-29)　DECK-1

(a) Acting stress

$\sigma cmax$ = -165 N/mm^2　　0.75 σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 165 N/mm^2

τmax = 2 N/mm^2

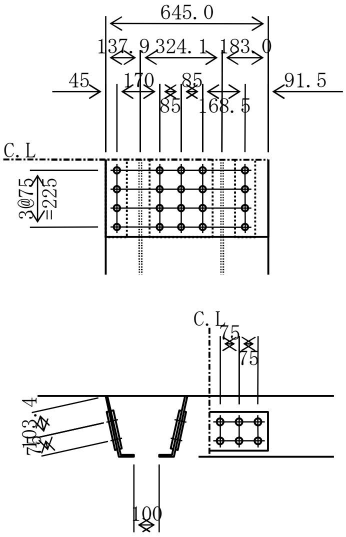
(b) Section area of main plate

1-DECK-1　PL　645 * 16　　　Ag = 103.2 cm^2　(SM490Y)

1-U.RIB 320 * 240 * 8　　　Agr = 53.9 cm^2　(SM490Y)

ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate　Pc = σc * Ag = 165 * 10320 = 1698244 N

・Rib　Pcr = σc * Agr = 165 * 5390 = 886957 N

(e) Required section area of the splice plates

・Mother material(One side)　AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2

・Rib　　　AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate　n = Pc / (108000 * 1.00) = 1698244 / 108000 = 15.7 pcs.

・Rib　nr = Pcr / (108000 * 1.00) = 886957 / 108000 = 8.2 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 20 = 1698244 / 20 = 84912 N

ρs = τ * Ag / 20 = 2 * 10320 / 20 = 1079 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(84912^2 + 1079^2)}$ = 84919 N

(h) Check of splice plates

	(SM490Y)	$Ags(cm^2)$		
1-SPL PL	645 * 9	58.1		
1-SPL PL	85 * 14	11.9		
1-SPL PL	250 * 14	35.0		
1-SPL PL	80 * 14	11.2		
		58.1		
4-SPL PL	155 * 10	62.0	> AgrR =	53.9cm2

(147) D-2 J-28(Sec-29) DECK-2

(a) Acting stress

σ cmax = -165 N/mm^2 0.75 σ ca = 0.75 * 210 = 158 N/mm^2

∴ σ c = 165 N/mm^2

τ max = 2 N/mm^2

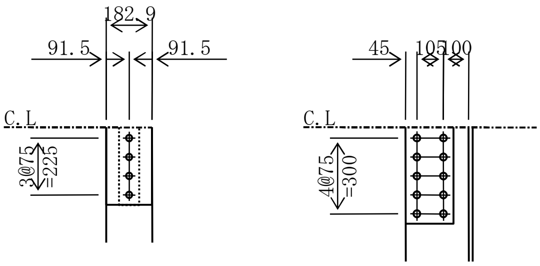
(b) Section area of main plate

1-DECK-2 PL 183 * 16 Ag = 29.3 cm^2 (SM490Y)

1-RIB PL 250 * 24 Agr = 60.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σ c * Ag = 165 * 2927 = 481662 N

・Rib Pcr = σ c * Agr = 165 * 6000 = 987336 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2

・Rib AgrR = Agr = 60.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 481662 / 108000 = 4.5 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 987336 / 108000 = 9.1 pcs. (1 @ 10 = 10 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(g) Tensile force per one bolt

ρ p = Pc / 4 = 481662 / 4 = 120415 N

ρ s = τ * Ag / 4 = 2 * 2927 / 4 = 1530 N

ρ = $\sqrt{}$ (ρ p^2 + ρ s^2) = $\sqrt{}$ (120415^2 + 1530^2) = 120425 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)
1-SPL PL	183 * 9	16.5
1-SPL PL	80 * 14	11.2
2-SPL PL	185 * 18	66.6 ＞ AgrR = 60.0cm2

(148) D-2 J-28(Sec-29) DECK-3

(a) Acting stress

σcmax = -165 N/mm² 0.75σca = 0.75 * 210 = 158 N/mm²

∴σc = 165 N/mm²

τmax = 2 N/mm²

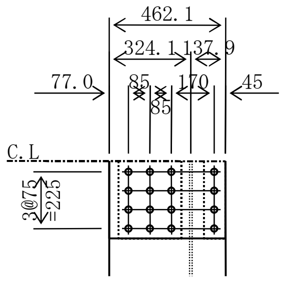
(b) Section area of main plate

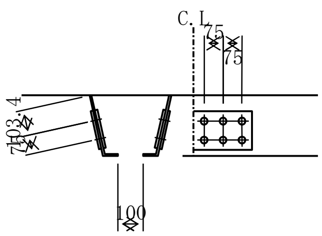
1-DECK-3 PL 462 * 16 Ag = 73.9 cm² (SM490Y)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm² (SM490Y)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm²

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 165 * 7393 = 1216530 N

・Rib Pcr = σc * Agr = 165 * 5390 = 886957 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm²

・Rib AgrR = Agr = 53.9 cm²

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1216530 / 108000 = 11.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 886957 / 108000 = 8.2 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 16 = 1216530 / 16 = 76033 N

ρs = τ * Ag / 16 = 2 * 7393 / 16 = 966 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(76033^2 + 966^2)} = 76039$ N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
1-SPL PL	462 ＊ 9	41.6	
1-SPL PL	250 ＊ 14	35.0	
1-SPL PL	85 ＊ 14	11.9	
		46.9	
4-SPL PL	155 ＊ 10	62.0	＞ AgrR = 53.9cm2

(149) D-2 J-29(Sec-30) DECK-1

(a) Acting stress

$\sigma cmax$ = -157 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 158 N/mm^2

τmax = 3 N/mm^2

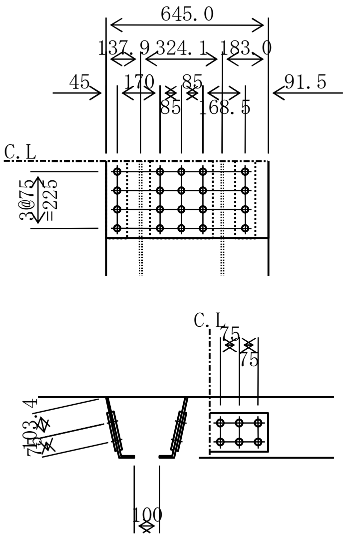
(b) Section area of main plate

1-DECK-1 PL 645 * 16   Ag = 103.2 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 10320 = 1625425 N

・Rib Pcr = σc * Agr = 158 * 5390 = 848925 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2

・Rib   AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1625425 / 108000 = 15.1 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 848925 / 108000 = 7.9 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 20 = 1625425 / 20 = 81271 N

ρs = τ * Ag / 20 = 3 * 10320 / 20 = 1570 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(81271^2 + 1570^2)}$ = 81286 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
1-SPL PL	645 ＊ 9	58.1	
1-SPL PL	85 ＊ 14	11.9	
1-SPL PL	250 ＊ 14	35.0	
1-SPL PL	80 ＊ 14	11.2	
		58.1	
4-SPL PL	155 ＊ 10	62.0	＞ AgrR = 53.9cm2

(150) D-2 J-29(Sec-30) DECK-2

(a) Acting stress

$\sigma cmax$ = -157 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 158 N/mm^2

τmax = 3 N/mm^2

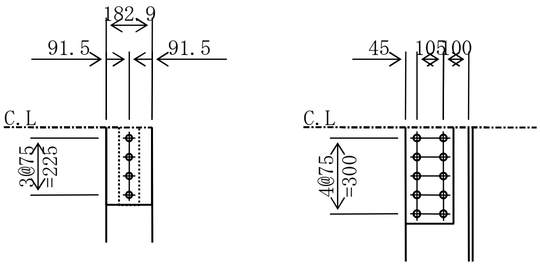
(b) Section area of main plate

1-DECK-2 PL 183 * 16   Ag = 29.3 cm^2 (SM490Y)

1-RIB PL 250 * 24   Agr = 60.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 2927 = 461009 N

・Rib Pcr = σc * Agr = 158 * 6000 = 945000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2

・Rib AgrR = Agr = 60.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 461009 / 108000 = 4.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 945000 / 108000 = 8.8 pcs. (1 @ 10 = 10 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(g) Tensile force per one bolt

ρp = Pc / 4 = 461009 / 4 = 115252 N

ρs = τ * Ag / 4 = 3 * 2927 / 4 = 2226 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(115252^2 + 2226^2)}$ = 115274 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
1-SPL PL	183 * 9	16.5	
1-SPL PL	80 * 14	11.2	
2-SPL PL	185 * 18	66.6	> AgrR = 60.0cm2

(151) D-2 J-29(Sec-30) DECK-3

(a) Acting stress

$\sigma cmax$ = -157 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma c$ = 158 N/mm^2

τmax = 3 N/mm^2

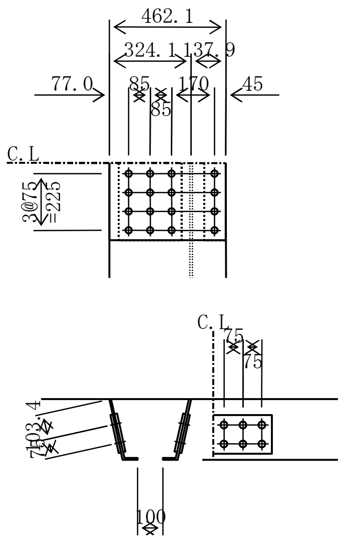
(b) Section area of main plate

1-DECK-3 PL 462 * 16   Ag = 73.9 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 7393 = 1164366 N

・Rib Pcr = σc * Agr = 158 * 5390 = 848925 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib   AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1164366 / 108000 = 10.8 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 848925 / 108000 = 7.9 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 16 = 1164366 / 16 = 72773 N

ρs = τ * Ag / 16 = 3 * 7393 / 16 = 1406 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(72773^2 + 1406^2)}$ = 72786 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)		
1-SPL PL	462 * 9	41.6		
1-SPL PL	250 * 14	35.0		
1-SPL PL	85 * 14	11.9		
		46.9		
4-SPL PL	155 * 10	62.0	＞ AgrR =	53.9cm2

(152) D-2 J-30(Sec-31) DECK-1

(a) Acting stress

$\sigma cmax$ = -143 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma c$ = 158 N/mm^2

τmax = 4 N/mm^2

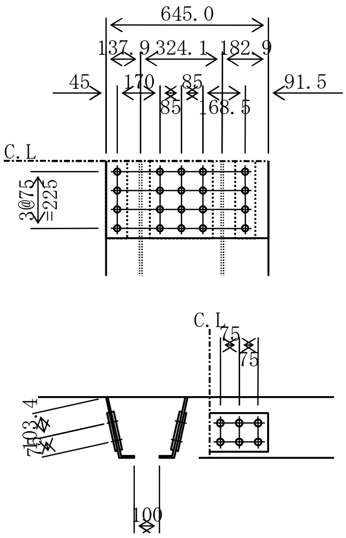
(b) Section area of main plate

1-DECK-1 PL 645 * 16 Ag = 103.2 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 10320 = 1625375 N

・Rib Pcr = σc * Agr = 158 * 5390 = 848925 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1625375 / 108000 = 15.0 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 848925 / 108000 = 7.9 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 20 = 1625375 / 20 = 81269 N

ρs = τ * Ag / 20 = 4 * 10320 / 20 = 2159 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(81269^2 + 2159^2)}$ = 81297 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)		
1-SPL PL	645 * 9	58.0		
1-SPL PL	85 * 14	11.9		
1-SPL PL	250 * 14	35.0		
1-SPL PL	80 * 14	11.2		
		58.1		
4-SPL PL	155 * 10	62.0	> AgrR =	53.9cm2

(153) D-2 J-30(Sec-31) DECK-2

(a) Acting stress

$\sigma cmax$ = -143 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 158 N/mm^2

τmax = 4 N/mm^2

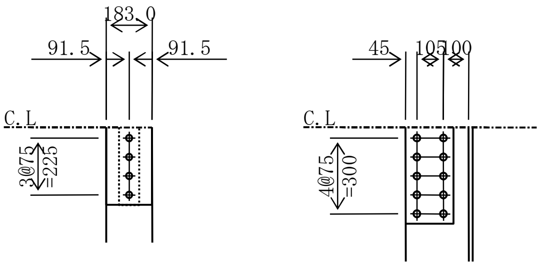
(b) Section area of main plate

1-DECK-2 PL 183 * 16   Ag = 29.3 cm^2 (SM490Y)

1-RIB PL 250 * 24   Agr = 60.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 2927 = 461059 N

・Rib Pcr = σc * Agr = 158 * 6000 = 945000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2

・Rib AgrR = Agr = 60.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 461059 / 108000 = 4.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 945000 / 108000 = 8.8 pcs. (1 @ 10 = 10 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(g) Tensile force per one bolt

ρp = Pc / 4 = 461059 / 4 = 115265 N

ρs = τ * Ag / 4 = 4 * 2927 / 4 = 3063 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(115265^2 + 3063^2)}$ = 115305 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
1-SPL PL	183 * 9	16.5	
1-SPL PL	80 * 14	11.2	
2-SPL PL	185 * 18	66.6	> AgrR = 60.0cm2

(154) D-2 J-30(Sec-31) DECK-3

(a) Acting stress

$\sigma cmax$ = -143 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma c$ = 158 N/mm^2

τmax = 4 N/mm^2

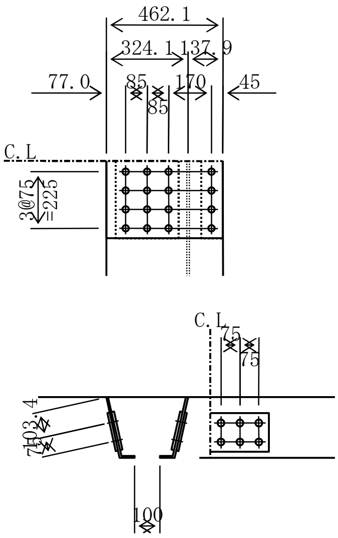
(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 7393 = 1164366 N

・Rib Pcr = σc * Agr = 158 * 5390 = 848925 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1164366 / 108000 = 10.8 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 848925 / 108000 = 7.9 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 16 = 1164366 / 16 = 72773 N

ρs = τ * Ag / 16 = 4 * 7393 / 16 = 1934 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(72773^2 + 1934^2)}$ = 72799 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)
1-SPL PL	462 * 9	41.6
1-SPL PL	250 * 14	35.0
1-SPL PL	85 * 14	11.9
		46.9
4-SPL PL	155 * 10	62.0 ＞ AgrR = 53.9cm2

(155) D-2 J-31(Sec-32) DECK-1

(a) Acting stress

σcmax = -120 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴σc = 120 N/mm^2

τmax = 5 N/mm^2

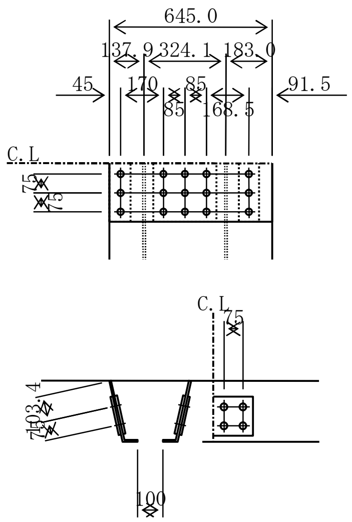
(b) Section area of main plate

1-DECK-1 PL 645 * 16   Ag = 103.2 cm^2 (SM400)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 120 * 10320 = 1236789 N

・Rib Pcr = σc * Agr = 120 * 5390 = 645948 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2

・Rib   AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1236789 / 108000 = 11.5 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 645948 / 108000 = 6.0 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 15 = 1236789 / 15 = 82453 N

ρs = τ * Ag / 15 = 5 * 10320 / 15 = 3435 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(82453^2 + 3435^2) = 82524 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	645 ＊ 9	58.1	
1-SPL PL	85 ＊ 14	11.9	
1-SPL PL	250 ＊ 14	35.0	
1-SPL PL	80 ＊ 14	11.2	
		58.1	
4-SPL PL	155 ＊ 10	62.0	＞ AgrR = 53.9cm2

(156) D-2 J-31(Sec-32) DECK-2

(a) Acting stress

$\sigma cmax$ = -120 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 120 N/mm^2

τmax = 5 N/mm^2

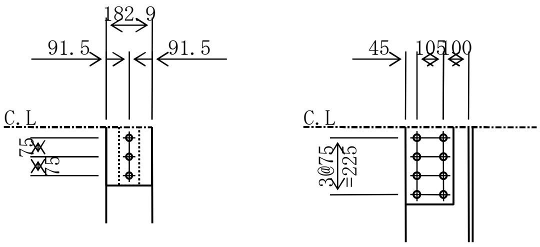
(b) Section area of main plate

1-DECK-2 PL 183 * 16 Ag = 29.3 cm^2 (SM400)

1-RIB PL 250 * 24 Agr = 60.0 cm^2 (SM400)

ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 120 * 2927 = 350782 N

・Rib Pcr = σc * Agr = 120 * 6000 = 719052 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2

・Rib AgrR = Agr = 60.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 350782 / 108000 = 3.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 719052 / 108000 = 6.7 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 3 = 350782 / 3 = 116927 N

ρs = τ * Ag / 3 = 5 * 2927 / 3 = 4871 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(116927^2 + 4871^2) = 117029 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	183 * 9	16.5	
1-SPL PL	80 * 14	11.2	
2-SPL PL	185 * 18	66.6	＞ AgrR = 60.0cm2

(157) D-2 J-31(Sec-32) DECK-3

(a) Acting stress

σcmax = -120 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma$c = 120 N/mm^2

τmax = 5 N/mm^2

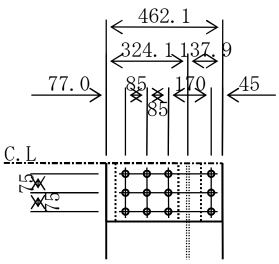
(b) Section area of main plate

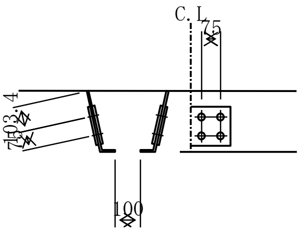
1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 120 * 7393 = 885968 N

・Rib Pcr = σc * Agr = 120 * 5390 = 645948 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 885968 / 108000 = 8.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 645948 / 108000 = 6.0 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 12 = 885968 / 12 = 73831 N

ρs = τ * Ag / 12 = 5 * 7393 / 12 = 3075 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(73831^2 + 3075^2) = 73895 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
1-SPL PL	462 * 9	41.6
1-SPL PL	250 * 14	35.0
1-SPL PL	85 * 14	11.9
		46.9
4-SPL PL	155 * 10	62.0 ＞ AgrR = 53.9cm2

(158) D-2 J-32(Sec-33) DECK-1

(a) Acting stress

$\sigma cmax$ = -88 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴σc = 105 N/mm^2

τmax = 8 N/mm^2

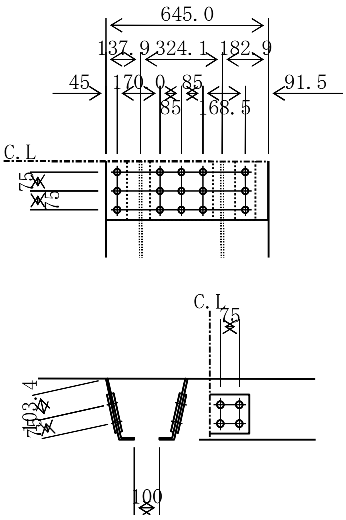
(b) Section area of main plate

1-DECK-1 PL 645 * 16 Ag = 103.2 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 10320 = 1083550 N

・Rib Pcr = σc * Agr = 105 * 5390 = 565950 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1083550 / 108000 = 10.0 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 15 = 1083550 / 15 = 72237 N

ρs = τ * Ag / 15 = 8 * 10320 / 15 = 5450 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(72237^2 + 5450^2)}$ = 72442 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	645 ＊ 9	58.0	
1-SPL PL	85 ＊ 14	11.9	
1-SPL PL	250 ＊ 14	35.0	
1-SPL PL	80 ＊ 14	11.2	
		58.1	
4-SPL PL	155 ＊ 10	62.0	＞ AgrR = 53.9cm2

(159) D-2 J-32(Sec-33) DECK-2

(a) Acting stress

σ cmax = -88 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2

$\therefore$ σ c = 105 N/mm^2

τ max = 8 N/mm^2

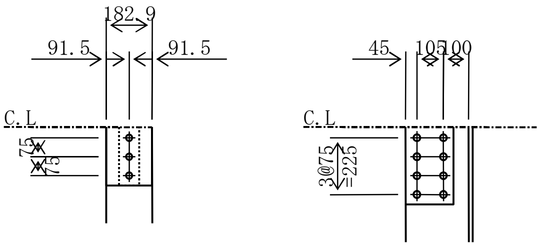
(b) Section area of main plate

1-DECK-2 PL 183 * 16 Ag = 29.3 cm^2 (SM400)

1-RIB PL 250 * 24 Agr = 60.0 cm^2 (SM400)

ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σ c * Ag = 105 * 2927 = 307339 N

・Rib Pcr = σ c * Agr = 105 * 6000 = 630000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2

・Rib AgrR = Agr = 60.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 307339 / 108000 = 2.8 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 630000 / 108000 = 5.8 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρ p = Pc / 3 = 307339 / 3 = 102446 N

ρ s = τ * Ag / 3 = 8 * 2927 / 3 = 7729 N

ρ = $\sqrt{}$ (ρ p^2 + ρ s^2) = $\sqrt{}$ (102446^2 + 7729^2) = 102738 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	183 * 9	16.5	
1-SPL PL	80 * 14	11.2	
2-SPL PL	185 * 18	66.6	> AgrR = 60.0cm2

(160) D-2 J-32(Sec-33) DECK-3

(a) Acting stress

σcmax = -88 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴σc = 105 N/mm^2

τmax = 8 N/mm^2

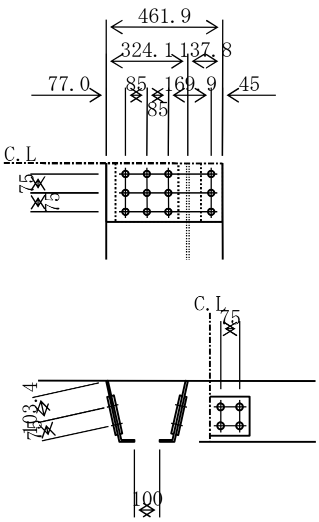
(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 7391 = 776026 N

・Rib Pcr = σc * Agr = 105 * 5390 = 565950 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 776026 / 108000 = 7.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 12 = 776026 / 12 = 64669 N

ρs = τ * Ag / 12 = 8 * 7391 / 12 = 4879 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(64669^2 + 4879^2) = 64853 N

(h) Check of splice plates

	(SS400)	$Ags(cm^2)$	
1-SPL PL	462 * 9	41.6	
1-SPL PL	250 * 14	35.0	
1-SPL PL	85 * 14	11.9	
		46.9	
4-SPL PL	155 * 10	62.0	＞ AgrR = 53.9cm2

(161) G2 J-1(Sec-1) DECK

(a) Acting stress

$\sigma cmax$ = -80 N/mm^2 $0.75\sigma ca$ = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 25 N/mm^2

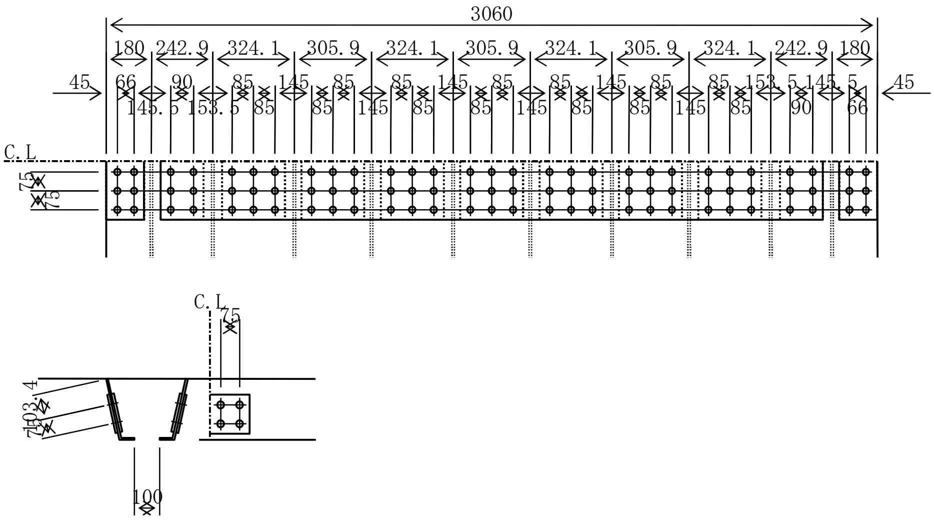
(b) Section area of main plate

1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM400)

4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM400)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 48960 = 5140800 N

・Rib Pcr = σc * Agr = 105 * 21560 = 2263800 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AgrR = Agr = 215.6 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5140800 / 108000 = 47.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2263800 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 87 = 5140800 / 87 = 59090 N

ρs = τ * Ag / 87 = 25 * 48960 / 87 = 14263 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(59090^2 + 14263^2)}$ = 60787 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)		
2-SPL PL	151 * 9	27.2		
1-SPL PL	2627 * 9	236.4		
		263.6		
2-SPL PL	151 * 14	42.3		
2-SPL PL	170 * 14	47.6		
7-SPL PL	250 * 14	245.0		
		334.9		
16-SPL PL	155 * 10	248.0	>	AgrR = 215.6cm^2

(162) G2 J-2(Sec-2) DECK

(a) Acting stress

$\sigma cmax$ = -104 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 17 N/mm^2

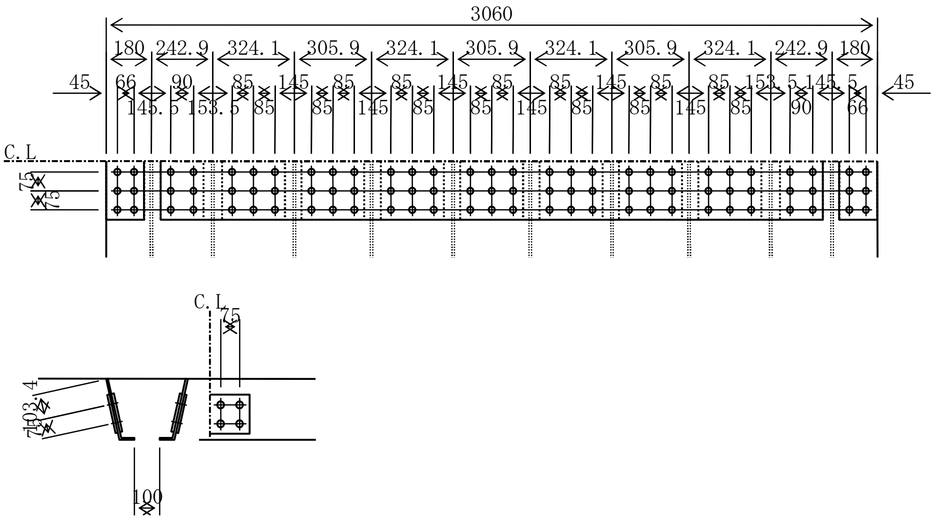
(b) Section area of main plate

1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM400)

4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM400)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 48960 = 5140800 N

・Rib Pcr = σc * Agr = 105 * 21560 = 2263800 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AgrR = Agr = 215.6 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5140800 / 108000 = 47.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2263800 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 87 = 5140800 / 87 = 59090 N

ρs = τ * Ag / 87 = 17 * 48960 / 87 = 9761 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(59090^2 + 9761^2) = 59890 N

(h) Check of splice plates

		Ags(cm^2)
	(SS400)	
2-SPL PL	151 * 9	27.2
1-SPL PL	2627 * 9	236.4
		263.6
2-SPL PL	151 * 14	42.3
2-SPL PL	170 * 14	47.6
7-SPL PL	250 * 14	245.0
		334.9
16-SPL PL	155 * 10	248.0 ＞ AgrR = 215.6cm^2

(163) G2 J-3(Sec-3) DECK

(a) Acting stress

$\sigma cmax$ = -115 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴σc = 115 N/mm^2

τmax = 11 N/mm^2

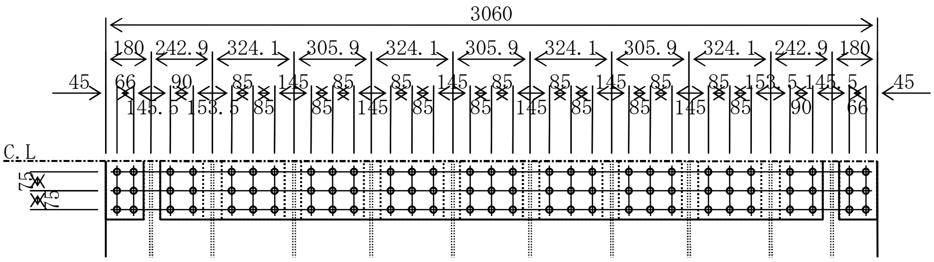
(b) Section area of main plate

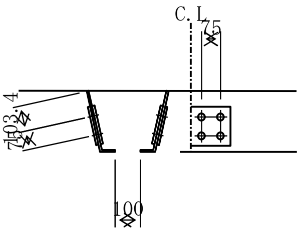
1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM400)

4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM400)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 115 * 48960 = 5650278 N

・Rib Pcr = σc * Agr = 115 * 21560 = 2488153 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AgrR = Agr = 215.6 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5650278 / 108000 = 52.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2488153 / 108000 = 23.0 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 87 = 5650278 / 87 = 64946 N

ρs = τ * Ag / 87 = 11 * 48960 / 87 = 6449 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(64946^2 + 6449^2)}$ = 65265 N

(h) Check of splice plates

		Ags(cm^2)
	(SS400)	
2-SPL PL	151 * 9	27.2
1-SPL PL	2627 * 9	236.4
		263.6
2-SPL PL	151 * 14	42.3
2-SPL PL	170 * 14	47.6
7-SPL PL	250 * 14	245.0
		334.9

16-SPL PL 155 * 10 248.0 ＞ AgrR = 215.6cm^2

(164) G2 J-4(Sec-5) DECK

(a) Acting stress

$\sigma cmax$ = -120 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 120 N/mm^2

τmax = 5 N/mm^2

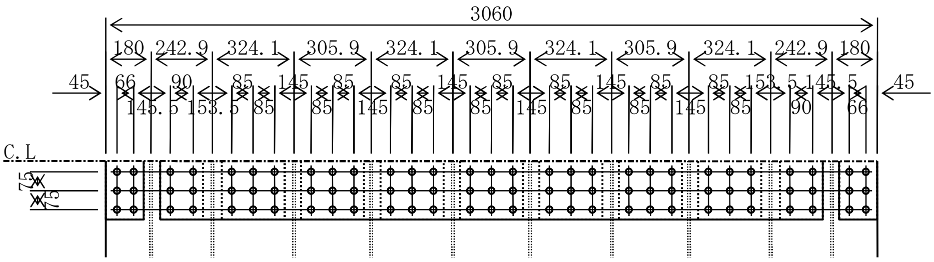
(b) Section area of main plate

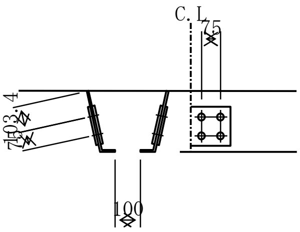
1-DECK PL 3060 * 16   Ag = 489.6 cm^2 (SM400)

4-U.RIB 320 * 240 * 8   Agr = 215.6 cm^2 (SM400)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 120 * 48960 = 5879362 N

・Rib Pcr = σc * Agr = 120 * 21560 = 2589033 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AgrR = Agr = 215.6 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5879362 / 108000 = 54.4 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2589033 / 108000 = 24.0 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 87 = 5879362 / 87 = 67579 N

ρs = τ * Ag / 87 = 5 * 48960 / 87 = 3073 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(67579^2 + 3073^2)}$ = 67649 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
2-SPL	PL 151 * 9	27.2
1-SPL	PL 2627 * 9	236.4
		263.6
2-SPL	PL 151 * 14	42.3
2-SPL	PL 170 * 14	47.6
7-SPL	PL 250 * 14	245.0
		334.9
16-SPL	PL 155 * 10	248.0 ＞ AgrR = 215.6cm^2

(165) G2 J-5(Sec-6) DECK

(a) Acting stress

$\sigma cmax$ = -115 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 115 N/mm^2

τmax = 11 N/mm^2

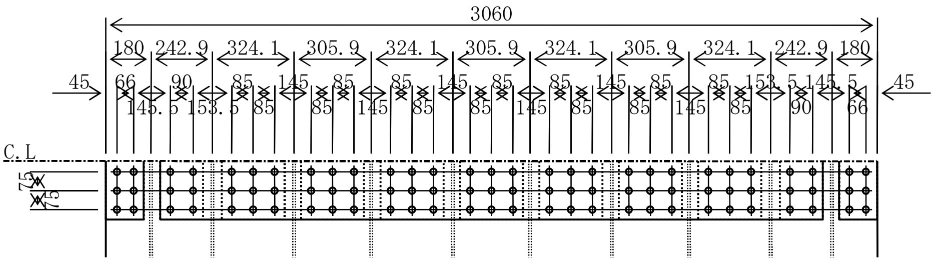
(b) Section area of main plate

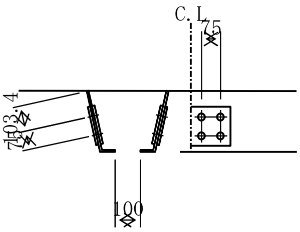
1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM400)

4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM400)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 115 * 48960 = 5633925 N

・Rib Pcr = σc * Agr = 115 * 21560 = 2480952 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AgrR = Agr = 215.6 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5633925 / 108000 = 52.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2480952 / 108000 = 23.0 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 87 = 5633925 / 87 = 64758 N

ρs = τ * Ag / 87 = 11 * 48960 / 87 = 5924 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(64758^2 + 5924^2)}$ = 65028 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
2-SPL	PL 151 * 9	27.2	
1-SPL	PL 2627 * 9	236.4	
		263.6	
2-SPL	PL 151 * 14	42.3	
2-SPL	PL 170 * 14	47.6	
7-SPL	PL 250 * 14	245.0	
		334.9	
16-SPL	PL 155 * 10	248.0	> AgrR = 215.6cm^2

(166) G2 J-6(Sec-7) DECK

(a) Acting stress

$\sigma cmax$ = -104 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 17 N/mm^2

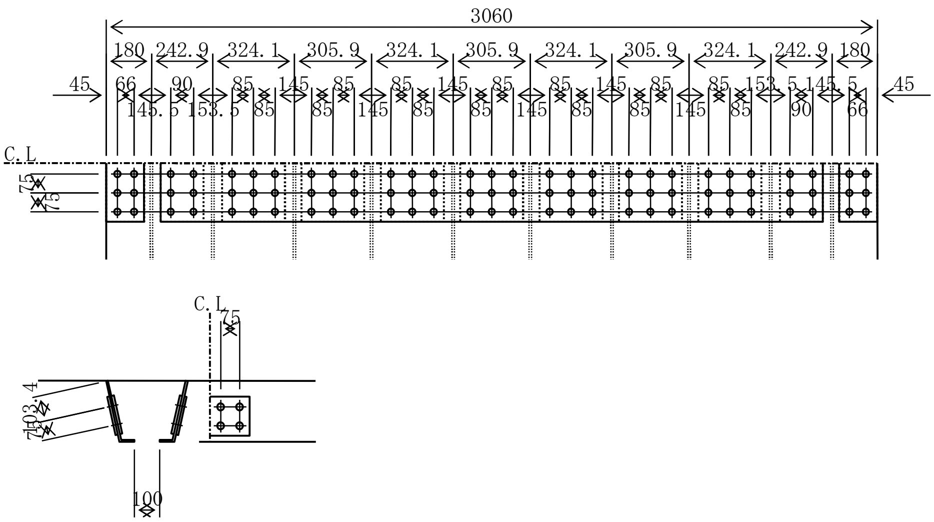
(b) Section area of main plate

1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM400)

4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM400)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 48960 = 5140800 N

・Rib Pcr = σc * Agr = 105 * 21560 = 2263800 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AgrR = Agr = 215.6 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5140800 / 108000 = 47.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2263800 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 87 = 5140800 / 87 = 59090 N

ρs = τ * Ag / 87 = 17 * 48960 / 87 = 9429 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(59090^2 + 9429^2)}$ = 59837 N

(h) Check of splice plates

	(SS400)	$Ags(cm^2)$
2-SPL PL	151 * 9	27.2
1-SPL PL	2627 * 9	236.4
		263.6
2-SPL PL	151 * 14	42.3
2-SPL PL	170 * 14	47.6
7-SPL PL	250 * 14	245.0
		334.9
16-SPL PL	155 * 10	248.0 ＞ AgrR = 215.6cm^2

(167) G2 J-7(Sec-8) DECK

(a) Acting stress

$\sigma cmax$ = -78 N/mm^2 0.75σca = 0.75 ∗ 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 24 N/mm^2

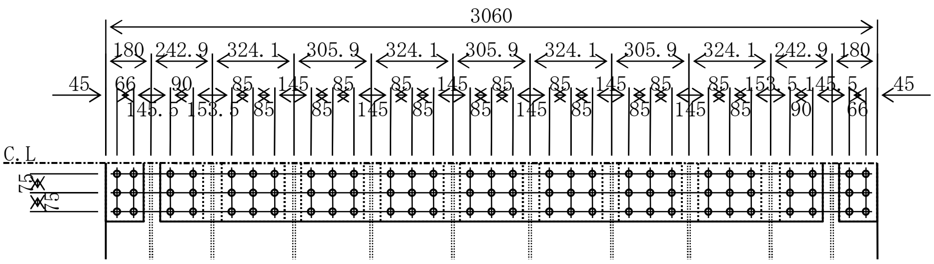
(b) Section area of main plate

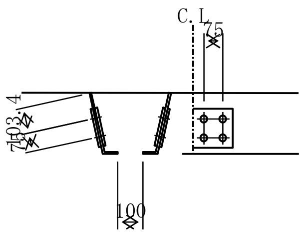
1-DECK PL 3060 ∗ 16 Ag = 489.6 cm^2 (SM400)

4-U.RIB 320 ∗ 240 ∗ 8 Agr = 215.6 cm^2 (SM400)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc ∗ Ag = 105 ∗ 48960 = 5140800 N

・Rib Pcr = σc ∗ Agr = 105 ∗ 21560 = 2263800 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AgrR = Agr = 215.6 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 ∗ 1.00) = 5140800 / 108000 = 47.6 pcs.

・Rib nr = Pcr / (108000 ∗ 1.00) = 2263800 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 87 = 5140800 / 87 = 59090 N

ρs = τ ∗ Ag / 87 = 24 ∗ 48960 / 87 = 13734 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(59090^2 + 13734^2)}$ = 60665 N

(h) Check of splice plates

		Ags(cm^2)
	(SS400)	
2-SPL PL	151 * 9	27.2
1-SPL PL	2627 * 9	236.4
		263.6
2-SPL PL	151 * 14	42.3
2-SPL PL	170 * 14	47.6
7-SPL PL	250 * 14	245.0
		334.9
16-SPL PL	155 * 10	248.0 ＞ AgrR = 215.6cm^2

(168) G2　J-8(Sec-8)　DECK

(a) Acting stress

$\sigma tmax$ = 31 N/mm^2　　0.75 σta = 0.75 * 140 = 105 N/mm^2

$\sigma cmax$ = -64 N/mm^2　　0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 28 N/mm^2

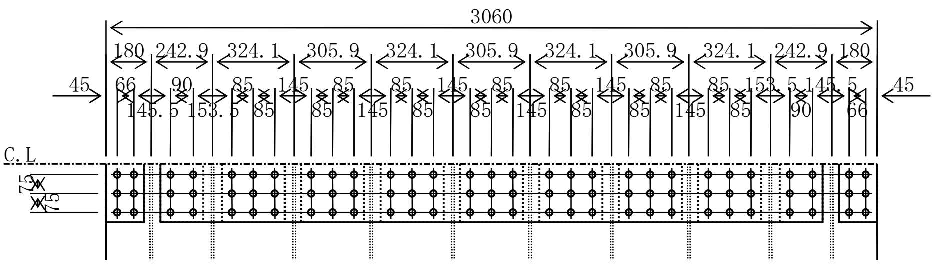
(b) Section area of main plate

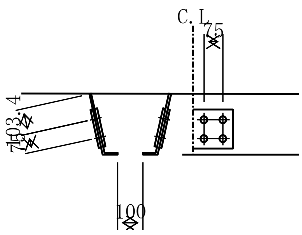
1-DECK　PL　3060 * 16　　　Ag = 489.6 cm^2　(SM400)

4-U.RIB 320 * 240 * 8　　　Agr = 215.6 cm^2　(SM400)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK　PL　3060 * 16　　　A = 489.6

(489.6 - (29* 2.5)* 1.6) * 1.1 = 411.0 ＜ 489.6　∴An = 411.0 cm^2

4-U.RIB 320 * 240 * 8　　　Ar = 215.6

(215.6 - 4*(4* 2.7)* 0.8- 4*(10.0*0.8)) * 1.1 = 163.9

＜ 215.6　∴Anr = 163.9 cm^2

ΣAn = An + Anr = 411.0 + 163.9 = 574.9 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 31 * 705.2 / 574.9 = 39 N/mm^2

＜ σta = 140 N/mm^2

(e) Design axial force

・Main plate　Pt = 0.75 σta * An / 1.1 = 105 * 41096 / 1.1 = 3922800 N

＞ σtn * An = 39 * 41096 = 1584587 N

Pc = σc * Ag = 105 * 48960 = 5140800 N

・Rib　Ptr = 0.75 σta * Anr / 1.1 = 105 * 16394 / 1.1 = 1564920 N

＞ σtn * Anr = 39 * 16394 = 632138 N

Pcr = σc * Agr = 105 * 21560 = 2263800 N

(f) Required section area of the splice plates

・Mother material(One side)　AnR = An / 2 = 411.0 / 2 = 205.5 cm^2

AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib　AnrR = Anr = 163.9 cm^2

AgrR = Agr = 215.6 cm^2

(g) Required bolt number

- Main plate n = Pc / (108000 * 1.00) = 5140800 / 108000 = 47.6 pcs.
- Rib nr = Pcr / (108000 * 1.00) = 2263800 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 87 = 5140800 / 87 = 59090 N
ρs = τ * Ag / 87 = 28 * 48960 / 87 = 15815 N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(59090^2 + 15815^2)}$ = 61170 N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1=	20.0<	27.2	∴ 20.0
1-SPL PL	2627 * 9	(236.4 -	(25*2.5)* 0.9)*1.1=	198.2<	236.4	∴198.2
		263.6				218.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1=	31.1<	42.3	∴ 31.1
2-SPL PL	170 * 14	(47.6 -	2*(2*2.5)* 1.4)*1.1=	37.0<	47.6	∴ 37.0
7-SPL PL	250 * 14	(245.0 -	7*(3*2.5)* 1.4)*1.1=	188.7<	245.0	∴188.7
		334.9				256.7
16-SPL PL	155 * 10	(248.0 -	16*(2*2.7)* 1.0)*1.1=	177.8<	248.0	∴177.8
		> AgrR				>AnrR

(169) G2 J-9(Sec-9) DECK

(a) Acting stress

σ tmax = 84 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2

σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2

∴ σ c = 105 N/mm^2

τ max = 31 N/mm^2

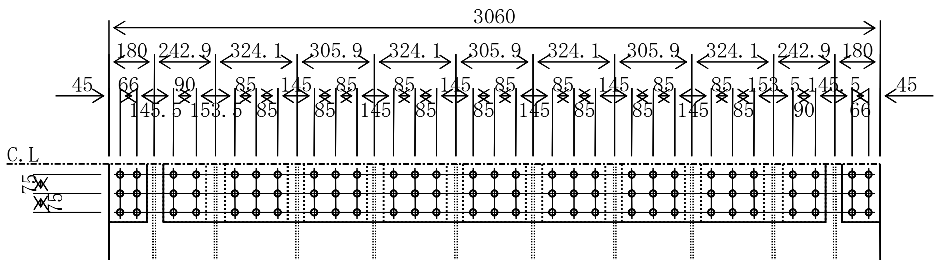
(b) Section area of main plate

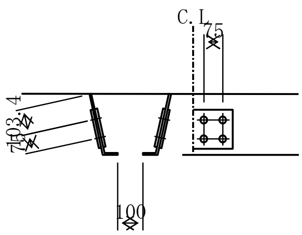
1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM400)

4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM400)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3060 * 16 A = 489.6

(489.6 - (29* 2.5)* 1.6) * 1.1 = 411.0 < 489.6 ∴An = 411.0 cm^2

4-U.RIB 320 * 240 * 8 Ar = 215.6

(215.6 - 4*(4* 2.7)* 0.8- 4*(10.0*0.8)) * 1.1 = 163.9

< 215.6 ∴Anr = 163.9 cm^2

ΣAn = An + Anr = 411.0 + 163.9 = 574.9 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 84 * 705.2 / 574.9 = 102 N/mm^2

< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 102 * 41096 = 4209838 N

> 0.75 σ ta * An / 1.1 = 105 * 41096 / 1.1 = 3922800 N

Pc = σ c * Ag = 105 * 48960 = 5140800 N

・Rib Ptr = σ tn * Anr = 102 * 16394 = 1679428 N

> 0.75 σ ta * Anr/ 1.1 = 105 * 16394 / 1.1 = 1564920 N

Pcr = σ c * Agr = 105 * 21560 = 2263800 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 411.0 / 2 = 205.5 cm^2

AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AnrR = Anr = 163.9 cm^2

AgrR = Agr = 215.6 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5140800 / 108000 = 47.6 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 2263800 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 87 = 5140800 / 87 = 59090$ N
$\rho s = \tau * Ag / 87 = 31 * 48960 / 87 = 17274$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(59090^2 + 17274^2)} = 61563$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2627 * 9	(236.4 -	(25*2.5)* 0.9)*1.1= 198.2<	236.4	∴198.2
		263.6			218.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
2-SPL PL	170 * 14	(47.6 -	2*(2*2.5)* 1.4)*1.1= 37.0<	47.6	∴ 37.0
7-SPL PL	250 * 14	(245.0 -	7*(3*2.5)* 1.4)*1.1= 188.7<	245.0	∴188.7
		334.9			256.7
16-SPL PL	155 * 10	(248.0 -	16*(2*2.7)* 1.0)*1.1= 177.8<	248.0	∴177.8
		＞ AgrR			＞AnrR

(170) G2 J-10(Sec-11) DECK

(a) Acting stress

$\sigma tmax$ = 90 N/mm^2 0.75σta = 0.75 * 140 = 105 N/mm^2

$\sigma cmax$ = -64 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 24 N/mm^2

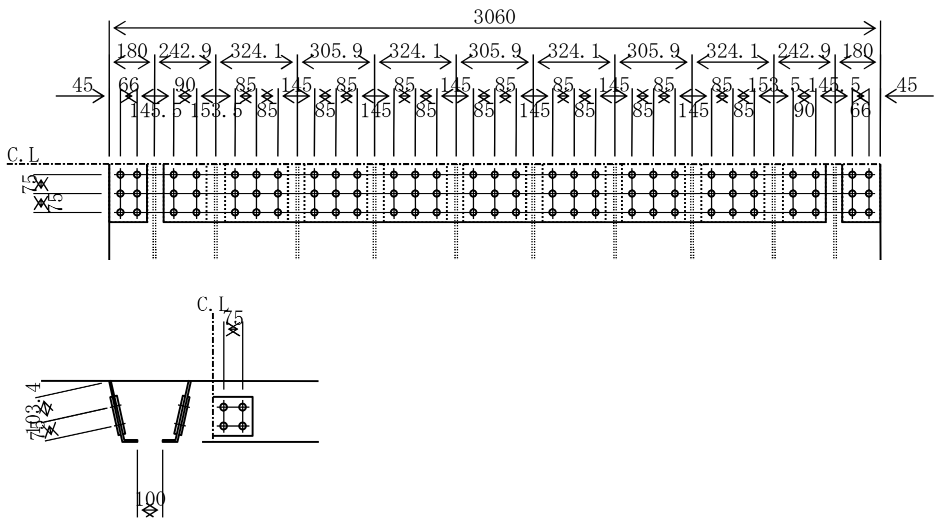
(b) Section area of main plate

1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM400)

4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM400)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 3060 * 16 A = 489.6

(489.6 - (29* 2.5)* 1.6) * 1.1 = 411.0 < 489.6 $\therefore$An = 411.0 cm^2

4-U.RIB 320 * 240 * 8 Ar = 215.6

(215.6 - 4*(4* 2.7)* 0.8- 4*(10.0*0.8)) * 1.1 = 163.9

< 215.6 $\therefore$Anr = 163.9 cm^2

ΣAn = An + Anr = 411.0 + 163.9 = 574.9 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 90 * 705.2 / 574.9 = 110 N/mm^2

< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 110 * 41096 = 4538814 N

> 0.75σta * An / 1.1 = 105 * 41096 / 1.1 = 3922800 N

Pc = σc * Ag = 105 * 48960 = 5140800 N

・Rib Ptr = σtn * Anr = 110 * 16394 = 1810666 N

> 0.75σta * Anr/ 1.1 = 105 * 16394 / 1.1 = 1564920 N

Pcr = σc * Agr = 105 * 21560 = 2263800 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 411.0 / 2 = 205.5 cm^2

AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AnrR = Anr = 163.9 cm^2

AgrR = Agr = 215.6 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5140800 / 108000 = 47.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2263800 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 87 = 5140800 / 87 = 59090 N

ρs = τ * Ag / 87 = 24 * 48960 / 87 = 13660 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(59090^2 + 13660^2)}$ = 60648 N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes		$Ans(cm^2)$
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0＜	27.2	∴ 20.0
1-SPL PL	2627 * 9	(236.4 -	(25*2.5)* 0.9)*1.1= 198.2＜	236.4	∴198.2
		263.6			218.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1＜	42.3	∴ 31.1
2-SPL PL	170 * 14	(47.6 -	2*(2*2.5)* 1.4)*1.1= 37.0＜	47.6	∴ 37.0
7-SPL PL	250 * 14	(245.0 -	7*(3*2.5)* 1.4)*1.1= 188.7＜	245.0	∴188.7
		334.9			256.7
16-SPL PL	155 * 10	(248.0 -	16*(2*2.7)* 1.0)*1.1= 177.8＜	248.0	∴177.8
		＞ AgrR			＞AnrR

(171) G2 J-11(Sec-12) DECK

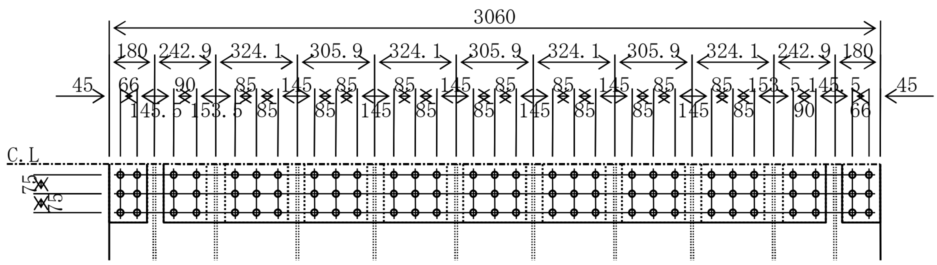
(a) Acting stress

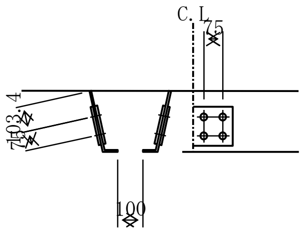
σ tmax = 53 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2
∴ σ c = 105 N/mm^2
τ max = 21 N/mm^2

(b) Section area of main plate

1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM400)
4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM400)
ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3060 * 16 A = 489.6
(489.6 - (29* 2.5)* 1.6) * 1.1 = 411.0 < 489.6 ∴An = 411.0 cm^2
4-U.RIB 320 * 240 * 8 Ar = 215.6
(215.6 - 4*(4* 2.7)* 0.8- 4*(10.0*0.8)) * 1.1 = 163.9
< 215.6 ∴Anr = 163.9 cm^2
ΣAn = An + Anr = 411.0 + 163.9 = 574.9 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 53 * 705.2 / 574.9 = 65 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 41096 / 1.1 = 3922800 N
> σ tn * An = 65 * 41096 = 2656707 N
Pc = σ c * Ag = 105 * 48960 = 5140800 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 16394 / 1.1 = 1564920 N
> σ tn * Anr = 65 * 16394 = 1059838 N
Pcr = σ c * Agr = 105 * 21560 = 2263800 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 411.0 / 2 = 205.5 cm^2
AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2
・Rib AnrR = Anr = 163.9 cm^2
AgrR = Agr = 215.6 cm^2

(g) Required bolt number

- Main plate n = Pc / (108000 * 1.00) = 5140800 / 108000 = 47.6 pcs.
- Rib nr = Pcr / (108000 * 1.00) = 2263800 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 87 = 5140800 / 87 = 59090 N
ρs = τ * Ag / 87 = 21 * 48960 / 87 = 11680 N
ρ = $\sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(59090^2 + 11680^2)}$ = 60233 N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2627 * 9	(236.4 -	(25*2.5)* 0.9)*1.1= 198.2<	236.4	∴198.2
		263.6			218.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
2-SPL PL	170 * 14	(47.6 -	2*(2*2.5)* 1.4)*1.1= 37.0<	47.6	∴ 37.0
7-SPL PL	250 * 14	(245.0 -	7*(3*2.5)* 1.4)*1.1= 188.7<	245.0	∴188.7
		334.9			256.7
16-SPL PL	155 * 10	(248.0 -	16*(2*2.7)* 1.0)*1.1= 177.8<	248.0	∴177.8
		> AgrR			>AnrR

(172) G2 J-12(Sec-12) DECK

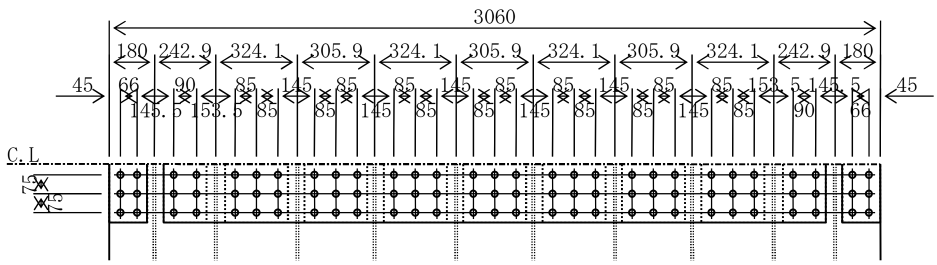
(a) Acting stress

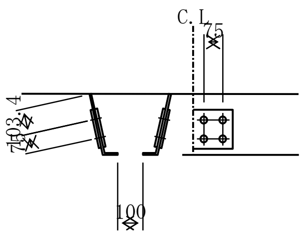
$\sigma tmax$ = 23 N/mm^2 $0.75\sigma ta$ = 0.75 * 140 = 105 N/mm^2
$\sigma cmax$ = -64 N/mm^2 $0.75\sigma ca$ = 0.75 * 140 = 105 N/mm^2
∴ σc = 105 N/mm^2
τmax = 17 N/mm^2

(b) Section area of main plate

1-DECK PL 3060 * 16   Ag = 489.6 cm^2 (SM400)
4-U.RIB 320 * 240 * 8   Agr = 215.6 cm^2 (SM400)
ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3060 * 16   A = 489.6
 (489.6 - (29* 2.5)* 1.6) * 1.1 = 411.0 < 489.6 ∴An = 411.0 cm^2
4-U.RIB 320 * 240 * 8   Ar = 215.6
 (215.6 - 4*(4* 2.7)* 0.8- 4*(10.0*0.8)) * 1.1 = 163.9
 < 215.6 ∴Anr = 163.9 cm^2
ΣAn = An + Anr = 411.0 + 163.9 = 574.9 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 23 * 705.2 / 574.9 = 28 N/mm^2
 < σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = $0.75\sigma ta$ * An / 1.1 = 105 * 41096 / 1.1 = 3922800 N
 > σtn * An = 28 * 41096 = 1140879 N
 Pc = σc * Ag = 105 * 48960 = 5140800 N
・Rib Ptr = $0.75\sigma ta$ * Anr / 1.1 = 105 * 16394 / 1.1 = 1564920 N
 > σtn * Anr = 28 * 16394 = 455130 N
 Pcr = σc * Agr = 105 * 21560 = 2263800 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 411.0 / 2 = 205.5 cm^2
 AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2
・Rib AnrR = Anr = 163.9 cm^2
 AgrR = Agr = 215.6 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5140800 / 108000 = 47.6 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 2263800 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 87 = 5140800 / 87 = 59090$ N
$\rho s = \tau * Ag / 87 = 17 * 48960 / 87 = 9555$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(59090^2 + 9555^2)} = 59857$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2627 * 9	(236.4 -	(25*2.5)* 0.9)*1.1= 198.2<	236.4	∴198.2
		263.6			218.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
2-SPL PL	170 * 14	(47.6 -	2*(2*2.5)* 1.4)*1.1= 37.0<	47.6	∴ 37.0
7-SPL PL	250 * 14	(245.0 -	7*(3*2.5)* 1.4)*1.1= 188.7<	245.0	∴188.7
		334.9			256.7
16-SPL PL	155 * 10	(248.0 -	16*(2*2.7)* 1.0)*1.1= 177.8<	248.0	∴177.8
		> AgrR			>AnrR

(173) G2　J-13(Sec-13)　DECK

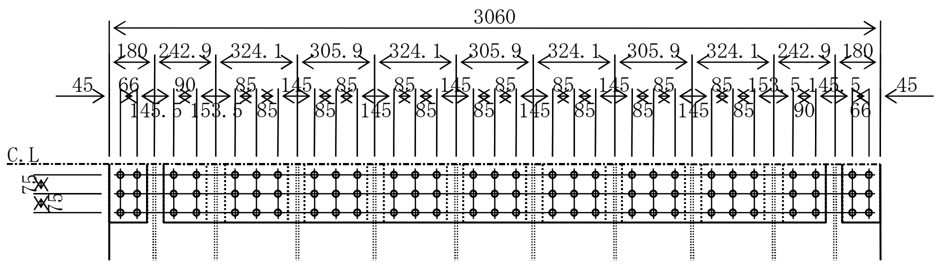
(a) Acting stress

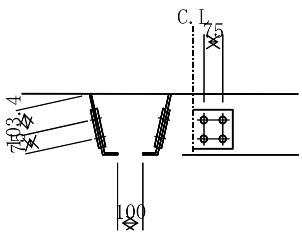
σtmax = 9 N/mm^2　　0.75σta = 0.75 * 140 = 105 N/mm^2
σcmax = -66 N/mm^2　　0.75σca = 0.75 * 140 = 105 N/mm^2
$\therefore\sigma$c = 105 N/mm^2
τmax = 11 N/mm^2

(b) Section area of main plate

1-DECK　PL　3060 * 16　　　Ag = 489.6 cm^2　(SM400)
4-U.RIB 320 * 240 * 8　　　Agr = 215.6 cm^2　(SM400)
ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK　PL　3060 * 16　　　A = 489.6
(489.6 - (29* 2.5)* 1.6) * 1.1 = 411.0 ＜ 489.6　$\therefore$An = 411.0 cm^2
4-U.RIB 320 * 240 * 8　　　Ar = 215.6
(215.6 - 4*(4* 2.7)* 0.8- 4*(10.0*0.8)) * 1.1 = 163.9
＜ 215.6　$\therefore$Anr = 163.9 cm^2
ΣAn = An + Anr = 411.0 + 163.9 = 574.9 cm^2
σtn = σtmax * ΣAg / ΣAn = 9 * 705.2 / 574.9 = 11 N/mm^2
＜ σta = 140 N/mm^2

(e) Design axial force

・Main plate　Pt = 0.75σta * An / 1.1 = 105 * 41096 / 1.1 = 3922800 N
＞ σtn * An = 11 * 41096 = 440835 N
Pc = σc * Ag = 105 * 48960 = 5140800 N
・Rib　Ptr = 0.75σta * Anr / 1.1 = 105 * 16394 / 1.1 = 1564920 N
＞ σtn * Anr = 11 * 16394 = 175862 N
Pcr = σc * Agr = 105 * 21560 = 2263800 N

(f) Required section area of the splice plates

・Mother material(One side)　AnR = An / 2 = 411.0 / 2 = 205.5 cm^2
AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2
・Rib　AnrR = Anr = 163.9 cm^2
AgrR = Agr = 215.6 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5140800 / 108000 = 47.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2263800 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 87 = 5140800 / 87 = 59090 N

ρs = τ * Ag / 87 = 11 * 48960 / 87 = 6422 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(59090^2 + 6422^2)}$ = 59438 N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0＜	27.2	∴ 20.0
1-SPL PL	2627 * 9	(236.4 -	(25*2.5)* 0.9)*1.1= 198.2＜	236.4	∴198.2
		263.6			218.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1＜	42.3	∴ 31.1
2-SPL PL	170 * 14	(47.6 -	2*(2*2.5)* 1.4)*1.1= 37.0＜	47.6	∴ 37.0
7-SPL PL	250 * 14	(245.0 -	7*(3*2.5)* 1.4)*1.1= 188.7＜	245.0	∴188.7
		334.9			256.7
16-SPL PL	155 * 10	(248.0 -	16*(2*2.7)* 1.0)*1.1= 177.8＜	248.0	∴177.8
		＞ AgrR			＞AnrR

(174) G2 J-14(Sec-14) DECK

(a) Acting stress

σ_{tmax} = 7 N/mm^2 $0.75\sigma_{ta}$ = 0.75 * 140 = 105 N/mm^2

σ_{cmax} = -70 N/mm^2 $0.75\sigma_{ca}$ = 0.75 * 140 = 105 N/mm^2

∴ σ_c = 105 N/mm^2

τ_{max} = 7 N/mm^2

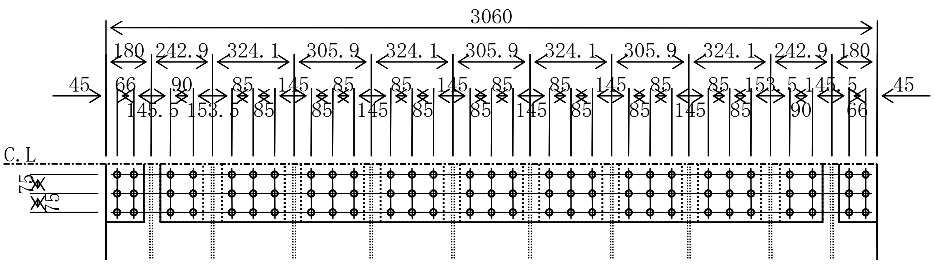
(b) Section area of main plate

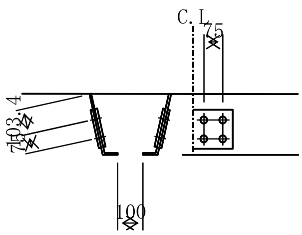
1-DECK PL 3060 * 16   Ag = 489.6 cm^2 (SM400)

4-U.RIB 320 * 240 * 8   Agr = 215.6 cm^2 (SM400)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3060 * 16   A = 489.6

(489.6 - (29* 2.5)* 1.6) * 1.1 = 411.0 < 489.6 ∴An = 411.0 cm^2

4-U.RIB 320 * 240 * 8   Ar = 215.6

(215.6 - 4*(4* 2.7)* 0.8- 4*(10.0*0.8)) * 1.1 = 163.9

< 215.6 ∴Anr = 163.9 cm^2

ΣAn = An + Anr = 411.0 + 163.9 = 574.9 cm^2

σ_{tn} = σ_{tmax} * ΣAg / ΣAn = 7 * 705.2 / 574.9 = 8 N/mm^2

< σ_{ta} = 140 N/mm^2

(e) Design axial force

・Main plate Pt = $0.75\sigma_{ta}$ * An / 1.1 = 105 * 41096 / 1.1 = 3922800 N

> σ_{tn} * An = 8 * 41096 = 346871 N

Pc = σ_c * Ag = 105 * 48960 = 5140800 N

・Rib Ptr = $0.75\sigma_{ta}$ * Anr / 1.1 = 105 * 16394 / 1.1 = 1564920 N

> σ_{tn} * Anr = 8 * 16394 = 138377 N

Pcr = σ_c * Agr = 105 * 21560 = 2263800 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 411.0 / 2 = 205.5 cm^2

AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AnrR = Anr = 163.9 cm^2

AgrR = Agr = 215.6 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5140800 / 108000 = 47.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2263800 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 87 = 5140800 / 87 = 59090 N

ρs = τ * Ag / 87 = 7 * 48960 / 87 = 3920 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(59090^2 + 3920^2)}$ = 59220 N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			$Ans(cm^2)$
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1=	20.0＜	27.2	∴ 20.0
1-SPL PL	2627 * 9	(236.4 -	(25*2.5)* 0.9)*1.1=	198.2＜	236.4	∴198.2
		263.6				218.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1=	31.1＜	42.3	∴ 31.1
2-SPL PL	170 * 14	(47.6 -	2*(2*2.5)* 1.4)*1.1=	37.0＜	47.6	∴ 37.0
7-SPL PL	250 * 14	(245.0 -	7*(3*2.5)* 1.4)*1.1=	188.7＜	245.0	∴188.7
		334.9				256.7
16-SPL PL	155 * 10	(248.0 -	16*(2*2.7)* 1.0)*1.1=	177.8＜	248.0	∴177.8
		＞ AgrR				＞AnrR

(175) G2 J-15(Sec-15) DECK

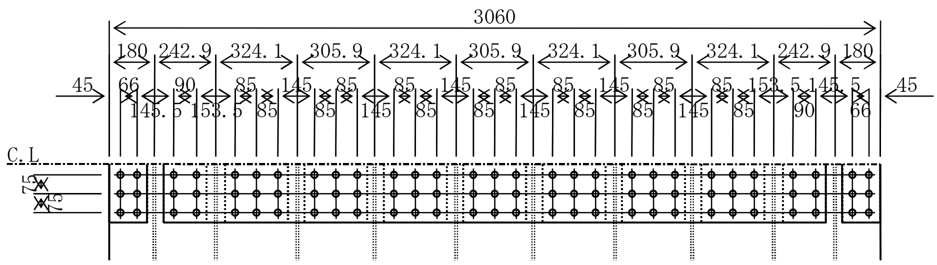
(a) Acting stress

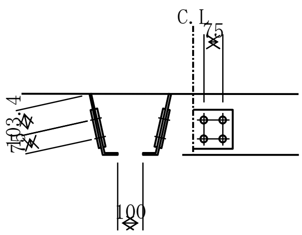
σtmax = 19 N/mm^2 0.75σta = 0.75 * 140 = 105 N/mm^2
σcmax = -64 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2
∴σc = 105 N/mm^2
τmax = 11 N/mm^2

(b) Section area of main plate

1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM400)
4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM400)
ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3060 * 16 A = 489.6
(489.6 - (29* 2.5)* 1.6) * 1.1 = 411.0 < 489.6 ∴An = 411.0 cm^2
4-U.RIB 320 * 240 * 8 Ar = 215.6
(215.6 - 4*(4* 2.7)* 0.8- 4*(10.0*0.8)) * 1.1 = 163.9
< 215.6 ∴Anr = 163.9 cm^2
ΣAn = An + Anr = 411.0 + 163.9 = 574.9 cm^2
σtn = σtmax * ΣAg / ΣAn = 19 * 705.2 / 574.9 = 23 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 105 * 41096 / 1.1 = 3922800 N
> σtn * An = 23 * 41096 = 937676 N
Pc = σc * Ag = 105 * 48960 = 5140800 N
・Rib Ptr = 0.75σta * Anr / 1.1 = 105 * 16394 / 1.1 = 1564920 N
> σtn * Anr = 23 * 16394 = 374066 N
Pcr = σc * Agr = 105 * 21560 = 2263800 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 411.0 / 2 = 205.5 cm^2
AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2
・Rib AnrR = Anr = 163.9 cm^2
AgrR = Agr = 215.6 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5140800 / 108000 = 47.6 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 2263800 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 87 = 5140800 / 87 = 59090$ N
$\rho s = \tau * Ag / 87 = 11 * 48960 / 87 = 6446$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(59090^2 + 6446^2)} = 59440$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2627 * 9	(236.4 -	(25*2.5)* 0.9)*1.1= 198.2<	236.4	∴198.2
		263.6			218.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
2-SPL PL	170 * 14	(47.6 -	2*(2*2.5)* 1.4)*1.1= 37.0<	47.6	∴ 37.0
7-SPL PL	250 * 14	(245.0 -	7*(3*2.5)* 1.4)*1.1= 188.7<	245.0	∴188.7
		334.9			256.7
16-SPL PL	155 * 10	(248.0 -	16*(2*2.7)* 1.0)*1.1= 177.8<	248.0	∴177.8
		> AgrR			>AnrR

(176) G2 J-16(Sec-16) DECK

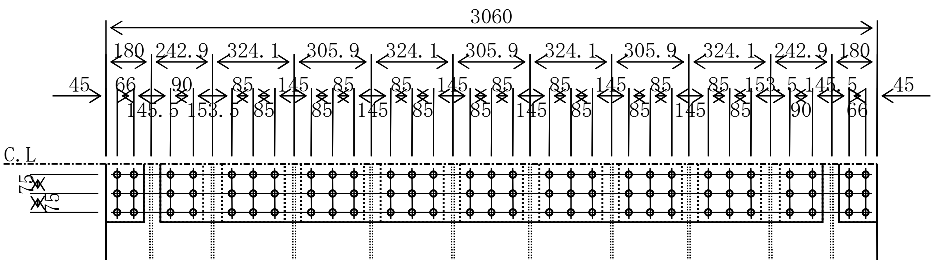
(a) Acting stress

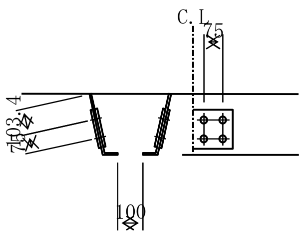
$\sigma tmax$ = 38 N/mm^2 0.75σta = 0.75 * 140 = 105 N/mm^2
$\sigma cmax$ = -64 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2
∴σc = 105 N/mm^2
τmax = 16 N/mm^2

(b) Section area of main plate

1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM400)
4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM400)
ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3060 * 16 A = 489.6
(489.6 - (29* 2.5)* 1.6) * 1.1 = 411.0 < 489.6 ∴An = 411.0 cm^2
4-U.RIB 320 * 240 * 8 Ar = 215.6
(215.6 - 4*(4* 2.7)* 0.8- 4*(10.0*0.8)) * 1.1 = 163.9
< 215.6 ∴Anr = 163.9 cm^2
ΣAn = An + Anr = 411.0 + 163.9 = 574.9 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 38 * 705.2 / 574.9 = 46 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 105 * 41096 / 1.1 = 3922800 N
> σtn * An = 46 * 41096 = 1905447 N
Pc = σc * Ag = 105 * 48960 = 5140800 N
・Rib Ptr = 0.75σta * Anr / 1.1 = 105 * 16394 / 1.1 = 1564920 N
> σtn * Anr = 46 * 16394 = 760139 N
Pcr = σc * Agr = 105 * 21560 = 2263800 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 411.0 / 2 = 205.5 cm^2
AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2
・Rib AnrR = Anr = 163.9 cm^2
AgrR = Agr = 215.6 cm^2

(g) Required bolt number

- Main plate n = Pc / (108000 * 1.00) = 5140800 / 108000 = 47.6 pcs.
- Rib nr = Pcr / (108000 * 1.00) = 2263800 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 87 = 5140800 / 87 = 59090 N
ρs = τ * Ag / 87 = 16 * 48960 / 87 = 9013 N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(59090^2 + 9013^2)}$ = 59773 N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2627 * 9	(236.4 -	(25*2.5)* 0.9)*1.1= 198.2<	236.4	∴198.2
		263.6			218.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
2-SPL PL	170 * 14	(47.6 -	2*(2*2.5)* 1.4)*1.1= 37.0<	47.6	∴ 37.0
7-SPL PL	250 * 14	(245.0 -	7*(3*2.5)* 1.4)*1.1= 188.7<	245.0	∴188.7
		334.9			256.7
16-SPL PL	155 * 10	(248.0 -	16*(2*2.7)* 1.0)*1.1= 177.8<	248.0	∴177.8
		> AgrR			>AnrR

(177) G2 J-17(Sec-17) DECK

(a) Acting stress

σtmax = 70 N/mm^2 0.75σta = 0.75 * 140 = 105 N/mm^2

σcmax = -64 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴σc = 105 N/mm^2

τmax = 22 N/mm^2

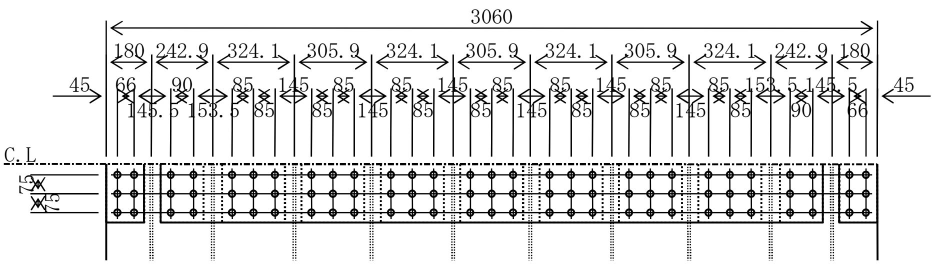
(b) Section area of main plate

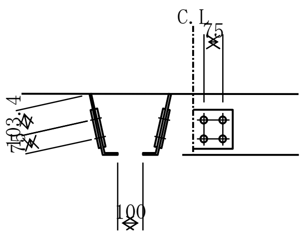
1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM400)

4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM400)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3060 * 16 A = 489.6

(489.6 - (29* 2.5)* 1.6) * 1.1 = 411.0 < 489.6 ∴An = 411.0 cm^2

4-U.RIB 320 * 240 * 8 Ar = 215.6

(215.6 - 4*(4* 2.7)* 0.8- 4*(10.0*0.8)) * 1.1 = 163.9

< 215.6 ∴Anr = 163.9 cm^2

ΣAn = An + Anr = 411.0 + 163.9 = 574.9 cm^2

σtn = σtmax * ΣAg / ΣAn = 70 * 705.2 / 574.9 = 85 N/mm^2

< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 105 * 41096 / 1.1 = 3922800 N

> σtn * An = 85 * 41096 = 3512467 N

Pc = σc * Ag = 105 * 48960 = 5140800 N

・Rib Ptr = 0.75σta * Anr / 1.1 = 105 * 16394 / 1.1 = 1564920 N

> σtn * Anr = 85 * 16394 = 1401226 N

Pcr = σc * Agr = 105 * 21560 = 2263800 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 411.0 / 2 = 205.5 cm^2

AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AnrR = Anr = 163.9 cm^2

AgrR = Agr = 215.6 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5140800 / 108000 = 47.6 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 2263800 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 87 = 5140800 / 87 = 59090 N
ρs = τ * Ag / 87 = 22 * 48960 / 87 = 12131 N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(59090^2 + 12131^2)}$ = 60322 N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0＜	27.2	∴ 20.0
1-SPL PL	2627 * 9	(236.4 -	(25*2.5)* 0.9)*1.1= 198.2＜	236.4	∴198.2
		263.6			218.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1＜	42.3	∴ 31.1
2-SPL PL	170 * 14	(47.6 -	2*(2*2.5)* 1.4)*1.1= 37.0＜	47.6	∴ 37.0
7-SPL PL	250 * 14	(245.0 -	7*(3*2.5)* 1.4)*1.1= 188.7＜	245.0	∴188.7
		334.9			256.7
16-SPL PL	155 * 10	(248.0 -	16*(2*2.7)* 1.0)*1.1= 177.8＜	248.0	∴177.8
		＞ AgrR			＞AnrR

(178) G2 J-18(Sec-18) DECK

(a) Acting stress

$\sigma tmax$ = 110 N/mm^2 0.75σta = 0.75 * 210 = 158 N/mm^2

$\sigma cmax$ = -64 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma c$ = 158 N/mm^2

τmax = 25 N/mm^2

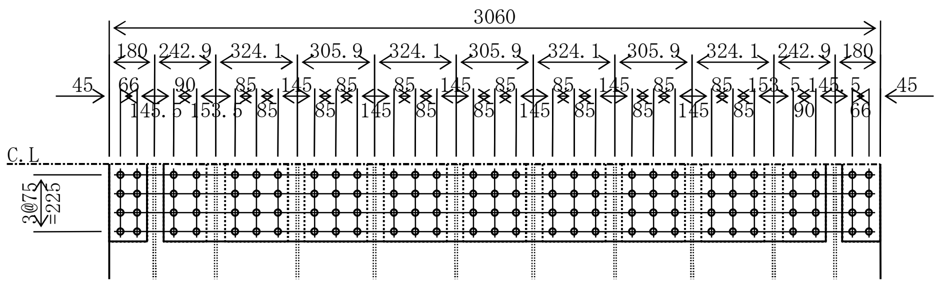
(b) Section area of main plate

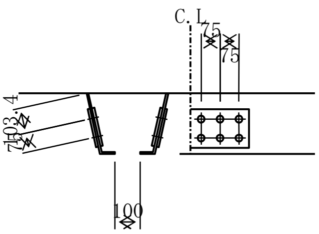
1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM490Y)

4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM490Y)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3060 * 16 A = 489.6

(489.6 - (29* 2.5)* 1.6) * 1.1 = 411.0 < 489.6 $\therefore$An = 411.0 cm^2

4-U.RIB 320 * 240 * 8 Ar = 215.6

(215.6 - 4*(4* 2.7)* 0.8- 4*(10.0*0.8)) * 1.1 = 163.9

< 215.6 $\therefore$Anr = 163.9 cm^2

ΣAn = An + Anr = 411.0 + 163.9 = 574.9 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 110 * 705.2 / 574.9 = 134 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 158 * 41096 / 1.1 = 5884200 N

> σtn * An = 134 * 41096 = 5527202 N

Pc = σc * Ag = 158 * 48960 = 7711200 N

・Rib Ptr = 0.75σta * Anr / 1.1 = 158 * 16394 / 1.1 = 2347380 N

> σtn * Anr = 134 * 16394 = 2204963 N

Pcr = σc * Agr = 158 * 21560 = 3395700 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 411.0 / 2 = 205.5 cm^2

AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AnrR = Anr = 163.9 cm^2

AgrR = Agr = 215.6 cm^2

(g) Required bolt number

- ・Main plate n = Pc / (108000 * 1.00) = 7711200 / 108000 = 71.4 pcs.
- ・Rib nr = Pcr / (108000 * 1.00) = 3395700 / 108000 = 31.4 pcs. (4 @ 12 = 48 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 116 = 7711200 / 116 = 66476$ N

$\rho s = \tau * Ag / 116 = 25 * 48960 / 116 = 10524$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(66476^2 + 10524^2)} = 67304$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes	Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0 < 27.2	∴ 20.0
1-SPL PL	2627 * 9	(236.4 -	(25*2.5)* 0.9)*1.1= 198.2 < 236.4	∴198.2
		263.6		218.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1 < 42.3	∴ 31.1
2-SPL PL	170 * 14	(47.6 -	2*(2*2.5)* 1.4)*1.1= 37.0 < 47.6	∴ 37.0
7-SPL PL	250 * 14	(245.0 -	7*(3*2.5)* 1.4)*1.1= 188.7 < 245.0	∴188.7
		334.9		256.7
16-SPL PL	155 * 10	(248.0 -	16*(2*2.7)* 1.0)*1.1= 177.8 < 248.0	∴177.8
		> AgrR		>AnrR

(179) G2 J-19(Sec-19) DECK

(a) Acting stress

σtmax = 151 N/mm^2 0.75σta = 0.75 * 210 = 158 N/mm^2

σcmax = -64 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2

∴σc = 158 N/mm^2

τmax = 29 N/mm^2

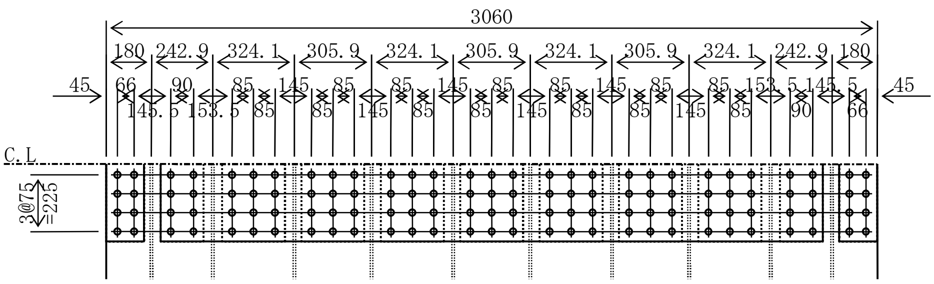
(b) Section area of main plate

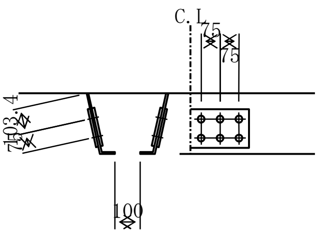
1-DECK PL 3060 * 16   Ag = 489.6 cm^2 (SM490Y)

4-U.RIB 320 * 240 * 8   Agr = 215.6 cm^2 (SM490Y)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3060 * 16   A = 489.6

(489.6 - (29* 2.5)* 1.6) * 1.1 = 411.0 < 489.6 ∴An = 411.0 cm^2

4-U.RIB 320 * 240 * 8   Ar = 215.6

(215.6 - 4*(4* 2.7)* 0.8- 4*(10.0*0.8)) * 1.1 = 163.9

< 215.6 ∴Anr = 163.9 cm^2

ΣAn = An + Anr = 411.0 + 163.9 = 574.9 cm^2

σtn = σtmax * ΣAg / ΣAn = 151 * 705.2 / 574.9 = 185 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 185 * 41096 = 7600464 N

> 0.75σta * An / 1.1 = 158 * 41096 / 1.1 = 5884200 N

Pc = σc * Ag = 158 * 48960 = 7711200 N

・Rib Ptr = σtn * Anr = 185 * 16394 = 3032048 N

> 0.75σta * Anr/ 1.1 = 158 * 16394 / 1.1 = 2347380 N

Pcr = σc * Agr = 158 * 21560 = 3395700 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 411.0 / 2 = 205.5 cm^2

AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AnrR = Anr = 163.9 cm^2

AgrR = Agr = 215.6 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 7711200 / 108000 = 71.4 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 3395700 / 108000 = 31.4 pcs. (4 @ 12 = 48 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 116 = 7711200 / 116 = 66476$ N
$\rho s = \tau * Ag / 116 = 29 * 48960 / 116 = 12291$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(66476^2 + 12291^2)} = 67603$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0＜	27.2	∴ 20.0
1-SPL PL	2627 * 9	(236.4 -	(25*2.5)* 0.9)*1.1= 198.2＜	236.4	∴198.2
		263.6			218.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1＜	42.3	∴ 31.1
2-SPL PL	170 * 14	(47.6 -	2*(2*2.5)* 1.4)*1.1= 37.0＜	47.6	∴ 37.0
7-SPL PL	250 * 14	(245.0 -	7*(3*2.5)* 1.4)*1.1= 188.7＜	245.0	∴188.7
		334.9			256.7
16-SPL PL	155 * 10	(248.0 -	16*(2*2.7)* 1.0)*1.1= 177.8＜	248.0	∴177.8
		＞ AgrR			＞AnrR

(180) G2 J-20(Sec-21) DECK

(a) Acting stress

$\sigma tmax$ = 144 N/mm² 0.75 σta = 0.75 * 210 = 158 N/mm²

$\sigma cmax$ = -64 N/mm² 0.75 σca = 0.75 * 210 = 158 N/mm²

∴ σc = 158 N/mm²

τmax = 37 N/mm²

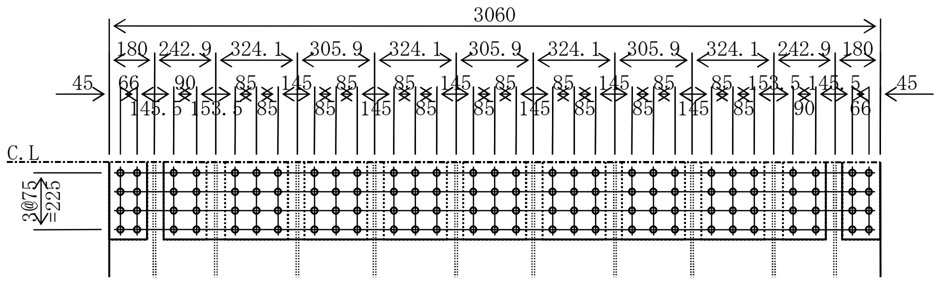
(b) Section area of main plate

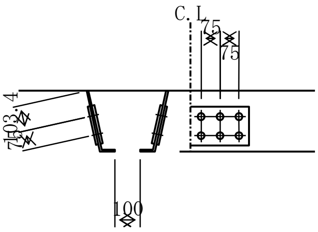
1-DECK PL 3060 * 16 Ag = 489.6 cm² (SM490Y)

4-U.RIB 320 * 240 * 8 Agr = 215.6 cm² (SM490Y)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm²

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3060 * 16 A = 489.6

(489.6 - (29* 2.5)* 1.6) * 1.1 = 411.0 < 489.6 ∴An = 411.0 cm²

4-U.RIB 320 * 240 * 8 Ar = 215.6

(215.6 - 4*(4* 2.7)* 0.8- 4*(10.0*0.8)) * 1.1 = 163.9

< 215.6 ∴Anr = 163.9 cm²

ΣAn = An + Anr = 411.0 + 163.9 = 574.9 cm²

σtn = $\sigma tmax$ * ΣAg / ΣAn = 144 * 705.2 / 574.9 = 177 N/mm²

< σta = 210 N/mm²

(e) Design axial force

・Main plate Pt = σtn * An = 177 * 41096 = 7261507 N

> 0.75 σta * An / 1.1 = 158 * 41096 / 1.1 = 5884200 N

Pc = σc * Ag = 158 * 48960 = 7711200 N

・Rib Ptr = σtn * Anr = 177 * 16394 = 2896828 N

> 0.75 σta * Anr/ 1.1 = 158 * 16394 / 1.1 = 2347380 N

Pcr = σc * Agr = 158 * 21560 = 3395700 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 411.0 / 2 = 205.5 cm²

AgR = Ag / 2 = 489.6 / 2 = 244.8 cm²

・Rib AnrR = Anr = 163.9 cm²

AgrR = Agr = 215.6 cm²

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 7711200 / 108000 = 71.4 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 3395700 / 108000 = 31.4 pcs. (4 @ 12 = 48 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(h) Tensile force per one bolt

ρp = Pc / 116 = 7711200 / 116 = 66476 N

ρs = τ * Ag / 116 = 37 * 48960 / 116 = 15630 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(66476^2 + 15630^2)}$ = 68289 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2627 * 9	(236.4 -	(25*2.5)* 0.9)*1.1= 198.2<	236.4	∴198.2
		263.6			218.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
2-SPL PL	170 * 14	(47.6 -	2*(2*2.5)* 1.4)*1.1= 37.0<	47.6	∴ 37.0
7-SPL PL	250 * 14	(245.0 -	7*(3*2.5)* 1.4)*1.1= 188.7<	245.0	∴188.7
		334.9			256.7
16-SPL PL	155 * 10	(248.0 -	16*(2*2.7)* 1.0)*1.1= 177.8<	248.0	∴177.8
		> AgrR			>AnrR

(181) G2 J-21(Sec-22) DECK

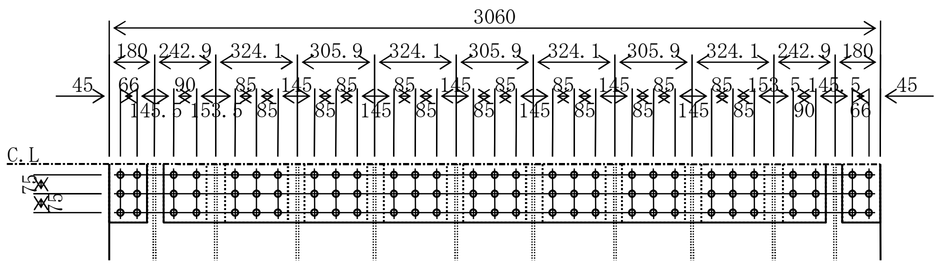
(a) Acting stress

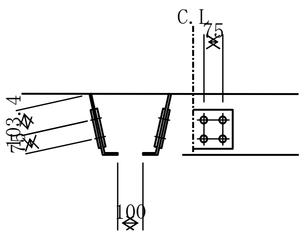
$\sigma tmax$ = 86 N/mm^2 0.75 σta = 0.75 * 140 = 105 N/mm^2
$\sigma cmax$ = -64 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2
∴ σc = 105 N/mm^2
τmax = 37 N/mm^2

(b) Section area of main plate

1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM400)
4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM400)
ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3060 * 16 A = 489.6
(489.6 - (29* 2.5)* 1.6) * 1.1 = 411.0 < 489.6 ∴An = 411.0 cm^2
4-U.RIB 320 * 240 * 8 Ar = 215.6
(215.6 - 4*(4* 2.7)* 0.8- 4*(10.0*0.8)) * 1.1 = 163.9
< 215.6 ∴Anr = 163.9 cm^2
ΣAn = An + Anr = 411.0 + 163.9 = 574.9 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 86 * 705.2 / 574.9 = 105 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 105 * 41096 = 4319782 N
> 0.75 σta * An / 1.1 = 105 * 41096 / 1.1 = 3922800 N
Pc = σc * Ag = 105 * 48960 = 5140800 N
・Rib Ptr = σtn * Anr = 105 * 16394 = 1723288 N
> 0.75 σta * Anr/ 1.1 = 105 * 16394 / 1.1 = 1564920 N
Pcr = σc * Agr = 105 * 21560 = 2263800 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 411.0 / 2 = 205.5 cm^2
AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2
・Rib AnrR = Anr = 163.9 cm^2
AgrR = Agr = 215.6 cm^2

(g) Required bolt number

- Main plate n = Pc / (108000 * 1.00) = 5140800 / 108000 = 47.6 pcs.
- Rib nr = Pcr / (108000 * 1.00) = 2263800 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 87 = 5140800 / 87 = 59090 N
ρs = τ * Ag / 87 = 37 * 48960 / 87 = 20543 N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(59090^2 + 20543^2)}$ = 62559 N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes		$Ans(cm^2)$
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0	< 27.2	∴ 20.0
1-SPL PL	2627 * 9	(236.4 -	(25*2.5)* 0.9)*1.1= 198.2	< 236.4	∴198.2
		263.6			218.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1	< 42.3	∴ 31.1
2-SPL PL	170 * 14	(47.6 -	2*(2*2.5)* 1.4)*1.1= 37.0	< 47.6	∴ 37.0
7-SPL PL	250 * 14	(245.0 -	7*(3*2.5)* 1.4)*1.1= 188.7	< 245.0	∴188.7
		334.9			256.7
16-SPL PL	155 * 10	(248.0 -	16*(2*2.7)* 1.0)*1.1= 177.8	< 248.0	∴177.8
		> AgrR			>AnrR

(182) G2 J-22(Sec-22) DECK

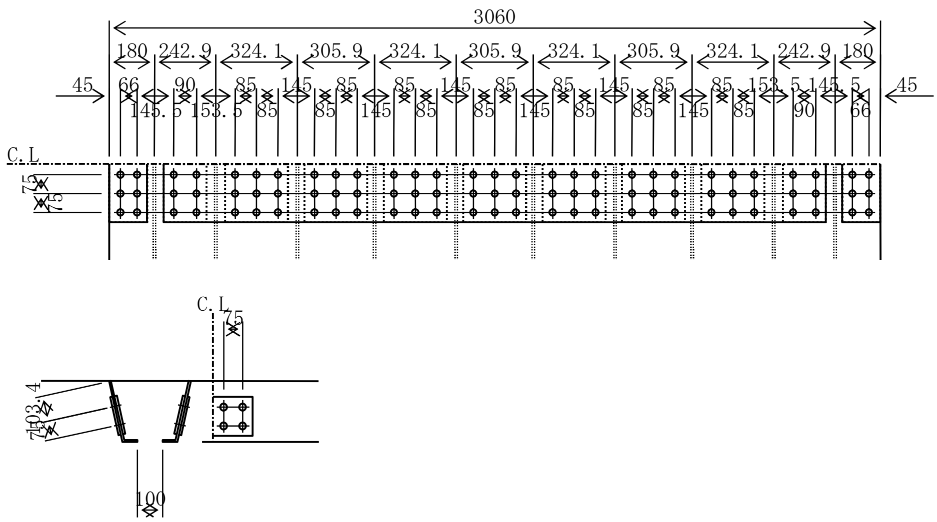
(a) Acting stress

σtmax = 27 N/mm^2 0.75σta = 0.75 * 140 = 105 N/mm^2
σcmax = -64 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2
∴σc = 105 N/mm^2
τmax = 33 N/mm^2

(b) Section area of main plate

1-DECK PL 3060 * 16   Ag = 489.6 cm^2 (SM400)
4-U.RIB 320 * 240 * 8   Agr = 215.6 cm^2 (SM400)
ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 3060 * 16   A = 489.6
(489.6 - (29* 2.5)* 1.6) * 1.1 = 411.0 < 489.6 ∴An = 411.0 cm^2
4-U.RIB 320 * 240 * 8   Ar = 215.6
(215.6 - 4*(4* 2.7)* 0.8- 4*(10.0*0.8)) * 1.1 = 163.9
< 215.6 ∴Anr = 163.9 cm^2
ΣAn = An + Anr = 411.0 + 163.9 = 574.9 cm^2
σtn = σtmax * ΣAg / ΣAn = 27 * 705.2 / 574.9 = 33 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 105 * 41096 / 1.1 = 3922800 N
> σtn * An = 33 * 41096 = 1372109 N
Pc = σc * Ag = 105 * 48960 = 5140800 N
・Rib Ptr = 0.75σta * Anr / 1.1 = 105 * 16394 / 1.1 = 1564920 N
> σtn * Anr = 33 * 16394 = 547375 N
Pcr = σc * Agr = 105 * 21560 = 2263800 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 411.0 / 2 = 205.5 cm^2
AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2
・Rib AnrR = Anr = 163.9 cm^2
AgrR = Agr = 215.6 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5140800 / 108000 = 47.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2263800 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 87 = 5140800 / 87 = 59090 N

ρs = τ * Ag / 87 = 33 * 48960 / 87 = 18826 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(59090^2 + 18826^2)}$ = 62016 N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2627 * 9	(236.4 -	(25*2.5)* 0.9)*1.1= 198.2<	236.4	∴198.2
		263.6			218.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
2-SPL PL	170 * 14	(47.6 -	2*(2*2.5)* 1.4)*1.1= 37.0<	47.6	∴ 37.0
7-SPL PL	250 * 14	(245.0 -	7*(3*2.5)* 1.4)*1.1= 188.7<	245.0	∴188.7
		334.9			256.7
16-SPL PL	155 * 10	(248.0 -	16*(2*2.7)* 1.0)*1.1= 177.8<	248.0	∴177.8
		> AgrR			>AnrR

(183) G2 J-23(Sec-23) DECK

(a) Acting stress

$\sigma cmax$ = -90 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 28 N/mm^2

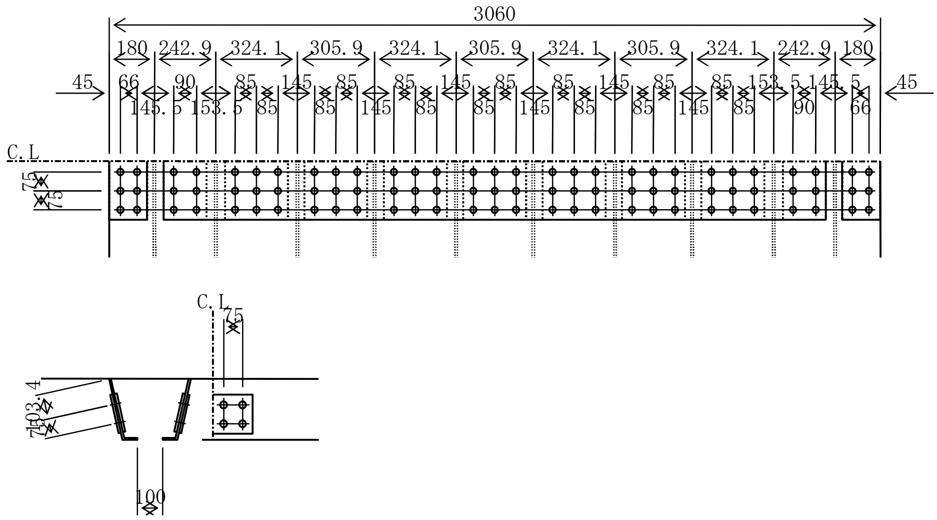
(b) Section area of main plate

1-DECK PL 3060 * 16   Ag = 489.6 cm^2 (SM400)

4-U.RIB 320 * 240 * 8   Agr = 215.6 cm^2 (SM400)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 48960 = 5140800 N

・Rib Pcr = σc * Agr = 105 * 21560 = 2263800 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AgrR = Agr = 215.6 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5140800 / 108000 = 47.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2263800 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 87 = 5140800 / 87 = 59090 N

ρs = τ * Ag / 87 = 28 * 48960 / 87 = 15877 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(59090^2 + 15877^2)}$ = 61185 N

(h) Check of splice plates

	(SS400)	A_{gs} (cm^2)	
2-SPL PL	151 * 9	27.2	
1-SPL PL	2627 * 9	236.4	
		263.6	
2-SPL PL	151 * 14	42.3	
2-SPL PL	170 * 14	47.6	
7-SPL PL	250 * 14	245.0	
		334.9	
16-SPL PL	155 * 10	248.0	> AgrR = 215.6cm^2

(184) G2 J-24(Sec-24) DECK

(a) Acting stress

$\sigma cmax$ = -126 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 126 N/mm^2

τmax = 24 N/mm^2

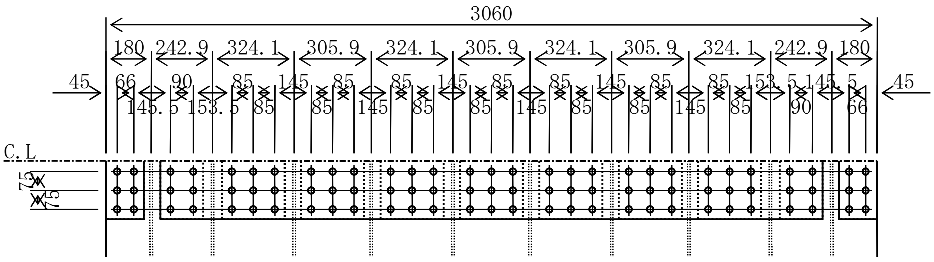
(b) Section area of main plate

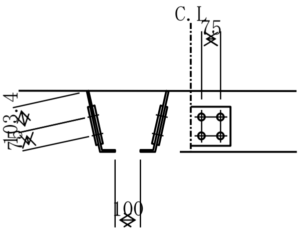
1-DECK PL 3060 * 16   Ag = 489.6 cm^2 (SM400)

4-U.RIB 320 * 240 * 8   Agr = 215.6 cm^2 (SM400)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 126 * 48960 = 6181934 N

・Rib Pcr = σc * Agr = 126 * 21560 = 2722273 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib   AgrR = Agr = 215.6 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 6181934 / 108000 = 57.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2722273 / 108000 = 25.2 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 87 = 6181934 / 87 = 71057 N

ρs = τ * Ag / 87 = 24 * 48960 / 87 = 13260 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(71057^2 + 13260^2)}$ = 72283 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)		
2-SPL PL	151 * 9	27.2		
1-SPL PL	2627 * 9	236.4		
		263.6		
2-SPL PL	151 * 14	42.3		
2-SPL PL	170 * 14	47.6		
7-SPL PL	250 * 14	245.0		
		334.9		
16-SPL PL	155 * 10	248.0	> AgrR =	215.6cm^2

(185) G2 J-25(Sec-25) DECK

(a) Acting stress

$\sigma cmax$ = -152 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 158 N/mm^2

τmax = 18 N/mm^2

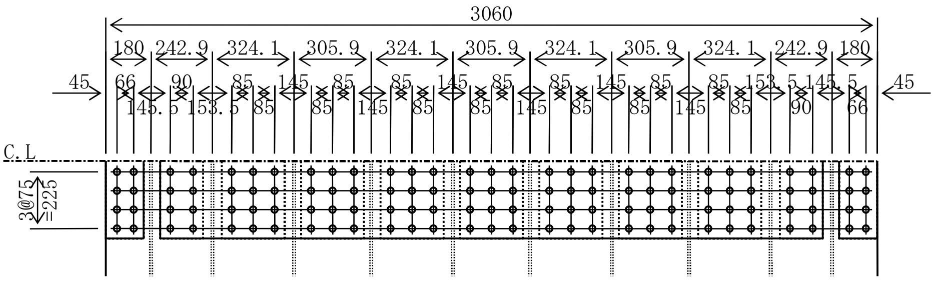
(b) Section area of main plate

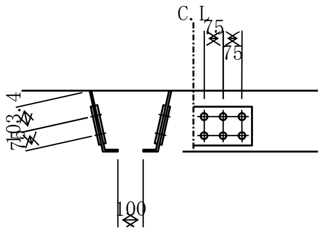
1-DECK PL 3060 * 16   Ag = 489.6 cm^2 (SM490Y)

4-U.RIB 320 * 240 * 8   Agr = 215.6 cm^2 (SM490Y)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 48960 = 7711200 N

・Rib Pcr = σc * Agr = 158 * 21560 = 3395700 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AgrR = Agr = 215.6 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 7711200 / 108000 = 71.4 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 3395700 / 108000 = 31.4 pcs. (4 @ 12 = 48 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 116 = 7711200 / 116 = 66476 N

ρs = τ * Ag / 116 = 18 * 48960 / 116 = 7470 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(66476^2 + 7470^2)}$ = 66894 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)
2-SPL PL	151 * 9	27.2
1-SPL PL	2627 * 9	236.4
		263.6
2-SPL PL	151 * 14	42.3
2-SPL PL	170 * 14	47.6
7-SPL PL	250 * 14	245.0
		334.9
16-SPL PL	155 * 10	248.0 ＞ AgrR = 215.6cm^2

(186) G2　J-26(Sec-26)　DECK

(a) Acting stress

$\sigma cmax$ = -165 N/mm^2　　0.75σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 165 N/mm^2

τmax = 14 N/mm^2

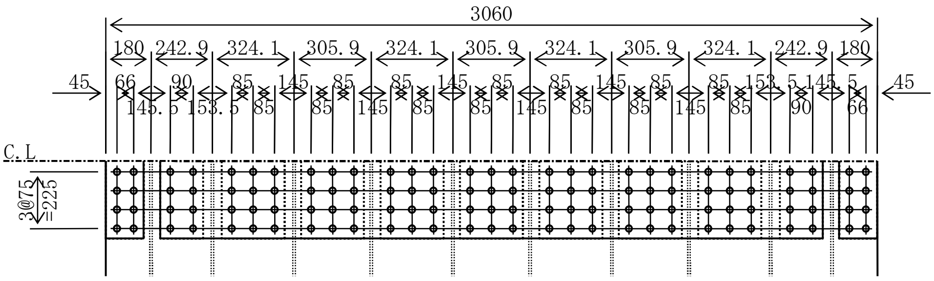
(b) Section area of main plate

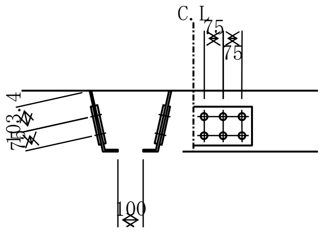
1-DECK　PL　3060 * 16　　　Ag = 489.6 cm^2　(SM490Y)

4-U.RIB 320 * 240 * 8　　　Agr = 215.6 cm^2　(SM490Y)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate　Pc = σc * Ag = 165 * 48960 = 8088828 N

・Rib　Pcr = σc * Agr = 165 * 21560 = 3561992 N

(e) Required section area of the splice plates

・Mother material(One side)　AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib　　　AgrR = Agr = 215.6 cm^2

(f) Required bolt number

・Main plate　n = Pc / (108000 * 1.00) = 8088828 / 108000 = 74.9 pcs.

・Rib　nr = Pcr / (108000 * 1.00) = 3561992 / 108000 = 33.0 pcs. (4 @ 12 = 48 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 116 = 8088828 / 116 = 69731 N

ρs = τ * Ag / 116 = 14 * 48960 / 116 = 5751 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(69731^2 + 5751^2)}$ = 69968 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
2-SPL PL	151 * 9	27.2	
1-SPL PL	2627 * 9	236.4	
		263.6	
2-SPL PL	151 * 14	42.3	
2-SPL PL	170 * 14	47.6	
7-SPL PL	250 * 14	245.0	
		334.9	
16-SPL PL	155 * 10	248.0	＞ AgrR = 215.6cm^2

(187) G2 J-27(Sec-27) DECK

(a) Acting stress

$\sigma cmax$ = -172 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 172 N/mm^2

τmax = 9 N/mm^2

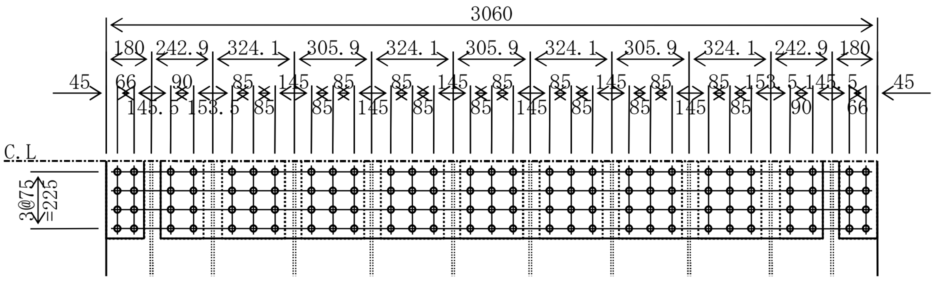
(b) Section area of main plate

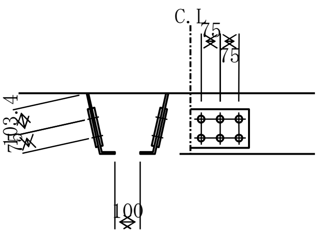
1-DECK PL 3060 * 16   Ag = 489.6 cm^2 (SM490Y)

4-U.RIB 320 * 240 * 8   Agr = 215.6 cm^2 (SM490Y)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 172 * 48960 = 8436640 N

・Rib Pcr = σc * Agr = 172 * 21560 = 3715155 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AgrR = Agr = 215.6 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 8436640 / 108000 = 78.1 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 3715155 / 108000 = 34.4 pcs. (4 @ 12 = 48 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 116 = 8436640 / 116 = 72730 N

ρs = τ * Ag / 116 = 9 * 48960 / 116 = 3646 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(72730^2 + 3646^2)}$ = 72821 N

(h) Check of splice plates

	Ags(cm^2)
(SM490Y)	
2-SPL PL 151 * 9	27.2
1-SPL PL 2627 * 9	236.4
	263.6
2-SPL PL 151 * 14	42.3
2-SPL PL 170 * 14	47.6
7-SPL PL 250 * 14	245.0
	334.9
16-SPL PL 155 * 10	248.0 ＞ AgrR = 215.6cm^2

(188) G2 J-28(Sec-29) DECK

(a) Acting stress

$\sigma cmax$ = -164 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 164 N/mm^2

τmax = 8 N/mm^2

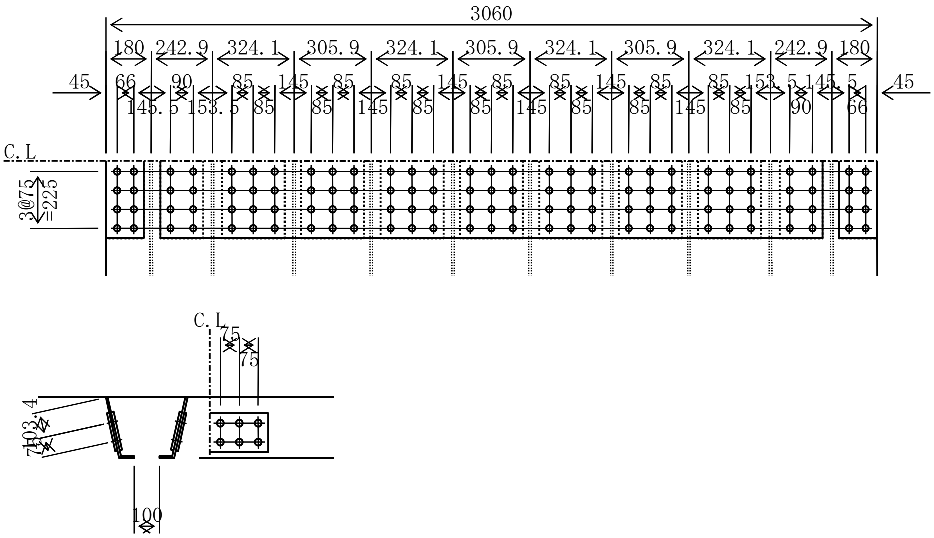
(b) Section area of main plate

1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM490Y)

4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM490Y)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 164 * 48960 = 8040407 N

・Rib Pcr = σc * Agr = 164 * 21560 = 3540669 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AgrR = Agr = 215.6 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 8040407 / 108000 = 74.4 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 3540669 / 108000 = 32.8 pcs. (4 @ 12 = 48 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 116 = 8040407 / 116 = 69314 N

ρs = τ * Ag / 116 = 8 * 48960 / 116 = 3236 N

ρ = √(ρp^2 + ρs^2) = √(69314^2 + 3236^2) = 69389 N

(h) Check of splice plates

		Ags(cm^2)
	(SM490Y)	
2-SPL PL	151 * 9	27.2
1-SPL PL	2627 * 9	236.4
		263.6
2-SPL PL	151 * 14	42.3
2-SPL PL	170 * 14	47.6
7-SPL PL	250 * 14	245.0
		334.9
16-SPL PL	155 * 10	248.0 ＞ AgrR = 215.6cm^2

(189) G2 J-29(Sec-30) DECK

(a) Acting stress

$\sigma cmax$ = -156 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 158 N/mm^2

τmax = 12 N/mm^2

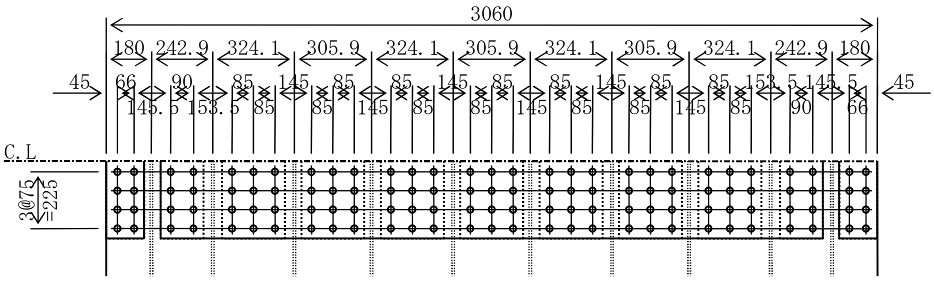
(b) Section area of main plate

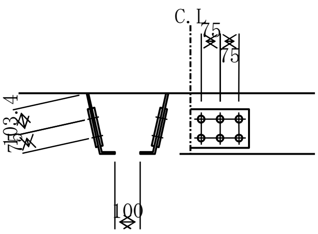
1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM490Y)

4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM490Y)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 48960 = 7711200 N

・Rib Pcr = σc * Agr = 158 * 21560 = 3395700 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AgrR = Agr = 215.6 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 7711200 / 108000 = 71.4 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 3395700 / 108000 = 31.4 pcs. (4 @ 12 = 48 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 116 = 7711200 / 116 = 66476 N

ρs = τ * Ag / 116 = 12 * 48960 / 116 = 5002 N

ρ = √(ρp^2 + ρs^2) = √(66476^2 + 5002^2) = 66664 N

(h) Check of splice plates

	(SM490Y)	$Ags(cm^2)$	
2-SPL PL	151 * 9	27.2	
1-SPL PL	2627 * 9	236.4	
		263.6	
2-SPL PL	151 * 14	42.3	
2-SPL PL	170 * 14	47.6	
7-SPL PL	250 * 14	245.0	
		334.9	
16-SPL PL	155 * 10	248.0	> AgrR = $215.6cm^2$

(190) G2 J-30(Sec-31) DECK

(a) Acting stress

σ cmax = -138 N/mm^2 0.75 σ ca = 0.75 * 210 = 158 N/mm^2

$\therefore$ σ c = 158 N/mm^2

τ max = 19 N/mm^2

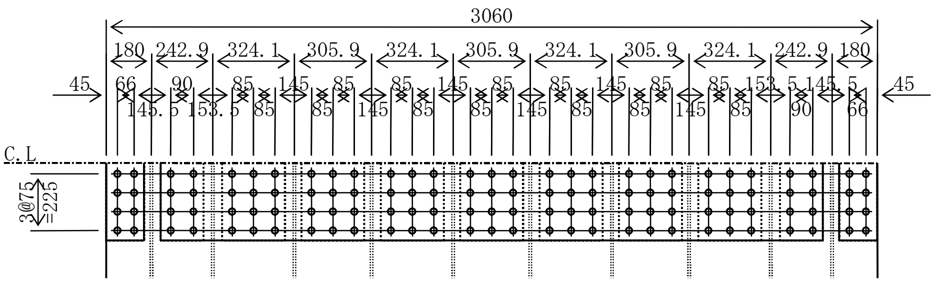
(b) Section area of main plate

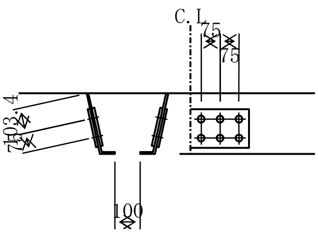
1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM490Y)

4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM490Y)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σ c * Ag = 158 * 48960 = 7711200 N

・Rib Pcr = σ c * Agr = 158 * 21560 = 3395700 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AgrR = Agr = 215.6 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 7711200 / 108000 = 71.4 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 3395700 / 108000 = 31.4 pcs. (4 @ 12 = 48 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρ p = Pc / 116 = 7711200 / 116 = 66476 N

ρ s = τ * Ag / 116 = 19 * 48960 / 116 = 8123 N

ρ = $\sqrt{}$ (ρ p^2 + ρ s^2) = $\sqrt{}$ (66476^2 + 8123^2) = 66970 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
2-SPL PL	151 * 9	27.2	
1-SPL PL	2627 * 9	236.4	
		263.6	
2-SPL PL	151 * 14	42.3	
2-SPL PL	170 * 14	47.6	
7-SPL PL	250 * 14	245.0	
		334.9	
16-SPL PL	155 * 10	248.0	＞ AgrR = 215.6cm^2

(191) G2 J-31(Sec-32) DECK

(a) Acting stress

σcmax = -113 N/mm^2 0.75σca = 0.75 ∗ 140 = 105 N/mm^2

∴σc = 113 N/mm^2

τmax = 29 N/mm^2

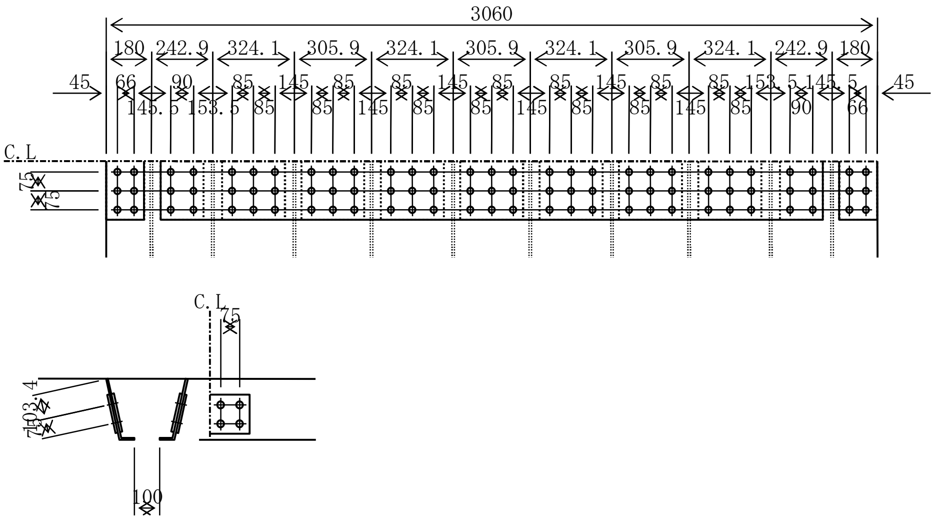
(b) Section area of main plate

1-DECK PL 3060 ∗ 16   Ag = 489.6 cm^2 (SM400)

4-U.RIB 320 ∗ 240 ∗ 8   Agr = 215.6 cm^2 (SM400)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc ∗ Ag = 113 ∗ 48960 = 5521415 N

・Rib Pcr = σc ∗ Agr = 113 ∗ 21560 = 2431407 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AgrR = Agr = 215.6 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 ∗ 1.00) = 5521415 / 108000 = 51.1 pcs.

・Rib nr = Pcr / (108000 ∗ 1.00) = 2431407 / 108000 = 22.5 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 87 = 5521415 / 87 = 63465 N

ρs = τ ∗ Ag / 87 = 29 ∗ 48960 / 87 = 16434 N

ρ = √(ρp^2 + ρs^2) = √(63465^2 + 16434^2) = 65558 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
2-SPL PL	151 * 9	27.2
1-SPL PL	2627 * 9	236.4
		263.6
2-SPL PL	151 * 14	42.3
2-SPL PL	170 * 14	47.6
7-SPL PL	250 * 14	245.0
		334.9
16-SPL PL	155 * 10	248.0 ＞ AgrR = 215.6cm^2

(192) G2 J-32(Sec-33) DECK

(a) Acting stress

$\sigma cmax$ = -80 N/mm^2 $0.75\sigma ca$ = 0.75 ＊ 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 35 N/mm^2

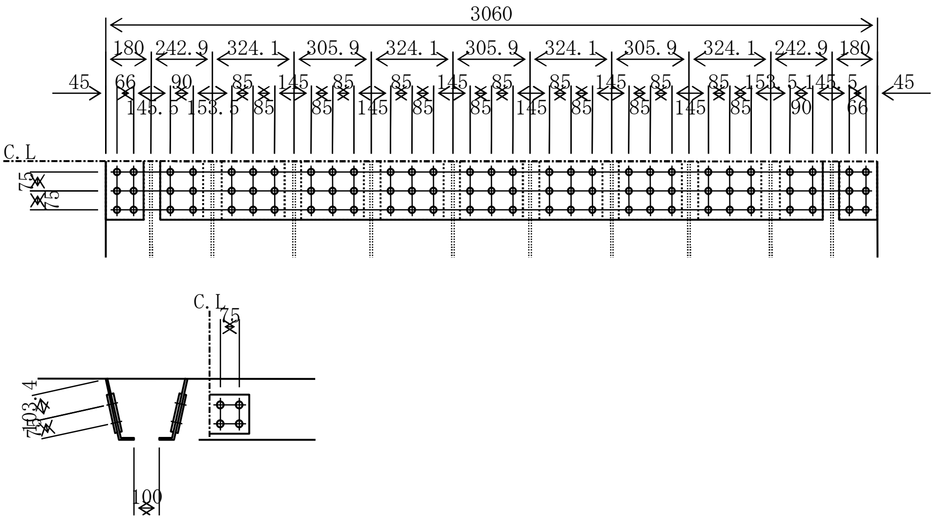
(b) Section area of main plate

1-DECK PL 3060 ＊ 16   Ag = 489.6 cm^2 (SM400)

4-U.RIB 320 ＊ 240 ＊ 8   Agr = 215.6 cm^2 (SM400)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc ＊ Ag = 105 ＊ 48960 = 5140800 N

・Rib Pcr = σc ＊ Agr = 105 ＊ 21560 = 2263800 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AgrR = Agr = 215.6 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 ＊ 1.00) = 5140800 / 108000 = 47.6 pcs.

・Rib nr = Pcr / (108000 ＊ 1.00) = 2263800 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 87 = 5140800 / 87 = 59090 N

ρs = τ ＊ Ag / 87 = 35 ＊ 48960 / 87 = 19968 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(59090^2 + 19968^2)}$ = 62372 N

(h) Check of splice plates

	(SS400)	A_{gs} (cm^2)	
2-SPL	PL 151 * 9	27.2	
1-SPL	PL 2627 * 9	236.4	
		263.6	
2-SPL	PL 151 * 14	42.3	
2-SPL	PL 170 * 14	47.6	
7-SPL	PL 250 * 14	245.0	
		334.9	
16-SPL	PL 155 * 10	248.0	> AgrR = 215.6cm^2

(193) D-3 J-1(Sec-1) DECK-1

(a) Acting stress

$\sigma cmax$ = -81 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 14 N/mm^2

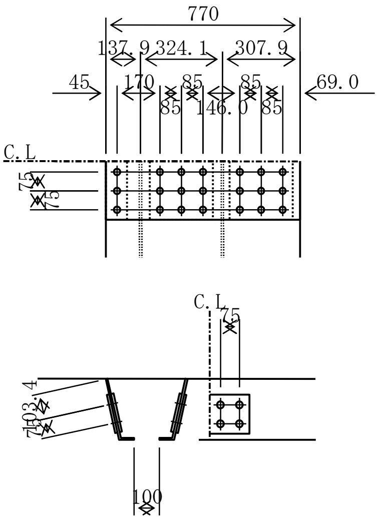
(b) Section area of main plate

1-DECK-1 PL 770 * 16   Ag = 123.2 cm^2 (SM400)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 123.2 + 53.9 = 177.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 12320 = 1293600 N

・Rib Pcr = σc * Agr = 105 * 5390 = 565950 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 123.2 / 2 = 61.6 cm^2

・Rib   AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1293600 / 108000 = 12.0 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 21 = 1293600 / 21 = 61600 N

ρs = τ * Ag / 21 = 14 * 12320 / 21 = 8420 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(61600^2 + 8420^2)}$ = 62173 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
1-SPL PL	770 ＊ 9	69.3
1-SPL PL	85 ＊ 14	11.9
2-SPL PL	250 ＊ 14	70.0
		81.9
4-SPL PL	155 ＊ 10	62.0 ＞ AgrR = 53.9cm2

(194) D-3 J-1(Sec-1) DECK-2

(a) Acting stress

$\sigma cmax$ = -81 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴σc = 105 N/mm^2

τmax = 14 N/mm^2

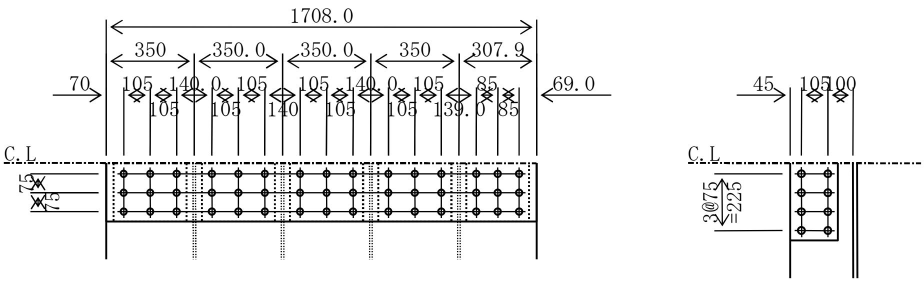
(b) Section area of main plate

1-DECK-2 PL 1708 * 16 Ag = 273.3 cm^2 (SM400)

5-RIB PL 250 * 24 Agr = 300.0 cm^2 (SM400)

ΣAg = Ag + Agr = 273.3 + 300.0 = 573.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 27327 = 2869356 N

・Rib Pcr = σc * Agr = 105 * 30000 = 3150000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 273.3 / 2 = 136.6 cm^2

・Rib AgrR = Agr = 300.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2869356 / 108000 = 26.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 3150000 / 108000 = 29.2 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 45 = 2869356 / 45 = 63763 N

ρs = τ * Ag / 45 = 14 * 27327 / 45 = 8716 N

ρ = $\sqrt{}(\rho p^2 + \rho s^2)$ = $\sqrt{}$(63763^2 + 8716^2) = 64356 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
1-SPL PL	1708 * 9	153.7
4-SPL PL	290 * 14	162.4
1-SPL PL	250 * 14	35.0
		197.4
10-SPL PL	185 * 18	333.0 ＞ AgrR = 300.0cm^2

(195) D-3 J-1(Sec-1) DECK-3

(a) Acting stress

$\sigma cmax$ = -81 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 14 N/mm^2

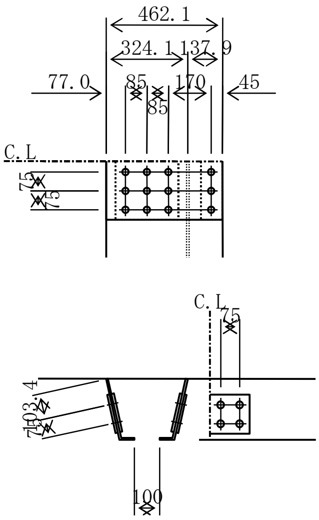
(b) Section area of main plate

1-DECK-3 PL 462 * 16   Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 7393 = 776244 N

・Rib Pcr = σc * Agr = 105 * 5390 = 565950 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 776244 / 108000 = 7.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 12 = 776244 / 12 = 64687 N

ρs = τ * Ag / 12 = 14 * 7393 / 12 = 8842 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(64687^2 + 8842^2)}$ = 65288 N

(h) Check of splice plates

	(SS400)	A_{gs} (cm^2)
1-SPL PL	462 * 9	41.6
1-SPL PL	250 * 14	35.0
1-SPL PL	85 * 14	11.9
		46.9
4-SPL PL	155 * 10	62.0 ＞ AgrR = 53.9cm2

(196) D-3　J-2(Sec-2)　DECK-1

(a) Acting stress

$\sigma cmax$ = -106 N/mm^2　　0.75σca = 0.75 * 140 = 105 N/mm^2

∴σc = 106 N/mm^2

τmax = 9 N/mm^2

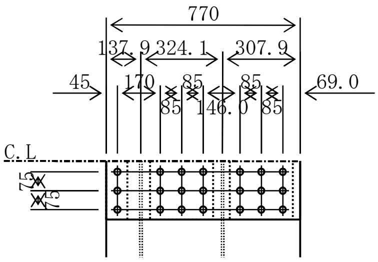
(b) Section area of main plate

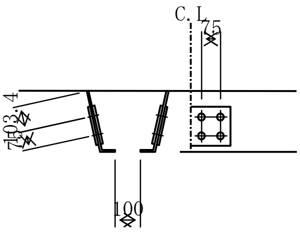
1-DECK-1　PL　770 * 16　　　Ag = 123.2 cm^2　(SM400)

1-U.RIB 320 * 240 * 8　　　Agr = 53.9 cm^2　(SM400)

ΣAg = Ag + Agr = 123.2 + 53.9 = 177.1 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate　Pc = σc * Ag = 106 * 12320 = 1309259 N

・Rib　Pcr = σc * Agr = 106 * 5390 = 572801 N

(e) Required section area of the splice plates

・Mother material(One side)　AgR = Ag / 2 = 123.2 / 2 = 61.6 cm^2

・Rib　　　AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate　n = Pc / (108000 * 1.00) = 1309259 / 108000 = 12.1 pcs.

・Rib　nr = Pcr / (108000 * 1.00) = 572801 / 108000 = 5.3 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 21 = 1309259 / 21 = 62346 N

ρs = τ * Ag / 21 = 9 * 12320 / 21 = 5306 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(62346^2 + 5306^2)}$ = 62571 N

(h) Check of splice plates

		Ags(cm^2)	
	(SS400)		
1-SPL PL	770 ＊ 9	69.3	
1-SPL PL	85 ＊ 14	11.9	
2-SPL PL	250 ＊ 14	70.0	
		81.9	
4-SPL PL	155 ＊ 10	62.0	＞ AgrR = 53.9cm2

(197) D-3 J-2(Sec-2) DECK-2

(a) Acting stress

σ_{cmax} = -106 N/mm^2 $0.75\sigma_{ca}$ = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma_c$ = 106 N/mm^2

τ_{max} = 9 N/mm^2

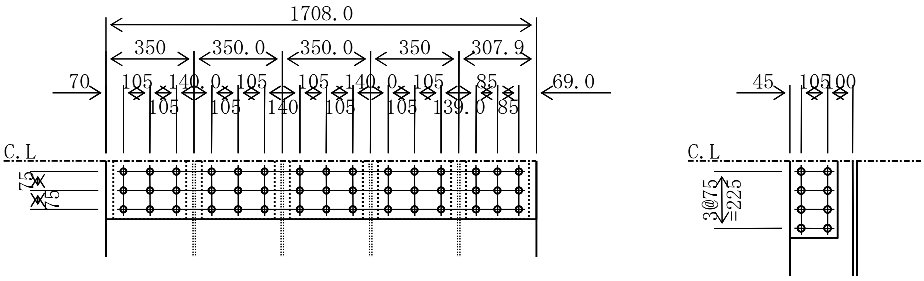
(b) Section area of main plate

1-DECK-2 PL 1708 * 16 Ag = 273.3 cm^2 (SM400)

5-RIB PL 250 * 24 Agr = 300.0 cm^2 (SM400)

ΣAg = Ag + Agr = 273.3 + 300.0 = 573.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σ_c * Ag = 106 * 27327 = 2904089 N

・Rib Pcr = σ_c * Agr = 106 * 30000 = 3188130 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 273.3 / 2 = 136.6 cm^2

・Rib AgrR = Agr = 300.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2904089 / 108000 = 26.9 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 3188130 / 108000 = 29.5 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ_a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρ_p = Pc / 45 = 2904089 / 45 = 64535 N

ρ_s = τ * Ag / 45 = 9 * 27327 / 45 = 5492 N

$\rho = \sqrt{(\rho_p^2 + \rho_s^2)} = \sqrt{(64535^2 + 5492^2)}$ = 64769 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
1-SPL	PL 1708 * 9	153.7
4-SPL	PL 290 * 14	162.4
1-SPL	PL 250 * 14	35.0
		197.4

10-SPL PL 185 * 18 333.0 > AgrR = 300.0cm^2

(198) D-3　J-2(Sec-2)　DECK-3

(a) Acting stress

$\sigma cmax$ = -106 N/mm^2　　0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 106 N/mm^2

τmax = 9 N/mm^2

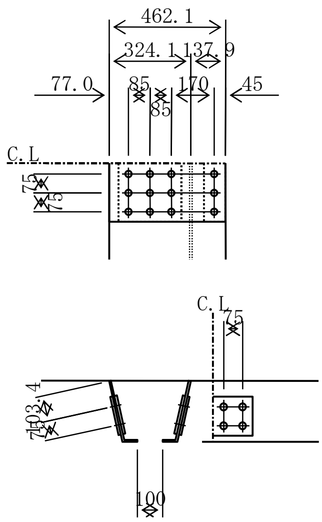
(b) Section area of main plate

1-DECK-3　PL　462 * 16　　　Ag = 73.9 cm^2　(SM400)

1-U.RIB 320 * 240 * 8　　　Agr = 53.9 cm^2　(SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate　Pc = σc * Ag = 106 * 7393 = 785640 N

・Rib　Pcr = σc * Agr = 106 * 5390 = 572801 N

(e) Required section area of the splice plates

・Mother material(One side)　AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib　　　AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate　n = Pc / (108000 * 1.00) = 785640 / 108000 = 7.3 pcs.

・Rib　nr = Pcr / (108000 * 1.00) = 572801 / 108000 = 5.3 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 12 = 785640 / 12 = 65470 N

ρs = τ * Ag / 12 = 9 * 7393 / 12 = 5572 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(65470^2 + 5572^2)}$ = 65707 N

(h) Check of splice plates

	(SS400)	$Ags(cm^2)$	
1-SPL PL	462 * 9	41.6	
1-SPL PL	250 * 14	35.0	
1-SPL PL	85 * 14	11.9	
		46.9	
4-SPL PL	155 * 10	62.0	> AgrR = 53.9cm2

(199) D-3 J-3(Sec-3) DECK-1

(a) Acting stress

$\sigma cmax$ = -117 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 117 N/mm^2

τmax = 6 N/mm^2

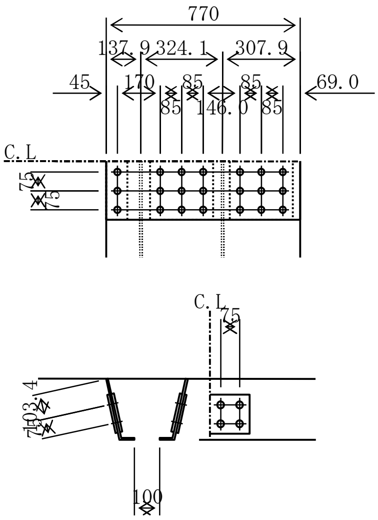
(b) Section area of main plate

1-DECK-1 PL 770 * 16 Ag = 123.2 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 123.2 + 53.9 = 177.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 117 * 12320 = 1446861 N

・Rib Pcr = σc * Agr = 117 * 5390 = 633002 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 123.2 / 2 = 61.6 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1446861 / 108000 = 13.4 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 633002 / 108000 = 5.9 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 21 = 1446861 / 21 = 68898 N

ρs = τ * Ag / 21 = 6 * 12320 / 21 = 3257 N

ρ = $\sqrt{}$ (ρp^2 + ρs^2) = $\sqrt{}$ (68898^2 + 3257^2) = 68975 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
1-SPL PL	770 * 9	69.3
1-SPL PL	85 * 14	11.9
2-SPL PL	250 * 14	70.0
		81.9
4-SPL PL	155 * 10	62.0 ＞ AgrR = 53.9cm2

(200) D-3　J-3(Sec-3)　DECK-2

(a) Acting stress

$\sigma cmax$ = -117 N/mm^2　　0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 117 N/mm^2

τmax = 6 N/mm^2

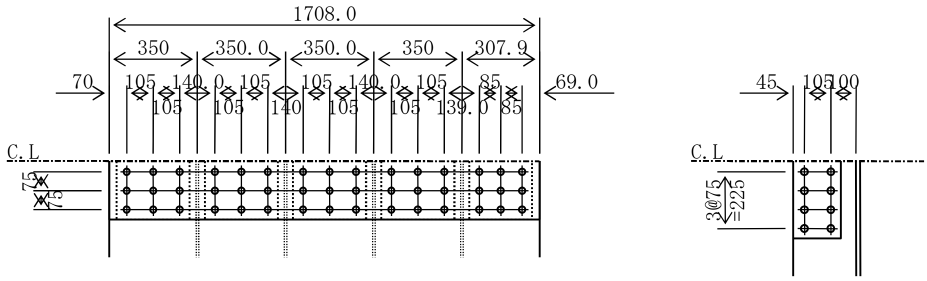
(b) Section area of main plate

1-DECK-2　PL　1708 * 16　　　Ag = 273.3 cm^2　(SM400)

5-RIB　PL　250 * 24　　　Agr = 300.0 cm^2　(SM400)

ΣAg = Ag + Agr = 273.3 + 300.0 = 573.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate　Pc = σc * Ag = 117 * 27327 = 3209306 N

・Rib　Pcr = σc * Agr = 117 * 30000 = 3523200 N

(e) Required section area of the splice plates

・Mother material(One side)　AgR = Ag / 2 = 273.3 / 2 = 136.6 cm^2

・Rib　　AgrR = Agr = 300.0 cm^2

(f) Required bolt number

・Main plate　n = Pc / (108000 * 1.00) = 3209306 / 108000 = 29.7 pcs.

・Rib　nr = Pcr / (108000 * 1.00) = 3523200 / 108000 = 32.6 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 45 = 3209306 / 45 = 71318 N

ρs = τ * Ag / 45 = 6 * 27327 / 45 = 3371 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(71318^2 + 3371^2)}$ = 71398 N

(h) Check of splice plates

	Ags(cm^2)
(SS400)	
1-SPL PL 1708 * 9	153.7
4-SPL PL 290 * 14	162.4
1-SPL PL 250 * 14	35.0
	197.4

10-SPL PL　185 * 18　　333.0　＞ AgrR = 300.0cm^2

(201) D-3　J-3(Sec-3)　DECK-3

(a) Acting stress

$\sigma cmax$ = -117 N/mm^2　　0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 117 N/mm^2

τmax = 6 N/mm^2

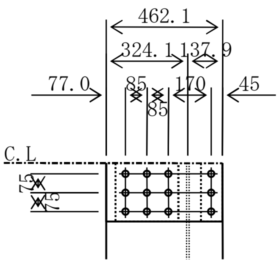
(b) Section area of main plate

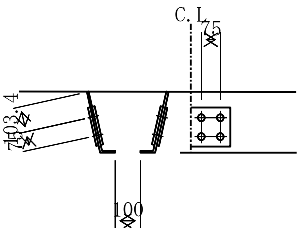
1-DECK-3　PL　462 * 16　　　Ag = 73.9 cm^2　(SM400)

1-U.RIB 320 * 240 * 8　　　Agr = 53.9 cm^2　(SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate　Pc = σc * Ag = 117 * 7393 = 868210 N

・Rib　Pcr = σc * Agr = 117 * 5390 = 633002 N

(e) Required section area of the splice plates

・Mother material(One side)　AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib　　AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate　n = Pc / (108000 * 1.00) = 868210 / 108000 = 8.0 pcs.

・Rib　nr = Pcr / (108000 * 1.00) = 633002 / 108000 = 5.9 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 12　　= 868210 / 12　　= 72351 N

ρs = τ * Ag / 12 = 6 * 7393 / 12 = 3420 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(72351^2 + 3420^2)}$ = 72432 N

(h) Check of splice plates

		Ags(cm^2)		
	(SS400)			
1-SPL PL	462 * 9	41.6		
1-SPL PL	250 * 14	35.0		
1-SPL PL	85 * 14	11.9		
		46.9		
4-SPL PL	155 * 10	62.0	> AgrR =	53.9cm2

(202) D-3 J-4(Sec-5) DECK-1

(a) Acting stress

$\sigma cmax$ = -122 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 122 N/mm^2

τmax = 3 N/mm^2

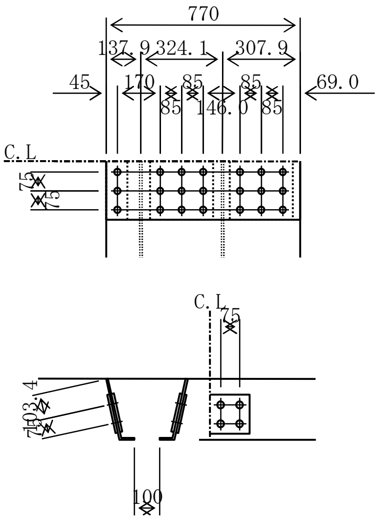
(b) Section area of main plate

1-DECK-1 PL 770 * 16 Ag = 123.2 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 123.2 + 53.9 = 177.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 122 * 12320 = 1506182 N

・Rib Pcr = σc * Agr = 122 * 5390 = 658954 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 123.2 / 2 = 61.6 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1506182 / 108000 = 13.9 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 658954 / 108000 = 6.1 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 21 = 1506182 / 21 = 71723 N

ρs = τ * Ag / 21 = 3 * 12320 / 21 = 1553 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(71723^2 + 1553^2)}$ = 71740 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
1-SPL PL	770 ＊ 9	69.3
1-SPL PL	85 ＊ 14	11.9
2-SPL PL	250 ＊ 14	70.0
		81.9
4-SPL PL	155 ＊ 10	62.0 ＞ AgrR = 53.9cm2

(203) D-3 J-4(Sec-5) DECK-2

(a) Acting stress

$\sigma cmax$ = -122 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 122 N/mm^2

τmax = 3 N/mm^2

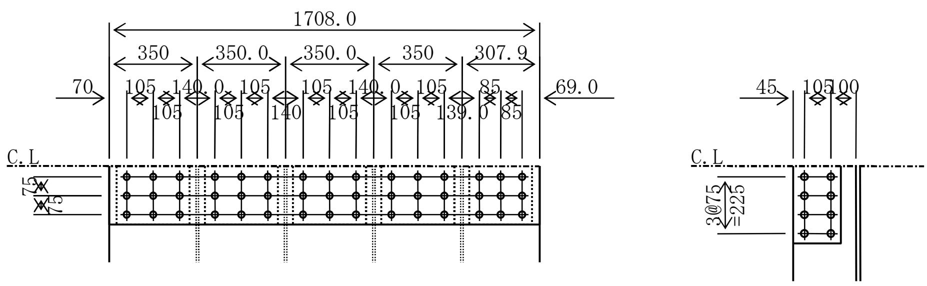
(b) Section area of main plate

1-DECK-2 PL 1708 * 16 Ag = 273.3 cm^2 (SM400)

5-RIB PL 250 * 24 Agr = 300.0 cm^2 (SM400)

ΣAg = Ag + Agr = 273.3 + 300.0 = 573.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 122 * 27327 = 3340887 N

・Rib Pcr = σc * Agr = 122 * 30000 = 3667650 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 273.3 / 2 = 136.6 cm^2

・Rib AgrR = Agr = 300.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 3340887 / 108000 = 30.9 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 3667650 / 108000 = 34.0 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 45 = 3340887 / 45 = 74242 N

ρs = τ * Ag / 45 = 3 * 27327 / 45 = 1608 N

$\rho = \sqrt{}(\rho p^2 + \rho s^2) = \sqrt{}(74242^2 + 1608^2)$ = 74259 N

(h) Check of splice plates

(SS400)	Ags(cm^2)
1-SPL PL 1708 * 9	153.7
4-SPL PL 290 * 14	162.4
1-SPL PL 250 * 14	35.0
	197.4
10-SPL PL 185 * 18	333.0 > AgrR = 300.0cm^2

(204) D-3 J-4(Sec-5) DECK-3

(a) Acting stress

$\sigma cmax$ = -122 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 122 N/mm^2

τmax = 3 N/mm^2

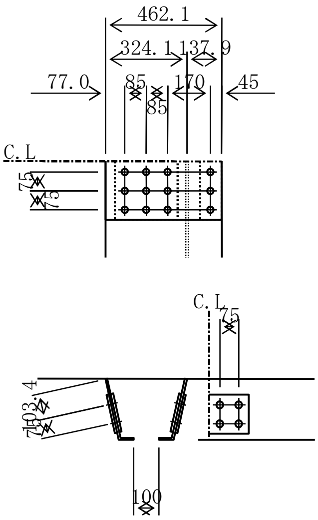
(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 122 * 7393 = 903807 N

・Rib Pcr = σc * Agr = 122 * 5390 = 658954 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 903807 / 108000 = 8.4 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 658954 / 108000 = 6.1 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 12 = 903807 / 12 = 75317 N

ρs = τ * Ag / 12 = 3 * 7393 / 12 = 1631 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(75317^2 + 1631^2)}$ = 75335 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	462 ＊ 9	41.6	
1-SPL PL	250 ＊ 14	35.0	
1-SPL PL	85 ＊ 14	11.9	
		46.9	
4-SPL PL	155 ＊ 10	62.0	＞ AgrR = 53.9cm2

(205) D-3 J-5(Sec-6) DECK-1

(a) Acting stress

$\sigma cmax$ = -117 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 117 N/mm^2

τmax = 6 N/mm^2

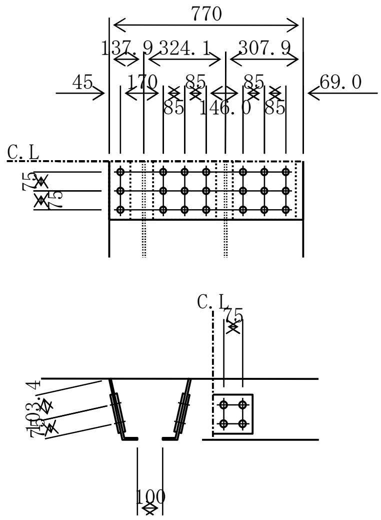
(b) Section area of main plate

1-DECK-1 PL 770 * 16 Ag = 123.2 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 123.2 + 53.9 = 177.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 117 * 12320 = 1442635 N

・Rib Pcr = σc * Agr = 117 * 5390 = 631153 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 123.2 / 2 = 61.6 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1442635 / 108000 = 13.4 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 631153 / 108000 = 5.8 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 21 = 1442635 / 21 = 68697 N

ρs = τ * Ag / 21 = 6 * 12320 / 21 = 3614 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(68697^2 + 3614^2)}$ = 68792 N

(h) Check of splice plates

		$A_{gs}(cm^2)$		
	(SS400)			
1-SPL PL	770 * 9	69.3		
1-SPL PL	85 * 14	11.9		
2-SPL PL	250 * 14	70.0		
		81.9		
4-SPL PL	155 * 10	62.0	> AgrR =	53.9cm2

(206) D-3 J-5(Sec-6) DECK-2

(a) Acting stress

$\sigma cmax$ = -117 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 117 N/mm^2

τmax = 6 N/mm^2

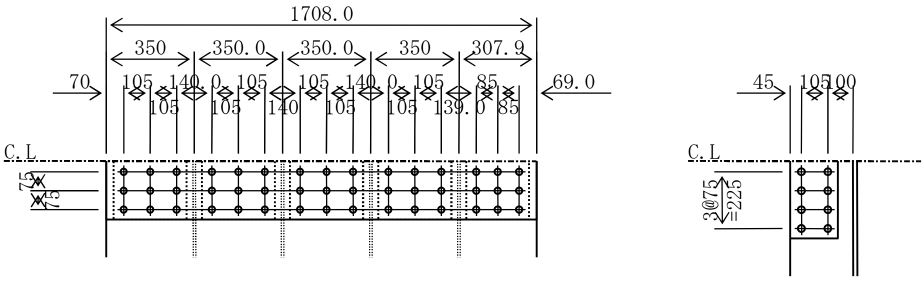
(b) Section area of main plate

1-DECK-2 PL 1708 * 16 Ag = 273.3 cm^2 (SM400)

5-RIB PL 250 * 24 Agr = 300.0 cm^2 (SM400)

ΣAg = Ag + Agr = 273.3 + 300.0 = 573.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 117 * 27327 = 3199933 N

・Rib Pcr = σc * Agr = 117 * 30000 = 3512910 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 273.3 / 2 = 136.6 cm^2

・Rib AgrR = Agr = 300.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 3199933 / 108000 = 29.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 3512910 / 108000 = 32.5 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 45 = 3199933 / 45 = 71110 N

ρs = τ * Ag / 45 = 6 * 27327 / 45 = 3741 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(71110^2 + 3741^2) = 71208 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
1-SPL PL	1708 * 9	153.7
4-SPL PL	290 * 14	162.4
1-SPL PL	250 * 14	35.0
		197.4
10-SPL PL	185 * 18	333.0 ＞ AgrR = 300.0cm^2

(207) D-3 J-5(Sec-6) DECK-3

(a) Acting stress

$\sigma cmax$ = -117 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 117 N/mm^2

τmax = 6 N/mm^2

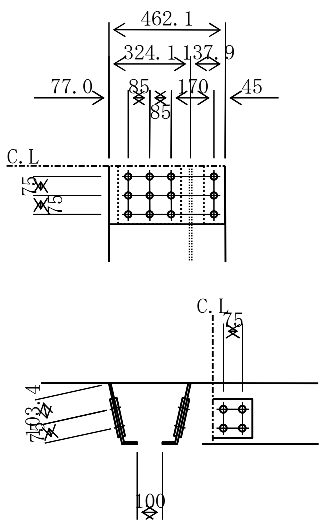
(b) Section area of main plate

1-DECK-3 PL 462 * 16   Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 117 * 7393 = 865675 N

・Rib Pcr = σc * Agr = 117 * 5390 = 631153 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 865675 / 108000 = 8.0 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 631153 / 108000 = 5.8 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 12 = 865675 / 12 = 72140 N

ρs = τ * Ag / 12 = 6 * 7393 / 12 = 3796 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(72140^2 + 3796^2)}$ = 72239 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)		
1-SPL PL	462 * 9	41.6		
1-SPL PL	250 * 14	35.0		
1-SPL PL	85 * 14	11.9		
		46.9		
4-SPL PL	155 * 10	62.0	＞ AgrR =	53.9cm2

(208) D-3 J-6(Sec-7) DECK-1

(a) Acting stress

$\sigma cmax$ = -106 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 106 N/mm^2

τmax = 10 N/mm^2

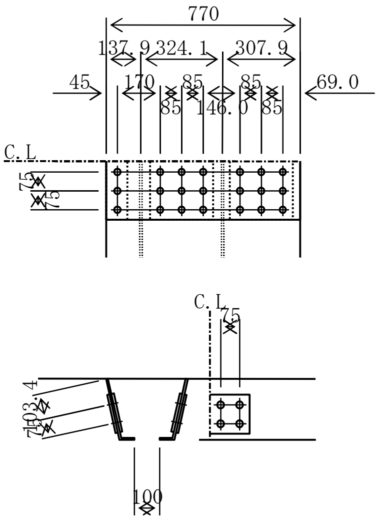
(b) Section area of main plate

1-DECK-1 PL 770 * 16 Ag = 123.2 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 123.2 + 53.9 = 177.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 106 * 12320 = 1304897 N

・Rib Pcr = σc * Agr = 106 * 5390 = 570893 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 123.2 / 2 = 61.6 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1304897 / 108000 = 12.1 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 570893 / 108000 = 5.3 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 21 = 1304897 / 21 = 62138 N

ρs = τ * Ag / 21 = 10 * 12320 / 21 = 6069 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(62138^2 + 6069^2) = 62434 N

(h) Check of splice plates

		Ags(cm^2)		
	(SS400)			
1-SPL PL	770 * 9	69.3		
1-SPL PL	85 * 14	11.9		
2-SPL PL	250 * 14	70.0		
		81.9		
4-SPL PL	155 * 10	62.0	＞ AgrR =	53.9cm2

(209) D-3 J-6(Sec-7) DECK-2

(a) Acting stress

$\sigma cmax$ = -106 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴σc = 106 N/mm^2

τmax = 10 N/mm^2

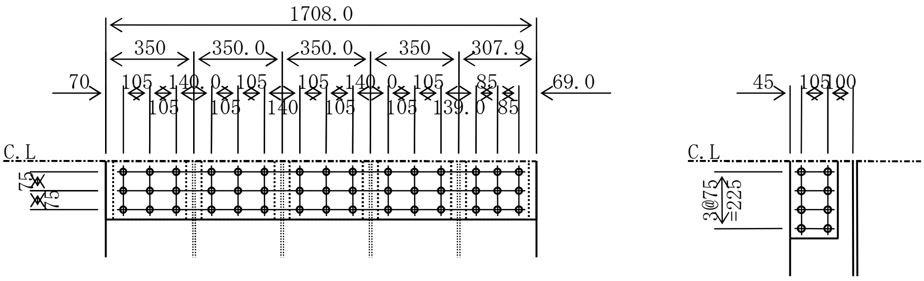
(b) Section area of main plate

1-DECK-2 PL 1708 * 16 Ag = 273.3 cm^2 (SM400)

5-RIB PL 250 * 24 Agr = 300.0 cm^2 (SM400)

ΣAg = Ag + Agr = 273.3 + 300.0 = 573.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 106 * 27327 = 2894415 N

・Rib Pcr = σc * Agr = 106 * 30000 = 3177510 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 273.3 / 2 = 136.6 cm^2

・Rib AgrR = Agr = 300.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2894415 / 108000 = 26.8 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 3177510 / 108000 = 29.4 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 45 = 2894415 / 45 = 64320 N

ρs = τ * Ag / 45 = 10 * 27327 / 45 = 6282 N

ρ = √(ρp^2 + ρs^2) = √(64320^2 + 6282^2) = 64626 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
1-SPL PL	1708 * 9	153.7
4-SPL PL	290 * 14	162.4
1-SPL PL	250 * 14	35.0
		197.4
10-SPL PL	185 * 18	333.0 ＞ AgrR = 300.0cm^2

(210) D-3 J-6(Sec-7) DECK-3

(a) Acting stress

$\sigma cmax$ = -106 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 106 N/mm^2

τmax = 10 N/mm^2

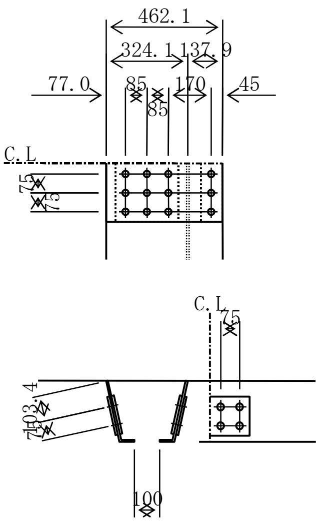
(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 106 * 7393 = 783023 N

・Rib Pcr = σc * Agr = 106 * 5390 = 570893 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 783023 / 108000 = 7.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 570893 / 108000 = 5.3 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 12 = 783023 / 12 = 65252 N

ρs = τ * Ag / 12 = 10 * 7393 / 12 = 6373 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(65252^2 + 6373^2)}$ = 65562 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
1-SPL PL	462 ＊ 9	41.6
1-SPL PL	250 ＊ 14	35.0
1-SPL PL	85 ＊ 14	11.9
		46.9
4-SPL PL	155 ＊ 10	62.0 ＞ AgrR = 53.9cm2

(211) D-3 J-7(Sec-8) DECK-1

(a) Acting stress

σ_{cmax} = -79 N/mm^2 0.75 σ_{ca} = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma_c$ = 105 N/mm^2

τ_{max} = 16 N/mm^2

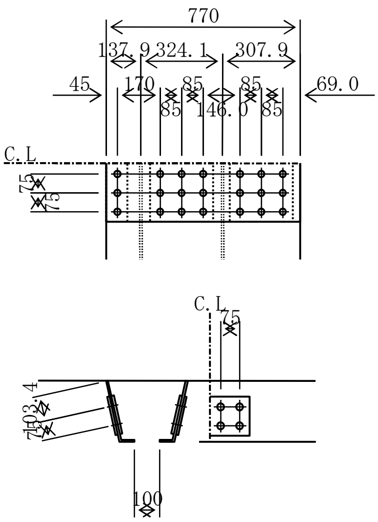
(b) Section area of main plate

1-DECK-1 PL 770 * 16 Ag = 123.2 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 123.2 + 53.9 = 177.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σ_c * Ag = 105 * 12320 = 1293600 N

・Rib Pcr = σ_c * Agr = 105 * 5390 = 565950 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 123.2 / 2 = 61.6 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1293600 / 108000 = 12.0 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 21 = 1293600 / 21 = 61600 N

ρs = τ * Ag / 21 = 16 * 12320 / 21 = 9137 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(61600^2 + 9137^2)}$ = 62274 N

(h) Check of splice plates

		Ags(cm^2)		
	(SS400)			
1-SPL PL	770 * 9	69.3		
1-SPL PL	85 * 14	11.9		
2-SPL PL	250 * 14	70.0		
		81.9		
4-SPL PL	155 * 10	62.0	> AgrR =	53.9cm2

(212) D-3 J-7(Sec-8) DECK-2

(a) Acting stress

$\sigma cmax$ = -79 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴σc = 105 N/mm^2

τmax = 16 N/mm^2

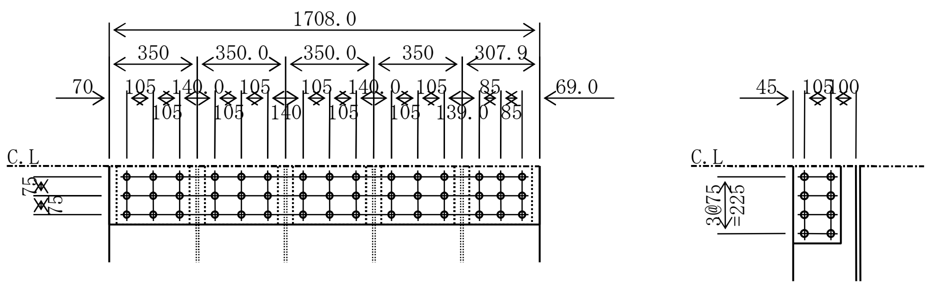
(b) Section area of main plate

1-DECK-2 PL 1708 * 16 Ag = 273.3 cm^2 (SM400)

5-RIB PL 250 * 24 Agr = 300.0 cm^2 (SM400)

ΣAg = Ag + Agr = 273.3 + 300.0 = 573.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 27327 = 2869356 N

・Rib Pcr = σc * Agr = 105 * 30000 = 3150000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 273.3 / 2 = 136.6 cm^2

・Rib AgrR = Agr = 300.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2869356 / 108000 = 26.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 3150000 / 108000 = 29.2 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 45 = 2869356 / 45 = 63763 N

ρs = τ * Ag / 45 = 16 * 27327 / 45 = 9458 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(63763^2 + 9458^2)}$ = 64461 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
1-SPL PL	1708 * 9	153.7
4-SPL PL	290 * 14	162.4
1-SPL PL	250 * 14	35.0
		197.4
10-SPL PL	185 * 18	333.0 ＞ AgrR = 300.0cm^2

(213) D-3 J-7(Sec-8) DECK-3

(a) Acting stress

σcmax = -79 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴σc = 105 N/mm^2

τmax = 16 N/mm^2

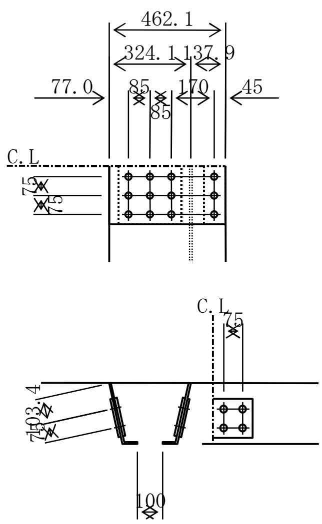
(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 7393 = 776244 N

・Rib Pcr = σc * Agr = 105 * 5390 = 565950 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 776244 / 108000 = 7.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 12 = 776244 / 12 = 64687 N

ρs = τ * Ag / 12 = 16 * 7393 / 12 = 9595 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(64687^2 + 9595^2)}$ = 65395 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
1-SPL PL	462 * 9	41.6
1-SPL PL	250 * 14	35.0
1-SPL PL	85 * 14	11.9
		46.9
4-SPL PL	155 * 10	62.0 ＞ AgrR = 53.9cm2

(214) D-3 J-8(Sec-8) DECK-1

(a) Acting stress

σ_{tmax} = 32 N/mm^2 　 $0.75\sigma_{ta}$ = 0.75 ＊ 140 = 105 N/mm^2

σ_{cmax} = −64 N/mm^2 　 $0.75\sigma_{ca}$ = 0.75 ＊ 140 = 105 N/mm^2

∴ σ_c = 105 N/mm^2

τ_{max} = 19 N/mm^2

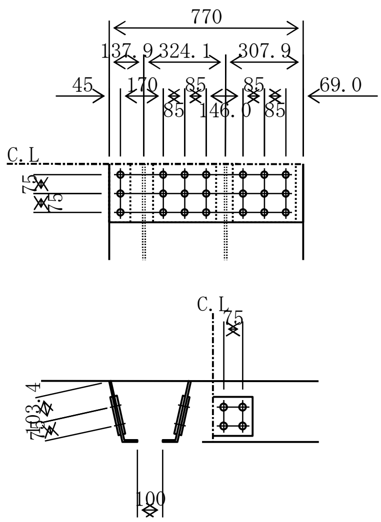
(b) Section area of main plate

1-DECK-1 PL 770 ＊ 16 　 Ag = 123.2 cm^2 (SM400)

1-U.RIB 320 ＊ 240 ＊ 8 　 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 123.2 + 53.9 = 177.1 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-1 PL 770 ＊ 16 　 A = 123.2

(123.2 − (7＊ 2.5)＊ 1.6) ＊ 1.1 = 104.7 ＜ 123.2 ∴An = 104.7 cm^2

1-U.RIB 320 ＊ 240 ＊ 8 　 Ar = 53.9

(53.9 − (4＊ 2.7)＊ 0.8− 1＊(10.0＊0.8)) ＊ 1.1 = 41.0

＜ 53.9 ∴Anr = 41.0 cm^2

ΣAn = An + Anr = 104.7 + 41.0 = 145.7 cm^2

σ_{tn} = σ_{tmax} ＊ ΣAg / ΣAn = 32 ＊ 177.1 / 145.7 = 39 N/mm^2

＜ σ_{ta} = 140 N/mm^2

(e) Design axial force

・Main plate Pt = $0.75\sigma_{ta}$ ＊ An / 1.1 = 105 ＊ 10472 / 1.1 = 999600 N

＞ σ_{tn} ＊ An = 39 ＊ 10472 = 411964 N

Pc = σ_c ＊ Ag = 105 ＊ 12320 = 1293600 N

・Rib Ptr = $0.75\sigma_{ta}$ ＊ Anr / 1.1 = 105 ＊ 4099 / 1.1 = 391230 N

＞ σ_{tn} ＊ Anr = 39 ＊ 4099 = 161237 N

Pcr = σ_c ＊ Agr = 105 ＊ 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 104.7 / 2 = 52.4 cm^2

AgR = Ag / 2 = 123.2 / 2 = 61.6 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1293600 / 108000 = 12.0 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 21 = 1293600 / 21 = 61600$ N

$\rho s = \tau * Ag / 21 = 19 * 12320 / 21 = 11216$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(61600^2 + 11216^2)} = 62613$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	770 * 9	(69.3 -	(7*2.5)* 0.9)*1.1=	58.9<	69.3	∴ 58.9
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
2-SPL PL	250 * 14	(70.0 -	2*(3*2.5)* 1.4)*1.1=	53.9<	70.0	∴ 53.9
		81.9				63.1
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(215) D-3 J-8(Sec-8) DECK-2

(a) Acting stress

σ tmax = 32 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2

σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2

$\therefore$ σ c = 105 N/mm^2

τ max = 19 N/mm^2

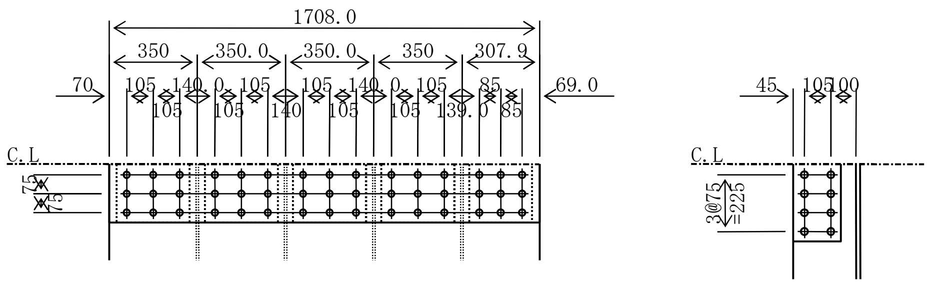
(b) Section area of main plate

1-DECK-2 PL 1708 * 16 Ag = 273.3 cm^2 (SM400)

5-RIB PL 250 * 24 Agr = 300.0 cm^2 (SM400)

ΣAg = Ag + Agr = 273.3 + 300.0 = 573.3 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2 PL 1708 * 16 A = 273.3

(273.3 - (15* 2.5)* 1.6) * 1.1 = 234.6 < 273.3 $\therefore$An = 234.6 cm^2

5-RIB PL 250 * 24 Ar = 300.0

(300.0 - 5*(2* 2.7)* 2.4) * 1.1 = 258.7 < 300.0 $\therefore$Anr = 258.7 cm^2

ΣAn = An + Anr = 234.6 + 258.7 = 493.3 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 32 * 573.3 / 493.3 = 38 N/mm^2

< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 23460 / 1.1 = 2239356 N

> σ tn * An = 38 * 23460 = 882365 N

Pc = σ c * Ag = 105 * 27327 = 2869356 N

・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 25872 / 1.1 = 2469600 N

> σ tn * Anr = 38 * 25872 = 973087 N

Pcr = σ c * Agr = 105 * 30000 = 3150000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 234.6 / 2 = 117.3 cm^2

AgR = Ag / 2 = 273.3 / 2 = 136.6 cm^2

・Rib AnrR = Anr = 258.7 cm^2

AgrR = Agr = 300.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2869356 / 108000 = 26.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 3150000 / 108000 = 29.2 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

ρp = Pc / 45 = 2869356 / 45 = 63763 N

ρs = τ * Ag / 45 = 19 * 27327 / 45 = 11610 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(63763^2 + 11610^2)}$ = 64812 N

(i) Check of splice plates

	(SS400)	Ags(cm²)	deduction of bolt holes		Ans(cm²)
1-SPL PL	1708 * 9	(153.7 -	(15*2.5)* 0.9)*1.1= 132.0＜	153.7	∴132.0
4-SPL PL	290 * 14	(162.4 -	4*(3*2.5)* 1.4)*1.1= 132.4＜	162.4	∴132.4
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1= 27.0＜	35.0	∴ 27.0
		197.4			159.4
10-SPL PL	185 * 18	(333.0 -	10*(2*2.7)* 1.8)*1.1= 259.4＜	333.0	∴259.4
		＞ AgrR			＞AnrR

(216) D-3 J-8(Sec-8) DECK-3

(a) Acting stress

σ_{tmax} = 32 N/mm^2 0.75σ_{ta} = 0.75 * 140 = 105 N/mm^2

σ_{cmax} = -64 N/mm^2 0.75σ_{ca} = 0.75 * 140 = 105 N/mm^2

∴ σ_c = 105 N/mm^2

τ_{max} = 19 N/mm^2

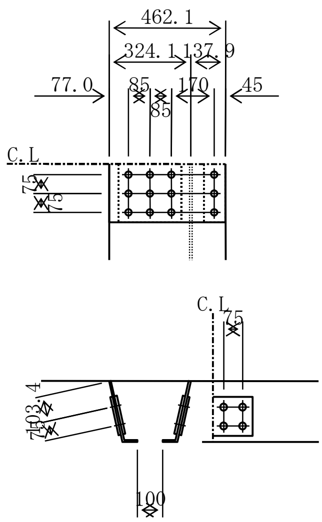
(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3 PL 462 * 16 A = 73.9

(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 ∴An = 63.7 cm^2

1-U.RIB 320 * 240 * 8 Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9 ∴Anr = 41.0 cm^2

ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2

σ_{tn} = σ_{tmax} * ΣAg / ΣAn = 32 * 127.8 / 104.7 = 40 N/mm^2

< σ_{ta} = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σ_{ta} * An / 1.1 = 105 * 6372 / 1.1 = 608244 N

> σ_{tn} * An = 40 * 6372 = 251780 N

Pc = σ_c * Ag = 105 * 7393 = 776244 N

・Rib Ptr = 0.75σ_{ta} * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N

> σ_{tn} * Anr = 40 * 4099 = 161948 N

Pcr = σ_c * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2

AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 776244 / 108000 = 7.2 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 12 = 776244 / 12 = 64687 N
ρs = τ * Ag / 12 = 19 * 7393 / 12 = 11779 N
ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(64687^2 + 11779^2) = 65751 N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		46.9				36.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(217) D-3 J-9(Sec-9) DECK-1

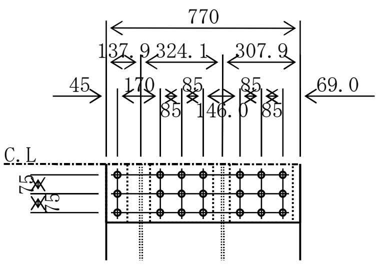
(a) Acting stress

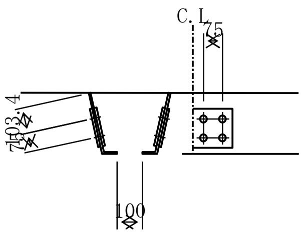
σ tmax = 86 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2
∴ σ c = 105 N/mm^2
τ max = 22 N/mm^2

(b) Section area of main plate

1-DECK-1 PL 770 * 16 Ag = 123.2 cm^2 (SM400)
1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)
ΣAg = Ag + Agr = 123.2 + 53.9 = 177.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-1 PL 770 * 16 A = 123.2
(123.2 - (7* 2.5)* 1.6) * 1.1 = 104.7 < 123.2 ∴An = 104.7 cm^2
1-U.RIB 320 * 240 * 8 Ar = 53.9
(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0
< 53.9 ∴Anr = 41.0 cm^2
ΣAn = An + Anr = 104.7 + 41.0 = 145.7 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 86 * 177.1 / 145.7 = 104 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 104 * 10472 = 1091516 N
> 0.75 σ ta * An / 1.1 = 105 * 10472 / 1.1 = 999600 N
Pc = σ c * Ag = 105 * 12320 = 1293600 N
・Rib Ptr = σ tn * Anr = 104 * 4099 = 427205 N
> 0.75 σ ta * Anr/ 1.1 = 105 * 4099 / 1.1 = 391230 N
Pcr = σ c * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 104.7 / 2 = 52.4 cm^2
AgR = Ag / 2 = 123.2 / 2 = 61.6 cm^2
・Rib AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1293600 / 108000 = 12.0 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 21 = 1293600 / 21 = 61600$ N
$\rho s = \tau * Ag / 21 = 22 * 12320 / 21 = 13018$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(61600^2 + 13018^2)} = 62961$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			$Ans(cm^2)$
1-SPL PL	770 * 9	(69.3 -	(7*2.5)* 0.9)*1.1=	58.9<	69.3	∴ 58.9
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
2-SPL PL	250 * 14	(70.0 -	2*(3*2.5)* 1.4)*1.1=	53.9<	70.0	∴ 53.9
		81.9				63.1
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(218) D-3 J-9(Sec-9) DECK-2

(a) Acting stress

σ tmax = 86 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2

σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma$ c = 105 N/mm^2

τ max = 22 N/mm^2

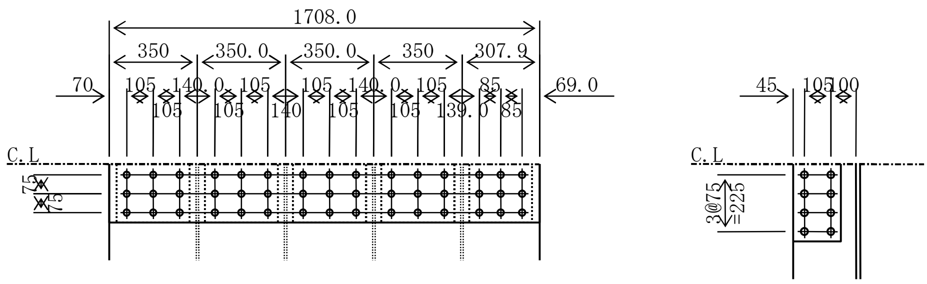
(b) Section area of main plate

1-DECK-2 PL 1708 * 16 Ag = 273.3 cm^2 (SM400)

5-RIB PL 250 * 24 Agr = 300.0 cm^2 (SM400)

ΣAg = Ag + Agr = 273.3 + 300.0 = 573.3 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2 PL 1708 * 16 A = 273.3

(273.3 - (15* 2.5)* 1.6) * 1.1 = 234.6 < 273.3 ∴An = 234.6 cm^2

5-RIB PL 250 * 24 Ar = 300.0

(300.0 - 5*(2* 2.7)* 2.4) * 1.1 = 258.7 < 300.0 ∴Anr = 258.7 cm^2

ΣAn = An + Anr = 234.6 + 258.7 = 493.3 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 86 * 573.3 / 493.3 = 100 N/mm^2

< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 100 * 23460 = 2337861 N

> 0.75 σ ta * An / 1.1 = 105 * 23460 / 1.1 = 2239356 N

Pc = σ c * Ag = 105 * 27327 = 2869356 N

・Rib Ptr = σ tn * Anr = 100 * 25872 = 2578233 N

> 0.75 σ ta * Anr/ 1.1 = 105 * 25872 / 1.1 = 2469600 N

Pcr = σ c * Agr = 105 * 30000 = 3150000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 234.6 / 2 = 117.3 cm^2

AgR = Ag / 2 = 273.3 / 2 = 136.6 cm^2

・Rib AnrR = Anr = 258.7 cm^2

AgrR = Agr = 300.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2869356 / 108000 = 26.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 3150000 / 108000 = 29.2 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 45 = 2869356 / 45 = 63763$ N

$\rho s = \tau * Ag / 45 = 22 * 27327 / 45 = 13475$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(63763^2 + 13475^2)} = 65172$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
1-SPL PL	1708 * 9	(153.7 -	(15*2.5)* 0.9)*1.1= 132.0<	153.7	∴132.0
4-SPL PL	290 * 14	(162.4 -	4*(3*2.5)* 1.4)*1.1= 132.4<	162.4	∴132.4
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1= 27.0<	35.0	∴ 27.0
		197.4			159.4
10-SPL PL	185 * 18	(333.0 -	10*(2*2.7)* 1.8)*1.1= 259.4<	333.0	∴259.4
		> AgrR			>AnrR

(219) D-3 J-9(Sec-9) DECK-3

(a) Acting stress

$\sigma tmax$ = 86 N/mm^2 0.75 σta = 0.75 * 140 = 105 N/mm^2

$\sigma cmax$ = -64 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 22 N/mm^2

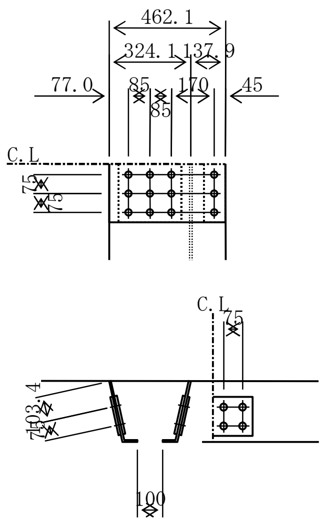
(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3 PL 462 * 16 A = 73.9

(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 ∴An = 63.7 cm^2

1-U.RIB 320 * 240 * 8 Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9 ∴Anr = 41.0 cm^2

ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 86 * 127.8 / 104.7 = 105 N/mm^2

< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 105 * 6372 = 667101 N

> 0.75 σta * An / 1.1 = 105 * 6372 / 1.1 = 608244 N

Pc = σc * Ag = 105 * 7393 = 776244 N

・Rib Ptr = σtn * Anr = 105 * 4099 = 429088 N

> 0.75 σta * Anr/ 1.1 = 105 * 4099 / 1.1 = 391230 N

Pcr = σc * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2

AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 776244 / 108000 = 7.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 12 = 776244 / 12 = 64687$ N

$\rho s = \tau * Ag / 12 = 22 * 7393 / 12 = 13671$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64687^2 + 13671^2)} = 66116$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		46.9				36.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(220) D-3 J-10(Sec-11) DECK-1

(a) Acting stress

σ tmax = 92 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2

σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2

∴ σ c = 105 N/mm^2

τ max = 17 N/mm^2

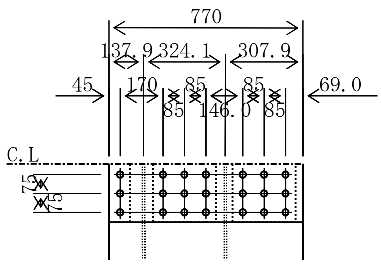
(b) Section area of main plate

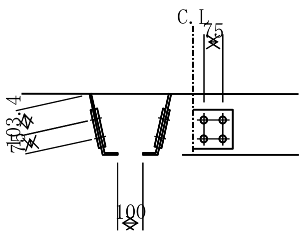
1-DECK-1 PL 770 * 16   Ag = 123.2 cm^2 (SM400)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 123.2 + 53.9 = 177.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-1 PL 770 * 16   A = 123.2

(123.2 - (7* 2.5)* 1.6) * 1.1 = 104.7 < 123.2 ∴An = 104.7 cm^2

1-U.RIB 320 * 240 * 8   Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9 ∴Anr = 41.0 cm^2

ΣAn = An + Anr = 104.7 + 41.0 = 145.7 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 92 * 177.1 / 145.7 = 112 N/mm^2

< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 112 * 10472 = 1176809 N

> 0.75 σ ta * An / 1.1 = 105 * 10472 / 1.1 = 999600 N

Pc = σ c * Ag = 105 * 12320 = 1293600 N

・Rib Ptr = σ tn * Anr = 112 * 4099 = 460587 N

> 0.75 σ ta * Anr/ 1.1 = 105 * 4099 / 1.1 = 391230 N

Pcr = σ c * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 104.7 / 2 = 52.4 cm^2

AgR = Ag / 2 = 123.2 / 2 = 61.6 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1293600 / 108000 = 12.0 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 21 = 1293600 / 21 = 61600$ N
$\rho s = \tau * Ag / 21 = 17 * 12320 / 21 = 10028$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(61600^2 + 10028^2)} = 62411$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	770 * 9	(69.3 -	(7*2.5)* 0.9)*1.1=	58.9<	69.3	∴ 58.9
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
2-SPL PL	250 * 14	(70.0 -	2*(3*2.5)* 1.4)*1.1=	53.9<	70.0	∴ 53.9
		81.9				63.1
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(221) D-3 J-10(Sec-11) DECK-2

(a) Acting stress

σ tmax = 92 N/mm^2 0.75σ ta = 0.75 * 140 = 105 N/mm^2

σ cmax = -64 N/mm^2 0.75σ ca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma$ c = 105 N/mm^2

τ max = 17 N/mm^2

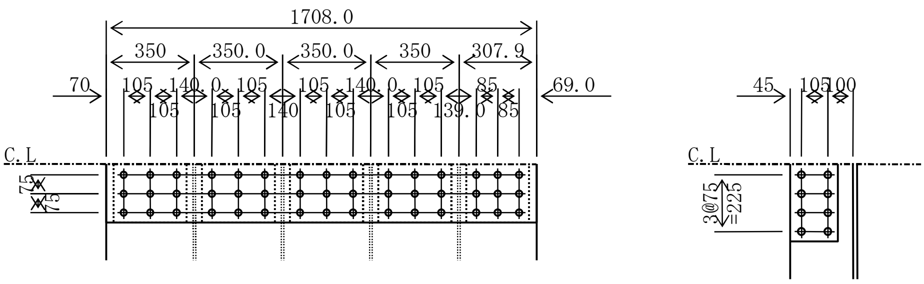
(b) Section area of main plate

1-DECK-2 PL 1708 * 16 Ag = 273.3 cm^2 (SM400)

5-RIB PL 250 * 24 Agr = 300.0 cm^2 (SM400)

ΣAg = Ag + Agr = 273.3 + 300.0 = 573.3 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2 PL 1708 * 16 A = 273.3

(273.3 - (15* 2.5)* 1.6) * 1.1 = 234.6 < 273.3 $\therefore$An = 234.6 cm^2

5-RIB PL 250 * 24 Ar = 300.0

(300.0 - 5*(2* 2.7)* 2.4) * 1.1 = 258.7 < 300.0 $\therefore$Anr = 258.7 cm^2

ΣAn = An + Anr = 234.6 + 258.7 = 493.3 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 92 * 573.3 / 493.3 = 107 N/mm^2

< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 107 * 23460 = 2520544 N

> 0.75σ ta * An / 1.1 = 105 * 23460 / 1.1 = 2239356 N

Pc = σ c * Ag = 105 * 27327 = 2869356 N

・Rib Ptr = σ tn * Anr = 107 * 25872 = 2779699 N

> 0.75σ ta * Anr/ 1.1 = 105 * 25872 / 1.1 = 2469600 N

Pcr = σ c * Agr = 105 * 30000 = 3150000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 234.6 / 2 = 117.3 cm^2

AgR = Ag / 2 = 273.3 / 2 = 136.6 cm^2

・Rib AnrR = Anr = 258.7 cm^2

AgrR = Agr = 300.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2869356 / 108000 = 26.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 3150000 / 108000 = 29.2 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 45 = 2869356 / 45 = 63763$ N

$\rho s = \tau * Ag / 45 = 17 * 27327 / 45 = 10380$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(63763^2 + 10380^2)} = 64603$ N

(i) Check of splice plates

	(SS400)	Ags(cm²)	deduction of bolt holes		Ans(cm²)
1-SPL PL	1708 * 9	(153.7 -	(15*2.5)* 0.9)*1.1= 132.0<	153.7	∴132.0
4-SPL PL	290 * 14	(162.4 -	4*(3*2.5)* 1.4)*1.1= 132.4<	162.4	∴132.4
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1= 27.0<	35.0	∴ 27.0
		197.4			159.4
10-SPL PL	185 * 18	(333.0 -	10*(2*2.7)* 1.8)*1.1= 259.4<	333.0	∴259.4
		＞ AgrR			＞AnrR

(222) D-3 J-10(Sec-11) DECK-3

(a) Acting stress

σ_{tmax} = 92 N/mm^2 $0.75\sigma_{ta}$ = 0.75 * 140 = 105 N/mm^2

σ_{cmax} = -64 N/mm^2 $0.75\sigma_{ca}$ = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma_c$ = 105 N/mm^2

τ_{max} = 17 N/mm^2

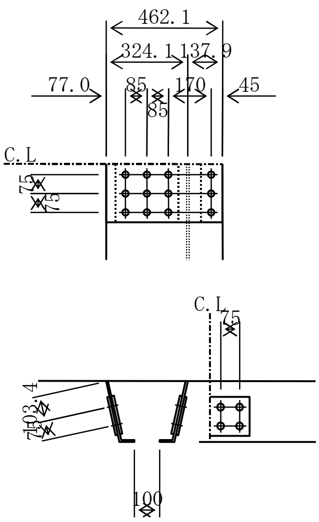
(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3 PL 462 * 16 A = 73.9

(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 $\therefore$An = 63.7 cm^2

1-U.RIB 320 * 240 * 8 Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9 $\therefore$Anr = 41.0 cm^2

ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2

σ_{tn} = σ_{tmax} * ΣAg / ΣAn = 92 * 127.8 / 104.7 = 113 N/mm^2

< σ_{ta} = 140 N/mm^2

(e) Design axial force

・Main plate Pt = σ_{tn} * An = 113 * 6372 = 719229 N

> $0.75\sigma_{ta}$ * An / 1.1 = 105 * 6372 / 1.1 = 608244 N

Pc = σ_c * Ag = 105 * 7393 = 776244 N

・Rib Ptr = σ_{tn} * Anr = 113 * 4099 = 462617 N

> $0.75\sigma_{ta}$ * Anr/ 1.1 = 105 * 4099 / 1.1 = 391230 N

Pcr = σ_c * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2

AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 776244 / 108000 = 7.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 12 = 776244 / 12 = 64687 N

ρs = τ * Ag / 12 = 17 * 7393 / 12 = 10530 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64687^2 + 10530^2)}$ = 65539 N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			$Ans(cm^2)$
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		46.9				36.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(223) D-3 J-11(Sec-12) DECK-1

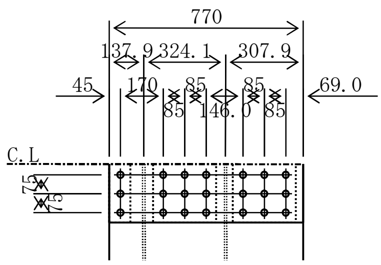
(a) Acting stress

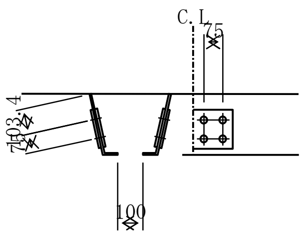
σ tmax = 54 N/mm^2 0.75σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2 0.75σ ca = 0.75 * 140 = 105 N/mm^2
∴σ c = 105 N/mm^2
τ max = 14 N/mm^2

(b) Section area of main plate

1-DECK-1 PL 770 * 16 Ag = 123.2 cm^2 (SM400)
1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)
ΣAg = Ag + Agr = 123.2 + 53.9 = 177.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-1 PL 770 * 16 A = 123.2
(123.2 - (7* 2.5)* 1.6) * 1.1 = 104.7 < 123.2 ∴An = 104.7 cm^2
1-U.RIB 320 * 240 * 8 Ar = 53.9
(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0
< 53.9 ∴Anr = 41.0 cm^2
ΣAn = An + Anr = 104.7 + 41.0 = 145.7 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 54 * 177.1 / 145.7 = 66 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σ ta * An / 1.1 = 105 * 10472 / 1.1 = 999600 N
> σ tn * An = 66 * 10472 = 690702 N
Pc = σ c * Ag = 105 * 12320 = 1293600 N
・Rib Ptr = 0.75σ ta * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N
> σ tn * Anr = 66 * 4099 = 270331 N
Pcr = σ c * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 104.7 / 2 = 52.4 cm^2
AgR = Ag / 2 = 123.2 / 2 = 61.6 cm^2
・Rib AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1293600 / 108000 = 12.0 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 21 = 1293600 / 21 = 61600$ N
$\rho s = \tau * Ag / 21 = 14 * 12320 / 21 = 8459$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(61600^2 + 8459^2)} = 62178$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			Ans(cm^2)
1-SPL PL	770 * 9	(69.3 -	(7*2.5)* 0.9)*1.1=	58.9<	69.3	∴ 58.9
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
2-SPL PL	250 * 14	(70.0 -	2*(3*2.5)* 1.4)*1.1=	53.9<	70.0	∴ 53.9
		81.9				63.1
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(224) D-3 J-11(Sec-12) DECK-2

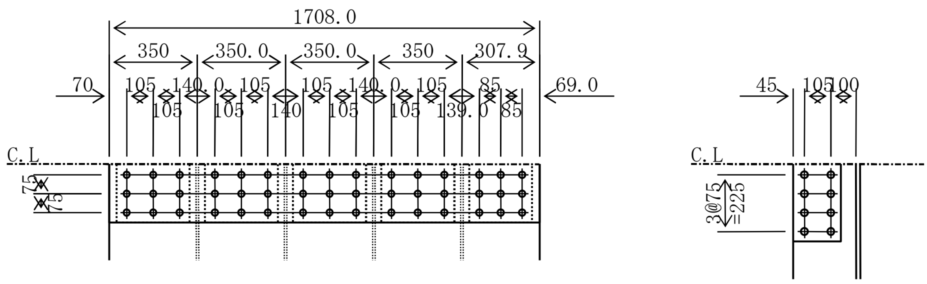
(a) Acting stress

σ tmax = 54 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2
∴ σ c = 105 N/mm^2
τ max = 14 N/mm^2

(b) Section area of main plate

1-DECK-2 PL 1708 * 16 Ag = 273.3 cm^2 (SM400)
5-RIB PL 250 * 24 Agr = 300.0 cm^2 (SM400)
ΣAg = Ag + Agr = 273.3 + 300.0 = 573.3 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2 PL 1708 * 16 A = 273.3
(273.3 - (15* 2.5)* 1.6) * 1.1 = 234.6 < 273.3 ∴An = 234.6 cm^2
5-RIB PL 250 * 24 Ar = 300.0
(300.0 - 5*(2* 2.7)* 2.4) * 1.1 = 258.7 < 300.0 ∴Anr = 258.7 cm^2
ΣAn = An + Anr = 234.6 + 258.7 = 493.3 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 54 * 573.3 / 493.3 = 63 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 23460 / 1.1 = 2239356 N
> σ tn * An = 63 * 23460 = 1479378 N
Pc = σ c * Ag = 105 * 27327 = 2869356 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 25872 / 1.1 = 2469600 N
> σ tn * Anr = 63 * 25872 = 1631483 N
Pcr = σ c * Agr = 105 * 30000 = 3150000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 234.6 / 2 = 117.3 cm^2
AgR = Ag / 2 = 273.3 / 2 = 136.6 cm^2
・Rib AnrR = Anr = 258.7 cm^2
AgrR = Agr = 300.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2869356 / 108000 = 26.6 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 3150000 / 108000 = 29.2 pcs. (5 @ 8 = 40 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 45 = 2869356 / 45 = 63763$ N

$\rho s = \tau * Ag / 45 = 14 * 27327 / 45 = 8756$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(63763^2 + 8756^2)} = 64362$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
1-SPL PL	1708 * 9	(153.7 -	(15*2.5)* 0.9)*1.1= 132.0<	153.7	∴132.0
4-SPL PL	290 * 14	(162.4 -	4*(3*2.5)* 1.4)*1.1= 132.4<	162.4	∴132.4
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1= 27.0<	35.0	∴ 27.0
		197.4			159.4
10-SPL PL	185 * 18	(333.0 -	10*(2*2.7)* 1.8)*1.1= 259.4<	333.0	∴259.4
		> AgrR			>AnrR

(225) D-3 J-11(Sec-12) DECK-3

(a) Acting stress

$\sigma tmax$ = 54 N/mm^2 0.75 σta = 0.75 * 140 = 105 N/mm^2

$\sigma cmax$ = -64 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 14 N/mm^2

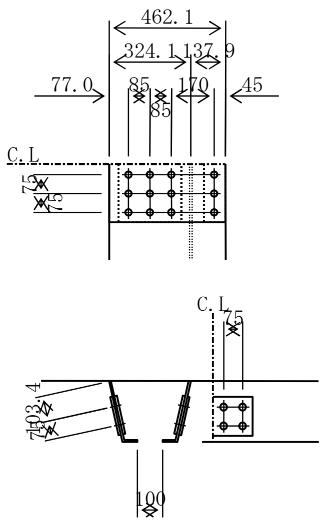
(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3 PL 462 * 16 A = 73.9

(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 $\therefore$An = 63.7 cm^2

1-U.RIB 320 * 240 * 8 Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9 $\therefore$Anr = 41.0 cm^2

ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 54 * 127.8 / 104.7 = 66 N/mm^2

< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σta * An / 1.1 = 105 * 6372 / 1.1 = 608244 N

> σtn * An = 66 * 6372 = 422136 N

Pc = σc * Ag = 105 * 7393 = 776244 N

・Rib Ptr = 0.75 σta * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N

> σtn * Anr = 66 * 4099 = 271523 N

Pcr = σc * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2

AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) =   776244 / 108000 = 7.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) =   565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 12 = 776244 / 12 = 64687$ N

$\rho s = \tau * Ag / 12 = 14 * 7393 / 12 = 8883$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64687^2 + 8883^2)} = 65294$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		46.9				36.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(226) D-3 J-12(Sec-12) DECK-1

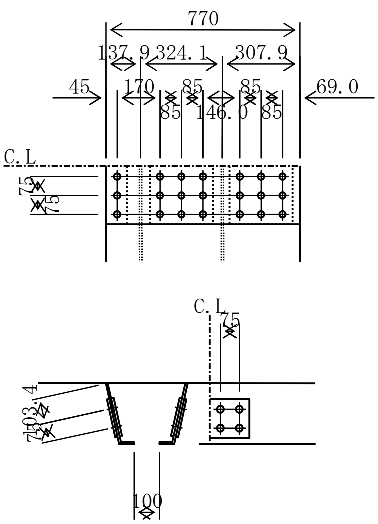
(a) Acting stress

σtmax = 23 N/mm^2 0.75σta = 0.75 * 140 = 105 N/mm^2
σcmax = -64 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2
$\therefore\sigma$c = 105 N/mm^2
τmax = 11 N/mm^2

(b) Section area of main plate

1-DECK-1 PL 770 * 16 Ag = 123.2 cm^2 (SM400)
1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)
ΣAg = Ag + Agr = 123.2 + 53.9 = 177.1 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-1 PL 770 * 16 A = 123.2
(123.2 - (7* 2.5)* 1.6) * 1.1 = 104.7 < 123.2 $\therefore$An = 104.7 cm^2
1-U.RIB 320 * 240 * 8 Ar = 53.9
(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0
< 53.9 $\therefore$Anr = 41.0 cm^2
ΣAn = An + Anr = 104.7 + 41.0 = 145.7 cm^2
σtn = σtmax * ΣAg / ΣAn = 23 * 177.1 / 145.7 = 28 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 105 * 10472 / 1.1 = 999600 N
> σtn * An = 28 * 10472 = 296811 N
Pc = σc * Ag = 105 * 12320 = 1293600 N
・Rib Ptr = 0.75σta * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N
> σtn * Anr = 28 * 4099 = 116168 N
Pcr = σc * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 104.7 / 2 = 52.4 cm^2
AgR = Ag / 2 = 123.2 / 2 = 61.6 cm^2
・Rib AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1293600 / 108000 = 12.0 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 21 = 1293600 / 21 = 61600$ N

$\rho s = \tau * Ag / 21 = 11 * 12320 / 21 = 6340$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(61600^2 + 6340^2)} = 61925$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	770 * 9	(69.3 -	(7*2.5)* 0.9)*1.1=	58.9<	69.3	∴ 58.9
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
2-SPL PL	250 * 14	(70.0 -	2*(3*2.5)* 1.4)*1.1=	53.9<	70.0	∴ 53.9
		81.9				63.1
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(227) D-3 J-12(Sec-12) DECK-2

(a) Acting stress

σ tmax = 23 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2

σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2

$\therefore$ σ c = 105 N/mm^2

τ max = 11 N/mm^2

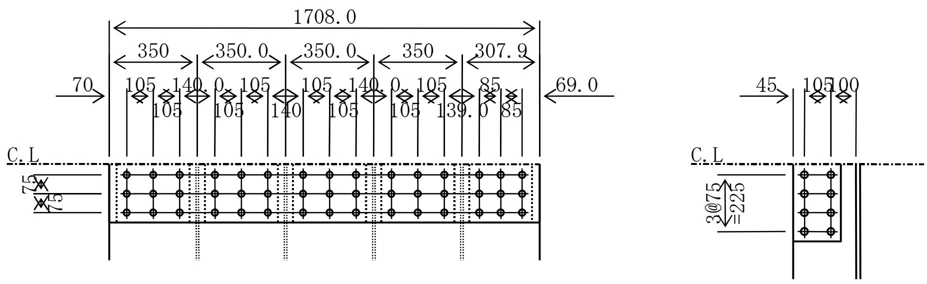
(b) Section area of main plate

1-DECK-2 PL 1708 * 16 Ag = 273.3 cm^2 (SM400)

5-RIB PL 250 * 24 Agr = 300.0 cm^2 (SM400)

ΣAg = Ag + Agr = 273.3 + 300.0 = 573.3 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2 PL 1708 * 16 A = 273.3

(273.3 - (15* 2.5)* 1.6) * 1.1 = 234.6 < 273.3 $\therefore$An = 234.6 cm^2

5-RIB PL 250 * 24 Ar = 300.0

(300.0 - 5*(2* 2.7)* 2.4) * 1.1 = 258.7 < 300.0 $\therefore$Anr = 258.7 cm^2

ΣAn = An + Anr = 234.6 + 258.7 = 493.3 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 23 * 573.3 / 493.3 = 27 N/mm^2

< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 23460 / 1.1 = 2239356 N

> σ tn * An = 27 * 23460 = 635725 N

Pc = σ c * Ag = 105 * 27327 = 2869356 N

・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 25872 / 1.1 = 2469600 N

> σ tn * Anr = 27 * 25872 = 701088 N

Pcr = σ c * Agr = 105 * 30000 = 3150000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 234.6 / 2 = 117.3 cm^2

AgR = Ag / 2 = 273.3 / 2 = 136.6 cm^2

・Rib AnrR = Anr = 258.7 cm^2

AgrR = Agr = 300.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2869356 / 108000 = 26.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 3150000 / 108000 = 29.2 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 45 = 2869356 / 45 = 63763$ N

$\rho s = \tau * Ag / 45 = 11 * 27327 / 45 = 6562$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(63763^2 + 6562^2)} = 64100$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes		$Ans(cm^2)$
1-SPL PL	1708 * 9	(153.7 -	(15*2.5)* 0.9)*1.1= 132.0＜	153.7	∴132.0
4-SPL PL	290 * 14	(162.4 -	4*(3*2.5)* 1.4)*1.1= 132.4＜	162.4	∴132.4
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1= 27.0＜	35.0	∴ 27.0
		197.4			159.4
10-SPL PL	185 * 18	(333.0 -	10*(2*2.7)* 1.8)*1.1= 259.4＜	333.0	∴259.4
		＞ AgrR			＞AnrR

(228) D-3　J-12(Sec-12)　DECK-3

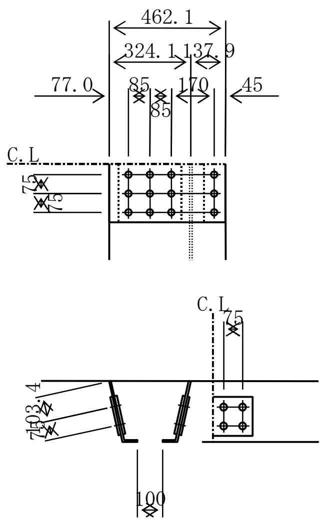
(a) Acting stress

σtmax = 23 N/mm^2　　0.75σta = 0.75 ＊ 140 = 105 N/mm^2
σcmax = −64 N/mm^2　　0.75σca = 0.75 ＊ 140 = 105 N/mm^2
∴σc = 105 N/mm^2
τmax = 11 N/mm^2

(b) Section area of main plate

1-DECK-3　PL　462 ＊ 16　　Ag = 73.9 cm^2　(SM400)
1-U.RIB 320 ＊ 240 ＊ 8　　Agr = 53.9 cm^2　(SM400)
ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3　PL　462 ＊ 16　　A = 73.9
　(73.9 - (4＊ 2.5)＊ 1.6) ＊ 1.1 = 63.7 ＜ 73.9　∴An = 63.7 cm^2
1-U.RIB 320 ＊ 240 ＊ 8　　Ar = 53.9
　(53.9 - (4＊ 2.7)＊ 0.8- 1＊(10.0＊0.8)) ＊ 1.1 = 41.0
　　　　　　　　　　　　＜ 53.9　∴Anr = 41.0 cm^2
ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2
σtn = σtmax ＊ ΣAg / ΣAn = 23 ＊ 127.8 / 104.7 = 28 N/mm^2
　　　　　　　　　　　　＜ σta = 140 N/mm^2

(e) Design axial force

・Main plate　Pt = 0.75σta ＊ An / 1.1 = 105 ＊ 6372 / 1.1 = 608244 N
　　　　　　　　＞ σtn ＊ An = 28 ＊ 6372 = 181402 N
　　　Pc = σc ＊ Ag = 105 ＊ 7393 = 776244 N
・Rib　Ptr = 0.75σta ＊ Anr / 1.1 = 105 ＊ 4099 / 1.1 = 391230 N
　　　　　　　　＞ σtn ＊ Anr = 28 ＊ 4099 = 116680 N
　　　Pcr = σc ＊ Agr = 105 ＊ 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side)　AnR = An / 2 = 63.7 / 2 = 31.9 cm^2
　　　　　AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2
・Rib　AnrR = Anr = 41.0 cm^2
　　　　　AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate $n = Pc / (108000 * 1.00) = 776244 / 108000 = 7.2$ pcs.
・Rib $nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2$ pcs. (1 @ 8 = 8 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 12 = 776244 / 12 = 64687$ N
$\rho s = \tau * Ag / 12 = 11 * 7393 / 12 = 6657$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64687^2 + 6657^2)} = 65029$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		46.9				36.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(229) D-3 J-13(Sec-13) DECK-1

(a) Acting stress

σ_{tmax} = 9 N/mm^2 $\quad$ 0.75σ_{ta} = 0.75 * 140 = 105 N/mm^2

σ_{cmax} = -66 N/mm^2 $\quad$ 0.75σ_{ca} = 0.75 * 140 = 105 N/mm^2

$\therefore\sigma_c$ = 105 N/mm^2

τ_{max} = 6 N/mm^2

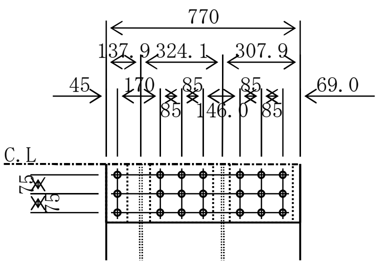
(b) Section area of main plate

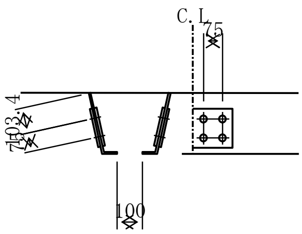
1-DECK-1 PL 770 * 16 $\quad$ Ag = 123.2 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 $\quad$ Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 123.2 + 53.9 = 177.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-1 PL 770 * 16 $\quad$ A = 123.2

(123.2 - (7* 2.5)* 1.6) * 1.1 = 104.7 < 123.2 $\therefore$An = 104.7 cm^2

1-U.RIB 320 * 240 * 8 $\quad$ Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9 $\therefore$Anr = 41.0 cm^2

ΣAn = An + Anr = 104.7 + 41.0 = 145.7 cm^2

σ_{tn} = σ_{tmax} * ΣAg / ΣAn = 9 * 177.1 / 145.7 = 11 N/mm^2

< σ_{ta} = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σ_{ta} * An / 1.1 = 105 * 10472 / 1.1 = 999600 N

> σ_{tn} * An = 11 * 10472 = 114682 N

Pc = σ_c * Ag = 105 * 12320 = 1293600 N

・Rib Ptr = 0.75σ_{ta} * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N

> σ_{tn} * Anr = 11 * 4099 = 44885 N

Pcr = σ_c * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 104.7 / 2 = 52.4 cm^2

AgR = Ag / 2 = 123.2 / 2 = 61.6 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate $n = Pc / (108000 * 1.00) = 1293600 / 108000 = 12.0$ pcs.

・Rib $nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2$ pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 21 = 1293600 / 21 = 61600$ N

$\rho s = \tau * Ag / 21 = 6 * 12320 / 21 = 3759$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(61600^2 + 3759^2)} = 61715$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			$Ans(cm^2)$
1-SPL PL	770 * 9	(69.3 -	(7*2.5)* 0.9)*1.1=	58.9＜	69.3	∴ 58.9
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2＜	11.9	∴ 9.2
2-SPL PL	250 * 14	(70.0 -	2*(3*2.5)* 1.4)*1.1=	53.9＜	70.0	∴ 53.9
		81.9				63.1
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4＜	62.0	∴ 44.4
		＞ AgrR				＞AnrR

(230) D-3 J-13(Sec-13) DECK-2

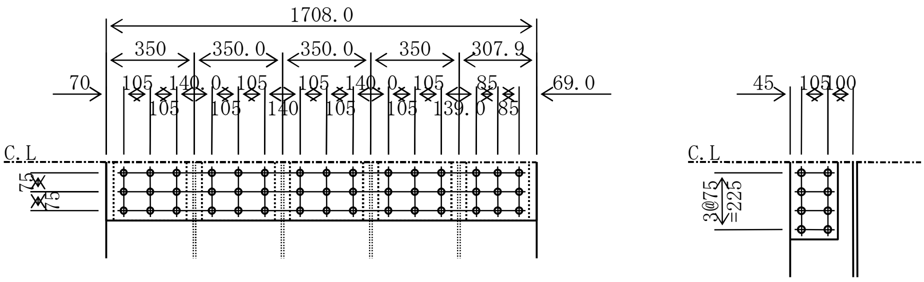
(a) Acting stress

σ tmax = 9 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -66 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2
$\therefore$ σ c = 105 N/mm^2
τ max = 6 N/mm^2

(b) Section area of main plate

1-DECK-2 PL 1708 * 16 Ag = 273.3 cm^2 (SM400)
5-RIB PL 250 * 24 Agr = 300.0 cm^2 (SM400)
ΣAg = Ag + Agr = 273.3 + 300.0 = 573.3 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2 PL 1708 * 16 A = 273.3
(273.3 - (15* 2.5)* 1.6) * 1.1 = 234.6 < 273.3 $\therefore$An = 234.6 cm^2
5-RIB PL 250 * 24 Ar = 300.0
(300.0 - 5*(2* 2.7)* 2.4) * 1.1 = 258.7 < 300.0 $\therefore$Anr = 258.7 cm^2
ΣAn = An + Anr = 234.6 + 258.7 = 493.3 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 9 * 573.3 / 493.3 = 10 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 23460 / 1.1 = 2239356 N
> σ tn * An = 10 * 23460 = 245631 N
Pc = σ c * Ag = 105 * 27327 = 2869356 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 25872 / 1.1 = 2469600 N
> σ tn * Anr = 10 * 25872 = 270887 N
Pcr = σ c * Agr = 105 * 30000 = 3150000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 234.6 / 2 = 117.3 cm^2
AgR = Ag / 2 = 273.3 / 2 = 136.6 cm^2
・Rib AnrR = Anr = 258.7 cm^2
AgrR = Agr = 300.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2869356 / 108000 = 26.6 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 3150000 / 108000 = 29.2 pcs. (5 @ 8 = 40 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

ρp = Pc / 45 = 2869356 / 45 = 63763 N

ρs = τ * Ag / 45 = 6 * 27327 / 45 = 3891 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(63763^2 + 3891^2)}$ = 63882 N

(i) Check of splice plates

	(SS400)	Ags(cm²)	deduction of bolt holes		Ans(cm²)
1-SPL PL	1708 * 9	(153.7 -	(15*2.5)* 0.9)*1.1= 132.0＜	153.7	∴132.0
4-SPL PL	290 * 14	(162.4 -	4*(3*2.5)* 1.4)*1.1= 132.4＜	162.4	∴132.4
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1= 27.0＜	35.0	∴ 27.0
		197.4			159.4
10-SPL PL	185 * 18	(333.0 -	10*(2*2.7)* 1.8)*1.1= 259.4＜	333.0	∴259.4
		＞ AgrR			＞AnrR

(231) D-3　J-13(Sec-13)　DECK-3

(a) Acting stress

σ tmax = 9 N/mm^2　　0.75 σ ta = 0.75 * 140 = 105 N/mm^2

σ cmax = -66 N/mm^2　　0.75 σ ca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma$ c = 105 N/mm^2

τ max = 6 N/mm^2

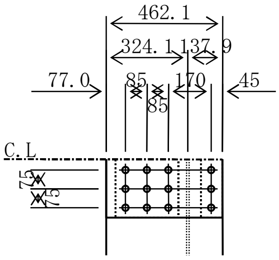
(b) Section area of main plate

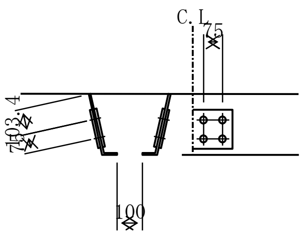
1-DECK-3　PL　462 * 16　　Ag = 73.9 cm^2　(SM400)

1-U.RIB 320 * 240 * 8　　Agr = 53.9 cm^2　(SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-3　PL　462 * 16　　A = 73.9

(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9　$\therefore$An = 63.7 cm^2

1-U.RIB 320 * 240 * 8　　Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9　$\therefore$Anr = 41.0 cm^2

ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 9 * 127.8 / 104.7 = 11 N/mm^2

< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate　Pt = 0.75 σ ta * An / 1.1 = 105 * 6372 / 1.1 = 608244 N

> σ tn * An = 11 * 6372 = 70090 N

Pc = σ c * Ag = 105 * 7393 = 776244 N

・Rib　Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N

> σ tn * Anr = 11 * 4099 = 45083 N

Pcr = σ c * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side)　AnR = An / 2 = 63.7 / 2 = 31.9 cm^2

AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib　AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 776244 / 108000 = 7.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 12 = 776244 / 12 = 64687$ N

$\rho s = \tau * Ag / 12 = 6 * 7393 / 12 = 3948$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64687^2 + 3948^2)} = 64807$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		46.9				36.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(232) D-3　J-14(Sec-14)　DECK-1

(a) Acting stress

$\sigma tmax$ = 7 N/mm^2　　0.75 σta = 0.75 ＊ 140 = 105 N/mm^2

$\sigma cmax$ = -70 N/mm^2　　0.75 σca = 0.75 ＊ 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 3 N/mm^2

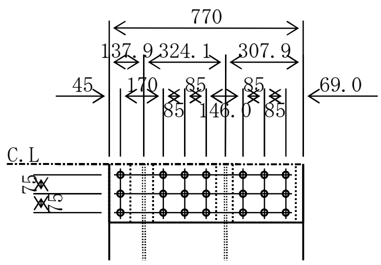
(b) Section area of main plate

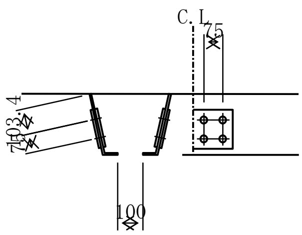
1-DECK-1　PL　770 ＊ 16　　Ag = 123.2 cm^2　(SM400)

1-U.RIB 320 ＊ 240 ＊ 8　　Agr = 53.9 cm^2　(SM400)

ΣAg = Ag + Agr = 123.2 + 53.9 = 177.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-1　PL　770 ＊ 16　　A = 123.2

(123.2 - (7＊ 2.5)＊ 1.6) ＊ 1.1 = 104.7 ＜ 123.2　∴An = 104.7 cm^2

1-U.RIB 320 ＊ 240 ＊ 8　　Ar = 53.9

(53.9 - (4＊ 2.7)＊ 0.8- 1＊(10.0＊0.8)) ＊ 1.1 = 41.0

＜ 53.9　∴Anr = 41.0 cm^2

ΣAn = An + Anr = 104.7 + 41.0 = 145.7 cm^2

σtn = $\sigma tmax$ ＊ ΣAg / ΣAn = 7 ＊ 177.1 / 145.7 = 9 N/mm^2

＜ σta = 140 N/mm^2

(e) Design axial force

・Main plate　Pt = 0.75 σta ＊ An / 1.1 = 105 ＊ 10472 / 1.1 = 999600 N

＞ σtn ＊ An = 9 ＊ 10472 = 90244 N

Pc = σc ＊ Ag = 105 ＊ 12320 = 1293600 N

・Rib　Ptr = 0.75 σta ＊ Anr / 1.1 = 105 ＊ 4099 / 1.1 = 391230 N

＞ σtn ＊ Anr = 9 ＊ 4099 = 35320 N

Pcr = σc ＊ Agr = 105 ＊ 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side)　AnR = An / 2 = 104.7 / 2 = 52.4 cm^2

AgR = Ag / 2 = 123.2 / 2 = 61.6 cm^2

・Rib　AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate $n = Pc / (108000 * 1.00) = 1293600 / 108000 = 12.0$ pcs.
・Rib $nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2$ pcs. (1 @ 8 = 8 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 21 = 1293600 / 21 = 61600$ N
$\rho s = \tau * Ag / 21 = 3 * 12320 / 21 = 1955$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(61600^2 + 1955^2)} = 61631$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	770 * 9	(69.3 -	(7*2.5)* 0.9)*1.1=	58.9<	69.3	∴ 58.9
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
2-SPL PL	250 * 14	(70.0 -	2*(3*2.5)* 1.4)*1.1=	53.9<	70.0	∴ 53.9
		81.9				63.1
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(233) D-3 J-14(Sec-14) DECK-2

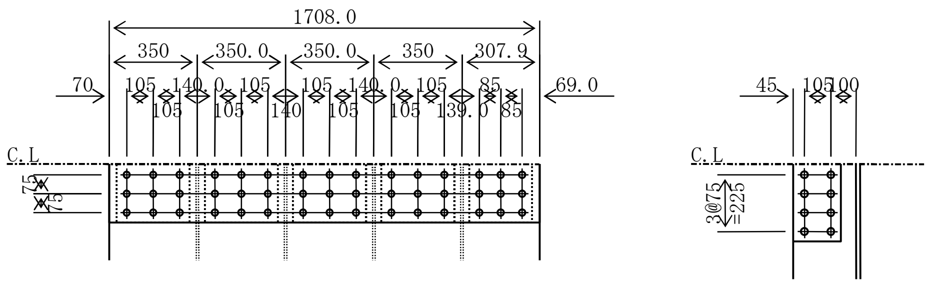
(a) Acting stress

$\sigma tmax$ = 7 N/mm^2 0.75σta = 0.75 * 140 = 105 N/mm^2
$\sigma cmax$ = -70 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2
∴σc = 105 N/mm^2
τmax = 3 N/mm^2

(b) Section area of main plate

1-DECK-2 PL 1708 * 16 Ag = 273.3 cm^2 (SM400)
5-RIB PL 250 * 24 Agr = 300.0 cm^2 (SM400)
ΣAg = Ag + Agr = 273.3 + 300.0 = 573.3 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2 PL 1708 * 16 A = 273.3
(273.3 - (15* 2.5)* 1.6) * 1.1 = 234.6 < 273.3 ∴An = 234.6 cm^2
5-RIB PL 250 * 24 Ar = 300.0
(300.0 - 5*(2* 2.7)* 2.4) * 1.1 = 258.7 < 300.0 ∴Anr = 258.7 cm^2
ΣAn = An + Anr = 234.6 + 258.7 = 493.3 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 7 * 573.3 / 493.3 = 8 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 105 * 23460 / 1.1 = 2239356 N
> σtn * An = 8 * 23460 = 193288 N
Pc = σc * Ag = 105 * 27327 = 2869356 N
・Rib Ptr = 0.75σta * Anr / 1.1 = 105 * 25872 / 1.1 = 2469600 N
> σtn * Anr = 8 * 25872 = 213162 N
Pcr = σc * Agr = 105 * 30000 = 3150000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 234.6 / 2 = 117.3 cm^2
AgR = Ag / 2 = 273.3 / 2 = 136.6 cm^2
・Rib AnrR = Anr = 258.7 cm^2
AgrR = Agr = 300.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2869356 / 108000 = 26.6 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 3150000 / 108000 = 29.2 pcs. (5 @ 8 = 40 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

ρp = Pc / 45 = 2869356 / 45 = 63763 N

ρs = τ * Ag / 45 = 3 * 27327 / 45 = 2023 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(63763^2 + 2023^2)}$ = 63796 N

(i) Check of splice plates

	(SS400)	Ags(cm²)	deduction of bolt holes		Ans(cm²)
1-SPL PL	1708 * 9	(153.7 -	(15*2.5)* 0.9)*1.1= 132.0<	153.7	∴132.0
4-SPL PL	290 * 14	(162.4 -	4*(3*2.5)* 1.4)*1.1= 132.4<	162.4	∴132.4
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1= 27.0<	35.0	∴ 27.0
		197.4			159.4
10-SPL PL	185 * 18	(333.0 -	10*(2*2.7)* 1.8)*1.1= 259.4<	333.0	∴259.4
		> AgrR			>AnrR

(234) D-3 J-14(Sec-14) DECK-3

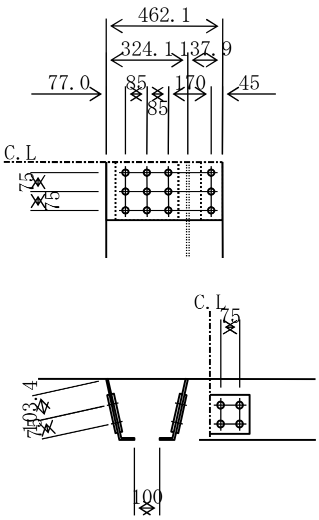
(a) Acting stress

σ_{tmax} = 7 N/mm^2 0.75 σ_{ta} = 0.75 * 140 = 105 N/mm^2
σ_{cmax} = -70 N/mm^2 0.75 σ_{ca} = 0.75 * 140 = 105 N/mm^2
∴ σ_c = 105 N/mm^2
τ_{max} = 3 N/mm^2

(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)
1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)
ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3 PL 462 * 16 A = 73.9
(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 ∴An = 63.7 cm^2
1-U.RIB 320 * 240 * 8 Ar = 53.9
(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0
< 53.9 ∴Anr = 41.0 cm^2
ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2
σ_{tn} = σ_{tmax} * ΣAg / ΣAn = 7 * 127.8 / 104.7 = 9 N/mm^2
< σ_{ta} = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ_{ta} * An / 1.1 = 105 * 6372 / 1.1 = 608244 N
> σ_{tn} * An = 9 * 6372 = 55154 N
Pc = σ_c * Ag = 105 * 7393 = 776244 N
・Rib Ptr = 0.75 σ_{ta} * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N
> σ_{tn} * Anr = 9 * 4099 = 35476 N
Pcr = σ_c * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2
AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2
・Rib AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate $n = Pc / (108000 * 1.00) = 776244 / 108000 = 7.2$ pcs.

・Rib $nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2$ pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 12 = 776244 / 12 = 64687$ N

$\rho s = \tau * Ag / 12 = 3 * 7393 / 12 = 2053$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64687^2 + 2053^2)} = 64720$ N

(i) Check of splice plates

	(SS400)	Ags(cm²)	deduction of bolt holes			Ans(cm²)
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		46.9				36.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(235) D-3 J-15(Sec-15) DECK-1

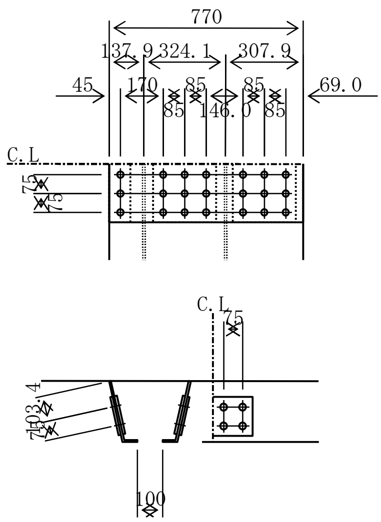
(a) Acting stress

$\sigma tmax$ = 19 N/mm^2 0.75σta = 0.75 * 140 = 105 N/mm^2
$\sigma cmax$ = -64 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma c$ = 105 N/mm^2
τmax = 8 N/mm^2

(b) Section area of main plate

1-DECK-1 PL 770 * 16 Ag = 123.2 cm^2 (SM400)
1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)
ΣAg = Ag + Agr = 123.2 + 53.9 = 177.1 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-1 PL 770 * 16 A = 123.2
(123.2 - (7* 2.5)* 1.6) * 1.1 = 104.7 < 123.2 $\therefore$An = 104.7 cm^2
1-U.RIB 320 * 240 * 8 Ar = 53.9
(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0
< 53.9 $\therefore$Anr = 41.0 cm^2
ΣAn = An + Anr = 104.7 + 41.0 = 145.7 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 19 * 177.1 / 145.7 = 23 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 105 * 10472 / 1.1 = 999600 N
> σtn * An = 23 * 10472 = 243938 N
Pc = σc * Ag = 105 * 12320 = 1293600 N
・Rib Ptr = 0.75σta * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N
> σtn * Anr = 23 * 4099 = 95474 N
Pcr = σc * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 104.7 / 2 = 52.4 cm^2
AgR = Ag / 2 = 123.2 / 2 = 61.6 cm^2
・Rib AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1293600 / 108000 = 12.0 pcs.

・Rib nr = Pcr / (108000 * 1.00) =   565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 21 = 1293600 / 21 = 61600 N

ρs = τ * Ag / 21 = 8 * 12320 / 21 = 4460 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(61600^2 + 4460^2)}$ = 61761 N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	770 * 9	(69.3 -	(7*2.5)* 0.9)*1.1=	58.9<	69.3	∴ 58.9
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
2-SPL PL	250 * 14	(70.0 -	2*(3*2.5)* 1.4)*1.1=	53.9<	70.0	∴ 53.9
		81.9				63.1
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(236) D-3 J-15(Sec-15) DECK-2

(a) Acting stress

$\sigma tmax$ = 19 N/mm^2 0.75 σta = 0.75 * 140 = 105 N/mm^2

$\sigma cmax$ = -64 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 8 N/mm^2

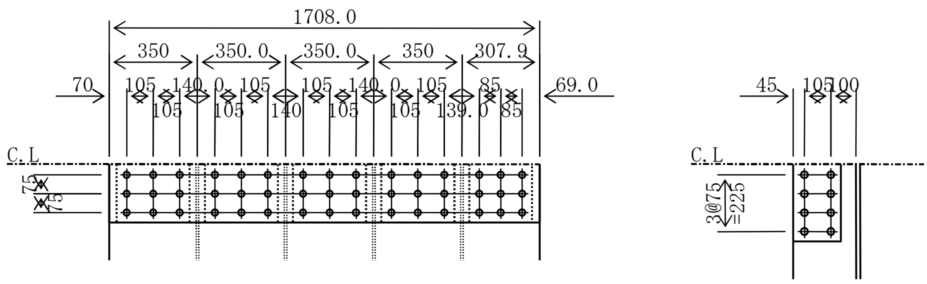
(b) Section area of main plate

1-DECK-2 PL 1708 * 16 Ag = 273.3 cm^2 (SM400)

5-RIB PL 250 * 24 Agr = 300.0 cm^2 (SM400)

ΣAg = Ag + Agr = 273.3 + 300.0 = 573.3 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2 PL 1708 * 16 A = 273.3

(273.3 - (15* 2.5)* 1.6) * 1.1 = 234.6 < 273.3 $\therefore$An = 234.6 cm^2

5-RIB PL 250 * 24 Ar = 300.0

(300.0 - 5*(2* 2.7)* 2.4) * 1.1 = 258.7 < 300.0 $\therefore$Anr = 258.7 cm^2

ΣAn = An + Anr = 234.6 + 258.7 = 493.3 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 19 * 573.3 / 493.3 = 22 N/mm^2

< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σta * An / 1.1 = 105 * 23460 / 1.1 = 2239356 N

> σtn * An = 22 * 23460 = 522478 N

Pc = σc * Ag = 105 * 27327 = 2869356 N

・Rib Ptr = 0.75 σta * Anr / 1.1 = 105 * 25872 / 1.1 = 2469600 N

> σtn * Anr = 22 * 25872 = 576198 N

Pcr = σc * Agr = 105 * 30000 = 3150000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 234.6 / 2 = 117.3 cm^2

AgR = Ag / 2 = 273.3 / 2 = 136.6 cm^2

・Rib AnrR = Anr = 258.7 cm^2

AgrR = Agr = 300.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2869356 / 108000 = 26.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 3150000 / 108000 = 29.2 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 45 = 2869356 / 45 = 63763$ N

$\rho s = \tau * Ag / 45 = 8 * 27327 / 45 = 4616$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(63763^2 + 4616^2)} = 63930$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
1-SPL PL	1708 * 9	(153.7 -	(15*2.5)* 0.9)*1.1= 132.0<	153.7	∴132.0
4-SPL PL	290 * 14	(162.4 -	4*(3*2.5)* 1.4)*1.1= 132.4<	162.4	∴132.4
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1= 27.0<	35.0	∴ 27.0
		197.4			159.4
10-SPL PL	185 * 18	(333.0 -	10*(2*2.7)* 1.8)*1.1= 259.4<	333.0	∴259.4
		> AgrR			>AnrR

(237) D-3 J-15(Sec-15) DECK-3

(a) Acting stress

$\sigma tmax$ = 19 N/mm^2 0.75σta = 0.75 * 140 = 105 N/mm^2

$\sigma cmax$ = -64 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 8 N/mm^2

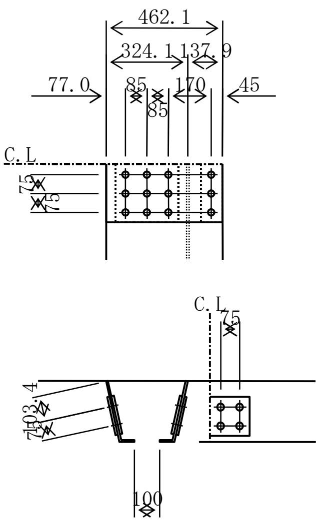
(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3 PL 462 * 16 A = 73.9

(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 $\therefore$An = 63.7 cm^2

1-U.RIB 320 * 240 * 8 Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9 $\therefore$Anr = 41.0 cm^2

ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 19 * 127.8 / 104.7 = 23 N/mm^2

< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 105 * 6372 / 1.1 = 608244 N

> σtn * An = 23 * 6372 = 149087 N

Pc = σc * Ag = 105 * 7393 = 776244 N

・Rib Ptr = 0.75σta * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N

> σtn * Anr = 23 * 4099 = 95895 N

Pcr = σc * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2

AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) =   776244 / 108000 = 7.2 pcs.
・Rib nr = Pcr / (108000 * 1.00) =   565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 12 = 776244 / 12 = 64687$ N
$\rho s = \tau * Ag / 12 = 8 * 7393 / 12 = 4683$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64687^2 + 4683^2)} = 64856$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		46.9				36.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(238) D-3 J-16(Sec-16) DECK-1

(a) Acting stress

$\sigma tmax$ = 39 N/mm^2 $0.75\sigma ta$ = 0.75 * 140 = 105 N/mm^2

$\sigma cmax$ = -64 N/mm^2 $0.75\sigma ca$ = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 11 N/mm^2

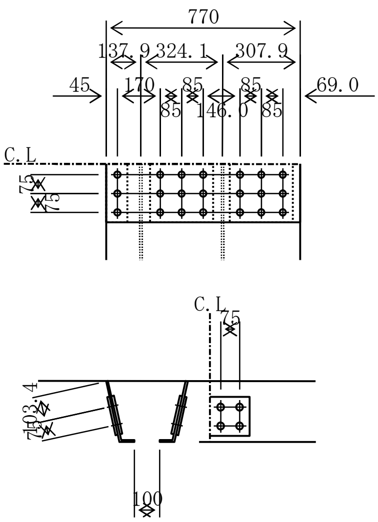
(b) Section area of main plate

1-DECK-1 PL 770 * 16   Ag = 123.2 cm^2 (SM400)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 123.2 + 53.9 = 177.1 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-1 PL 770 * 16   A = 123.2

(123.2 - (7* 2.5)* 1.6) * 1.1 = 104.7 < 123.2 ∴An = 104.7 cm^2

1-U.RIB 320 * 240 * 8   Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9 ∴Anr = 41.0 cm^2

ΣAn = An + Anr = 104.7 + 41.0 = 145.7 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 39 * 177.1 / 145.7 = 47 N/mm^2

< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = $0.75\sigma ta$ * An / 1.1 = 105 * 10472 / 1.1 = 999600 N

> σtn * An = 47 * 10472 = 495717 N

Pc = σc * Ag = 105 * 12320 = 1293600 N

・Rib Ptr = $0.75\sigma ta$ * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N

> σtn * Anr = 47 * 4099 = 194017 N

Pcr = σc * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 104.7 / 2 = 52.4 cm^2

AgR = Ag / 2 = 123.2 / 2 = 61.6 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

- Main plate n = Pc / (108000 * 1.00) = 1293600 / 108000 = 12.0 pcs.
- Rib nr = Pcr / (108000 * 1.00) =   565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 21 = 1293600 / 21 = 61600$ N
$\rho s = \tau * Ag / 21 = 11 * 12320 / 21 = 6503$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(61600^2 + 6503^2)} = 61942$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	770 * 9	(69.3 -	(7*2.5)* 0.9)*1.1=	58.9<	69.3	∴ 58.9
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
2-SPL PL	250 * 14	(70.0 -	2*(3*2.5)* 1.4)*1.1=	53.9<	70.0	∴ 53.9
		81.9				63.1
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(239) D-3 J-16(Sec-16) DECK-2

(a) Acting stress

$\sigma tmax$ = 39 N/mm^2 0.75 σta = 0.75 * 140 = 105 N/mm^2

$\sigma cmax$ = -64 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 11 N/mm^2

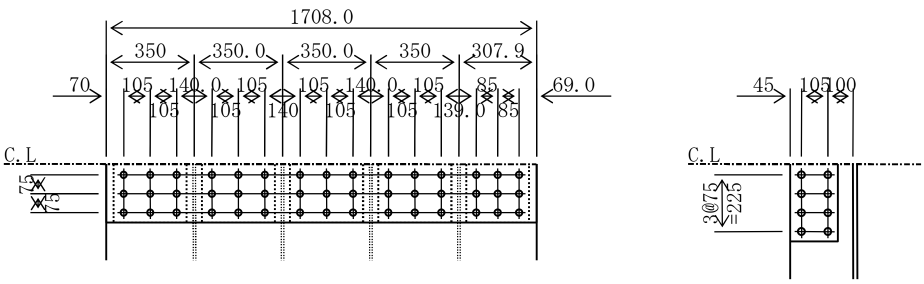
(b) Section area of main plate

1-DECK-2 PL 1708 * 16 Ag = 273.3 cm^2 (SM400)

5-RIB PL 250 * 24 Agr = 300.0 cm^2 (SM400)

ΣAg = Ag + Agr = 273.3 + 300.0 = 573.3 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2 PL 1708 * 16 A = 273.3

(273.3 - (15* 2.5)* 1.6) * 1.1 = 234.6 < 273.3 $\therefore$An = 234.6 cm^2

5-RIB PL 250 * 24 Ar = 300.0

(300.0 - 5*(2* 2.7)* 2.4) * 1.1 = 258.7 < 300.0 $\therefore$Anr = 258.7 cm^2

ΣAn = An + Anr = 234.6 + 258.7 = 493.3 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 39 * 573.3 / 493.3 = 45 N/mm^2

< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σta * An / 1.1 = 105 * 23460 / 1.1 = 2239356 N

> σtn * An = 45 * 23460 = 1061750 N

Pc = σc * Ag = 105 * 27327 = 2869356 N

・Rib Ptr = 0.75 σta * Anr / 1.1 = 105 * 25872 / 1.1 = 2469600 N

> σtn * Anr = 45 * 25872 = 1170916 N

Pcr = σc * Agr = 105 * 30000 = 3150000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 234.6 / 2 = 117.3 cm^2

AgR = Ag / 2 = 273.3 / 2 = 136.6 cm^2

・Rib AnrR = Anr = 258.7 cm^2

AgrR = Agr = 300.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2869356 / 108000 = 26.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 3150000 / 108000 = 29.2 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 45 = 2869356 / 45 = 63763$ N

$\rho s = \tau * Ag / 45 = 11 * 27327 / 45 = 6732$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(63763^2 + 6732^2)} = 64118$ N

(i) Check of splice plates

	(SS400)	Ags(cm²)	deduction of bolt holes		Ans(cm²)
1-SPL PL	1708 * 9	(153.7 -	(15*2.5)* 0.9)*1.1= 132.0	< 153.7	∴132.0
4-SPL PL	290 * 14	(162.4 -	4*(3*2.5)* 1.4)*1.1= 132.4	< 162.4	∴132.4
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1= 27.0	< 35.0	∴ 27.0
		197.4			159.4
10-SPL PL	185 * 18	(333.0 -	10*(2*2.7)* 1.8)*1.1= 259.4	< 333.0	∴259.4
		> AgrR			>AnrR

(240) D-3 J-16(Sec-16) DECK-3

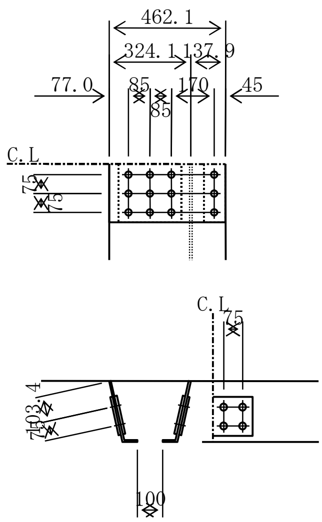
(a) Acting stress

$\sigma tmax$ = 39 N/mm^2 0.75σta = 0.75 * 140 = 105 N/mm^2
$\sigma cmax$ = -64 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma c$ = 105 N/mm^2
τmax = 11 N/mm^2

(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)
1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)
ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3 PL 462 * 16 A = 73.9
(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 $\therefore$An = 63.7 cm^2
1-U.RIB 320 * 240 * 8 Ar = 53.9
(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0
< 53.9 $\therefore$Anr = 41.0 cm^2
ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 39 * 127.8 / 104.7 = 48 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 105 * 6372 / 1.1 = 608244 N
> σtn * An = 48 * 6372 = 302967 N
Pc = σc * Ag = 105 * 7393 = 776244 N
・Rib Ptr = 0.75σta * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N
> σtn * Anr = 48 * 4099 = 194872 N
Pcr = σc * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2
AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2
・Rib AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 776244 / 108000 = 7.2 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 12 = 776244 / 12 = 64687$ N
$\rho s = \tau * Ag / 12 = 11 * 7393 / 12 = 6829$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64687^2 + 6829^2)} = 65046$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		46.9				36.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(241) D-3 J-17(Sec-17) DECK-1

(a) Acting stress

$\sigma tmax$ = 72 N/mm^2 0.75 σta = 0.75 * 140 = 105 N/mm^2

$\sigma cmax$ = -64 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 14 N/mm^2

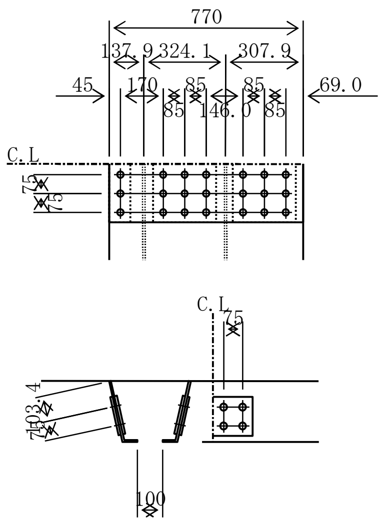
(b) Section area of main plate

1-DECK-1 PL 770 * 16   Ag = 123.2 cm^2 (SM400)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 123.2 + 53.9 = 177.1 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-1 PL 770 * 16   A = 123.2

(123.2 - (7* 2.5)* 1.6) * 1.1 = 104.7 < 123.2 ∴An = 104.7 cm^2

1-U.RIB 320 * 240 * 8   Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9 ∴Anr = 41.0 cm^2

ΣAn = An + Anr = 104.7 + 41.0 = 145.7 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 72 * 177.1 / 145.7 = 87 N/mm^2

< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σta * An / 1.1 = 105 * 10472 / 1.1 = 999600 N

> σtn * An = 87 * 10472 = 913804 N

Pc = σc * Ag = 105 * 12320 = 1293600 N

・Rib Ptr = 0.75 σta * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N

> σtn * Anr = 87 * 4099 = 357650 N

Pcr = σc * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 104.7 / 2 = 52.4 cm^2

AgR = Ag / 2 = 123.2 / 2 = 61.6 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1293600 / 108000 = 12.0 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 21 = 1293600 / 21 = 61600 N

ρs = τ * Ag / 21 = 14 * 12320 / 21 = 8328 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(61600^2 + 8328^2)}$ = 62160 N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			Ans(cm^2)
1-SPL PL	770 * 9	(69.3 -	(7*2.5)* 0.9)*1.1=	58.9<	69.3	∴ 58.9
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
2-SPL PL	250 * 14	(70.0 -	2*(3*2.5)* 1.4)*1.1=	53.9<	70.0	∴ 53.9
		81.9				63.1
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(242) D-3 J-17(Sec-17) DECK-2

(a) Acting stress

$\sigma tmax = 72\ N/mm^2 \quad 0.75\sigma ta = 0.75 * 140 = 105\ N/mm^2$

$\sigma cmax = -64\ N/mm^2 \quad 0.75\sigma ca = 0.75 * 140 = 105\ N/mm^2$

$\therefore \sigma c = 105\ N/mm^2$

$\tau max = 14\ N/mm^2$

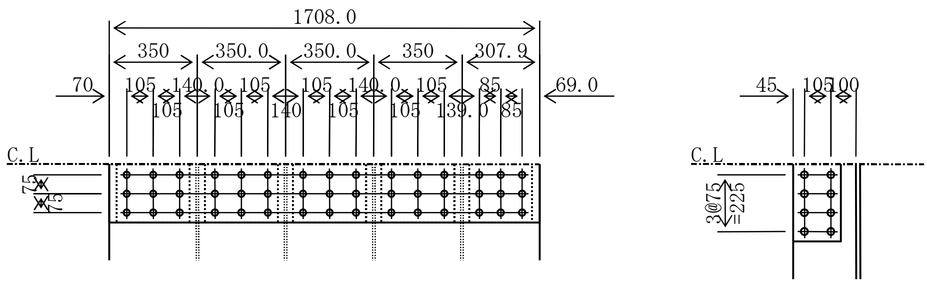
(b) Section area of main plate

1-DECK-2 PL 1708 * 16 $Ag = 273.3\ cm^2$ (SM400)

5-RIB PL 250 * 24 $Agr = 300.0\ cm^2$ (SM400)

$\Sigma Ag = Ag + Agr = 273.3 + 300.0 = 573.3\ cm^2$

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2 PL 1708 * 16 $A = 273.3$

$(273.3 - (15 * 2.5) * 1.6) * 1.1 = 234.6 < 273.3 \quad \therefore An = 234.6\ cm^2$

5-RIB PL 250 * 24 $Ar = 300.0$

$(300.0 - 5 * (2 * 2.7) * 2.4) * 1.1 = 258.7 < 300.0 \quad \therefore Anr = 258.7\ cm^2$

$\Sigma An = An + Anr = 234.6 + 258.7 = 493.3\ cm^2$

$\sigma tn = \sigma tmax * \Sigma Ag / \Sigma An = 72 * 573.3 / 493.3 = 83\ N/mm^2$

$< \sigma ta = 140\ N/mm^2$

(e) Design axial force

・Main plate $Pt = 0.75\sigma ta * An / 1.1 = 105 * 23460 / 1.1 = 2239356\ N$

$> \sigma tn * An = 83 * 23460 = 1957228\ N$

$Pc = \sigma c * Ag = 105 * 27327 = 2869356\ N$

・Rib $Ptr = 0.75\sigma ta * Anr / 1.1 = 105 * 25872 / 1.1 = 2469600\ N$

$> \sigma tn * Anr = 83 * 25872 = 2158464\ N$

$Pcr = \sigma c * Agr = 105 * 30000 = 3150000\ N$

(f) Required section area of the splice plates

・Mother material(One side) $AnR = An / 2 = 234.6 / 2 = 117.3\ cm^2$

$AgR = Ag / 2 = 273.3 / 2 = 136.6\ cm^2$

・Rib $AnrR = Anr = 258.7\ cm^2$

$AgrR = Agr = 300.0\ cm^2$

(g) Required bolt number

・Main plate $n = Pc / (108000 * 1.00) = 2869356 / 108000 = 26.6$ pcs.

・Rib $nr = Pcr / (108000 * 1.00) = 3150000 / 108000 = 29.2$ pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

$\rho a = 108000\ N$ (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 45 = 2869356 / 45 = 63763$ N

$\rho s = \tau * Ag / 45 = 14 * 27327 / 45 = 8620$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(63763^2 + 8620^2)} = 64344$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
1-SPL PL	1708 * 9	(153.7 -	(15*2.5)* 0.9)*1.1= 132.0<	153.7	∴132.0
4-SPL PL	290 * 14	(162.4 -	4*(3*2.5)* 1.4)*1.1= 132.4<	162.4	∴132.4
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1= 27.0<	35.0	∴ 27.0
		197.4			159.4
10-SPL PL	185 * 18	(333.0 -	10*(2*2.7)* 1.8)*1.1= 259.4<	333.0	∴259.4
		> AgrR			>AnrR

(243) D-3 J-17(Sec-17) DECK-3

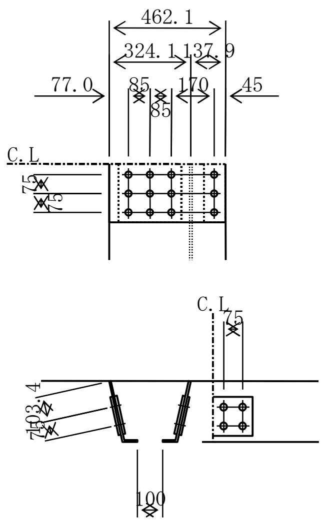
(a) Acting stress

$\sigma tmax$ = 72 N/mm^2 $0.75\sigma ta$ = 0.75 * 140 = 105 N/mm^2
$\sigma cmax$ = -64 N/mm^2 $0.75\sigma ca$ = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma c$ = 105 N/mm^2
τmax = 14 N/mm^2

(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)
1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)
ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3 PL 462 * 16 A = 73.9
(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 ∴An = 63.7 cm^2
1-U.RIB 320 * 240 * 8 Ar = 53.9
(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0
< 53.9 ∴Anr = 41.0 cm^2
ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 72 * 127.8 / 104.7 = 88 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = $0.75\sigma ta$ * An / 1.1 = 105 * 6372 / 1.1 = 608244 N
> σtn * An = 88 * 6372 = 558489 N
Pc = σc * Ag = 105 * 7393 = 776244 N
・Rib Ptr = $0.75\sigma ta$ * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N
> σtn * Anr = 88 * 4099 = 359227 N
Pcr = σc * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2
AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2
・Rib AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 776244 / 108000 = 7.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 12 = 776244 / 12 = 64687$ N

$\rho s = \tau * Ag / 12 = 14 * 7393 / 12 = 8745$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64687^2 + 8745^2)} = 65275$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			$Ans(cm^2)$
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		46.9				36.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(244) D-3 J-18(Sec-18) DECK-1

(a) Acting stress

σ tmax = 113 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 210 = 158 N/mm^2

∴ σ c = 158 N/mm^2

τ max = 17 N/mm^2

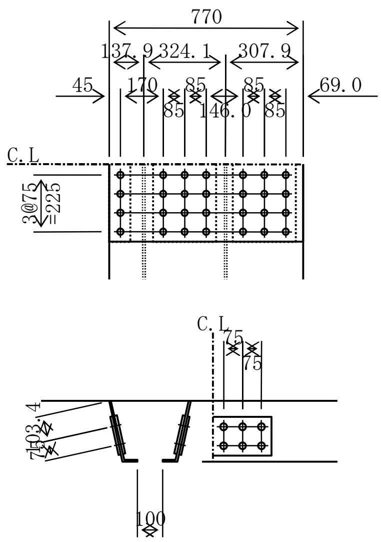
(b) Section area of main plate

1-DECK-1 PL 770 * 16 Ag = 123.2 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 123.2 + 53.9 = 177.1 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-1 PL 770 * 16 A = 123.2

(123.2 - (7* 2.5)* 1.6) * 1.1 = 104.7 < 123.2 ∴An = 104.7 cm^2

1-U.RIB 320 * 240 * 8 Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9 ∴Anr = 41.0 cm^2

ΣAn = An + Anr = 104.7 + 41.0 = 145.7 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 113 * 177.1 / 145.7 = 137 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 158 * 10472 / 1.1 = 1499400 N

> σ tn * An = 137 * 10472 = 1434315 N

Pc = σ c * Ag = 158 * 12320 = 1940400 N

・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 158 * 4099 / 1.1 = 586845 N

> σ tn * Anr = 137 * 4099 = 561372 N

Pcr = σ c * Agr = 158 * 5390 = 848925 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 104.7 / 2 = 52.4 cm^2

AgR = Ag / 2 = 123.2 / 2 = 61.6 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1940400 / 108000 = 18.0 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 848925 / 108000 = 7.9 pcs. (1 @ 12 = 12 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 28 = 1940400 / 28 = 69300$ N
$\rho s = \tau * Ag / 28 = 17 * 12320 / 28 = 7641$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(69300^2 + 7641^2)} = 69720$ N

(i) Check of splice plates

	(SM490Y)	$Ags(cm^2)$	deduction of bolt holes			Ans(cm^2)
1-SPL PL	770 * 9	(69.3 -	(7*2.5)* 0.9)*1.1=	58.9<	69.3	∴ 58.9
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
2-SPL PL	250 * 14	(70.0 -	2*(3*2.5)* 1.4)*1.1=	53.9<	70.0	∴ 53.9
		81.9				63.1
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(245) D-3 J-18(Sec-18) DECK-2

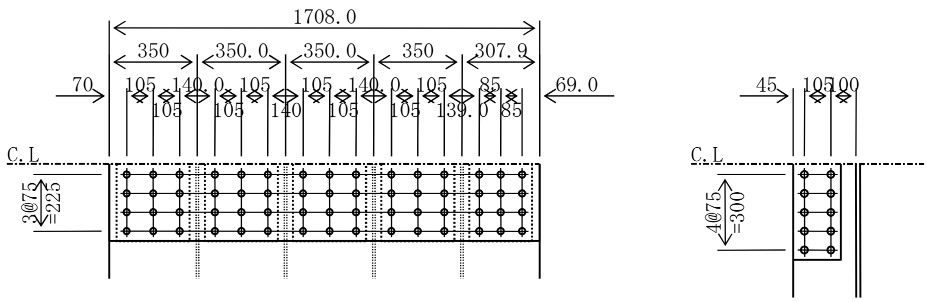
(a) Acting stress

σ tmax = 113 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 210 = 158 N/mm^2
$\therefore \sigma$ c = 158 N/mm^2
τ max = 17 N/mm^2

(b) Section area of main plate

1-DECK-2 PL 1708 * 16 Ag = 273.3 cm^2 (SM490Y)
5-RIB PL 250 * 24 Agr = 300.0 cm^2 (SM490Y)
ΣAg = Ag + Agr = 273.3 + 300.0 = 573.3 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2 PL 1708 * 16 A = 273.3
(273.3 - (15* 2.5)* 1.6) * 1.1 = 234.6 < 273.3 $\therefore$An = 234.6 cm^2
5-RIB PL 250 * 24 Ar = 300.0
(300.0 - 5*(2* 2.7)* 2.4) * 1.1 = 258.7 < 300.0 $\therefore$Anr = 258.7 cm^2
ΣAn = An + Anr = 234.6 + 258.7 = 493.3 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 113 * 573.3 / 493.3 = 131 N/mm^2
< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 158 * 23460 / 1.1 = 3359034 N
> σ tn * An = 131 * 23460 = 3072084 N
Pc = σ c * Ag = 158 * 27327 = 4304034 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 158 * 25872 / 1.1 = 3704400 N
> σ tn * Anr = 131 * 25872 = 3387946 N
Pcr = σ c * Agr = 158 * 30000 = 4725000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 234.6 / 2 = 117.3 cm^2
AgR = Ag / 2 = 273.3 / 2 = 136.6 cm^2
・Rib AnrR = Anr = 258.7 cm^2
AgrR = Agr = 300.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 4304034 / 108000 = 39.9 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 4725000 / 108000 = 43.8 pcs. (5 @ 10 = 50 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 60 = 4304034 / 60 = 71734$ N

$\rho s = \tau * Ag / 60 = 17 * 27327 / 60 = 7910$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(71734^2 + 7910^2)} = 72169$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm²)	deduction of bolt holes			Ans(cm²)
1-SPL PL	1708 * 9	(153.7 -	(15*2.5)* 0.9)*1.1=	132.0<	153.7	∴132.0
4-SPL PL	290 * 14	(162.4 -	4*(3*2.5)* 1.4)*1.1=	132.4<	162.4	∴132.4
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
		197.4				159.4
10-SPL PL	185 * 18	(333.0 -	10*(2*2.7)* 1.8)*1.1=	259.4<	333.0	∴259.4
		＞ AgrR				＞AnrR

(246) D-3 J-18(Sec-18) DECK-3

(a) Acting stress

σ tmax = 113 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 210 = 158 N/mm^2

∴ σ c = 158 N/mm^2

τ max = 17 N/mm^2

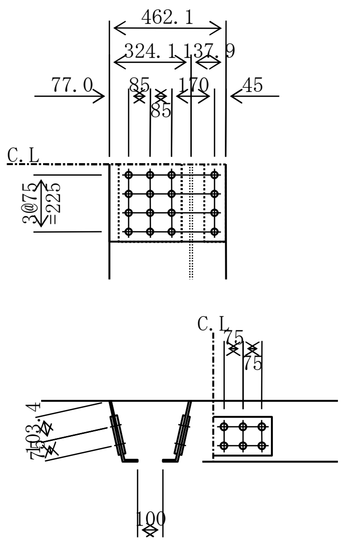
(b) Section area of main plate

1-DECK-3 PL 462 * 16   Ag = 73.9 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3 PL 462 * 16   A = 73.9

(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 ∴An = 63.7 cm^2

1-U.RIB 320 * 240 * 8   Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9 ∴Anr = 41.0 cm^2

ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 113 * 127.8 / 104.7 = 138 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 158 * 6372 / 1.1 = 912366 N

> σ tn * An = 138 * 6372 = 876609 N

Pc = σ c * Ag = 158 * 7393 = 1164366 N

・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 158 * 4099 / 1.1 = 586845 N

> σ tn * Anr = 138 * 4099 = 563846 N

Pcr = σ c * Agr = 158 * 5390 = 848925 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2

AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate $n = Pc / (108000 * 1.00) = 1164366 / 108000 = 10.8$ pcs.

・Rib $nr = Pcr / (108000 * 1.00) = 848925 / 108000 = 7.9$ pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 16 = 1164366 / 16 = 72773$ N

$\rho s = \tau * Ag / 16 = 17 * 7393 / 16 = 8024$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(72773^2 + 8024^2)} = 73214$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		46.9				36.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(247) D-3　J-19(Sec-19)　DECK-1

(a) Acting stress

$\sigma tmax$ = 154 N/mm^2　　0.75 σta = 0.75 ＊ 210 = 158 N/mm^2

$\sigma cmax$ = -64 N/mm^2　　0.75 σca = 0.75 ＊ 210 = 158 N/mm^2

∴ σc = 158 N/mm^2

τmax = 20 N/mm^2

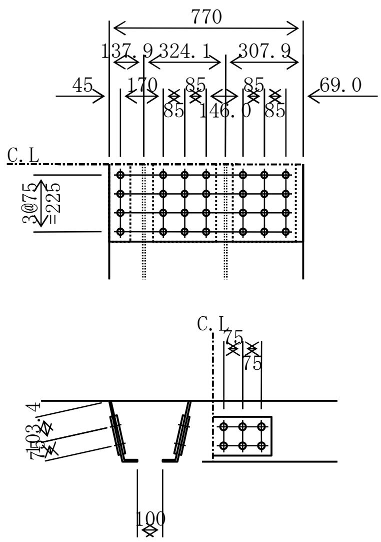
(b) Section area of main plate

1-DECK-1　PL　770 ＊ 16　　　Ag = 123.2 cm^2　(SM490Y)

1-U.RIB 320 ＊ 240 ＊ 8　　　Agr = 53.9 cm^2　(SM490Y)

ΣAg = Ag + Agr = 123.2 + 53.9 = 177.1 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-1　PL　770 ＊ 16　　　A = 123.2

(123.2 - (7＊ 2.5)＊ 1.6) ＊ 1.1 = 104.7 ＜ 123.2　∴An = 104.7 cm^2

1-U.RIB 320 ＊ 240 ＊ 8　　　Ar = 53.9

(53.9 - (4＊ 2.7)＊ 0.8- 1＊(10.0＊0.8)) ＊ 1.1 = 41.0

＜ 53.9　∴Anr = 41.0 cm^2

ΣAn = An + Anr = 104.7 + 41.0 = 145.7 cm^2

σtn = $\sigma tmax$ ＊ ΣAg / ΣAn = 154 ＊ 177.1 / 145.7 = 188 N/mm^2

＜ σta = 210 N/mm^2

(e) Design axial force

・Main plate　Pt = σtn ＊ An = 188 ＊ 10472 = 1963826 N

＞ 0.75 σta ＊ An / 1.1 = 158 ＊ 10472 / 1.1 = 1499400 N

Pc = σc ＊ Ag = 158 ＊ 12320 = 1940400 N

・Rib　Ptr = σtn ＊ Anr = 188 ＊ 4099 = 768615 N

＞ 0.75 σta ＊ Anr/ 1.1 = 158 ＊ 4099 / 1.1 = 586845 N

Pcr = σc ＊ Agr = 158 ＊ 5390 = 848925 N

(f) Required section area of the splice plates

・Mother material(One side)　AnR = An / 2 = 104.7 / 2 = 52.4 cm^2

AgR = Ag / 2 = 123.2 / 2 = 61.6 cm^2

・Rib　　AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 1963826 / 108000 = 18.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 848925 / 108000 = 7.9 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(h) Tensile force per one bolt

$\rho p = Pt / 28 = 1963826 / 28 = 70137$ N

$\rho s = \tau * Ag / 28 = 20 * 12320 / 28 = 8675$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(70137^2 + 8675^2)} = 70671$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	770 * 9	(69.3 -	(7*2.5)* 0.9)*1.1=	58.9<	69.3	∴ 58.9
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
2-SPL PL	250 * 14	(70.0 -	2*(3*2.5)* 1.4)*1.1=	53.9<	70.0	∴ 53.9
		81.9				63.1
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(248) D-3 J-19(Sec-19) DECK-2

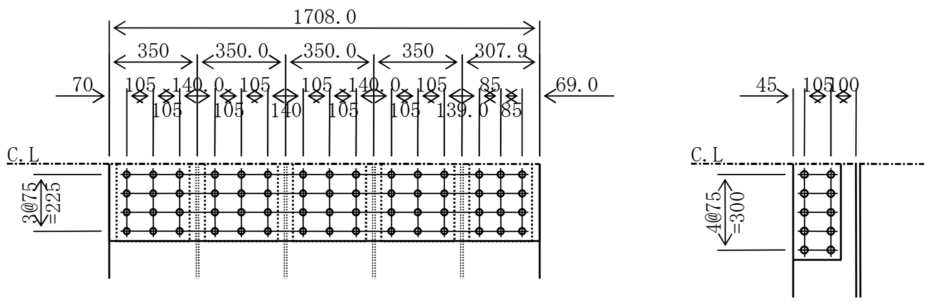
(a) Acting stress

σ tmax = 154 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 210 = 158 N/mm^2
$\therefore \sigma$ c = 158 N/mm^2
τ max = 20 N/mm^2

(b) Section area of main plate

1-DECK-2 PL 1708 * 16 Ag = 273.3 cm^2 (SM490Y)
5-RIB PL 250 * 24 Agr = 300.0 cm^2 (SM490Y)
ΣAg = Ag + Agr = 273.3 + 300.0 = 573.3 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2 PL 1708 * 16 A = 273.3
(273.3 - (15* 2.5)* 1.6) * 1.1 = 234.6 < 273.3 ∴An = 234.6 cm^2
5-RIB PL 250 * 24 Ar = 300.0
(300.0 - 5*(2* 2.7)* 2.4) * 1.1 = 258.7 < 300.0 ∴Anr = 258.7 cm^2
ΣAn = An + Anr = 234.6 + 258.7 = 493.3 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 154 * 573.3 / 493.3 = 179 N/mm^2
< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 179 * 23460 = 4206214 N
> 0.75 σ ta * An / 1.1 = 158 * 23460 / 1.1 = 3359034 N
Pc = σ c * Ag = 158 * 27327 = 4304034 N
・Rib Ptr = σ tn * Anr = 179 * 25872 = 4638685 N
> 0.75 σ ta * Anr/ 1.1 = 158 * 25872 / 1.1 = 3704400 N
Pcr = σ c * Agr = 158 * 30000 = 4725000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 234.6 / 2 = 117.3 cm^2
AgR = Ag / 2 = 273.3 / 2 = 136.6 cm^2
・Rib AnrR = Anr = 258.7 cm^2
AgrR = Agr = 300.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 4304034 / 108000 = 39.9 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 4725000 / 108000 = 43.8 pcs. (5 @ 10 = 50 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 60 = 4304034 / 60 = 71734$ N

$\rho s = \tau * Ag / 60 = 20 * 27327 / 60 = 8979$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(71734^2 + 8979^2)} = 72294$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	1708 * 9	(153.7 -	(15*2.5)* 0.9)*1.1=	132.0<	153.7	∴132.0
4-SPL PL	290 * 14	(162.4 -	4*(3*2.5)* 1.4)*1.1=	132.4<	162.4	∴132.4
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
		197.4				159.4
10-SPL PL	185 * 18	(333.0 -	10*(2*2.7)* 1.8)*1.1=	259.4<	333.0	∴259.4
		> AgrR				>AnrR

(249) D-3 J-19(Sec-19) DECK-3

(a) Acting stress

σ tmax = 154 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 210 = 158 N/mm^2

$\therefore$ σ c = 158 N/mm^2

τ max = 20 N/mm^2

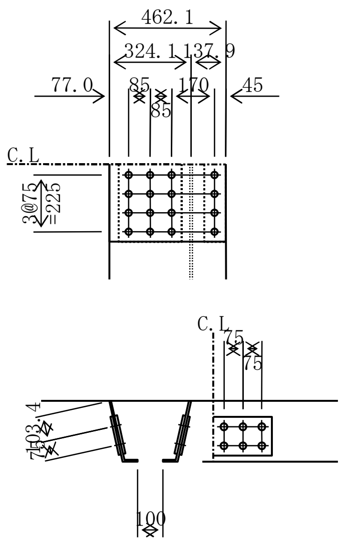
(b) Section area of main plate

1-DECK-3 PL 462 * 16   Ag = 73.9 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3 PL 462 * 16   A = 73.9

(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 $\therefore$An = 63.7 cm^2

1-U.RIB 320 * 240 * 8   Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9 $\therefore$Anr = 41.0 cm^2

ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 154 * 127.8 / 104.7 = 188 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 188 * 6372 = 1200230 N

> 0.75 σ ta * An / 1.1 = 158 * 6372 / 1.1 = 912366 N

Pc = σ c * Ag = 158 * 7393 = 1164366 N

・Rib Ptr = σ tn * Anr = 188 * 4099 = 772003 N

> 0.75 σ ta * Anr/ 1.1 = 158 * 4099 / 1.1 = 586845 N

Pcr = σ c * Agr = 158 * 5390 = 848925 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2

AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 1200230 / 108000 = 11.1 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 848925 / 108000 = 7.9 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(h) Tensile force per one bolt

ρp = Pt / 16 = 1200230 / 16 = 75014 N

ρs = τ * Ag / 16 = 20 * 7393 / 16 = 9109 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(75014^2 + 9109^2)}$ = 75565 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		46.9				36.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(250) D-3　J-20(Sec-21)　DECK-1

(a) Acting stress

σ tmax = 147 N/mm^2　　0.75 σ ta = 0.75 * 210 = 158 N/mm^2

σ cmax = -64 N/mm^2　　0.75 σ ca = 0.75 * 210 = 158 N/mm^2

$\therefore$ σ c = 158 N/mm^2

τ max = 26 N/mm^2

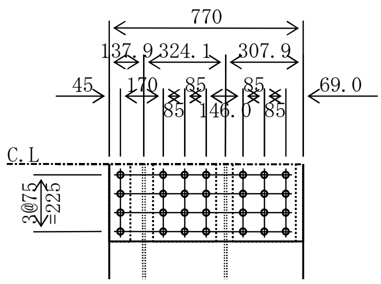
(b) Section area of main plate

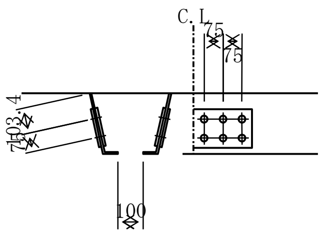
1-DECK-1　PL　770 * 16　　　Ag = 123.2 cm^2　(SM490Y)

1-U.RIB 320 * 240 * 8　　　Agr = 53.9 cm^2　(SM490Y)

ΣAg = Ag + Agr = 123.2 + 53.9 = 177.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-1　PL　770 * 16　　　A = 123.2

(123.2 - (7* 2.5)* 1.6) * 1.1 = 104.7 < 123.2　$\therefore$An = 104.7 cm^2

1-U.RIB 320 * 240 * 8　　　Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9　$\therefore$Anr = 41.0 cm^2

ΣAn = An + Anr = 104.7 + 41.0 = 145.7 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 147 * 177.1 / 145.7 = 179 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate　Pt = σ tn * An = 179 * 10472 = 1876535 N

> 0.75 σ ta * An / 1.1 = 158 * 10472 / 1.1 = 1499400 N

Pc = σ c * Ag = 158 * 12320 = 1940400 N

・Rib　Ptr = σ tn * Anr = 179 * 4099 = 734450 N

> 0.75 σ ta * Anr/ 1.1 = 158 * 4099 / 1.1 = 586845 N

Pcr = σ c * Agr = 158 * 5390 = 848925 N

(f) Required section area of the splice plates

・Mother material(One side)　AnR = An / 2 = 104.7 / 2 = 52.4 cm^2

AgR = Ag / 2 = 123.2 / 2 = 61.6 cm^2

・Rib　　AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1940400 / 108000 = 18.0 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 848925 / 108000 = 7.9 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 28 = 1940400 / 28 = 69300$ N

$\rho s = \tau * Ag / 28 = 26 * 12320 / 28 = 11511$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(69300^2 + 11511^2)} = 70249$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	770 * 9	(69.3 -	(7*2.5)* 0.9)*1.1=	58.9<	69.3	∴ 58.9
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
2-SPL PL	250 * 14	(70.0 -	2*(3*2.5)* 1.4)*1.1=	53.9<	70.0	∴ 53.9
		81.9				63.1
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(251) D-3 J-20(Sec-21) DECK-2

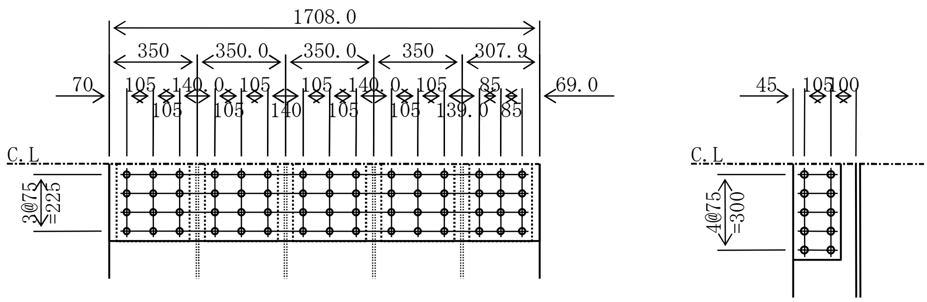
(a) Acting stress

σ tmax = 147 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 210 = 158 N/mm^2
∴ σ c = 158 N/mm^2
τ max = 26 N/mm^2

(b) Section area of main plate

1-DECK-2 PL 1708 * 16 Ag = 273.3 cm^2 (SM490Y)
5-RIB PL 250 * 24 Agr = 300.0 cm^2 (SM490Y)
ΣAg = Ag + Agr = 273.3 + 300.0 = 573.3 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2 PL 1708 * 16 A = 273.3
(273.3 - (15* 2.5)* 1.6) * 1.1 = 234.6 < 273.3 ∴An = 234.6 cm^2
5-RIB PL 250 * 24 Ar = 300.0
(300.0 - 5*(2* 2.7)* 2.4) * 1.1 = 258.7 < 300.0 ∴Anr = 258.7 cm^2
ΣAn = An + Anr = 234.6 + 258.7 = 493.3 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 147 * 573.3 / 493.3 = 171 N/mm^2
< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 171 * 23460 = 4019251 N
> 0.75 σ ta * An / 1.1 = 158 * 23460 / 1.1 = 3359034 N
Pc = σ c * Ag = 158 * 27327 = 4304034 N
・Rib Ptr = σ tn * Anr = 171 * 25872 = 4432498 N
> 0.75 σ ta * Anr/ 1.1 = 158 * 25872 / 1.1 = 3704400 N
Pcr = σ c * Agr = 158 * 30000 = 4725000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 234.6 / 2 = 117.3 cm^2
AgR = Ag / 2 = 273.3 / 2 = 136.6 cm^2
・Rib AnrR = Anr = 258.7 cm^2
AgrR = Agr = 300.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 4304034 / 108000 = 39.9 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 4725000 / 108000 = 43.8 pcs. (5 @ 10 = 50 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 60 = 4304034 / 60 = 71734$ N

$\rho s = \tau * Ag / 60 = 26 * 27327 / 60 = 11915$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(71734^2 + 11915^2)} = 72717$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
1-SPL PL	1708 * 9	(153.7 -	(15*2.5)* 0.9)*1.1= 132.0<	153.7	∴132.0
4-SPL PL	290 * 14	(162.4 -	4*(3*2.5)* 1.4)*1.1= 132.4<	162.4	∴132.4
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1= 27.0<	35.0	∴ 27.0
		197.4			159.4
10-SPL PL	185 * 18	(333.0 -	10*(2*2.7)* 1.8)*1.1= 259.4<	333.0	∴259.4
		＞ AgrR			＞AnrR

(252) D-3　J-20(Sec-21)　DECK-3

(a) Acting stress

$\sigma tmax$ = 147 N/mm^2　　0.75 σta = 0.75 * 210 = 158 N/mm^2

$\sigma cmax$ = -64 N/mm^2　　0.75 σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma c$ = 158 N/mm^2

τmax = 26 N/mm^2

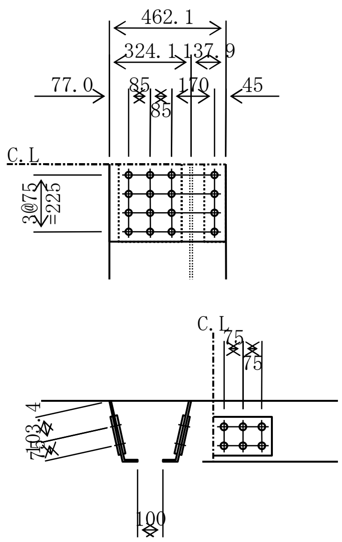
(b) Section area of main plate

1-DECK-3　PL　462 * 16　　Ag = 73.9 cm^2　(SM490Y)

1-U.RIB 320 * 240 * 8　　Agr = 53.9 cm^2　(SM490Y)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3　PL　462 * 16　　A = 73.9

(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9　∴An = 63.7 cm^2

1-U.RIB 320 * 240 * 8　　Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9　∴Anr = 41.0 cm^2

ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 147 * 127.8 / 104.7 = 180 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate　Pt = σtn * An = 180 * 6372 = 1146881 N

> 0.75 σta * An / 1.1 = 158 * 6372 / 1.1 = 912366 N

Pc = σc * Ag = 158 * 7393 = 1164366 N

・Rib　Ptr = σtn * Anr = 180 * 4099 = 737688 N

> 0.75 σta * Anr/ 1.1 = 158 * 4099 / 1.1 = 586845 N

Pcr = σc * Agr = 158 * 5390 = 848925 N

(f) Required section area of the splice plates

・Mother material(One side)　AnR = An / 2 = 63.7 / 2 = 31.9 cm^2

AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib　　AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1164366 / 108000 = 10.8 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 848925 / 108000 = 7.9 pcs. (1 @ 12 = 12 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 16 = 1164366 / 16 = 72773$ N
$\rho s = \tau * Ag / 16 = 26 * 7393 / 16 = 12088$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(72773^2 + 12088^2)} = 73770$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8＜	41.6	∴ 35.8
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0＜	35.0	∴ 27.0
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2＜	11.9	∴ 9.2
		46.9				36.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4＜	62.0	∴ 44.4
		＞ AgrR				＞AnrR

(253) D-3 J-21(Sec-22) DECK-1

(a) Acting stress

σ tmax = 88 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2

σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2

∴ σ c = 105 N/mm^2

τ max = 25 N/mm^2

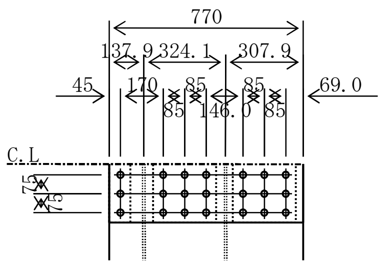
(b) Section area of main plate

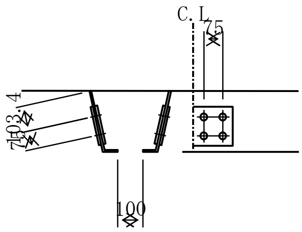
1-DECK-1 PL 770 * 16 Ag = 123.2 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 123.2 + 53.9 = 177.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-1 PL 770 * 16 A = 123.2

(123.2 - (7* 2.5)* 1.6) * 1.1 = 104.7 < 123.2 ∴An = 104.7 cm^2

1-U.RIB 320 * 240 * 8 Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9 ∴Anr = 41.0 cm^2

ΣAn = An + Anr = 104.7 + 41.0 = 145.7 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 88 * 177.1 / 145.7 = 107 N/mm^2

< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 107 * 10472 = 1122128 N

> 0.75 σ ta * An / 1.1 = 105 * 10472 / 1.1 = 999600 N

Pc = σ c * Ag = 105 * 12320 = 1293600 N

・Rib Ptr = σ tn * Anr = 107 * 4099 = 439186 N

> 0.75 σ ta * Anr/ 1.1 = 105 * 4099 / 1.1 = 391230 N

Pcr = σ c * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 104.7 / 2 = 52.4 cm^2

AgR = Ag / 2 = 123.2 / 2 = 61.6 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1293600 / 108000 = 12.0 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 21 = 1293600 / 21 = 61600$ N
$\rho s = \tau * Ag / 21 = 25 * 12320 / 21 = 14878$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(61600^2 + 14878^2)} = 63371$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			$Ans(cm^2)$
1-SPL PL	770 * 9	(69.3 -	(7*2.5)* 0.9)*1.1=	58.9<	69.3	∴ 58.9
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
2-SPL PL	250 * 14	(70.0 -	2*(3*2.5)* 1.4)*1.1=	53.9<	70.0	∴ 53.9
		81.9				63.1
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(254) D-3 J-21(Sec-22) DECK-2

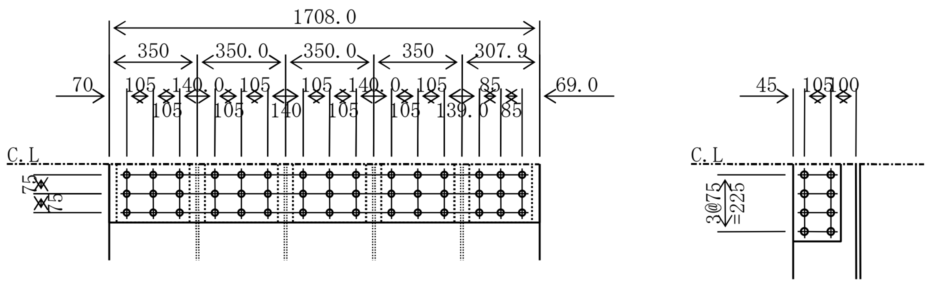
(a) Acting stress

$\sigma tmax$ = 88 N/mm^2 0.75 σta = 0.75 * 140 = 105 N/mm^2
$\sigma cmax$ = -64 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma c$ = 105 N/mm^2
τmax = 25 N/mm^2

(b) Section area of main plate

1-DECK-2 PL 1708 * 16 Ag = 273.3 cm^2 (SM400)
5-RIB PL 250 * 24 Agr = 300.0 cm^2 (SM400)
ΣAg = Ag + Agr = 273.3 + 300.0 = 573.3 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2 PL 1708 * 16 A = 273.3
(273.3 - (15* 2.5)* 1.6) * 1.1 = 234.6 < 273.3 ∴An = 234.6 cm^2
5-RIB PL 250 * 24 Ar = 300.0
(300.0 - 5*(2* 2.7)* 2.4) * 1.1 = 258.7 < 300.0 ∴Anr = 258.7 cm^2
ΣAn = An + Anr = 234.6 + 258.7 = 493.3 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 88 * 573.3 / 493.3 = 102 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 102 * 23460 = 2403426 N
> 0.75 σta * An / 1.1 = 105 * 23460 / 1.1 = 2239356 N
Pc = σc * Ag = 105 * 27327 = 2869356 N
・Rib Ptr = σtn * Anr = 102 * 25872 = 2650540 N
> 0.75 σta * Anr/ 1.1 = 105 * 25872 / 1.1 = 2469600 N
Pcr = σc * Agr = 105 * 30000 = 3150000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 234.6 / 2 = 117.3 cm^2
AgR = Ag / 2 = 273.3 / 2 = 136.6 cm^2
・Rib AnrR = Anr = 258.7 cm^2
AgrR = Agr = 300.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2869356 / 108000 = 26.6 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 3150000 / 108000 = 29.2 pcs. (5 @ 8 = 40 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 45 = 2869356 / 45 = 63763$ N

$\rho s = \tau * Ag / 45 = 25 * 27327 / 45 = 15400$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(63763^2 + 15400^2)} = 65597$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			$Ans(cm^2)$
1-SPL PL	1708 * 9	(153.7 -	(15*2.5)* 0.9)*1.1=	132.0<	153.7	∴132.0
4-SPL PL	290 * 14	(162.4 -	4*(3*2.5)* 1.4)*1.1=	132.4<	162.4	∴132.4
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
		197.4				159.4
10-SPL PL	185 * 18	(333.0 -	10*(2*2.7)* 1.8)*1.1=	259.4<	333.0	∴259.4
		＞ AgrR				＞AnrR

(255) D-3 J-21(Sec-22) DECK-3

(a) Acting stress

σ tmax = 88 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2

σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2

∴ σ c = 105 N/mm^2

τ max = 25 N/mm^2

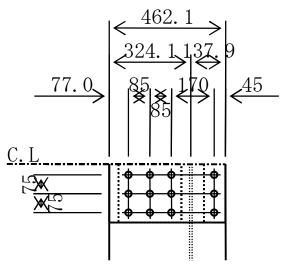
(b) Section area of main plate

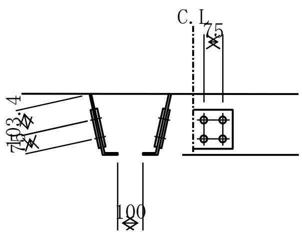
1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-3 PL 462 * 16 A = 73.9

(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 ∴An = 63.7 cm^2

1-U.RIB 320 * 240 * 8 Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9 ∴Anr = 41.0 cm^2

ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 88 * 127.8 / 104.7 = 108 N/mm^2

< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 108 * 6372 = 685810 N

> 0.75 σ ta * An / 1.1 = 105 * 6372 / 1.1 = 608244 N

Pc = σ c * Ag = 105 * 7393 = 776244 N

・Rib Ptr = σ tn * Anr = 108 * 4099 = 441121 N

> 0.75 σ ta * Anr/ 1.1 = 105 * 4099 / 1.1 = 391230 N

Pcr = σ c * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2

AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 776244 / 108000 = 7.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 12 = 776244 / 12 = 64687 N

ρs = τ * Ag / 12 = 25 * 7393 / 12 = 15623 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64687^2 + 15623^2)}$ = 66547 N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			Ans(cm^2)
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0<	35.0	∴ 27.0
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		46.9				36.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(256) D-3 J-22(Sec-23) DECK-1

(a) Acting stress

$\sigma tmax$ = 30 N/mm^2 $0.75\sigma ta$ = 0.75 * 140 = 105 N/mm^2

$\sigma cmax$ = -64 N/mm^2 $0.75\sigma ca$ = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 23 N/mm^2

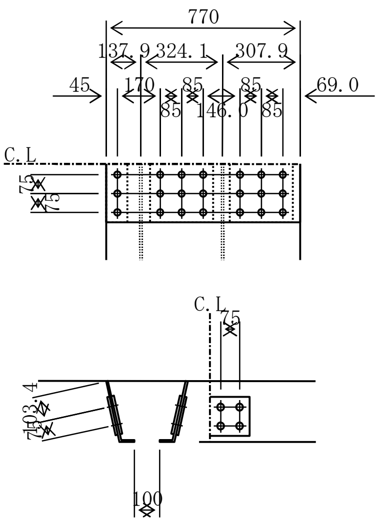
(b) Section area of main plate

1-DECK-1 PL 770 * 16   Ag = 123.2 cm^2 (SM400)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 123.2 + 53.9 = 177.1 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-1 PL 770 * 16   A = 123.2

(123.2 - (7* 2.5)* 1.6) * 1.1 = 104.7 < 123.2 $\therefore$An = 104.7 cm^2

1-U.RIB 320 * 240 * 8   Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9 $\therefore$Anr = 41.0 cm^2

ΣAn = An + Anr = 104.7 + 41.0 = 145.7 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 30 * 177.1 / 145.7 = 37 N/mm^2

< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = $0.75\sigma ta$ * An / 1.1 = 105 * 10472 / 1.1 = 999600 N

> σtn * An = 37 * 10472 = 384000 N

Pc = σc * Ag = 105 * 12320 = 1293600 N

・Rib Ptr = $0.75\sigma ta$ * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N

> σtn * Anr = 37 * 4099 = 150293 N

Pcr = σc * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 104.7 / 2 = 52.4 cm^2

AgR = Ag / 2 = 123.2 / 2 = 61.6 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1293600 / 108000 = 12.0 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 21 = 1293600 / 21 = 61600$ N

$\rho s = \tau * Ag / 21 = 23 * 12320 / 21 = 13380$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(61600^2 + 13380^2)} = 63036$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	770 * 9	(69.3 -	(7*2.5)* 0.9)*1.1=	58.9<	69.3	∴ 58.9
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
2-SPL PL	250 * 14	(70.0 -	2*(3*2.5)* 1.4)*1.1=	53.9<	70.0	∴ 53.9
		81.9				63.1
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		＞ AgrR				＞AnrR

(257) D-3 J-22(Sec-23) DECK-2

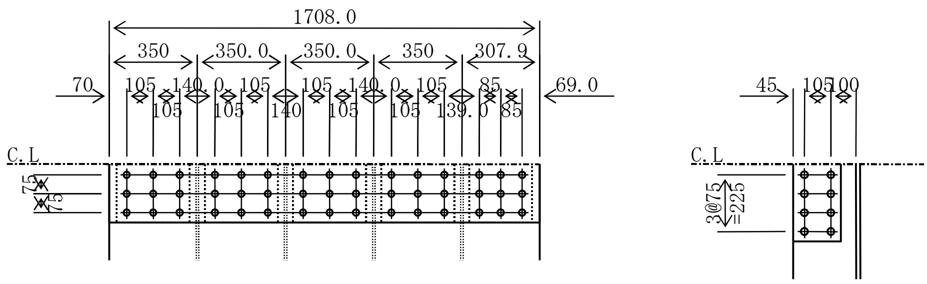
(a) Acting stress

σ tmax = 30 N/mm^2 0.75σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2 0.75σ ca = 0.75 * 140 = 105 N/mm^2
∴σ c = 105 N/mm^2
τ max = 23 N/mm^2

(b) Section area of main plate

1-DECK-2 PL 1708 * 16 Ag = 273.3 cm^2 (SM400)
5-RIB PL 250 * 24 Agr = 300.0 cm^2 (SM400)
ΣAg = Ag + Agr = 273.3 + 300.0 = 573.3 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2 PL 1708 * 16 A = 273.3
(273.3 - (15* 2.5)* 1.6) * 1.1 = 234.6 < 273.3 ∴An = 234.6 cm^2
5-RIB PL 250 * 24 Ar = 300.0
(300.0 - 5*(2* 2.7)* 2.4) * 1.1 = 258.7 < 300.0 ∴Anr = 258.7 cm^2
ΣAn = An + Anr = 234.6 + 258.7 = 493.3 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 30 * 573.3 / 493.3 = 35 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σ ta * An / 1.1 = 105 * 23460 / 1.1 = 2239356 N
> σ tn * An = 35 * 23460 = 822470 N
Pc = σ c * Ag = 105 * 27327 = 2869356 N
・Rib Ptr = 0.75σ ta * Anr / 1.1 = 105 * 25872 / 1.1 = 2469600 N
> σ tn * Anr = 35 * 25872 = 907034 N
Pcr = σ c * Agr = 105 * 30000 = 3150000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 234.6 / 2 = 117.3 cm^2
AgR = Ag / 2 = 273.3 / 2 = 136.6 cm^2
・Rib AnrR = Anr = 258.7 cm^2
AgrR = Agr = 300.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2869356 / 108000 = 26.6 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 3150000 / 108000 = 29.2 pcs. (5 @ 8 = 40 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 45 = 2869356 / 45 = 63763$ N

$\rho s = \tau * Ag / 45 = 23 * 27327 / 45 = 13849$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(63763^2 + 13849^2)} = 65250$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
1-SPL PL	1708 * 9	(153.7 -	(15*2.5)* 0.9)*1.1= 132.0<	153.7	∴132.0
4-SPL PL	290 * 14	(162.4 -	4*(3*2.5)* 1.4)*1.1= 132.4<	162.4	∴132.4
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1= 27.0<	35.0	∴ 27.0
		197.4			159.4
10-SPL PL	185 * 18	(333.0 -	10*(2*2.7)* 1.8)*1.1= 259.4<	333.0	∴259.4
		> AgrR			>AnrR

(258) D-3 J-22(Sec-23) DECK-3

(a) Acting stress

$\sigma tmax$ = 30 N/mm^2 0.75 σta = 0.75 * 140 = 105 N/mm^2

$\sigma cmax$ = -64 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 23 N/mm^2

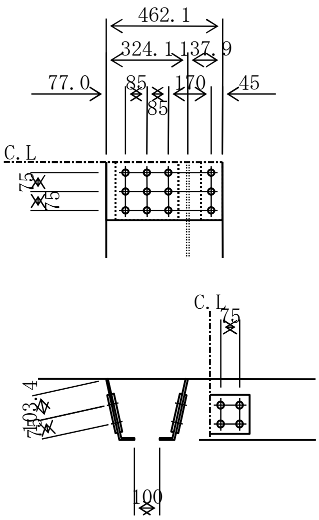
(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3 PL 462 * 16 A = 73.9

(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 $\therefore$An = 63.7 cm^2

1-U.RIB 320 * 240 * 8 Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9 $\therefore$Anr = 41.0 cm^2

ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 30 * 127.8 / 104.7 = 37 N/mm^2

< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σta * An / 1.1 = 105 * 6372 / 1.1 = 608244 N

\> σtn * An = 37 * 6372 = 234689 N

Pc = σc * Ag = 105 * 7393 = 776244 N

・Rib Ptr = 0.75 σta * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N

\> σtn * Anr = 37 * 4099 = 150955 N

Pcr = σc * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2

AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 776244 / 108000 = 7.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 12 = 776244 / 12 = 64687 N

ρs = τ * Ag / 12 = 23 * 7393 / 12 = 14050 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(64687^2 + 14050^2) = 66195 N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8＜	41.6	∴ 35.8
1-SPL PL	250 * 14	(35.0 -	(3*2.5)* 1.4)*1.1=	27.0＜	35.0	∴ 27.0
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2＜	11.9	∴ 9.2
		46.9				36.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4＜	62.0	∴ 44.4
		＞ AgrR				＞AnrR

(259) D-3 J-23(Sec-23) DECK-1

(a) Acting stress

$\sigma cmax$ = -92 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 19 N/mm^2

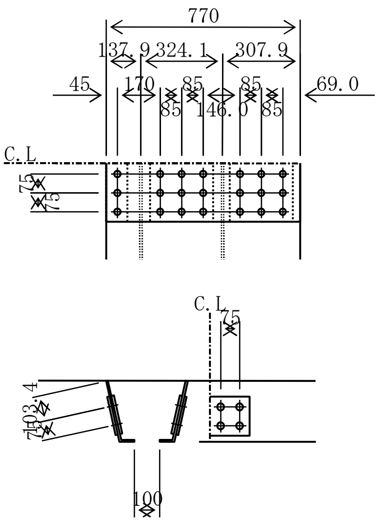
(b) Section area of main plate

1-DECK-1 PL 770 * 16 Ag = 123.2 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 123.2 + 53.9 = 177.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 12320 = 1293600 N

・Rib Pcr = σc * Agr = 105 * 5390 = 565950 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 123.2 / 2 = 61.6 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1293600 / 108000 = 12.0 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 21 = 1293600 / 21 = 61600 N

ρs = τ * Ag / 21 = 19 * 12320 / 21 = 11321 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(61600^2 + 11321^2) = 62632 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
1-SPL PL	770 ＊ 9	69.3
1-SPL PL	85 ＊ 14	11.9
2-SPL PL	250 ＊ 14	70.0
		81.9
4-SPL PL	155 ＊ 10	62.0 ＞ AgrR = 53.9cm2

(260) D-3 J-23(Sec-23) DECK-2

(a) Acting stress

$\sigma cmax$ = -92 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 19 N/mm^2

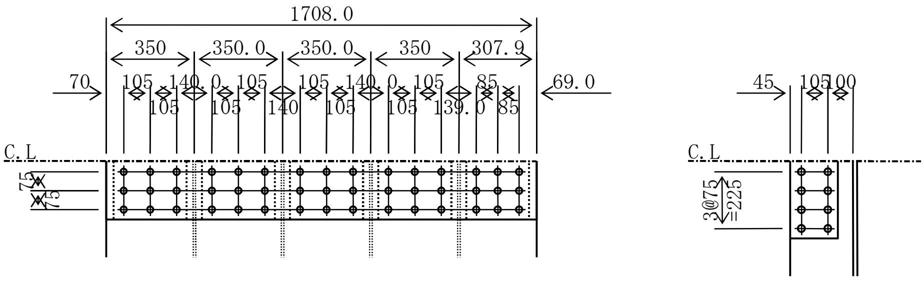
(b) Section area of main plate

1-DECK-2 PL 1708 * 16 Ag = 273.3 cm^2 (SM400)

5-RIB PL 250 * 24 Agr = 300.0 cm^2 (SM400)

ΣAg = Ag + Agr = 273.3 + 300.0 = 573.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 27327 = 2869356 N

・Rib Pcr = σc * Agr = 105 * 30000 = 3150000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 273.3 / 2 = 136.6 cm^2

・Rib AgrR = Agr = 300.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2869356 / 108000 = 26.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 3150000 / 108000 = 29.2 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 45 = 2869356 / 45 = 63763 N

ρs = τ * Ag / 45 = 19 * 27327 / 45 = 11719 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(63763^2 + 11719^2) = 64831 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
1-SPL PL	1708 * 9	153.7
4-SPL PL	290 * 14	162.4
1-SPL PL	250 * 14	35.0
		197.4

10-SPL PL 185 * 18 333.0 ＞ AgrR = 300.0cm^2

(261) D-3 J-23(Sec-23) DECK-3

(a) Acting stress

$\sigma cmax$ = -92 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 19 N/mm^2

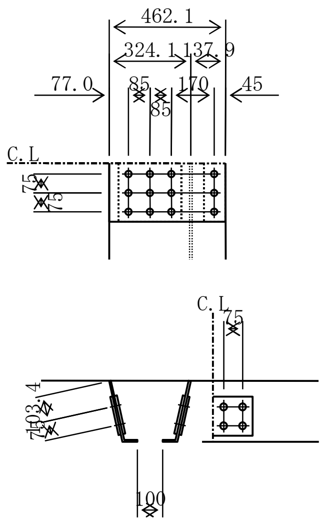
(b) Section area of main plate

1-DECK-3 PL 462 * 16   Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 7393 = 776244 N

・Rib Pcr = σc * Agr = 105 * 5390 = 565950 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 776244 / 108000 = 7.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 12 = 776244 / 12 = 64687 N

ρs = τ * Ag / 12 = 19 * 7393 / 12 = 11888 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64687^2 + 11888^2)}$ = 65770 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	462 ＊ 9	41.6	
1-SPL PL	250 ＊ 14	35.0	
1-SPL PL	85 ＊ 14	11.9	
		46.9	
4-SPL PL	155 ＊ 10	62.0	＞ AgrR = 53.9cm2

(262) D-3 J-24(Sec-24) DECK-1

(a) Acting stress

$\sigma cmax$ = -129 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 129 N/mm^2

τmax = 16 N/mm^2

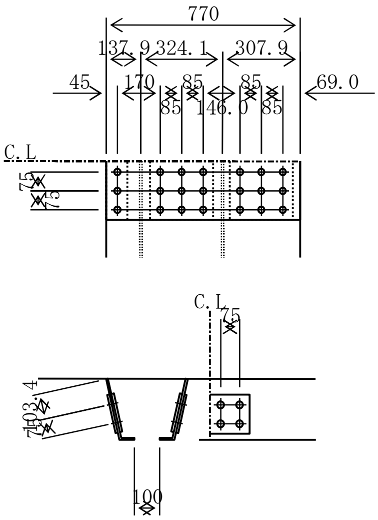
(b) Section area of main plate

1-DECK-1 PL 770 * 16   Ag = 123.2 cm^2 (SM400)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 123.2 + 53.9 = 177.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 129 * 12320 = 1584019 N

・Rib Pcr = σc * Agr = 129 * 5390 = 693008 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 123.2 / 2 = 61.6 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1584019 / 108000 = 14.7 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 693008 / 108000 = 6.4 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 21 = 1584019 / 21 = 75429 N

ρs = τ * Ag / 21 = 16 * 12320 / 21 = 9539 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(75429^2 + 9539^2)}$ = 76030 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	770 * 9	69.3	
1-SPL PL	85 * 14	11.9	
2-SPL PL	250 * 14	70.0	
		81.9	
4-SPL PL	155 * 10	62.0	＞ AgrR = 53.9cm2

(263) D-3 J-24(Sec-24) DECK-2

(a) Acting stress

$\sigma cmax$ = -129 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 129 N/mm^2

τmax = 16 N/mm^2

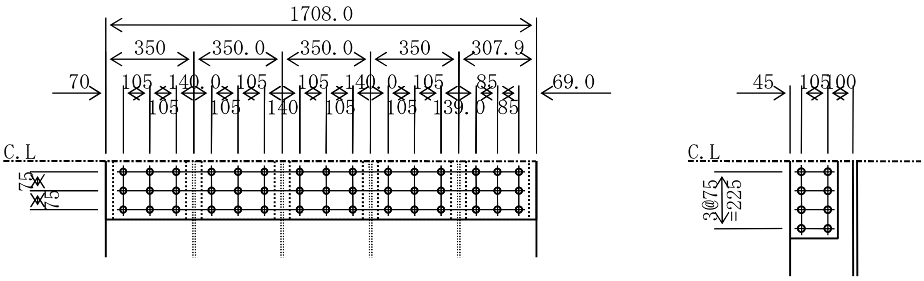
(b) Section area of main plate

1-DECK-2 PL 1708 * 16 Ag = 273.3 cm^2 (SM400)

5-RIB PL 250 * 24 Agr = 300.0 cm^2 (SM400)

ΣAg = Ag + Agr = 273.3 + 300.0 = 573.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 129 * 27327 = 3513540 N

・Rib Pcr = σc * Agr = 129 * 30000 = 3857190 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 273.3 / 2 = 136.6 cm^2

・Rib AgrR = Agr = 300.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 3513540 / 108000 = 32.5 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 3857190 / 108000 = 35.7 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 45 = 3513540 / 45 = 78079 N

ρs = τ * Ag / 45 = 16 * 27327 / 45 = 9874 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(78079^2 + 9874^2)}$ = 78701 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
1-SPL PL	1708 * 9	153.7
4-SPL PL	290 * 14	162.4
1-SPL PL	250 * 14	35.0
		197.4
10-SPL PL	185 * 18	333.0 > AgrR = 300.0cm^2

(264) D-3 J-24(Sec-24) DECK-3

(a) Acting stress

$\sigma cmax$ = -129 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 129 N/mm^2

τmax = 16 N/mm^2

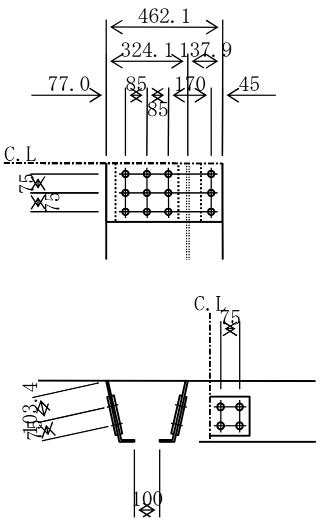
(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 129 * 7393 = 950514 N

・Rib Pcr = σc * Agr = 129 * 5390 = 693008 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 950514 / 108000 = 8.8 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 693008 / 108000 = 6.4 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 12 = 950514 / 12 = 79210 N

ρs = τ * Ag / 12 = 16 * 7393 / 12 = 10017 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(79210^2 + 10017^2)}$ = 79840 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	462 * 9	41.6	
1-SPL PL	250 * 14	35.0	
1-SPL PL	85 * 14	11.9	
		46.9	
4-SPL PL	155 * 10	62.0	> AgrR = 53.9cm2

(265) D-3 J-25(Sec-25) DECK-1

(a) Acting stress

$\sigma cmax$ = -154 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 158 N/mm^2

τmax = 13 N/mm^2

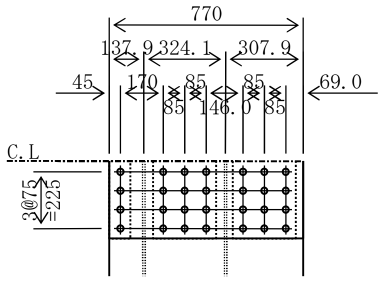
(b) Section area of main plate

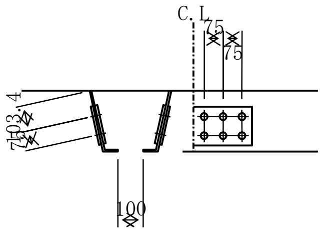
1-DECK-1 PL 770 * 16 Ag = 123.2 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 123.2 + 53.9 = 177.1 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 12320 = 1940400 N

・Rib Pcr = σc * Agr = 158 * 5390 = 848925 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 123.2 / 2 = 61.6 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1940400 / 108000 = 18.0 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 848925 / 108000 = 7.9 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 28 = 1940400 / 28 = 69300 N

ρs = τ * Ag / 28 = 13 * 12320 / 28 = 5551 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(69300^2 + 5551^2)}$ = 69522 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
1-SPL PL	770 * 9	69.3	
1-SPL PL	85 * 14	11.9	
2-SPL PL	250 * 14	70.0	
		81.9	
4-SPL PL	155 * 10	62.0	> AgrR = 53.9cm2

(266) D-3 J-25(Sec-25) DECK-2

(a) Acting stress

σ cmax = -154 N/mm^2 0.75 σ ca = 0.75 * 210 = 158 N/mm^2

∴ σ c = 158 N/mm^2

τ max = 13 N/mm^2

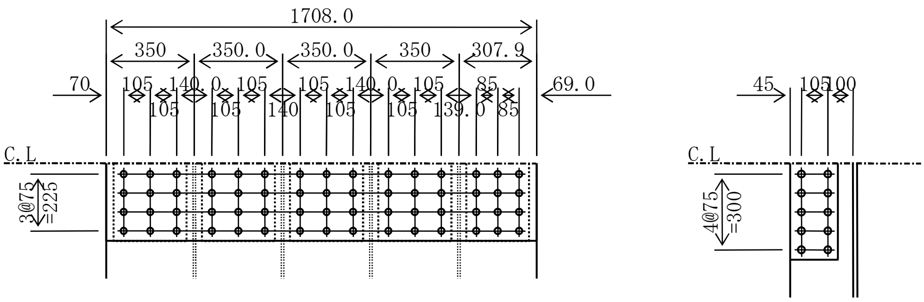
(b) Section area of main plate

1-DECK-2 PL 1708 * 16 Ag = 273.3 cm^2 (SM490Y)

5-RIB PL 250 * 24 Agr = 300.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 273.3 + 300.0 = 573.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σ c * Ag = 158 * 27327 = 4304034 N

・Rib Pcr = σ c * Agr = 158 * 30000 = 4725000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 273.3 / 2 = 136.6 cm^2

・Rib AgrR = Agr = 300.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 4304034 / 108000 = 39.9 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 4725000 / 108000 = 43.8 pcs. (5 @ 10 = 50 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(g) Tensile force per one bolt

ρ p = Pc / 60 = 4304034 / 60 = 71734 N

ρ s = τ * Ag / 60 = 13 * 27327 / 60 = 5746 N

ρ = $\sqrt{}$ (ρ p^2 + ρ s^2) = $\sqrt{}$ (71734^2 + 5746^2) = 71964 N

(h) Check of splice plates

(SM490Y)	Ags(cm^2)
1-SPL PL 1708 * 9	153.7
4-SPL PL 290 * 14	162.4
1-SPL PL 250 * 14	35.0
	197.4

10-SPL PL 185 * 18 333.0 > AgrR = 300.0cm^2

(267) D-3　J-25(Sec-25)　DECK-3

(a) Acting stress

$\sigma cmax$ = -154 N/mm^2　　0.75 σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 158 N/mm^2

τmax = 13 N/mm^2

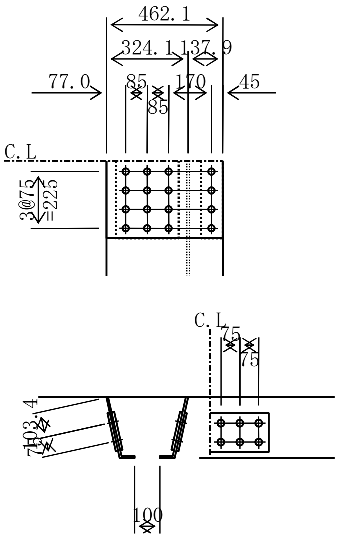
(b) Section area of main plate

1-DECK-3　PL　462 * 16　　　Ag = 73.9 cm^2　(SM490Y)

1-U.RIB 320 * 240 * 8　　　Agr = 53.9 cm^2　(SM490Y)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate　Pc = σc * Ag = 158 * 7393 = 1164366 N

・Rib　Pcr = σc * Agr = 158 * 5390 = 848925 N

(e) Required section area of the splice plates

・Mother material(One side)　AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib　　　AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate　n = Pc / (108000 * 1.00) = 1164366 / 108000 = 10.8 pcs.

・Rib　nr = Pcr / (108000 * 1.00) = 848925 / 108000 = 7.9 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 16 = 1164366 / 16 = 72773 N

ρs = τ * Ag / 16 = 13 * 7393 / 16 = 5829 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(72773^2 + 5829^2)}$ = 73006 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
1-SPL PL	462 * 9	41.6	
1-SPL PL	250 * 14	35.0	
1-SPL PL	85 * 14	11.9	
		46.9	
4-SPL PL	155 * 10	62.0	＞ AgrR = 53.9cm2

(268) D-3 J-26(Sec-26) DECK-1

(a) Acting stress

σcmax = -168 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma$c = 168 N/mm^2

τmax = 8 N/mm^2

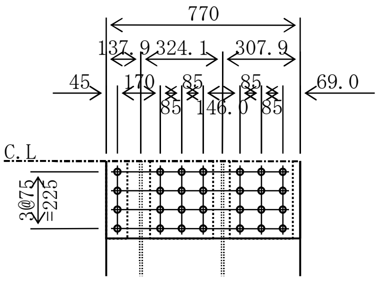
(b) Section area of main plate

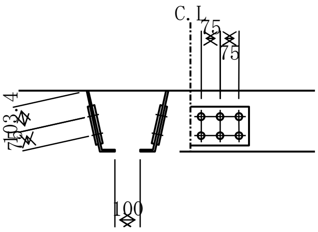
1-DECK-1 PL 770 * 16 Ag = 123.2 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 123.2 + 53.9 = 177.1 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 168 * 12320 = 2070499 N

・Rib Pcr = σc * Agr = 168 * 5390 = 905843 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 123.2 / 2 = 61.6 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2070499 / 108000 = 19.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 905843 / 108000 = 8.4 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 28 = 2070499 / 28 = 73946 N

ρs = τ * Ag / 28 = 8 * 12320 / 28 = 3634 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(73946^2 + 3634^2) = 74036 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)
1-SPL PL	770 * 9	69.3
1-SPL PL	85 * 14	11.9
2-SPL PL	250 * 14	70.0
		81.9
4-SPL PL	155 * 10	62.0 ＞ AgrR = 53.9cm2

(269) D-3　J-26(Sec-26)　DECK-2

(a) Acting stress

$\sigma cmax$ = -168 N/mm^2　　0.75 σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 168 N/mm^2

τmax = 8 N/mm^2

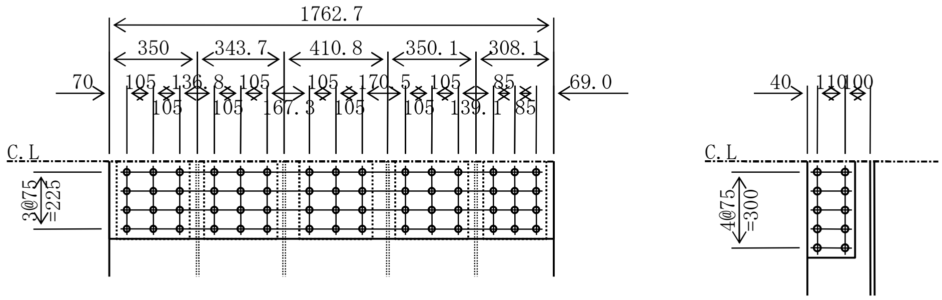
(b) Section area of main plate

1-DECK-2　PL　1763 * 16　　　Ag = 282.0 cm^2　(SM490Y)

5-RIB　　PL　250 * 24　　　Agr = 300.0 cm^2　(SM490Y)

ΣAg = Ag + Agr = 282.0 + 300.0 = 582.0 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate　Pc = σc * Ag = 168 * 28203 = 4739722 N

・Rib　Pcr = σc * Agr = 168 * 30000 = 5041800 N

(e) Required section area of the splice plates

・Mother material(One side)　AgR = Ag / 2 = 282.0 / 2 = 141.0 cm^2

・Rib　　　AgrR = Agr = 300.0 cm^2

(f) Required bolt number

・Main plate　n = Pc / (108000 * 1.00) = 4739722 / 108000 = 43.9 pcs.

・Rib　nr = Pcr / (108000 * 1.00) = 5041800 / 108000 = 46.7 pcs. (5 @ 10 = 50 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 4,5 unites)

(g) Tensile force per one bolt

ρp = Pc / 60 = 4739722 / 60 = 78995 N

ρs = τ * Ag / 60 = 8 * 28203 / 60 = 3883 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(78995^2 + 3883^2)}$ = 79091 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
1-SPL PL	1763 * 9	158.6	
4-SPL PL	290 * 14	162.4	
1-SPL PL	250 * 14	35.0	
		197.4	
10-SPL PL	190 * 18	342.0	＞ AgrR = 300.0cm^2

(270) D-3　J-26(Sec-26)　DECK-3

(a) Acting stress

$\sigma cmax$ = -168 N/mm^2　　0.75 σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 168 N/mm^2

τmax = 8 N/mm^2

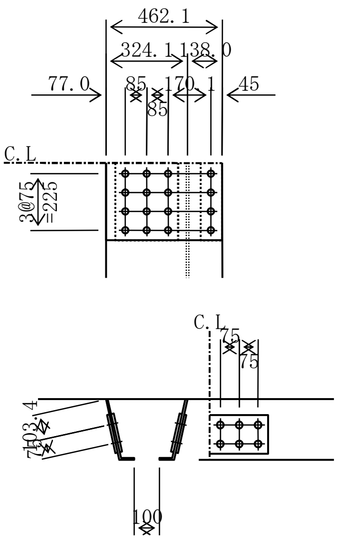
(b) Section area of main plate

1-DECK-3　PL　462 * 16　　Ag = 73.9 cm^2　(SM490Y)

1-U.RIB 320 * 240 * 8　　Agr = 53.9 cm^2　(SM490Y)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate　Pc = σc * Ag = 168 * 7394 = 1242676 N

・Rib　Pcr = σc * Agr = 168 * 5390 = 905843 N

(e) Required section area of the splice plates

・Mother material(One side)　AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib　　AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate　n = Pc / (108000 * 1.00) = 1242676 / 108000 = 11.5 pcs.

・Rib　nr = Pcr / (108000 * 1.00) = 905843 / 108000 = 8.4 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 16 = 1242676 / 16 = 77667 N

ρs = τ * Ag / 16 = 8 * 7394 / 16 = 3817 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(77667^2 + 3817^2)}$ = 77761 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
1-SPL PL	462 ＊ 9	41.6	
1-SPL PL	250 ＊ 14	35.0	
1-SPL PL	85 ＊ 14	11.9	
		46.9	
4-SPL PL	155 ＊ 10	62.0	＞ AgrR = 53.9cm2

(271) D-3 J-27(Sec-27) DECK-1

(a) Acting stress

σ cmax = -177 N/mm^2 0.75 σ ca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma$ c = 177 N/mm^2

τ max = 5 N/mm^2

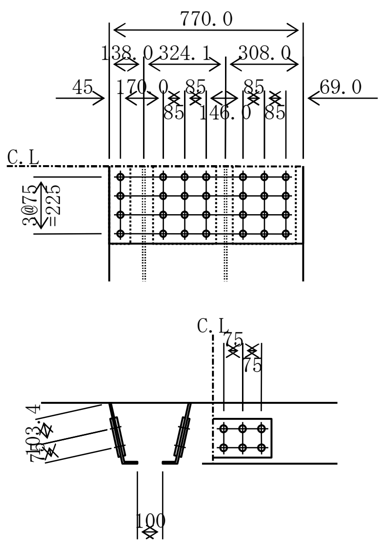
(b) Section area of main plate

1-DECK-1 PL 770 * 16 Ag = 123.2 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 123.2 + 53.9 = 177.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σ c * Ag = 177 * 12320 = 2174762 N

・Rib Pcr = σ c * Agr = 177 * 5390 = 951421 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 123.2 / 2 = 61.6 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2174762 / 108000 = 20.1 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 951421 / 108000 = 8.8 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρ p = Pc / 28 = 2174762 / 28 = 77670 N

ρ s = τ * Ag / 28 = 5 * 12320 / 28 = 2266 N

ρ = $\sqrt{}$ (ρ p^2 + ρ s^2) = $\sqrt{}$ (77670^2 + 2266^2) = 77703 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)		
1-SPL PL	770 * 9	69.3		
1-SPL PL	85 * 14	11.9		
2-SPL PL	250 * 14	70.0		
		81.9		
4-SPL PL	155 * 10	62.0	＞ AgrR =	53.9cm2

(272) D-3 J-27(Sec-27) DECK-2

(a) Acting stress

$\sigma cmax$ = -177 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma c$ = 177 N/mm^2

τmax = 5 N/mm^2

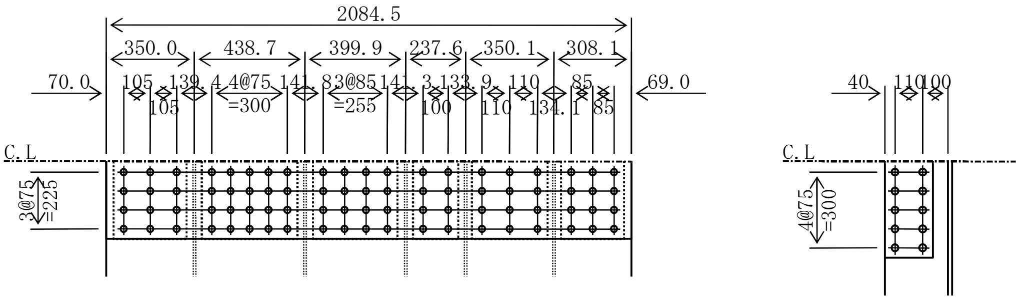
(b) Section area of main plate

1-DECK-2 PL 2085 * 16 Ag = 333.5 cm^2 (SM490Y)

6-RIB PL 250 * 24 Agr = 360.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 333.5 + 360.0 = 693.5 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 177 * 33352 = 5887246 N

・Rib Pcr = σc * Agr = 177 * 36000 = 6354576 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 333.5 / 2 = 166.8 cm^2

・Rib AgrR = Agr = 360.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5887246 / 108000 = 54.5 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 6354576 / 108000 = 58.8 pcs. (6 @ 10 = 60 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(g) Tensile force per one bolt

ρp = Pc / 80 = 5887246 / 80 = 73591 N

ρs = τ * Ag / 80 = 5 * 33352 / 80 = 2147 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(73591^2 + 2147^2)}$ = 73622 N

(h) Check of splice plates

(SM490Y)	Ags(cm^2)
1-SPL PL 2085 * 9	187.6
1-SPL PL 290 * 14	40.6
1-SPL PL 380 * 14	53.2
1-SPL PL 335 * 14	46.9
1-SPL PL 180 * 14	25.2
1-SPL PL 300 * 14	42.0
1-SPL PL 250 * 14	35.0
	242.9

12-SPL PL 190 * 18 410.4 ＞ AgrR = 360.0cm^2

(273) D-3 J-27(Sec-27) DECK-3

(a) Acting stress

$\sigma cmax$ = -177 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 177 N/mm^2

τmax = 5 N/mm^2

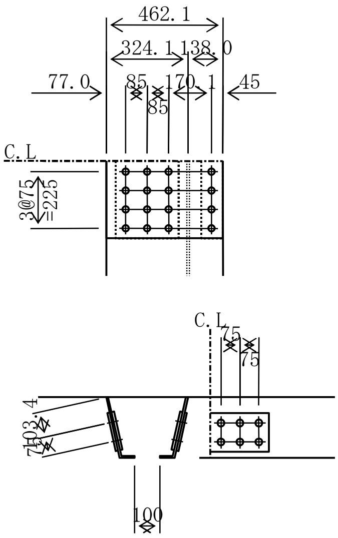
(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 177 * 7394 = 1305117 N

・Rib Pcr = σc * Agr = 177 * 5390 = 951421 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1305117 / 108000 = 12.1 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 951421 / 108000 = 8.8 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 16 = 1305117 / 16 = 81570 N

ρs = τ * Ag / 16 = 5 * 7394 / 16 = 2380 N

ρ = $\sqrt{}$ (ρp^2 + ρs^2) = $\sqrt{}$ (81570^2 + 2380^2) = 81605 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
1-SPL PL	462 * 9	41.6	
1-SPL PL	250 * 14	35.0	
1-SPL PL	85 * 14	11.9	
		46.9	
4-SPL PL	155 * 10	62.0	＞ AgrR = 53.9cm2

(274) D-3 J-28(Sec-29) DECK-1

(a) Acting stress

$\sigma cmax$ = -169 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma c$ = 169 N/mm^2

τmax = 4 N/mm^2

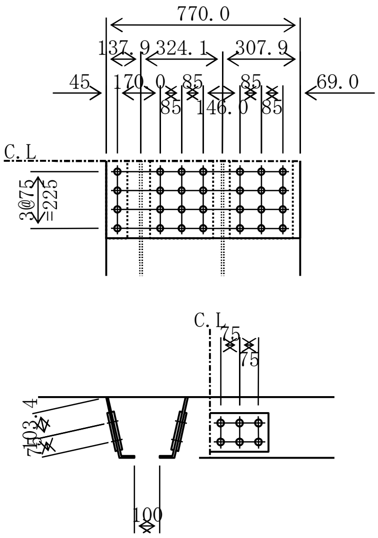
(b) Section area of main plate

1-DECK-1 PL 770 * 16 Ag = 123.2 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 123.2 + 53.9 = 177.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 169 * 12320 = 2079180 N

・Rib Pcr = σc * Agr = 169 * 5390 = 909665 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 123.2 / 2 = 61.6 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2079180 / 108000 = 19.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 909665 / 108000 = 8.4 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 28 = 2079180 / 28 = 74256 N

ρs = τ * Ag / 28 = 4 * 12320 / 28 = 1964 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(74256^2 + 1964^2)}$ = 74282 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
1-SPL PL	770 * 9	69.3	
1-SPL PL	85 * 14	11.9	
2-SPL PL	250 * 14	70.0	
		81.9	
4-SPL PL	155 * 10	62.0	＞ AgrR = 53.9cm2

(275) D-3 J-28(Sec-29) DECK-2

(a) Acting stress

$\sigma cmax$ = -169 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma c$ = 169 N/mm^2

τmax = 4 N/mm^2

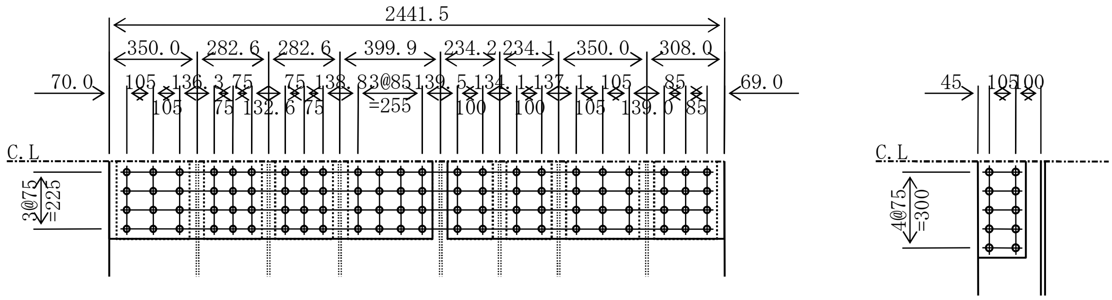
(b) Section area of main plate

1-DECK-2 PL 2442 * 16 Ag = 390.6 cm^2 (SM490Y)

8-RIB PL 250 * 24 Agr = 480.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 390.6 + 480.0 = 870.6 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 169 * 39064 = 6592873 N

・Rib Pcr = σc * Agr = 169 * 48000 = 8100912 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 390.6 / 2 = 195.3 cm^2

・Rib AgrR = Agr = 480.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 6592873 / 108000 = 61.0 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 8100912 / 108000 = 75.0 pcs. (8 @ 10 = 80 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(g) Tensile force per one bolt

ρp = Pc / 92 = 6592873 / 92 = 71662 N

ρs = τ * Ag / 92 = 4 * 39064 / 92 = 1895 N

ρ = $\sqrt{}$ (ρp^2 + ρs^2) = $\sqrt{}$ (71662^2 + 1895^2) = 71687 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)
1-SPL	PL 1283 * 9	115.4
1-SPL	PL 1099 * 9	98.9
		214.4
2-SPL	PL 290 * 14	81.2
2-SPL	PL 230 * 14	64.4
1-SPL	PL 335 * 14	46.9
2-SPL	PL 180 * 14	50.4
1-SPL	PL 250 * 14	35.0
		277.9
16-SPL	PL 185 * 18	532.8 ＞ AgrR = 480.0cm^2

(276) D-3 J-28(Sec-29) DECK-3

(a) Acting stress

σ cmax = -169 N/mm^2 0.75 σ ca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma$ c = 169 N/mm^2

τ max = 4 N/mm^2

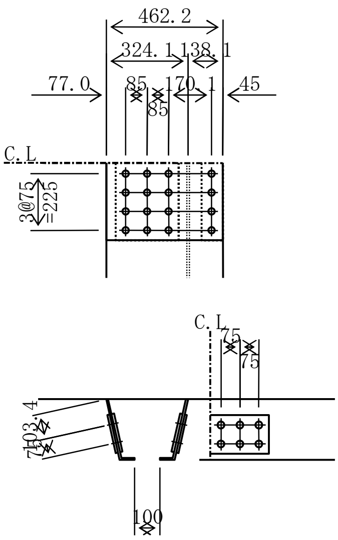
(b) Section area of main plate

1-DECK-3 PL 462 * 16   Ag = 73.9 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σ c * Ag = 169 * 7395 = 1247999 N

・Rib Pcr = σ c * Agr = 169 * 5390 = 909665 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib   AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1247999 / 108000 = 11.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 909665 / 108000 = 8.4 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρ p = Pc / 16 = 1247999 / 16 = 78000 N

ρ s = τ * Ag / 16 = 4 * 7395 / 16 = 2063 N

ρ = $\sqrt{}$ (ρ p^2 + ρ s^2) = $\sqrt{}$ (78000^2 + 2063^2) = 78027 N

(h) Check of splice plates

	(SM490Y)	$A_{gs}(cm^2)$		
1-SPL PL	462 ＊ 9	41.6		
1-SPL PL	250 ＊ 14	35.0		
1-SPL PL	85 ＊ 14	11.9		
		46.9		
4-SPL PL	155 ＊ 10	62.0	＞ AgrR =	53.9cm2

(277) D-3 J-29(Sec-30) DECK-1

(a) Acting stress

$\sigma cmax$ = -160 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 160 N/mm^2

τmax = 8 N/mm^2

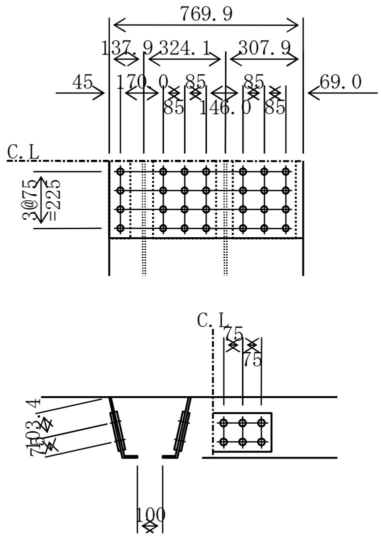
(b) Section area of main plate

1-DECK-1 PL 770 * 16 Ag = 123.2 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 123.2 + 53.9 = 177.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 160 * 12319 = 1968717 N

・Rib Pcr = σc * Agr = 160 * 5390 = 861392 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 123.2 / 2 = 61.6 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1968717 / 108000 = 18.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 861392 / 108000 = 8.0 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 28 = 1968717 / 28 = 70311 N

ρs = τ * Ag / 28 = 8 * 12319 / 28 = 3702 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(70311^2 + 3702^2)}$ = 70409 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
1-SPL PL	770 * 9	69.3	
1-SPL PL	85 * 14	11.9	
2-SPL PL	250 * 14	70.0	
		81.9	
4-SPL PL	155 * 10	62.0	＞ AgrR = 53.9cm2

(278) D-3 J-29(Sec-30) DECK-2

(a) Acting stress

$\sigma cmax$ = -160 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma c$ = 160 N/mm^2

τmax = 8 N/mm^2

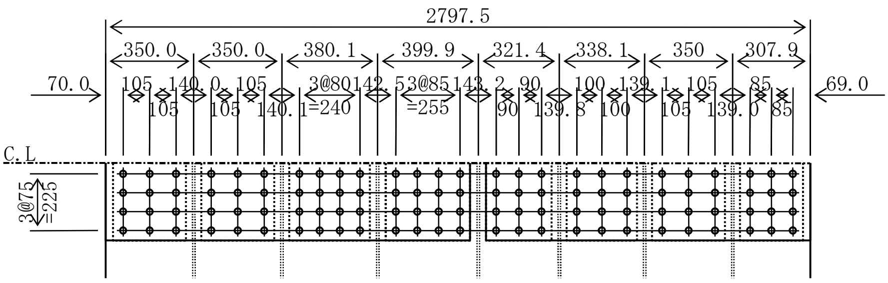
(b) Section area of main plate

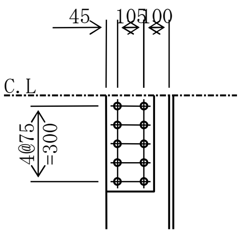
1-DECK-2 PL 2797 * 16 Ag = 447.6 cm^2 (SM490Y)

8-RIB PL 250 * 24 Agr = 480.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 447.6 + 480.0 = 927.6 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 160 * 44760 = 7153204 N

・Rib Pcr = σc * Agr = 160 * 48000 = 7671024 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 447.6 / 2 = 223.8 cm^2

・Rib AgrR = Agr = 480.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 7153204 / 108000 = 66.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 7671024 / 108000 = 71.0 pcs. (8 @ 10 = 80 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(g) Tensile force per one bolt

ρp = Pc / 104 = 7153204 / 104 = 68781 N

ρs = τ * Ag / 104 = 8 * 44760 / 104 = 3622 N

ρ = $\sqrt{}$ (ρp^2 + ρs^2) = $\sqrt{}$ (68781^2 + 3622^2) = 68876 N

(h) Check of splice plates

(SM490Y)	$Ags(cm^2)$	
1-SPL PL 1448 * 9	130.3	
1-SPL PL 1287 * 9	115.8	
	246.1	
3-SPL PL 290 * 14	121.8	
1-SPL PL 320 * 14	44.8	
1-SPL PL 335 * 14	46.9	
1-SPL PL 260 * 14	36.4	
1-SPL PL 280 * 14	39.2	
1-SPL PL 250 * 14	35.0	
	324.1	
16-SPL PL 185 * 18	532.8	＞ AgrR = 480.0cm^2

(279) D-3 J-29(Sec-30) DECK-3

(a) Acting stress

$\sigma cmax$ = -160 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 160 N/mm^2

τmax = 8 N/mm^2

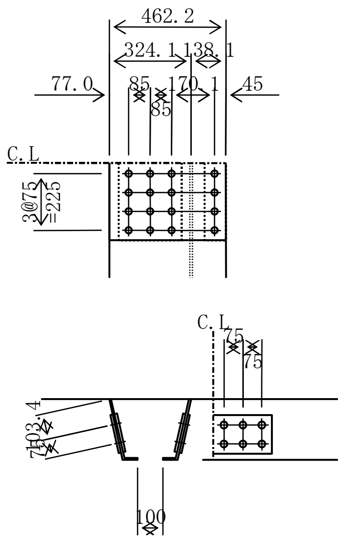
(b) Section area of main plate

1-DECK-3 PL 462 * 16   Ag = 74.0 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 74.0 + 53.9 = 127.9 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 160 * 7395 = 1181824 N

・Rib Pcr = σc * Agr = 160 * 5390 = 861392 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 74.0 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1181824 / 108000 = 10.9 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 861392 / 108000 = 8.0 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 16 = 1181824 / 16 = 73864 N

ρs = τ * Ag / 16 = 8 * 7395 / 16 = 3889 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(73864^2 + 3889^2)}$ = 73966 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
1-SPL PL	462 ＊ 9	41.6	
1-SPL PL	250 ＊ 14	35.0	
1-SPL PL	85 ＊ 14	11.9	
		46.9	
4-SPL PL	155 ＊ 10	62.0	＞ AgrR = 53.9cm2

(280) D-3　J-30(Sec-31)　DECK-1

(a) Acting stress

σcmax = -141 N/mm^2　　0.75σca = 0.75 * 210 = 158 N/mm^2

∴σc = 158 N/mm^2

τmax = 16 N/mm^2

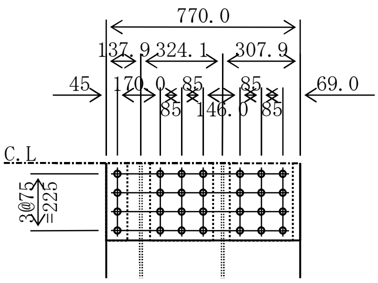
(b) Section area of main plate

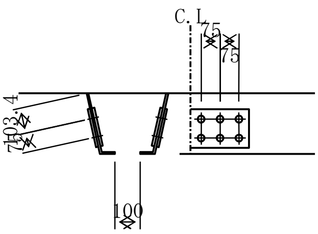
1-DECK-1　PL　770 * 16　　　Ag = 123.2 cm^2　(SM490Y)

1-U.RIB 320 * 240 * 8　　　Agr = 53.9 cm^2　(SM490Y)

ΣAg = Ag + Agr = 123.2 + 53.9 = 177.1 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate　Pc = σc * Ag = 158 * 12320 = 1940375 N

・Rib　Pcr = σc * Agr = 158 * 5390 = 848925 N

(e) Required section area of the splice plates

・Mother material(One side)　AgR = Ag / 2 = 123.2 / 2 = 61.6 cm^2

・Rib　　AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate　n = Pc / (108000 * 1.00) = 1940375 / 108000 = 18.0 pcs.

・Rib　nr = Pcr / (108000 * 1.00) = 848925 / 108000 = 7.9 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 28 = 1940375 / 28 = 69299 N

ρs = τ * Ag / 28 = 16 * 12320 / 28 = 7023 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(69299^2 + 7023^2) = 69654 N

(h) Check of splice plates

	(SM490Y)	$Ags(cm^2)$		
1-SPL PL	770 * 9	69.3		
1-SPL PL	85 * 14	11.9		
2-SPL PL	250 * 14	70.0		
		81.9		
4-SPL PL	155 * 10	62.0	> AgrR =	53.9cm2

(281) D-3 J-30(Sec-31) DECK-2

(a) Acting stress

$\sigma cmax$ = -141 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 158 N/mm^2

τmax = 16 N/mm^2

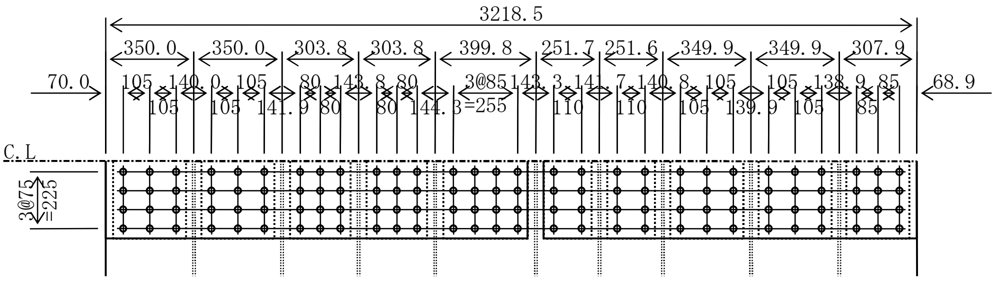
(b) Section area of main plate

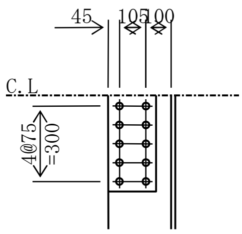
1-DECK-2 PL 3218 * 16 Ag = 515.0 cm^2 (SM490Y)

10-RIB PL 250 * 24 Agr = 600.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 515.0 + 600.0 = 1115.0 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 51496 = 8110570 N

・Rib Pcr = σc * Agr = 158 * 60000 = 9450000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 515.0 / 2 = 257.5 cm^2

・Rib AgrR = Agr = 600.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 8110570 / 108000 = 75.1 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 9450000 / 108000 = 87.5 pcs. (10 @ 10 = 100 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(g) Tensile force per one bolt

ρp = Pc / 116 = 8110570 / 116 = 69919 N

ρs = τ * Ag / 116 = 16 * 51496 / 116 = 7086 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(69919^2 + 7086^2)}$ = 70277 N

(h) Check of splice plates

(SM490Y)	Ags(cm^2)
1-SPL PL 1675 * 9	150.7
1-SPL PL 1480 * 9	133.2
	284.0
4-SPL PL 290 * 14	162.4
2-SPL PL 240 * 14	67.2
1-SPL PL 335 * 14	46.9
2-SPL PL 190 * 14	53.2
1-SPL PL 250 * 14	35.0
	364.7
20-SPL PL 185 * 18	666.0 ＞ AgrR = 600.0cm^2

(282) D-3 J-30(Sec-31) DECK-3

(a) Acting stress

$\sigma cmax$ = -141 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma c$ = 158 N/mm^2

τmax = 16 N/mm^2

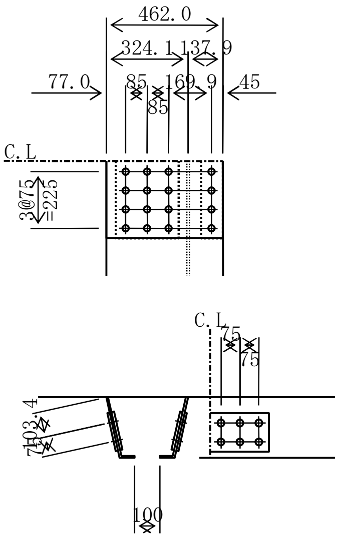
(b) Section area of main plate

1-DECK-3 PL 462 * 16   Ag = 73.9 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 7392 = 1164215 N

・Rib Pcr = σc * Agr = 158 * 5390 = 848925 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1164215 / 108000 = 10.8 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 848925 / 108000 = 7.9 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 16 = 1164215 / 16 = 72763 N

ρs = τ * Ag / 16 = 16 * 7392 / 16 = 7374 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(72763^2 + 7374^2)}$ = 73136 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)		
1-SPL PL	462 ＊ 9	41.6		
1-SPL PL	250 ＊ 14	35.0		
1-SPL PL	85 ＊ 14	11.9		
		46.9		
4-SPL PL	155 ＊ 10	62.0	＞ AgrR =	53.9cm2

(283) D-3　J-31(Sec-32)　DECK-1

(a) Acting stress

σ cmax = -117 N/mm^2　　0.75 σ ca = 0.75 ＊ 140 = 105 N/mm^2

∴ σ c = 117 N/mm^2

τ max = 26 N/mm^2

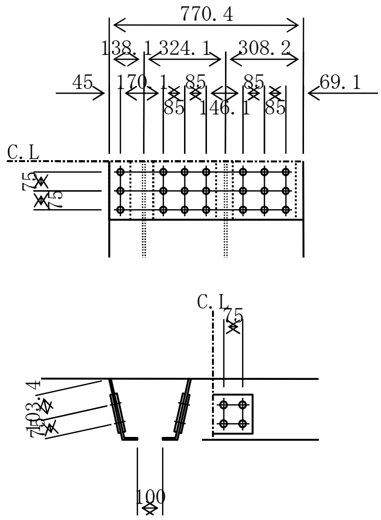
(b) Section area of main plate

1-DECK-1　PL　770 ＊ 16　　　Ag = 123.3 cm^2　(SM400)

1-U.RIB 320 ＊ 240 ＊ 8　　　Agr = 53.9 cm^2　(SM400)

ΣAg = Ag + Agr = 123.3 + 53.9 = 177.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate　Pc = σ c ＊ Ag = 117 ＊ 12326 = 1440302 N

・Rib　Pcr = σ c ＊ Agr = 117 ＊ 5390 = 629838 N

(e) Required section area of the splice plates

・Mother material(One side)　AgR = Ag / 2 = 123.3 / 2 = 61.6 cm^2

・Rib　　　AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate　n = Pc / (108000 ＊ 1.00) = 1440302 / 108000 = 13.3 pcs.

・Rib　nr = Pcr / (108000 ＊ 1.00) = 629838 / 108000 = 5.8 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.)　Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρ p = Pc / 21 = 1440302 / 21 = 68586 N

ρ s = τ ＊ Ag / 21 = 26 ＊ 12326 / 21 = 15132 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(68586^2 + 15132^2)}$ = 70235 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	770 ＊ 9	69.3	
1-SPL PL	85 ＊ 14	11.9	
2-SPL PL	250 ＊ 14	70.0	
		81.9	
4-SPL PL	155 ＊ 10	62.0	＞ AgrR = 53.9cm2

(284) D-3　J-31(Sec-32)　DECK-2

(a) Acting stress

$\sigma cmax$ = -117 N/mm^2　　0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 117 N/mm^2

τmax = 26 N/mm^2

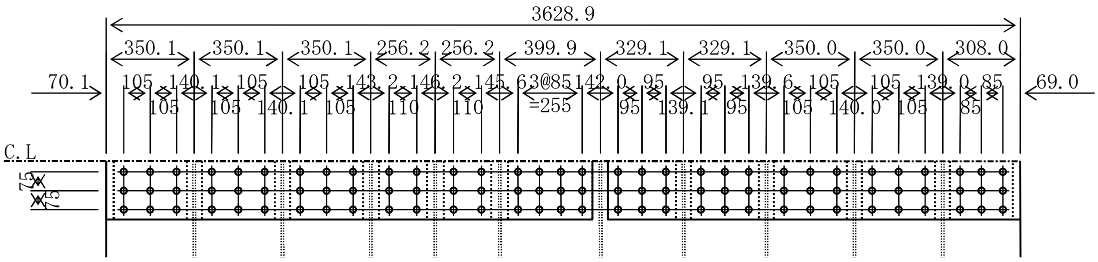
(b) Section area of main plate

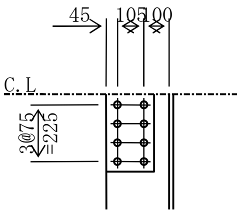
1-DECK-2　PL　3629 * 16　　　Ag = 580.6 cm^2　(SM400)

11-RIB　PL　250 * 24　　　Agr = 660.0 cm^2　(SM400)

ΣAg = Ag + Agr = 580.6 + 660.0 = 1240.6 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate　Pc = σc * Ag = 117 * 58063 = 6784840 N

・Rib　Pcr = σc * Agr = 117 * 66000 = 7712298 N

(e) Required section area of the splice plates

・Mother material(One side)　AgR = Ag / 2 = 580.6 / 2 = 290.3 cm^2

・Rib　　AgrR = Agr = 660.0 cm^2

(f) Required bolt number

・Main plate　n = Pc / (108000 * 1.00) = 6784840 / 108000 = 62.8 pcs.

・Rib　nr = Pcr / (108000 * 1.00) = 7712298 / 108000 = 71.4 pcs. (11 @ 8 = 88 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 96 = 6784840 / 96 = 70675 N

ρs = τ * Ag / 96 = 26 * 58063 / 96 = 15593 N

ρ = $\sqrt{}(\rho p^2 + \rho s^2)$ = $\sqrt{}$(70675^2 + 15593^2) = 72375 N

(h) Check of splice plates

(SS400)	Ags(cm^2)
1-SPL PL 1930 * 9	173.7
1-SPL PL 1637 * 9	147.3
	321.0
5-SPL PL 290 * 14	203.0
2-SPL PL 190 * 14	53.2
1-SPL PL 335 * 14	46.9
2-SPL PL 270 * 14	75.6
1-SPL PL 250 * 14	35.0
	413.7
22-SPL PL 185 * 18	732.6 > AgrR = 660.0cm^2

(285) D-3 J-31(Sec-32) DECK-3

(a) Acting stress

σcmax = -117 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma$c = 117 N/mm^2

τmax = 26 N/mm^2

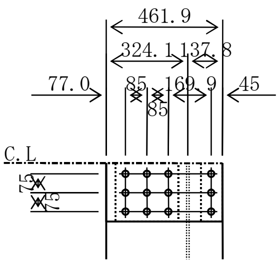
(b) Section area of main plate

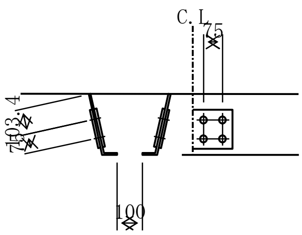
1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 117 * 7391 = 863609 N

・Rib Pcr = σc * Agr = 117 * 5390 = 629838 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 863609 / 108000 = 8.0 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 629838 / 108000 = 5.8 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 12 = 863609 / 12 = 71967 N

ρs = τ * Ag / 12 = 26 * 7391 / 12 = 15878 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(71967^2 + 15878^2) = 73698 N

(h) Check of splice plates

	(SS400)	Ags(cm²)
1-SPL PL	462 * 9	41.6
1-SPL PL	250 * 14	35.0
1-SPL PL	85 * 14	11.9
		46.9
4-SPL PL	155 * 10	62.0 ＞ AgrR = 53.9cm2

(286) D-3 J-32(Sec-33) DECK-1

(a) Acting stress

$\sigma cmax$ = -82 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 34 N/mm^2

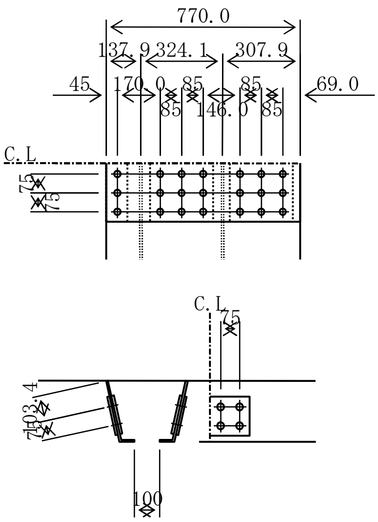
(b) Section area of main plate

1-DECK-1 PL 770 * 16 Ag = 123.2 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 123.2 + 53.9 = 177.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 12320 = 1293566 N

・Rib Pcr = σc * Agr = 105 * 5390 = 565950 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 123.2 / 2 = 61.6 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1293566 / 108000 = 12.0 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 21 = 1293566 / 21 = 61598 N

ρs = τ * Ag / 21 = 34 * 12320 / 21 = 20111 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(61598^2 + 20111^2)}$ = 64798 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
1-SPL PL	770 * 9	69.3
1-SPL PL	85 * 14	11.9
2-SPL PL	250 * 14	70.0
		81.9
4-SPL PL	155 * 10	62.0 ＞ AgrR = 53.9cm2

(287) D-3　J-32(Sec-33)　DECK-2

(a) Acting stress

σ cmax = -82 N/mm^2　　0.75 σ ca = 0.75 * 140 = 105 N/mm^2

∴ σ c = 105 N/mm^2

τ max = 34 N/mm^2

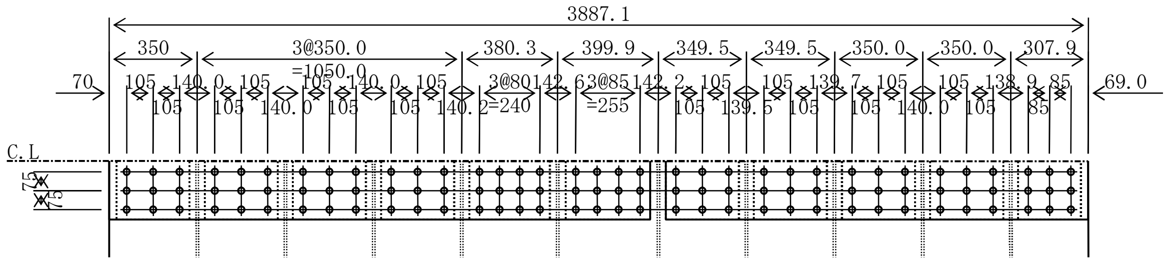
(b) Section area of main plate

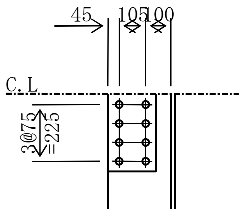
1-DECK-2　PL　3887 * 16　　　Ag = 621.9 cm^2　(SM400)

11-RIB　　PL　250 * 24　　　Agr = 660.0 cm^2　(SM400)

ΣAg = Ag + Agr = 621.9 + 660.0 = 1281.9 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate　Pc = σ c * Ag = 105 * 62193 = 6530311 N

・Rib　Pcr = σ c * Agr = 105 * 66000 = 6930000 N

(e) Required section area of the splice plates

・Mother material(One side)　AgR = Ag / 2 = 621.9 / 2 = 311.0 cm^2

・Rib　　　AgrR = Agr = 660.0 cm^2

(f) Required bolt number

・Main plate　n = Pc / (108000 * 1.00) = 6530311 / 108000 = 60.5 pcs.

・Rib　nr = Pcr / (108000 * 1.00) = 6930000 / 108000 = 64.2 pcs. (11 @ 8 = 88 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.)　Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρ p = Pc / 105 = 6530311 / 105 = 62193 N

ρ s = τ * Ag / 105 = 34 * 62193 / 105 = 20305 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(62193^2 + 20305^2)}$ = 65424 N

(h) Check of splice plates

(SS400)	A_{gs} (cm^2)	
1-SPL PL 2148 * 9	193.3	
1-SPL PL 1677 * 9	150.9	
	344.2	
8-SPL PL 290 * 14	324.8	
1-SPL PL 320 * 14	44.8	
1-SPL PL 335 * 14	46.9	
1-SPL PL 250 * 14	35.0	
	451.5	
22-SPL PL 185 * 18	732.6	＞ AgrR = 660.0cm^2

(288) D-3 J-32(Sec-33) DECK-3

(a) Acting stress

$\sigma cmax$ = -82 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 34 N/mm^2

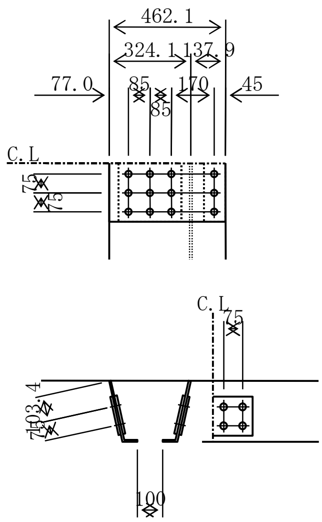
(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 7393 = 776244 N

・Rib Pcr = σc * Agr = 105 * 5390 = 565950 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 776244 / 108000 = 7.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 12 = 776244 / 12 = 64687 N

ρs = τ * Ag / 12 = 34 * 7393 / 12 = 21119 N

ρ = $\sqrt{}(\rho p^2 + \rho s^2)$ = $\sqrt{}($ 64687^2 + 21119^2) = 68047 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)		
1-SPL PL	462 * 9	41.6		
1-SPL PL	250 * 14	35.0		
1-SPL PL	85 * 14	11.9		
		46.9		
4-SPL PL	155 * 10	62.0	＞ AgrR =	53.9cm2

(289) G3 J-1(Sec-1) DECK

(a) Acting stress

$\sigma cmax$ = -74 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 23 N/mm^2

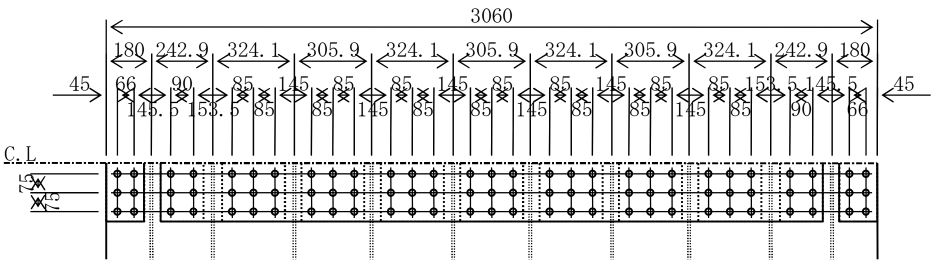
(b) Section area of main plate

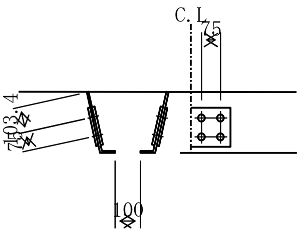
1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM400)

4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM400)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 48960 = 5140800 N

・Rib Pcr = σc * Agr = 105 * 21560 = 2263800 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AgrR = Agr = 215.6 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5140800 / 108000 = 47.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2263800 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 87 = 5140800 / 87 = 59090 N

ρs = τ * Ag / 87 = 23 * 48960 / 87 = 12811 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(59090^2 + 12811^2) = 60462 N

(h) Check of splice plates

	(SS400)	A_{gs} (cm^2)
2-SPL	PL 151 * 9	27.2
1-SPL	PL 2627 * 9	236.4
		263.6
2-SPL	PL 151 * 14	42.3
2-SPL	PL 170 * 14	47.6
7-SPL	PL 250 * 14	245.0
		334.9
16-SPL	PL 155 * 10	248.0 ＞ AgrR = 215.6cm^2

(290) G3 J-2(Sec-2) DECK

(a) Acting stress

$\sigma cmax$ = -95 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 17 N/mm^2

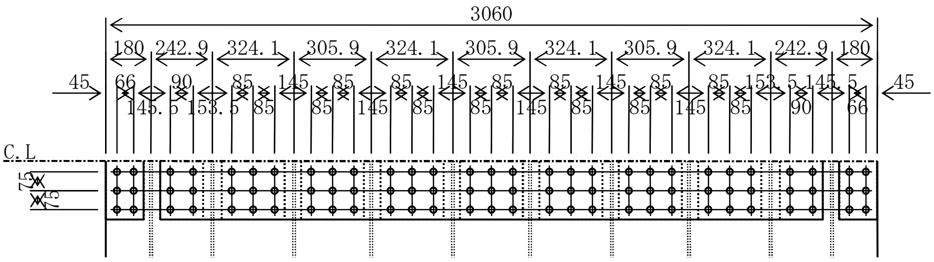
(b) Section area of main plate

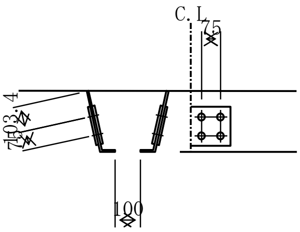
1-DECK PL 3060 * 16   Ag = 489.6 cm^2 (SM400)

4-U.RIB 320 * 240 * 8   Agr = 215.6 cm^2 (SM400)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 48960 = 5140800 N

・Rib Pcr = σc * Agr = 105 * 21560 = 2263800 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AgrR = Agr = 215.6 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5140800 / 108000 = 47.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2263800 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 87 = 5140800 / 87 = 59090 N

ρs = τ * Ag / 87 = 17 * 48960 / 87 = 9754 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(59090^2 + 9754^2)}$ = 59889 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
2-SPL PL	151 * 9	27.2
1-SPL PL	2627 * 9	236.4
		263.6
2-SPL PL	151 * 14	42.3
2-SPL PL	170 * 14	47.6
7-SPL PL	250 * 14	245.0
		334.9
16-SPL PL	155 * 10	248.0 ＞ AgrR = 215.6cm^2

(291) G3 J-3(Sec-3) DECK

(a) Acting stress

$\sigma cmax$ = -105 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 10 N/mm^2

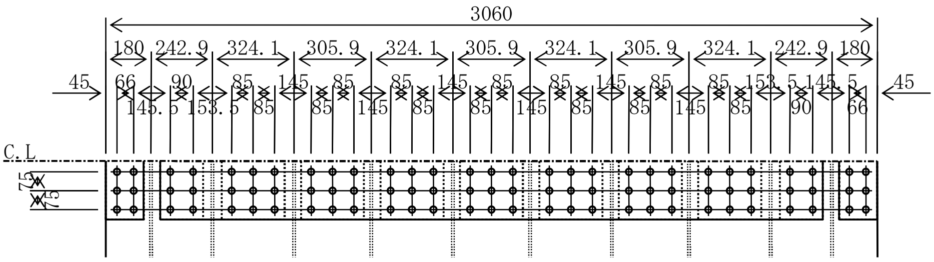
(b) Section area of main plate

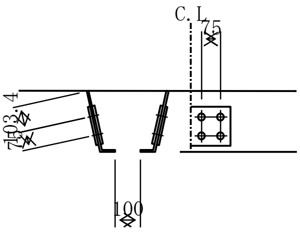
1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM400)

4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM400)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 48960 = 5141926 N

・Rib Pcr = σc * Agr = 105 * 21560 = 2264296 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AgrR = Agr = 215.6 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5141926 / 108000 = 47.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2264296 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 87 = 5141926 / 87 = 59103 N

ρs = τ * Ag / 87 = 10 * 48960 / 87 = 5868 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(59103^2 + 5868^2) = 59393 N

(h) Check of splice plates

	(SS400)	$Ags(cm^2)$
2-SPL PL	151 * 9	27.2
1-SPL PL	2627 * 9	236.4
		263.6
2-SPL PL	151 * 14	42.3
2-SPL PL	170 * 14	47.6
7-SPL PL	250 * 14	245.0
		334.9
16-SPL PL	155 * 10	248.0 ＞ AgrR = 215.6cm^2

(292) G3　J-4(Sec-5)　DECK

(a) Acting stress

$\sigma cmax$ = -108 N/mm^2　　$0.75\sigma ca$ = 0.75 * 140 = 105 N/mm^2

∴ σc = 108 N/mm^2

τmax = 5 N/mm^2

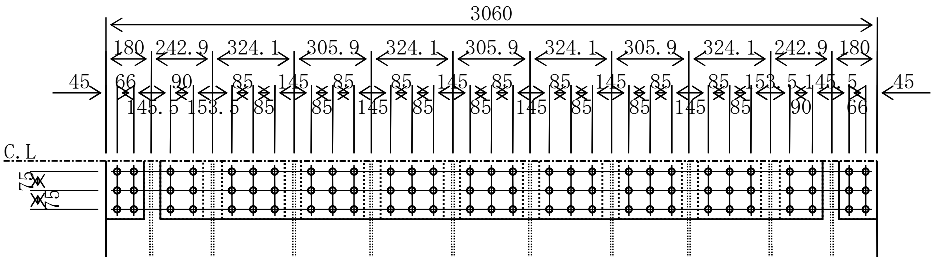
(b) Section area of main plate

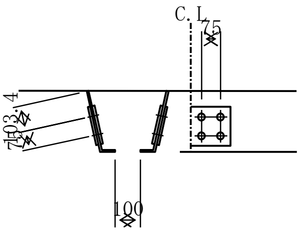
1-DECK　PL　3060 * 16　　　Ag = 489.6 cm^2　(SM400)

4-U.RIB 320 * 240 * 8　　　Agr = 215.6 cm^2　(SM400)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate　Pc = σc * Ag = 108 * 48960 = 5302662 N

・Rib　Pcr = σc * Agr = 108 * 21560 = 2335077 N

(e) Required section area of the splice plates

・Mother material(One side)　AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib　　AgrR = Agr = 215.6 cm^2

(f) Required bolt number

・Main plate　n = Pc / (108000 * 1.00) = 5302662 / 108000 = 49.1 pcs.

・Rib　nr = Pcr / (108000 * 1.00) = 2335077 / 108000 = 21.6 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 87 = 5302662 / 87 = 60950 N

ρs = τ * Ag / 87 = 5 * 48960 / 87 = 2783 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(60950^2 + 2783^2)}$ = 61014 N

(h) Check of splice plates

	(SS400)	Ags(cm²)
2-SPL PL	151 * 9	27.2
1-SPL PL	2627 * 9	236.4
		263.6
2-SPL PL	151 * 14	42.3
2-SPL PL	170 * 14	47.6
7-SPL PL	250 * 14	245.0
		334.9
16-SPL PL	155 * 10	248.0

16-SPL PL 155 * 10 248.0 ＞ AgrR = 215.6cm^2

(293) G3 J-5(Sec-6) DECK

(a) Acting stress

$\sigma cmax$ = -105 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 10 N/mm^2

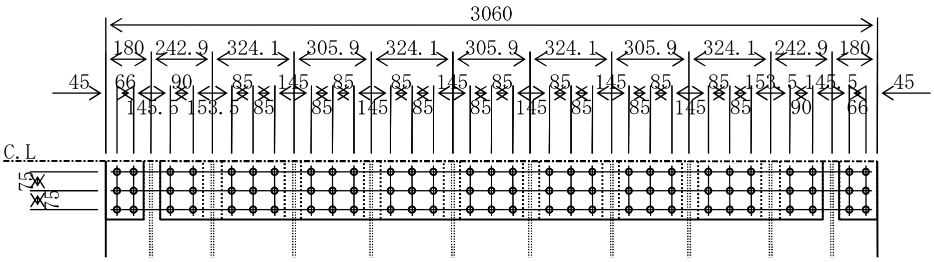
(b) Section area of main plate

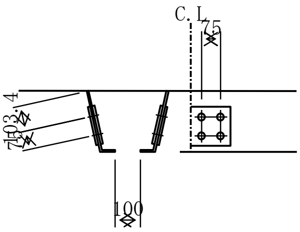
1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM400)

4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM400)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 48960 = 5150935 N

・Rib Pcr = σc * Agr = 105 * 21560 = 2268263 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AgrR = Agr = 215.6 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5150935 / 108000 = 47.7 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2268263 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 87 = 5150935 / 87 = 59206 N

ρs = τ * Ag / 87 = 10 * 48960 / 87 = 5539 N

ρ = $\sqrt{}(\rho p^2 + \rho s^2)$ = $\sqrt{}($ 59206^2 + 5539^2) = 59465 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
2-SPL PL	151 * 9	27.2
1-SPL PL	2627 * 9	236.4
		263.6
2-SPL PL	151 * 14	42.3
2-SPL PL	170 * 14	47.6
7-SPL PL	250 * 14	245.0
		334.9
16-SPL PL	155 * 10	248.0

$248.0 > AgrR = 215.6cm^2$

(294) G3 J-6(Sec-7) DECK

(a) Acting stress

$\sigma cmax$ = -96 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 15 N/mm^2

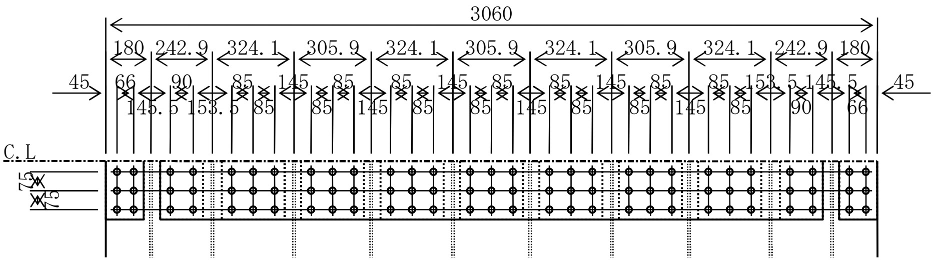
(b) Section area of main plate

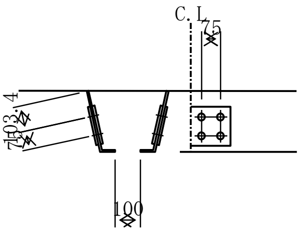
1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM400)

4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM400)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 48960 = 5140800 N

・Rib Pcr = σc * Agr = 105 * 21560 = 2263800 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AgrR = Agr = 215.6 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5140800 / 108000 = 47.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2263800 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 87 = 5140800 / 87 = 59090 N

ρs = τ * Ag / 87 = 15 * 48960 / 87 = 8653 N

ρ = $\sqrt{}(\rho p^2 + \rho s^2)$ = $\sqrt{}$(59090^2 + 8653^2) = 59720 N

(h) Check of splice plates

	(SS400)	$Ags(cm^2)$	
2-SPL PL	151 * 9	27.2	
1-SPL PL	2627 * 9	236.4	
		263.6	
2-SPL PL	151 * 14	42.3	
2-SPL PL	170 * 14	47.6	
7-SPL PL	250 * 14	245.0	
		334.9	
16-SPL PL	155 * 10	248.0	> AgrR = $215.6cm^2$

(295) G3 J-7(Sec-8) DECK

(a) Acting stress

$\sigma cmax$ = -74 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 20 N/mm^2

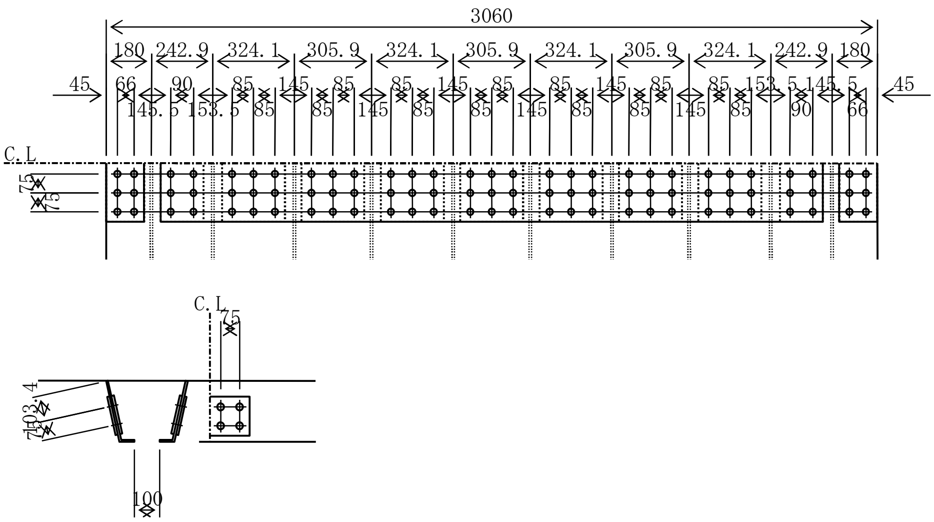
(b) Section area of main plate

1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM400)

4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM400)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 48960 = 5140800 N

・Rib Pcr = σc * Agr = 105 * 21560 = 2263800 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AgrR = Agr = 215.6 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5140800 / 108000 = 47.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2263800 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 87 = 5140800 / 87 = 59090 N

ρs = τ * Ag / 87 = 20 * 48960 / 87 = 11083 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(59090^2 + 11083^2)}$ = 60120 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
2-SPL PL	151 * 9	27.2	
1-SPL PL	2627 * 9	236.4	
		263.6	
2-SPL PL	151 * 14	42.3	
2-SPL PL	170 * 14	47.6	
7-SPL PL	250 * 14	245.0	
		334.9	
16-SPL PL	155 * 10	248.0	＞ AgrR = 215.6cm^2

(296) G3 J-8(Sec-8) DECK

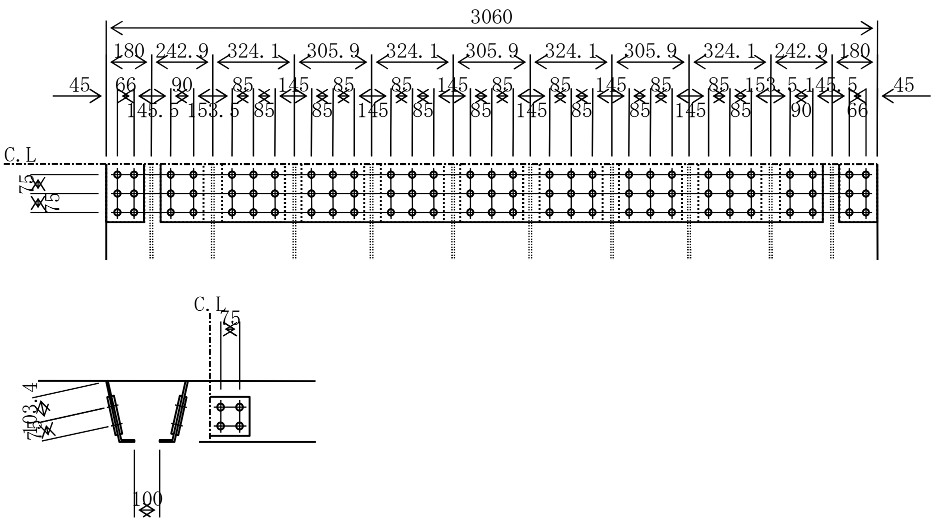
(a) Acting stress

σ_{tmax} = 26 N/mm^2 0.75σ_{ta} = 0.75 * 140 = 105 N/mm^2
σ_{cmax} = -64 N/mm^2 0.75σ_{ca} = 0.75 * 140 = 105 N/mm^2
∴ σ_c = 105 N/mm^2
τ_{max} = 24 N/mm^2

(b) Section area of main plate

1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM400)
4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM400)
ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 3060 * 16 A = 489.6
(489.6 - (29* 2.5)* 1.6) * 1.1 = 411.0 < 489.6 ∴An = 411.0 cm^2
4-U.RIB 320 * 240 * 8 Ar = 215.6
(215.6 - 4*(4* 2.7)* 0.8- 4*(10.0*0.8)) * 1.1 = 163.9
< 215.6 ∴Anr = 163.9 cm^2
ΣAn = An + Anr = 411.0 + 163.9 = 574.9 cm^2
σ_{tn} = σ_{tmax} * ΣAg / ΣAn = 26 * 705.2 / 574.9 = 32 N/mm^2
< σ_{ta} = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σ_{ta} * An / 1.1 = 105 * 41096 / 1.1 = 3922800 N
> σ_{tn} * An = 32 * 41096 = 1334151 N
Pc = σ_c * Ag = 105 * 48960 = 5140800 N
・Rib Ptr = 0.75σ_{ta} * Anr / 1.1 = 105 * 16394 / 1.1 = 1564920 N
> σ_{tn} * Anr = 32 * 16394 = 532232 N
Pcr = σ_c * Agr = 105 * 21560 = 2263800 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 411.0 / 2 = 205.5 cm^2
AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2
・Rib AnrR = Anr = 163.9 cm^2
AgrR = Agr = 215.6 cm^2

(g) Required bolt number

・Main plate $n = Pc / (108000 * 1.00) = 5140800 / 108000 = 47.6$ pcs.

・Rib $nr = Pcr / (108000 * 1.00) = 2263800 / 108000 = 21.0$ pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 87 = 5140800 / 87 = 59090$ N

$\rho s = \tau * Ag / 87 = 24 * 48960 / 87 = 13745$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(59090^2 + 13745^2)} = 60667$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes	Ans(cm^2)
2-SPL PL	151 * 9	(27.2 −	2*(2*2.5)* 0.9)*1.1= 20.0< 27.2	∴ 20.0
1-SPL PL	2627 * 9	(236.4 −	(25*2.5)* 0.9)*1.1= 198.2< 236.4	∴198.2
		263.6		218.2
2-SPL PL	151 * 14	(42.3 −	2*(2*2.5)* 1.4)*1.1= 31.1< 42.3	∴ 31.1
2-SPL PL	170 * 14	(47.6 −	2*(2*2.5)* 1.4)*1.1= 37.0< 47.6	∴ 37.0
7-SPL PL	250 * 14	(245.0 −	7*(3*2.5)* 1.4)*1.1= 188.7< 245.0	∴188.7
		334.9		256.7
16-SPL PL	155 * 10	(248.0 −	16*(2*2.7)* 1.0)*1.1= 177.8< 248.0	∴177.8
		> AgrR		>AnrR

(297) G3 J-9(Sec-9) DECK

(a) Acting stress

σ tmax = 73 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2

σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2

∴ σ c = 105 N/mm^2

τ max = 28 N/mm^2

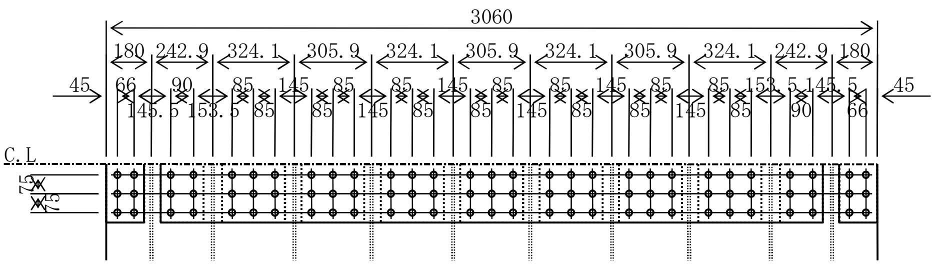
(b) Section area of main plate

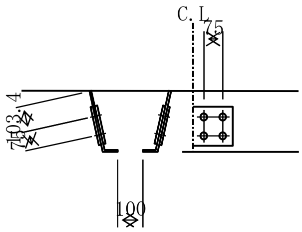
1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM400)

4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM400)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3060 * 16 A = 489.6

(489.6 - (29* 2.5)* 1.6) * 1.1 = 411.0 < 489.6 ∴An = 411.0 cm^2

4-U.RIB 320 * 240 * 8 Ar = 215.6

(215.6 - 4*(4* 2.7)* 0.8- 4*(10.0*0.8)) * 1.1 = 163.9

< 215.6 ∴Anr = 163.9 cm^2

ΣAn = An + Anr = 411.0 + 163.9 = 574.9 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 73 * 705.2 / 574.9 = 90 N/mm^2

< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 41096 / 1.1 = 3922800 N

> σ tn * An = 90 * 41096 = 3701605 N

Pc = σ c * Ag = 105 * 48960 = 5140800 N

・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 16394 / 1.1 = 1564920 N

> σ tn * Anr = 90 * 16394 = 1476679 N

Pcr = σ c * Agr = 105 * 21560 = 2263800 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 411.0 / 2 = 205.5 cm^2

AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AnrR = Anr = 163.9 cm^2

AgrR = Agr = 215.6 cm^2

(g) Required bolt number

・Main plate　n　= Pc　/ (108000 * 1.00) =　5140800 / 108000 = 47.6 pcs.

・Rib　nr = Pcr / (108000 * 1.00) =　2263800 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 87　=　5140800 / 87　=　59090 N

ρs =　τ * Ag / 87　=　28 *　48960 / 87　=　15570 N

ρ　= $\sqrt{}$(ρp^2 +　ρs^2) = $\sqrt{}$(　59090^2 +　15570^2) =　61107 N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
2-SPL PL	151 *　9	(27.2 -	2*(2*2.5)* 0.9)*1.1=	20.0＜	27.2	∴ 20.0
1-SPL PL	2627 *　9	(236.4 -	(25*2.5)* 0.9)*1.1=	198.2＜	236.4	∴198.2
		263.6				218.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1=	31.1＜	42.3	∴ 31.1
2-SPL PL	170 * 14	(47.6 -	2*(2*2.5)* 1.4)*1.1=	37.0＜	47.6	∴ 37.0
7-SPL PL	250 * 14	(245.0 -	7*(3*2.5)* 1.4)*1.1=	188.7＜	245.0	∴188.7
		334.9				256.7
16-SPL PL	155 * 10	(248.0 -	16*(2*2.7)* 1.0)*1.1=	177.8＜	248.0	∴177.8
		＞ AgrR				＞AnrR

(298) G3 J-10(Sec-11) DECK

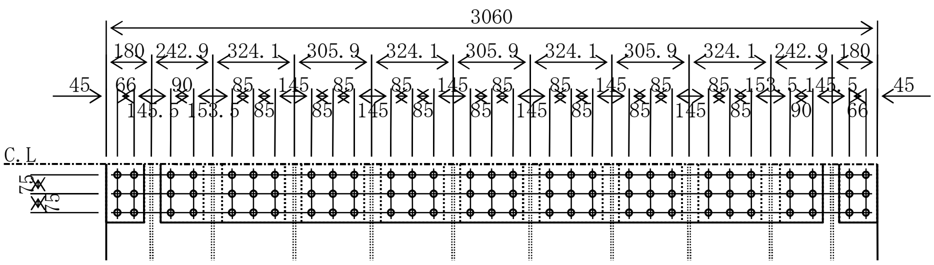
(a) Acting stress

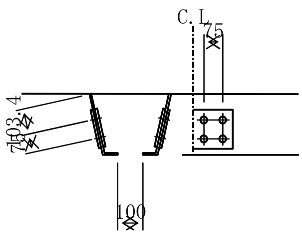
$\sigma tmax$ = 80 N/mm² 0.75σta = 0.75 * 140 = 105 N/mm²
$\sigma cmax$ = -64 N/mm² 0.75σca = 0.75 * 140 = 105 N/mm²
$\therefore \sigma c$ = 105 N/mm²
τmax = 21 N/mm²

(b) Section area of main plate

1-DECK PL 3060 * 16 Ag = 489.6 cm² (SM400)
4-U.RIB 320 * 240 * 8 Agr = 215.6 cm² (SM400)
ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm²

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3060 * 16 A = 489.6
(489.6 - (29* 2.5)* 1.6) * 1.1 = 411.0 < 489.6 ∴An = 411.0 cm²
4-U.RIB 320 * 240 * 8 Ar = 215.6
(215.6 - 4*(4* 2.7)* 0.8- 4*(10.0*0.8)) * 1.1 = 163.9
< 215.6 ∴Anr = 163.9 cm²
ΣAn = An + Anr = 411.0 + 163.9 = 574.9 cm²
σtn = $\sigma tmax$ * ΣAg / ΣAn = 80 * 705.2 / 574.9 = 98 N/mm²
< σta = 140 N/mm²

(e) Design axial force

・Main plate Pt = σtn * An = 98 * 41096 = 4015558 N
> 0.75σta * An / 1.1 = 105 * 41096 / 1.1 = 3922800 N
Pc = σc * Ag = 105 * 48960 = 5140800 N
・Rib Ptr = σtn * Anr = 98 * 16394 = 1601924 N
> 0.75σta * Anr/ 1.1 = 105 * 16394 / 1.1 = 1564920 N
Pcr = σc * Agr = 105 * 21560 = 2263800 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 411.0 / 2 = 205.5 cm²
AgR = Ag / 2 = 489.6 / 2 = 244.8 cm²
・Rib AnrR = Anr = 163.9 cm²
AgrR = Agr = 215.6 cm²

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5140800 / 108000 = 47.6 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 2263800 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 87 = 5140800 / 87 = 59090 N
ρs = τ * Ag / 87 = 21 * 48960 / 87 = 11732 N
ρ = $\sqrt{}(\rho p^2 + \rho s^2) = \sqrt{}(59090^2 + 11732^2)$ = 60243 N

(i) Check of splice plates

	(SS400)	Ags(cm²)	deduction of bolt holes		Ans(cm²)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0＜	27.2	∴ 20.0
1-SPL PL	2627 * 9	(236.4 -	(25*2.5)* 0.9)*1.1= 198.2＜	236.4	∴198.2
		263.6			218.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1＜	42.3	∴ 31.1
2-SPL PL	170 * 14	(47.6 -	2*(2*2.5)* 1.4)*1.1= 37.0＜	47.6	∴ 37.0
7-SPL PL	250 * 14	(245.0 -	7*(3*2.5)* 1.4)*1.1= 188.7＜	245.0	∴188.7
		334.9			256.7
16-SPL PL	155 * 10	(248.0 -	16*(2*2.7)* 1.0)*1.1= 177.8＜	248.0	∴177.8
		＞ AgrR			＞AnrR

(299) G3 J-11(Sec-12) DECK

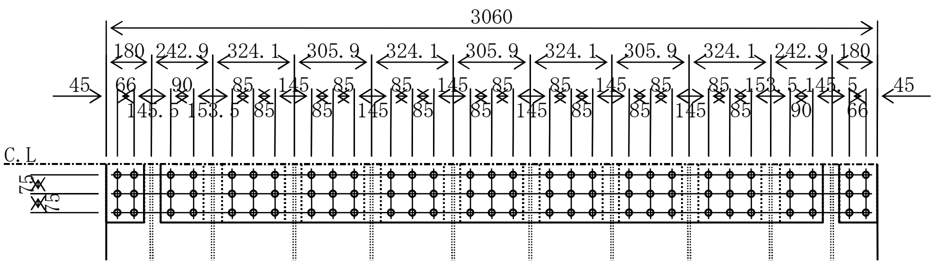
(a) Acting stress

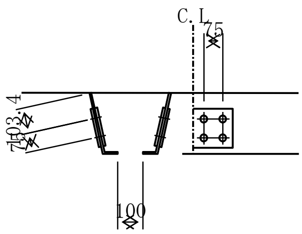
σ tmax = 47 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2
∴ σ c = 105 N/mm^2
τ max = 18 N/mm^2

(b) Section area of main plate

1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM400)
4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM400)
ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3060 * 16 A = 489.6
(489.6 - (29* 2.5)* 1.6) * 1.1 = 411.0 < 489.6 ∴An = 411.0 cm^2
4-U.RIB 320 * 240 * 8 Ar = 215.6
(215.6 - 4*(4* 2.7)* 0.8- 4*(10.0*0.8)) * 1.1 = 163.9
< 215.6 ∴Anr = 163.9 cm^2
ΣAn = An + Anr = 411.0 + 163.9 = 574.9 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 47 * 705.2 / 574.9 = 58 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 41096 / 1.1 = 3922800 N
> σ tn * An = 58 * 41096 = 2368967 N
Pc = σ c * Ag = 105 * 48960 = 5140800 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 16394 / 1.1 = 1564920 N
> σ tn * Anr = 58 * 16394 = 945050 N
Pcr = σ c * Agr = 105 * 21560 = 2263800 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 411.0 / 2 = 205.5 cm^2
AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2
・Rib AnrR = Anr = 163.9 cm^2
AgrR = Agr = 215.6 cm^2

(g) Required bolt number

- Main plate n = Pc / (108000 * 1.00) = 5140800 / 108000 = 47.6 pcs.
- Rib nr = Pcr / (108000 * 1.00) = 2263800 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 87 = 5140800 / 87 = 59090 N
ρs = τ * Ag / 87 = 18 * 48960 / 87 = 9951 N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(59090^2 + 9951^2)}$ = 59922 N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes		$Ans(cm^2)$
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2627 * 9	(236.4 -	(25*2.5)* 0.9)*1.1= 198.2<	236.4	∴198.2
		263.6			218.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
2-SPL PL	170 * 14	(47.6 -	2*(2*2.5)* 1.4)*1.1= 37.0<	47.6	∴ 37.0
7-SPL PL	250 * 14	(245.0 -	7*(3*2.5)* 1.4)*1.1= 188.7<	245.0	∴188.7
		334.9			256.7
16-SPL PL	155 * 10	(248.0 -	16*(2*2.7)* 1.0)*1.1= 177.8<	248.0	∴177.8
		> AgrR			>AnrR

(300) G3 J-12(Sec-12) DECK

(a) Acting stress

σ_{tmax} = 20 N/mm^2 0.75σ_{ta} = 0.75 * 140 = 105 N/mm^2

σ_{cmax} = -64 N/mm^2 0.75σ_{ca} = 0.75 * 140 = 105 N/mm^2

∴σ_c = 105 N/mm^2

τ_{max} = 14 N/mm^2

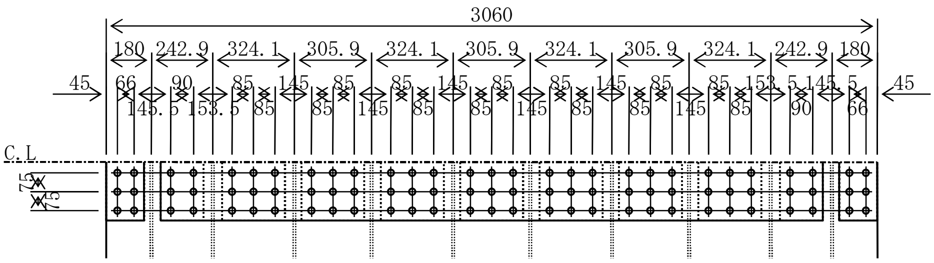
(b) Section area of main plate

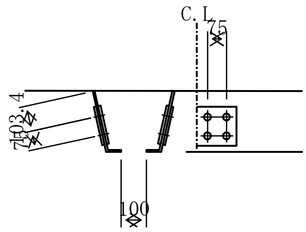
1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM400)

4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM400)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3060 * 16 A = 489.6

(489.6 - (29* 2.5)* 1.6) * 1.1 = 411.0 < 489.6 ∴An = 411.0 cm^2

4-U.RIB 320 * 240 * 8 Ar = 215.6

(215.6 - 4*(4* 2.7)* 0.8- 4*(10.0*0.8)) * 1.1 = 163.9

< 215.6 ∴Anr = 163.9 cm^2

ΣAn = An + Anr = 411.0 + 163.9 = 574.9 cm^2

σ_{tn} = σ_{tmax} * ΣAg / ΣAn = 20 * 705.2 / 574.9 = 25 N/mm^2

< σ_{ta} = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σ_{ta} * An / 1.1 = 105 * 41096 / 1.1 = 3922800 N

> σ_{tn} * An = 25 * 41096 = 1031035 N

Pc = σ_c * Ag = 105 * 48960 = 5140800 N

・Rib Ptr = 0.75σ_{ta} * Anr / 1.1 = 105 * 16394 / 1.1 = 1564920 N

> σ_{tn} * Anr = 25 * 16394 = 411310 N

Pcr = σ_c * Agr = 105 * 21560 = 2263800 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 411.0 / 2 = 205.5 cm^2

AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AnrR = Anr = 163.9 cm^2

AgrR = Agr = 215.6 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5140800 / 108000 = 47.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2263800 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 87 = 5140800 / 87 = 59090$ N

$\rho s = \tau * Ag / 87 = 14 * 48960 / 87 = 8058$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(59090^2 + 8058^2)} = 59636$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1=	20.0<	27.2	∴ 20.0
1-SPL PL	2627 * 9	(236.4 -	(25*2.5)* 0.9)*1.1=	198.2<	236.4	∴198.2
		263.6				218.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1=	31.1<	42.3	∴ 31.1
2-SPL PL	170 * 14	(47.6 -	2*(2*2.5)* 1.4)*1.1=	37.0<	47.6	∴ 37.0
7-SPL PL	250 * 14	(245.0 -	7*(3*2.5)* 1.4)*1.1=	188.7<	245.0	∴188.7
		334.9				256.7
16-SPL PL	155 * 10	(248.0 -	16*(2*2.7)* 1.0)*1.1=	177.8<	248.0	∴177.8
		> AgrR				>AnrR

(301) G3 J-13(Sec-13) DECK

(a) Acting stress

σ tmax = 8 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2

σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2

∴ σ c = 105 N/mm^2

τ max = 10 N/mm^2

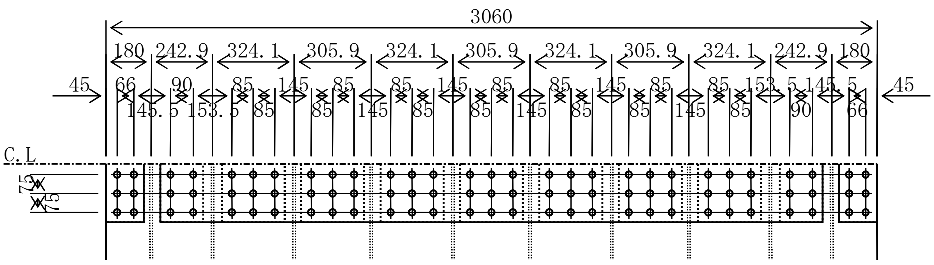
(b) Section area of main plate

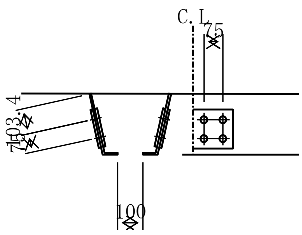
1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM400)

4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM400)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3060 * 16 A = 489.6

(489.6 - (29* 2.5)* 1.6) * 1.1 = 411.0 < 489.6 ∴An = 411.0 cm^2

4-U.RIB 320 * 240 * 8 Ar = 215.6

(215.6 - 4*(4* 2.7)* 0.8- 4*(10.0*0.8)) * 1.1 = 163.9

< 215.6 ∴Anr = 163.9 cm^2

ΣAn = An + Anr = 411.0 + 163.9 = 574.9 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 8 * 705.2 / 574.9 = 10 N/mm^2

< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 41096 / 1.1 = 3922800 N

> σ tn * An = 10 * 41096 = 392643 N

Pc = σ c * Ag = 105 * 48960 = 5140800 N

・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 16394 / 1.1 = 1564920 N

> σ tn * Anr = 10 * 16394 = 156637 N

Pcr = σ c * Agr = 105 * 21560 = 2263800 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 411.0 / 2 = 205.5 cm^2

AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AnrR = Anr = 163.9 cm^2

AgrR = Agr = 215.6 cm^2

(g) Required bolt number

- Main plate n = Pc / (108000 * 1.00) = 5140800 / 108000 = 47.6 pcs.
- Rib nr = Pcr / (108000 * 1.00) = 2263800 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 87 = 5140800 / 87 = 59090 N
ρs = τ * Ag / 87 = 10 * 48960 / 87 = 5899 N
ρ = $\sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(59090^2 + 5899^2)}$ = 59383 N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2627 * 9	(236.4 -	(25*2.5)* 0.9)*1.1= 198.2<	236.4	∴198.2
		263.6			218.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
2-SPL PL	170 * 14	(47.6 -	2*(2*2.5)* 1.4)*1.1= 37.0<	47.6	∴ 37.0
7-SPL PL	250 * 14	(245.0 -	7*(3*2.5)* 1.4)*1.1= 188.7<	245.0	∴188.7
		334.9			256.7
16-SPL PL	155 * 10	(248.0 -	16*(2*2.7)* 1.0)*1.1= 177.8<	248.0	∴177.8
		> AgrR			>AnrR

(302) G3　J-14(Sec-14)　DECK

(a) Acting stress

$\sigma tmax$ = 6 N/mm^2　　0.75σta = 0.75 * 140 = 105 N/mm^2

$\sigma cmax$ = -67 N/mm^2　　0.75σca = 0.75 * 140 = 105 N/mm^2

∴σc = 105 N/mm^2

τmax = 6 N/mm^2

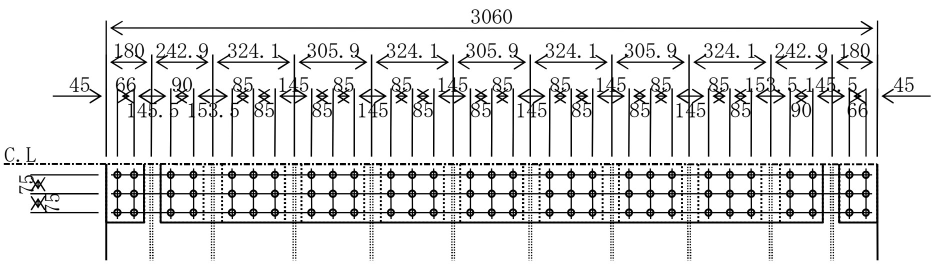
(b) Section area of main plate

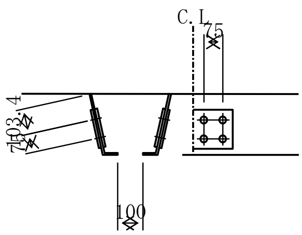
1-DECK　PL　3060 * 16　　　Ag　=　489.6 cm^2　(SM400)

4-U.RIB 320 * 240 * 8　　　Agr = 215.6 cm^2　(SM400)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK　PL　3060 * 16　　　A = 489.6

(489.6 - (29* 2.5)* 1.6) * 1.1 = 411.0 ＜ 489.6　∴An = 411.0 cm^2

4-U.RIB 320 * 240 * 8　　　Ar = 215.6

(215.6 - 4*(4* 2.7)* 0.8- 4*(10.0*0.8)) * 1.1 = 163.9

＜ 215.6　∴Anr = 163.9 cm^2

ΣAn = An + Anr = 411.0 + 163.9 = 574.9 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 6 * 705.2 / 574.9 = 7 N/mm^2

＜ σta = 140 N/mm^2

(e) Design axial force

・Main plate　Pt = 0.75σta * An / 1.1 = 105 * 41096 / 1.1 = 3922800 N

＞ σtn * An = 7 * 41096 = 293487 N

Pc = σc * Ag = 105 * 48960 = 5140800 N

・Rib　Ptr = 0.75σta * Anr / 1.1 = 105 * 16394 / 1.1 = 1564920 N

＞ σtn * Anr = 7 * 16394 = 117081 N

Pcr = σc * Agr = 105 * 21560 = 2263800 N

(f) Required section area of the splice plates

・Mother material(One side)　AnR = An / 2 = 411.0 / 2 = 205.5 cm^2

AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib　　AnrR = Anr = 163.9 cm^2

AgrR = Agr = 215.6 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5140800 / 108000 = 47.6 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 2263800 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 87 = 5140800 / 87 = 59090$ N
$\rho s = \tau * Ag / 87 = 6 * 48960 / 87 = 3538$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(59090^2 + 3538^2)} = 59195$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2627 * 9	(236.4 -	(25*2.5)* 0.9)*1.1= 198.2<	236.4	∴198.2
		263.6			218.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
2-SPL PL	170 * 14	(47.6 -	2*(2*2.5)* 1.4)*1.1= 37.0<	47.6	∴ 37.0
7-SPL PL	250 * 14	(245.0 -	7*(3*2.5)* 1.4)*1.1= 188.7<	245.0	∴188.7
		334.9			256.7
16-SPL PL	155 * 10	(248.0 -	16*(2*2.7)* 1.0)*1.1= 177.8<	248.0	∴177.8
		> AgrR			>AnrR

(303) G3 J-15(Sec-15) DECK

(a) Acting stress

$\sigma tmax$ = 16 N/mm^2 0.75σta = 0.75 * 140 = 105 N/mm^2

$\sigma cmax$ = -64 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 9 N/mm^2

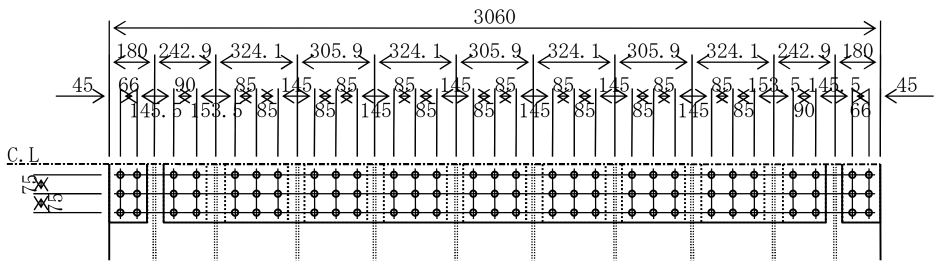
(b) Section area of main plate

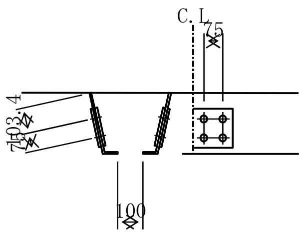
1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM400)

4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM400)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3060 * 16 A = 489.6

(489.6 - (29* 2.5)* 1.6) * 1.1 = 411.0 < 489.6 $\therefore$An = 411.0 cm^2

4-U.RIB 320 * 240 * 8 Ar = 215.6

(215.6 - 4*(4* 2.7)* 0.8- 4*(10.0*0.8)) * 1.1 = 163.9

< 215.6 $\therefore$Anr = 163.9 cm^2

ΣAn = An + Anr = 411.0 + 163.9 = 574.9 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 16 * 705.2 / 574.9 = 19 N/mm^2

< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 105 * 41096 / 1.1 = 3922800 N

> σtn * An = 19 * 41096 = 793756 N

Pc = σc * Ag = 105 * 48960 = 5140800 N

・Rib Ptr = 0.75σta * Anr / 1.1 = 105 * 16394 / 1.1 = 1564920 N

> σtn * Anr = 19 * 16394 = 316652 N

Pcr = σc * Agr = 105 * 21560 = 2263800 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 411.0 / 2 = 205.5 cm^2

AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AnrR = Anr = 163.9 cm^2

AgrR = Agr = 215.6 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5140800 / 108000 = 47.6 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 2263800 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 87 = 5140800 / 87 = 59090 N
ρs = τ * Ag / 87 = 9 * 48960 / 87 = 5034 N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(59090^2 + 5034^2)}$ = 59304 N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes		$Ans(cm^2)$
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2627 * 9	(236.4 -	(25*2.5)* 0.9)*1.1= 198.2<	236.4	∴198.2
		263.6			218.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
2-SPL PL	170 * 14	(47.6 -	2*(2*2.5)* 1.4)*1.1= 37.0<	47.6	∴ 37.0
7-SPL PL	250 * 14	(245.0 -	7*(3*2.5)* 1.4)*1.1= 188.7<	245.0	∴188.7
		334.9			256.7
16-SPL PL	155 * 10	(248.0 -	16*(2*2.7)* 1.0)*1.1= 177.8<	248.0	∴177.8
		＞ AgrR			＞AnrR

(304) G3 J-16(Sec-16) DECK

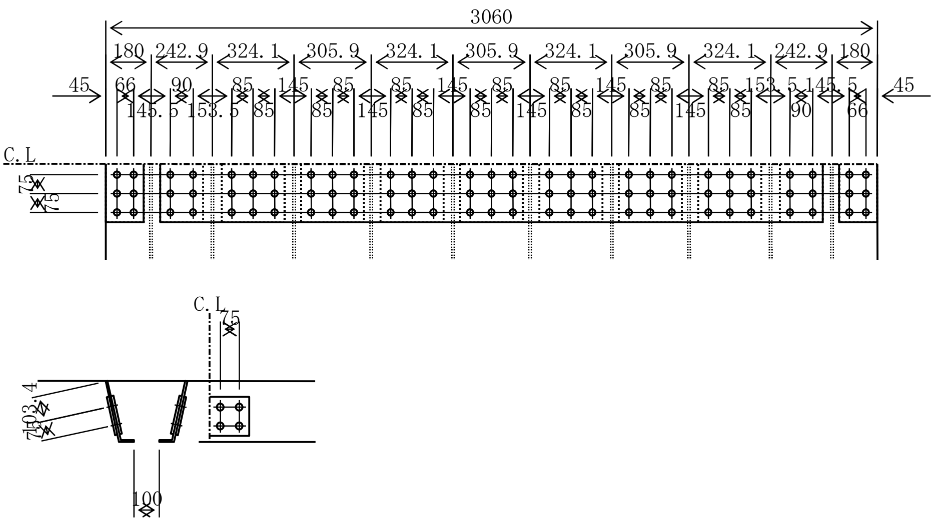
(a) Acting stress

$\sigma tmax$ = 33 N/mm^2 0.75σta = 0.75 * 140 = 105 N/mm^2
$\sigma cmax$ = -64 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma c$ = 105 N/mm^2
τmax = 13 N/mm^2

(b) Section area of main plate

1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM400)
4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM400)
ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 3060 * 16 A = 489.6
(489.6 - (29* 2.5)* 1.6) * 1.1 = 411.0 < 489.6 $\therefore$An = 411.0 cm^2
4-U.RIB 320 * 240 * 8 Ar = 215.6
(215.6 - 4*(4* 2.7)* 0.8- 4*(10.0*0.8)) * 1.1 = 163.9
< 215.6 $\therefore$Anr = 163.9 cm^2
ΣAn = An + Anr = 411.0 + 163.9 = 574.9 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 33 * 705.2 / 574.9 = 40 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 105 * 41096 / 1.1 = 3922800 N
> σtn * An = 40 * 41096 = 1662924 N
Pc = σc * Ag = 105 * 48960 = 5140800 N
・Rib Ptr = 0.75σta * Anr / 1.1 = 105 * 16394 / 1.1 = 1564920 N
> σtn * Anr = 40 * 16394 = 663389 N
Pcr = σc * Agr = 105 * 21560 = 2263800 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 411.0 / 2 = 205.5 cm^2
AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2
・Rib AnrR = Anr = 163.9 cm^2
AgrR = Agr = 215.6 cm^2

(g) Required bolt number

- Main plate n = Pc / (108000 * 1.00) = 5140800 / 108000 = 47.6 pcs.
- Rib nr = Pcr / (108000 * 1.00) = 2263800 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 87 = 5140800 / 87 = 59090$ N
$\rho s = \tau * Ag / 87 = 13 * 48960 / 87 = 7076$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(59090^2 + 7076^2)} = 59512$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2627 * 9	(236.4 -	(25*2.5)* 0.9)*1.1= 198.2<	236.4	∴198.2
		263.6			218.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
2-SPL PL	170 * 14	(47.6 -	2*(2*2.5)* 1.4)*1.1= 37.0<	47.6	∴ 37.0
7-SPL PL	250 * 14	(245.0 -	7*(3*2.5)* 1.4)*1.1= 188.7<	245.0	∴188.7
		334.9			256.7
16-SPL PL	155 * 10	(248.0 -	16*(2*2.7)* 1.0)*1.1= 177.8<	248.0	∴177.8
		> AgrR			>AnrR

(305) G3 J-17(Sec-17) DECK

(a) Acting stress

$\sigma tmax$ = 62 N/mm^2 $0.75\sigma ta$ = 0.75 * 140 = 105 N/mm^2

$\sigma cmax$ = -64 N/mm^2 $0.75\sigma ca$ = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 17 N/mm^2

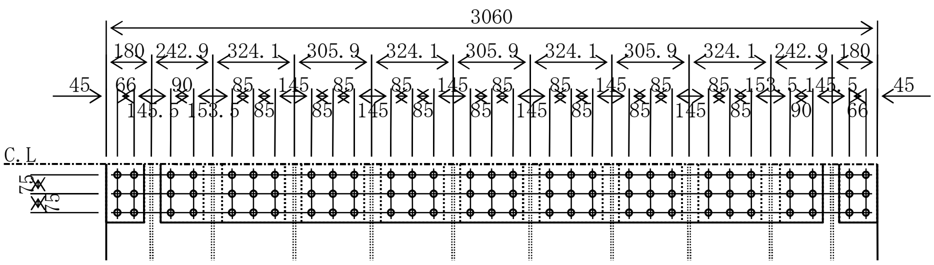
(b) Section area of main plate

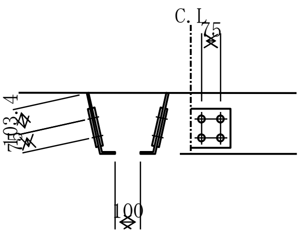
1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM400)

4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM400)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3060 * 16 A = 489.6

(489.6 - (29* 2.5)* 1.6) * 1.1 = 411.0 < 489.6 ∴An = 411.0 cm^2

4-U.RIB 320 * 240 * 8 Ar = 215.6

(215.6 - 4*(4* 2.7)* 0.8- 4*(10.0*0.8)) * 1.1 = 163.9

< 215.6 ∴Anr = 163.9 cm^2

ΣAn = An + Anr = 411.0 + 163.9 = 574.9 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 62 * 705.2 / 574.9 = 76 N/mm^2

< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = $0.75\sigma ta$ * An / 1.1 = 105 * 41096 / 1.1 = 3922800 N

> σtn * An = 76 * 41096 = 3127788 N

Pc = σc * Ag = 105 * 48960 = 5140800 N

・Rib Ptr = $0.75\sigma ta$ * Anr / 1.1 = 105 * 16394 / 1.1 = 1564920 N

> σtn * Anr = 76 * 16394 = 1247766 N

Pcr = σc * Agr = 105 * 21560 = 2263800 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 411.0 / 2 = 205.5 cm^2

AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AnrR = Anr = 163.9 cm^2

AgrR = Agr = 215.6 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5140800 / 108000 = 47.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2263800 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 87 = 5140800 / 87 = 59090$ N

$\rho s = \tau * Ag / 87 = 17 * 48960 / 87 = 9291$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(59090^2 + 9291^2)} = 59816$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2627 * 9	(236.4 -	(25*2.5)* 0.9)*1.1= 198.2<	236.4	∴198.2
		263.6			218.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
2-SPL PL	170 * 14	(47.6 -	2*(2*2.5)* 1.4)*1.1= 37.0<	47.6	∴ 37.0
7-SPL PL	250 * 14	(245.0 -	7*(3*2.5)* 1.4)*1.1= 188.7<	245.0	∴188.7
		334.9			256.7
16-SPL PL	155 * 10	(248.0 -	16*(2*2.7)* 1.0)*1.1= 177.8<	248.0	∴177.8
		> AgrR			>AnrR

(306) G3 J-18(Sec-18) DECK

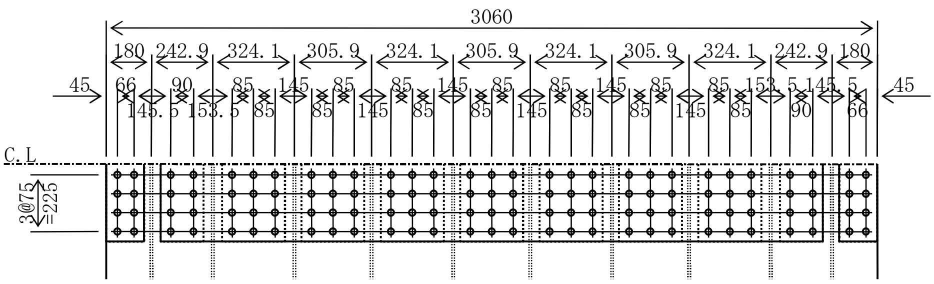
(a) Acting stress

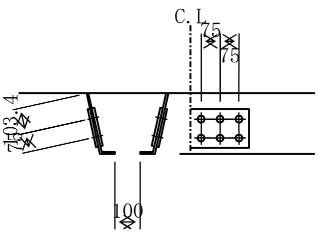
σtmax = 102 N/mm² 0.75σta = 0.75 ＊ 210 = 158 N/mm²
σcmax = -64 N/mm² 0.75σca = 0.75 ＊ 210 = 158 N/mm²
∴σc = 158 N/mm²
τmax = 21 N/mm²

(b) Section area of main plate

1-DECK PL 3060 ＊ 16 Ag = 489.6 cm² (SM490Y)
4-U.RIB 320 ＊ 240 ＊ 8 Agr = 215.6 cm² (SM490Y)
ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm²

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3060 ＊ 16 A = 489.6
(489.6 - (29＊ 2.5)＊ 1.6) ＊ 1.1 = 411.0 ＜ 489.6 ∴An = 411.0 cm²
4-U.RIB 320 ＊ 240 ＊ 8 Ar = 215.6
(215.6 - 4＊(4＊ 2.7)＊ 0.8- 4＊(10.0＊0.8)) ＊ 1.1 = 163.9
＜ 215.6 ∴Anr = 163.9 cm²
ΣAn = An + Anr = 411.0 + 163.9 = 574.9 cm²
σtn = σtmax ＊ ΣAg / ΣAn = 102 ＊ 705.2 / 574.9 = 125 N/mm²
＜ σta = 210 N/mm²

(e) Design axial force

・Main plate Pt = 0.75σta ＊ An / 1.1 = 158 ＊ 41096 / 1.1 = 5884200 N
＞ σtn ＊ An = 125 ＊ 41096 = 5142070 N
Pc = σc ＊ Ag = 158 ＊ 48960 = 7711200 N
・Rib Ptr = 0.75σta ＊ Anr / 1.1 = 158 ＊ 16394 / 1.1 = 2347380 N
＞ σtn ＊ Anr = 125 ＊ 16394 = 2051323 N
Pcr = σc ＊ Agr = 158 ＊ 21560 = 3395700 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 411.0 / 2 = 205.5 cm²
AgR = Ag / 2 = 489.6 / 2 = 244.8 cm²
・Rib AnrR = Anr = 163.9 cm²
AgrR = Agr = 215.6 cm²

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 7711200 / 108000 = 71.4 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 3395700 / 108000 = 31.4 pcs. (4 @ 12 = 48 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 116 = 7711200 / 116 = 66476$ N

$\rho s = \tau * Ag / 116 = 21 * 48960 / 116 = 8976$ N

$\rho = \sqrt{\rho p^2 + \rho s^2} = \sqrt{66476^2 + 8976^2} = 67079$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1=	20.0＜	27.2	∴ 20.0
1-SPL PL	2627 * 9	(236.4 -	(25*2.5)* 0.9)*1.1=	198.2＜	236.4	∴198.2
		263.6				218.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1=	31.1＜	42.3	∴ 31.1
2-SPL PL	170 * 14	(47.6 -	2*(2*2.5)* 1.4)*1.1=	37.0＜	47.6	∴ 37.0
7-SPL PL	250 * 14	(245.0 -	7*(3*2.5)* 1.4)*1.1=	188.7＜	245.0	∴188.7
		334.9				256.7
16-SPL PL	155 * 10	(248.0 -	16*(2*2.7)* 1.0)*1.1=	177.8＜	248.0	∴177.8
		＞ AgrR				＞AnrR

(307) G3 J-19(Sec-19) DECK

(a) Acting stress

$\sigma tmax$ = 141 N/mm^2 0.75σta = 0.75 * 210 = 158 N/mm^2

$\sigma cmax$ = -64 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma c$ = 158 N/mm^2

τmax = 26 N/mm^2

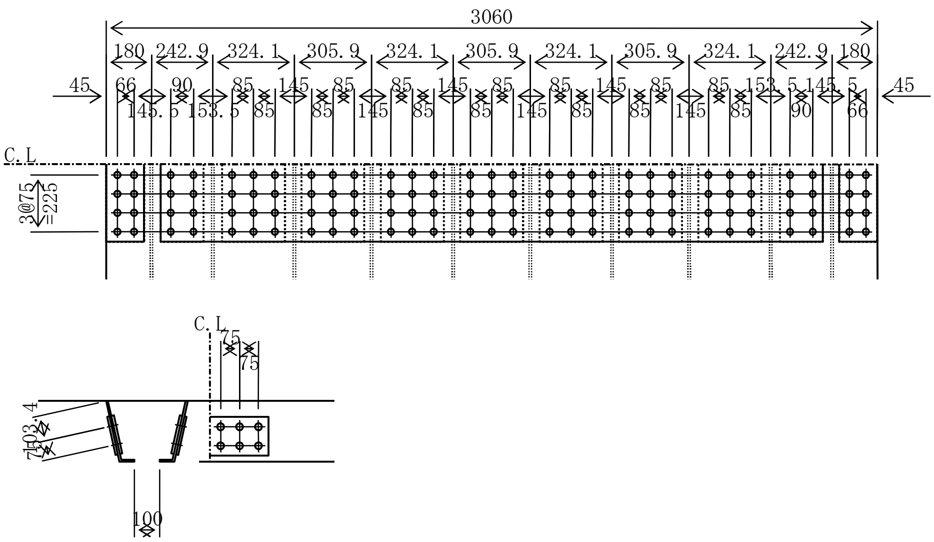
(b) Section area of main plate

1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM490Y)

4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM490Y)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 3060 * 16 A = 489.6

(489.6 - (29* 2.5)* 1.6) * 1.1 = 411.0 < 489.6 $\therefore$An = 411.0 cm^2

4-U.RIB 320 * 240 * 8 Ar = 215.6

(215.6 - 4*(4* 2.7)* 0.8- 4*(10.0*0.8)) * 1.1 = 163.9

< 215.6 $\therefore$Anr = 163.9 cm^2

ΣAn = An + Anr = 411.0 + 163.9 = 574.9 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 141 * 705.2 / 574.9 = 173 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 173 * 41096 = 7119855 N

> 0.75σta * An / 1.1 = 158 * 41096 / 1.1 = 5884200 N

Pc = σc * Ag = 158 * 48960 = 7711200 N

・Rib Ptr = σtn * Anr = 173 * 16394 = 2840319 N

> 0.75σta * Anr/ 1.1 = 158 * 16394 / 1.1 = 2347380 N

Pcr = σc * Agr = 158 * 21560 = 3395700 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 411.0 / 2 = 205.5 cm^2

AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AnrR = Anr = 163.9 cm^2

AgrR = Agr = 215.6 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 7711200 / 108000 = 71.4 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 3395700 / 108000 = 31.4 pcs. (4 @ 12 = 48 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 116 = 7711200 / 116 = 66476$ N
$\rho s = \tau * Ag / 116 = 26 * 48960 / 116 = 10820$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(66476^2 + 10820^2)} = 67351$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0＜	27.2	∴ 20.0
1-SPL PL	2627 * 9	(236.4 -	(25*2.5)* 0.9)*1.1= 198.2＜	236.4	∴198.2
		263.6			218.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1＜	42.3	∴ 31.1
2-SPL PL	170 * 14	(47.6 -	2*(2*2.5)* 1.4)*1.1= 37.0＜	47.6	∴ 37.0
7-SPL PL	250 * 14	(245.0 -	7*(3*2.5)* 1.4)*1.1= 188.7＜	245.0	∴188.7
		334.9			256.7
16-SPL PL	155 * 10	(248.0 -	16*(2*2.7)* 1.0)*1.1= 177.8＜	248.0	∴177.8
		＞ AgrR			＞AnrR

(308) G3 J-20(Sec-21) DECK

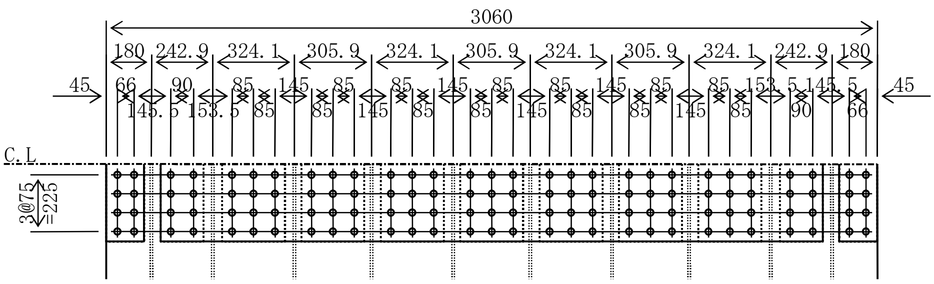
(a) Acting stress

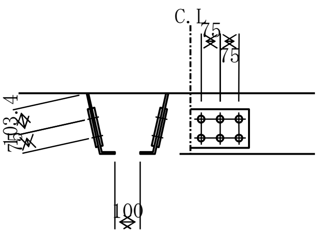
σ tmax = 138 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 210 = 158 N/mm^2
∴ σ c = 158 N/mm^2
τ max = 33 N/mm^2

(b) Section area of main plate

1-DECK PL 3060 * 16   Ag = 489.6 cm^2 (SM490Y)
4-U.RIB 320 * 240 * 8   Agr = 215.6 cm^2 (SM490Y)
ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3060 * 16   A = 489.6
 (489.6 -   (29* 2.5)* 1.6) * 1.1 = 411.0 < 489.6 ∴An = 411.0 cm^2
4-U.RIB 320 * 240 * 8   Ar = 215.6
 (215.6 - 4*(4* 2.7)* 0.8- 4*(10.0*0.8)) * 1.1 = 163.9
< 215.6 ∴Anr = 163.9 cm^2
ΣAn = An + Anr = 411.0 + 163.9 = 574.9 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 138 * 705.2 / 574.9 = 169 N/mm^2
< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An =   169 * 41096 = 6932280 N
 > 0.75 σ ta * An / 1.1 =   158 * 41096 / 1.1 = 5884200 N
 Pc = σ c * Ag =   158 * 48960 = 7711200 N
・Rib Ptr = σ tn * Anr =   169 * 16394 = 2765490 N
 > 0.75 σ ta * Anr/ 1.1 =   158 * 16394 / 1.1 = 2347380 N
 Pcr = σ c * Agr =   158 * 21560 = 3395700 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 =   411.0 / 2 = 205.5 cm^2
 AgR = Ag / 2 =   489.6 / 2 = 244.8 cm^2
・Rib   AnrR = Anr = 163.9 cm^2
 AgrR = Agr = 215.6 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 7711200 / 108000 = 71.4 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 3395700 / 108000 = 31.4 pcs. (4 @ 12 = 48 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(h) Tensile force per one bolt

ρp = Pc / 116 = 7711200 / 116 = 66476 N

ρs = τ * Ag / 116 = 33 * 48960 / 116 = 13964 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(66476^2 + 13964^2)}$ = 67927 N

(i) Check of splice plates

(SM490Y)			Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9		(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2627 * 9		(236.4 -	(25*2.5)* 0.9)*1.1= 198.2<	236.4	∴198.2
			263.6			218.2
2-SPL PL	151 * 14		(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
2-SPL PL	170 * 14		(47.6 -	2*(2*2.5)* 1.4)*1.1= 37.0<	47.6	∴ 37.0
7-SPL PL	250 * 14		(245.0 -	7*(3*2.5)* 1.4)*1.1= 188.7<	245.0	∴188.7
			334.9			256.7
16-SPL PL	155 * 10		(248.0 -	16*(2*2.7)* 1.0)*1.1= 177.8<	248.0	∴177.8
			> AgrR			>AnrR

(309) G3　J-21(Sec-22)　DECK

(a) Acting stress

σ tmax = 84 N/mm^2　　0.75 σ ta = 0.75 * 140 = 105 N/mm^2

σ cmax = -64 N/mm^2　　0.75 σ ca = 0.75 * 140 = 105 N/mm^2

∴ σ c = 105 N/mm^2

τ max = 33 N/mm^2

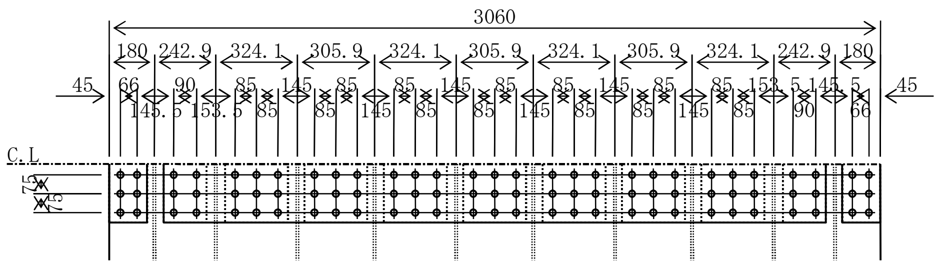
(b) Section area of main plate

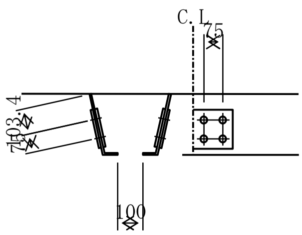
1-DECK　PL　3060 * 16　　　Ag = 489.6 cm^2　(SM400)

4-U.RIB 320 * 240 * 8　　　Agr = 215.6 cm^2　(SM400)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK　PL　3060 * 16　　A = 489.6

(489.6 - (29* 2.5)* 1.6) * 1.1 = 411.0 ＜ 489.6　∴An = 411.0 cm^2

4-U.RIB 320 * 240 * 8　　Ar = 215.6

(215.6 - 4*(4* 2.7)* 0.8- 4*(10.0*0.8)) * 1.1 = 163.9

＜ 215.6　∴Anr = 163.9 cm^2

ΣAn = An + Anr = 411.0 + 163.9 = 574.9 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 84 * 705.2 / 574.9 = 103 N/mm^2

＜ σ ta = 140 N/mm^2

(e) Design axial force

・Main plate　Pt = σ tn * An = 103 * 41096 = 4249108 N

> 0.75 σ ta * An / 1.1 = 105 * 41096 / 1.1 = 3922800 N

Pc = σ c * Ag = 105 * 48960 = 5140800 N

・Rib　Ptr = σ tn * Anr = 103 * 16394 = 1695094 N

> 0.75 σ ta * Anr/ 1.1 = 105 * 16394 / 1.1 = 1564920 N

Pcr = σ c * Agr = 105 * 21560 = 2263800 N

(f) Required section area of the splice plates

・Mother material(One side)　AnR = An / 2 = 411.0 / 2 = 205.5 cm^2

AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib　　AnrR = Anr = 163.9 cm^2

AgrR = Agr = 215.6 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5140800 / 108000 = 47.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2263800 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 87 = 5140800 / 87 = 59090$ N

$\rho s = \tau * Ag / 87 = 33 * 48960 / 87 = 18773$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(59090^2 + 18773^2)} = 62000$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes		$Ans(cm^2)$
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2627 * 9	(236.4 -	(25*2.5)* 0.9)*1.1= 198.2<	236.4	∴198.2
		263.6			218.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
2-SPL PL	170 * 14	(47.6 -	2*(2*2.5)* 1.4)*1.1= 37.0<	47.6	∴ 37.0
7-SPL PL	250 * 14	(245.0 -	7*(3*2.5)* 1.4)*1.1= 188.7<	245.0	∴188.7
		334.9			256.7
16-SPL PL	155 * 10	(248.0 -	16*(2*2.7)* 1.0)*1.1= 177.8<	248.0	∴177.8
		> AgrR			>AnrR

(310) G3 J-22(Sec-23) DECK

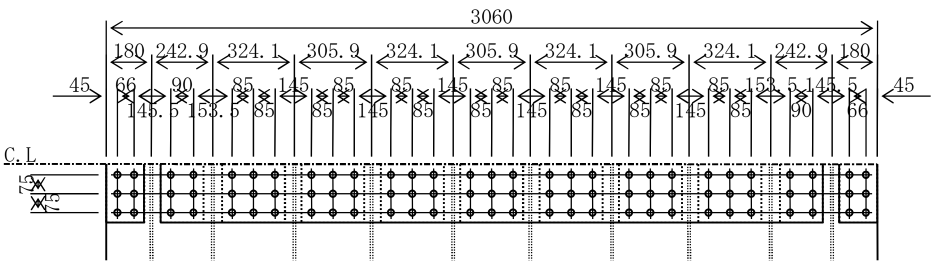
(a) Acting stress

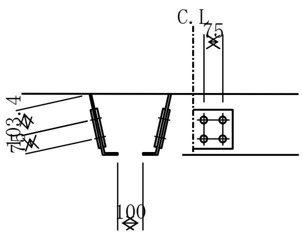
σ tmax = 29 N/mm² 0.75 σ ta = 0.75 * 140 = 105 N/mm²
σ cmax = -64 N/mm² 0.75 σ ca = 0.75 * 140 = 105 N/mm²
∴ σ c = 105 N/mm²
τ max = 34 N/mm²

(b) Section area of main plate

1-DECK PL 3060 * 16 Ag = 489.6 cm² (SM400)
4-U.RIB 320 * 240 * 8 Agr = 215.6 cm² (SM400)
ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm²

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3060 * 16 A = 489.6
(489.6 - (29* 2.5)* 1.6) * 1.1 = 411.0 < 489.6 ∴An = 411.0 cm²
4-U.RIB 320 * 240 * 8 Ar = 215.6
(215.6 - 4*(4* 2.7)* 0.8- 4*(10.0*0.8)) * 1.1 = 163.9
< 215.6 ∴Anr = 163.9 cm²
ΣAn = An + Anr = 411.0 + 163.9 = 574.9 cm²
σ tn = σ tmax * ΣAg / ΣAn = 29 * 705.2 / 574.9 = 36 N/mm²
< σ ta = 140 N/mm²

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 41096 / 1.1 = 3922800 N
> σ tn * An = 36 * 41096 = 1478071 N
Pc = σ c * Ag = 105 * 48960 = 5140800 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 16394 / 1.1 = 1564920 N
> σ tn * Anr = 36 * 16394 = 589646 N
Pcr = σ c * Agr = 105 * 21560 = 2263800 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 411.0 / 2 = 205.5 cm²
AgR = Ag / 2 = 489.6 / 2 = 244.8 cm²
・Rib AnrR = Anr = 163.9 cm²
AgrR = Agr = 215.6 cm²

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5140800 / 108000 = 47.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2263800 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 87 = 5140800 / 87 = 59090$ N

$\rho s = \tau * Ag / 87 = 34 * 48960 / 87 = 18975$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(59090^2 + 18975^2)} = 62062$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2627 * 9	(236.4 -	(25*2.5)* 0.9)*1.1= 198.2<	236.4	∴198.2
		263.6			218.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
2-SPL PL	170 * 14	(47.6 -	2*(2*2.5)* 1.4)*1.1= 37.0<	47.6	∴ 37.0
7-SPL PL	250 * 14	(245.0 -	7*(3*2.5)* 1.4)*1.1= 188.7<	245.0	∴188.7
		334.9			256.7
16-SPL PL	155 * 10	(248.0 -	16*(2*2.7)* 1.0)*1.1= 177.8<	248.0	∴177.8
		＞ AgrR			＞AnrR

(311) G3 J-23(Sec-23) DECK

(a) Acting stress

$\sigma cmax$ = -90 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴σc = 105 N/mm^2

τmax = 29 N/mm^2

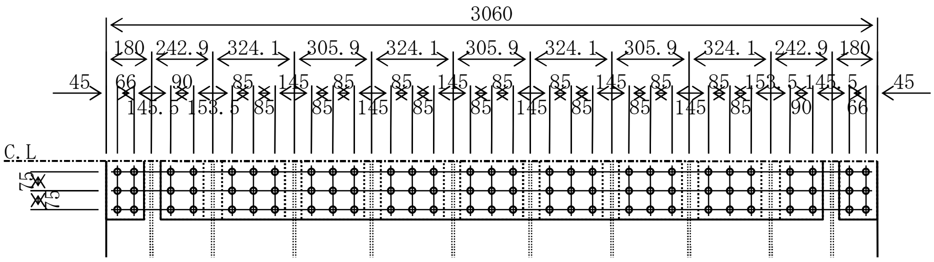
(b) Section area of main plate

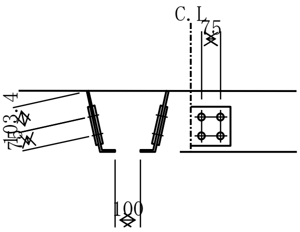
1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM400)

4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM400)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 48960 = 5140800 N

・Rib Pcr = σc * Agr = 105 * 21560 = 2263800 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AgrR = Agr = 215.6 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5140800 / 108000 = 47.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2263800 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 87 = 5140800 / 87 = 59090 N

ρs = τ * Ag / 87 = 29 * 48960 / 87 = 16331 N

ρ = √(ρp^2 + ρs^2) = √(59090^2 + 16331^2) = 61305 N

(h) Check of splice plates

	Ags(cm^2)
(SS400)	
2-SPL PL 151 * 9	27.2
1-SPL PL 2627 * 9	236.4
	263.6
2-SPL PL 151 * 14	42.3
2-SPL PL 170 * 14	47.6
7-SPL PL 250 * 14	245.0
	334.9
16-SPL PL 155 * 10	248.0 > AgrR = 215.6cm^2

(312) G3 J-24(Sec-24) DECK

(a) Acting stress

σcmax = -125 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

$\therefore\sigma$c = 125 N/mm^2

τmax = 23 N/mm^2

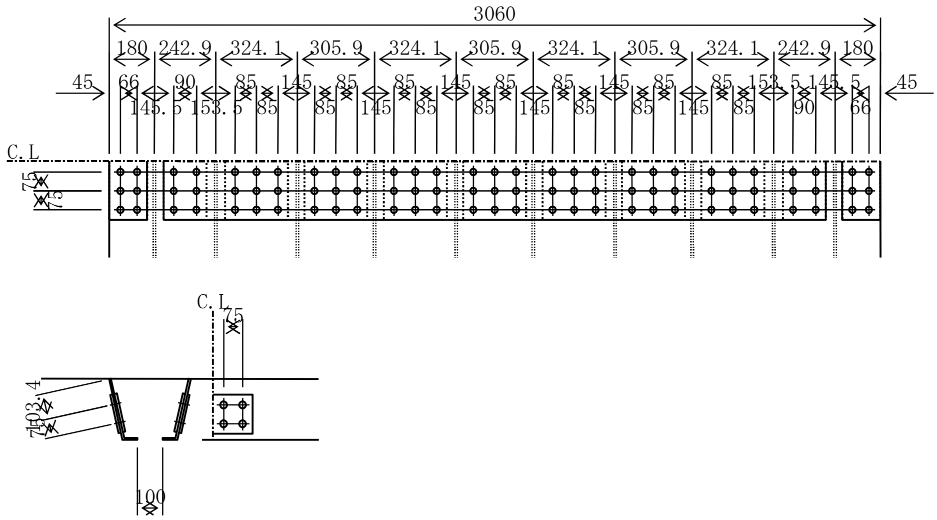
(b) Section area of main plate

1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM400)

4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM400)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 125 * 48960 = 6114468 N

・Rib Pcr = σc * Agr = 125 * 21560 = 2692564 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AgrR = Agr = 215.6 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 6114468 / 108000 = 56.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2692564 / 108000 = 24.9 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 87 = 6114468 / 87 = 70281 N

ρs = τ * Ag / 87 = 23 * 48960 / 87 = 12888 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(70281^2 + 12888^2) = 71453 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
2-SPL PL	151 * 9	27.2
1-SPL PL	2627 * 9	236.4
		263.6
2-SPL PL	151 * 14	42.3
2-SPL PL	170 * 14	47.6
7-SPL PL	250 * 14	245.0
		334.9
16-SPL PL	155 * 10	248.0 ＞ AgrR = 215.6cm^2

(313) G3 J-25(Sec-25) DECK

(a) Acting stress

$\sigma cmax$ = −148 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 158 N/mm^2

τmax = 17 N/mm^2

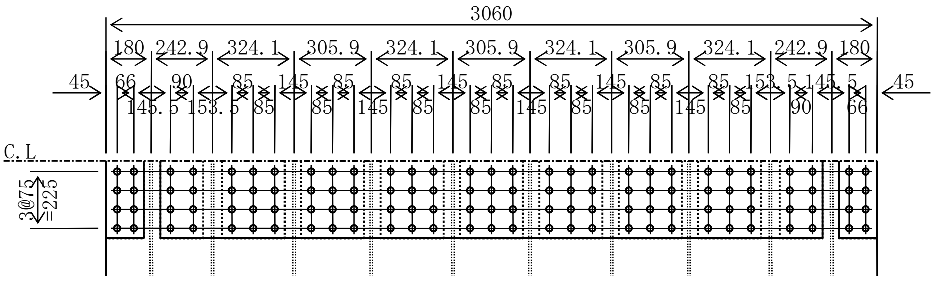
(b) Section area of main plate

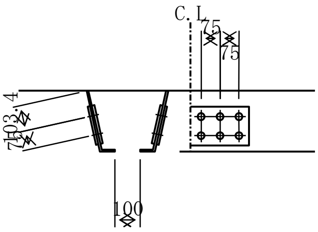
1-DECK PL 3060 * 16   Ag = 489.6 cm^2 (SM490Y)

4-U.RIB 320 * 240 * 8   Agr = 215.6 cm^2 (SM490Y)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 48960 = 7711200 N

・Rib Pcr = σc * Agr = 158 * 21560 = 3395700 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib   AgrR = Agr = 215.6 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 7711200 / 108000 = 71.4 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 3395700 / 108000 = 31.4 pcs. (4 @ 12 = 48 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 116 = 7711200 / 116 = 66476 N

ρs = τ * Ag / 116 = 17 * 48960 / 116 = 7154 N

ρ = $\sqrt{}(\rho p^2 + \rho s^2)$ = $\sqrt{}$(66476^2 + 7154^2) = 66860 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)
2-SPL PL	151 * 9	27.2
1-SPL PL	2627 * 9	236.4
		263.6
2-SPL PL	151 * 14	42.3
2-SPL PL	170 * 14	47.6
7-SPL PL	250 * 14	245.0
		334.9
16-SPL PL	155 * 10	248.0 ＞ AgrR = 215.6cm^2

(314) G3 J-26(Sec-26) DECK

(a) Acting stress

$\sigma cmax$ = -165 N/mm^2 $0.75\sigma ca$ = 0.75 * 210 = 158 N/mm^2

∴ σc = 165 N/mm^2

τmax = 13 N/mm^2

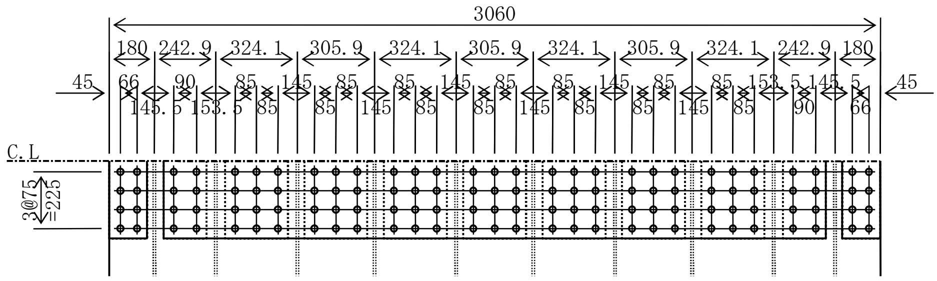
(b) Section area of main plate

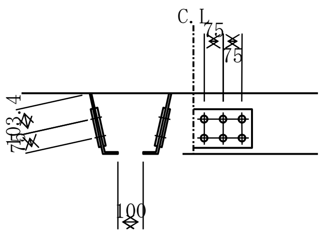
1-DECK PL 3060 * 16   Ag = 489.6 cm^2 (SM490Y)

4-U.RIB 320 * 240 * 8   Agr = 215.6 cm^2 (SM490Y)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 165 * 48960 = 8080799 N

・Rib Pcr = σc * Agr = 165 * 21560 = 3558456 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AgrR = Agr = 215.6 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 8080799 / 108000 = 74.8 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 3558456 / 108000 = 32.9 pcs. (4 @ 12 = 48 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 116 = 8080799 / 116 = 69662 N

ρs = τ * Ag / 116 = 13 * 48960 / 116 = 5545 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(69662^2 + 5545^2)}$ = 69882 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
2-SPL PL	151 * 9	27.2	
1-SPL PL	2627 * 9	236.4	
		263.6	
2-SPL PL	151 * 14	42.3	
2-SPL PL	170 * 14	47.6	
7-SPL PL	250 * 14	245.0	
		334.9	
16-SPL PL	155 * 10	248.0	＞ AgrR = 215.6cm^2

(315) G3 J-27(Sec-27) DECK

(a) Acting stress

σcmax = -168 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2

∴σc = 168 N/mm^2

τmax = 13 N/mm^2

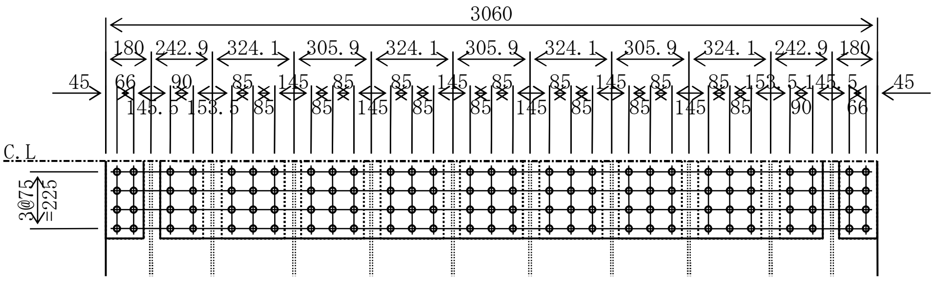
(b) Section area of main plate

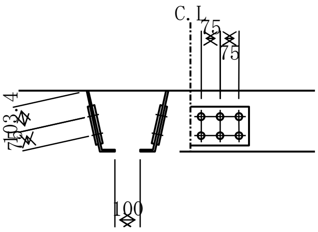
1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM490Y)

4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM490Y)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 168 * 48960 = 8221853 N

・Rib Pcr = σc * Agr = 168 * 21560 = 3620571 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AgrR = Agr = 215.6 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 8221853 / 108000 = 76.1 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 3620571 / 108000 = 33.5 pcs. (4 @ 12 = 48 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 116 = 8221853 / 116 = 70878 N

ρs = τ * Ag / 116 = 13 * 48960 / 116 = 5326 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(70878^2 + 5326^2)}$ = 71078 N

(h) Check of splice plates

	(SM490Y)	A_{gs}(cm^2)	
2-SPL PL	151 * 9	27.2	
1-SPL PL	2627 * 9	236.4	
		263.6	
2-SPL PL	151 * 14	42.3	
2-SPL PL	170 * 14	47.6	
7-SPL PL	250 * 14	245.0	
		334.9	
16-SPL PL	155 * 10	248.0	> AgrR = 215.6cm^2

(316) G3　J-28(Sec-29)　DECK

(a) Acting stress

σcmax = -161 N/mm^2　　0.75σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma$c = 161 N/mm^2

τmax = 11 N/mm^2

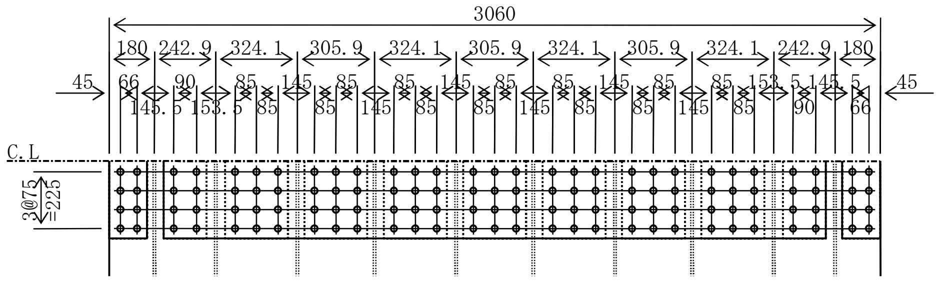
(b) Section area of main plate

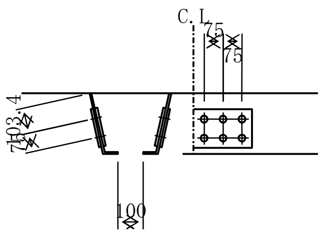
1-DECK　PL　3060 * 16　　　Ag = 489.6 cm^2　(SM490Y)

4-U.RIB 320 * 240 * 8　　　Agr = 215.6 cm^2　(SM490Y)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate　Pc = σc * Ag = 161 * 48960 = 7860577 N

・Rib　Pcr = σc * Agr = 161 * 21560 = 3461480 N

(e) Required section area of the splice plates

・Mother material(One side)　AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib　　　AgrR = Agr = 215.6 cm^2

(f) Required bolt number

・Main plate　n = Pc / (108000 * 1.00) = 7860577 / 108000 = 72.8 pcs.

・Rib　nr = Pcr / (108000 * 1.00) = 3461480 / 108000 = 32.1 pcs. (4 @ 12 = 48 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 116 = 7860577 / 116 = 67764 N

ρs = τ * Ag / 116 = 11 * 48960 / 116 = 4749 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(67764^2 + 4749^2)}$ = 67930 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
2-SPL PL	151 * 9	27.2	
1-SPL PL	2627 * 9	236.4	
		263.6	
2-SPL PL	151 * 14	42.3	
2-SPL PL	170 * 14	47.6	
7-SPL PL	250 * 14	245.0	
		334.9	
16-SPL PL	155 * 10	248.0	＞ AgrR = 215.6cm^2

(317) G3 J-29(Sec-30) DECK

(a) Acting stress

$\sigma cmax$ = -154 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 158 N/mm^2

τmax = 16 N/mm^2

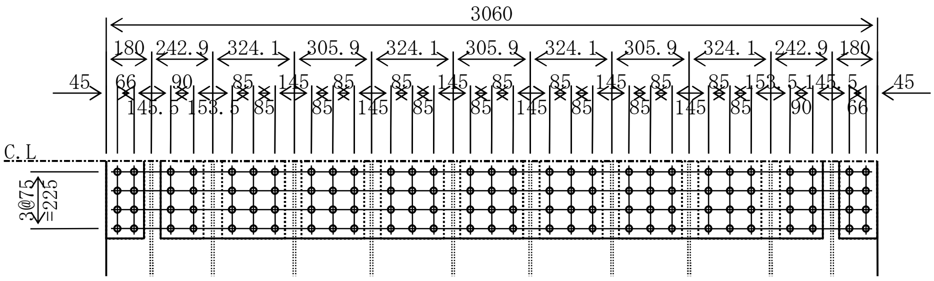
(b) Section area of main plate

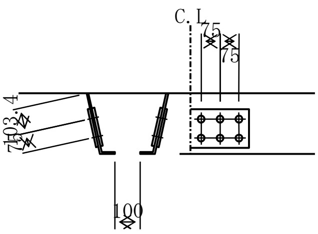
1-DECK PL 3060 * 16   Ag = 489.6 cm^2 (SM490Y)

4-U.RIB 320 * 240 * 8   Agr = 215.6 cm^2 (SM490Y)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 48960 = 7711200 N

・Rib Pcr = σc * Agr = 158 * 21560 = 3395700 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AgrR = Agr = 215.6 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 7711200 / 108000 = 71.4 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 3395700 / 108000 = 31.4 pcs. (4 @ 12 = 48 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 116 = 7711200 / 116 = 66476 N

ρs = τ * Ag / 116 = 16 * 48960 / 116 = 6596 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(66476^2 + 6596^2) = 66802 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)
2-SPL PL	151 * 9	27.2
1-SPL PL	2627 * 9	236.4
		263.6
2-SPL PL	151 * 14	42.3
2-SPL PL	170 * 14	47.6
7-SPL PL	250 * 14	245.0
		334.9
16-SPL PL	155 * 10	248.0

248.0 ＞ AgrR = 215.6cm^2

(318) G3 J-30(Sec-31) DECK

(a) Acting stress

$\sigma cmax$ = -136 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 158 N/mm^2

τmax = 23 N/mm^2

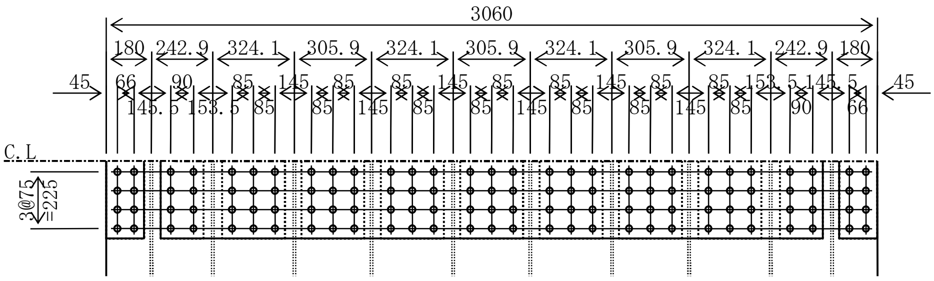
(b) Section area of main plate

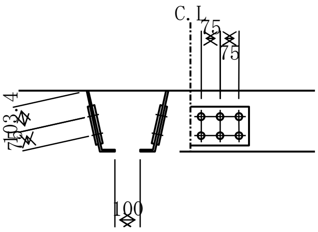
1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM490Y)

4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM490Y)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 48960 = 7711200 N

・Rib Pcr = σc * Agr = 158 * 21560 = 3395700 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AgrR = Agr = 215.6 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 7711200 / 108000 = 71.4 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 3395700 / 108000 = 31.4 pcs. (4 @ 12 = 48 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 116 = 7711200 / 116 = 66476 N

ρs = τ * Ag / 116 = 23 * 48960 / 116 = 9519 N

ρ = √(ρp^2 + ρs^2) = √(66476^2 + 9519^2) = 67154 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)
2-SPL PL	151 * 9	27.2
1-SPL PL	2627 * 9	236.4
		263.6
2-SPL PL	151 * 14	42.3
2-SPL PL	170 * 14	47.6
7-SPL PL	250 * 14	245.0
		334.9
16-SPL PL	155 * 10	248.0 ＞ AgrR = 215.6cm^2

(319) G3 J-31(Sec-32) DECK

(a) Acting stress

$\sigma cmax$ = -113 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴σc = 113 N/mm^2

τmax = 30 N/mm^2

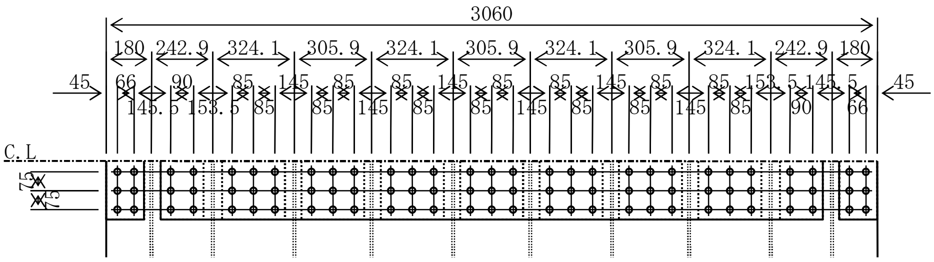
(b) Section area of main plate

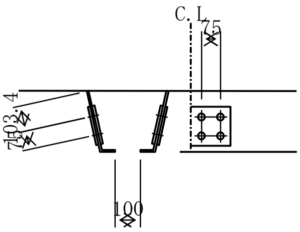
1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM400)

4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM400)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 113 * 48960 = 5549224 N

・Rib Pcr = σc * Agr = 113 * 21560 = 2443654 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AgrR = Agr = 215.6 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5549224 / 108000 = 51.4 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2443654 / 108000 = 22.6 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 87 = 5549224 / 87 = 63784 N

ρs = τ * Ag / 87 = 30 * 48960 / 87 = 16754 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(63784^2 + 16754^2) = 65948 N

(h) Check of splice plates

	(SS400)	$A_{gs}(cm^2)$
2-SPL PL	151 * 9	27.2
1-SPL PL	2627 * 9	236.4
		263.6
2-SPL PL	151 * 14	42.3
2-SPL PL	170 * 14	47.6
7-SPL PL	250 * 14	245.0
		334.9
16-SPL PL	155 * 10	248.0

16-SPL PL 155 * 10 248.0 ＞ AgrR = 215.6cm^2

(320) G3 J-32(Sec-33) DECK

(a) Acting stress

$\sigma cmax$ = -80 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 34 N/mm^2

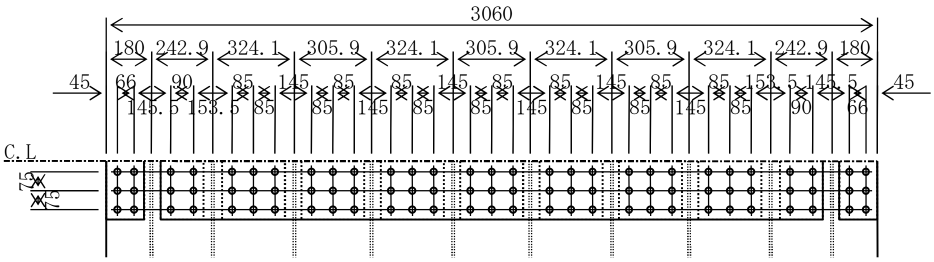
(b) Section area of main plate

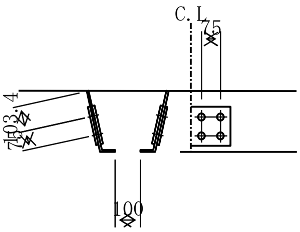
1-DECK PL 3060 * 16 Ag = 489.6 cm^2 (SM400)

4-U.RIB 320 * 240 * 8 Agr = 215.6 cm^2 (SM400)

ΣAg = Ag + Agr = 489.6 + 215.6 = 705.2 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 48960 = 5140800 N

・Rib Pcr = σc * Agr = 105 * 21560 = 2263800 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 489.6 / 2 = 244.8 cm^2

・Rib AgrR = Agr = 215.6 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5140800 / 108000 = 47.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2263800 / 108000 = 21.0 pcs. (4 @ 8 = 32 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 87 = 5140800 / 87 = 59090 N

ρs = τ * Ag / 87 = 34 * 48960 / 87 = 19149 N

ρ = √(ρp^2 + ρs^2) = √(59090^2 + 19149^2) = 62115 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
2-SPL	PL 151 * 9	27.2
1-SPL	PL 2627 * 9	236.4
		263.6
2-SPL	PL 151 * 14	42.3
2-SPL	PL 170 * 14	47.6
7-SPL	PL 250 * 14	245.0
		334.9
16-SPL	PL 155 * 10	248.0 ＞ AgrR = 215.6cm^2

(321) D-4 J-1(Sec-1) DECK-1

(a) Acting stress

$\sigma cmax$ = -80 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 158 N/mm^2

τmax = 31 N/mm^2

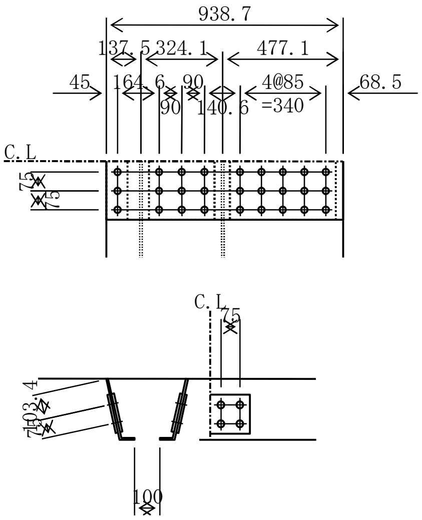
(b) Section area of main plate

1-DECK-1 PL 939 * 16   Ag = 150.2 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 150.2 + 53.9 = 204.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 15019 = 2365499 N

・Rib Pcr = σc * Agr = 158 * 5390 = 848925 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 150.2 / 2 = 75.1 cm^2

・Rib   AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2365499 / 108000 = 21.9 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 848925 / 108000 = 7.9 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 27 = 2365499 / 27 = 87611 N

ρs = τ * Ag / 27 = 31 * 15019 / 27 = 17210 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(87611^2 + 17210^2)}$ = 89285 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
1-SPL PL	939 ＊ 9	84.5	
1-SPL PL	85 ＊ 14	11.9	
1-SPL PL	260 ＊ 14	36.4	
1-SPL PL	420 ＊ 14	58.8	
		107.1	
4-SPL PL	155 ＊ 10	62.0	＞ AgrR = 53.9cm2

(322) D-4 J-1(Sec-1) DECK-2

(a) Acting stress

$\sigma cmax$ = -80 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 158 N/mm^2

τmax = 31 N/mm^2

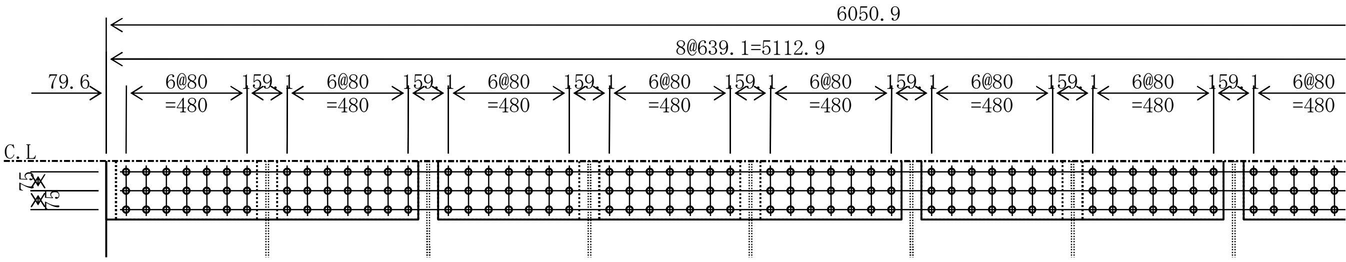
(b) Section area of main plate

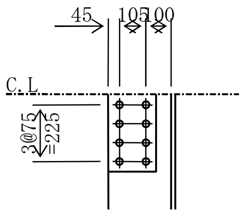
1-DECK-2 PL 6051 * 16 Ag = 968.2 cm^2 (SM490Y)

11-RIB PL 250 * 24 Agr = 660.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 968.2 + 660.0 = 1628.2 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 96815 = 15248369 N

・Rib Pcr = σc * Agr = 158 * 66000 = 10395000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 968.2 / 2 = 484.1 cm^2

・Rib AgrR = Agr = 660.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 15248369 / 108000 = 141.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 10395000 / 108000 = 86.3 pcs. (11 @ 8 = 88 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 195 = 15248369 / 195 = 78197 N

ρs = τ * Ag / 195 = 31 * 96815 / 195 = 15360 N

ρ = $\sqrt{}(\rho p^2 + \rho s^2)$ = $\sqrt{}$(78197^2 + 15360^2) = 79691 N

(h) Check of splice plates

(SM490Y)	Ags(cm^2)
1-SPL PL 1239 * 9	111.5
1-SPL PL 1838 * 9	165.4
1-SPL PL 1199 * 9	107.9
1-SPL PL 1538 * 9	138.4
	523.2
8-SPL PL 560 * 14	627.2
1-SPL PL 400 * 14	56.0
1-SPL PL 240 * 14	33.6
1-SPL PL 80 * 14	11.2
	728.0
22-SPL PL 185 * 18	732.6 ＞ AgrR = 660.0cm^2

(323) D-4 J-1(Sec-1) DECK-3

(a) Acting stress

$\sigma cmax$ = -80 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 158 N/mm^2

τmax = 31 N/mm^2

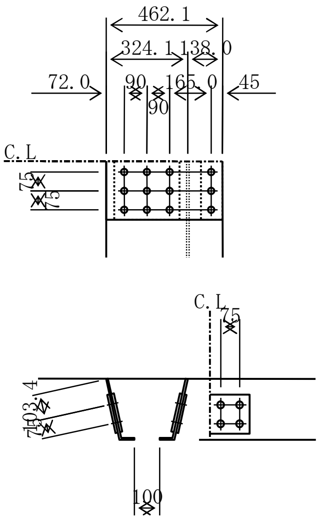
(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 7393 = 1164391 N

・Rib Pcr = σc * Agr = 158 * 5390 = 848925 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1164391 / 108000 = 10.8 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 848925 / 108000 = 7.9 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 12 = 1164391 / 12 = 97033 N

ρs = τ * Ag / 12 = 31 * 7393 / 12 = 19060 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(97033^2 + 19060^2)}$ = 98887 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)		
1-SPL PL	462 * 9	41.6		
1-SPL PL	260 * 14	36.4		
1-SPL PL	85 * 14	11.9		
		48.3		
4-SPL PL	155 * 10	62.0	＞ AgrR =	53.9cm2

(324) D-4 J-2(Sec-2) DECK-1

(a) Acting stress

$\sigma cmax$ = -100 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 20 N/mm^2

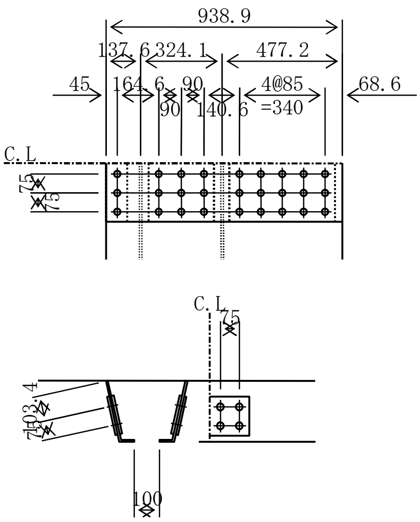
(b) Section area of main plate

1-DECK-1 PL 939 * 16 Ag = 150.2 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 150.2 + 53.9 = 204.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 15022 = 1577285 N

・Rib Pcr = σc * Agr = 105 * 5390 = 565950 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 150.2 / 2 = 75.1 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1577285 / 108000 = 14.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 27 = 1577285 / 27 = 58418 N

ρs = τ * Ag / 27 = 20 * 15022 / 27 = 10984 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(58418^2 + 10984^2)}$ = 59442 N

(h) Check of splice plates

	(SS400)	$Ags(cm^2)$		
1-SPL PL	939 ＊ 9	84.5		
1-SPL PL	85 ＊ 14	11.9		
1-SPL PL	260 ＊ 14	36.4		
1-SPL PL	420 ＊ 14	58.8		
		107.1		
4-SPL PL	155 ＊ 10	62.0	＞ AgrR =	53.9cm2

(325) D-4 J-2(Sec-2) DECK-2

(a) Acting stress

σ cmax = -100 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2

∴ σ c = 105 N/mm^2

τ max = 20 N/mm^2

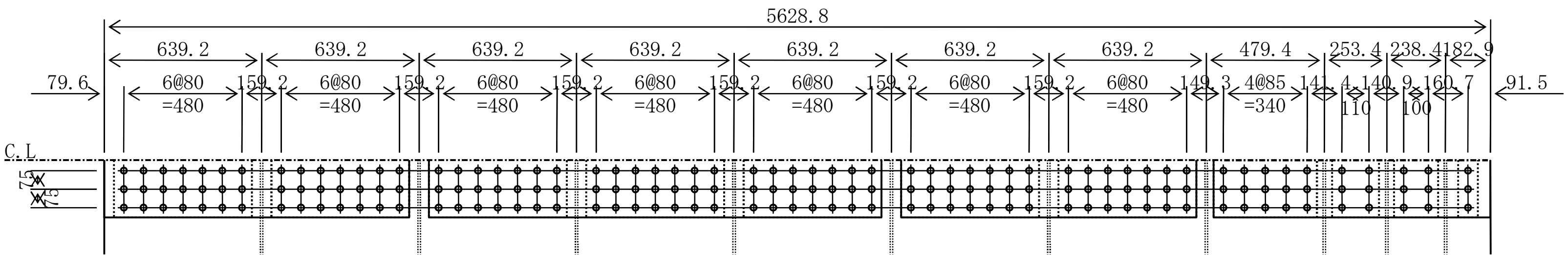
(b) Section area of main plate

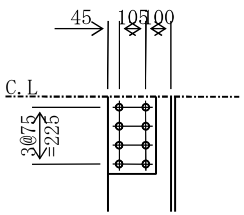
1-DECK-2 PL 5629 * 16 Ag = 900.6 cm^2 (SM400)

11-RIB PL 250 * 24 Agr = 660.0 cm^2 (SM400)

ΣAg = Ag + Agr = 900.6 + 660.0 = 1560.6 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate $P_c = \sigma c * A_g = 105 * 90060 = 9456334$ N

・Rib $P_{cr} = \sigma c * A_{gr} = 105 * 66000 = 6930000$ N

(e) Required section area of the splice plates

・Mother material(One side) $A_{gR} = A_g / 2 = 900.6 / 2 = 450.3\ cm^2$

・Rib $A_{grR} = A_{gr} = 660.0\ cm^2$

(f) Required bolt number

・Main plate $n = P_c / (108000 * 1.00) = 9456334 / 108000 = 87.6$ pcs.

・Rib $n_r = P_{cr} / (108000 * 1.00) = 6930000 / 108000 = 64.2$ pcs. (11 @ 8 = 88 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

$\rho p = P_c / 177 = 9456334 / 177 = 53426$ N

$\rho s = \tau * A_g / 177 = 20 * 90060 / 177 = 10045$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(53426^2 + 10045^2)} = 54362$ N

(h) Check of splice plates

(SS400)	$Ags(cm^2)$
1-SPL PL 1239 * 9	111.5
1-SPL PL 1838 * 9	165.5
1-SPL PL 1199 * 9	107.9
1-SPL PL 1124 * 9	101.2
	486.1

$> A_{gR} = 450.3 cm^2$

7-SPL PL 560 * 14	548.8
1-SPL PL 420 * 14	58.8
1-SPL PL 190 * 14	26.6
1-SPL PL 180 * 14	25.2
1-SPL PL 80 * 14	11.2
	670.6

$> A_{gR} = 450.3 cm^2$

22-SPL PL 185 * 18 732.6 $> A_{grR} = 660.0 cm^2$

(326) D-4 J-2(Sec-2) DECK-3

(a) Acting stress

$\sigma cmax$ = -100 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴σc = 105 N/mm^2

τmax = 20 N/mm^2

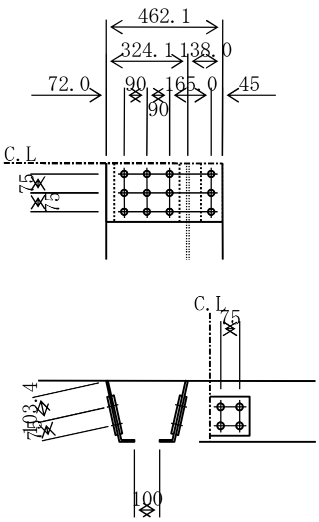
(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 7393 = 776261 N

・Rib Pcr = σc * Agr = 105 * 5390 = 565950 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 776261 / 108000 = 7.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 12 = 776261 / 12 = 64688 N

ρs = τ * Ag / 12 = 20 * 7393 / 12 = 12163 N

ρ = $\sqrt{}(\rho p^2 + \rho s^2)$ = $\sqrt{}$(64688^2 + 12163^2) = 65822 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	462 * 9	41.6	
1-SPL PL	260 * 14	36.4	
1-SPL PL	85 * 14	11.9	
		48.3	
4-SPL PL	155 * 10	62.0	＞ AgrR = 53.9cm2

(327) D-4 J-3(Sec-3) DECK-1

(a) Acting stress

$\sigma cmax$ = -110 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 110 N/mm^2

τmax = 11 N/mm^2

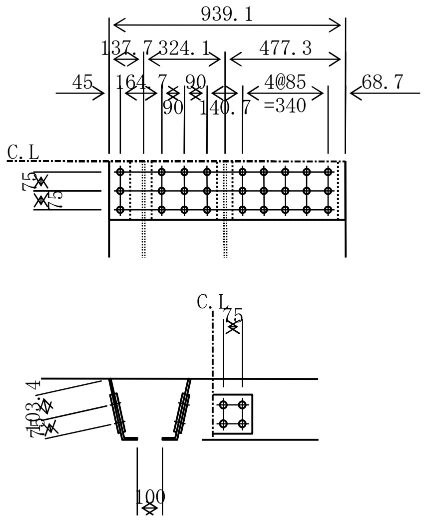
(b) Section area of main plate

1-DECK-1 PL 939 * 16 Ag = 150.3 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 150.3 + 53.9 = 204.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 110 * 15025 = 1648456 N

・Rib Pcr = σc * Agr = 110 * 5390 = 591342 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 150.3 / 2 = 75.1 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1648456 / 108000 = 15.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 591342 / 108000 = 5.5 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 27 = 1648456 / 27 = 61054 N

ρs = τ * Ag / 27 = 11 * 15025 / 27 = 6255 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(61054^2 + 6255^2)}$ = 61374 N

(h) Check of splice plates

	(SS400)	$A_{gs}(cm^2)$		
1-SPL PL	939 * 9	84.5		
1-SPL PL	85 * 14	11.9		
1-SPL PL	260 * 14	36.4		
1-SPL PL	420 * 14	58.8		
		107.1		
4-SPL PL	155 * 10	62.0	> AgrR =	53.9cm2

(328) D-4 J-3(Sec-3) DECK-2

(a) Acting stress

$\sigma cmax$ = -110 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 110 N/mm^2

τmax = 11 N/mm^2

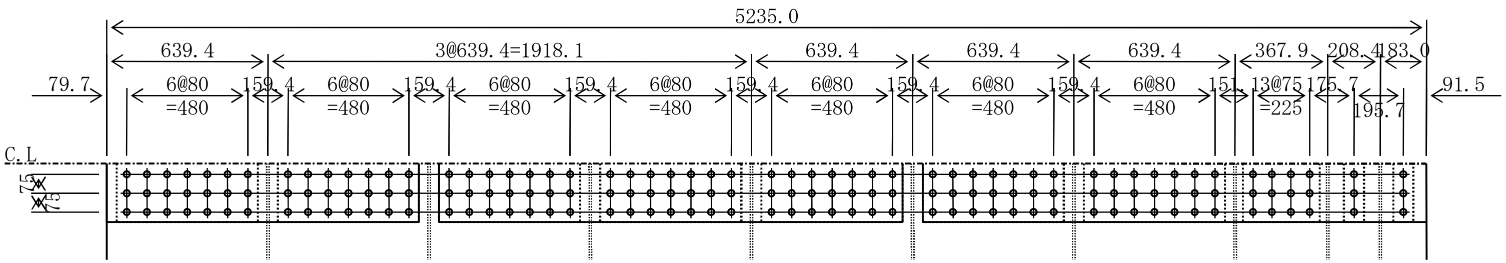
(b) Section area of main plate

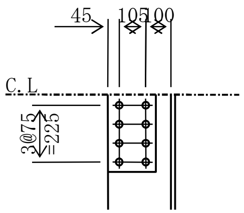
1-DECK-2 PL 5235 * 16 Ag = 837.6 cm^2 (SM400)

10-RIB PL 250 * 24 Agr = 600.0 cm^2 (SM400)

ΣAg = Ag + Agr = 837.6 + 600.0 = 1437.6 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate $Pc = \sigma c * Ag = 110 * 83760 = 9189358$ N

・Rib $Pcr = \sigma c * Agr = 110 * 60000 = 6582660$ N

(e) Required section area of the splice plates

・Mother material(One side) $AgR = Ag / 2 = 837.6 / 2 = 418.8$ cm^2

・Rib $AgrR = Agr = 600.0$ cm^2

(f) Required bolt number

・Main plate $n = Pc / (108000 * 1.00) = 9189358 / 108000 = 85.1$ pcs.

・Rib $nr = Pcr / (108000 * 1.00) = 6582660 / 108000 = 61.0$ pcs. (10 @ 8 = 80 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

$\rho p = Pc / 165 = 9189358 / 165 = 55693$ N

$\rho s = \tau * Ag / 165 = 11 * 83760 / 165 = 5706$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(55693^2 + 5706^2)} = 55985$ N

(h) Check of splice plates

	(SS400)	$Ags(cm^2)$
1-SPL PL	1239 * 9	111.5
1-SPL PL	1839 * 9	165.5
1-SPL PL	1998 * 9	179.9
		456.9
7-SPL PL	560 * 14	548.8
1-SPL PL	305 * 14	42.7
2-SPL PL	80 * 14	22.4
		613.9
20-SPL PL	185 * 18	666.0 ＞ AgrR = 600.0cm^2

(329) D-4 J-3(Sec-3) DECK-3

(a) Acting stress

$\sigma cmax$ = -110 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 110 N/mm^2

τmax = 11 N/mm^2

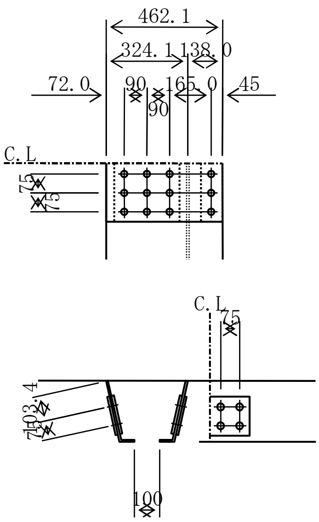
(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 110 * 7393 = 811089 N

・Rib Pcr = σc * Agr = 110 * 5390 = 591342 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 811089 / 108000 = 7.5 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 591342 / 108000 = 5.5 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 12 = 811089 / 12 = 67591 N

ρs = τ * Ag / 12 = 11 * 7393 / 12 = 6925 N

ρ = $\sqrt{}(\rho p^2 + \rho s^2)$ = $\sqrt{}$(67591^2 + 6925^2) = 67945 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	462 * 9	41.6	
1-SPL PL	260 * 14	36.4	
1-SPL PL	85 * 14	11.9	
		48.3	
4-SPL PL	155 * 10	62.0	> AgrR = 53.9cm2

(330) D-4 J-4(Sec-5) DECK-1

(a) Acting stress

$\sigma cmax$ = -113 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 113 N/mm^2

τmax = 6 N/mm^2

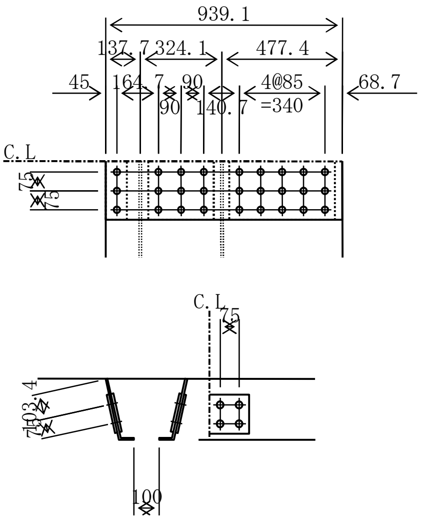
(b) Section area of main plate

1-DECK-1 PL 939 * 16 Ag = 150.3 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 150.3 + 53.9 = 204.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 113 * 15026 = 1697403 N

・Rib Pcr = σc * Agr = 113 * 5390 = 608881 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 150.3 / 2 = 75.1 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1697403 / 108000 = 15.7 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 608881 / 108000 = 5.6 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 27 = 1697403 / 27 = 62867 N

ρs = τ * Ag / 27 = 6 * 15026 / 27 = 3417 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(62867^2 + 3417^2)}$ = 62960 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
1-SPL PL	939 * 9	84.5
1-SPL PL	85 * 14	11.9
1-SPL PL	260 * 14	36.4
1-SPL PL	420 * 14	58.8
		107.1

4-SPL PL 155 * 10 62.0 ＞ AgrR = 53.9cm2

(331) D-4 J-4(Sec-5) DECK-2

(a) Acting stress

σ cmax = -113 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma$c = 113 N/mm^2

τmax = 6 N/mm^2

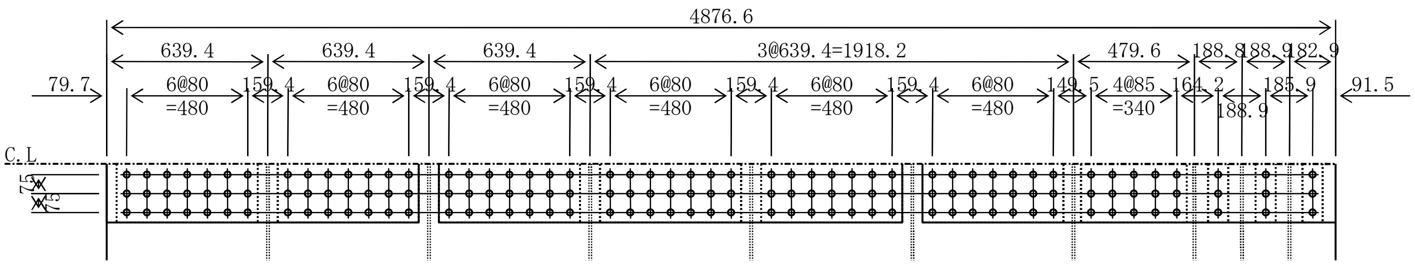
(b) Section area of main plate

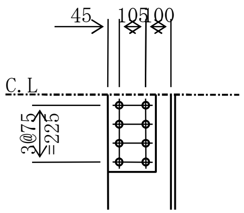
1-DECK-2 PL 4877 * 16   Ag = 780.3 cm^2 (SM400)

10-RIB   PL 250 * 24   Agr = 600.0 cm^2 (SM400)

ΣAg = Ag + Agr = 780.3 + 600.0 = 1380.3 cm^2

(c) Bolt arrangement





(d) Design axial force

- Main plate $P_c = \sigma_c * A_g = 113 * 78026 = 8814180$ N
- Rib $P_{cr} = \sigma_c * A_{gr} = 113 * 60000 = 6777900$ N

(e) Required section area of the splice plates

- Mother material(One side) $A_{gR} = A_g / 2 = 780.3 / 2 = 390.1\ cm^2$
- Rib $A_{grR} = A_{gr} = 600.0\ cm^2$

(f) Required bolt number

- Main plate $n = P_c / (108000 * 1.00) = 8814180 / 108000 = 81.6$ pcs.
- Rib $n_r = P_{cr} / (108000 * 1.00) = 6777900 / 108000 = 62.8$ pcs. (10 @ 8 = 80 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
$\rho_a = 108000$ N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

$\rho_p = P_c / 150 = 8814180 / 150 = 58761$ N
$\rho_s = \tau * A_g / 150 = 6 * 78026 / 150 = 3194$ N
$\rho = \sqrt{(\rho_p^2 + \rho_s^2)} = \sqrt{(58761^2 + 3194^2)} = 58848$ N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
1-SPL	PL 1239 * 9	111.5
1-SPL	PL 1839 * 9	165.5
1-SPL	PL 1640 * 9	147.6
		424.6
6-SPL	PL 560 * 14	470.4
1-SPL	PL 420 * 14	58.8
3-SPL	PL 80 * 14	33.6
		562.8
20-SPL	PL 185 * 18	666.0 ＞ AgrR = 600.0cm^2

(332) D-4　J-4(Sec-5)　DECK-3

(a) Acting stress

$\sigma cmax$ = -113 N/mm^2　　0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 113 N/mm^2

τmax = 6 N/mm^2

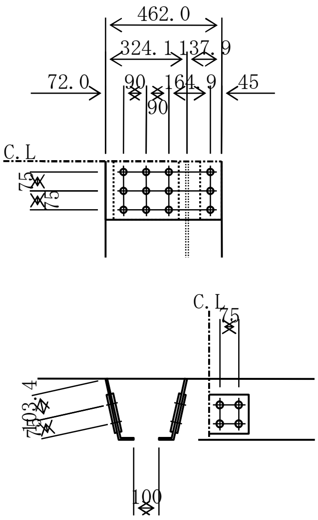
(b) Section area of main plate

1-DECK-3　PL　462 * 16　　　Ag = 73.9 cm^2　(SM400)

1-U.RIB 320 * 240 * 8　　　Agr = 53.9 cm^2　(SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate　Pc = σc * Ag = 113 * 7392 = 835019 N

・Rib　Pcr = σc * Agr = 113 * 5390 = 608881 N

(e) Required section area of the splice plates

・Mother material(One side)　AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib　　AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate　n = Pc / (108000 * 1.00) = 835019 / 108000 = 7.7 pcs.

・Rib　nr = Pcr / (108000 * 1.00) = 608881 / 108000 = 5.6 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 12 = 835019 / 12 = 69585 N

ρs = τ * Ag / 12 = 6 * 7392 / 12 = 3782 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(69585^2 + 3782^2)}$ = 69688 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)		
1-SPL PL	462 ＊ 9	41.6		
1-SPL PL	260 ＊ 14	36.4		
1-SPL PL	85 ＊ 14	11.9		
		48.3		
4-SPL PL	155 ＊ 10	62.0	＞ AgrR =	53.9cm2

(333) D-4 J-5(Sec-6) DECK-1

(a) Acting stress

$\sigma cmax$ = -110 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 110 N/mm^2

τmax = 13 N/mm^2

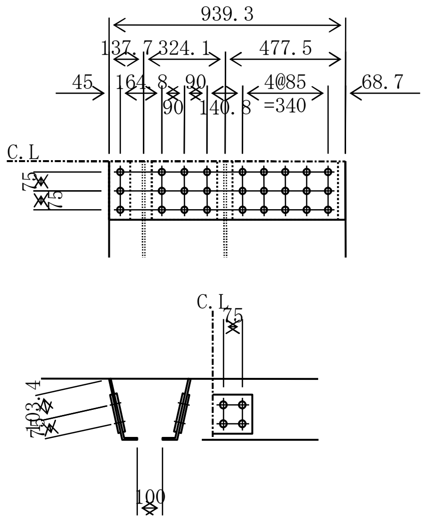
(b) Section area of main plate

1-DECK-1 PL 939 * 16 Ag = 150.3 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 150.3 + 53.9 = 204.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 110 * 15029 = 1648499 N

・Rib Pcr = σc * Agr = 110 * 5390 = 591213 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 150.3 / 2 = 75.1 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1648499 / 108000 = 15.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 591213 / 108000 = 5.5 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 27 = 1648499 / 27 = 61056 N

ρs = τ * Ag / 27 = 13 * 15029 / 27 = 6988 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(61056^2 + 6988^2)}$ = 61454 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)		
1-SPL PL	939 ＊ 9	84.5		
1-SPL PL	85 ＊ 14	11.9		
1-SPL PL	260 ＊ 14	36.4		
1-SPL PL	420 ＊ 14	58.8		
		107.1		
4-SPL PL	155 ＊ 10	62.0	＞ AgrR =	53.9cm2

(334) D-4 J-5(Sec-6) DECK-2

(a) Acting stress

σ cmax = -110 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2

∴ σ c = 110 N/mm^2

τ max = 13 N/mm^2

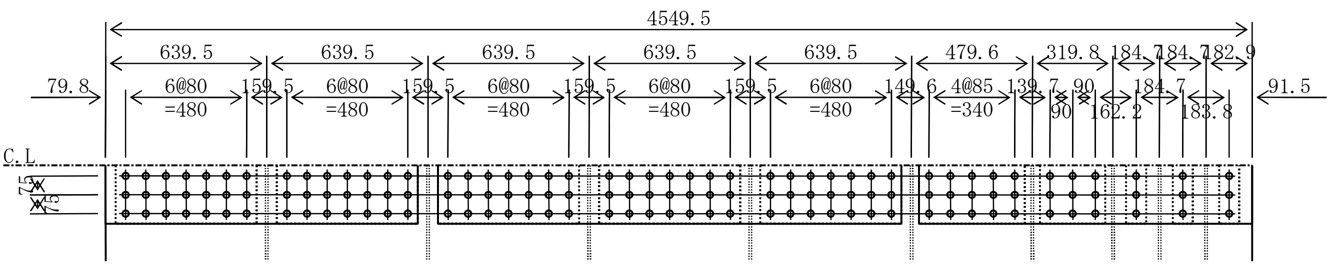
(b) Section area of main plate

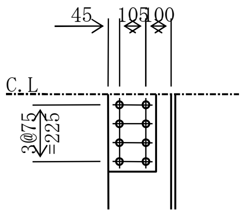
1-DECK-2 PL 4549 * 16 Ag = 727.9 cm^2 (SM400)

10-RIB PL 250 * 24 Agr = 600.0 cm^2 (SM400)

ΣAg = Ag + Agr = 727.9 + 600.0 = 1327.9 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σ c * Ag = 110 * 72792 = 7984283 N

・Rib Pcr = σ c * Agr = 110 * 60000 = 6581220 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 727.9 / 2 = 364.0 cm^2

・Rib AgrR = Agr = 600.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 7984283 / 108000 = 73.9 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 6581220 / 108000 = 60.9 pcs. (10 @ 8 = 80 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρ p = Pc / 138 = 7984283 / 138 = 57857 N

ρ s = τ * Ag / 138 = 13 * 72792 / 138 = 6622 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(57857^2 + 6622^2)}$ = 58235 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
1-SPL	PL 1239 * 9	111.5
1-SPL	PL 1839 * 9	165.5
1-SPL	PL 1322 * 9	119.0
		396.0
5-SPL	PL 560 * 14	392.0
1-SPL	PL 420 * 14	58.8
1-SPL	PL 260 * 14	36.4
3-SPL	PL 80 * 14	33.6
		520.8
20-SPL	PL 185 * 18	666.0 ＞ AgrR = 600.0cm^2

(335) D-4 J-5(Sec-6) DECK-3

(a) Acting stress

$\sigma cmax$ = -110 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 110 N/mm^2

τmax = 13 N/mm^2

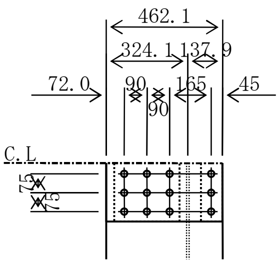
(b) Section area of main plate

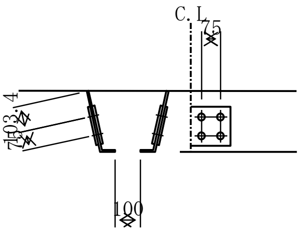
1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 110 * 7393 = 810894 N

・Rib Pcr = σc * Agr = 110 * 5390 = 591213 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 810894 / 108000 = 7.5 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 591213 / 108000 = 5.5 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 12 = 810894 / 12 = 67575 N

ρs = τ * Ag / 12 = 13 * 7393 / 12 = 7734 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(67575^2 + 7734^2) = 68016 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	462 * 9	41.6	
1-SPL PL	260 * 14	36.4	
1-SPL PL	85 * 14	11.9	
		48.3	
4-SPL PL	155 * 10	62.0	＞ AgrR = 53.9cm2

(336) D-4 J-6(Sec-7) DECK-1

(a) Acting stress

$\sigma cmax$ = -99 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 20 N/mm^2

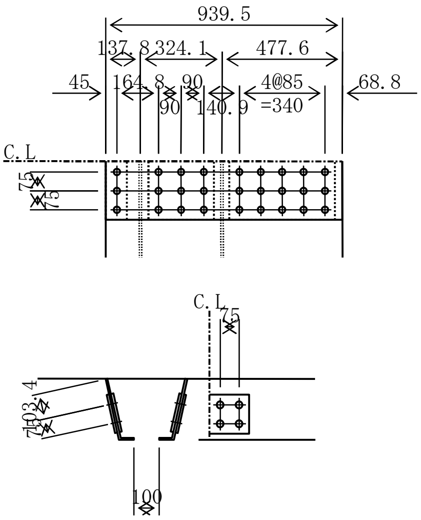
(b) Section area of main plate

1-DECK-1 PL 940 * 16 Ag = 150.3 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 150.3 + 53.9 = 204.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 15032 = 1578360 N

・Rib Pcr = σc * Agr = 105 * 5390 = 565950 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 150.3 / 2 = 75.2 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1578360 / 108000 = 14.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 27 = 1578360 / 27 = 58458 N

ρs = τ * Ag / 27 = 20 * 15032 / 27 = 10884 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(58458^2 + 10884^2) = 59462 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	940 ＊ 9	84.6	
1-SPL PL	85 ＊ 14	11.9	
1-SPL PL	260 ＊ 14	36.4	
1-SPL PL	420 ＊ 14	58.8	
		107.1	
4-SPL PL	155 ＊ 10	62.0	＞ AgrR = 53.9cm2

(337) D-4 J-6(Sec-7) DECK-2

(a) Acting stress

$\sigma cmax$ = -99 N/mm² 0.75 σca = 0.75 * 140 = 105 N/mm²

∴ σc = 105 N/mm²

τmax = 20 N/mm²

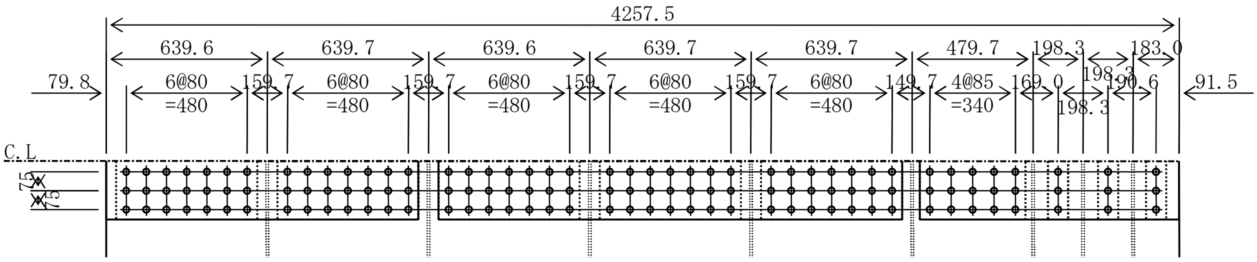
(b) Section area of main plate

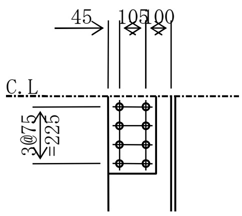
1-DECK-2 PL 4258 * 16 Ag = 681.2 cm² (SM400)

9-RIB PL 250 * 24 Agr = 540.0 cm² (SM400)

ΣAg = Ag + Agr = 681.2 + 540.0 = 1221.2 cm²

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 68120 = 7152634 N

・Rib Pcr = σc * Agr = 105 * 54000 = 5670000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 681.2 / 2 = 340.6 cm²

・Rib AgrR = Agr = 540.0 cm²

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 7152634 / 108000 = 66.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 5670000 / 108000 = 52.5 pcs. (9 @ 8 = 72 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 129 = 7152634 / 129 = 55447 N

ρs = τ * Ag / 129 = 20 * 68120 / 129 = 10324 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(55447^2 + 10324^2)}$ = 56400 N

(h) Check of splice plates

	(SS400)	$A_{gs}(cm^2)$
1-SPL	PL 1239 * 9	111.6
1-SPL	PL 1839 * 9	165.5
1-SPL	PL 1029 * 9	92.6
		369.7
5-SPL	PL 560 * 14	392.0
1-SPL	PL 420 * 14	58.8
3-SPL	PL 80 * 14	33.6
		484.4
18-SPL	PL 185 * 18	599.4 > AgrR = 540.0cm²

(338) D-4 J-6(Sec-7) DECK-3

(a) Acting stress

$\sigma cmax$ = -99 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 20 N/mm^2

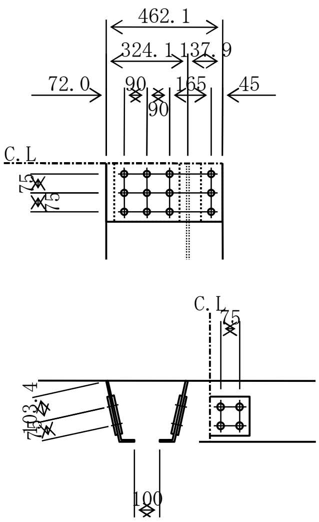
(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 7393 = 776244 N

・Rib Pcr = σc * Agr = 105 * 5390 = 565950 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 776244 / 108000 = 7.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 12 = 776244 / 12 = 64687 N

ρs = τ * Ag / 12 = 20 * 7393 / 12 = 12044 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64687^2 + 12044^2)}$ = 65799 N

(h) Check of splice plates

	(SS400)	A_{gs} (cm^2)		
1-SPL PL	462 * 9	41.6		
1-SPL PL	260 * 14	36.4		
1-SPL PL	85 * 14	11.9		
		48.3		
4-SPL PL	155 * 10	62.0	> AgrR =	53.9cm2

(339) D-4 J-7(Sec-8) DECK-1

(a) Acting stress

$\sigma cmax$ = −78 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 26 N/mm^2

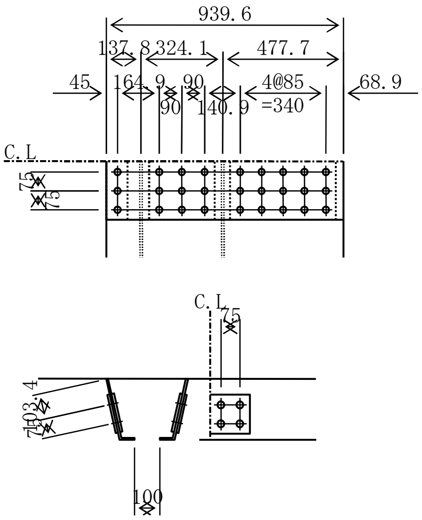
(b) Section area of main plate

1-DECK-1 PL 940 * 16 Ag = 150.3 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 150.3 + 53.9 = 204.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 15034 = 1578612 N

・Rib Pcr = σc * Agr = 105 * 5390 = 565950 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 150.3 / 2 = 75.2 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1578612 / 108000 = 14.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 27 = 1578612 / 27 = 58467 N

ρs = τ * Ag / 27 = 26 * 15034 / 27 = 14245 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(58467^2 + 14245^2)}$ = 60177 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)		
1-SPL PL	940 * 9	84.6		
1-SPL PL	85 * 14	11.9		
1-SPL PL	260 * 14	36.4		
1-SPL PL	420 * 14	58.8		
		107.1		
4-SPL PL	155 * 10	62.0	＞ AgrR =	53.9cm2

(340) D-4 J-7(Sec-8) DECK-2

(a) Acting stress

$\sigma cmax$ = -78 N/mm² 0.75 σca = 0.75 * 140 = 105 N/mm²

∴ σc = 105 N/mm²

τmax = 26 N/mm²

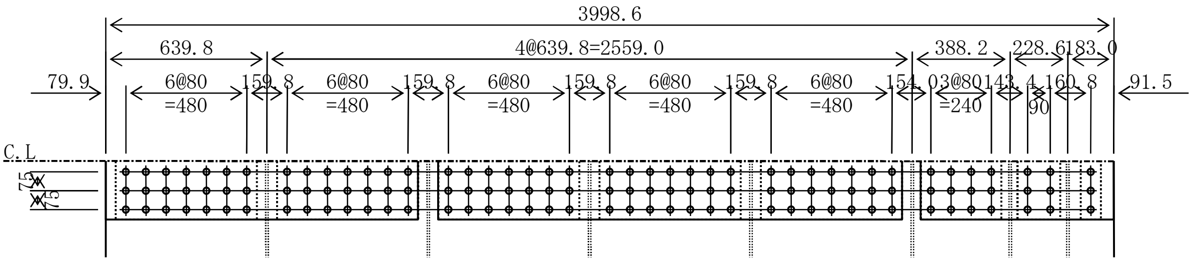
(b) Section area of main plate

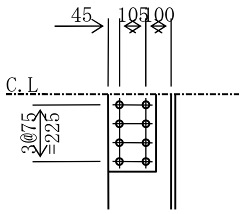
1-DECK-2 PL 3999 * 16 Ag = 639.8 cm² (SM400)

8-RIB PL 250 * 24 Agr = 480.0 cm² (SM400)

ΣAg = Ag + Agr = 639.8 + 480.0 = 1119.8 cm²

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 63977 = 6717614 N

・Rib Pcr = σc * Agr = 105 * 48000 = 5040000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 639.8 / 2 = 319.9 cm²

・Rib AgrR = Agr = 480.0 cm²

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 6717614 / 108000 = 62.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 5040000 / 108000 = 46.7 pcs. (8 @ 8 = 64 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 126 = 6717614 / 126 = 53314 N

ρs = τ * Ag / 126 = 26 * 63977 / 126 = 12989 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(53314^2 + 12989^2)}$ = 54874 N

(h) Check of splice plates

(SS400)	A_{gs} (cm^2)
1-SPL PL 1240 * 9	111.6
1-SPL PL 1840 * 9	165.6
1-SPL PL 766 * 9	68.9
	346.0
5-SPL PL 560 * 14	392.0
1-SPL PL 320 * 14	44.8
1-SPL PL 170 * 14	23.8
1-SPL PL 80 * 14	11.2
	471.8
16-SPL PL 185 * 18	532.8 ＞ AgrR = 480.0cm^2

(341) D-4　J-7(Sec-8)　DECK-3

(a) Acting stress

$\sigma cmax$ = -78 N/mm^2　　0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 26 N/mm^2

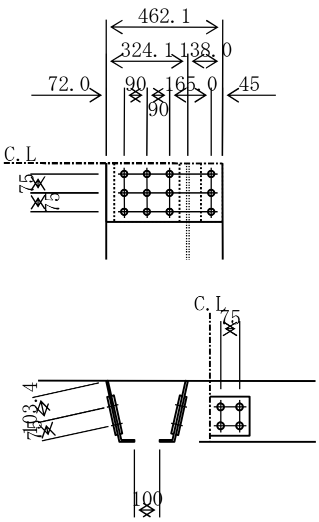
(b) Section area of main plate

1-DECK-3　PL　462 * 16　　　Ag = 73.9 cm^2　(SM400)

1-U.RIB 320 * 240 * 8　　　Agr = 53.9 cm^2　(SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate　Pc = σc * Ag = 105 * 7393 = 776311 N

・Rib　Pcr = σc * Agr = 105 * 5390 = 565950 N

(e) Required section area of the splice plates

・Mother material(One side)　AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib　　　AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate　n = Pc / (108000 * 1.00) = 776311 / 108000 = 7.2 pcs.

・Rib　nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 12 = 776311 / 12 = 64693 N

ρs = τ * Ag / 12 = 26 * 7393 / 12 = 15762 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64693^2 + 15762^2)}$ = 66585 N

(h) Check of splice plates

	(SS400)	$Ags(cm^2)$	
1-SPL PL	462 ＊ 9	41.6	
1-SPL PL	260 ＊ 14	36.4	
1-SPL PL	85 ＊ 14	11.9	
		48.3	
4-SPL PL	155 ＊ 10	62.0	＞ AgrR = 53.9cm2

(342) D-4 J-8(Sec-8) DECK-1

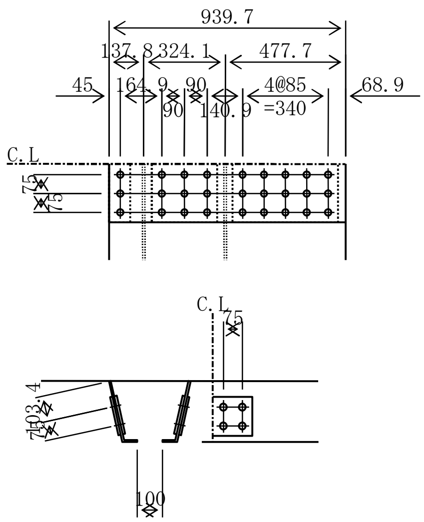
(a) Acting stress

σ tmax = 27 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma$ c = 105 N/mm^2
τ max = 33 N/mm^2

(b) Section area of main plate

1-DECK-1 PL 940 * 16 Ag = 150.3 cm^2 (SM400)
1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)
ΣAg = Ag + Agr = 150.3 + 53.9 = 204.2 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-1 PL 940 * 16 A = 150.3
(150.3 - (9* 2.5)* 1.6) * 1.1 = 125.8 < 150.3 $\therefore$An = 125.8 cm^2
1-U.RIB 320 * 240 * 8 Ar = 53.9
(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0
< 53.9 $\therefore$Anr = 41.0 cm^2
ΣAn = An + Anr = 125.8 + 41.0 = 166.8 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 27 * 204.2 / 166.8 = 33 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 12578 / 1.1 = 1200629 N
> σ tn * An = 33 * 12578 = 409383 N
Pc = σ c * Ag = 105 * 15035 = 1578629 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N
> σ tn * Anr = 33 * 4099 = 133399 N
Pcr = σ c * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 125.8 / 2 = 62.9 cm^2
AgR = Ag / 2 = 150.3 / 2 = 75.2 cm^2
・Rib AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

- Main plate n = Pc / (108000 * 1.00) = 1578629 / 108000 = 14.6 pcs.
- Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 27 = 1578629 / 27 = 58468$ N
$\rho s = \tau * Ag / 27 = 33 * 15035 / 27 = 18587$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(58468^2 + 18587^2)} = 61351$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			$Ans(cm^2)$
1-SPL PL	940 * 9	(84.6 -	(9*2.5)* 0.9)*1.1=	70.8<	84.6	∴ 70.8
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
1-SPL PL	260 * 14	(36.4 -	(3*2.5)* 1.4)*1.1=	28.5<	36.4	∴ 28.5
1-SPL PL	420 * 14	(58.8 -	(5*2.5)* 1.4)*1.1=	45.4<	58.8	∴ 45.4
		107.1				83.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(343) D-4 J-8(Sec-8) DECK-2

(a) Acting stress

σ tmax = 27 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2

σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2

∴ σ c = 105 N/mm^2

τ max = 33 N/mm^2

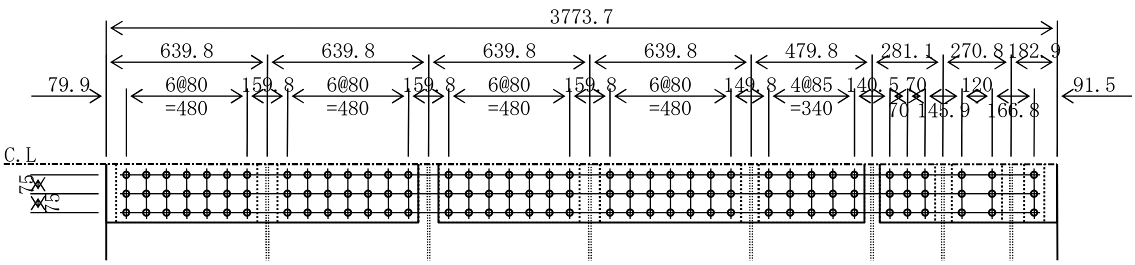
(b) Section area of main plate

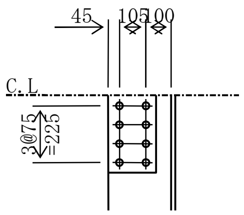
1-DECK-2 PL 3774 * 16 Ag = 603.8 cm^2 (SM400)

8-RIB PL 250 * 24 Agr = 480.0 cm^2 (SM400)

ΣAg = Ag + Agr = 603.8 + 480.0 = 1083.8 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-2 PL 3774 * 16 A = 603.8

(603.8 - (39* 2.5)* 1.6) * 1.1 = 492.6 < 603.8 ∴An = 492.6 cm^2

8-RIB PL 250 * 24 Ar = 480.0

(480.0 - 8*(2* 2.7)* 2.4) * 1.1 = 414.0 < 480.0 ∴Anr = 414.0 cm^2

ΣAn = An + Anr = 492.6 + 414.0 = 906.5 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 27 * 1083.8 / 906.5 = 32 N/mm^2

< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 49257 / 1.1 = 4701816 N

> σ tn * An = 32 * 49257 = 1564982 N

Pc = σ c * Ag = 105 * 60379 = 6339816 N

・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 41395 / 1.1 = 3951360 N

> σ tn * Anr = 32 * 41395 = 1315195 N

Pcr = σ c * Agr = 105 * 48000 = 5040000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 492.6 / 2 = 246.3 cm^2

AgR = Ag / 2 = 603.8 / 2 = 301.9 cm^2

・Rib AnrR = Anr = 414.0 cm^2

AgrR = Agr = 480.0 cm^2

(g) Required bolt number

- Main plate $n = Pc / (108000 * 1.00) = 6339816 / 108000 = 58.7$ pcs.
- Rib $nr = Pcr / (108000 * 1.00) = 5040000 / 108000 = 46.7$ pcs. (8 @ 8 = 64 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 117 = 6339816 / 117 = 54186$ N

$\rho s = \tau * Ag / 117 = 33 * 60379 / 117 = 17226$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(54186^2 + 17226^2)} = 56859$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			$Ans(cm^2)$
1-SPL PL	1240 * 9	(111.6 -	(14*2.5)* 0.9)*1.1=	88.1<	111.6	∴ 88.1
1-SPL PL	1690 * 9	(152.1 -	(19*2.5)* 0.9)*1.1=	120.2<	152.1	∴120.2
1-SPL PL	704 * 9	(63.4 -	(6*2.5)* 0.9)*1.1=	54.9<	63.4	∴ 54.9
		327.0				263.2
4-SPL PL	560 * 14	(313.6 -	4*(7*2.5)* 1.4)*1.1=	237.2<	313.6	∴237.2
1-SPL PL	420 * 14	(58.8 -	(5*2.5)* 1.4)*1.1=	45.4<	58.8	∴ 45.4
1-SPL PL	220 * 14	(30.8 -	(3*2.5)* 1.4)*1.1=	22.3<	30.8	∴ 22.3
1-SPL PL	200 * 14	(28.0 -	(2*2.5)* 1.4)*1.1=	23.1<	28.0	∴ 23.1
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1=	8.5<	11.2	∴ 8.5
		442.4				336.5
16-SPL PL	185 * 18	(532.8 -	16*(2*2.7)* 1.8)*1.1=	415.0<	532.8	∴415.0
		> AgrR				>AnrR

(344) D-4 J-8(Sec-8) DECK-3

(a) Acting stress

σ tmax = 27 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2

σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2

∴ σ c = 105 N/mm^2

τ max = 33 N/mm^2

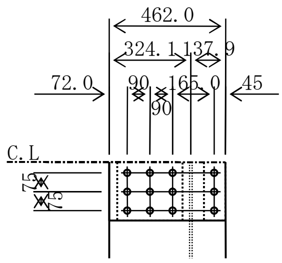
(b) Section area of main plate

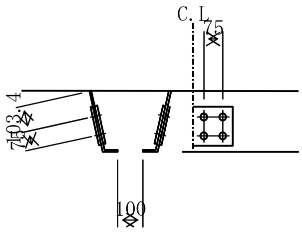
1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-3 PL 462 * 16 A = 73.9

(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 ∴An = 63.7 cm^2

1-U.RIB 320 * 240 * 8 Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9 ∴Anr = 41.0 cm^2

ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 27 * 127.8 / 104.7 = 32 N/mm^2

< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 6372 / 1.1 = 608210 N

> σ tn * An = 32 * 6372 = 206721 N

Pc = σ c * Ag = 105 * 7392 = 776210 N

・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N

> σ tn * Anr = 32 * 4099 = 132973 N

Pcr = σ c * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2

AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 776210 / 108000 = 7.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 12 = 776210 / 12 = 64684$ N

$\rho s = \tau * Ag / 12 = 33 * 7392 / 12 = 20563$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64684^2 + 20563^2)} = 67874$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	260 * 14	(36.4 -	(3*2.5)* 1.4)*1.1=	28.5<	36.4	∴ 28.5
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		48.3				37.7
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(345) D-4 J-9(Sec-9) DECK-1

(a) Acting stress

$\sigma tmax$ = 82 N/mm^2 0.75σta = 0.75 * 140 = 105 N/mm^2

$\sigma cmax$ = -64 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 39 N/mm^2

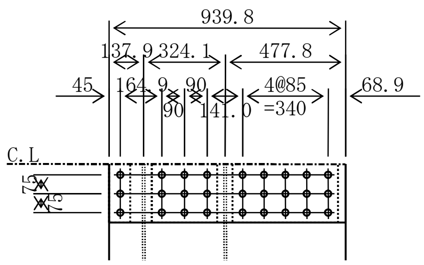
(b) Section area of main plate

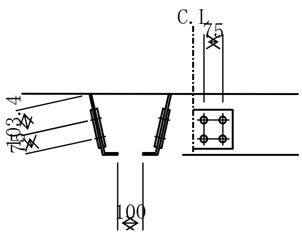
1-DECK-1 PL 940 * 16   Ag = 150.4 cm^2 (SM400)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 150.4 + 53.9 = 204.3 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-1 PL 940 * 16   A = 150.4

(150.4 - (9* 2.5)* 1.6) * 1.1 = 125.8 < 150.4 ∴An = 125.8 cm^2

1-U.RIB 320 * 240 * 8   Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9 ∴Anr = 41.0 cm^2

ΣAn = An + Anr = 125.8 + 41.0 = 166.8 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 82 * 204.3 / 166.8 = 100 N/mm^2

< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 100 * 12580 = 1258836 N

> 0.75σta * An / 1.1 = 105 * 12580 / 1.1 = 1200847 N

Pc = σc * Ag = 105 * 15037 = 1578847 N

・Rib Ptr = σtn * Anr = 100 * 4099 = 410122 N

> 0.75σta * Anr/ 1.1 = 105 * 4099 / 1.1 = 391230 N

Pcr = σc * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 125.8 / 2 = 62.9 cm^2

AgR = Ag / 2 = 150.4 / 2 = 75.2 cm^2

・Rib   AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate $n = Pc / (108000 * 1.00) = 1578847 / 108000 = 14.6$ pcs.

・Rib $nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2$ pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 27 = 1578847 / 27 = 58476$ N

$\rho s = \tau * Ag / 27 = 39 * 15037 / 27 = 21696$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(58476^2 + 21696^2)} = 62371$ N

(i) Check of splice plates

	(SS400)	Ags(cm²)	deduction of bolt holes			Ans(cm²)
1-SPL PL	940 * 9	(84.6 -	(9*2.5)* 0.9)*1.1=	70.8<	84.6	∴ 70.8
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
1-SPL PL	260 * 14	(36.4 -	(3*2.5)* 1.4)*1.1=	28.5<	36.4	∴ 28.5
1-SPL PL	420 * 14	(58.8 -	(5*2.5)* 1.4)*1.1=	45.4<	58.8	∴ 45.4
		107.1				83.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(346) D-4 J-9(Sec-9) DECK-2

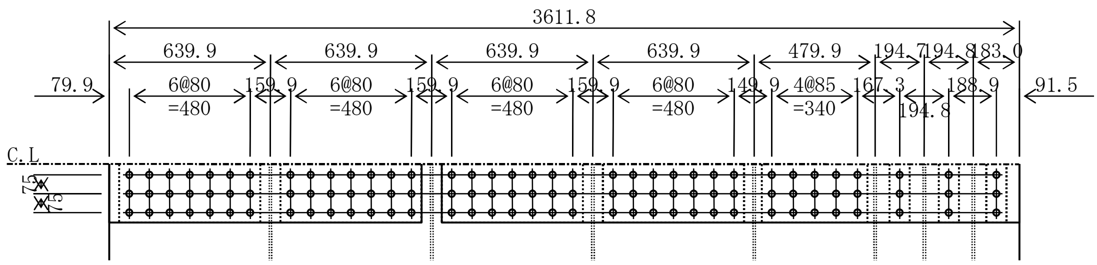
(a) Acting stress

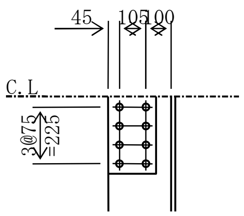
σ tmax = 82 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2
∴ σ c = 105 N/mm^2
τ max = 39 N/mm^2

(b) Section area of main plate

1-DECK-2 PL 3612 * 16 Ag = 577.9 cm^2 (SM400)
8-RIB PL 250 * 24 Agr = 480.0 cm^2 (SM400)
ΣAg = Ag + Agr = 577.9 + 480.0 = 1057.9 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-2 PL 3612 * 16 A = 577.9
(577.9 - (36* 2.5)* 1.6) * 1.1 = 477.3 < 577.9 ∴An = 477.3 cm^2
8-RIB PL 250 * 24 Ar = 480.0
(480.0 - 8*(2* 2.7)* 2.4) * 1.1 = 414.0 < 480.0 ∴Anr = 414.0 cm^2
ΣAn = An + Anr = 477.3 + 414.0 = 891.2 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 82 * 1057.9 / 891.2 = 97 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 97 * 47728 = 4628871 N
> 0.75 σ ta * An / 1.1 = 105 * 47728 / 1.1 = 4555891 N
Pc = σ c * Ag = 105 * 57789 = 6067891 N
・Rib Ptr = σ tn * Anr = 97 * 41395 = 4014656 N
> 0.75 σ ta * Anr/ 1.1 = 105 * 41395 / 1.1 = 3951360 N
Pcr = σ c * Agr = 105 * 48000 = 5040000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 477.3 / 2 = 238.6 cm^2
AgR = Ag / 2 = 577.9 / 2 = 288.9 cm^2
・Rib AnrR = Anr = 414.0 cm^2
AgrR = Agr = 480.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 6067891 / 108000 = 56.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 5040000 / 108000 = 46.7 pcs. (8 @ 8 = 64 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 108 = 6067891 / 108 = 56184$ N

$\rho s = \tau * Ag / 108 = 39 * 57789 / 108 = 20846$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(56184^2 + 20846^2)} = 59927$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	1240 * 9	(111.6 -	(14*2.5)* 0.9)*1.1=	88.1<	111.6	∴ 88.1
1-SPL PL	2292 * 9	(206.3 -	(22*2.5)* 0.9)*1.1=	172.5<	206.3	∴172.5
		317.9				260.6
4-SPL PL	560 * 14	(313.6 -	4*(7*2.5)* 1.4)*1.1=	237.2<	313.6	∴237.2
1-SPL PL	420 * 14	(58.8 -	(5*2.5)* 1.4)*1.1=	45.4<	58.8	∴ 45.4
3-SPL PL	80 * 14	(33.6 -	3*(1*2.5)* 1.4)*1.1=	25.4<	33.6	∴ 25.4
		406.0				308.0
16-SPL PL	185 * 18	(532.8 -	16*(2*2.7)* 1.8)*1.1=	415.0<	532.8	∴415.0
		> AgrR				>AnrR

(347) D-4 J-9(Sec-9) DECK-3

(a) Acting stress

σ_{tmax} = 82 N/mm^2 0.75σ_{ta} = 0.75 * 140 = 105 N/mm^2

σ_{cmax} = −64 N/mm^2 0.75σ_{ca} = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma_c$ = 105 N/mm^2

τ_{max} = 39 N/mm^2

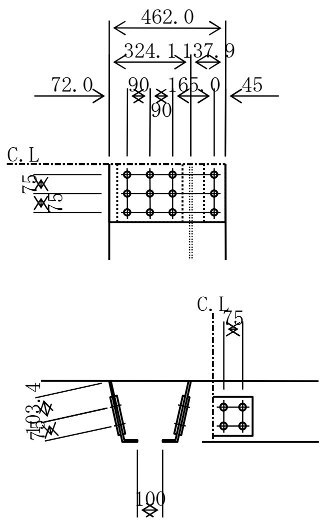
(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3 PL 462 * 16 A = 73.9

(73.9 − (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 ∴An = 63.7 cm^2

1-U.RIB 320 * 240 * 8 Ar = 53.9

(53.9 − (4* 2.7)* 0.8− 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9 ∴Anr = 41.0 cm^2

ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2

σ_{tn} = σ_{tmax} * ΣAg / ΣAn = 82 * 127.8 / 104.7 = 100 N/mm^2

< σ_{ta} = 140 N/mm^2

(e) Design axial force

・Main plate Pt = σ_{tn} * An = 100 * 6372 = 635551 N

> 0.75σ_{ta} * An / 1.1 = 105 * 6372 / 1.1 = 608194 N

Pc = σ_c * Ag = 105 * 7392 = 776194 N

・Rib Ptr = σ_{tn} * Anr = 100 * 4099 = 408828 N

> 0.75σ_{ta} * Anr/ 1.1 = 105 * 4099 / 1.1 = 391230 N

Pcr = σ_c * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2

AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate　n　= Pc　/ (108000 * 1.00) =　 776194 / 108000 =　7.2 pcs.
・Rib　nr = Pcr / (108000 * 1.00) =　 565950 / 108000 =　5.2 pcs. (1 @ 8 = 8 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 12 = 776194 / 12 = 64683$ N
$\rho s = \tau * Ag / 12 = 39 * 7392 / 12 = 23999$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64683^2 + 23999^2)} = 68991$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			$Ans(cm^2)$
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8＜	41.6	∴ 35.8
1-SPL PL	260 * 14	(36.4 -	(3*2.5)* 1.4)*1.1=	28.5＜	36.4	∴ 28.5
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2＜	11.9	∴ 9.2
		48.3				37.7
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4＜	62.0	∴ 44.4
		＞ AgrR				＞AnrR

(348) D-4 J-10(Sec-11) DECK-1

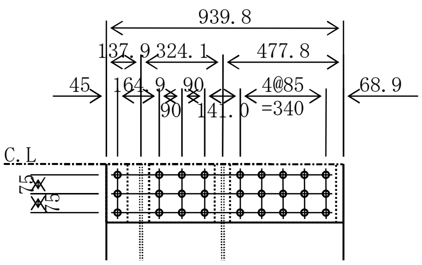
(a) Acting stress

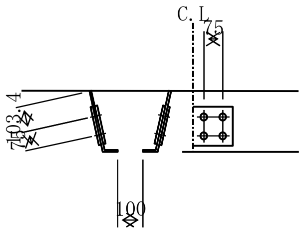
σ tmax = 86 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2
$\therefore$ σ c = 105 N/mm^2
τ max = 29 N/mm^2

(b) Section area of main plate

1-DECK-1 PL 940 * 16 Ag = 150.4 cm^2 (SM400)
1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)
ΣAg = Ag + Agr = 150.4 + 53.9 = 204.3 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-1 PL 940 * 16 A = 150.4
(150.4 - (9* 2.5)* 1.6) * 1.1 = 125.8 < 150.4 $\therefore$An = 125.8 cm^2
1-U.RIB 320 * 240 * 8 Ar = 53.9
(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0
< 53.9 $\therefore$Anr = 41.0 cm^2
ΣAn = An + Anr = 125.8 + 41.0 = 166.8 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 86 * 204.3 / 166.8 = 105 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 105 * 12581 = 1323621 N
> 0.75 σ ta * An / 1.1 = 105 * 12581 / 1.1 = 1200898 N
Pc = σ c * Ag = 105 * 15037 = 1578898 N
・Rib Ptr = σ tn * Anr = 105 * 4099 = 431211 N
> 0.75 σ ta * Anr/ 1.1 = 105 * 4099 / 1.1 = 391230 N
Pcr = σ c * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 125.8 / 2 = 62.9 cm^2
AgR = Ag / 2 = 150.4 / 2 = 75.2 cm^2
・Rib AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate $n = Pc / (108000 * 1.00) = 1578898 / 108000 = 14.6$ pcs.

・Rib $nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2$ pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 27 = 1578898 / 27 = 58478$ N

$\rho s = \tau * Ag / 27 = 29 * 15037 / 27 = 15947$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(58478^2 + 15947^2)} = 60613$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	940 * 9	(84.6 -	(9*2.5)* 0.9)*1.1=	70.8＜	84.6	∴ 70.8
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2＜	11.9	∴ 9.2
1-SPL PL	260 * 14	(36.4 -	(3*2.5)* 1.4)*1.1=	28.5＜	36.4	∴ 28.5
1-SPL PL	420 * 14	(58.8 -	(5*2.5)* 1.4)*1.1=	45.4＜	58.8	∴ 45.4
		107.1				83.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4＜	62.0	∴ 44.4
		＞ AgrR				＞AnrR

(349) D-4 J-10(Sec-11) DECK-2

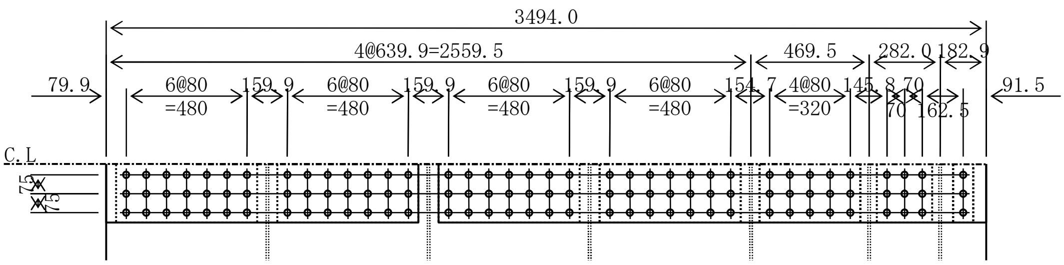
(a) Acting stress

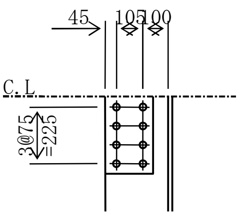
$\sigma tmax$ = 86 N/mm^2 0.75 σta = 0.75 * 140 = 105 N/mm^2
$\sigma cmax$ = -64 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma c$ = 105 N/mm^2
τmax = 29 N/mm^2

(b) Section area of main plate

1-DECK-2 PL 3494 * 16 Ag = 559.0 cm^2 (SM400)
7-RIB PL 250 * 24 Agr = 420.0 cm^2 (SM400)
ΣAg = Ag + Agr = 559.0 + 420.0 = 979.0 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-2 PL 3494 * 16 A = 559.0
(559.0 - (37* 2.5)* 1.6) * 1.1 = 452.1 < 559.0 ∴An = 452.1 cm^2
7-RIB PL 250 * 24 Ar = 420.0
(420.0 - 7*(2* 2.7)* 2.4) * 1.1 = 362.2 < 420.0 ∴Anr = 362.2 cm^2
ΣAn = An + Anr = 452.1 + 362.2 = 814.4 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 86 * 979.0 / 814.4 = 103 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 103 * 45214 = 4669734 N
> 0.75 σta * An / 1.1 = 105 * 45214 / 1.1 = 4315903 N
Pc = σc * Ag = 105 * 55904 = 5869903 N
・Rib Ptr = σtn * Anr = 103 * 36221 = 3740891 N
> 0.75 σta * Anr/ 1.1 = 105 * 36221 / 1.1 = 3457440 N
Pcr = σc * Agr = 105 * 42000 = 4410000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 452.1 / 2 = 226.1 cm^2
AgR = Ag / 2 = 559.0 / 2 = 279.5 cm^2
・Rib AnrR = Anr = 362.2 cm^2
AgrR = Agr = 420.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5869903 / 108000 = 54.4 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 4410000 / 108000 = 40.8 pcs. (7 @ 8 = 56 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 111 = 5869903 / 111 = 52882$ N

$\rho s = \tau * Ag / 111 = 29 * 55904 / 111 = 14421$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(52882^2 + 14421^2)} = 54813$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
1-SPL PL	1240 * 9	(111.6 -	(14*2.5)* 0.9)*1.1= 88.1	< 111.6	∴ 88.1
1-SPL PL	2174 * 9	(195.7 -	(23*2.5)* 0.9)*1.1= 158.3	< 195.7	∴158.3
		307.3			246.4
4-SPL PL	560 * 14	(313.6 -	4*(7*2.5)* 1.4)*1.1= 237.2	< 313.6	∴237.2
1-SPL PL	400 * 14	(56.0 -	(5*2.5)* 1.4)*1.1= 42.4	< 56.0	∴ 42.4
1-SPL PL	220 * 14	(30.8 -	(3*2.5)* 1.4)*1.1= 22.3	< 30.8	∴ 22.3
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1= 8.5	< 11.2	∴ 8.5
		411.6			310.3
14-SPL PL	185 * 18	(466.2 -	14*(2*2.7)* 1.8)*1.1= 363.1	< 466.2	∴363.1
		> AgrR			>AnrR

(350) D-4 J-10(Sec-11) DECK-3

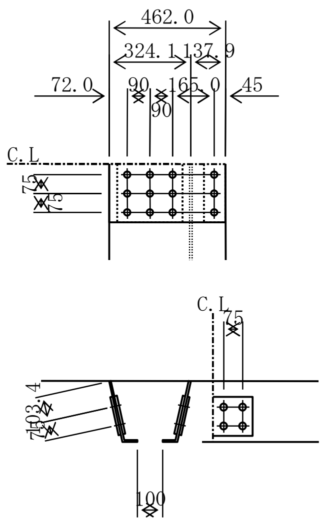
(a) Acting stress

σ tmax = 86 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2
∴ σ c = 105 N/mm^2
τ max = 29 N/mm^2

(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)
1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)
ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3 PL 462 * 16 A = 73.9
(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 ∴An = 63.7 cm^2
1-U.RIB 320 * 240 * 8 Ar = 53.9
(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0
< 53.9 ∴Anr = 41.0 cm^2
ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 86 * 127.8 / 104.7 = 105 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 105 * 6372 = 668237 N
> 0.75 σ ta * An / 1.1 = 105 * 6372 / 1.1 = 608194 N
Pc = σ c * Ag = 105 * 7392 = 776194 N
・Rib Ptr = σ tn * Anr = 105 * 4099 = 429854 N
> 0.75 σ ta * Anr/ 1.1 = 105 * 4099 / 1.1 = 391230 N
Pcr = σ c * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2
AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2
・Rib AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 776194 / 108000 = 7.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 12 = 776194 / 12 = 64683$ N

$\rho s = \tau * Ag / 12 = 29 * 7392 / 12 = 17639$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64683^2 + 17639^2)} = 67045$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			$Ans(cm^2)$
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	260 * 14	(36.4 -	(3*2.5)* 1.4)*1.1=	28.5<	36.4	∴ 28.5
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		48.3				37.7
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(351) D-4 J-11(Sec-12) DECK-1

(a) Acting stress

$\sigma tmax$ = 48 N/mm^2 0.75σta = 0.75 ＊ 140 = 105 N/mm^2

$\sigma cmax$ = -64 N/mm^2 0.75σca = 0.75 ＊ 140 = 105 N/mm^2

∴σc = 105 N/mm^2

τmax = 23 N/mm^2

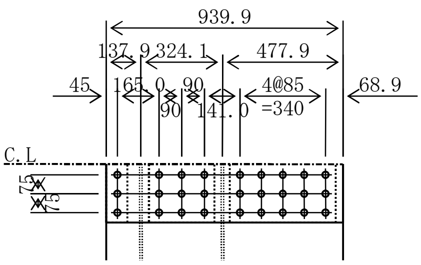
(b) Section area of main plate

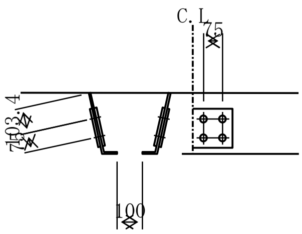
1-DECK-1 PL 940 ＊ 16 Ag = 150.4 cm^2 (SM400)

1-U.RIB 320 ＊ 240 ＊ 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 150.4 + 53.9 = 204.3 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-1 PL 940 ＊ 16 A = 150.4

(150.4 - (9＊ 2.5)＊ 1.6) ＊ 1.1 = 125.8 ＜ 150.4 ∴An = 125.8 cm^2

1-U.RIB 320 ＊ 240 ＊ 8 Ar = 53.9

(53.9 - (4＊ 2.7)＊ 0.8- 1＊(10.0＊0.8)) ＊ 1.1 = 41.0

＜ 53.9 ∴Anr = 41.0 cm^2

ΣAn = An + Anr = 125.8 + 41.0 = 166.8 cm^2

σtn = $\sigma tmax$ ＊ ΣAg / ΣAn = 48 ＊ 204.3 / 166.8 = 59 N/mm^2

＜ σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta ＊ An / 1.1 = 105 ＊ 12582 / 1.1 = 1201049 N

＞ σtn ＊ An = 59 ＊ 12582 = 743354 N

Pc = σc ＊ Ag = 105 ＊ 15039 = 1579049 N

・Rib Ptr = 0.75σta ＊ Anr / 1.1 = 105 ＊ 4099 / 1.1 = 391230 N

＞ σtn ＊ Anr = 59 ＊ 4099 = 242140 N

Pcr = σc ＊ Agr = 105 ＊ 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 125.8 / 2 = 62.9 cm^2

AgR = Ag / 2 = 150.4 / 2 = 75.2 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

- Main plate n = Pc / (108000 * 1.00) = 1579049 / 108000 = 14.6 pcs.
- Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 27 = 1579049 / 27 = 58483 N

ρs = τ * Ag / 27 = 23 * 15039 / 27 = 12561 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(58483^2 + 12561^2)}$ = 59817 N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			$Ans(cm^2)$
1-SPL PL	940 * 9	(84.6 -	(9*2.5)* 0.9)*1.1=	70.8<	84.6	∴ 70.8
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
1-SPL PL	260 * 14	(36.4 -	(3*2.5)* 1.4)*1.1=	28.5<	36.4	∴ 28.5
1-SPL PL	420 * 14	(58.8 -	(5*2.5)* 1.4)*1.1=	45.4<	58.8	∴ 45.4
		107.1				83.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(352) D-4 J-11(Sec-12) DECK-2

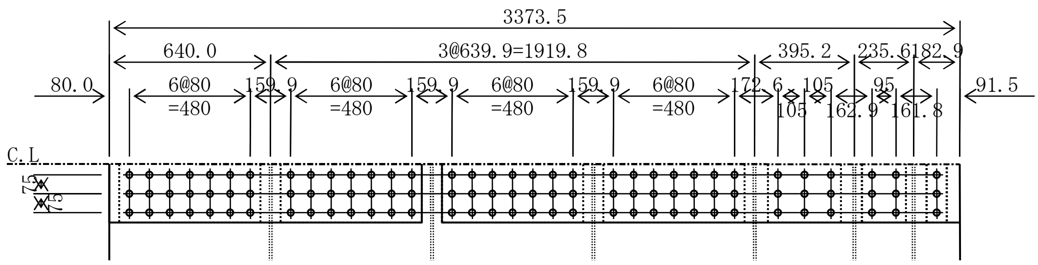
(a) Acting stress

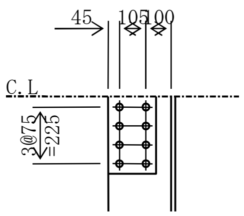
σ tmax = 48 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma$ c = 105 N/mm^2
τ max = 23 N/mm^2

(b) Section area of main plate

1-DECK-2 PL 3373 * 16   Ag = 539.8 cm^2 (SM400)
7-RIB PL 250 * 24   Agr = 420.0 cm^2 (SM400)
ΣAg = Ag + Agr = 539.8 + 420.0 = 959.8 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-2 PL 3373 * 16   A = 539.8
(539.8 - (34* 2.5)* 1.6) * 1.1 = 444.1 < 539.8 ∴An = 444.1 cm^2
7-RIB PL 250 * 24   Ar = 420.0
(420.0 - 7*(2* 2.7)* 2.4) * 1.1 = 362.2 < 420.0 ∴Anr = 362.2 cm^2
ΣAn = An + Anr = 444.1 + 362.2 = 806.3 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 48 * 959.8 / 806.3 = 57 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 44413 / 1.1 = 4239430 N
> σ tn * An = 57 * 44413 = 2550176 N
Pc = σ c * Ag = 105 * 53976 = 5667430 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 36221 / 1.1 = 3457440 N
> σ tn * Anr = 57 * 36221 = 2079780 N
Pcr = σ c * Agr = 105 * 42000 = 4410000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 444.1 / 2 = 222.1 cm^2
AgR = Ag / 2 = 539.8 / 2 = 269.9 cm^2
・Rib AnrR = Anr = 362.2 cm^2
AgrR = Agr = 420.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5667430 / 108000 = 52.5 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 4410000 / 108000 = 40.8 pcs. (7 @ 8 = 56 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

ρp = Pc / 102 = 5667430 / 102 = 55563 N
ρs = τ * Ag / 102 = 23 * 53976 / 102 = 11933 N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(55563^2 + 11933^2)}$ = 56830 N

(i) Check of splice plates

	(SS400)	Ags(cm²)	deduction of bolt holes		Ans(cm²)
1-SPL PL	1240 * 9	(111.6 -	(14*2.5)* 0.9)*1.1= 88.1<	111.6	∴ 88.1
1-SPL PL	2054 * 9	(184.8 -	(20*2.5)* 0.9)*1.1= 153.8<	184.8	∴153.8
		296.4			241.9
4-SPL PL	560 * 14	(313.6 -	4*(7*2.5)* 1.4)*1.1= 237.2<	313.6	∴237.2
1-SPL PL	290 * 14	(40.6 -	(3*2.5)* 1.4)*1.1= 33.1<	40.6	∴ 33.1
1-SPL PL	175 * 14	(24.5 -	(2*2.5)* 1.4)*1.1= 19.3<	24.5	∴ 19.3
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1= 8.5<	11.2	∴ 8.5
		389.9			298.0
14-SPL PL	185 * 18	(466.2 -	14*(2*2.7)* 1.8)*1.1= 363.1<	466.2	∴363.1
		> AgrR			>AnrR

(353) D-4 J-11(Sec-12) DECK-3

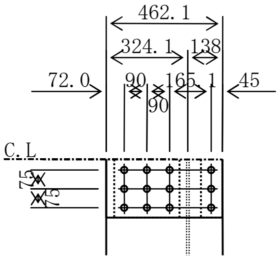
(a) Acting stress

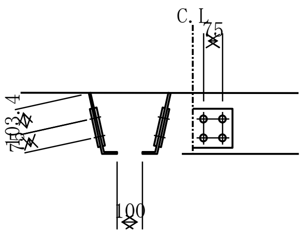
$\sigma tmax$ = 48 N/mm^2 0.75 σta = 0.75 * 140 = 105 N/mm^2
$\sigma cmax$ = -64 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma c$ = 105 N/mm^2
τmax = 23 N/mm^2

(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)
1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)
ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-3 PL 462 * 16 A = 73.9
(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 $\therefore$An = 63.7 cm^2
1-U.RIB 320 * 240 * 8 Ar = 53.9
(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0
< 53.9 $\therefore$Anr = 41.0 cm^2
ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 48 * 127.8 / 104.7 = 59 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σta * An / 1.1 = 105 * 6373 / 1.1 = 608328 N
> σtn * An = 59 * 6373 = 375318 N
Pc = σc * Ag = 105 * 7394 = 776328 N
・Rib Ptr = 0.75 σta * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N
> σtn * Anr = 59 * 4099 = 241376 N
Pcr = σc * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2
AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2
・Rib AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) =   776328 / 108000 = 7.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) =   565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 12 = 776328 / 12 = 64694$ N

$\rho s = \tau * Ag / 12 = 23 * 7394 / 12 = 13894$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64694^2 + 13894^2)} = 66169$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	260 * 14	(36.4 -	(3*2.5)* 1.4)*1.1=	28.5<	36.4	∴ 28.5
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		48.3				37.7
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(354) D-4 J-12(Sec-12) DECK-1

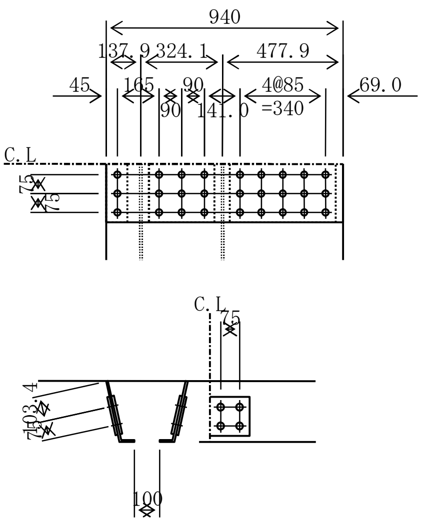
(a) Acting stress

σ tmax = 19 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2
∴ σ c = 105 N/mm^2
τ max = 12 N/mm^2

(b) Section area of main plate

1-DECK-1 PL 940 * 16   Ag = 150.4 cm^2 (SM400)
1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM400)
ΣAg = Ag + Agr = 150.4 + 53.9 = 204.3 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-1 PL 940 * 16   A = 150.4
(150.4 - (9* 2.5)* 1.6) * 1.1 = 125.8 < 150.4 ∴An = 125.8 cm^2
1-U.RIB 320 * 240 * 8   Ar = 53.9
(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0
< 53.9 ∴Anr = 41.0 cm^2
ΣAn = An + Anr = 125.8 + 41.0 = 166.8 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 19 * 204.3 / 166.8 = 23 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 12584 / 1.1 = 1201200 N
> σ tn * An = 23 * 12584 = 293405 N
Pc = σ c * Ag = 105 * 15040 = 1579200 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N
> σ tn * Anr = 23 * 4099 = 95562 N
Pcr = σ c * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 125.8 / 2 = 62.9 cm^2
AgR = Ag / 2 = 150.4 / 2 = 75.2 cm^2
・Rib AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1579200 / 108000 = 14.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) =   565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 27 = 1579200 / 27 = 58489$ N

$\rho s = \tau * Ag / 27 = 12 * 15040 / 27 = 6482$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(58489^2 + 6482^2)} = 58847$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	940 * 9	(84.6 -	(9*2.5)* 0.9)*1.1=	70.8<	84.6	∴ 70.8
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
1-SPL PL	260 * 14	(36.4 -	(3*2.5)* 1.4)*1.1=	28.5<	36.4	∴ 28.5
1-SPL PL	420 * 14	(58.8 -	(5*2.5)* 1.4)*1.1=	45.4<	58.8	∴ 45.4
		107.1				83.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(355) D-4 J-12(Sec-12) DECK-2

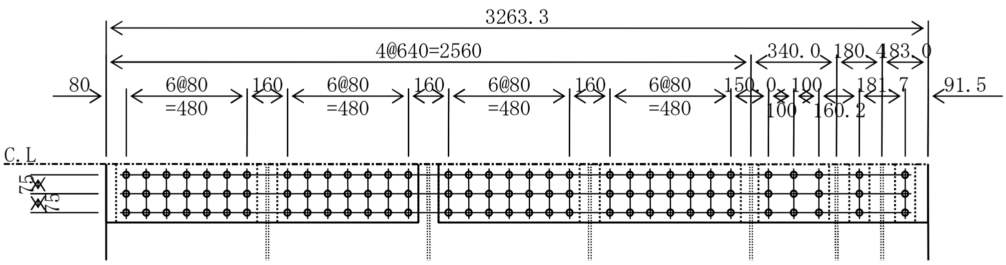
(a) Acting stress

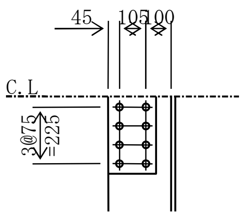
σtmax = 19 N/mm² 0.75σta = 0.75 * 140 = 105 N/mm²
σcmax = -64 N/mm² 0.75σca = 0.75 * 140 = 105 N/mm²
∴σc = 105 N/mm²
τmax = 12 N/mm²

(b) Section area of main plate

1-DECK-2 PL 3263 * 16 Ag = 522.1 cm² (SM400)
7-RIB PL 250 * 24 Agr = 420.0 cm² (SM400)
ΣAg = Ag + Agr = 522.1 + 420.0 = 942.1 cm²

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-2 PL 3263 * 16 A = 522.1
(522.1 - (33* 2.5)* 1.6) * 1.1 = 429.1 < 522.1 ∴An = 429.1 cm²
7-RIB PL 250 * 24 Ar = 420.0
(420.0 - 7*(2* 2.7)* 2.4) * 1.1 = 362.2 < 420.0 ∴Anr = 362.2 cm²
ΣAn = An + Anr = 429.1 + 362.2 = 791.4 cm²
σtn = σtmax * ΣAg / ΣAn = 19 * 942.1 / 791.4 = 23 N/mm²
< σta = 140 N/mm²

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 105 * 42915 / 1.1 = 4096428 N
> σtn * An = 23 * 42915 = 972733 N
Pc = σc * Ag = 105 * 52214 = 5482428 N
・Rib Ptr = 0.75σta * Anr / 1.1 = 105 * 36221 / 1.1 = 3457440 N
> σtn * Anr = 23 * 36221 = 821000 N
Pcr = σc * Agr = 105 * 42000 = 4410000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 429.1 / 2 = 214.6 cm²
AgR = Ag / 2 = 522.1 / 2 = 261.1 cm²
・Rib AnrR = Anr = 362.2 cm²
AgrR = Agr = 420.0 cm²

(g) Required bolt number

- Main plate n = Pc / (108000 * 1.00) = 5482428 / 108000 = 50.8 pcs.
- Rib nr = Pcr / (108000 * 1.00) = 4410000 / 108000 = 40.8 pcs. (7 @ 8 = 56 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

ρp = Pc / 99 = 5482428 / 99 = 55378 N

ρs = τ * Ag / 99 = 12 * 52214 / 99 = 6137 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(55378^2 + 6137^2)}$ = 55717 N

(i) Check of splice plates

(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
1-SPL PL 1240 * 9	(111.6 -	(14*2.5)* 0.9)*1.1= 88.1<	111.6	∴ 88.1
1-SPL PL 1943 * 9	(174.9 -	(19*2.5)* 0.9)*1.1= 145.4<	174.9	∴145.4
	286.5			233.5
4-SPL PL 560 * 14	(313.6 -	4*(7*2.5)* 1.4)*1.1= 237.2<	313.6	∴237.2
1-SPL PL 280 * 14	(39.2 -	(3*2.5)* 1.4)*1.1= 31.6<	39.2	∴ 31.6
2-SPL PL 80 * 14	(22.4 -	2*(1*2.5)* 1.4)*1.1= 16.9<	22.4	∴ 16.9
	375.2			285.7
14-SPL PL 185 * 18	(466.2 -	14*(2*2.7)* 1.8)*1.1= 363.1<	466.2	∴363.1
	> AgrR			>AnrR

(356) D-4 J-12(Sec-12) DECK-3

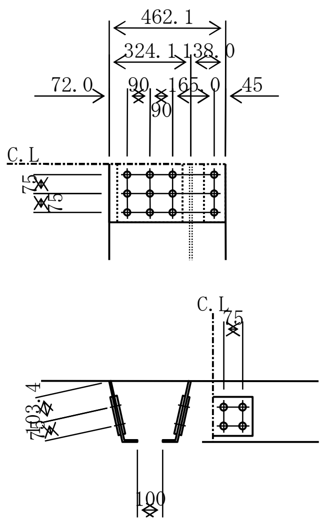
(a) Acting stress

$\sigma tmax$ = 19 N/mm^2 0.75σta = 0.75 * 140 = 105 N/mm^2
$\sigma cmax$ = -64 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2
∴σc = 105 N/mm^2
τmax = 12 N/mm^2

(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)
1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)
ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3 PL 462 * 16 A = 73.9
(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 ∴An = 63.7 cm^2
1-U.RIB 320 * 240 * 8 Ar = 53.9
(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0
< 53.9 ∴Anr = 41.0 cm^2
ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 19 * 127.8 / 104.7 = 23 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 105 * 6373 / 1.1 = 608311 N
> σtn * An = 23 * 6373 = 148121 N
Pc = σc * Ag = 105 * 7393 = 776311 N
・Rib Ptr = 0.75σta * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N
> σtn * Anr = 23 * 4099 = 95263 N
Pcr = σc * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2
AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2
・Rib AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate $n = Pc / (108000 * 1.00) = 776311 / 108000 = 7.2$ pcs.
・Rib $nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2$ pcs. (1 @ 8 = 8 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 12 = 776311 / 12 = 64693$ N
$\rho s = \tau * Ag / 12 = 12 * 7393 / 12 = 7169$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64693^2 + 7169^2)} = 65089$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes				$Ans(cm^2)$
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8	<	41.6	∴ 35.8
1-SPL PL	260 * 14	(36.4 -	(3*2.5)* 1.4)*1.1=	28.5	<	36.4	∴ 28.5
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2	<	11.9	∴ 9.2
		48.3					37.7
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4	<	62.0	∴ 44.4
		> AgrR					>AnrR

(357) D-4 J-13(Sec-13) DECK-1

(a) Acting stress

$\sigma tmax$ = 7 N/mm^2 $0.75\sigma ta$ = 0.75 * 140 = 105 N/mm^2

$\sigma cmax$ = -64 N/mm^2 $0.75\sigma ca$ = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 8 N/mm^2

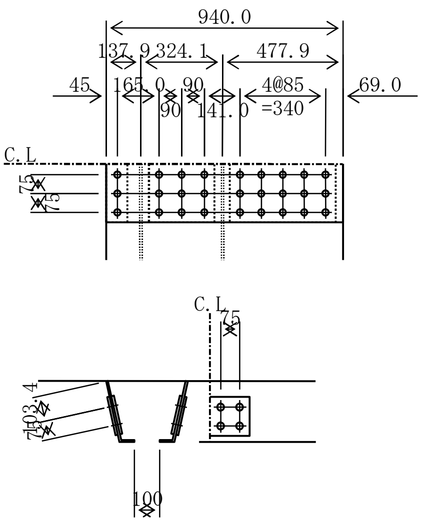
(b) Section area of main plate

1-DECK-1 PL 940 * 16   Ag = 150.4 cm^2 (SM400)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 150.4 + 53.9 = 204.3 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-1 PL 940 * 16   A = 150.4

(150.4 - (9* 2.5)* 1.6) * 1.1 = 125.8 < 150.4   ∴An = 125.8 cm^2

1-U.RIB 320 * 240 * 8   Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9   ∴Anr = 41.0 cm^2

ΣAn = An + Anr = 125.8 + 41.0 = 166.8 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 7 * 204.3 / 166.8 = 8 N/mm^2

< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = $0.75\sigma ta$ * An / 1.1 = 105 * 12583 / 1.1 = 1201150 N

> σtn * An = 8 * 12583 = 101430 N

Pc = σc * Ag = 105 * 15040 = 1579150 N

・Rib Ptr = $0.75\sigma ta$ * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N

> σtn * Anr = 8 * 4099 = 33037 N

Pcr = σc * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 125.8 / 2 = 62.9 cm^2

AgR = Ag / 2 = 150.4 / 2 = 75.2 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1579150 / 108000 = 14.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 27 = 1579150 / 27 = 58487$ N

$\rho s = \tau * Ag / 27 = 8 * 15040 / 27 = 4220$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(58487^2 + 4220^2)} = 58639$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	940 * 9	(84.6 -	(9*2.5)* 0.9)*1.1=	70.8<	84.6	∴ 70.8
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
1-SPL PL	260 * 14	(36.4 -	(3*2.5)* 1.4)*1.1=	28.5<	36.4	∴ 28.5
1-SPL PL	420 * 14	(58.8 -	(5*2.5)* 1.4)*1.1=	45.4<	58.8	∴ 45.4
		107.1				83.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(358) D-4 J-13(Sec-13) DECK-2

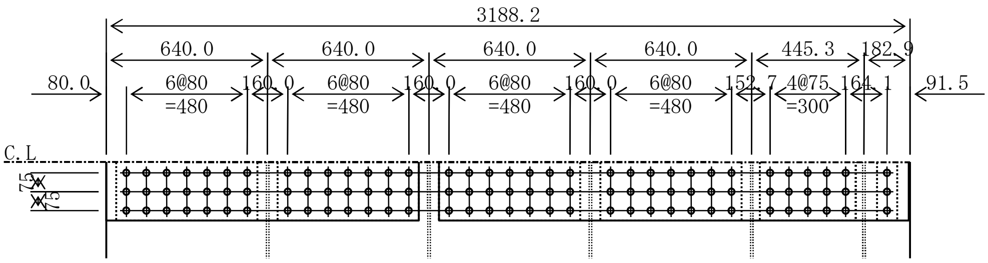
(a) Acting stress

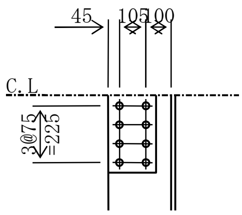
σ tmax = 7 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2
∴ σ c = 105 N/mm^2
τ max = 8 N/mm^2

(b) Section area of main plate

1-DECK-2 PL 3188 * 16 Ag = 510.1 cm^2 (SM400)
6-RIB PL 250 * 24 Agr = 360.0 cm^2 (SM400)
ΣAg = Ag + Agr = 510.1 + 360.0 = 870.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-2 PL 3188 * 16 A = 510.1
(510.1 - (34* 2.5)* 1.6) * 1.1 = 411.5 < 510.1 ∴An = 411.5 cm^2
6-RIB PL 250 * 24 Ar = 360.0
(360.0 - 6*(2* 2.7)* 2.4) * 1.1 = 310.5 < 360.0 ∴Anr = 310.5 cm^2
ΣAn = An + Anr = 411.5 + 310.5 = 722.0 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 7 * 870.1 / 722.0 = 8 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 41152 / 1.1 = 3928193 N
> σ tn * An = 8 * 41152 = 326437 N
Pc = σ c * Ag = 105 * 51011 = 5356193 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 31046 / 1.1 = 2963520 N
> σ tn * Anr = 8 * 31046 = 246272 N
Pcr = σ c * Agr = 105 * 36000 = 3780000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 411.5 / 2 = 205.8 cm^2
AgR = Ag / 2 = 510.1 / 2 = 255.1 cm^2
・Rib AnrR = Anr = 310.5 cm^2
AgrR = Agr = 360.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5356193 / 108000 = 49.6 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 3780000 / 108000 = 35.0 pcs. (6 @ 8 = 48 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 102 = 5356193 / 102 = 52512$ N
$\rho s = \tau * Ag / 102 = 8 * 51011 / 102 = 3789$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(52512^2 + 3789^2)} = 52648$ N

(i) Check of splice plates

(SS400)	Ags(cm^2)	deduction of bolt holes	Ans(cm^2)
1-SPL PL 1240 * 9	(111.6 -	(14*2.5)* 0.9)*1.1= 88.1< 111.6	∴ 88.1
1-SPL PL 1863 * 9	(167.7 -	(20*2.5)* 0.9)*1.1= 135.0< 167.7	∴135.0
	279.3		223.1
4-SPL PL 560 * 14	(313.6 -	4*(7*2.5)* 1.4)*1.1= 237.2< 313.6	∴237.2
1-SPL PL 380 * 14	(53.2 -	(5*2.5)* 1.4)*1.1= 39.3< 53.2	∴ 39.3
1-SPL PL 80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1= 8.5< 11.2	∴ 8.5
	378.0		284.9
12-SPL PL 185 * 18	(399.6 -	12*(2*2.7)* 1.8)*1.1= 311.3< 399.6	∴311.3
	> AgrR		>AnrR

(359) D-4 J-13(Sec-13) DECK-3

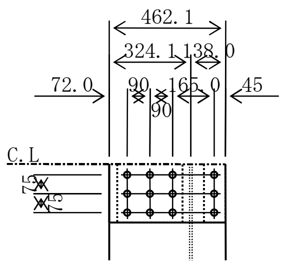
(a) Acting stress

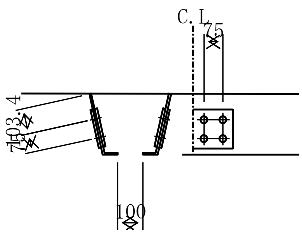
$\sigma tmax$ = 7 N/mm^2 0.75σta = 0.75 * 140 = 105 N/mm^2
$\sigma cmax$ = -64 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2
∴σc = 105 N/mm^2
τmax = 8 N/mm^2

(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)
1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)
ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-3 PL 462 * 16 A = 73.9
(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 ∴An = 63.7 cm^2
1-U.RIB 320 * 240 * 8 Ar = 53.9
(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0
< 53.9 ∴Anr = 41.0 cm^2
ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 7 * 127.8 / 104.7 = 8 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 105 * 6373 / 1.1 = 608311 N
> σtn * An = 8 * 6373 = 51207 N
Pc = σc * Ag = 105 * 7393 = 776311 N
・Rib Ptr = 0.75σta * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N
> σtn * Anr = 8 * 4099 = 32933 N
Pcr = σc * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2
AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2
・Rib AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 776311 / 108000 = 7.2 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 12 = 776311 / 12 = 64693 N
ρs = τ * Ag / 12 = 8 * 7393 / 12 = 4668 N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64693^2 + 4668^2)}$ = 64861 N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	260 * 14	(36.4 -	(3*2.5)* 1.4)*1.1=	28.5<	36.4	∴ 28.5
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		48.3				37.7
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(360) D-4 J-14(Sec-14) DECK-1

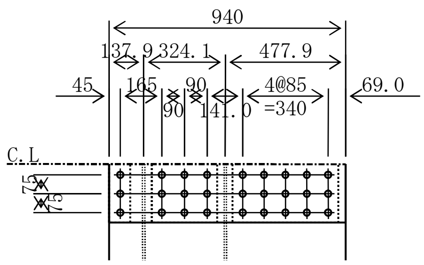
(a) Acting stress

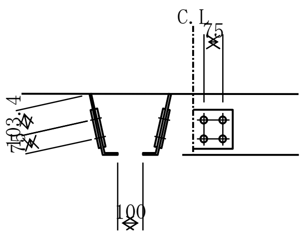
σ tmax = 4 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -67 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2
∴ σ c = 105 N/mm^2
τ max = 5 N/mm^2

(b) Section area of main plate

1-DECK-1 PL 940 * 16 Ag = 150.4 cm^2 (SM400)
1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)
ΣAg = Ag + Agr = 150.4 + 53.9 = 204.3 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-1 PL 940 * 16 A = 150.4
(150.4 - (9* 2.5)* 1.6) * 1.1 = 125.8 < 150.4 ∴An = 125.8 cm^2
1-U.RIB 320 * 240 * 8 Ar = 53.9
(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0
< 53.9 ∴Anr = 41.0 cm^2
ΣAn = An + Anr = 125.8 + 41.0 = 166.8 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 4 * 204.3 / 166.8 = 5 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 12584 / 1.1 = 1201200 N
> σ tn * An = 5 * 12584 = 64818 N
Pc = σ c * Ag = 105 * 15040 = 1579200 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N
> σ tn * Anr = 5 * 4099 = 21111 N
Pcr = σ c * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 125.8 / 2 = 62.9 cm^2
AgR = Ag / 2 = 150.4 / 2 = 75.2 cm^2
・Rib AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1579200 / 108000 = 14.6 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 27 = 1579200 / 27 = 58489$ N
$\rho s = \tau * Ag / 27 = 5 * 15040 / 27 = 2709$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(58489^2 + 2709^2)} = 58552$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	940 * 9	(84.6 -	(9*2.5)* 0.9)*1.1=	70.8<	84.6	∴ 70.8
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
1-SPL PL	260 * 14	(36.4 -	(3*2.5)* 1.4)*1.1=	28.5<	36.4	∴ 28.5
1-SPL PL	420 * 14	(58.8 -	(5*2.5)* 1.4)*1.1=	45.4<	58.8	∴ 45.4
		107.1				83.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(361) D-4 J-14(Sec-14) DECK-2

(a) Acting stress

σ tmax = 4 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2

σ cmax = -67 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2

∴ σ c = 105 N/mm^2

τ max = 5 N/mm^2

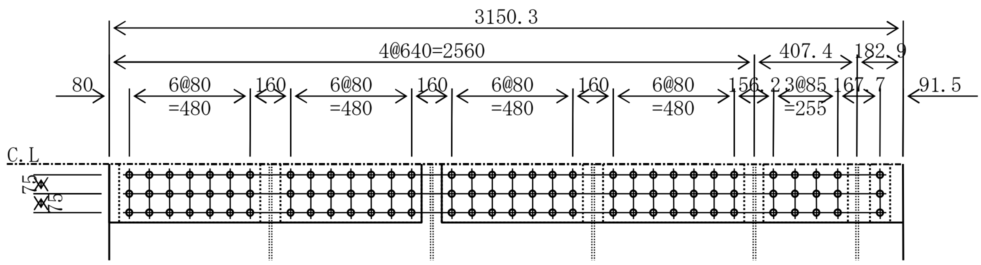
(b) Section area of main plate

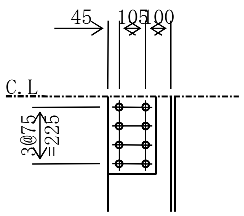
1-DECK-2 PL 3150 * 16 Ag = 504.1 cm^2 (SM400)

6-RIB PL 250 * 24 Agr = 360.0 cm^2 (SM400)

ΣAg = Ag + Agr = 504.1 + 360.0 = 864.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-2 PL 3150 * 16 A = 504.1

(504.1 - (33* 2.5)* 1.6) * 1.1 = 409.3 ＜ 504.1 ∴An = 409.3 cm^2

6-RIB PL 250 * 24 Ar = 360.0

(360.0 - 6*(2* 2.7)* 2.4) * 1.1 = 310.5 ＜ 360.0 ∴Anr = 310.5 cm^2

ΣAn = An + Anr = 409.3 + 310.5 = 719.7 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 4 * 864.1 / 719.7 = 5 N/mm^2

＜ σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 40926 / 1.1 = 3906588 N

＞ σ tn * An = 5 * 40926 = 206655 N

Pc = σ c * Ag = 105 * 50406 = 5292588 N

・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 31046 / 1.1 = 2963520 N

＞ σ tn * Anr = 5 * 31046 = 156767 N

Pcr = σ c * Agr = 105 * 36000 = 3780000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 409.3 / 2 = 204.6 cm^2

AgR = Ag / 2 = 504.1 / 2 = 252.0 cm^2

・Rib AnrR = Anr = 310.5 cm^2

AgrR = Agr = 360.0 cm^2

(g) Required bolt number

・Main plate $n = Pc / (108000 * 1.00) = 5292588 / 108000 = 49.0$ pcs.

・Rib $nr = Pcr / (108000 * 1.00) = 3780000 / 108000 = 35.0$ pcs. (6 @ 8 = 48 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 99 = 5292588 / 99 = 53460$ N

$\rho s = \tau * Ag / 99 = 5 * 50406 / 99 = 2476$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(53460^2 + 2476^2)} = 53518$ N

(i) Check of splice plates

	(SS400)	Ags(cm²)	deduction of bolt holes			Ans(cm²)
1-SPL PL	1240 * 9	(111.6 -	(14*2.5)* 0.9)*1.1=	88.1<	111.6	∴ 88.1
1-SPL PL	1830 * 9	(164.7 -	(19*2.5)* 0.9)*1.1=	134.2<	164.7	∴134.2
		276.3				222.3
4-SPL PL	560 * 14	(313.6 -	4*(7*2.5)* 1.4)*1.1=	237.2<	313.6	∴237.2
1-SPL PL	335 * 14	(46.9 -	(4*2.5)* 1.4)*1.1=	36.2<	46.9	∴ 36.2
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1=	8.5<	11.2	∴ 8.5
		371.7				281.8
12-SPL PL	185 * 18	(399.6 -	12*(2*2.7)* 1.8)*1.1=	311.3<	399.6	∴311.3
		> AgrR				>AnrR

(362) D-4 J-14(Sec-14) DECK-3

(a) Acting stress

$\sigma tmax = 4\ N/mm^2 \quad 0.75\sigma ta = 0.75 * 140 = 105\ N/mm^2$

$\sigma cmax = -67\ N/mm^2 \quad 0.75\sigma ca = 0.75 * 140 = 105\ N/mm^2$

$\therefore \sigma c = 105\ N/mm^2$

$\tau max = 5\ N/mm^2$

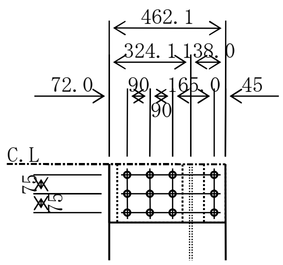
(b) Section area of main plate

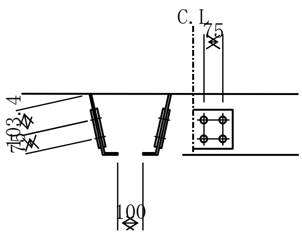
1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

$\Sigma Ag = Ag + Agr = 73.9 + 53.9 = 127.8\ cm^2$

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-3 PL 462 * 16 A = 73.9

(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 ∴An = 63.7 cm^2

1-U.RIB 320 * 240 * 8 Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9 ∴Anr = 41.0 cm^2

$\Sigma An = An + Anr = 63.7 + 41.0 = 104.7\ cm^2$

$\sigma tn = \sigma tmax * \Sigma Ag / \Sigma An = 4 * 127.8 / 104.7 = 5\ N/mm^2$

$< \sigma ta = 140\ N/mm^2$

(e) Design axial force

・Main plate Pt = $0.75\sigma ta$ * An / 1.1 = 105 * 6372 / 1.1 = 608261 N

> σtn * An = 5 * 6372 = 32720 N

Pc = σc * Ag = 105 * 7393 = 776261 N

・Rib Ptr = $0.75\sigma ta$ * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N

> σtn * Anr = 5 * 4099 = 21045 N

Pcr = σc * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2

AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 776261 / 108000 = 7.2 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 12 = 776261 / 12 = 64688$ N
$\rho s = \tau * Ag / 12 = 5 * 7393 / 12 = 2997$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64688^2 + 2997^2)} = 64758$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	260 * 14	(36.4 -	(3*2.5)* 1.4)*1.1=	28.5<	36.4	∴ 28.5
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		48.3				37.7
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(363) D-4 J-15(Sec-15) DECK-1

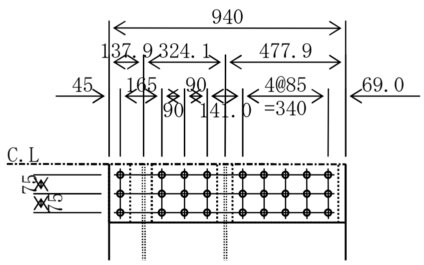
(a) Acting stress

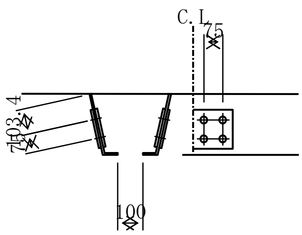
$\sigma tmax$ = 14 N/mm^2 0.75 σta = 0.75 ＊ 140 = 105 N/mm^2
$\sigma cmax$ = -64 N/mm^2 0.75 σca = 0.75 ＊ 140 = 105 N/mm^2
∴ σc = 105 N/mm^2
τmax = 9 N/mm^2

(b) Section area of main plate

1-DECK-1 PL 940 ＊ 16 Ag = 150.4 cm^2 (SM400)
1-U.RIB 320 ＊ 240 ＊ 8 Agr = 53.9 cm^2 (SM400)
ΣAg = Ag + Agr = 150.4 + 53.9 = 204.3 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-1 PL 940 ＊ 16 A = 150.4
(150.4 - (9＊ 2.5)＊ 1.6) ＊ 1.1 = 125.8 ＜ 150.4 ∴An = 125.8 cm^2
1-U.RIB 320 ＊ 240 ＊ 8 Ar = 53.9
(53.9 - (4＊ 2.7)＊ 0.8- 1＊(10.0＊0.8)) ＊ 1.1 = 41.0
＜ 53.9 ∴Anr = 41.0 cm^2
ΣAn = An + Anr = 125.8 + 41.0 = 166.8 cm^2
σtn = $\sigma tmax$ ＊ ΣAg / ΣAn = 14 ＊ 204.3 / 166.8 = 17 N/mm^2
＜ σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σta ＊ An / 1.1 = 105 ＊ 12584 / 1.1 = 1201200 N
＞ σtn ＊ An = 17 ＊ 12584 = 210341 N
Pc = σc ＊ Ag = 105 ＊ 15040 = 1579200 N
・Rib Ptr = 0.75 σta ＊ Anr / 1.1 = 105 ＊ 4099 / 1.1 = 391230 N
＞ σtn ＊ Anr = 17 ＊ 4099 = 68508 N
Pcr = σc ＊ Agr = 105 ＊ 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 125.8 / 2 = 62.9 cm^2
AgR = Ag / 2 = 150.4 / 2 = 75.2 cm^2
・Rib AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

- Main plate $n = Pc / (108000 * 1.00) = 1579200 / 108000 = 14.6$ pcs.
- Rib $nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2$ pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 27 = 1579200 / 27 = 58489$ N
$\rho s = \tau * Ag / 27 = 9 * 15040 / 27 = 5232$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(58489^2 + 5232^2)} = 58722$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	940 * 9	(84.6 -	(9*2.5)* 0.9)*1.1=	70.8<	84.6	∴ 70.8
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
1-SPL PL	260 * 14	(36.4 -	(3*2.5)* 1.4)*1.1=	28.5<	36.4	∴ 28.5
1-SPL PL	420 * 14	(58.8 -	(5*2.5)* 1.4)*1.1=	45.4<	58.8	∴ 45.4
		107.1				83.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(364) D-4 J-15(Sec-15) DECK-2

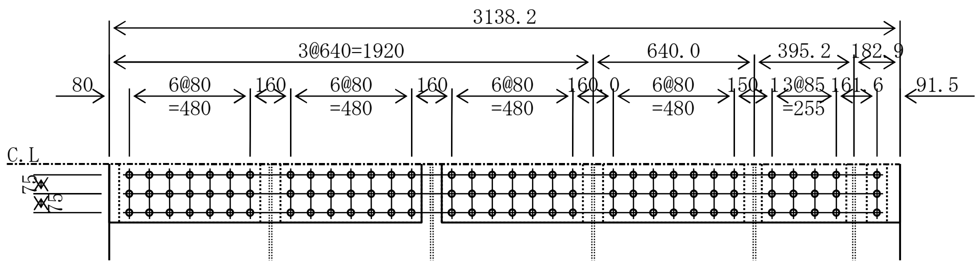
(a) Acting stress

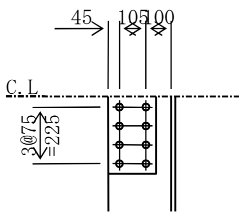
$\sigma tmax$ = 14 N/mm^2 0.75 σta = 0.75 * 140 = 105 N/mm^2
$\sigma cmax$ = -64 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma c$ = 105 N/mm^2
τmax = 9 N/mm^2

(b) Section area of main plate

1-DECK-2 PL 3138 * 16 Ag = 502.1 cm^2 (SM400)
6-RIB PL 250 * 24 Agr = 360.0 cm^2 (SM400)
ΣAg = Ag + Agr = 502.1 + 360.0 = 862.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-2 PL 3138 * 16 A = 502.1
(502.1 - (33* 2.5)* 1.6) * 1.1 = 407.1 < 502.1 ∴An = 407.1 cm^2
6-RIB PL 250 * 24 Ar = 360.0
(360.0 - 6*(2* 2.7)* 2.4) * 1.1 = 310.5 < 360.0 ∴Anr = 310.5 cm^2
ΣAn = An + Anr = 407.1 + 310.5 = 717.6 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 14 * 862.1 / 717.6 = 16 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σta * An / 1.1 = 105 * 40712 / 1.1 = 3886126 N
> σtn * An = 16 * 40712 = 667592 N
Pc = σc * Ag = 105 * 50211 = 5272126 N
・Rib Ptr = 0.75 σta * Anr / 1.1 = 105 * 31046 / 1.1 = 2963520 N
> σtn * Anr = 16 * 31046 = 509099 N
Pcr = σc * Agr = 105 * 36000 = 3780000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 407.1 / 2 = 203.6 cm^2
AgR = Ag / 2 = 502.1 / 2 = 251.1 cm^2
・Rib AnrR = Anr = 310.5 cm^2
AgrR = Agr = 360.0 cm^2

(g) Required bolt number

- Main plate $n = Pc / (108000 * 1.00) = 5272126 / 108000 = 48.8$ pcs.
- Rib $nr = Pcr / (108000 * 1.00) = 3780000 / 108000 = 35.0$ pcs. (6 @ 8 = 48 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 99 = 5272126 / 99 = 53254$ N
$\rho s = \tau * Ag / 99 = 9 * 50211 / 99 = 4763$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(53254^2 + 4763^2)} = 53466$ N

(i) Check of splice plates

	(SS400)	Ags(cm²)	deduction of bolt holes		Ans(cm²)
1-SPL PL	1240 * 9	(111.6 -	(14*2.5)* 0.9)*1.1= 88.1<	111.6	∴ 88.1
1-SPL PL	1818 * 9	(163.6 -	(19*2.5)* 0.9)*1.1= 133.0<	163.6	∴133.0
		275.2			221.1
4-SPL PL	560 * 14	(313.6 -	4*(7*2.5)* 1.4)*1.1= 237.2<	313.6	∴237.2
1-SPL PL	335 * 14	(46.9 -	(4*2.5)* 1.4)*1.1= 36.2<	46.9	∴ 36.2
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1= 8.5<	11.2	∴ 8.5
		371.7			281.8
12-SPL PL	185 * 18	(399.6 -	12*(2*2.7)* 1.8)*1.1= 311.3<	399.6	∴311.3
		> AgrR			>AnrR

(365) D-4 J-15(Sec-15) DECK-3

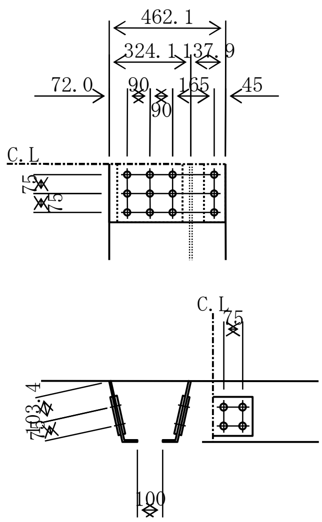
(a) Acting stress

σ tmax = 14 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2
∴ σ c = 105 N/mm^2
τ max = 9 N/mm^2

(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)
1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)
ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3 PL 462 * 16 A = 73.9
(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 ∴An = 63.7 cm^2
1-U.RIB 320 * 240 * 8 Ar = 53.9
(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0
< 53.9 ∴Anr = 41.0 cm^2
ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 14 * 127.8 / 104.7 = 17 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 6372 / 1.1 = 608244 N
> σ tn * An = 17 * 6372 = 106178 N
Pc = σ c * Ag = 105 * 7393 = 776244 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N
> σ tn * Anr = 17 * 4099 = 68295 N
Pcr = σ c * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2
AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2
・Rib AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate $n = Pc / (108000 * 1.00) = 776244 / 108000 = 7.2$ pcs.

・Rib $nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2$ pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 12 = 776244 / 12 = 64687$ N

$\rho s = \tau * Ag / 12 = 9 * 7393 / 12 = 5786$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64687^2 + 5786^2)} = 64945$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	260 * 14	(36.4 -	(3*2.5)* 1.4)*1.1=	28.5<	36.4	∴ 28.5
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		48.3				37.7
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(366) D-4　J-16(Sec-16)　DECK-1

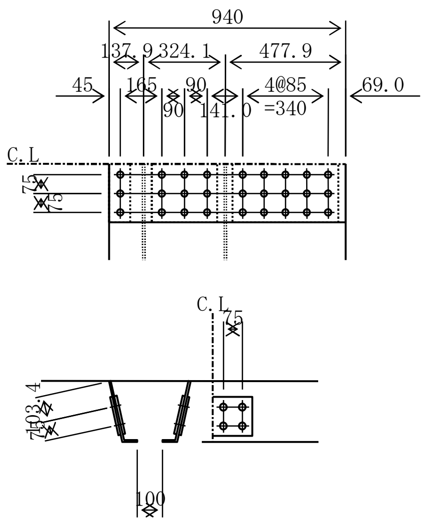
(a) Acting stress

$\sigma tmax$ = 31 N/mm^2　　$0.75\sigma ta$ = 0.75 * 140 = 105 N/mm^2
$\sigma cmax$ = -64 N/mm^2　　$0.75\sigma ca$ = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma c$ = 105 N/mm^2
τmax = 11 N/mm^2

(b) Section area of main plate

1-DECK-1　PL　940 * 16　　　Ag = 150.4 cm^2　(SM400)
1-U.RIB 320 * 240 * 8　　　Agr = 53.9 cm^2　(SM400)
ΣAg = Ag + Agr = 150.4 + 53.9 = 204.3 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-1　PL　940 * 16　　A = 150.4
(150.4 - (9* 2.5)* 1.6) * 1.1 = 125.8 ＜ 150.4　∴An = 125.8 cm^2
1-U.RIB 320 * 240 * 8　　Ar = 53.9
(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0
＜ 53.9　∴Anr = 41.0 cm^2
ΣAn = An + Anr = 125.8 + 41.0 = 166.8 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 31 * 204.3 / 166.8 = 38 N/mm^2
＜ σta = 140 N/mm^2

(e) Design axial force

・Main plate　Pt = $0.75\sigma ta$ * An / 1.1 = 105 * 12584 / 1.1 = 1201200 N
＞ σtn * An = 38 * 12584 = 474019 N
Pc = σc * Ag = 105 * 15040 = 1579200 N
・Rib　Ptr = $0.75\sigma ta$ * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N
＞ σtn * Anr = 38 * 4099 = 154388 N
Pcr = σc * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side)　AnR = An / 2 = 125.8 / 2 = 62.9 cm^2
AgR = Ag / 2 = 150.4 / 2 = 75.2 cm^2
・Rib　AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

- Main plate $n = P_c / (108000 * 1.00) = 1579200 / 108000 = 14.6$ pcs.
- Rib $n_r = P_{cr} / (108000 * 1.00) = 565950 / 108000 = 5.2$ pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = P_c / 27 = 1579200 / 27 = 58489$ N
$\rho s = \tau * A_g / 27 = 11 * 15040 / 27 = 6015$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(58489^2 + 6015^2)} = 58797$ N

(i) Check of splice plates

	(SS400)	$A_{gs}(cm^2)$	deduction of bolt holes			$A_{ns}(cm^2)$
1-SPL PL	940 ＊ 9	(84.6 −	(9*2.5)＊ 0.9)*1.1=	70.8＜	84.6	∴ 70.8
1-SPL PL	85 ＊ 14	(11.9 −	(1*2.5)＊ 1.4)*1.1=	9.2＜	11.9	∴ 9.2
1-SPL PL	260 ＊ 14	(36.4 −	(3*2.5)＊ 1.4)*1.1=	28.5＜	36.4	∴ 28.5
1-SPL PL	420 ＊ 14	(58.8 −	(5*2.5)＊ 1.4)*1.1=	45.4＜	58.8	∴ 45.4
		107.1				83.2
4-SPL PL	155 ＊ 10	(62.0 −	4*(2*2.7)＊ 1.0)*1.1=	44.4＜	62.0	∴ 44.4
		＞ AgrR				＞AnrR

(367) D-4 J-16(Sec-16) DECK-2

(a) Acting stress

$\sigma tmax$ = 31 N/mm^2 0.75 σta = 0.75 * 140 = 105 N/mm^2

$\sigma cmax$ = -64 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 11 N/mm^2

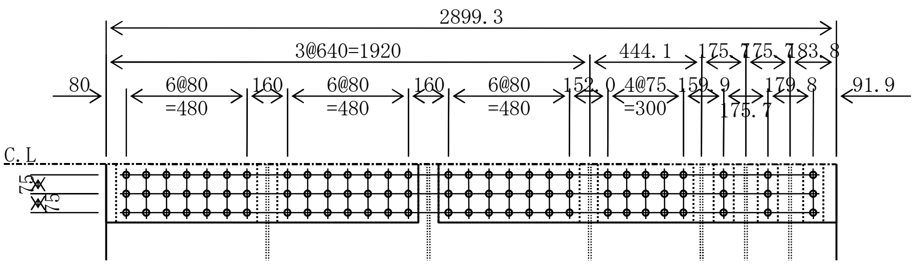
(b) Section area of main plate

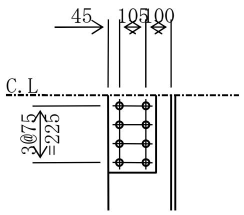
1-DECK-2 PL 2899 * 16 Ag = 463.9 cm^2 (SM400)

7-RIB PL 250 * 24 Agr = 420.0 cm^2 (SM400)

ΣAg = Ag + Agr = 463.9 + 420.0 = 883.9 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-2 PL 2899 * 16 A = 463.9

(463.9 - (29* 2.5)* 1.6) * 1.1 = 382.7 < 463.9 $\therefore$An = 382.7 cm^2

7-RIB PL 250 * 24 Ar = 420.0

(420.0 - 7*(2* 2.7)* 2.4) * 1.1 = 362.2 < 420.0 $\therefore$Anr = 362.2 cm^2

ΣAn = An + Anr = 382.7 + 362.2 = 744.9 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 31 * 883.9 / 744.9 = 36 N/mm^2

< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σta * An / 1.1 = 105 * 38268 / 1.1 = 3652824 N

> σtn * An = 36 * 38268 = 1396730 N

Pc = σc * Ag = 105 * 46389 = 4870824 N

・Rib Ptr = 0.75 σta * Anr / 1.1 = 105 * 36221 / 1.1 = 3457440 N

> σtn * Anr = 36 * 36221 = 1322021 N

Pcr = σc * Agr = 105 * 42000 = 4410000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 382.7 / 2 = 191.3 cm^2

AgR = Ag / 2 = 463.9 / 2 = 231.9 cm^2

・Rib AnrR = Anr = 362.2 cm^2

AgrR = Agr = 420.0 cm^2

(g) Required bolt number

- Main plate n = Pc / (108000 * 1.00) = 4870824 / 108000 = 45.1 pcs.
- Rib nr = Pcr / (108000 * 1.00) = 4410000 / 108000 = 40.8 pcs. (7 @ 8 = 56 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 87 = 4870824 / 87 = 55986$ N
$\rho s = \tau * Ag / 87 = 11 * 46389 / 87 = 5758$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(55986^2 + 5758^2)} = 56282$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	1240 * 9	(111.6 -	(14*2.5)* 0.9)*1.1=	88.1<	111.6	∴ 88.1
1-SPL PL	1579 * 9	(142.1 -	(15*2.5)* 0.9)*1.1=	119.2<	142.1	∴119.2
		253.7				207.3
3-SPL PL	560 * 14	(235.2 -	3*(7*2.5)* 1.4)*1.1=	177.9<	235.2	∴177.9
1-SPL PL	380 * 14	(53.2 -	(5*2.5)* 1.4)*1.1=	39.3<	53.2	∴ 39.3
3-SPL PL	80 * 14	(33.6 -	3*(1*2.5)* 1.4)*1.1=	25.4<	33.6	∴ 25.4
		322.0				242.6
14-SPL PL	185 * 18	(466.2 -	14*(2*2.7)* 1.8)*1.1=	363.1<	466.2	∴363.1
		> AgrR				>AnrR

(368) D-4 J-16(Sec-16) DECK-3

(a) Acting stress

$\sigma tmax$ = 31 N/mm^2 0.75 σta = 0.75 ＊ 140 = 105 N/mm^2

$\sigma cmax$ = -64 N/mm^2 0.75 σca = 0.75 ＊ 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 11 N/mm^2

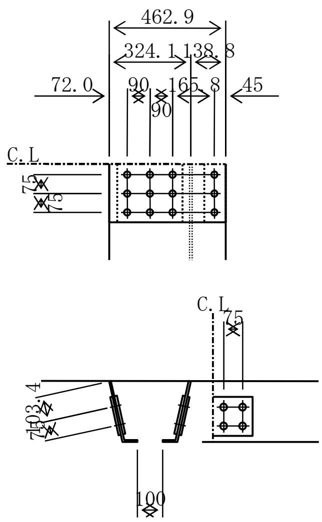
(b) Section area of main plate

1-DECK-3 PL 463 ＊ 16 Ag = 74.1 cm^2 (SM400)

1-U.RIB 320 ＊ 240 ＊ 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 74.1 + 53.9 = 128.0 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3 PL 463 ＊ 16 A = 74.1

(74.1 - (4＊ 2.5)＊ 1.6) ＊ 1.1 = 63.9 ＜ 74.1 ∴An = 63.9 cm^2

1-U.RIB 320 ＊ 240 ＊ 8 Ar = 53.9

(53.9 - (4＊ 2.7)＊ 0.8- 1＊(10.0＊0.8)) ＊ 1.1 = 41.0

＜ 53.9 ∴Anr = 41.0 cm^2

ΣAn = An + Anr = 63.9 + 41.0 = 104.8 cm^2

σtn = $\sigma tmax$ ＊ ΣAg / ΣAn = 31 ＊ 128.0 / 104.8 = 38 N/mm^2

＜ σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σta ＊ An / 1.1 = 105 ＊ 6386 / 1.1 = 609588 N

＞ σtn ＊ An = 38 ＊ 6386 = 239725 N

Pc = σc ＊ Ag = 105 ＊ 7406 = 777588 N

・Rib Ptr = 0.75 σta ＊ Anr / 1.1 = 105 ＊ 4099 / 1.1 = 391230 N

＞ σtn ＊ Anr = 38 ＊ 4099 = 153854 N

Pcr = σc ＊ Agr = 105 ＊ 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.9 / 2 = 31.9 cm^2

AgR = Ag / 2 = 74.1 / 2 = 37.0 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 777588 / 108000 = 7.2 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 12 = 777588 / 12 = 64799$ N
$\rho s = \tau * Ag / 12 = 11 * 7406 / 12 = 6664$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64799^2 + 6664^2)} = 65141$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	463 * 9	(41.7 -	(4*2.5)* 0.9)*1.1=	35.9<	41.7	∴ 35.9
1-SPL PL	260 * 14	(36.4 -	(3*2.5)* 1.4)*1.1=	28.5<	36.4	∴ 28.5
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		48.3				37.7
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(369) D-4 J-17(Sec-17) DECK-1

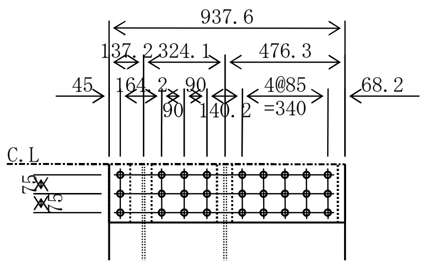
(a) Acting stress

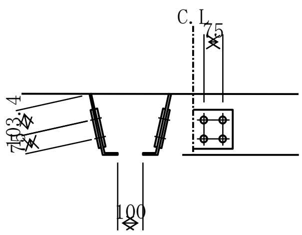
σtmax = 61 N/mm^2 0.75σta = 0.75 * 140 = 105 N/mm^2
σcmax = -64 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2
∴σc = 105 N/mm^2
τmax = 20 N/mm^2

(b) Section area of main plate

1-DECK-1 PL 938 * 16 Ag = 150.0 cm^2 (SM400)
1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)
ΣAg = Ag + Agr = 150.0 + 53.9 = 203.9 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-1 PL 938 * 16 A = 150.0
(150.0 - (9* 2.5)* 1.6) * 1.1 = 125.4 < 150.0 ∴An = 125.4 cm^2
1-U.RIB 320 * 240 * 8 Ar = 53.9
(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0
< 53.9 ∴Anr = 41.0 cm^2
ΣAn = An + Anr = 125.4 + 41.0 = 166.4 cm^2
σtn = σtmax * ΣAg / ΣAn = 61 * 203.9 / 166.4 = 74 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 105 * 12542 / 1.1 = 1197168 N
> σtn * An = 74 * 12542 = 931042 N
Pc = σc * Ag = 105 * 15002 = 1575168 N
・Rib Ptr = 0.75σta * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N
> σtn * Anr = 74 * 4099 = 304261 N
Pcr = σc * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 125.4 / 2 = 62.7 cm^2
AgR = Ag / 2 = 150.0 / 2 = 75.0 cm^2
・Rib AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1575168 / 108000 = 14.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 27 = 1575168 / 27 = 58340 N

ρs = τ * Ag / 27 = 20 * 15002 / 27 = 10879 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(58340^2 + 10879^2)}$ = 59345 N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	938 * 9	(84.4 -	(9*2.5)* 0.9)*1.1=	70.5<	84.4	∴ 70.5
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
1-SPL PL	260 * 14	(36.4 -	(3*2.5)* 1.4)*1.1=	28.5<	36.4	∴ 28.5
1-SPL PL	420 * 14	(58.8 -	(5*2.5)* 1.4)*1.1=	45.4<	58.8	∴ 45.4
		107.1				83.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(370) D-4 J-17(Sec-17) DECK-2

(a) Acting stress

σ tmax = 61 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2

σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2

$\therefore$ σ c = 105 N/mm^2

τ max = 20 N/mm^2

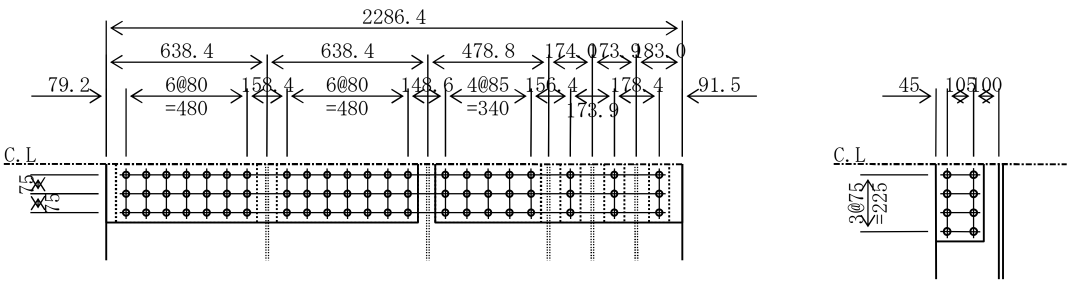
(b) Section area of main plate

1-DECK-2 PL 2286 * 16   Ag = 365.8 cm^2 (SM400)

6-RIB PL 250 * 24   Agr = 360.0 cm^2 (SM400)

ΣAg = Ag + Agr = 365.8 + 360.0 = 725.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2 PL 2286 * 16   A = 365.8

(365.8 - (22* 2.5)* 1.6) * 1.1 = 305.6 < 365.8 $\therefore$An = 305.6 cm^2

6-RIB PL 250 * 24   Ar = 360.0

(360.0 - 6*(2* 2.7)* 2.4) * 1.1 = 310.5 < 360.0 $\therefore$Anr = 310.5 cm^2

ΣAn = An + Anr = 305.6 + 310.5 = 616.1 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 61 * 725.8 / 616.1 = 71 N/mm^2

< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 30560 / 1.1 = 2917102 N

> σ tn * An = 71 * 30560 = 2181117 N

Pc = σ c * Ag = 105 * 36582 = 3841102 N

・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 31046 / 1.1 = 2963520 N

> σ tn * Anr = 71 * 31046 = 2215824 N

Pcr = σ c * Agr = 105 * 36000 = 3780000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 305.6 / 2 = 152.8 cm^2

AgR = Ag / 2 = 365.8 / 2 = 182.9 cm^2

・Rib AnrR = Anr = 310.5 cm^2

AgrR = Agr = 360.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 3841102 / 108000 = 35.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 3780000 / 108000 = 35.0 pcs. (6 @ 8 = 48 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 66 = 3841102 / 66 = 58199$ N

$\rho s = \tau * Ag / 66 = 20 * 36582 / 66 = 10853$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(58199^2 + 10853^2)} = 59202$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	1238 * 9	(111.4 -	(14*2.5)* 0.9)*1.1=	87.9<	111.4	∴ 87.9
1-SPL PL	980 * 9	(88.2 -	(8*2.5)* 0.9)*1.1=	77.2<	88.2	∴ 77.2
		199.6				165.1
2-SPL PL	560 * 14	(156.8 -	2*(7*2.5)* 1.4)*1.1=	118.6<	156.8	∴118.6
1-SPL PL	420 * 14	(58.8 -	(5*2.5)* 1.4)*1.1=	45.4<	58.8	∴ 45.4
3-SPL PL	80 * 14	(33.6 -	3*(1*2.5)* 1.4)*1.1=	25.4<	33.6	∴ 25.4
		249.2				189.4
12-SPL PL	185 * 18	(399.6 -	12*(2*2.7)* 1.8)*1.1=	311.3<	399.6	∴311.3
		> AgrR				>AnrR

(371) D-4 J-17(Sec-17) DECK-3

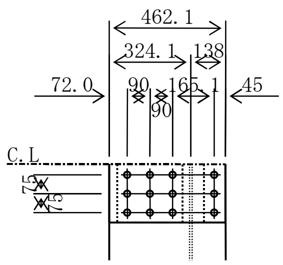
(a) Acting stress

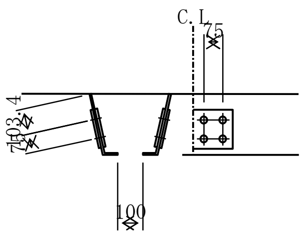
σ tmax = 61 N/mm^2 0.75σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2 0.75σ ca = 0.75 * 140 = 105 N/mm^2
∴σ c = 105 N/mm^2
τ max = 20 N/mm^2

(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)
1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)
ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1-DECK-3 PL 462 * 16 A = 73.9
(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 ∴An = 63.7 cm^2
1-U.RIB 320 * 240 * 8 Ar = 53.9
(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0
< 53.9 ∴Anr = 41.0 cm^2
ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 61 * 127.8 / 104.7 = 74 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σ ta * An / 1.1 = 105 * 6373 / 1.1 = 608328 N
> σ tn * An = 74 * 6373 = 471308 N
Pc = σ c * Ag = 105 * 7394 = 776328 N
・Rib Ptr = 0.75σ ta * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N
> σ tn * Anr = 74 * 4099 = 303109 N
Pcr = σ c * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2
AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2
・Rib AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 776328 / 108000 = 7.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 12 = 776328 / 12 = 64694$ N

$\rho s = \tau * Ag / 12 = 20 * 7394 / 12 = 12064$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64694^2 + 12064^2)} = 65809$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8＜	41.6	∴ 35.8
1-SPL PL	260 * 14	(36.4 -	(3*2.5)* 1.4)*1.1=	28.5＜	36.4	∴ 28.5
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2＜	11.9	∴ 9.2
		48.3				37.7
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4＜	62.0	∴ 44.4
		＞ AgrR				＞AnrR

(372) D-4 J-18(Sec-18) DECK-1

(a) Acting stress

$\sigma tmax$ = 106 N/mm^2 0.75 σta = 0.75 * 210 = 158 N/mm^2

$\sigma cmax$ = -64 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma c$ = 158 N/mm^2

τmax = 23 N/mm^2

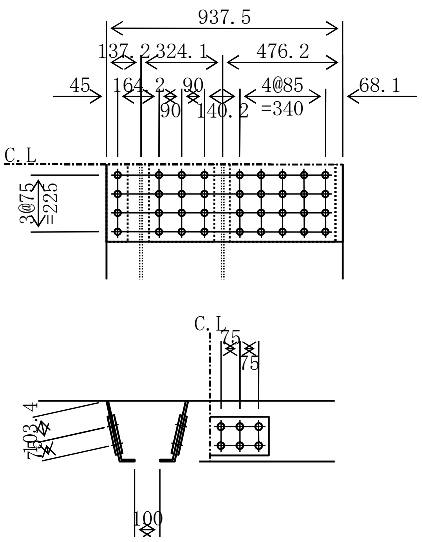
(b) Section area of main plate

1-DECK-1 PL 937 * 16 Ag = 150.0 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 150.0 + 53.9 = 203.9 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-1 PL 937 * 16 A = 150.0

(150.0 - (9* 2.5)* 1.6) * 1.1 = 125.4 < 150.0 $\therefore$An = 125.4 cm^2

1-U.RIB 320 * 240 * 8 Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9 $\therefore$Anr = 41.0 cm^2

ΣAn = An + Anr = 125.4 + 41.0 = 166.4 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 106 * 203.9 / 166.4 = 130 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σta * An / 1.1 = 158 * 12540 / 1.1 = 1795450 N

> σtn * An = 130 * 12540 = 1632848 N

Pc = σc * Ag = 158 * 15000 = 2362450 N

・Rib Ptr = 0.75 σta * Anr / 1.1 = 158 * 4099 / 1.1 = 586845 N

> σtn * Anr = 130 * 4099 = 533698 N

Pcr = σc * Agr = 158 * 5390 = 848925 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 125.4 / 2 = 62.7 cm^2

AgR = Ag / 2 = 150.0 / 2 = 75.0 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate $n = Pc / (108000 * 1.00) = 2362450 / 108000 = 21.9$ pcs.

・Rib $nr = Pcr / (108000 * 1.00) = 848925 / 108000 = 7.9$ pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 36 = 2362450 / 36 = 65624$ N

$\rho s = \tau * Ag / 36 = 23 * 15000 / 36 = 9538$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(65624^2 + 9538^2)} = 66313$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	937 * 9	(84.4 -	(9*2.5)* 0.9)*1.1=	70.5<	84.4	∴ 70.5
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
1-SPL PL	260 * 14	(36.4 -	(3*2.5)* 1.4)*1.1=	28.5<	36.4	∴ 28.5
1-SPL PL	420 * 14	(58.8 -	(5*2.5)* 1.4)*1.1=	45.4<	58.8	∴ 45.4
		107.1				83.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(373) D-4 J-18(Sec-18) DECK-2

(a) Acting stress

σ tmax = 106 N/mm^2 0.75σta = 0.75 * 210 = 158 N/mm^2

σ cmax = -64 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2

∴σc = 158 N/mm^2

τ max = 23 N/mm^2

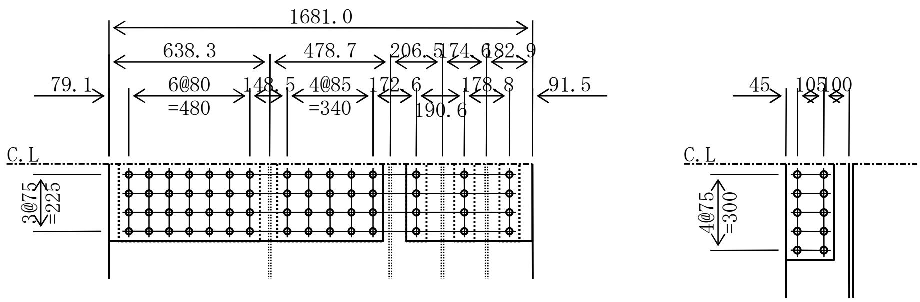
(b) Section area of main plate

1-DECK-2 PL 1681 * 16 Ag = 269.0 cm^2 (SM490Y)

5-RIB PL 250 * 24 Agr = 300.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 269.0 + 300.0 = 569.0 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2 PL 1681 * 16 A = 269.0

(269.0 - (15* 2.5)* 1.6) * 1.1 = 229.9 < 269.0 ∴An = 229.9 cm^2

5-RIB PL 250 * 24 Ar = 300.0

(300.0 - 5*(2* 2.7)* 2.4) * 1.1 = 258.7 < 300.0 ∴Anr = 258.7 cm^2

ΣAn = An + Anr = 229.9 + 258.7 = 488.6 cm^2

σtn = σtmax * ΣAg / ΣAn = 106 * 569.0 / 488.6 = 124 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 158 * 22986 / 1.1 = 3291170 N

> σtn * An = 124 * 22986 = 2844258 N

Pc = σc * Ag = 158 * 26896 = 4236170 N

・Rib Ptr = 0.75σta * Anr / 1.1 = 158 * 25872 / 1.1 = 3704400 N

> σtn * Anr = 124 * 25872 = 3201374 N

Pcr = σc * Agr = 158 * 30000 = 4725000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 229.9 / 2 = 114.9 cm^2

AgR = Ag / 2 = 269.0 / 2 = 134.5 cm^2

・Rib AnrR = Anr = 258.7 cm^2

AgrR = Agr = 300.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 4236170 / 108000 = 39.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 4725000 / 108000 = 43.8 pcs. (5 @ 10 = 50 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 60 = 4236170 / 60 = 70603$ N

$\rho s = \tau * Ag / 60 = 23 * 26896 / 60 = 10262$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(70603^2 + 10262^2)} = 71345$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
1-SPL PL	1088 * 9	(97.9 -	(12*2.5)* 0.9)*1.1= 78.0<	97.9	∴ 78.0
1-SPL PL	501 * 9	(45.1 -	(3*2.5)* 0.9)*1.1= 42.2<	45.1	∴ 42.2
		143.0			120.1
1-SPL PL	560 * 14	(78.4 -	(7*2.5)* 1.4)*1.1= 59.3<	78.4	∴ 59.3
1-SPL PL	420 * 14	(58.8 -	(5*2.5)* 1.4)*1.1= 45.4<	58.8	∴ 45.4
3-SPL PL	80 * 14	(33.6 -	3*(1*2.5)* 1.4)*1.1= 25.4<	33.6	∴ 25.4
		170.8			130.1
10-SPL PL	185 * 18	(333.0 -	10*(2*2.7)* 1.8)*1.1= 259.4<	333.0	∴259.4
		> AgrR			>AnrR

(374) D-4 J-18(Sec-18) DECK-3

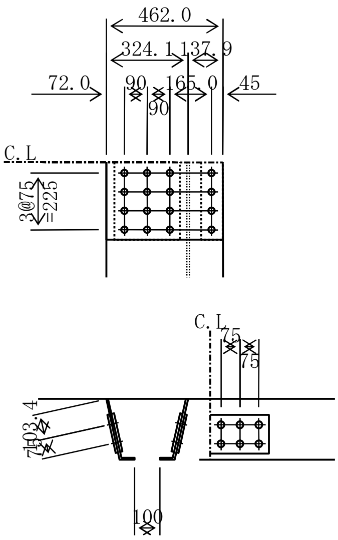
(a) Acting stress

$\sigma tmax$ = 106 N/mm^2 0.75 σta = 0.75 * 210 = 158 N/mm^2
$\sigma cmax$ = -64 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2
∴ σc = 158 N/mm^2
τmax = 23 N/mm^2

(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM490Y)
1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM490Y)
ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3 PL 462 * 16 A = 73.9
(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 ∴An = 63.7 cm^2
1-U.RIB 320 * 240 * 8 Ar = 53.9
(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0
< 53.9 ∴Anr = 41.0 cm^2
ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 106 * 127.8 / 104.7 = 130 N/mm^2
< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σta * An / 1.1 = 158 * 6372 / 1.1 = 912316 N
> σtn * An = 130 * 6372 = 826551 N
Pc = σc * Ag = 158 * 7392 = 1164316 N
・Rib Ptr = 0.75 σta * Anr / 1.1 = 158 * 4099 / 1.1 = 586845 N
> σtn * Anr = 130 * 4099 = 531677 N
Pcr = σc * Agr = 158 * 5390 = 848925 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2
AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2
・Rib AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate $n = Pc / (108000 * 1.00) = 1164316 / 108000 = 10.8$ pcs.

・Rib $nr = Pcr / (108000 * 1.00) = 848925 / 108000 = 7.9$ pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 16 = 1164316 / 16 = 72770$ N

$\rho s = \tau * Ag / 16 = 23 * 7392 / 16 = 10577$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(72770^2 + 10577^2)} = 73534$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	260 * 14	(36.4 -	(3*2.5)* 1.4)*1.1=	28.5<	36.4	∴ 28.5
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		48.3				37.7
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(375) D-4 J-19(Sec-19) DECK-1

(a) Acting stress

$\sigma tmax$ = 147 N/mm^2 0.75 σta = 0.75 * 210 = 158 N/mm^2

$\sigma cmax$ = -64 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma c$ = 158 N/mm^2

τmax = 22 N/mm^2

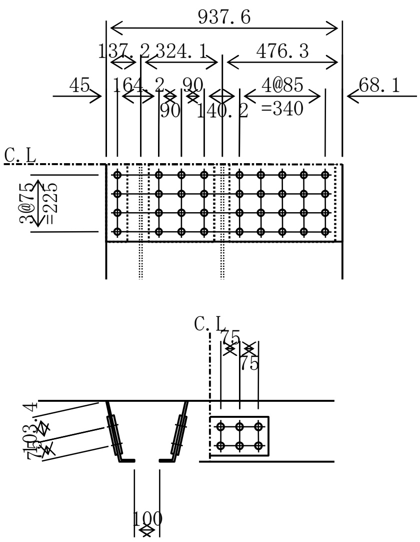
(b) Section area of main plate

1-DECK-1 PL 938 * 16   Ag = 150.0 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 150.0 + 53.9 = 203.9 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-1 PL 938 * 16   A = 150.0

(150.0 - (9* 2.5)* 1.6) * 1.1 = 125.4 < 150.0 $\therefore$An = 125.4 cm^2

1-U.RIB 320 * 240 * 8   Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9 $\therefore$Anr = 41.0 cm^2

ΣAn = An + Anr = 125.4 + 41.0 = 166.4 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 147 * 203.9 / 166.4 = 180 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 180 * 12541 = 2256623 N

> 0.75 σta * An / 1.1 = 158 * 12541 / 1.1 = 1795676 N

Pc = σc * Ag = 158 * 15001 = 2362676 N

・Rib Ptr = σtn * Anr = 180 * 4099 = 737487 N

> 0.75 σta * Anr/ 1.1 = 158 * 4099 / 1.1 = 586845 N

Pcr = σc * Agr = 158 * 5390 = 848925 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 125.4 / 2 = 62.7 cm^2

AgR = Ag / 2 = 150.0 / 2 = 75.0 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate $n = Pc / (108000 * 1.00) = 2362676 / 108000 = 21.9$ pcs.

・Rib $nr = Pcr / (108000 * 1.00) = 848925 / 108000 = 7.9$ pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 36 = 2362676 / 36 = 65630$ N

$\rho s = \tau * Ag / 36 = 22 * 15001 / 36 = 9208$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(65630^2 + 9208^2)} = 66273$ N

(i) Check of splice plates

	(SM490Y)	$Ags(cm^2)$	deduction of bolt holes			$Ans(cm^2)$
1-SPL PL	938 * 9	(84.4 -	(9*2.5)* 0.9)*1.1=	70.5<	84.4	∴ 70.5
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
1-SPL PL	260 * 14	(36.4 -	(3*2.5)* 1.4)*1.1=	28.5<	36.4	∴ 28.5
1-SPL PL	420 * 14	(58.8 -	(5*2.5)* 1.4)*1.1=	45.4<	58.8	∴ 45.4
		107.1				83.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(376) D-4 J-19(Sec-19) DECK-2

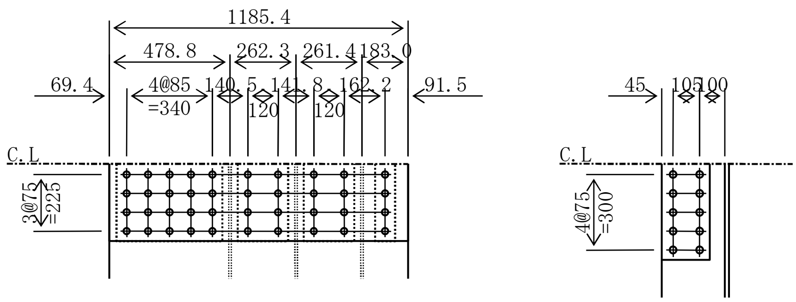
(a) Acting stress

σ tmax = 147 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 210 = 158 N/mm^2
$\therefore \sigma$ c = 158 N/mm^2
τ max = 22 N/mm^2

(b) Section area of main plate

1-DECK-2 PL 1185 * 16 Ag = 189.7 cm^2 (SM490Y)
4-RIB PL 250 * 24 Agr = 240.0 cm^2 (SM490Y)
ΣAg = Ag + Agr = 189.7 + 240.0 = 429.7 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2 PL 1185 * 16 A = 189.7
(189.7 - (10* 2.5)* 1.6) * 1.1 = 164.6 < 189.7 ∴An = 164.6 cm^2
4-RIB PL 250 * 24 Ar = 240.0
(240.0 - 4*(2* 2.7)* 2.4) * 1.1 = 207.0 < 240.0 ∴Anr = 207.0 cm^2
ΣAn = An + Anr = 164.6 + 207.0 = 371.6 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 147 * 429.7 / 371.6 = 170 N/mm^2
< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 170 * 16463 = 2795031 N
> 0.75 σ ta * An / 1.1 = 158 * 16463 / 1.1 = 2357233 N
Pc = σ c * Ag = 158 * 18967 = 2987233 N
・Rib Ptr = σ tn * Anr = 170 * 20698 = 3513921 N
> 0.75 σ ta * Anr/ 1.1 = 158 * 20698 / 1.1 = 2963520 N
Pcr = σ c * Agr = 158 * 24000 = 3780000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 164.6 / 2 = 82.3 cm^2
AgR = Ag / 2 = 189.7 / 2 = 94.8 cm^2
・Rib AnrR = Anr = 207.0 cm^2
AgrR = Agr = 240.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2987233 / 108000 = 27.7 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 3780000 / 108000 = 35.0 pcs. (4 @ 10 = 40 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 40 = 2987233 / 40 = 74681$ N

$\rho s = \tau * Ag / 40 = 22 * 18967 / 40 = 10478$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(74681^2 + 10478^2)} = 75412$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm²)	deduction of bolt holes			Ans(cm²)
1-SPL PL	1185 * 9	(106.7 -	(10*2.5)* 0.9)*1.1=	92.6<	106.7	∴ 92.6
1-SPL PL	420 * 14	(58.8 -	(5*2.5)* 1.4)*1.1=	45.4<	58.8	∴ 45.4
2-SPL PL	200 * 14	(56.0 -	2*(2*2.5)* 1.4)*1.1=	46.2<	56.0	∴ 46.2
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1=	8.5<	11.2	∴ 8.5
		126.0				100.1
8-SPL PL	185 * 18	(266.4 -	8*(2*2.7)* 1.8)*1.1=	207.5<	266.4	∴207.5
		＞ AgrR				＞AnrR

(377) D-4 J-19(Sec-19) DECK-3

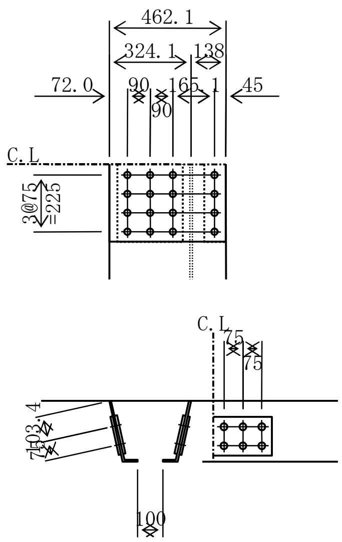
(a) Acting stress

σtmax = 147 N/mm^2 0.75σta = 0.75 * 210 = 158 N/mm^2
σcmax = -64 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2
∴σc = 158 N/mm^2
τmax = 22 N/mm^2

(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM490Y)
1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM490Y)
ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3 PL 462 * 16 A = 73.9
(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 ∴An = 63.7 cm^2
1-U.RIB 320 * 240 * 8 Ar = 53.9
(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0
< 53.9 ∴Anr = 41.0 cm^2
ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2
σtn = σtmax * ΣAg / ΣAn = 147 * 127.8 / 104.7 = 179 N/mm^2
< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 179 * 6373 = 1142377 N
> 0.75σta * An / 1.1 = 158 * 6373 / 1.1 = 912492 N
Pc = σc * Ag = 158 * 7394 = 1164492 N
・Rib Ptr = σtn * Anr = 179 * 4099 = 734690 N
> 0.75σta * Anr/ 1.1 = 158 * 4099 / 1.1 = 586845 N
Pcr = σc * Agr = 158 * 5390 = 848925 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2
AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2
・Rib AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1164492 / 108000 = 10.8 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 848925 / 108000 = 7.9 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 16 = 1164492 / 16 = 72781$ N

$\rho s = \tau * Ag / 16 = 22 * 7394 / 16 = 10211$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(72781^2 + 10211^2)} = 73494$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	260 * 14	(36.4 -	(3*2.5)* 1.4)*1.1=	28.5<	36.4	∴ 28.5
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		48.3				37.7
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(378) D-4 J-20(Sec-21) DECK-1

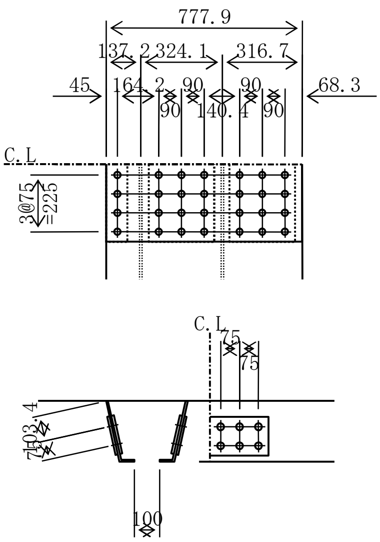
(a) Acting stress

σ tmax = 146 N/mm² 0.75 σ ta = 0.75 * 210 = 158 N/mm²
σ cmax = -64 N/mm² 0.75 σ ca = 0.75 * 210 = 158 N/mm²
∴ σ c = 158 N/mm²
τ max = 26 N/mm²

(b) Section area of main plate

1-DECK-1 PL 778 * 16 Ag = 124.5 cm² (SM490Y)
1-U.RIB 320 * 240 * 8 Agr = 53.9 cm² (SM490Y)
ΣAg = Ag + Agr = 124.5 + 53.9 = 178.4 cm²

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-1 PL 778 * 16 A = 124.5
(124.5 - (7* 2.5)* 1.6) * 1.1 = 106.1 < 124.5 ∴An = 106.1 cm²
1-U.RIB 320 * 240 * 8 Ar = 53.9
(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0
< 53.9 ∴Anr = 41.0 cm²
ΣAn = An + Anr = 106.1 + 41.0 = 147.1 cm²
σ tn = σ tmax * ΣAg / ΣAn = 146 * 178.4 / 147.1 = 177 N/mm²
< σ ta = 210 N/mm²

(e) Design axial force

・Main plate Pt = σ tn * An = 177 * 10612 = 1881943 N
> 0.75 σ ta * An / 1.1 = 158 * 10612 / 1.1 = 1519409 N
Pc = σ c * Ag = 158 * 12447 = 1960409 N
・Rib Ptr = σ tn * Anr = 177 * 4099 = 726867 N
> 0.75 σ ta * Anr/ 1.1 = 158 * 4099 / 1.1 = 586845 N
Pcr = σ c * Agr = 158 * 5390 = 848925 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 106.1 / 2 = 53.1 cm²
AgR = Ag / 2 = 124.5 / 2 = 62.2 cm²
・Rib AnrR = Anr = 41.0 cm²
AgrR = Agr = 53.9 cm²

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1960409 / 108000 = 18.2 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 848925 / 108000 = 7.9 pcs. (1 @ 12 = 12 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 28 = 1960409 / 28 = 70015$ N
$\rho s = \tau * Ag / 28 = 26 * 12447 / 28 = 11442$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(70015^2 + 11442^2)} = 70943$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	778 * 9	(70.0 -	(7*2.5)* 0.9)*1.1=	59.7<	70.0	∴ 59.7
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
2-SPL PL	260 * 14	(72.8 -	2*(3*2.5)* 1.4)*1.1=	57.0<	72.8	∴ 57.0
		84.7				66.2
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(379) D-4 J-20(Sec-21) DECK-2

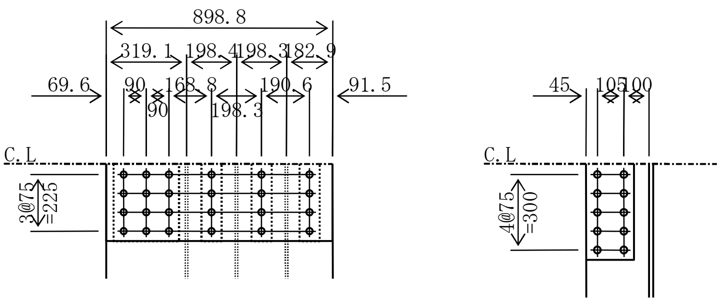
(a) Acting stress

σ tmax = 146 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 210 = 158 N/mm^2
∴ σ c = 158 N/mm^2
τ max = 26 N/mm^2

(b) Section area of main plate

1-DECK-2 PL 899 * 16 Ag = 143.8 cm^2 (SM490Y)
4-RIB PL 250 * 24 Agr = 240.0 cm^2 (SM490Y)
ΣAg = Ag + Agr = 143.8 + 240.0 = 383.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2 PL 899 * 16 A = 143.8
(143.8 - (6* 2.5)* 1.6) * 1.1 = 131.8 < 143.8 ∴An = 131.8 cm^2
4-RIB PL 250 * 24 Ar = 240.0
(240.0 - 4*(2* 2.7)* 2.4) * 1.1 = 207.0 < 240.0 ∴Anr = 207.0 cm^2
ΣAn = An + Anr = 131.8 + 207.0 = 338.8 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 146 * 383.8 / 338.8 = 166 N/mm^2
< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 166 * 13178 = 2183724 N
> 0.75 σ ta * An / 1.1 = 158 * 13178 / 1.1 = 1886900 N
Pc = σ c * Ag = 158 * 14380 = 2264900 N
・Rib Ptr = σ tn * Anr = 166 * 20698 = 3429704 N
> 0.75 σ ta * Anr/ 1.1 = 158 * 20698 / 1.1 = 2963520 N
Pcr = σ c * Agr = 158 * 24000 = 3780000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 131.8 / 2 = 65.9 cm^2
AgR = Ag / 2 = 143.8 / 2 = 71.9 cm^2
・Rib AnrR = Anr = 207.0 cm^2
AgrR = Agr = 240.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2264900 / 108000 = 21.0 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 3780000 / 108000 = 35.0 pcs. (4 @ 10 = 40 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 24 = 2264900 / 24 = 94371$ N

$\rho s = \tau * Ag / 24 = 26 * 14380 / 24 = 15422$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(94371^2 + 15422^2)} = 95623$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm²)	deduction of bolt holes			Ans(cm²)
1-SPL PL	899 * 9	(80.9 -	(6*2.5)* 0.9)*1.1=	74.1<	80.9	∴ 74.1
1-SPL PL	260 * 14	(36.4 -	(3*2.5)* 1.4)*1.1=	28.5<	36.4	∴ 28.5
3-SPL PL	80 * 14	(33.6 -	3*(1*2.5)* 1.4)*1.1=	25.4<	33.6	∴ 25.4
		70.0				53.9
8-SPL PL	185 * 18	(266.4 -	8*(2*2.7)* 1.8)*1.1=	207.5<	266.4	∴207.5
		> AgrR				>AnrR

(380) D-4 J-20(Sec-21) DECK-3

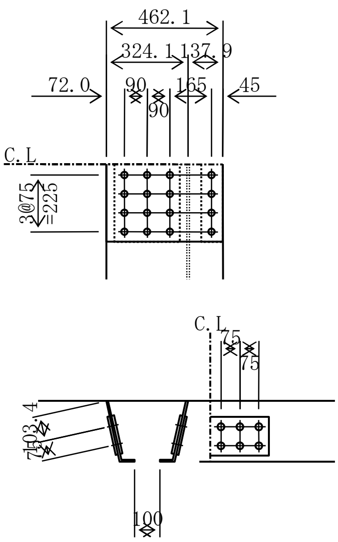
(a) Acting stress

σ tmax = 146 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 210 = 158 N/mm^2
∴ σ c = 158 N/mm^2
τ max = 26 N/mm^2

(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM490Y)
1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM490Y)
ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3 PL 462 * 16 A = 73.9
(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 ∴An = 63.7 cm^2
1-U.RIB 320 * 240 * 8 Ar = 53.9
(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0
< 53.9 ∴Anr = 41.0 cm^2
ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 146 * 127.8 / 104.7 = 179 N/mm^2
< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 179 * 6372 = 1137763 N
> 0.75 σ ta * An / 1.1 = 158 * 6372 / 1.1 = 912366 N
Pc = σ c * Ag = 158 * 7393 = 1164366 N
・Rib Ptr = σ tn * Anr = 179 * 4099 = 731823 N
> 0.75 σ ta * Anr/ 1.1 = 158 * 4099 / 1.1 = 586845 N
Pcr = σ c * Agr = 158 * 5390 = 848925 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2
AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2
・Rib AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate $n = Pc / (108000 * 1.00) = 1164366 / 108000 = 10.8$ pcs.

・Rib $nr = Pcr / (108000 * 1.00) = 848925 / 108000 = 7.9$ pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 16 = 1164366 / 16 = 72773$ N

$\rho s = \tau * Ag / 16 = 26 * 7393 / 16 = 11893$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(72773^2 + 11893^2)} = 73738$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	260 * 14	(36.4 -	(3*2.5)* 1.4)*1.1=	28.5<	36.4	∴ 28.5
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		48.3				37.7
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(381) D-4 J-21(Sec-22) DECK-1

(a) Acting stress

σ tmax = 92 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2

σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2

$\therefore$ σ c = 105 N/mm^2

τ max = 16 N/mm^2

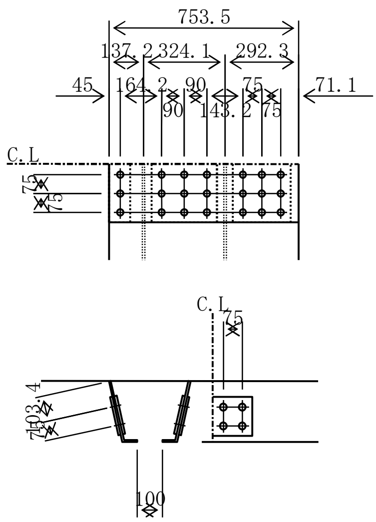
(b) Section area of main plate

1-DECK-1 PL 754 * 16 Ag = 120.6 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 120.6 + 53.9 = 174.5 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-1 PL 754 * 16 A = 120.6

(120.6 - (7* 2.5)* 1.6) * 1.1 = 101.8 < 120.6 $\therefore$An = 101.8 cm^2

1-U.RIB 320 * 240 * 8 Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9 $\therefore$Anr = 41.0 cm^2

ΣAn = An + Anr = 101.8 + 41.0 = 142.8 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 92 * 174.5 / 142.8 = 113 N/mm^2

< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 113 * 10182 = 1150519 N

> 0.75 σ ta * An / 1.1 = 105 * 10182 / 1.1 = 971964 N

Pc = σ c * Ag = 105 * 12057 = 1265964 N

・Rib Ptr = σ tn * Anr = 113 * 4099 = 463101 N

> 0.75 σ ta * Anr/ 1.1 = 105 * 4099 / 1.1 = 391230 N

Pcr = σ c * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 101.8 / 2 = 50.9 cm^2

AgR = Ag / 2 = 120.6 / 2 = 60.3 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate　n　= Pc　/ (108000 * 1.00) =　1265964 / 108000 = 11.7 pcs.

・Rib　nr = Pcr / (108000 * 1.00) =　565950 / 108000 =　5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 21 = 1265964 / 21 = 60284$ N

$\rho s = \tau * Ag / 21 = 16 * 12057 / 21 = 8948$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(60284^2 + 8948^2)} = 60945$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	754 * 9	(67.8 -	(7*2.5)* 0.9)*1.1=	57.3<	67.8	∴ 57.3
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
1-SPL PL	260 * 14	(36.4 -	(3*2.5)* 1.4)*1.1=	28.5<	36.4	∴ 28.5
1-SPL PL	230 * 14	(32.2 -	(3*2.5)* 1.4)*1.1=	23.9<	32.2	∴ 23.9
		80.5				61.6
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(382) D-4 J-21(Sec-22) DECK-2

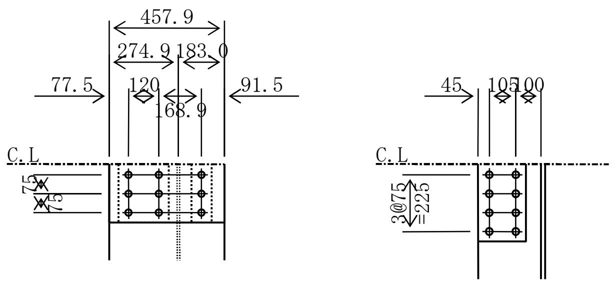
(a) Acting stress

$\sigma tmax$ = 92 N/mm^2 0.75 σta = 0.75 * 140 = 105 N/mm^2
$\sigma cmax$ = -64 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma c$ = 105 N/mm^2
τmax = 16 N/mm^2

(b) Section area of main plate

1-DECK-2 PL 458 * 16 Ag = 73.3 cm^2 (SM400)
2-RIB PL 250 * 24 Agr = 120.0 cm^2 (SM400)
ΣAg = Ag + Agr = 73.3 + 120.0 = 193.3 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2 PL 458 * 16 A = 73.3
(73.3 - (3* 2.5)* 1.6) * 1.1 = 67.4 < 73.3 $\therefore$An = 67.4 cm^2
2-RIB PL 250 * 24 Ar = 120.0
(120.0 - 2*(2* 2.7)* 2.4) * 1.1 = 103.5 < 120.0 $\therefore$Anr = 103.5 cm^2
ΣAn = An + Anr = 67.4 + 103.5 = 170.9 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 92 * 193.3 / 170.9 = 105 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 105 * 6739 = 704898 N
> 0.75 σta * An / 1.1 = 105 * 6739 / 1.1 = 643238 N
Pc = σc * Ag = 105 * 7326 = 769238 N
・Rib Ptr = σtn * Anr = 105 * 10349 = 1082532 N
> 0.75 σta * Anr/ 1.1 = 105 * 10349 / 1.1 = 987840 N
Pcr = σc * Agr = 105 * 12000 = 1260000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 67.4 / 2 = 33.7 cm^2
AgR = Ag / 2 = 73.3 / 2 = 36.6 cm^2
・Rib AnrR = Anr = 103.5 cm^2
AgrR = Agr = 120.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 769238 / 108000 = 7.1 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 1260000 / 108000 = 11.7 pcs. (2 @ 8 = 16 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 9 = 769238 / 9 = 85471$ N

$\rho s = \tau * Ag / 9 = 16 * 7326 / 9 = 12687$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(85471^2 + 12687^2)} = 86407$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	458 * 9	(41.2 -	(3*2.5)* 0.9)*1.1=	37.9<	41.2	∴ 37.9
1-SPL PL	200 * 14	(28.0 -	(2*2.5)* 1.4)*1.1=	23.1<	28.0	∴ 23.1
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1=	8.5<	11.2	∴ 8.5
		39.2				31.6
4-SPL PL	185 * 18	(133.2 -	4*(2*2.7)* 1.8)*1.1=	103.8<	133.2	∴103.8
		> AgrR				>AnrR

(383) D-4 J-21(Sec-22) DECK-3

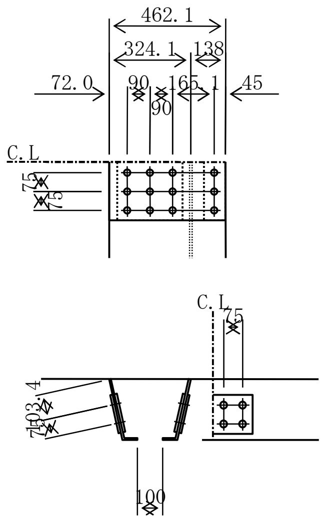
(a) Acting stress

σ_{tmax} = 92 N/mm^2 $0.75\sigma_{ta}$ = 0.75 * 140 = 105 N/mm^2
σ_{cmax} = -64 N/mm^2 $0.75\sigma_{ca}$ = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma_c$ = 105 N/mm^2
τ_{max} = 16 N/mm^2

(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)
1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)
ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3 PL 462 * 16 A = 73.9
(73.9 - (4* 2.5)* 1.6) * 1.1 = 63.7 < 73.9 ∴An = 63.7 cm^2
1-U.RIB 320 * 240 * 8 Ar = 53.9
(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0
< 53.9 ∴Anr = 41.0 cm^2
ΣAn = An + Anr = 63.7 + 41.0 = 104.7 cm^2
σ_{tn} = σ_{tmax} * ΣAg / ΣAn = 92 * 127.8 / 104.7 = 113 N/mm^2
< σ_{ta} = 140 N/mm^2

(e) Design axial force

・Main plate Pt = σ_{tn} * An = 113 * 6373 = 719562 N
> $0.75\sigma_{ta}$ * An / 1.1 = 105 * 6373 / 1.1 = 608328 N
Pc = σ_c * Ag = 105 * 7394 = 776328 N
・Rib Ptr = σ_{tn} * Anr = 113 * 4099 = 462767 N
> $0.75\sigma_{ta}$ * Anr/ 1.1 = 105 * 4099 / 1.1 = 391230 N
Pcr = σ_c * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 63.7 / 2 = 31.9 cm^2
AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2
・Rib AnrR = Anr = 41.0 cm^2
AgrR = Agr = 53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) =   776328 / 108000 = 7.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) =   565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 12 = 776328 / 12 = 64694$ N

$\rho s = \tau * Ag / 12 = 16 * 7394 / 12 = 9603$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64694^2 + 9603^2)} = 65403$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			Ans(cm^2)
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	260 * 14	(36.4 -	(3*2.5)* 1.4)*1.1=	28.5<	36.4	∴ 28.5
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		48.3				37.7
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(384) D-4 J-22(Sec-23) DECK-1

(a) Acting stress

$\sigma tmax$ = 32 N/mm^2 0.75σta = 0.75 * 140 = 105 N/mm^2

$\sigma cmax$ = -64 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 12 N/mm^2

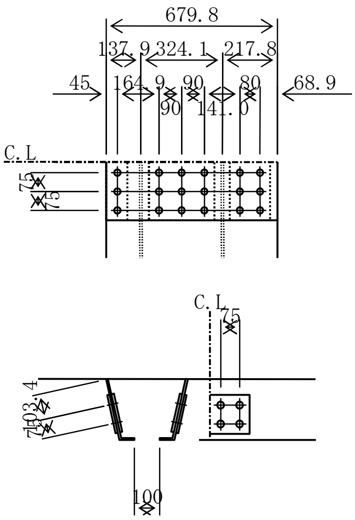
(b) Section area of main plate

1-DECK-1 PL 680 * 16 Ag = 108.8 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 108.8 + 53.9 = 162.7 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-1 PL 680 * 16 A = 108.8

(108.8 - (6* 2.5)* 1.6) * 1.1 = 93.2 < 108.8 $\therefore$An = 93.2 cm^2

1-U.RIB 320 * 240 * 8 Ar = 53.9

(53.9 - (4* 2.7)* 0.8- 1*(10.0*0.8)) * 1.1 = 41.0

< 53.9 $\therefore$Anr = 41.0 cm^2

ΣAn = An + Anr = 93.2 + 41.0 = 134.2 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 32 * 162.7 / 134.2 = 38 N/mm^2

< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 105 * 9325 / 1.1 = 890098 N

> σtn * An = 38 * 9325 = 358772 N

Pc = σc * Ag = 105 * 10877 = 1142098 N

・Rib Ptr = 0.75σta * Anr / 1.1 = 105 * 4099 / 1.1 = 391230 N

> σtn * Anr = 38 * 4099 = 157693 N

Pcr = σc * Agr = 105 * 5390 = 565950 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 93.2 / 2 = 46.6 cm^2

AgR = Ag / 2 = 108.8 / 2 = 54.4 cm^2

・Rib AnrR = Anr = 41.0 cm^2

AgrR = Agr = 53.9 cm^2

(g) Required bolt number

- Main plate $n = P_c / (108000 * 1.00) = 1142098 / 108000 = 10.6$ pcs.
- Rib $n_r = P_{cr} / (108000 * 1.00) = 565950 / 108000 = 5.2$ pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = P_c / 18 = 1142098 / 18 = 63450$ N
$\rho s = \tau * A_g / 18 = 12 * 10877 / 18 = 7553$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(63450^2 + 7553^2)} = 63898$ N

(i) Check of splice plates

	(SS400)	A_{gs} (cm^2)	deduction of bolt holes			A_{ns} (cm^2)
1-SPL PL	680 * 9	(61.2 -	(6*2.5)* 0.9)*1.1=	52.5<	61.2	∴ 52.5
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
1-SPL PL	260 * 14	(36.4 -	(3*2.5)* 1.4)*1.1=	28.5<	36.4	∴ 28.5
1-SPL PL	160 * 14	(22.4 -	(2*2.5)* 1.4)*1.1=	16.9<	22.4	∴ 16.9
		70.7				54.7
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(385) D-4 J-22(Sec-23) DECK-2

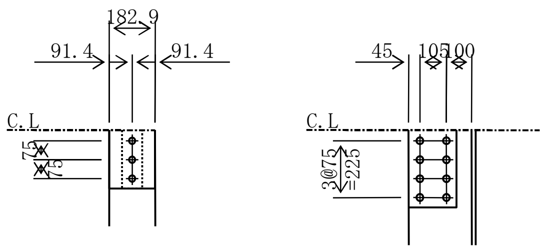
(a) Acting stress

σ tmax = 32 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2
∴ σ c = 105 N/mm^2
τ max = 12 N/mm^2

(b) Section area of main plate

1-DECK-2 PL 183 * 16 Ag = 29.3 cm^2 (SM400)
1-RIB PL 250 * 24 Agr = 60.0 cm^2 (SM400)
ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-2 PL 183 * 16 A = 29.3
(29.3 - (1* 2.5)* 1.6) * 1.1 = 27.8 < 29.3 ∴An = 27.8 cm^2
1-RIB PL 250 * 24 Ar = 60.0
(60.0 - (2* 2.7)* 2.4) * 1.1 = 51.7 < 60.0 ∴Anr = 51.7 cm^2
ΣAn = An + Anr = 27.8 + 51.7 = 79.5 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 32 * 89.3 / 79.5 = 36 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 2779 / 1.1 = 265255 N
> σ tn * An = 36 * 2779 = 99019 N
Pc = σ c * Ag = 105 * 2926 = 307255 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 5174 / 1.1 = 493920 N
> σ tn * Anr = 36 * 5174 = 184380 N
Pcr = σ c * Agr = 105 * 6000 = 630000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 27.8 / 2 = 13.9 cm^2
AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2
・Rib AnrR = Anr = 51.7 cm^2
AgrR = Agr = 60.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 307255 / 108000 = 2.8 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 630000 / 108000 = 5.8 pcs. (1 @ 8 = 8 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 3 = 307255 / 3 = 102418$ N

$\rho s = \tau * Ag / 3 = 12 * 2926 / 3 = 12192$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(102418^2 + 12192^2)} = 103141$ N

(i) Check of splice plates

	(SS400)	Ags(cm²)	deduction of bolt holes			Ans(cm²)
1-SPL PL	183 * 9	(16.5 -	(1*2.5)* 0.9)*1.1=	15.6＜	16.5	∴ 15.6
1-SPL PL	80 * 14	(11.2 -	(1*2.5)* 1.4)*1.1=	8.5＜	11.2	∴ 8.5
2-SPL PL	185 * 18	(66.6 -	2*(2*2.7)* 1.8)*1.1=	51.9＜	66.6	∴ 51.9
		＞ AgrR				＞AnrR

(386) D-4　J-22(Sec-23)　DECK-3

(a) Acting stress

$\sigma tmax$ = 32 N/mm^2　　0.75σta = 0.75 ＊ 140 = 105 N/mm^2

$\sigma cmax$ = −64 N/mm^2　　0.75σca = 0.75 ＊ 140 = 105 N/mm^2

∴σc = 105 N/mm^2

τmax = 12 N/mm^2

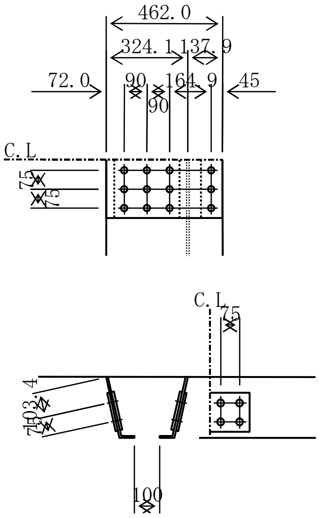
(b) Section area of main plate

1-DECK-3　PL　462 ＊ 16　　　Ag　=　73.9 cm^2　(SM400)

1-U.RIB 320 ＊ 240 ＊ 8　　　Agr =　53.9 cm^2　(SM400)

ΣAg = Ag + Agr =　73.9 +　53.9 =　127.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1-DECK-3　PL　462 ＊ 16　　A　=　73.9

(　73.9 -　(4＊ 2.5)＊ 1.6) ＊ 1.1 =　63.7 ＜　73.9　∴An　=　63.7 cm^2

1-U.RIB 320 ＊ 240 ＊ 8　　Ar =　53.9

(　53.9 -　(4＊ 2.7)＊ 0.8-　1＊(10.0＊0.8)) ＊ 1.1 =　41.0

＜　53.9　∴Anr =　41.0 cm^2

ΣAn = An + Anr =　63.7 +　41.0 =　104.7 cm^2

σtn = $\sigma tmax$ ＊ ΣAg / ΣAn =　32 ＊　127.8 /　104.7 =　39 N/mm^2

＜ σta =　140 N/mm^2

(e) Design axial force

・Main plate　Pt　= 0.75σta ＊ An　/ 1.1 =　105 ＊　6371 / 1.1 =　608110 N

＞ σtn ＊ An　=　39 ＊　6371　=　246934 N

Pc　= σc　＊ Ag　=　105 ＊　7392 =　776110 N

・Rib　Ptr = 0.75σta ＊ Anr / 1.1 =　105 ＊　4099 / 1.1 =　391230 N

＞ σtn ＊ Anr =　39 ＊　4099　=　158866 N

Pcr = σc　＊ Agr =　105 ＊　5390 =　565950 N

(f) Required section area of the splice plates

・Mother material(One side)　AnR　= An　/ 2 =　63.7 / 2 =　31.9 cm^2

AgR　= Ag　/ 2 =　73.9 / 2 =　37.0 cm^2

・Rib　　AnrR = Anr =　41.0 cm^2

AgrR = Agr =　53.9 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 776110 / 108000 = 7.2 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 12 = 776110 / 12 = 64676$ N
$\rho s = \tau * Ag / 12 = 12 * 7392 / 12 = 7699$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64676^2 + 7699^2)} = 65132$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			Ans(cm^2)
1-SPL PL	462 * 9	(41.6 -	(4*2.5)* 0.9)*1.1=	35.8<	41.6	∴ 35.8
1-SPL PL	260 * 14	(36.4 -	(3*2.5)* 1.4)*1.1=	28.5<	36.4	∴ 28.5
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
		48.3				37.7
4-SPL PL	155 * 10	(62.0 -	4*(2*2.7)* 1.0)*1.1=	44.4<	62.0	∴ 44.4
		> AgrR				>AnrR

(387) D-4 J-23(Sec-23) DECK-1

(a) Acting stress

$\sigma cmax$ = -92 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 8 N/mm^2

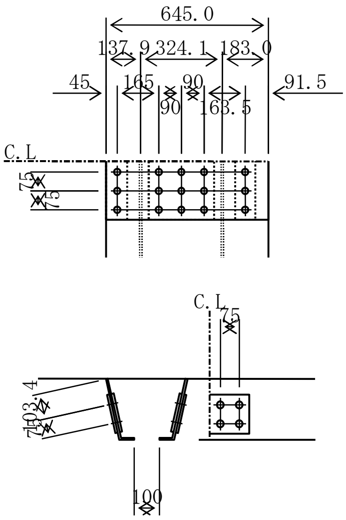
(b) Section area of main plate

1-DECK-1 PL 645 * 16 Ag = 103.2 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 10320 = 1083617 N

・Rib Pcr = σc * Agr = 105 * 5390 = 565950 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1083617 / 108000 = 10.0 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 15 = 1083617 / 15 = 72241 N

ρs = τ * Ag / 15 = 8 * 10320 / 15 = 5423 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(72241^2 + 5423^2)}$ = 72444 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)		
1-SPL PL	645 * 9	58.1		
1-SPL PL	85 * 14	11.9		
1-SPL PL	260 * 14	36.4		
1-SPL PL	80 * 14	11.2		
		59.5		
4-SPL PL	155 * 10	62.0	＞ AgrR =	53.9cm2

(388) D-4 J-23(Sec-23) DECK-2

(a) Acting stress

σ cmax = -92 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2

∴ σ c = 105 N/mm^2

τ max = 8 N/mm^2

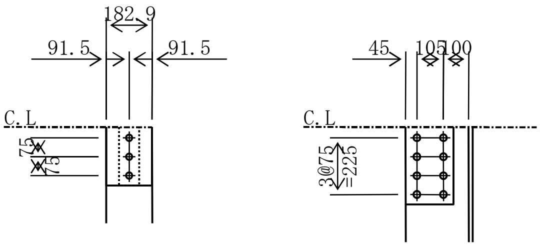
(b) Section area of main plate

1-DECK-2 PL 183 * 16 Ag = 29.3 cm^2 (SM400)

1-RIB PL 250 * 24 Agr = 60.0 cm^2 (SM400)

ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σ c * Ag = 105 * 2927 = 307339 N

・Rib Pcr = σ c * Agr = 105 * 6000 = 630000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2

・Rib AgrR = Agr = 60.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 307339 / 108000 = 2.8 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 630000 / 108000 = 5.8 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρ p = Pc / 3 = 307339 / 3 = 102446 N

ρ s = τ * Ag / 3 = 8 * 2927 / 3 = 7690 N

$\rho = \sqrt{}(\rho p^2 + \rho s^2) = \sqrt{}(102446^2 + 7690^2) = 102735$ N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	183 * 9	16.5	
1-SPL PL	80 * 14	11.2	
2-SPL PL	185 * 18	66.6	＞ AgrR = 60.0cm2

(389) D-4 J-23(Sec-23) DECK-3

(a) Acting stress

$\sigma cmax$ = -92 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 8 N/mm^2

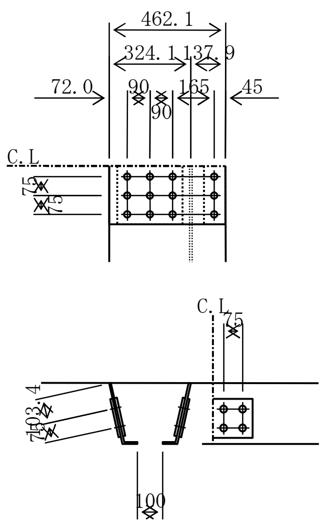
(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 7393 = 776244 N

・Rib Pcr = σc * Agr = 105 * 5390 = 565950 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 776244 / 108000 = 7.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 12 = 776244 / 12 = 64687 N

ρs = τ * Ag / 12 = 8 * 7393 / 12 = 4856 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(64687^2 + 4856^2) = 64869 N

(h) Check of splice plates

	(SS400)	$A_{gs}(cm^2)$	
1-SPL PL	462 * 9	41.6	
1-SPL PL	260 * 14	36.4	
1-SPL PL	85 * 14	11.9	
		48.3	
4-SPL PL	155 * 10	62.0	＞ AgrR = 53.9cm2

(390) D-4 J-24(Sec-24) DECK-1

(a) Acting stress

$\sigma cmax$ = -123 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 123 N/mm^2

τmax = 5 N/mm^2

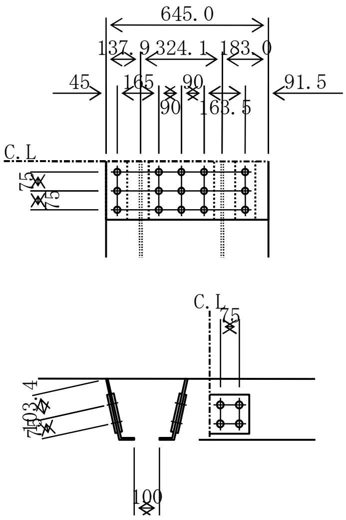
(b) Section area of main plate

1-DECK-1 PL 645 * 16 Ag = 103.2 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 123 * 10320 = 1266026 N

・Rib Pcr = σc * Agr = 123 * 5390 = 661218 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1266026 / 108000 = 11.7 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 661218 / 108000 = 6.1 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 15 = 1266026 / 15 = 84402 N

ρs = τ * Ag / 15 = 5 * 10320 / 15 = 3671 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(84402^2 + 3671^2) = 84482 N

(h) Check of splice plates

	(SS400)	$Ags (cm^2)$	
1-SPL PL	645 * 9	58.1	
1-SPL PL	85 * 14	11.9	
1-SPL PL	260 * 14	36.4	
1-SPL PL	80 * 14	11.2	
		59.5	
4-SPL PL	155 * 10	62.0	＞ AgrR = 53.9cm2

(391) D-4 J-24(Sec-24) DECK-2

(a) Acting stress

$\sigma cmax$ = -123 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴σc = 123 N/mm^2

τmax = 5 N/mm^2

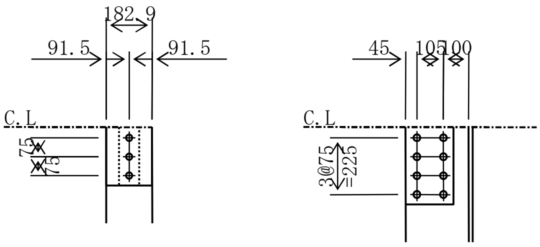
(b) Section area of main plate

1-DECK-2 PL 183 * 16 Ag = 29.3 cm^2 (SM400)

1-RIB PL 250 * 24 Agr = 60.0 cm^2 (SM400)

ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 123 * 2927 = 359075 N

・Rib Pcr = σc * Agr = 123 * 6000 = 736050 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2

・Rib AgrR = Agr = 60.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 359075 / 108000 = 3.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 736050 / 108000 = 6.8 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 3 = 359075 / 3 = 119692 N

ρs = τ * Ag / 3 = 5 * 2927 / 3 = 5206 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(119692^2 + 5206^2)}$ = 119805 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	183 * 9	16.5	
1-SPL PL	80 * 14	11.2	
2-SPL PL	185 * 18	66.6	＞ AgrR = 60.0cm2

(392) D-4 J-24(Sec-24) DECK-3

(a) Acting stress

$\sigma cmax$ = -123 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 123 N/mm^2

τmax = 5 N/mm^2

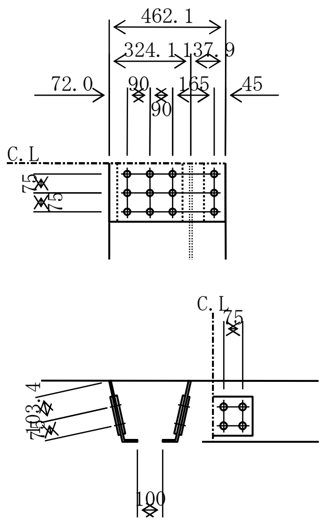
(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 123 * 7393 = 906912 N

・Rib Pcr = σc * Agr = 123 * 5390 = 661218 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 906912 / 108000 = 8.4 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 661218 / 108000 = 6.1 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 12 = 906912 / 12 = 75576 N

ρs = τ * Ag / 12 = 5 * 7393 / 12 = 3287 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(75576^2 + 3287^2)}$ = 75647 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	462 * 9	41.6	
1-SPL PL	260 * 14	36.4	
1-SPL PL	85 * 14	11.9	
		48.3	
4-SPL PL	155 * 10	62.0	＞ AgrR = 53.9cm2

(393) D-4 J-25(Sec-25) DECK-1

(a) Acting stress

$\sigma cmax$ = -145 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 158 N/mm^2

τmax = 4 N/mm^2

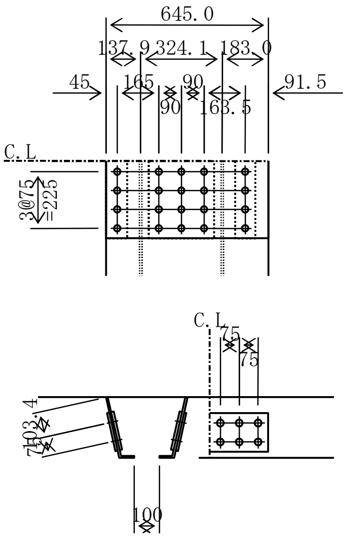
(b) Section area of main plate

1-DECK-1 PL 645 * 16 Ag = 103.2 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 10320 = 1625425 N

・Rib Pcr = σc * Agr = 158 * 5390 = 848925 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1625425 / 108000 = 15.1 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 848925 / 108000 = 7.9 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 20 = 1625425 / 20 = 81271 N

ρs = τ * Ag / 20 = 4 * 10320 / 20 = 2053 N

ρ = $\sqrt{}(\rho p^2 + \rho s^2)$ = $\sqrt{}($ 81271^2 + 2053^2) = 81297 N

(h) Check of splice plates

	(SM490Y)	A_{gs} (cm^2)		
1-SPL PL	645 * 9	58.1		
1-SPL PL	85 * 14	11.9		
1-SPL PL	260 * 14	36.4		
1-SPL PL	80 * 14	11.2		
		59.5		
4-SPL PL	155 * 10	62.0	> AgrR =	53.9cm2

(394) D-4 J-25(Sec-25) DECK-2

(a) Acting stress

$\sigma cmax$ = -145 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 158 N/mm^2

τmax = 4 N/mm^2

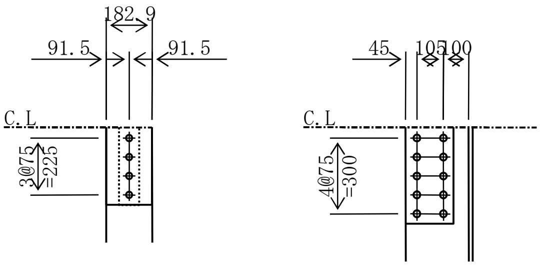
(b) Section area of main plate

1-DECK-2 PL 183 * 16 Ag = 29.3 cm^2 (SM490Y)

1-RIB PL 250 * 24 Agr = 60.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 2927 = 461009 N

・Rib Pcr = σc * Agr = 158 * 6000 = 945000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2

・Rib AgrR = Agr = 60.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 461009 / 108000 = 4.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 945000 / 108000 = 8.8 pcs. (1 @ 10 = 10 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(g) Tensile force per one bolt

ρp = Pc / 4 = 461009 / 4 = 115252 N

ρs = τ * Ag / 4 = 4 * 2927 / 4 = 2911 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(115252^2 + 2911^2)}$ = 115289 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
1-SPL PL	183 * 9	16.5	
1-SPL PL	80 * 14	11.2	
2-SPL PL	185 * 18	66.6	> AgrR = 60.0cm2

(395) D-4 J-25(Sec-25) DECK-3

(a) Acting stress

$\sigma cmax$ = -145 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma c$ = 158 N/mm^2

τmax = 4 N/mm^2

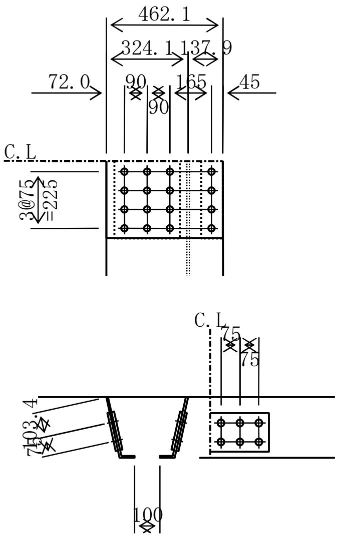
(b) Section area of main plate

1-DECK-3 PL 462 * 16   Ag = 73.9 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 7393 = 1164366 N

・Rib Pcr = σc * Agr = 158 * 5390 = 848925 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib   AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1164366 / 108000 = 10.8 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 848925 / 108000 = 7.9 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 16 = 1164366 / 16 = 72773 N

ρs = τ * Ag / 16 = 4 * 7393 / 16 = 1838 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(72773^2 + 1838^2)}$ = 72796 N

(h) Check of splice plates

	(SM490Y)	$Ags(cm^2)$		
1-SPL PL	462 * 9	41.6		
1-SPL PL	260 * 14	36.4		
1-SPL PL	85 * 14	11.9		
		48.3		
4-SPL PL	155 * 10	62.0	> AgrR =	53.9cm2

(396) D-4 J-26(Sec-26) DECK-1

(a) Acting stress

$\sigma cmax$ = -159 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 159 N/mm^2

τmax = 3 N/mm^2

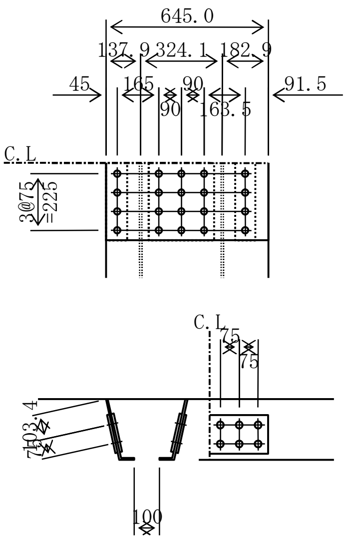
(b) Section area of main plate

1-DECK-1 PL 645 * 16 Ag = 103.2 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 159 * 10320 = 1640803 N

・Rib Pcr = σc * Agr = 159 * 5390 = 856983 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1640803 / 108000 = 15.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 856983 / 108000 = 7.9 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 20 = 1640803 / 20 = 82040 N

ρs = τ * Ag / 20 = 3 * 10320 / 20 = 1550 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(82040^2 + 1550^2)}$ = 82055 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)
1-SPL PL	645 * 9	58.0
1-SPL PL	85 * 14	11.9
1-SPL PL	260 * 14	36.4
1-SPL PL	80 * 14	11.2
		59.5
4-SPL PL	155 * 10	62.0 ＞ AgrR = 53.9cm2

(397) D-4 J-26(Sec-26) DECK-2

(a) Acting stress

$\sigma cmax$ = -159 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 159 N/mm^2

τmax = 3 N/mm^2

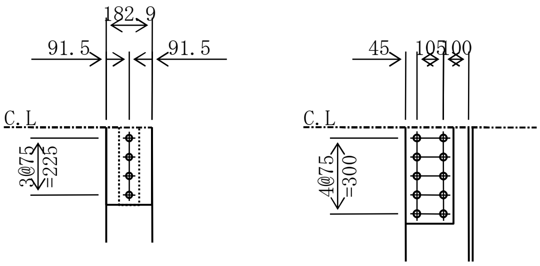
(b) Section area of main plate

1-DECK-2 PL 183 * 16 Ag = 29.3 cm^2 (SM490Y)

1-RIB PL 250 * 24 Agr = 60.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 159 * 2927 = 465410 N

・Rib Pcr = σc * Agr = 159 * 6000 = 953970 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2

・Rib AgrR = Agr = 60.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 465410 / 108000 = 4.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 953970 / 108000 = 8.8 pcs. (1 @ 10 = 10 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(g) Tensile force per one bolt

ρp = Pc / 4 = 465410 / 4 = 116353 N

ρs = τ * Ag / 4 = 3 * 2927 / 4 = 2198 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(116353^2 + 2198^2)}$ = 116373 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
1-SPL PL	183 * 9	16.5	
1-SPL PL	80 * 14	11.2	
2-SPL PL	185 * 18	66.6	＞ AgrR = 60.0cm2

(398) D-4 J-26(Sec-26) DECK-3

(a) Acting stress

σcmax = -159 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2

∴σc = 159 N/mm^2

τmax = 3 N/mm^2

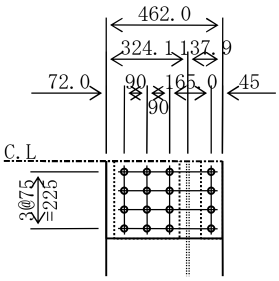
(b) Section area of main plate

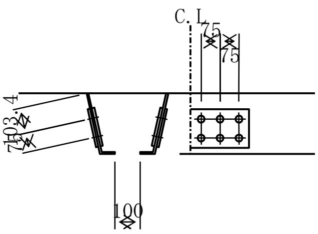
1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 159 * 7392 = 1175316 N

・Rib Pcr = σc * Agr = 159 * 5390 = 856983 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1175316 / 108000 = 10.9 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 856983 / 108000 = 7.9 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 16 = 1175316 / 16 = 73457 N

ρs = τ * Ag / 16 = 3 * 7392 / 16 = 1388 N

ρ = √(ρp^2 + ρs^2) = √(73457^2 + 1388^2) = 73470 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)		
1-SPL PL	462 * 9	41.6		
1-SPL PL	260 * 14	36.4		
1-SPL PL	85 * 14	11.9		
		48.3		
4-SPL PL	155 * 10	62.0	> AgrR =	53.9cm2

(399) D-4 J-27(Sec-27) DECK-1

(a) Acting stress

$\sigma cmax$ = -163 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 163 N/mm^2

τmax = 2 N/mm^2

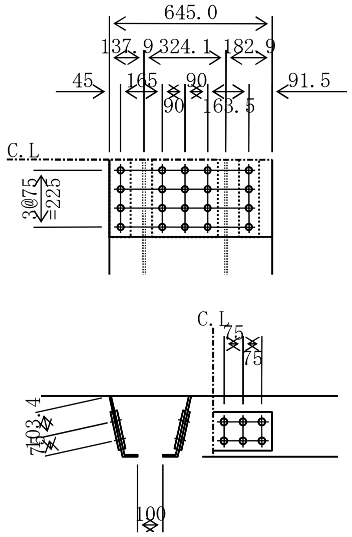
(b) Section area of main plate

1-DECK-1 PL 645 * 16 Ag = 103.2 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 163 * 10320 = 1680968 N

・Rib Pcr = σc * Agr = 163 * 5390 = 877961 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1680968 / 108000 = 15.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 877961 / 108000 = 8.1 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 20 = 1680968 / 20 = 84048 N

ρs = τ * Ag / 20 = 2 * 10320 / 20 = 972 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(84048^2 + 972^2)}$ = 84054 N

(h) Check of splice plates

	(SM490Y)	$A_{gs}(cm^2)$		
1-SPL PL	645 * 9	58.0		
1-SPL PL	85 * 14	11.9		
1-SPL PL	260 * 14	36.4		
1-SPL PL	80 * 14	11.2		
		59.5		
4-SPL PL	155 * 10	62.0	> AgrR =	53.9cm2

(400) D-4 J-27(Sec-27) DECK-2

(a) Acting stress

$\sigma cmax$ = -163 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 163 N/mm^2

τmax = 2 N/mm^2

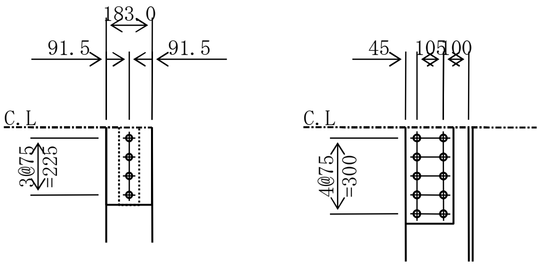
(b) Section area of main plate

1-DECK-2 PL 183 * 16   Ag = 29.3 cm^2 (SM490Y)

1-RIB PL 250 * 24   Agr = 60.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 163 * 2927 = 476829 N

・Rib Pcr = σc * Agr = 163 * 6000 = 977322 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2

・Rib AgrR = Agr = 60.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 476829 / 108000 = 4.4 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 977322 / 108000 = 9.0 pcs. (1 @ 10 = 10 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(g) Tensile force per one bolt

ρp = Pc / 4 = 476829 / 4 = 119207 N

ρs = τ * Ag / 4 = 2 * 2927 / 4 = 1379 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(119207^2 + 1379^2) = 119215 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
1-SPL PL	183 * 9	16.5	
1-SPL PL	80 * 14	11.2	
2-SPL PL	185 * 18	66.6	＞ AgrR = 60.0cm2

(401) D-4 J-27(Sec-27) DECK-3

(a) Acting stress

$\sigma cmax$ = -163 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 163 N/mm^2

τmax = 2 N/mm^2

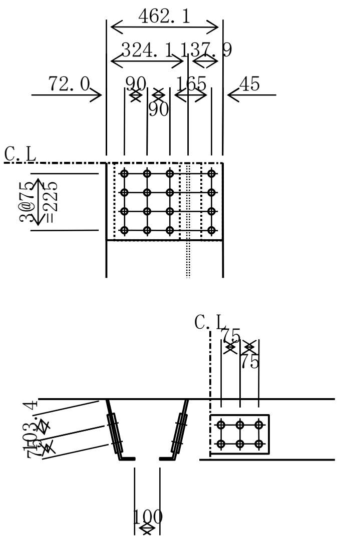
(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 163 * 7393 = 1204191 N

・Rib Pcr = σc * Agr = 163 * 5390 = 877961 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1204191 / 108000 = 11.1 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 877961 / 108000 = 8.1 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 16 = 1204191 / 16 = 75262 N

ρs = τ * Ag / 16 = 2 * 7393 / 16 = 871 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(75262^2 + 871^2)}$ = 75267 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
1-SPL PL	462 ＊ 9	41.6	
1-SPL PL	260 ＊ 14	36.4	
1-SPL PL	85 ＊ 14	11.9	
		48.3	
4-SPL PL	155 ＊ 10	62.0	＞ AgrR = 53.9cm2

(402) D-4 J-28(Sec-29) DECK-1

(a) Acting stress

$\sigma cmax$ = -162 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 162 N/mm^2

τmax = 2 N/mm^2

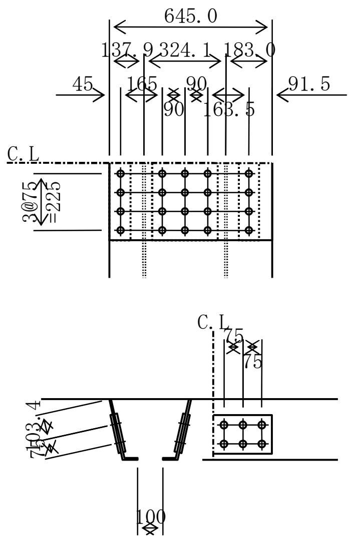
(b) Section area of main plate

1-DECK-1 PL 645 * 16   Ag = 103.2 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 162 * 10320 = 1667387 N

・Rib Pcr = σc * Agr = 162 * 5390 = 870841 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2

・Rib   AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1667387 / 108000 = 15.4 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 870841 / 108000 = 8.1 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 20 = 1667387 / 20 = 83369 N

ρs = τ * Ag / 20 = 2 * 10320 / 20 = 1049 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(83369^2 + 1049^2)}$ = 83376 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
1-SPL PL	645 ＊ 9	58.1	
1-SPL PL	85 ＊ 14	11.9	
1-SPL PL	260 ＊ 14	36.4	
1-SPL PL	80 ＊ 14	11.2	
		59.5	
4-SPL PL	155 ＊ 10	62.0	＞ AgrR = 53.9cm2

(403) D-4 J-28(Sec-29) DECK-2

(a) Acting stress

$\sigma cmax$ = -162 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 162 N/mm^2

τmax = 2 N/mm^2

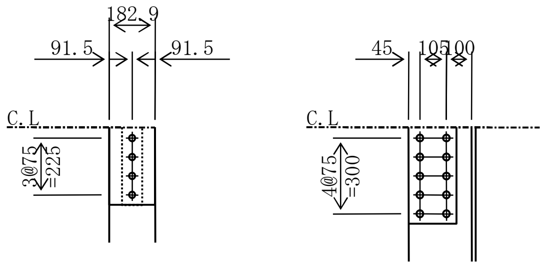
(b) Section area of main plate

1-DECK-2 PL 183 * 16   Ag = 29.3 cm^2 (SM490Y)

1-RIB PL 250 * 24   Agr = 60.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 162 * 2927 = 472910 N

・Rib Pcr = σc * Agr = 162 * 6000 = 969396 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2

・Rib AgrR = Agr = 60.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 472910 / 108000 = 4.4 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 969396 / 108000 = 9.0 pcs. (1 @ 10 = 10 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(g) Tensile force per one bolt

ρp = Pc / 4 = 472910 / 4 = 118228 N

ρs = τ * Ag / 4 = 2 * 2927 / 4 = 1488 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(118228^2 + 1488^2)}$ = 118237 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
1-SPL PL	183 * 9	16.5	
1-SPL PL	80 * 14	11.2	
2-SPL PL	185 * 18	66.6	＞ AgrR = 60.0cm2

(404) D-4 J-28(Sec-29) DECK-3

(a) Acting stress

$\sigma cmax$ = -162 N/mm^2 $0.75\sigma ca$ = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma c$ = 162 N/mm^2

τmax = 2 N/mm^2

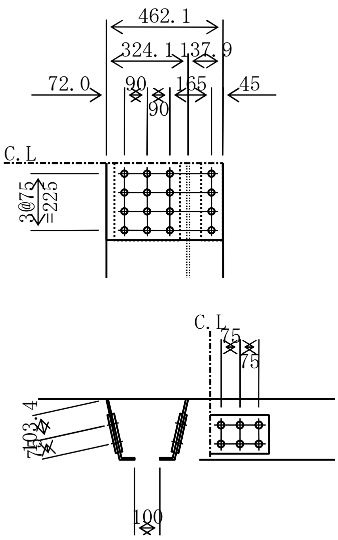
(b) Section area of main plate

1-DECK-3 PL 462 * 16   Ag = 73.9 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8   Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 162 * 7393 = 1194425 N

・Rib Pcr = σc * Agr = 162 * 5390 = 870841 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1194425 / 108000 = 11.1 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 870841 / 108000 = 8.1 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 16 = 1194425 / 16 = 74652 N

ρs = τ * Ag / 16 = 2 * 7393 / 16 = 939 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(74652^2 + 939^2)}$ = 74657 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
1-SPL PL	462 * 9	41.6	
1-SPL PL	260 * 14	36.4	
1-SPL PL	85 * 14	11.9	
		48.3	
4-SPL PL	155 * 10	62.0	＞ AgrR = 53.9cm2

(405) D-4 J-29(Sec-30) DECK-1

(a) Acting stress

$\sigma cmax$ = -155 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 158 N/mm^2

τmax = 3 N/mm^2

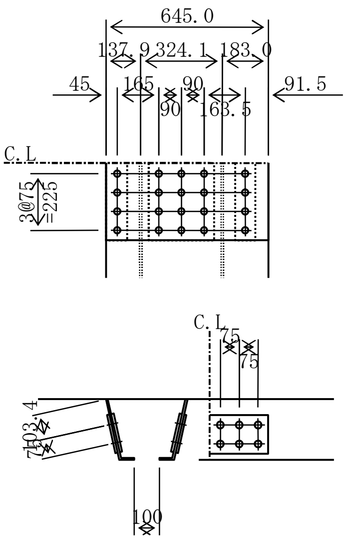
(b) Section area of main plate

1-DECK-1 PL 645 * 16 Ag = 103.2 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 10320 = 1625425 N

・Rib Pcr = σc * Agr = 158 * 5390 = 848925 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1625425 / 108000 = 15.1 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 848925 / 108000 = 7.9 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 20 = 1625425 / 20 = 81271 N

ρs = τ * Ag / 20 = 3 * 10320 / 20 = 1579 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(81271^2 + 1579^2)}$ = 81287 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
1-SPL PL	645 ＊ 9	58.1	
1-SPL PL	85 ＊ 14	11.9	
1-SPL PL	260 ＊ 14	36.4	
1-SPL PL	80 ＊ 14	11.2	
		59.5	
4-SPL PL	155 ＊ 10	62.0	＞ AgrR = 53.9cm2

(406) D-4 J-29(Sec-30) DECK-2

(a) Acting stress

$\sigma cmax$ = -155 N/mm² 0.75 σca = 0.75 * 210 = 158 N/mm²

$\therefore \sigma c$ = 158 N/mm²

τmax = 3 N/mm²

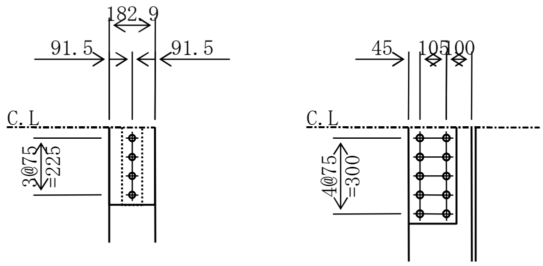
(b) Section area of main plate

1-DECK-2 PL 183 * 16 Ag = 29.3 cm² (SM490Y)

1-RIB PL 250 * 24 Agr = 60.0 cm² (SM490Y)

ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm²

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 2927 = 461009 N

・Rib Pcr = σc * Agr = 158 * 6000 = 945000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 29.3 / 2 = 14.6 cm²

・Rib AgrR = Agr = 60.0 cm²

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 461009 / 108000 = 4.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 945000 / 108000 = 8.8 pcs. (1 @ 10 = 10 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(g) Tensile force per one bolt

ρp = Pc / 4 = 461009 / 4 = 115252 N

ρs = τ * Ag / 4 = 3 * 2927 / 4 = 2239 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(115252^2 + 2239^2)}$ = 115274 N

(h) Check of splice plates

	(SM490Y)	Ags(cm²)	
1-SPL PL	183 * 9	16.5	
1-SPL PL	80 * 14	11.2	
2-SPL PL	185 * 18	66.6	> AgrR = 60.0cm2

(407) D-4 J-29(Sec-30) DECK-3

(a) Acting stress

$\sigma cmax$ = -155 N/mm^2 $0.75\sigma ca$ = 0.75 * 210 = 158 N/mm^2

∴ σc = 158 N/mm^2

τmax = 3 N/mm^2

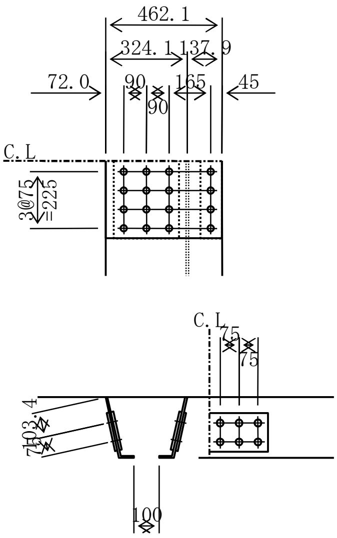
(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 7393 = 1164366 N

・Rib Pcr = σc * Agr = 158 * 5390 = 848925 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1164366 / 108000 = 10.8 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 848925 / 108000 = 7.9 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 16 = 1164366 / 16 = 72773 N

ρs = τ * Ag / 16 = 3 * 7393 / 16 = 1414 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(72773^2 + 1414^2)}$ = 72787 N

(h) Check of splice plates

	(SM490Y)	$Ags(cm^2)$	
1-SPL PL	462 * 9	41.6	
1-SPL PL	260 * 14	36.4	
1-SPL PL	85 * 14	11.9	
		48.3	
4-SPL PL	155 * 10	62.0	＞ AgrR = 53.9cm2

(408) D-4 J-30(Sec-31) DECK-1

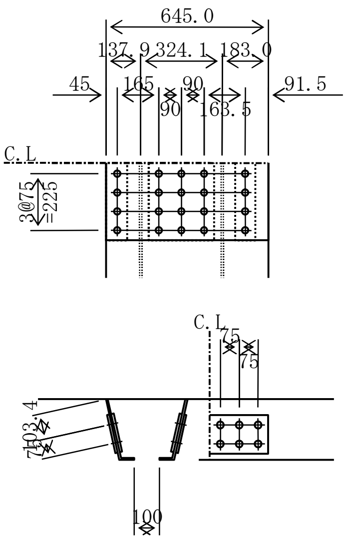
(a) Acting stress

$\sigma cmax$ = -141 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2
$\therefore \sigma c$ = 158 N/mm^2
τmax = 4 N/mm^2

(b) Section area of main plate

1-DECK-1 PL 645 * 16 Ag = 103.2 cm^2 (SM490Y)
1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM490Y)
ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 10320 = 1625425 N
・Rib Pcr = σc * Agr = 158 * 5390 = 848925 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2
・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1625425 / 108000 = 15.1 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 848925 / 108000 = 7.9 pcs. (1 @ 12 = 12 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 20 = 1625425 / 20 = 81271 N
ρs = τ * Ag / 20 = 4 * 10320 / 20 = 2150 N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(81271^2 + 2150^2)}$ = 81300 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
1-SPL PL	645 ＊ 9	58.1	
1-SPL PL	85 ＊ 14	11.9	
1-SPL PL	260 ＊ 14	36.4	
1-SPL PL	80 ＊ 14	11.2	
		59.5	
4-SPL PL	155 ＊ 10	62.0	＞ AgrR = 53.9cm2

(409) D-4　J-30(Sec-31)　DECK-2

(a) Acting stress

$\sigma cmax$ = -141 N/mm^2　　0.75 σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma c$ = 158 N/mm^2

τmax = 4 N/mm^2

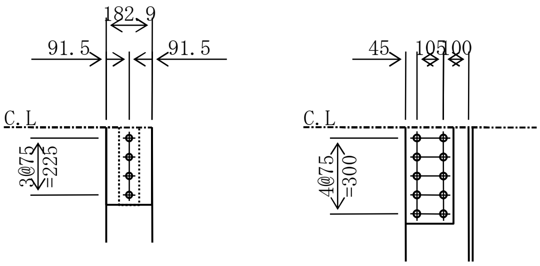
(b) Section area of main plate

1-DECK-2　PL　183 * 16　　　Ag = 29.3 cm^2　(SM490Y)

1-RIB　PL　250 * 24　　　Agr = 60.0 cm^2　(SM490Y)

ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate　Pc = σc * Ag = 158 * 2927 = 461009 N

・Rib　Pcr = σc * Agr = 158 * 6000 = 945000 N

(e) Required section area of the splice plates

・Mother material(One side)　AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2

・Rib　　AgrR = Agr = 60.0 cm^2

(f) Required bolt number

・Main plate　n = Pc / (108000 * 1.00) = 461009 / 108000 = 4.3 pcs.

・Rib　nr = Pcr / (108000 * 1.00) = 945000 / 108000 = 8.8 pcs. (1 @ 10 = 10 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 4,5 unites)

(g) Tensile force per one bolt

ρp = Pc / 4 = 461009 / 4 = 115252 N

ρs = τ * Ag / 4 = 4 * 2927 / 4 = 3049 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(115252^2 + 3049^2)}$ = 115293 N

(h) Check of splice plates

	(SM490Y)	$Ags(cm^2)$	
1-SPL PL	183 * 9	16.5	
1-SPL PL	80 * 14	11.2	
2-SPL PL	185 * 18	66.6	＞ AgrR = 60.0cm2

(410) D-4 J-30(Sec-31) DECK-3

(a) Acting stress

$\sigma cmax$ = -141 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma c$ = 158 N/mm^2

τmax = 4 N/mm^2

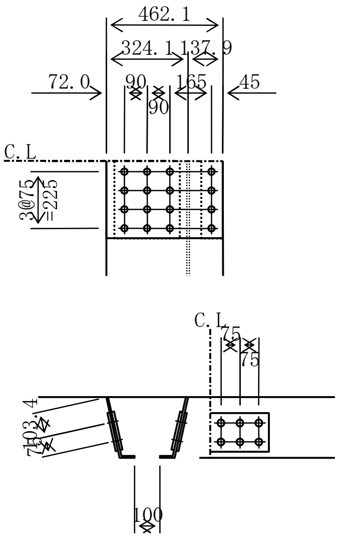
(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM490Y)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM490Y)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 7393 = 1164366 N

・Rib Pcr = σc * Agr = 158 * 5390 = 848925 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1164366 / 108000 = 10.8 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 848925 / 108000 = 7.9 pcs. (1 @ 12 = 12 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 16 = 1164366 / 16 = 72773 N

ρs = τ * Ag / 16 = 4 * 7393 / 16 = 1925 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(72773^2 + 1925^2)}$ = 72798 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
1-SPL PL	462 * 9	41.6	
1-SPL PL	260 * 14	36.4	
1-SPL PL	85 * 14	11.9	
		48.3	
4-SPL PL	155 * 10	62.0	> AgrR = 53.9cm2

(411) D-4 J-31(Sec-32) DECK-1

(a) Acting stress

σcmax = -118 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

$\therefore\sigma$c = 118 N/mm^2

τmax = 5 N/mm^2

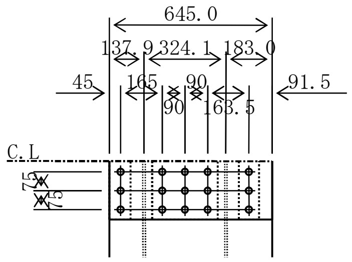
(b) Section area of main plate

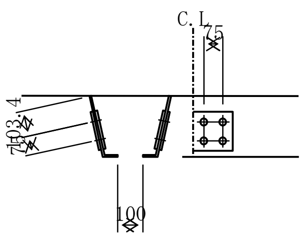
1-DECK-1 PL 645 * 16 Ag = 103.2 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 118 * 10320 = 1221649 N

・Rib Pcr = σc * Agr = 118 * 5390 = 638041 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1221649 / 108000 = 11.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 638041 / 108000 = 5.9 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 15 = 1221649 / 15 = 81443 N

ρs = τ * Ag / 15 = 5 * 10320 / 15 = 3441 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(81443^2 + 3441^2) = 81516 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)		
1-SPL PL	645 ＊ 9	58.1		
1-SPL PL	85 ＊ 14	11.9		
1-SPL PL	260 ＊ 14	36.4		
1-SPL PL	80 ＊ 14	11.2		
		59.5		
4-SPL PL	155 ＊ 10	62.0	＞ AgrR =	53.9cm2

(412) D-4 J-31(Sec-32) DECK-2

(a) Acting stress

σcmax = -118 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴σc = 118 N/mm^2

τmax = 5 N/mm^2

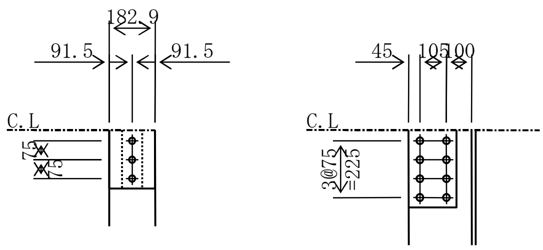
(b) Section area of main plate

1-DECK-2 PL 183 * 16 Ag = 29.3 cm^2 (SM400)

1-RIB PL 250 * 24 Agr = 60.0 cm^2 (SM400)

ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 118 * 2927 = 346488 N

・Rib Pcr = σc * Agr = 118 * 6000 = 710250 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2

・Rib AgrR = Agr = 60.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 346488 / 108000 = 3.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 710250 / 108000 = 6.6 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 3 = 346488 / 3 = 115496 N

ρs = τ * Ag / 3 = 5 * 2927 / 3 = 4879 N

$\rho = \sqrt{}(\rho p^2 + \rho s^2) = \sqrt{}(115496^2 + 4879^2) = 115599$ N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	183 * 9	16.5	
1-SPL PL	80 * 14	11.2	
2-SPL PL	185 * 18	66.6	＞ AgrR = 60.0cm2

(413) D-4 J-31(Sec-32) DECK-3

(a) Acting stress

$\sigma cmax$ = -118 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 118 N/mm^2

τmax = 5 N/mm^2

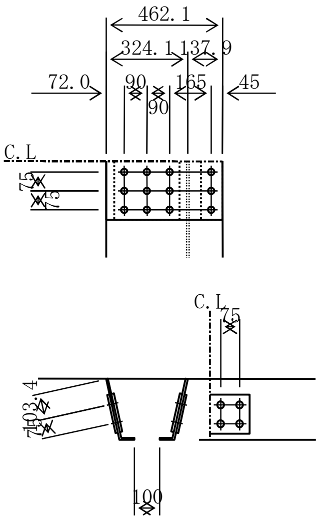
(b) Section area of main plate

1-DECK-3 PL 462 * 16 Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 118 * 7393 = 875123 N

・Rib Pcr = σc * Agr = 118 * 5390 = 638041 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 875123 / 108000 = 8.1 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 638041 / 108000 = 5.9 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 12 = 875123 / 12 = 72927 N

ρs = τ * Ag / 12 = 5 * 7393 / 12 = 3081 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(72927^2 + 3081^2)}$ = 72992 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	462 ＊ 9	41.6	
1-SPL PL	260 ＊ 14	36.4	
1-SPL PL	85 ＊ 14	11.9	
		48.3	
4-SPL PL	155 ＊ 10	62.0	＞ AgrR = 53.9cm2

(414) D-4 J-32(Sec-33) DECK-1

(a) Acting stress

σcmax = -87 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma$c = 105 N/mm^2

τmax = 8 N/mm^2

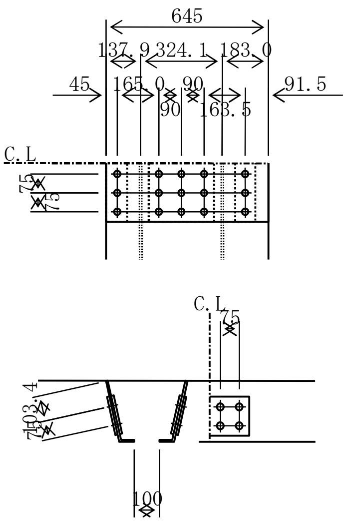
(b) Section area of main plate

1-DECK-1 PL 645 * 16 Ag = 103.2 cm^2 (SM400)

1-U.RIB 320 * 240 * 8 Agr = 53.9 cm^2 (SM400)

ΣAg = Ag + Agr = 103.2 + 53.9 = 157.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 10320 = 1083600 N

・Rib Pcr = σc * Agr = 105 * 5390 = 565950 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 103.2 / 2 = 51.6 cm^2

・Rib AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1083600 / 108000 = 10.0 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 15 = 1083600 / 15 = 72240 N

ρs = τ * Ag / 15 = 8 * 10320 / 15 = 5370 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(72240^2 + 5370^2) = 72439 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	645 ＊ 9	58.0	
1-SPL PL	85 ＊ 14	11.9	
1-SPL PL	260 ＊ 14	36.4	
1-SPL PL	80 ＊ 14	11.2	
		59.5	
4-SPL PL	155 ＊ 10	62.0	＞ AgrR = 53.9cm2

(415) D-4 J-32(Sec-33) DECK-2

(a) Acting stress

σcmax = -87 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma$c = 105 N/mm^2

τmax = 8 N/mm^2

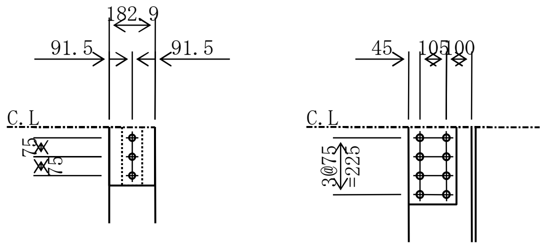
(b) Section area of main plate

1-DECK-2 PL 183 * 16   Ag = 29.3 cm^2 (SM400)

1-RIB PL 250 * 24   Agr = 60.0 cm^2 (SM400)

ΣAg = Ag + Agr = 29.3 + 60.0 = 89.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 2927 = 307322 N

・Rib Pcr = σc * Agr = 105 * 6000 = 630000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 29.3 / 2 = 14.6 cm^2

・Rib AgrR = Agr = 60.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 307322 / 108000 = 2.8 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 630000 / 108000 = 5.8 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 3 = 307322 / 3 = 102441 N

ρs = τ * Ag / 3 = 8 * 2927 / 3 = 7615 N

$\rho = \sqrt{}(\rho p^2 + \rho s^2) = \sqrt{}(102441^2 + 7615^2) = 102723$ N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	183 * 9	16.5	
1-SPL PL	80 * 14	11.2	
2-SPL PL	185 * 18	66.6	＞ AgrR = 60.0cm2

(416) D-4　J-32(Sec-33)　DECK-3

(a) Acting stress

σ cmax = -87 N/mm^2　　0.75 σ ca = 0.75 * 140 = 105 N/mm^2

∴ σ c = 105 N/mm^2

τ max = 8 N/mm^2

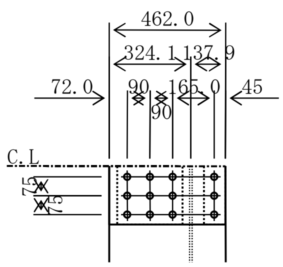
(b) Section area of main plate

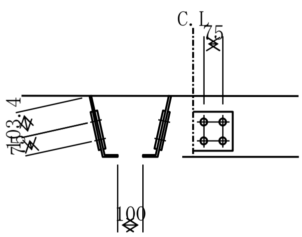
1-DECK-3 PL 462 * 16　　　Ag = 73.9 cm^2 (SM400)

1-U.RIB 320 * 240 * 8　　　Agr = 53.9 cm^2 (SM400)

Σ Ag = Ag + Agr = 73.9 + 53.9 = 127.8 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σ c * Ag = 105 * 7393 = 776227 N

・Rib Pcr = σ c * Agr = 105 * 5390 = 565950 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 73.9 / 2 = 37.0 cm^2

・Rib　　AgrR = Agr = 53.9 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 776227 / 108000 = 7.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 565950 / 108000 = 5.2 pcs. (1 @ 8 = 8 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρ p = Pc / 12 = 776227 / 12 = 64686 N

ρ s = τ * Ag / 12 = 8 * 7393 / 12 = 4808 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64686^2 + 4808^2)}$ = 64864 N

(h) Check of splice plates

	(SS400)	$Ags(cm^2)$	
1-SPL PL	462 ＊ 9	41.6	
1-SPL PL	260 ＊ 14	36.4	
1-SPL PL	85 ＊ 14	11.9	
		48.3	
4-SPL PL	155 ＊ 10	62.0	＞ AgrR = 53.9cm2

(417) G4 J-1(Sec-1) DECK

(a) Acting stress

$\sigma cmax$ = -77 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 32 N/mm^2

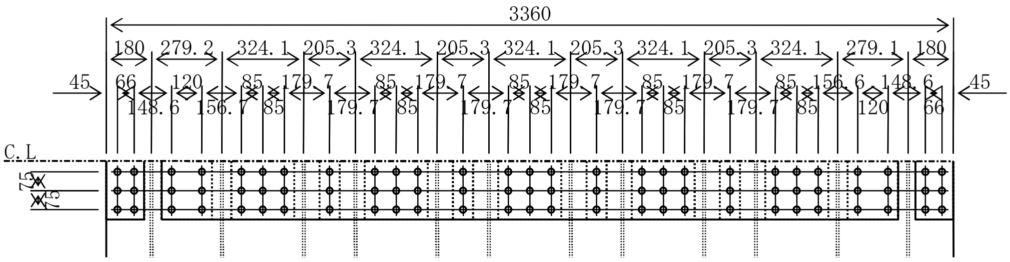
(b) Section area of main plate

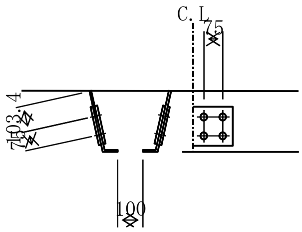
1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM400)

5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM400)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 53760 = 5644800 N

・Rib Pcr = σc * Agr = 105 * 26950 = 2829750 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AgrR = Agr = 269.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5644800 / 108000 = 52.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2829750 / 108000 = 26.2 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 81 = 5644800 / 81 = 69689 N

ρs = τ * Ag / 81 = 32 * 53760 / 81 = 21146 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(69689^2 + 21146^2) = 72827 N

(h) Check of splice plates

	(SS400)	$Ags(cm^2)$
2-SPL PL	151 * 9	27.2
1-SPL PL	2921 * 9	262.9
		290.1
2-SPL PL	151 * 14	42.3
2-SPL PL	200 * 14	56.0
5-SPL PL	250 * 14	175.0
4-SPL PL	80 * 14	44.8
		318.1
20-SPL PL	155 * 10	310.0 > AgrR = 269.5cm2

(418) G4 J-2(Sec-2) DECK

(a) Acting stress

$\sigma cmax$ = -96 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 21 N/mm^2

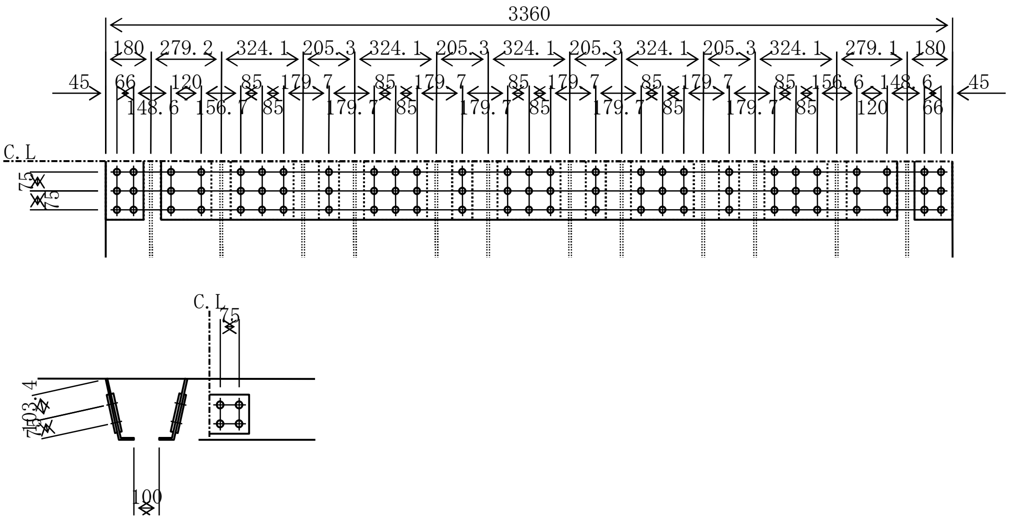
(b) Section area of main plate

1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM400)

5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM400)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 53760 = 5644800 N

・Rib Pcr = σc * Agr = 105 * 26950 = 2829750 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AgrR = Agr = 269.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5644800 / 108000 = 52.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2829750 / 108000 = 26.2 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 81 = 5644800 / 81 = 69689 N

ρs = τ * Ag / 81 = 21 * 53760 / 81 = 14063 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(69689^2 + 14063^2) = 71094 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
2-SPL PL	151 * 9	27.2	
1-SPL PL	2921 * 9	262.9	
		290.1	
2-SPL PL	151 * 14	42.3	
2-SPL PL	200 * 14	56.0	
5-SPL PL	250 * 14	175.0	
4-SPL PL	80 * 14	44.8	
		318.1	
20-SPL PL	155 * 10	310.0	> AgrR = 269.5cm2

(419) G4 J-3(Sec-3) DECK

(a) Acting stress

$\sigma cmax$ = -106 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 106 N/mm^2

τmax = 13 N/mm^2

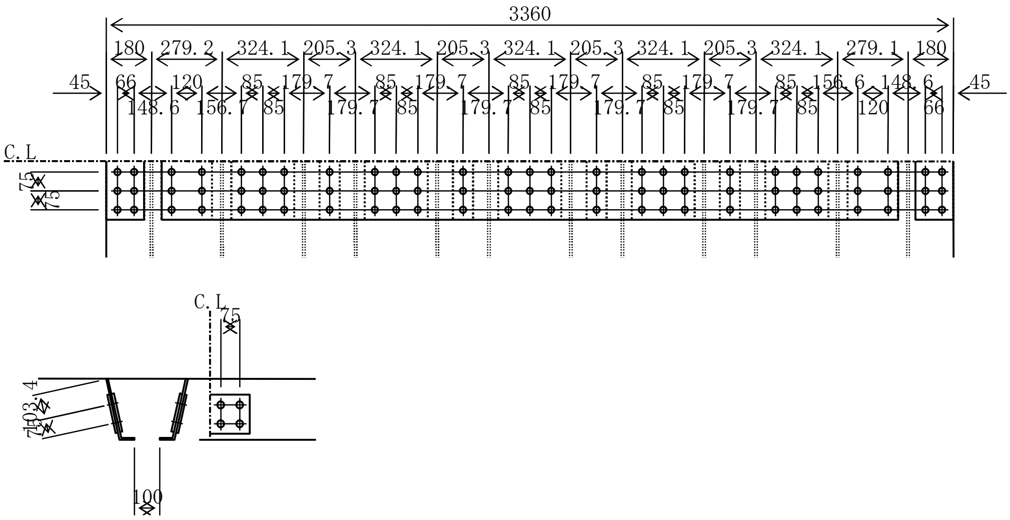
(b) Section area of main plate

1-DECK PL 3360 * 16   Ag = 537.6 cm^2 (SM400)

5-U.RIB 320 * 240 * 8   Agr = 269.5 cm^2 (SM400)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 106 * 53760 = 5695711 N

・Rib Pcr = σc * Agr = 106 * 26950 = 2855272 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib   AgrR = Agr = 269.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5695711 / 108000 = 52.7 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2855272 / 108000 = 26.4 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 81 = 5695711 / 81 = 70317 N

ρs = τ * Ag / 81 = 13 * 53760 / 81 = 8740 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(70317^2 + 8740^2)}$ = 70859 N

(h) Check of splice plates

	(SS400)	A_{gs} (cm^2)	
2-SPL PL	151 * 9	27.2	
1-SPL PL	2921 * 9	262.9	
		290.1	
2-SPL PL	151 * 14	42.3	
2-SPL PL	200 * 14	56.0	
5-SPL PL	250 * 14	175.0	
4-SPL PL	80 * 14	44.8	
		318.1	
20-SPL PL	155 * 10	310.0	＞ AgrR = 269.5cm2

(420) G4 J-4(Sec-5) DECK

(a) Acting stress

$\sigma cmax$ = -109 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 109 N/mm^2

τmax = 8 N/mm^2

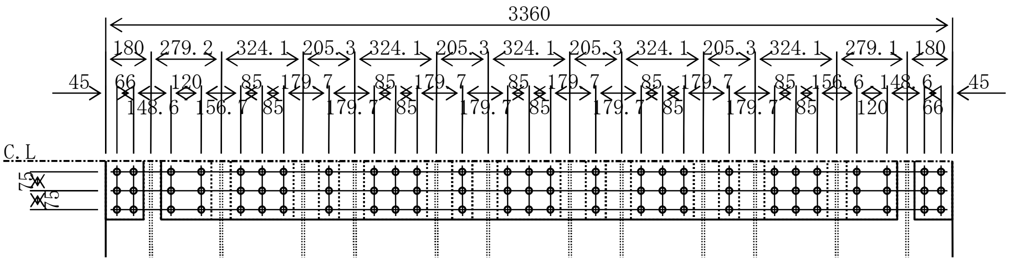
(b) Section area of main plate

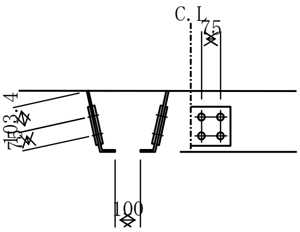
1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM400)

5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM400)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 109 * 53760 = 5877204 N

・Rib Pcr = σc * Agr = 109 * 26950 = 2946255 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AgrR = Agr = 269.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5877204 / 108000 = 54.4 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2946255 / 108000 = 27.3 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 81 = 5877204 / 81 = 72558 N

ρs = τ * Ag / 81 = 8 * 53760 / 81 = 5219 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(72558^2 + 5219^2) = 72746 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
2-SPL PL	151 * 9	27.2
1-SPL PL	2921 * 9	262.9
		290.1
2-SPL PL	151 * 14	42.3
2-SPL PL	200 * 14	56.0
5-SPL PL	250 * 14	175.0
4-SPL PL	80 * 14	44.8
		318.1
20-SPL PL	155 * 10	310.0 ＞ AgrR = 269.5cm2

(421) G4 J-5(Sec-6) DECK

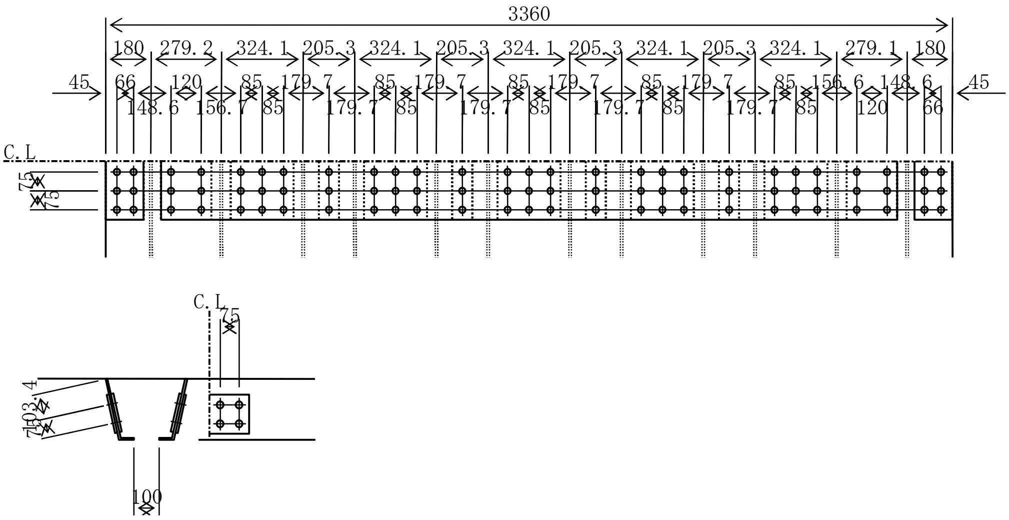
(a) Acting stress

$\sigma cmax$ = -106 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma c$ = 106 N/mm^2
τmax = 13 N/mm^2

(b) Section area of main plate

1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM400)
5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM400)
ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 106 * 53760 = 5711140 N
・Rib Pcr = σc * Agr = 106 * 26950 = 2863006 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2
・Rib AgrR = Agr = 269.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5711140 / 108000 = 52.9 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 2863006 / 108000 = 26.5 pcs. (5 @ 8 = 40 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 81 = 5711140 / 81 = 70508 N
ρs = τ * Ag / 81 = 13 * 53760 / 81 = 8616 N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(70508^2 + 8616^2)}$ = 71032 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
2-SPL PL	151 * 9	27.2	
1-SPL PL	2921 * 9	262.9	
		290.1	
2-SPL PL	151 * 14	42.3	
2-SPL PL	200 * 14	56.0	
5-SPL PL	250 * 14	175.0	
4-SPL PL	80 * 14	44.8	
		318.1	
20-SPL PL	155 * 10	310.0	＞ AgrR = 269.5cm2

(422) G4 J-6(Sec-7) DECK

(a) Acting stress

$\sigma cmax$ = -96 N/mm^2 $0.75\sigma ca$ = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 20 N/mm^2

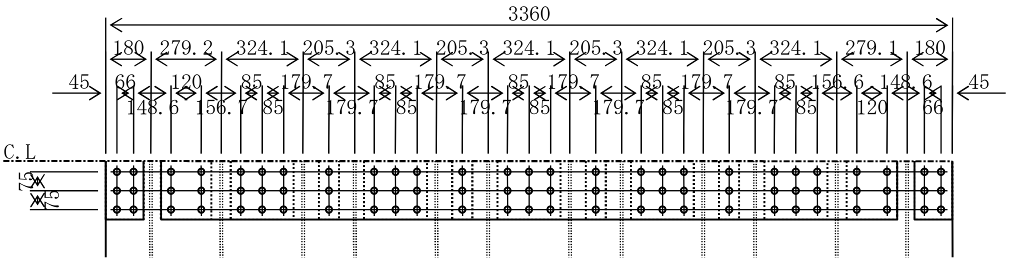
(b) Section area of main plate

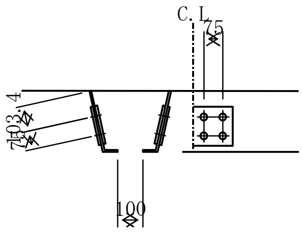
1-DECK PL 3360 * 16   Ag = 537.6 cm^2 (SM400)

5-U.RIB 320 * 240 * 8   Agr = 269.5 cm^2 (SM400)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 53760 = 5644800 N

・Rib Pcr = σc * Agr = 105 * 26950 = 2829750 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AgrR = Agr = 269.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5644800 / 108000 = 52.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2829750 / 108000 = 26.2 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 81 = 5644800 / 81 = 69689 N

ρs = τ * Ag / 81 = 20 * 53760 / 81 = 13431 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(69689^2 + 13431^2)}$ = 70971 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
2-SPL PL	151 * 9	27.2
1-SPL PL	2921 * 9	262.9
		290.1
2-SPL PL	151 * 14	42.3
2-SPL PL	200 * 14	56.0
5-SPL PL	250 * 14	175.0
4-SPL PL	80 * 14	44.8
		318.1
20-SPL PL	155 * 10	310.0 ＞ AgrR = 269.5cm2

(423) G4 J-7(Sec-8) DECK

(a) Acting stress

$\sigma cmax$ = -76 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 27 N/mm^2

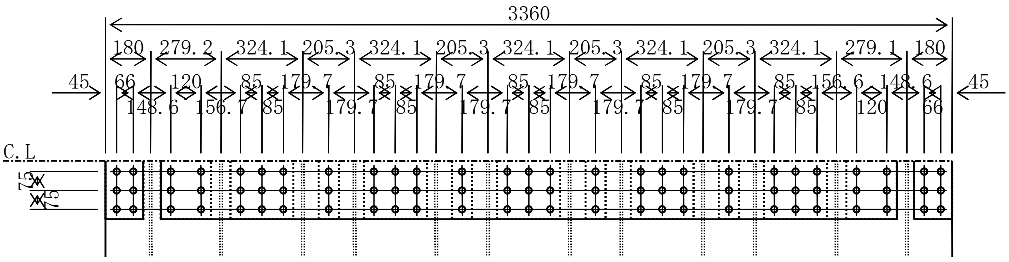
(b) Section area of main plate

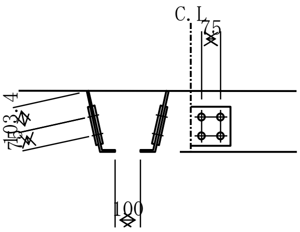
1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM400)

5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM400)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 53760 = 5644800 N

・Rib Pcr = σc * Agr = 105 * 26950 = 2829750 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AgrR = Agr = 269.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5644800 / 108000 = 52.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2829750 / 108000 = 26.2 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 81 = 5644800 / 81 = 69689 N

ρs = τ * Ag / 81 = 27 * 53760 / 81 = 17637 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(69689^2 + 17637^2) = 71886 N

(h) Check of splice plates

	(SS400)	$Ags(cm^2)$	
2-SPL PL	151 * 9	27.2	
1-SPL PL	2921 * 9	262.9	
		290.1	
2-SPL PL	151 * 14	42.3	
2-SPL PL	200 * 14	56.0	
5-SPL PL	250 * 14	175.0	
4-SPL PL	80 * 14	44.8	
		318.1	
20-SPL PL	155 * 10	310.0	> AgrR = 269.5cm2

(424) G4 J-8(Sec-8) DECK

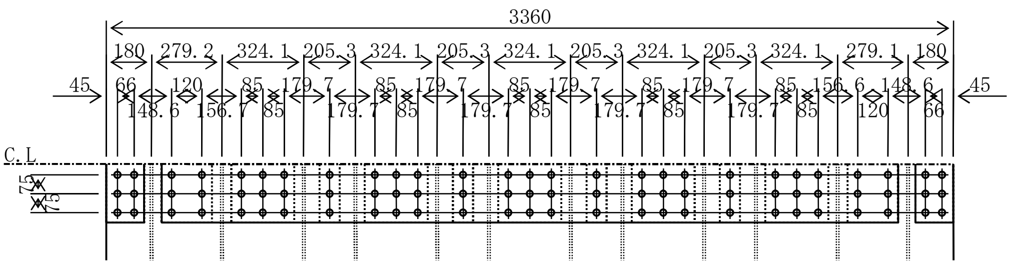
(a) Acting stress

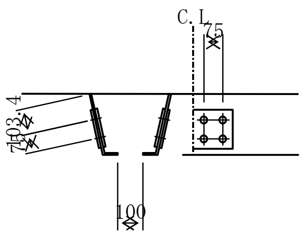
$\sigma tmax$ = 25 N/mm^2 0.75σta = 0.75 * 140 = 105 N/mm^2
$\sigma cmax$ = -64 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma c$ = 105 N/mm^2
τmax = 35 N/mm^2

(b) Section area of main plate

1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM400)
5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM400)
ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3360 * 16 A = 537.6
(537.6 - (27* 2.5)* 1.6) * 1.1 = 472.6 < 537.6 $\therefore$An = 472.6 cm^2
5-U.RIB 320 * 240 * 8 Ar = 269.5
(269.5 - 5*(4* 2.7)* 0.8- 5*(10.0*0.8)) * 1.1 = 204.9
< 269.5 $\therefore$Anr = 204.9 cm^2
ΣAn = An + Anr = 472.6 + 204.9 = 677.5 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 25 * 807.1 / 677.5 = 30 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 105 * 47256 / 1.1 = 4510800 N
> σtn * An = 30 * 47256 = 1411747 N
Pc = σc * Ag = 105 * 53760 = 5644800 N
・Rib Ptr = 0.75σta * Anr / 1.1 = 105 * 20493 / 1.1 = 1956150 N
> σtn * Anr = 30 * 20493 = 612217 N
Pcr = σc * Agr = 105 * 26950 = 2829750 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 472.6 / 2 = 236.3 cm^2
AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2
・Rib AnrR = Anr = 204.9 cm^2
AgrR = Agr = 269.5 cm^2

(g) Required bolt number

- Main plate n = Pc / (108000 * 1.00) = 5644800 / 108000 = 52.3 pcs.
- Rib nr = Pcr / (108000 * 1.00) = 2829750 / 108000 = 26.2 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 81 = 5644800 / 81 = 69689 N

ρs = τ * Ag / 81 = 35 * 53760 / 81 = 23037 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(69689^2 + 23037^2)}$ = 73398 N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2921 * 9	(262.9 -	(23*2.5)* 0.9)*1.1= 232.2<	262.9	∴232.2
		290.1			252.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
2-SPL PL	200 * 14	(56.0 -	2*(2*2.5)* 1.4)*1.1= 46.2<	56.0	∴ 46.2
5-SPL PL	250 * 14	(175.0 -	5*(3*2.5)* 1.4)*1.1= 134.8<	175.0	∴134.8
4-SPL PL	80 * 14	(44.8 -	4*(1*2.5)* 1.4)*1.1= 33.9<	44.8	∴ 33.9
		318.1			245.9
20-SPL PL	155 * 10	(310.0 -	20*(2*2.7)* 1.0)*1.1= 222.2<	310.0	∴222.2
		> AgrR			>AnrR

(425) G4 J-9(Sec-9) DECK

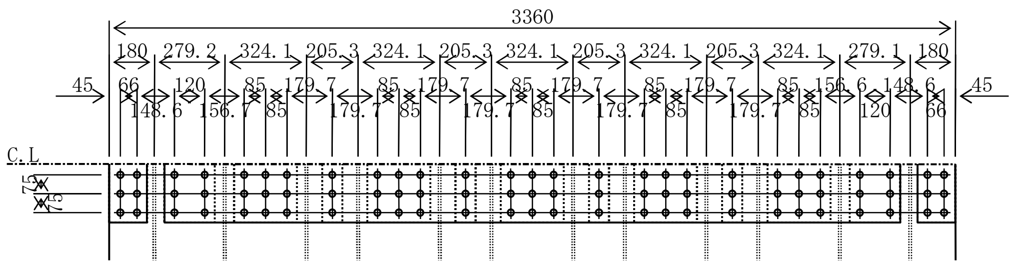
(a) Acting stress

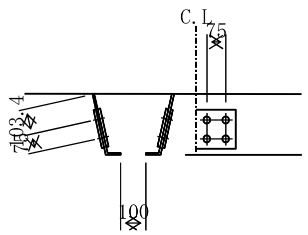
$\sigma tmax$ = 78 N/mm^2 $0.75\sigma ta$ = 0.75 * 140 = 105 N/mm^2
$\sigma cmax$ = -64 N/mm^2 $0.75\sigma ca$ = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma c$ = 105 N/mm^2
τmax = 41 N/mm^2

(b) Section area of main plate

1-DECK PL 3360 * 16   Ag = 537.6 cm^2 (SM400)
5-U.RIB 320 * 240 * 8   Agr = 269.5 cm^2 (SM400)
ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3360 * 16   A = 537.6
(537.6 - (27* 2.5)* 1.6) * 1.1 = 472.6 < 537.6 $\therefore$An = 472.6 cm^2
5-U.RIB 320 * 240 * 8   Ar = 269.5
(269.5 - 5*(4* 2.7)* 0.8- 5*(10.0*0.8)) * 1.1 = 204.9
< 269.5 $\therefore$Anr = 204.9 cm^2
ΣAn = An + Anr = 472.6 + 204.9 = 677.5 cm^2
$\sigma tn = \sigma tmax * \Sigma Ag / \Sigma An$ = 78 * 807.1 / 677.5 = 93 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = $0.75\sigma ta$ * An / 1.1 = 105 * 47256 / 1.1 = 4510800 N
> σtn * An = 93 * 47256 = 4392028 N
Pc = σc * Ag = 105 * 53760 = 5644800 N
・Rib Ptr = $0.75\sigma ta$ * Anr / 1.1 = 105 * 20493 / 1.1 = 1956150 N
> σtn * Anr = 93 * 20493 = 1904643 N
Pcr = σc * Agr = 105 * 26950 = 2829750 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 472.6 / 2 = 236.3 cm^2
AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2
・Rib AnrR = Anr = 204.9 cm^2
AgrR = Agr = 269.5 cm^2

(g) Required bolt number

- Main plate n = Pc / (108000 * 1.00) = 5644800 / 108000 = 52.3 pcs.
- Rib nr = Pcr / (108000 * 1.00) = 2829750 / 108000 = 26.2 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 81 = 5644800 / 81 = 69689$ N
$\rho s = \tau * Ag / 81 = 41 * 53760 / 81 = 26905$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(69689^2 + 26905^2)} = 74702$ N

(i) Check of splice plates

	(SS400)	Ags(cm²)	deduction of bolt holes		Ans(cm²)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2921 * 9	(262.9 -	(23*2.5)* 0.9)*1.1= 232.2<	262.9	∴232.2
		290.1			252.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
2-SPL PL	200 * 14	(56.0 -	2*(2*2.5)* 1.4)*1.1= 46.2<	56.0	∴ 46.2
5-SPL PL	250 * 14	(175.0 -	5*(3*2.5)* 1.4)*1.1= 134.8<	175.0	∴134.8
4-SPL PL	80 * 14	(44.8 -	4*(1*2.5)* 1.4)*1.1= 33.9<	44.8	∴ 33.9
		318.1			245.9
20-SPL PL	155 * 10	(310.0 -	20*(2*2.7)* 1.0)*1.1= 222.2<	310.0	∴222.2
		> AgrR			>AnrR

(426) G4 J-10(Sec-11) DECK

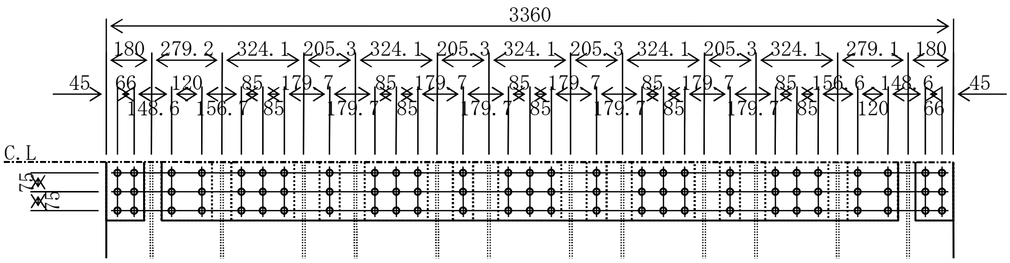
(a) Acting stress

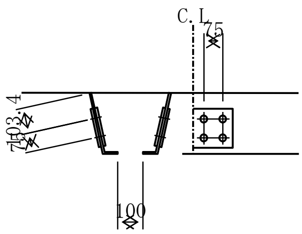
σ_{tmax} = 82 N/mm^2 $0.75\sigma_{ta}$ = 0.75 * 140 = 105 N/mm^2
σ_{cmax} = -64 N/mm^2 $0.75\sigma_{ca}$ = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma_c$ = 105 N/mm^2
τ_{max} = 30 N/mm^2

(b) Section area of main plate

1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM400)
5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM400)
ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3360 * 16 A = 537.6
 (537.6 - (27* 2.5)* 1.6) * 1.1 = 472.6 < 537.6 $\therefore$An = 472.6 cm^2
5-U.RIB 320 * 240 * 8 Ar = 269.5
 (269.5 - 5*(4* 2.7)* 0.8- 5*(10.0*0.8)) * 1.1 = 204.9
 < 269.5 $\therefore$Anr = 204.9 cm^2
ΣAn = An + Anr = 472.6 + 204.9 = 677.5 cm^2
σ_{tn} = σ_{tmax} * ΣAg / ΣAn = 82 * 807.1 / 677.5 = 98 N/mm^2
 < σ_{ta} = 140 N/mm^2

(e) Design axial force

・Main plate Pt = σ_{tn} * An = 98 * 47256 = 4630781 N
 > $0.75\sigma_{ta}$ * An / 1.1 = 105 * 47256 / 1.1 = 4510800 N
 Pc = σ_c * Ag = 105 * 53760 = 5644800 N
・Rib Ptr = σ_{tn} * Anr = 98 * 20493 = 2008181 N
 > $0.75\sigma_{ta}$ * Anr/ 1.1 = 105 * 20493 / 1.1 = 1956150 N
 Pcr = σ_c * Agr = 105 * 26950 = 2829750 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 472.6 / 2 = 236.3 cm^2
 AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2
・Rib AnrR = Anr = 204.9 cm^2
 AgrR = Agr = 269.5 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5644800 / 108000 = 52.3 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 2829750 / 108000 = 26.2 pcs. (5 @ 8 = 40 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 81 = 5644800 / 81 = 69689$ N
$\rho s = \tau * Ag / 81 = 30 * 53760 / 81 = 19843$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(69689^2 + 19843^2)} = 72459$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes		$Ans(cm^2)$
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2921 * 9	(262.9 -	(23*2.5)* 0.9)*1.1= 232.2<	262.9	∴232.2
		290.1			252.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
2-SPL PL	200 * 14	(56.0 -	2*(2*2.5)* 1.4)*1.1= 46.2<	56.0	∴ 46.2
5-SPL PL	250 * 14	(175.0 -	5*(3*2.5)* 1.4)*1.1= 134.8<	175.0	∴134.8
4-SPL PL	80 * 14	(44.8 -	4*(1*2.5)* 1.4)*1.1= 33.9<	44.8	∴ 33.9
		318.1			245.9
20-SPL PL	155 * 10	(310.0 -	20*(2*2.7)* 1.0)*1.1= 222.2<	310.0	∴222.2
		＞ AgrR			＞AnrR

(427) G4 J-11(Sec-12) DECK

(a) Acting stress

σtmax = 46 N/mm^2 0.75σta = 0.75 * 140 = 105 N/mm^2

σcmax = -64 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴σc = 105 N/mm^2

τmax = 24 N/mm^2

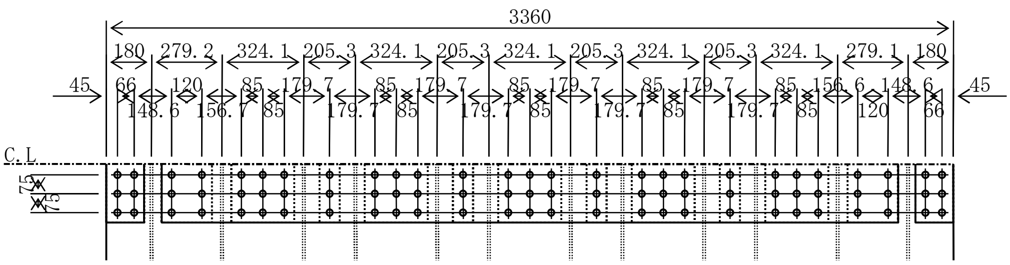
(b) Section area of main plate

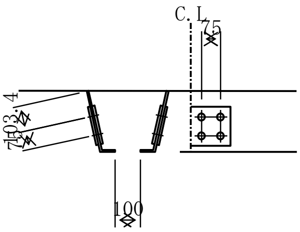
1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM400)

5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM400)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3360 * 16 A = 537.6

(537.6 - (27* 2.5)* 1.6) * 1.1 = 472.6 < 537.6 ∴An = 472.6 cm^2

5-U.RIB 320 * 240 * 8 Ar = 269.5

(269.5 - 5*(4* 2.7)* 0.8- 5*(10.0*0.8)) * 1.1 = 204.9

< 269.5 ∴Anr = 204.9 cm^2

ΣAn = An + Anr = 472.6 + 204.9 = 677.5 cm^2

σtn = σtmax * ΣAg / ΣAn = 46 * 807.1 / 677.5 = 54 N/mm^2

< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 105 * 47256 / 1.1 = 4510800 N

> σtn * An = 54 * 47256 = 2570273 N

Pc = σc * Ag = 105 * 53760 = 5644800 N

・Rib Ptr = 0.75σta * Anr / 1.1 = 105 * 20493 / 1.1 = 1956150 N

> σtn * Anr = 54 * 20493 = 1114623 N

Pcr = σc * Agr = 105 * 26950 = 2829750 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 472.6 / 2 = 236.3 cm^2

AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AnrR = Anr = 204.9 cm^2

AgrR = Agr = 269.5 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5644800 / 108000 = 52.3 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 2829750 / 108000 = 26.2 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 81 = 5644800 / 81 = 69689$ N
$\rho s = \tau * Ag / 81 = 24 * 53760 / 81 = 15643$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(69689^2 + 15643^2)} = 71423$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2921 * 9	(262.9 -	(23*2.5)* 0.9)*1.1= 232.2<	262.9	∴232.2
		290.1			252.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
2-SPL PL	200 * 14	(56.0 -	2*(2*2.5)* 1.4)*1.1= 46.2<	56.0	∴ 46.2
5-SPL PL	250 * 14	(175.0 -	5*(3*2.5)* 1.4)*1.1= 134.8<	175.0	∴134.8
4-SPL PL	80 * 14	(44.8 -	4*(1*2.5)* 1.4)*1.1= 33.9<	44.8	∴ 33.9
		318.1			245.9
20-SPL PL	155 * 10	(310.0 -	20*(2*2.7)* 1.0)*1.1= 222.2<	310.0	∴222.2
		> AgrR			>AnrR

(428) G4　J-12(Sec-12)　DECK

(a) Acting stress

$\sigma tmax$ = 18 N/mm^2　　0.75 σta = 0.75 * 140 = 105 N/mm^2

$\sigma cmax$ = -64 N/mm^2　　0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 17 N/mm^2

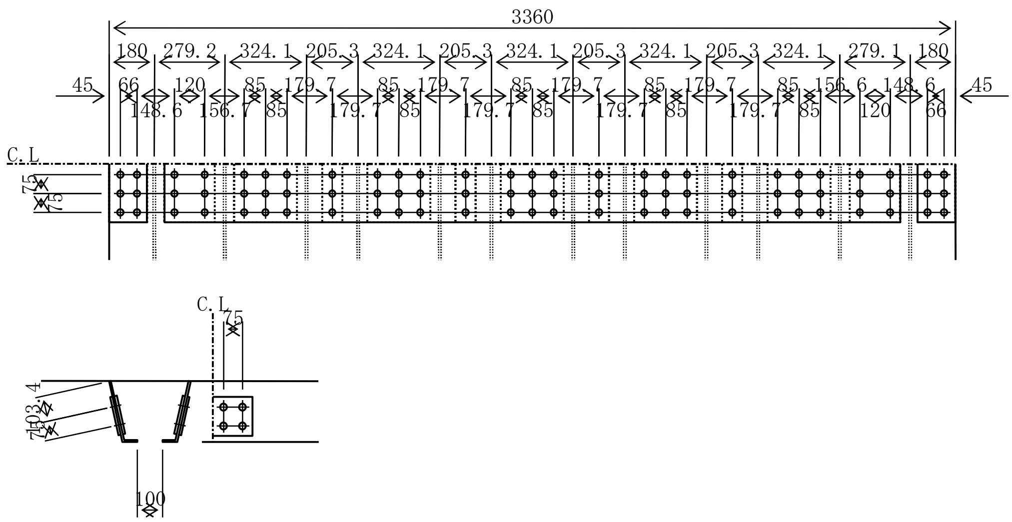
(b) Section area of main plate

1-DECK　PL　3360 * 16　　　Ag = 537.6 cm^2　(SM400)

5-U.RIB 320 * 240 * 8　　　Agr = 269.5 cm^2　(SM400)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK　PL　3360 * 16　　　A = 537.6

(537.6 - (27* 2.5)* 1.6) * 1.1 = 472.6 ＜ 537.6　∴An = 472.6 cm^2

5-U.RIB 320 * 240 * 8　　　Ar = 269.5

(269.5 - 5*(4* 2.7)* 0.8- 5*(10.0*0.8)) * 1.1 = 204.9

＜ 269.5　∴Anr = 204.9 cm^2

ΣAn = An + Anr = 472.6 + 204.9 = 677.5 cm^2

$\sigma tn = \sigma tmax * \Sigma Ag / \Sigma An$ = 18 * 807.1 / 677.5 = 21 N/mm^2

＜ σta = 140 N/mm^2

(e) Design axial force

・Main plate　Pt = 0.75 σta * An / 1.1 = 105 * 47256 / 1.1 = 4510800 N

＞ σtn * An = 21 * 47256 = 999150 N

Pc = σc * Ag = 105 * 53760 = 5644800 N

・Rib　Ptr = 0.75 σta * Anr / 1.1 = 105 * 20493 / 1.1 = 1956150 N

＞ σtn * Anr = 21 * 20493 = 433291 N

Pcr = σc * Agr = 105 * 26950 = 2829750 N

(f) Required section area of the splice plates

・Mother material(One side)　AnR = An / 2 = 472.6 / 2 = 236.3 cm^2

AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib　AnrR = Anr = 204.9 cm^2

AgrR = Agr = 269.5 cm^2

(g) Required bolt number

- Main plate n = Pc / (108000 * 1.00) = 5644800 / 108000 = 52.3 pcs.
- Rib nr = Pcr / (108000 * 1.00) = 2829750 / 108000 = 26.2 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 81 = 5644800 / 81 = 69689$ N

$\rho s = \tau * Ag / 81 = 17 * 53760 / 81 = 11414$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(69689^2 + 11414^2)} = 70617$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0＜	27.2	∴ 20.0
1-SPL PL	2921 * 9	(262.9 -	(23*2.5)* 0.9)*1.1= 232.2＜	262.9	∴232.2
		290.1			252.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1＜	42.3	∴ 31.1
2-SPL PL	200 * 14	(56.0 -	2*(2*2.5)* 1.4)*1.1= 46.2＜	56.0	∴ 46.2
5-SPL PL	250 * 14	(175.0 -	5*(3*2.5)* 1.4)*1.1= 134.8＜	175.0	∴134.8
4-SPL PL	80 * 14	(44.8 -	4*(1*2.5)* 1.4)*1.1= 33.9＜	44.8	∴ 33.9
		318.1			245.9
20-SPL PL	155 * 10	(310.0 -	20*(2*2.7)* 1.0)*1.1= 222.2＜	310.0	∴222.2
		＞ AgrR			＞AnrR

(429) G4 J-13(Sec-13) DECK

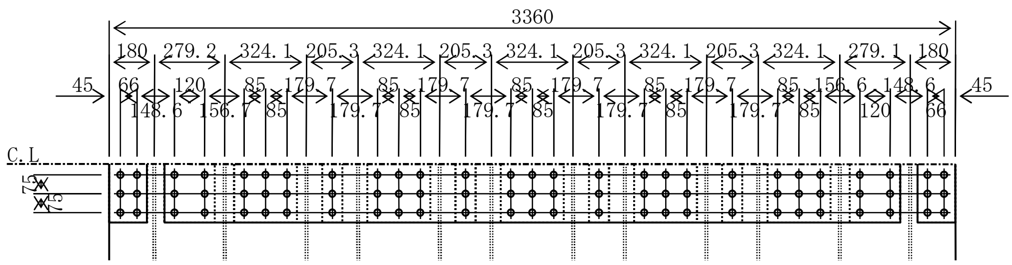
(a) Acting stress

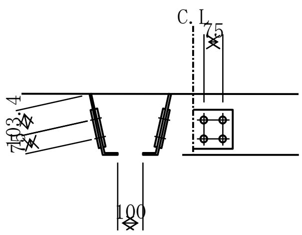
$\sigma tmax$ = 6 N/mm^2 0.75σta = 0.75 * 140 = 105 N/mm^2
$\sigma cmax$ = -64 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma c$ = 105 N/mm^2
τmax = 11 N/mm^2

(b) Section area of main plate

1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM400)
5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM400)
ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3360 * 16 A = 537.6
(537.6 - (27* 2.5)* 1.6) * 1.1 = 472.6 < 537.6 $\therefore$An = 472.6 cm^2
5-U.RIB 320 * 240 * 8 Ar = 269.5
(269.5 - 5*(4* 2.7)* 0.8- 5*(10.0*0.8)) * 1.1 = 204.9
< 269.5 $\therefore$Anr = 204.9 cm^2
ΣAn = An + Anr = 472.6 + 204.9 = 677.5 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 6 * 807.1 / 677.5 = 7 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 105 * 47256 / 1.1 = 4510800 N
> σtn * An = 7 * 47256 = 350446 N
Pc = σc * Ag = 105 * 53760 = 5644800 N
・Rib Ptr = 0.75σta * Anr / 1.1 = 105 * 20493 / 1.1 = 1956150 N
> σtn * Anr = 7 * 20493 = 151974 N
Pcr = σc * Agr = 105 * 26950 = 2829750 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 472.6 / 2 = 236.3 cm^2
AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2
・Rib AnrR = Anr = 204.9 cm^2
AgrR = Agr = 269.5 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5644800 / 108000 = 52.3 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 2829750 / 108000 = 26.2 pcs. (5 @ 8 = 40 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 81 = 5644800 / 81 = 69689$ N
$\rho s = \tau * Ag / 81 = 11 * 53760 / 81 = 7619$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(69689^2 + 7619^2)} = 70104$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2921 * 9	(262.9 -	(23*2.5)* 0.9)*1.1= 232.2<	262.9	∴232.2
		290.1			252.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
2-SPL PL	200 * 14	(56.0 -	2*(2*2.5)* 1.4)*1.1= 46.2<	56.0	∴ 46.2
5-SPL PL	250 * 14	(175.0 -	5*(3*2.5)* 1.4)*1.1= 134.8<	175.0	∴134.8
4-SPL PL	80 * 14	(44.8 -	4*(1*2.5)* 1.4)*1.1= 33.9<	44.8	∴ 33.9
		318.1			245.9
20-SPL PL	155 * 10	(310.0 -	20*(2*2.7)* 1.0)*1.1= 222.2<	310.0	∴222.2
		> AgrR			>AnrR

(430) G4 J-14(Sec-14) DECK

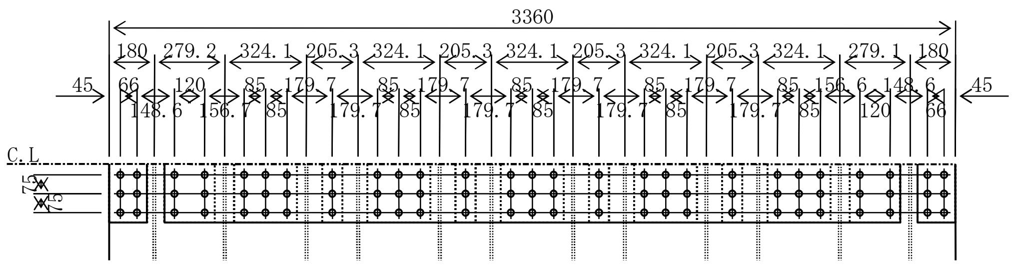
(a) Acting stress

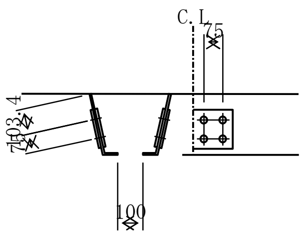
$\sigma tmax$ = 4 N/mm^2 0.75σta = 0.75 * 140 = 105 N/mm^2
$\sigma cmax$ = -66 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma c$ = 105 N/mm^2
τmax = 7 N/mm^2

(b) Section area of main plate

1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM400)
5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM400)
ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3360 * 16 A = 537.6
(537.6 - (27* 2.5)* 1.6) * 1.1 = 472.6 < 537.6 $\therefore$An = 472.6 cm^2
5-U.RIB 320 * 240 * 8 Ar = 269.5
(269.5 - 5*(4* 2.7)* 0.8- 5*(10.0*0.8)) * 1.1 = 204.9
< 269.5 $\therefore$Anr = 204.9 cm^2
ΣAn = An + Anr = 472.6 + 204.9 = 677.5 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 4 * 807.1 / 677.5 = 5 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 105 * 47256 / 1.1 = 4510800 N
> σtn * An = 5 * 47256 = 224004 N
Pc = σc * Ag = 105 * 53760 = 5644800 N
・Rib Ptr = 0.75σta * Anr / 1.1 = 105 * 20493 / 1.1 = 1956150 N
> σtn * Anr = 5 * 20493 = 97141 N
Pcr = σc * Agr = 105 * 26950 = 2829750 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 472.6 / 2 = 236.3 cm^2
AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2
・Rib AnrR = Anr = 204.9 cm^2
AgrR = Agr = 269.5 cm^2

(g) Required bolt number

- Main plate n = Pc / (108000 * 1.00) = 5644800 / 108000 = 52.3 pcs.
- Rib nr = Pcr / (108000 * 1.00) = 2829750 / 108000 = 26.2 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 81 = 5644800 / 81 = 69689 N
ρs = τ * Ag / 81 = 7 * 53760 / 81 = 4925 N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(69689^2 + 4925^2)}$ = 69863 N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes	$Ans(cm^2)$
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0 < 27.2	∴ 20.0
1-SPL PL	2921 * 9	(262.9 -	(23*2.5)* 0.9)*1.1= 232.2 < 262.9	∴232.2
		290.1		252.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1 < 42.3	∴ 31.1
2-SPL PL	200 * 14	(56.0 -	2*(2*2.5)* 1.4)*1.1= 46.2 < 56.0	∴ 46.2
5-SPL PL	250 * 14	(175.0 -	5*(3*2.5)* 1.4)*1.1= 134.8 < 175.0	∴134.8
4-SPL PL	80 * 14	(44.8 -	4*(1*2.5)* 1.4)*1.1= 33.9 < 44.8	∴ 33.9
		318.1		245.9
20-SPL PL	155 * 10	(310.0 -	20*(2*2.7)* 1.0)*1.1= 222.2 < 310.0	∴222.2
		> AgrR		>AnrR

(431) G4 J-15(Sec-15) DECK

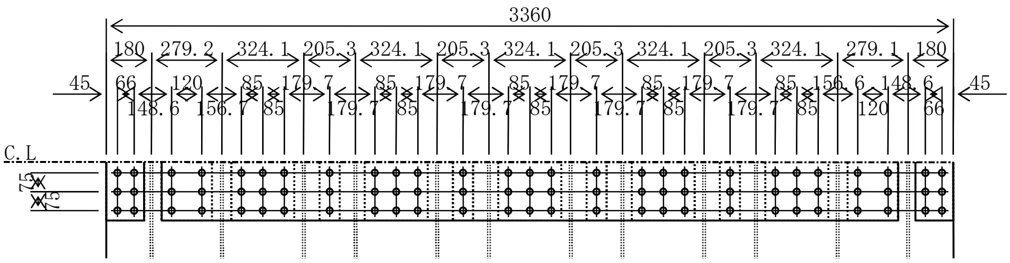
(a) Acting stress

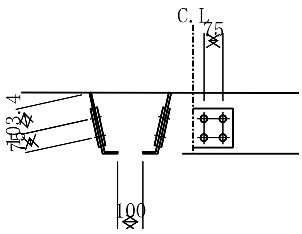
$\sigma tmax$ = 13 N/mm^2 0.75 σta = 0.75 * 140 = 105 N/mm^2
$\sigma cmax$ = -64 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma c$ = 105 N/mm^2
τmax = 10 N/mm^2

(b) Section area of main plate

1-DECK PL 3360 * 16   Ag = 537.6 cm^2 (SM400)
5-U.RIB 320 * 240 * 8   Agr = 269.5 cm^2 (SM400)
ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3360 * 16   A = 537.6
(537.6 - (27* 2.5)* 1.6) * 1.1 = 472.6 < 537.6 $\therefore$An = 472.6 cm^2
5-U.RIB 320 * 240 * 8   Ar = 269.5
(269.5 - 5*(4* 2.7)* 0.8- 5*(10.0*0.8)) * 1.1 = 204.9
< 269.5 $\therefore$Anr = 204.9 cm^2
ΣAn = An + Anr = 472.6 + 204.9 = 677.5 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 13 * 807.1 / 677.5 = 15 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σta * An / 1.1 = 105 * 47256 / 1.1 = 4510800 N
> σtn * An = 15 * 47256 = 726844 N
Pc = σc * Ag = 105 * 53760 = 5644800 N
・Rib Ptr = 0.75 σta * Anr / 1.1 = 105 * 20493 / 1.1 = 1956150 N
> σtn * Anr = 15 * 20493 = 315203 N
Pcr = σc * Agr = 105 * 26950 = 2829750 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 472.6 / 2 = 236.3 cm^2
AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2
・Rib AnrR = Anr = 204.9 cm^2
AgrR = Agr = 269.5 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5644800 / 108000 = 52.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2829750 / 108000 = 26.2 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 81 = 5644800 / 81 = 69689$ N

$\rho s = \tau * Ag / 81 = 10 * 53760 / 81 = 6648$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(69689^2 + 6648^2)} = 70005$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1=	20.0<	27.2	∴ 20.0
1-SPL PL	2921 * 9	(262.9 -	(23*2.5)* 0.9)*1.1=	232.2<	262.9	∴232.2
		290.1				252.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1=	31.1<	42.3	∴ 31.1
2-SPL PL	200 * 14	(56.0 -	2*(2*2.5)* 1.4)*1.1=	46.2<	56.0	∴ 46.2
5-SPL PL	250 * 14	(175.0 -	5*(3*2.5)* 1.4)*1.1=	134.8<	175.0	∴134.8
4-SPL PL	80 * 14	(44.8 -	4*(1*2.5)* 1.4)*1.1=	33.9<	44.8	∴ 33.9
		318.1				245.9
20-SPL PL	155 * 10	(310.0 -	20*(2*2.7)* 1.0)*1.1=	222.2<	310.0	∴222.2
		> AgrR				>AnrR

(432) G4 J-16(Sec-16) DECK

(a) Acting stress

$\sigma tmax$ = 28 N/mm^2 $0.75\sigma ta$ = 0.75 * 140 = 105 N/mm^2

$\sigma cmax$ = -64 N/mm^2 $0.75\sigma ca$ = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 16 N/mm^2

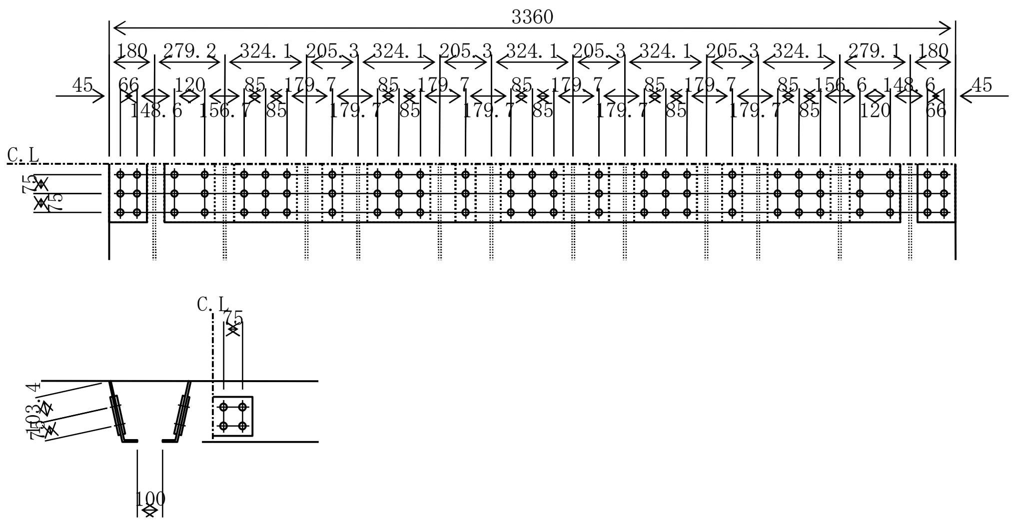
(b) Section area of main plate

1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM400)

5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM400)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 3360 * 16 A = 537.6

(537.6 - (27* 2.5)* 1.6) * 1.1 = 472.6 < 537.6 $\therefore$An = 472.6 cm^2

5-U.RIB 320 * 240 * 8 Ar = 269.5

(269.5 - 5*(4* 2.7)* 0.8- 5*(10.0*0.8)) * 1.1 = 204.9

< 269.5 $\therefore$Anr = 204.9 cm^2

ΣAn = An + Anr = 472.6 + 204.9 = 677.5 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 28 * 807.1 / 677.5 = 33 N/mm^2

< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = $0.75\sigma ta$ * An / 1.1 = 105 * 47256 / 1.1 = 4510800 N

> σtn * An = 33 * 47256 = 1574219 N

Pc = σc * Ag = 105 * 53760 = 5644800 N

・Rib Ptr = $0.75\sigma ta$ * Anr / 1.1 = 105 * 20493 / 1.1 = 1956150 N

> σtn * Anr = 33 * 20493 = 682675 N

Pcr = σc * Agr = 105 * 26950 = 2829750 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 472.6 / 2 = 236.3 cm^2

AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AnrR = Anr = 204.9 cm^2

AgrR = Agr = 269.5 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5644800 / 108000 = 52.3 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 2829750 / 108000 = 26.2 pcs. (5 @ 8 = 40 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 81 = 5644800 / 81 = 69689 N
ρs = τ * Ag / 81 = 16 * 53760 / 81 = 10615 N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(69689^2 + 10615^2)}$ = 70493 N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0＜	27.2	∴ 20.0
1-SPL PL	2921 * 9	(262.9 -	(23*2.5)* 0.9)*1.1= 232.2＜	262.9	∴232.2
		290.1			252.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1＜	42.3	∴ 31.1
2-SPL PL	200 * 14	(56.0 -	2*(2*2.5)* 1.4)*1.1= 46.2＜	56.0	∴ 46.2
5-SPL PL	250 * 14	(175.0 -	5*(3*2.5)* 1.4)*1.1= 134.8＜	175.0	∴134.8
4-SPL PL	80 * 14	(44.8 -	4*(1*2.5)* 1.4)*1.1= 33.9＜	44.8	∴ 33.9
		318.1			245.9
20-SPL PL	155 * 10	(310.0 -	20*(2*2.7)* 1.0)*1.1= 222.2＜	310.0	∴222.2
		＞ AgrR			＞AnrR

(433) G4 J-17(Sec-17) DECK

(a) Acting stress

$\sigma tmax$ = 58 N/mm^2 $0.75\sigma ta$ = 0.75 ＊ 140 = 105 N/mm^2

$\sigma cmax$ = -64 N/mm^2 $0.75\sigma ca$ = 0.75 ＊ 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 21 N/mm^2

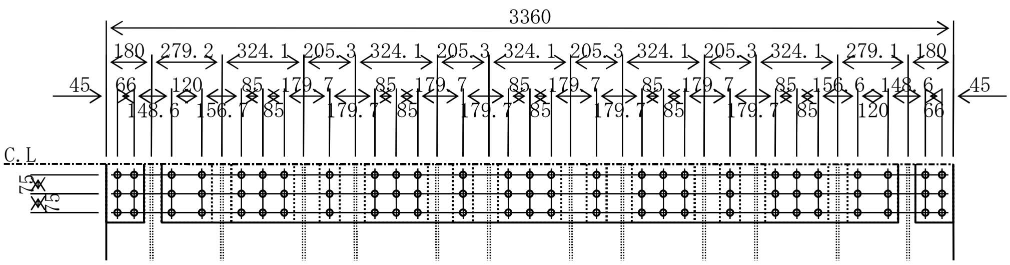
(b) Section area of main plate

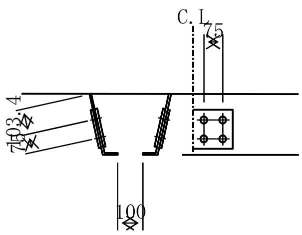
1-DECK PL 3360 ＊ 16   Ag = 537.6 cm^2 (SM400)

5-U.RIB 320 ＊ 240 ＊ 8   Agr = 269.5 cm^2 (SM400)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3360 ＊ 16   A = 537.6

(537.6 - (27＊ 2.5)＊ 1.6) ＊ 1.1 = 472.6 ＜ 537.6 ∴An = 472.6 cm^2

5-U.RIB 320 ＊ 240 ＊ 8   Ar = 269.5

(269.5 - 5＊(4＊ 2.7)＊ 0.8- 5＊(10.0＊0.8)) ＊ 1.1 = 204.9

＜ 269.5 ∴Anr = 204.9 cm^2

ΣAn = An + Anr = 472.6 + 204.9 = 677.5 cm^2

σtn = $\sigma tmax$ ＊ ΣAg / ΣAn = 58 ＊ 807.1 / 677.5 = 69 N/mm^2

＜ σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = $0.75\sigma ta$ ＊ An / 1.1 = 105 ＊ 47256 / 1.1 = 4510800 N

＞ σtn ＊ An = 69 ＊ 47256 = 3266492 N

Pc = σc ＊ Ag = 105 ＊ 53760 = 5644800 N

・Rib Ptr = $0.75\sigma ta$ ＊ Anr / 1.1 = 105 ＊ 20493 / 1.1 = 1956150 N

＞ σtn ＊ Anr = 69 ＊ 20493 = 1416544 N

Pcr = σc ＊ Agr = 105 ＊ 26950 = 2829750 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 472.6 / 2 = 236.3 cm^2

AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AnrR = Anr = 204.9 cm^2

AgrR = Agr = 269.5 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5644800 / 108000 = 52.3 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 2829750 / 108000 = 26.2 pcs. (5 @ 8 = 40 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

ρp = Pc / 81 = 5644800 / 81 = 69689 N
ρs = τ * Ag / 81 = 21 * 53760 / 81 = 14079 N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(69689^2 + 14079^2)}$ = 71097 N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2921 * 9	(262.9 -	(23*2.5)* 0.9)*1.1= 232.2<	262.9	∴232.2
		290.1			252.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
2-SPL PL	200 * 14	(56.0 -	2*(2*2.5)* 1.4)*1.1= 46.2<	56.0	∴ 46.2
5-SPL PL	250 * 14	(175.0 -	5*(3*2.5)* 1.4)*1.1= 134.8<	175.0	∴134.8
4-SPL PL	80 * 14	(44.8 -	4*(1*2.5)* 1.4)*1.1= 33.9<	44.8	∴ 33.9
		318.1			245.9
20-SPL PL	155 * 10	(310.0 -	20*(2*2.7)* 1.0)*1.1= 222.2<	310.0	∴222.2
		> AgrR			>AnrR

(434) G4 J-18(Sec-18) DECK

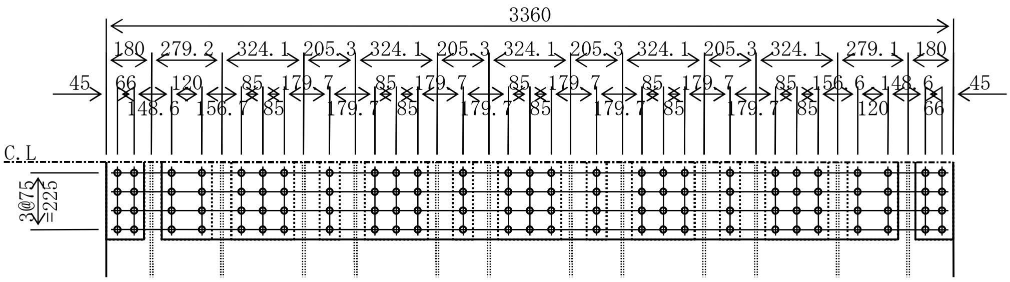
(a) Acting stress

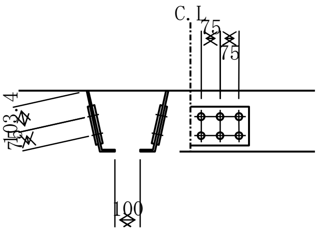
σtmax = 103 N/mm² 0.75σta = 0.75 * 210 = 158 N/mm²
σcmax = -64 N/mm² 0.75σca = 0.75 * 210 = 158 N/mm²
∴σc = 158 N/mm²
τmax = 24 N/mm²

(b) Section area of main plate

1-DECK PL 3360 * 16 Ag = 537.6 cm² (SM490Y)
5-U.RIB 320 * 240 * 8 Agr = 269.5 cm² (SM490Y)
ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm²

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3360 * 16 A = 537.6
(537.6 - (27* 2.5)* 1.6) * 1.1 = 472.6 < 537.6 ∴An = 472.6 cm²
5-U.RIB 320 * 240 * 8 Ar = 269.5
(269.5 - 5*(4* 2.7)* 0.8- 5*(10.0*0.8)) * 1.1 = 204.9
< 269.5 ∴Anr = 204.9 cm²
ΣAn = An + Anr = 472.6 + 204.9 = 677.5 cm²
σtn = σtmax * ΣAg / ΣAn = 103 * 807.1 / 677.5 = 123 N/mm²
< σta = 210 N/mm²

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 158 * 47256 / 1.1 = 6766200 N
> σtn * An = 123 * 47256 = 5816724 N
Pc = σc * Ag = 158 * 53760 = 8467200 N
・Rib Ptr = 0.75σta * Anr / 1.1 = 158 * 20493 / 1.1 = 2934225 N
> σtn * Anr = 123 * 20493 = 2522476 N
Pcr = σc * Agr = 158 * 26950 = 4244625 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 472.6 / 2 = 236.3 cm²
AgR = Ag / 2 = 537.6 / 2 = 268.8 cm²
・Rib AnrR = Anr = 204.9 cm²
AgrR = Agr = 269.5 cm²

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 8467200 / 108000 = 78.4 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 4244625 / 108000 = 39.3 pcs. (5 @ 12 = 60 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(h) Tensile force per one bolt

ρp = Pc / 108 = 8467200 / 108 = 78400 N
ρs = τ * Ag / 108 = 24 * 53760 / 108 = 12042 N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(78400^2 + 12042^2)}$ = 79319 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2921 * 9	(262.9 -	(23*2.5)* 0.9)*1.1= 232.2<	262.9	∴232.2
		290.1			252.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
2-SPL PL	200 * 14	(56.0 -	2*(2*2.5)* 1.4)*1.1= 46.2<	56.0	∴ 46.2
5-SPL PL	250 * 14	(175.0 -	5*(3*2.5)* 1.4)*1.1= 134.8<	175.0	∴134.8
4-SPL PL	80 * 14	(44.8 -	4*(1*2.5)* 1.4)*1.1= 33.9<	44.8	∴ 33.9
		318.1			245.9
20-SPL PL	155 * 10	(310.0 -	20*(2*2.7)* 1.0)*1.1= 222.2<	310.0	∴222.2
		＞ AgrR			＞AnrR

(435) G4 J-19(Sec-19) DECK

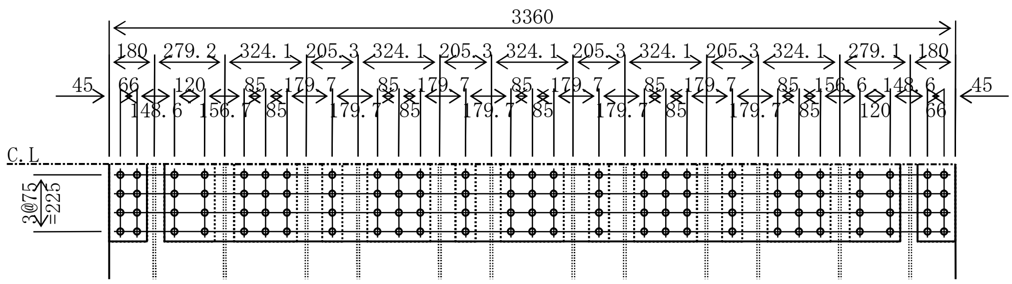
(a) Acting stress

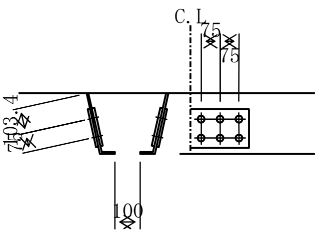
$\sigma tmax$ = 144 N/mm^2 0.75σta = 0.75 * 210 = 158 N/mm^2
$\sigma cmax$ = -64 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2
∴ σc = 158 N/mm^2
τmax = 26 N/mm^2

(b) Section area of main plate

1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM490Y)
5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM490Y)
ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3360 * 16 A = 537.6
(537.6 - (27* 2.5)* 1.6) * 1.1 = 472.6 < 537.6 ∴An = 472.6 cm^2
5-U.RIB 320 * 240 * 8 Ar = 269.5
(269.5 - 5*(4* 2.7)* 0.8- 5*(10.0*0.8)) * 1.1 = 204.9
< 269.5 ∴Anr = 204.9 cm^2
ΣAn = An + Anr = 472.6 + 204.9 = 677.5 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 144 * 807.1 / 677.5 = 172 N/mm^2
< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 172 * 47256 = 8113283 N
> 0.75σta * An / 1.1 = 158 * 47256 / 1.1 = 6766200 N
Pc = σc * Ag = 158 * 53760 = 8467200 N
・Rib Ptr = σtn * Anr = 172 * 20493 = 3518400 N
> 0.75σta * Anr/ 1.1 = 158 * 20493 / 1.1 = 2934225 N
Pcr = σc * Agr = 158 * 26950 = 4244625 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 472.6 / 2 = 236.3 cm^2
AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2
・Rib AnrR = Anr = 204.9 cm^2
AgrR = Agr = 269.5 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 8467200 / 108000 = 78.4 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 4244625 / 108000 = 39.3 pcs. (5 @ 12 = 60 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 108 = 8467200 / 108 = 78400$ N
$\rho s = \tau * Ag / 108 = 26 * 53760 / 108 = 12765$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(78400^2 + 12765^2)} = 79432$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2921 * 9	(262.9 -	(23*2.5)* 0.9)*1.1= 232.2<	262.9	∴232.2
		290.1			252.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
2-SPL PL	200 * 14	(56.0 -	2*(2*2.5)* 1.4)*1.1= 46.2<	56.0	∴ 46.2
5-SPL PL	250 * 14	(175.0 -	5*(3*2.5)* 1.4)*1.1= 134.8<	175.0	∴134.8
4-SPL PL	80 * 14	(44.8 -	4*(1*2.5)* 1.4)*1.1= 33.9<	44.8	∴ 33.9
		318.1			245.9
20-SPL PL	155 * 10	(310.0 -	20*(2*2.7)* 1.0)*1.1= 222.2<	310.0	∴222.2
		> AgrR			>AnrR

(436) G4 J-20(Sec-21) DECK

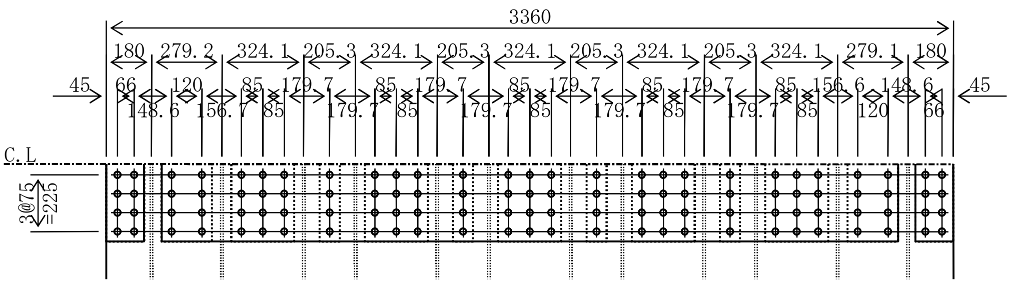
(a) Acting stress

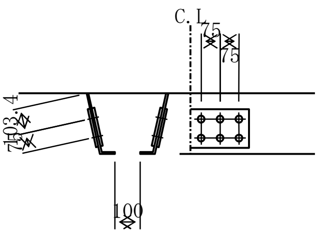
σtmax = 144 N/mm^2 0.75σta = 0.75 * 210 = 158 N/mm^2
σcmax = -64 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2
∴σc = 158 N/mm^2
τmax = 31 N/mm^2

(b) Section area of main plate

1-DECK PL 3360 * 16   Ag = 537.6 cm^2 (SM490Y)
5-U.RIB 320 * 240 * 8   Agr = 269.5 cm^2 (SM490Y)
ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3360 * 16   A = 537.6
(537.6 - (27* 2.5)* 1.6) * 1.1 = 472.6 < 537.6 ∴An = 472.6 cm^2
5-U.RIB 320 * 240 * 8   Ar = 269.5
(269.5 - 5*(4* 2.7)* 0.8- 5*(10.0*0.8)) * 1.1 = 204.9
< 269.5 ∴Anr = 204.9 cm^2
ΣAn = An + Anr = 472.6 + 204.9 = 677.5 cm^2
σtn = σtmax * ΣAg / ΣAn = 144 * 807.1 / 677.5 = 172 N/mm^2
< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 172 * 47256 = 8106246 N
> 0.75σta * An / 1.1 = 158 * 47256 / 1.1 = 6766200 N
Pc = σc * Ag = 158 * 53760 = 8467200 N
・Rib Ptr = σtn * Anr = 172 * 20493 = 3515348 N
> 0.75σta * Anr/ 1.1 = 158 * 20493 / 1.1 = 2934225 N
Pcr = σc * Agr = 158 * 26950 = 4244625 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 472.6 / 2 = 236.3 cm^2
AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2
・Rib AnrR = Anr = 204.9 cm^2
AgrR = Agr = 269.5 cm^2

(g) Required bolt number

- Main plate n = Pc / (108000 * 1.00) = 8467200 / 108000 = 78.4 pcs.
- Rib nr = Pcr / (108000 * 1.00) = 4244625 / 108000 = 39.3 pcs. (5 @ 12 = 60 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(h) Tensile force per one bolt

ρp = Pc / 108 = 8467200 / 108 = 78400 N
ρs = τ * Ag / 108 = 31 * 53760 / 108 = 15359 N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(78400^2 + 15359^2)}$ = 79890 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2921 * 9	(262.9 -	(23*2.5)* 0.9)*1.1= 232.2<	262.9	∴232.2
		290.1			252.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
2-SPL PL	200 * 14	(56.0 -	2*(2*2.5)* 1.4)*1.1= 46.2<	56.0	∴ 46.2
5-SPL PL	250 * 14	(175.0 -	5*(3*2.5)* 1.4)*1.1= 134.8<	175.0	∴134.8
4-SPL PL	80 * 14	(44.8 -	4*(1*2.5)* 1.4)*1.1= 33.9<	44.8	∴ 33.9
		318.1			245.9
20-SPL PL	155 * 10	(310.0 -	20*(2*2.7)* 1.0)*1.1= 222.2<	310.0	∴222.2
		> AgrR			>AnrR

(437) G4 J-21(Sec-22) DECK

(a) Acting stress

$\sigma tmax$ = 91 N/mm^2 $\quad$ 0.75 σta = 0.75 * 140 = 105 N/mm^2

$\sigma cmax$ = -64 N/mm^2 $\quad$ 0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 34 N/mm^2

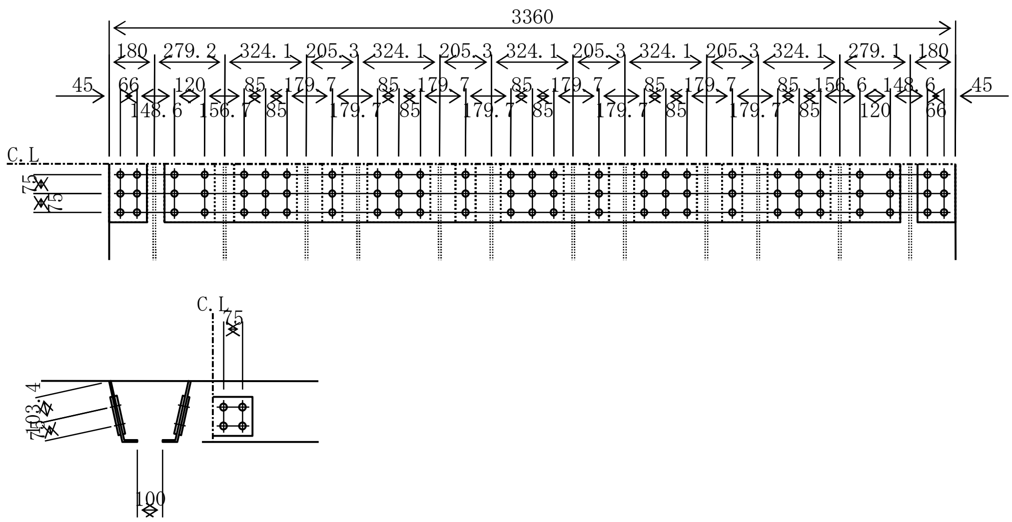
(b) Section area of main plate

1-DECK PL 3360 * 16 $\quad$ Ag = 537.6 cm^2 (SM400)

5-U.RIB 320 * 240 * 8 $\quad$ Agr = 269.5 cm^2 (SM400)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 3360 * 16 $\quad$ A = 537.6

(537.6 - (27* 2.5)* 1.6) * 1.1 = 472.6 < 537.6 $\quad\therefore$An = 472.6 cm^2

5-U.RIB 320 * 240 * 8 $\quad$ Ar = 269.5

(269.5 - 5*(4* 2.7)* 0.8- 5*(10.0*0.8)) * 1.1 = 204.9

< 269.5 $\quad\therefore$Anr = 204.9 cm^2

ΣAn = An + Anr = 472.6 + 204.9 = 677.5 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 91 * 807.1 / 677.5 = 109 N/mm^2

< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 109 * 47256 = 5129512 N

\> 0.75 σta * An / 1.1 = 105 * 47256 / 1.1 = 4510800 N

Pc = σc * Ag = 105 * 53760 = 5644800 N

・Rib Ptr = σtn * Anr = 109 * 20493 = 2224460 N

\> 0.75 σta * Anr/ 1.1 = 105 * 20493 / 1.1 = 1956150 N

Pcr = σc * Agr = 105 * 26950 = 2829750 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 472.6 / 2 = 236.3 cm^2

AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AnrR = Anr = 204.9 cm^2

AgrR = Agr = 269.5 cm^2

(g) Required bolt number

- Main plate n = Pc / (108000 * 1.00) = 5644800 / 108000 = 52.3 pcs.
- Rib nr = Pcr / (108000 * 1.00) = 2829750 / 108000 = 26.2 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 81 = 5644800 / 81 = 69689$ N
$\rho s = \tau * Ag / 81 = 34 * 53760 / 81 = 22386$ N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(69689^2 + 22386^2)} = 73196$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2921 * 9	(262.9 -	(23*2.5)* 0.9)*1.1= 232.2<	262.9	∴232.2
		290.1			252.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
2-SPL PL	200 * 14	(56.0 -	2*(2*2.5)* 1.4)*1.1= 46.2<	56.0	∴ 46.2
5-SPL PL	250 * 14	(175.0 -	5*(3*2.5)* 1.4)*1.1= 134.8<	175.0	∴134.8
4-SPL PL	80 * 14	(44.8 -	4*(1*2.5)* 1.4)*1.1= 33.9<	44.8	∴ 33.9
		318.1			245.9
20-SPL PL	155 * 10	(310.0 -	20*(2*2.7)* 1.0)*1.1= 222.2<	310.0	∴222.2
		> AgrR			>AnrR

(438) G4 J-22(Sec-23) DECK

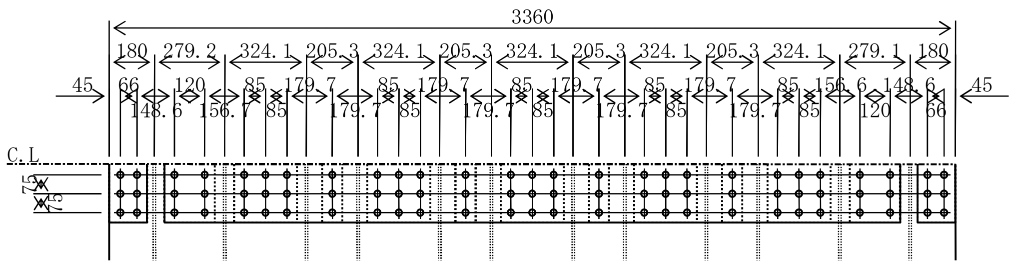
(a) Acting stress

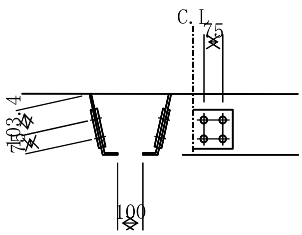
σtmax = 31 N/mm^2 0.75σta = 0.75 * 140 = 105 N/mm^2
σcmax = -64 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2
∴σc = 105 N/mm^2
τmax = 35 N/mm^2

(b) Section area of main plate

1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM400)
5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM400)
ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- DECK PL 3360 * 16 A = 537.6
(537.6 - (27* 2.5)* 1.6) * 1.1 = 472.6 < 537.6 ∴An = 472.6 cm^2
5-U.RIB 320 * 240 * 8 Ar = 269.5
(269.5 - 5*(4* 2.7)* 0.8- 5*(10.0*0.8)) * 1.1 = 204.9
< 269.5 ∴Anr = 204.9 cm^2
ΣAn = An + Anr = 472.6 + 204.9 = 677.5 cm^2
σtn = σtmax * ΣAg / ΣAn = 31 * 807.1 / 677.5 = 37 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 105 * 47256 / 1.1 = 4510800 N
> σtn * An = 37 * 47256 = 1762700 N
Pc = σc * Ag = 105 * 53760 = 5644800 N
・Rib Ptr = 0.75σta * Anr / 1.1 = 105 * 20493 / 1.1 = 1956150 N
> σtn * Anr = 37 * 20493 = 764411 N
Pcr = σc * Agr = 105 * 26950 = 2829750 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 472.6 / 2 = 236.3 cm^2
AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2
・Rib AnrR = Anr = 204.9 cm^2
AgrR = Agr = 269.5 cm^2

(g) Required bolt number

・Main plate $n = Pc / (108000 * 1.00) = 5644800 / 108000 = 52.3$ pcs.

・Rib $nr = Pcr / (108000 * 1.00) = 2829750 / 108000 = 26.2$ pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 81 = 5644800 / 81 = 69689$ N

$\rho s = \tau * Ag / 81 = 35 * 53760 / 81 = 23175$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(69689^2 + 23175^2)} = 73441$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes		Ans(cm^2)
2-SPL PL	151 * 9	(27.2 -	2*(2*2.5)* 0.9)*1.1= 20.0<	27.2	∴ 20.0
1-SPL PL	2921 * 9	(262.9 -	(23*2.5)* 0.9)*1.1= 232.2<	262.9	∴232.2
		290.1			252.2
2-SPL PL	151 * 14	(42.3 -	2*(2*2.5)* 1.4)*1.1= 31.1<	42.3	∴ 31.1
2-SPL PL	200 * 14	(56.0 -	2*(2*2.5)* 1.4)*1.1= 46.2<	56.0	∴ 46.2
5-SPL PL	250 * 14	(175.0 -	5*(3*2.5)* 1.4)*1.1= 134.8<	175.0	∴134.8
4-SPL PL	80 * 14	(44.8 -	4*(1*2.5)* 1.4)*1.1= 33.9<	44.8	∴ 33.9
		318.1			245.9
20-SPL PL	155 * 10	(310.0 -	20*(2*2.7)* 1.0)*1.1= 222.2<	310.0	∴222.2
		> AgrR			>AnrR

(439) G4 J-23(Sec-23) DECK

(a) Acting stress

$\sigma cmax$ = -91 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 30 N/mm^2

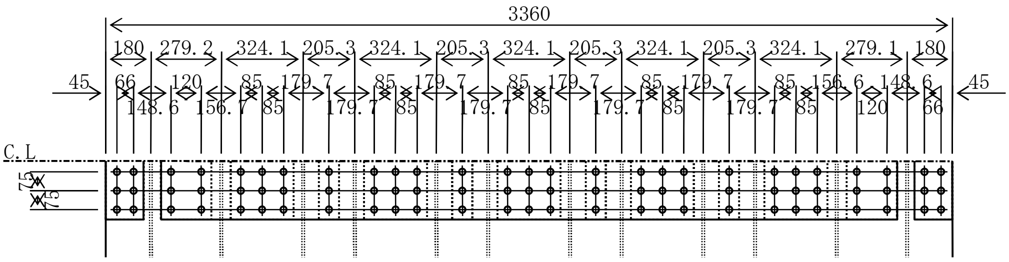
(b) Section area of main plate

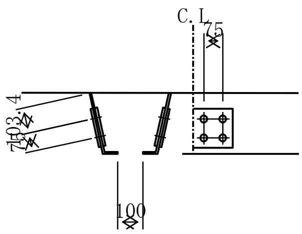
1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM400)

5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM400)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 53760 = 5644800 N

・Rib Pcr = σc * Agr = 105 * 26950 = 2829750 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AgrR = Agr = 269.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5644800 / 108000 = 52.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2829750 / 108000 = 26.2 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 81 = 5644800 / 81 = 69689 N

ρs = τ * Ag / 81 = 30 * 53760 / 81 = 20008 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(69689^2 + 20008^2)}$ = 72504 N

(h) Check of splice plates

	(SS400)	$Ags(cm^2)$
2-SPL PL	151 * 9	27.2
1-SPL PL	2921 * 9	262.9
		290.1
2-SPL PL	151 * 14	42.3
2-SPL PL	200 * 14	56.0
5-SPL PL	250 * 14	175.0
4-SPL PL	80 * 14	44.8
		318.1
20-SPL PL	155 * 10	310.0 ＞ AgrR = 269.5cm2

(440) G4 J-24(Sec-24) DECK

(a) Acting stress

$\sigma cmax$ = -122 N/mm^2 0.75σca = 0.75 ＊ 140 = 105 N/mm^2

∴ σc = 122 N/mm^2

τmax = 21 N/mm^2

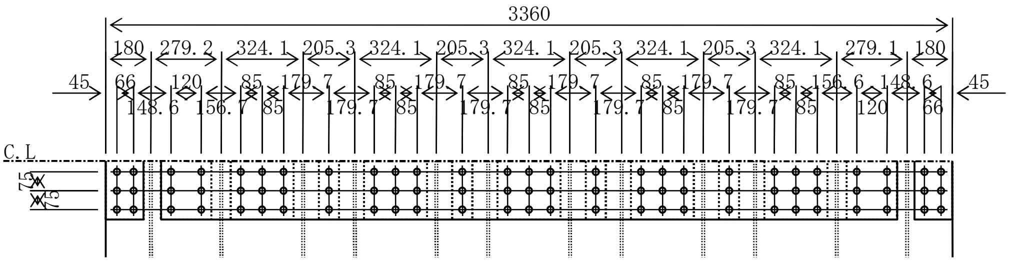
(b) Section area of main plate

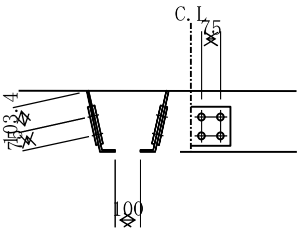
1-DECK PL 3360 ＊ 16 Ag = 537.6 cm^2 (SM400)

5-U.RIB 320 ＊ 240 ＊ 8 Agr = 269.5 cm^2 (SM400)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc ＊ Ag = 122 ＊ 53760 = 6545764 N

・Rib Pcr = σc ＊ Agr = 122 ＊ 26950 = 3281405 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AgrR = Agr = 269.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 ＊ 1.00) = 6545764 / 108000 = 60.6 pcs.

・Rib nr = Pcr / (108000 ＊ 1.00) = 3281405 / 108000 = 30.4 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 81 = 6545764 / 81 = 80812 N

ρs = τ ＊ Ag / 81 = 21 ＊ 53760 / 81 = 14047 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(80812^2 + 14047^2)}$ = 82024 N

(h) Check of splice plates

	(SS400)	$Ags(cm^2)$	
2-SPL PL	151 * 9	27.2	
1-SPL PL	2921 * 9	262.9	
		290.1	
2-SPL PL	151 * 14	42.3	
2-SPL PL	200 * 14	56.0	
5-SPL PL	250 * 14	175.0	
4-SPL PL	80 * 14	44.8	
		318.1	
20-SPL PL	155 * 10	310.0	＞ AgrR = 269.5cm2

(441) G4 J-25(Sec-25) DECK

(a) Acting stress

$\sigma cmax$ = -144 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma c$ = 158 N/mm^2

τmax = 16 N/mm^2

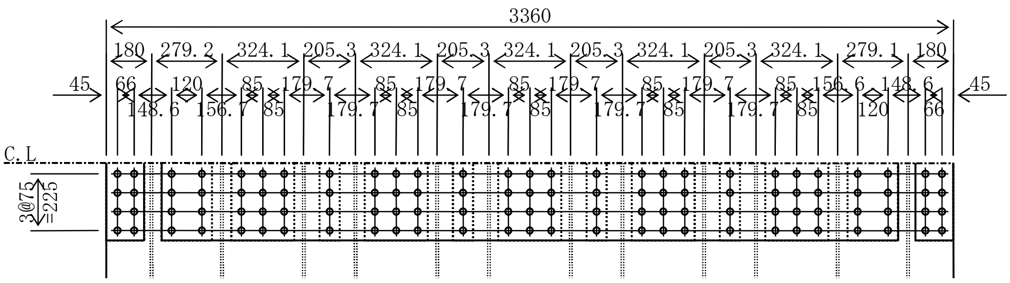
(b) Section area of main plate

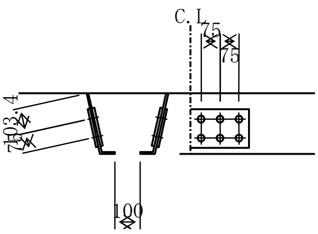
1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM490Y)

5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM490Y)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 53760 = 8467200 N

・Rib Pcr = σc * Agr = 158 * 26950 = 4244625 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AgrR = Agr = 269.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 8467200 / 108000 = 78.4 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 4244625 / 108000 = 39.3 pcs. (5 @ 12 = 60 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 108 = 8467200 / 108 = 78400 N

ρs = τ * Ag / 108 = 16 * 53760 / 108 = 8168 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(78400^2 + 8168^2)}$ = 78824 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)
2-SPL PL	151 * 9	27.2
1-SPL PL	2921 * 9	262.9
		290.1
2-SPL PL	151 * 14	42.3
2-SPL PL	200 * 14	56.0
5-SPL PL	250 * 14	175.0
4-SPL PL	80 * 14	44.8
		318.1
20-SPL PL	155 * 10	310.0 ＞ AgrR = 269.5cm2

(442) G4 J-26(Sec-26) DECK

(a) Acting stress

σ cmax = -155 N/mm^2 0.75 σ ca = 0.75 * 210 = 158 N/mm^2

∴ σ c = 158 N/mm^2

τ max = 13 N/mm^2

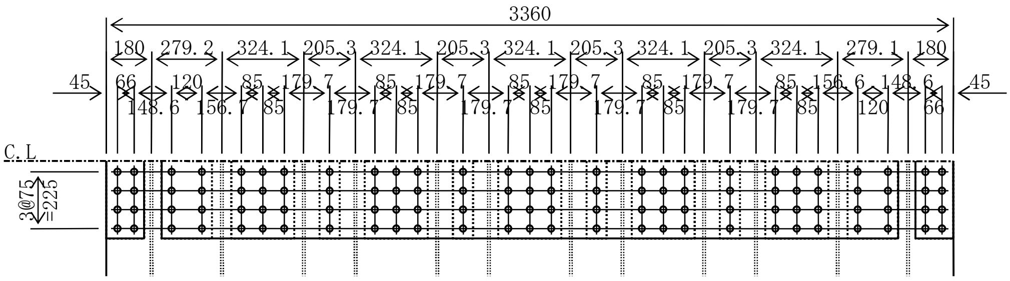
(b) Section area of main plate

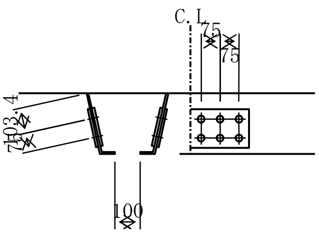
1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM490Y)

5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM490Y)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σ c * Ag = 158 * 53760 = 8467200 N

・Rib Pcr = σ c * Agr = 158 * 26950 = 4244625 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AgrR = Agr = 269.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 8467200 / 108000 = 78.4 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 4244625 / 108000 = 39.3 pcs. (5 @ 12 = 60 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρ p = Pc / 108 = 8467200 / 108 = 78400 N

ρ s = τ * Ag / 108 = 13 * 53760 / 108 = 6313 N

ρ = $\sqrt{}$ (ρ p^2 + ρ s^2) = $\sqrt{}$ (78400^2 + 6313^2) = 78654 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)
2-SPL PL	151 ＊ 9	27.2
1-SPL PL	2921 ＊ 9	262.9
		290.1
2-SPL PL	151 ＊ 14	42.3
2-SPL PL	200 ＊ 14	56.0
5-SPL PL	250 ＊ 14	175.0
4-SPL PL	80 ＊ 14	44.8
		318.1
20-SPL PL	155 ＊ 10	310.0 ＞ AgrR = 269.5cm2

(443) G4 J-27(Sec-27) DECK

(a) Acting stress

$\sigma cmax$ = -161 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 161 N/mm^2

τmax = 13 N/mm^2

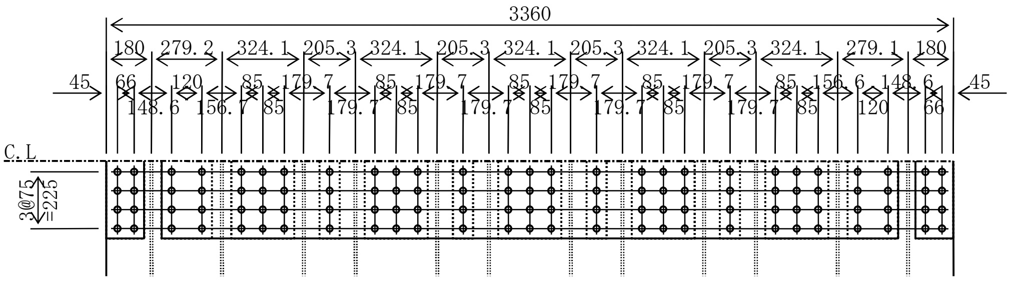
(b) Section area of main plate

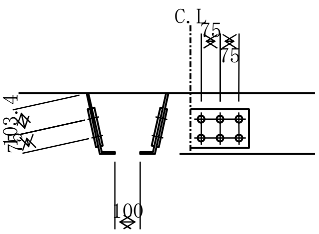
1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM490Y)

5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM490Y)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 161 * 53760 = 8663263 N

・Rib Pcr = σc * Agr = 161 * 26950 = 4342912 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AgrR = Agr = 269.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 8663263 / 108000 = 80.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 4342912 / 108000 = 40.2 pcs. (5 @ 12 = 60 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 108 = 8663263 / 108 = 80215 N

ρs = τ * Ag / 108 = 13 * 53760 / 108 = 6277 N

ρ = $\sqrt{}$ (ρp^2 + ρs^2) = $\sqrt{}$(80215^2 + 6277^2) = 80461 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
2-SPL PL	151 * 9	27.2	
1-SPL PL	2921 * 9	262.9	
		290.1	
2-SPL PL	151 * 14	42.3	
2-SPL PL	200 * 14	56.0	
5-SPL PL	250 * 14	175.0	
4-SPL PL	80 * 14	44.8	
		318.1	
20-SPL PL	155 * 10	310.0	＞ AgrR = 269.5cm2

(444) G4 J-28(Sec-29) DECK

(a) Acting stress

$\sigma cmax$ = -160 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 160 N/mm^2

τmax = 13 N/mm^2

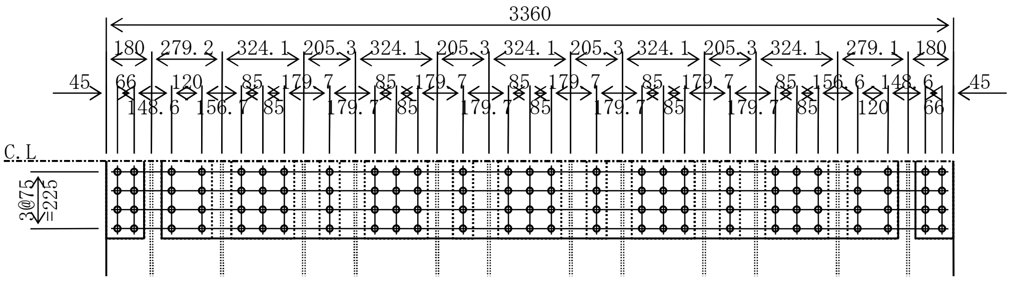
(b) Section area of main plate

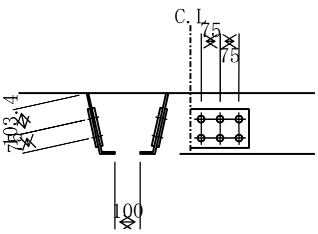
1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM490Y)

5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM490Y)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 160 * 53760 = 8593213 N

・Rib Pcr = σc * Agr = 160 * 26950 = 4307796 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AgrR = Agr = 269.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 8593213 / 108000 = 79.6 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 4307796 / 108000 = 39.9 pcs. (5 @ 12 = 60 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 108 = 8593213 / 108 = 79567 N

ρs = τ * Ag / 108 = 13 * 53760 / 108 = 6488 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(79567^2 + 6488^2)}$ = 79831 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)		
2-SPL PL	151 * 9	27.2		
1-SPL PL	2921 * 9	262.9		
		290.1		
2-SPL PL	151 * 14	42.3		
2-SPL PL	200 * 14	56.0		
5-SPL PL	250 * 14	175.0		
4-SPL PL	80 * 14	44.8		
		318.1		
20-SPL PL	155 * 10	310.0	＞ AgrR =	269.5cm2

(445) G4 J-29(Sec-30) DECK

(a) Acting stress

σ_{cmax} = -154 N/mm^2 0.75 σ_{ca} = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma_c$ = 158 N/mm^2

τ_{max} = 17 N/mm^2

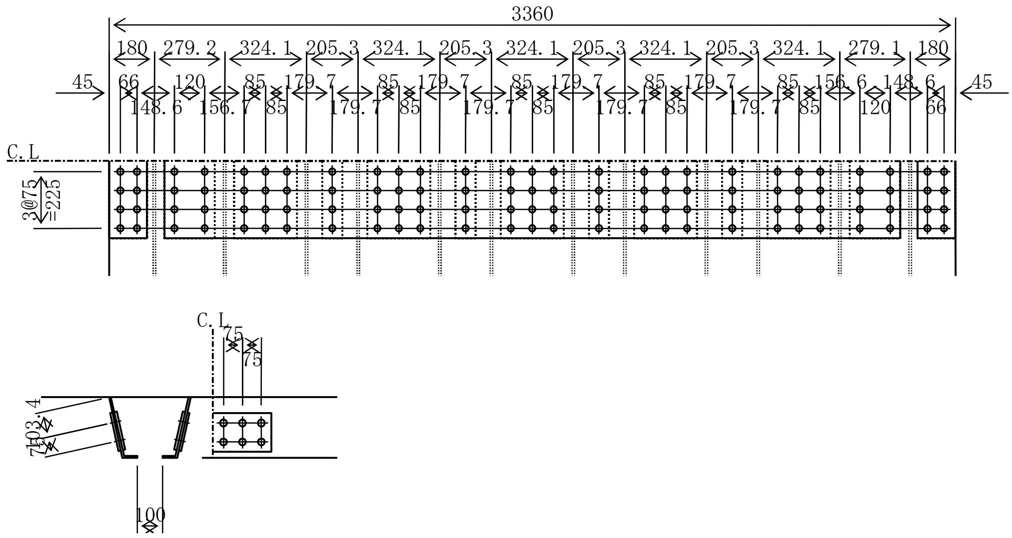
(b) Section area of main plate

1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM490Y)

5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM490Y)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σ_c * Ag = 158 * 53760 = 8467200 N

・Rib Pcr = σ_c * Agr = 158 * 26950 = 4244625 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AgrR = Agr = 269.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 8467200 / 108000 = 78.4 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 4244625 / 108000 = 39.3 pcs. (5 @ 12 = 60 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ_a = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρ_p = Pc / 108 = 8467200 / 108 = 78400 N

ρ_s = τ * Ag / 108 = 17 * 53760 / 108 = 8576 N

$\rho = \sqrt{(\rho_p^2 + \rho_s^2)} = \sqrt{(78400^2 + 8576^2)}$ = 78868 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)
2-SPL PL	151 * 9	27.2
1-SPL PL	2921 * 9	262.9
		290.1
2-SPL PL	151 * 14	42.3
2-SPL PL	200 * 14	56.0
5-SPL PL	250 * 14	175.0
4-SPL PL	80 * 14	44.8
		318.1

20-SPL PL 155 * 10 310.0 ＞ AgrR = 269.5cm2

(446) G4 J-30(Sec-31) DECK

(a) Acting stress

$\sigma cmax$ = -140 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma c$ = 158 N/mm^2

τmax = 21 N/mm^2

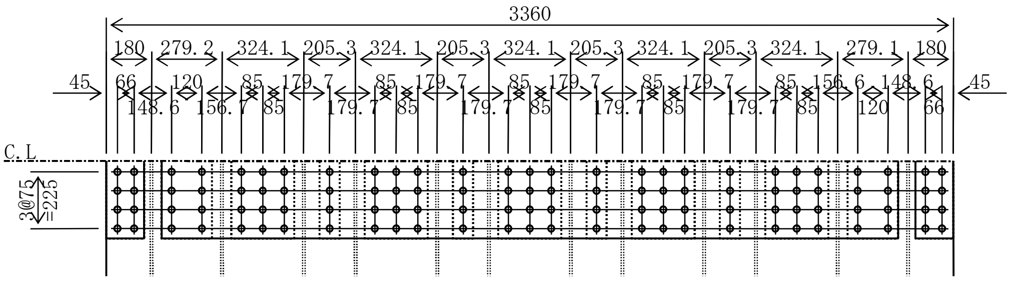
(b) Section area of main plate

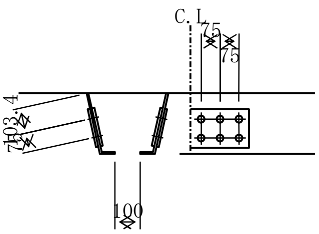
1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM490Y)

5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM490Y)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 53760 = 8467200 N

・Rib Pcr = σc * Agr = 158 * 26950 = 4244625 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AgrR = Agr = 269.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 8467200 / 108000 = 78.4 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 4244625 / 108000 = 39.3 pcs. (5 @ 12 = 60 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,3 unites)

(g) Tensile force per one bolt

ρp = Pc / 108 = 8467200 / 108 = 78400 N

ρs = τ * Ag / 108 = 21 * 53760 / 108 = 10699 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(78400^2 + 10699^2)}$ = 79127 N

(h) Check of splice plates

(SM490Y)		Ags(cm^2)		
2-SPL PL	151 * 9	27.2		
1-SPL PL	2921 * 9	262.9		
		290.1		
2-SPL PL	151 * 14	42.3		
2-SPL PL	200 * 14	56.0		
5-SPL PL	250 * 14	175.0		
4-SPL PL	80 * 14	44.8		
		318.1		
20-SPL PL	155 * 10	310.0	> AgrR =	269.5cm2

(447) G4 J-31(Sec-32) DECK

(a) Acting stress

σcmax = -117 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma$c = 117 N/mm^2

τmax = 24 N/mm^2

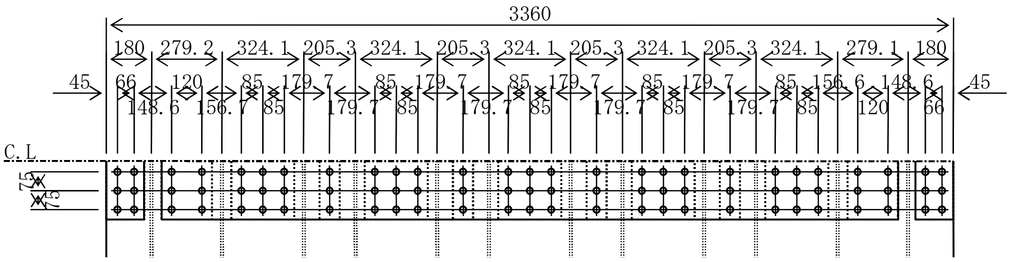
(b) Section area of main plate

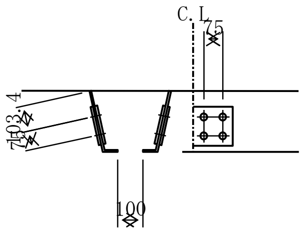
1-DECK PL 3360 * 16   Ag = 537.6 cm^2 (SM400)

5-U.RIB 320 * 240 * 8   Agr = 269.5 cm^2 (SM400)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 117 * 53760 = 6313897 N

・Rib Pcr = σc * Agr = 117 * 26950 = 3165170 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib   AgrR = Agr = 269.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 6313897 / 108000 = 58.5 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 3165170 / 108000 = 29.3 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 81 = 6313897 / 81 = 77949 N

ρs = τ * Ag / 81 = 24 * 53760 / 81 = 15890 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(77949^2 + 15890^2) = 79552 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
2-SPL PL	151 * 9	27.2	
1-SPL PL	2921 * 9	262.9	
		290.1	
2-SPL PL	151 * 14	42.3	
2-SPL PL	200 * 14	56.0	
5-SPL PL	250 * 14	175.0	
4-SPL PL	80 * 14	44.8	
		318.1	
20-SPL PL	155 * 10	310.0	＞ AgrR = 269.5cm2

(448) G4 J-32(Sec-33) DECK

(a) Acting stress

$\sigma cmax$ = -86 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 31 N/mm^2

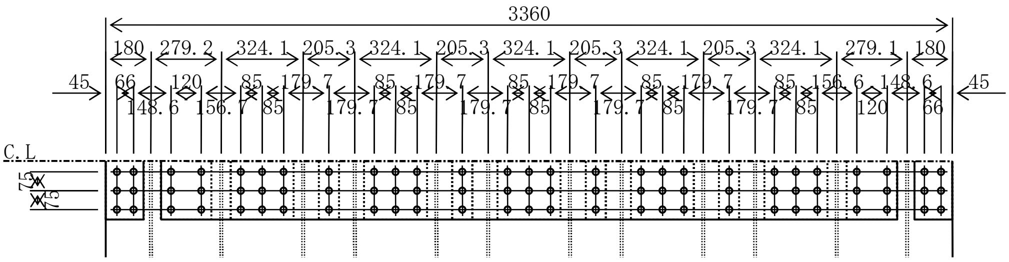
(b) Section area of main plate

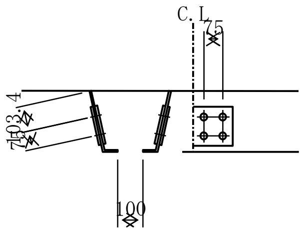
1-DECK PL 3360 * 16 Ag = 537.6 cm^2 (SM400)

5-U.RIB 320 * 240 * 8 Agr = 269.5 cm^2 (SM400)

ΣAg = Ag + Agr = 537.6 + 269.5 = 807.1 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 53760 = 5644800 N

・Rib Pcr = σc * Agr = 105 * 26950 = 2829750 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 537.6 / 2 = 268.8 cm^2

・Rib AgrR = Agr = 269.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5644800 / 108000 = 52.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2829750 / 108000 = 26.2 pcs. (5 @ 8 = 40 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,2 unites)

(g) Tensile force per one bolt

ρp = Pc / 81 = 5644800 / 81 = 69689 N

ρs = τ * Ag / 81 = 31 * 53760 / 81 = 20763 N

$\rho = \sqrt{}(\rho p^2 + \rho s^2) = \sqrt{}(69689^2 + 20763^2)$ = 72716 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
2-SPL PL	151 * 9	27.2	
1-SPL PL	2921 * 9	262.9	
		290.1	
2-SPL PL	151 * 14	42.3	
2-SPL PL	200 * 14	56.0	
5-SPL PL	250 * 14	175.0	
4-SPL PL	80 * 14	44.8	
		318.1	
20-SPL PL	155 * 10	310.0	＞ AgrR = 269.5cm2

(449) D-5 J-1(Sec-1) DECK

(a) Acting stress

σcmax = -74 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴σc = 105 N/mm^2

τmax = 9 N/mm^2

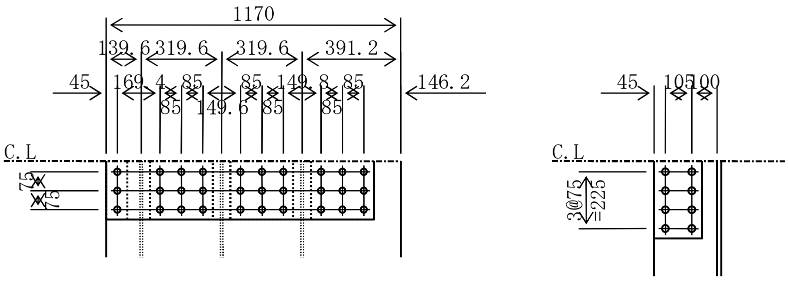
(b) Section area of main plate

1-DECK PL 1170 * 16 Ag = 187.2 cm^2 (SM400)

3-RIB PL 250 * 24 Agr = 180.0 cm^2 (SM400)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 18720 = 1965600 N

・Rib Pcr = σc * Agr = 105 * 18000 = 1890000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2

・Rib AgrR = Agr = 180.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1965600 / 108000 = 18.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 30 = 1965600 / 30 = 65520 N

ρs = τ * Ag / 30 = 9 * 18720 / 30 = 5814 N

ρ = √(ρp^2 + ρs^2) = √(65520^2 + 5814^2) = 65777 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
1-SPL PL	1064 * 9	95.7
1-SPL PL	85 * 14	11.9
3-SPL PL	250 * 14	105.0
		116.9
6-SPL PL	185 * 18	199.8 > AgrR = 180.0cm2

(450) D-5 J-2(Sec-2) DECK

(a) Acting stress

$\sigma cmax$ = -92 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴σc = 105 N/mm^2

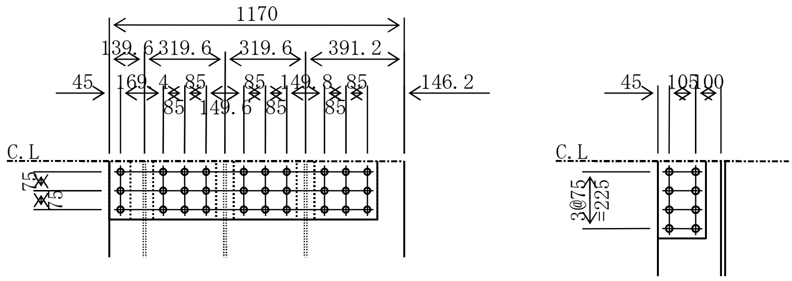
τmax = 7 N/mm^2

(b) Section area of main plate

1-DECK	PL	1170 * 16	Ag =	187.2 cm^2	(SM400)
3-RIB	PL	250 * 24	Agr =	180.0 cm^2	(SM400)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 18720 = 1965600 N

・Rib Pcr = σc * Agr = 105 * 18000 = 1890000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2

・Rib AgrR = Agr = 180.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1965600 / 108000 = 18.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 30 = 1965600 / 30 = 65520 N

ρs = τ * Ag / 30 = 7 * 18720 / 30 = 4062 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(65520^2 + 4062^2)}$ = 65646 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
1-SPL PL	1064 * 9	95.7
1-SPL PL	85 * 14	11.9
3-SPL PL	250 * 14	105.0
		116.9
6-SPL PL	185 * 18	199.8 ＞ AgrR = 180.0cm2

(451) D-5 J-3(Sec-3) DECK

(a) Acting stress

σcmax = -102 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴σc = 105 N/mm^2

τmax = 4 N/mm^2

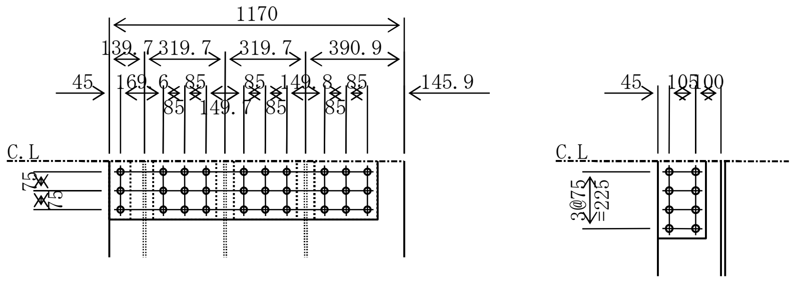
(b) Section area of main plate

1-DECK PL 1170 * 16 Ag = 187.2 cm^2 (SM400)

3-RIB PL 250 * 24 Agr = 180.0 cm^2 (SM400)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 18720 = 1965600 N

・Rib Pcr = σc * Agr = 105 * 18000 = 1890000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2

・Rib AgrR = Agr = 180.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1965600 / 108000 = 18.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 30 = 1965600 / 30 = 65520 N

ρs = τ * Ag / 30 = 4 * 18720 / 30 = 2449 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(65520^2 + 2449^2) = 65566 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
1-SPL	PL 1064 * 9	95.8
1-SPL	PL 85 * 14	11.9
3-SPL	PL 250 * 14	105.0
		116.9
6-SPL	PL 185 * 18	199.8 ＞ AgrR = 180.0cm2

(452) D-5 J-4(Sec-5) DECK

(a) Acting stress

$\sigma cmax$ = -105 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

∴ σc = 105 N/mm^2

τmax = 2 N/mm^2

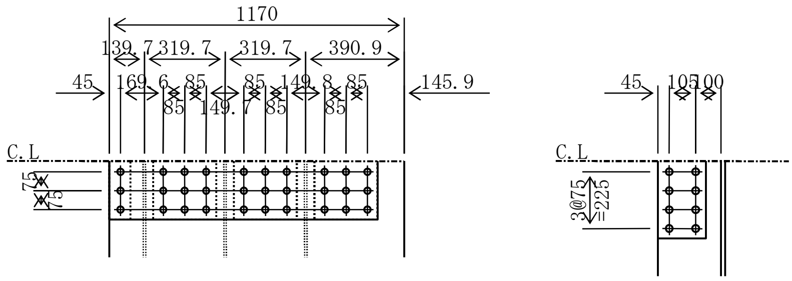
(b) Section area of main plate

1-DECK PL 1170 * 16 Ag = 187.2 cm^2 (SM400)

3-RIB PL 250 * 24 Agr = 180.0 cm^2 (SM400)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 18720 = 1972246 N

・Rib Pcr = σc * Agr = 105 * 18000 = 1896390 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2

・Rib AgrR = Agr = 180.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1972246 / 108000 = 18.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 1896390 / 108000 = 17.6 pcs. (3 @ 8 = 24 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 30 = 1972246 / 30 = 65742 N

ρs = τ * Ag / 30 = 2 * 18720 / 30 = 1396 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(65742^2 + 1396^2)}$ = 65756 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
1-SPL PL	1064 * 9	95.8
1-SPL PL	85 * 14	11.9
3-SPL PL	250 * 14	105.0
		116.9
6-SPL PL	185 * 18	199.8 > AgrR = 180.0cm2

(453) D-5 J-5(Sec-6) DECK

(a) Acting stress

$\sigma cmax$ = -102 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

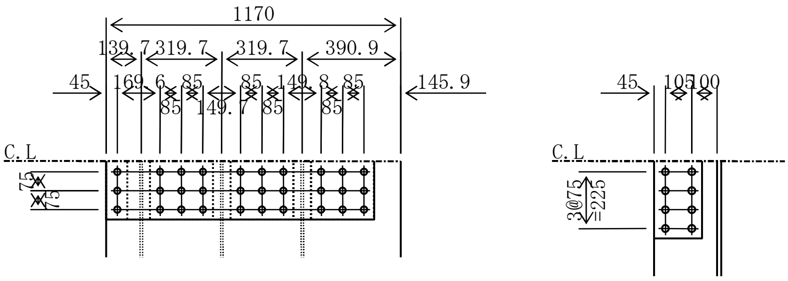
τmax = 5 N/mm^2

(b) Section area of main plate

1-DECK	PL	1170 * 16	Ag =	187.2 cm^2	(SM400)
3-RIB	PL	250 * 24	Agr =	180.0 cm^2	(SM400)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 18720 = 1965600 N

・Rib Pcr = σc * Agr = 105 * 18000 = 1890000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2

・Rib AgrR = Agr = 180.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1965600 / 108000 = 18.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 30 = 1965600 / 30 = 65520 N

ρs = τ * Ag / 30 = 5 * 18720 / 30 = 2905 N

$\rho = \sqrt{}(\rho p^2 + \rho s^2) = \sqrt{}(65520^2 + 2905^2)$ = 65584 N

(h) Check of splice plates

		Ags(cm^2)
	(SS400)	
1-SPL PL	1064 * 9	95.8
1-SPL PL	85 * 14	11.9
3-SPL PL	250 * 14	105.0
		116.9
6-SPL PL	185 * 18	199.8 ＞ AgrR = 180.0cm2

(454) D-5 J-6(Sec-7) DECK

(a) Acting stress

$\sigma cmax$ = -92 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴σc = 105 N/mm^2

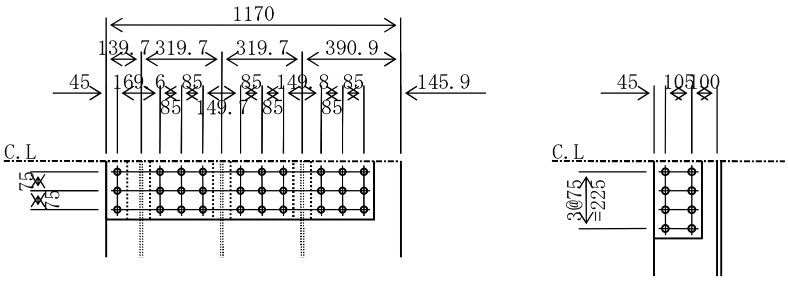
τmax = 7 N/mm^2

(b) Section area of main plate

1-DECK	PL 1170 * 16	Ag =	187.2 cm^2	(SM400)
3-RIB	PL 250 * 24	Agr =	180.0 cm^2	(SM400)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 18720 = 1965600 N

・Rib Pcr = σc * Agr = 105 * 18000 = 1890000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2

・Rib AgrR = Agr = 180.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1965600 / 108000 = 18.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 30 = 1965600 / 30 = 65520 N

ρs = τ * Ag / 30 = 7 * 18720 / 30 = 4563 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(65520^2 + 4563^2)}$ = 65679 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	1064 * 9	95.8	
1-SPL PL	85 * 14	11.9	
3-SPL PL	250 * 14	105.0	
		116.9	
6-SPL PL	185 * 18	199.8	> AgrR = 180.0cm2

(455) D-5 J-7(Sec-8) DECK

(a) Acting stress

$\sigma cmax$ = -74 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

∴σc = 105 N/mm^2

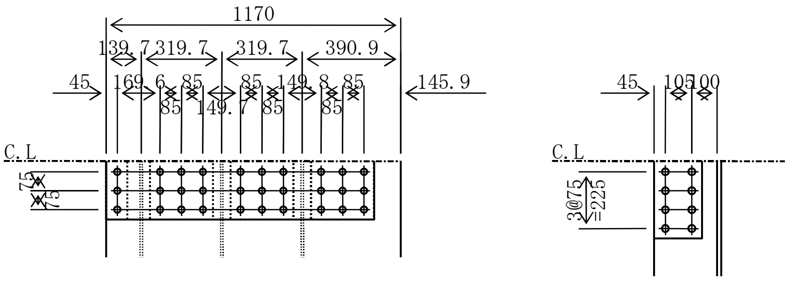
τmax = 10 N/mm^2

(b) Section area of main plate

1-DECK	PL	1170 * 16	Ag =	187.2 cm^2	(SM400)
3-RIB	PL	250 * 24	Agr =	180.0 cm^2	(SM400)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 105 * 18720 = 1965600 N

・Rib Pcr = σc * Agr = 105 * 18000 = 1890000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2

・Rib AgrR = Agr = 180.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1965600 / 108000 = 18.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 30 = 1965600 / 30 = 65520 N

ρs = τ * Ag / 30 = 10 * 18720 / 30 = 6433 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(65520^2 + 6433^2)}$ = 65835 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)
1-SPL PL	1064 * 9	95.8
1-SPL PL	85 * 14	11.9
3-SPL PL	250 * 14	105.0
		116.9
6-SPL PL	185 * 18	199.8 ＞ AgrR = 180.0cm2

(456) D-5 J-8(Sec-8) DECK

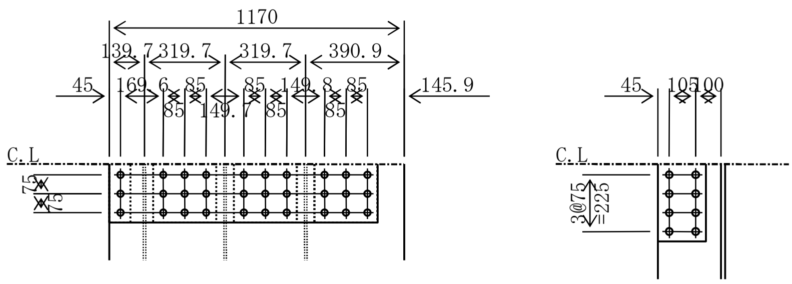
(a) Acting stress

σ tmax = 23 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2
∴ σ c = 105 N/mm^2
τ max = 14 N/mm^2

(b) Section area of main plate

1-DECK PL 1170 * 16   Ag = 187.2 cm^2 (SM400)
3-RIB PL 250 * 24   Agr = 180.0 cm^2 (SM400)
ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 1170 * 16   A = 187.2
(187.2 - (10* 2.5)* 1.6) * 1.1 = 161.9 < 187.2 ∴An = 161.9 cm^2
3-RIB PL 250 * 24   Ar = 180.0
(180.0 - 3*(2* 2.7)* 2.4) * 1.1 = 155.2 < 180.0 ∴Anr = 155.2 cm^2
ΣAn = An + Anr = 161.9 + 155.2 = 317.2 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 23 * 367.2 / 317.2 = 27 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 16192 / 1.1 = 1545600 N
> σ tn * An = 27 * 16192 = 430585 N
Pc = σ c * Ag = 105 * 18720 = 1965600 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 15523 / 1.1 = 1481760 N
> σ tn * Anr = 27 * 15523 = 412800 N
Pcr = σ c * Agr = 105 * 18000 = 1890000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 161.9 / 2 = 81.0 cm^2
AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2
・Rib AnrR = Anr = 155.2 cm^2
AgrR = Agr = 180.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1965600 / 108000 = 18.2 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 30 = 1965600 / 30 = 65520$ N

$\rho s = \tau * Ag / 30 = 14 * 18720 / 30 = 8614$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(65520^2 + 8614^2)} = 66084$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	1064 * 9	(95.8 -	(10*2.5)* 0.9)*1.1=	80.6<	95.8	∴ 80.6
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
3-SPL PL	250 * 14	(105.0 -	3*(3*2.5)* 1.4)*1.1=	80.9<	105.0	∴ 80.9
		116.9				90.1
6-SPL PL	185 * 18	(199.8 -	6*(2*2.7)* 1.8)*1.1=	155.6<	199.8	∴155.6
		> AgrR				>AnrR

(457) D-5 J-9(Sec-9) DECK

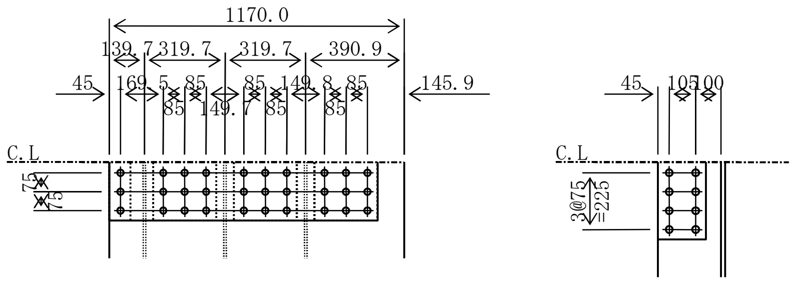
(a) Acting stress

σ tmax = 72 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2
∴ σ c = 105 N/mm^2
τ max = 17 N/mm^2

(b) Section area of main plate

1-DECK PL 1170 * 16 Ag = 187.2 cm^2 (SM400)
3-RIB PL 250 * 24 Agr = 180.0 cm^2 (SM400)
ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 1170 * 16 A = 187.2
(187.2 - (10* 2.5)* 1.6) * 1.1 = 161.9 < 187.2 ∴An = 161.9 cm^2
3-RIB PL 250 * 24 Ar = 180.0
(180.0 - 3*(2* 2.7)* 2.4) * 1.1 = 155.2 < 180.0 ∴Anr = 155.2 cm^2
ΣAn = An + Anr = 161.9 + 155.2 = 317.1 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 72 * 367.2 / 317.1 = 83 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 16191 / 1.1 = 1545550 N
> σ tn * An = 83 * 16191 = 1351088 N
Pc = σ c * Ag = 105 * 18720 = 1965550 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 15523 / 1.1 = 1481760 N
> σ tn * Anr = 83 * 15523 = 1295324 N
Pcr = σ c * Agr = 105 * 18000 = 1890000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 161.9 / 2 = 81.0 cm^2
AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2
・Rib AnrR = Anr = 155.2 cm^2
AgrR = Agr = 180.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1965550 / 108000 = 18.2 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 30 = 1965550 / 30 = 65518$ N

$\rho s = \tau * Ag / 30 = 17 * 18720 / 30 = 10349$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(65518^2 + 10349^2)} = 66331$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			$Ans(cm^2)$
1-SPL PL	1064 * 9	(95.8 -	(10*2.5)* 0.9)*1.1=	80.6<	95.8	∴ 80.6
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
3-SPL PL	250 * 14	(105.0 -	3*(3*2.5)* 1.4)*1.1=	80.9<	105.0	∴ 80.9
		116.9				90.1
6-SPL PL	185 * 18	(199.8 -	6*(2*2.7)* 1.8)*1.1=	155.6<	199.8	∴155.6
		> AgrR				>AnrR

(458) D-5 J-10(Sec-11) DECK

(a) Acting stress

$\sigma tmax$ = 76 N/mm^2 0.75 σta = 0.75 * 140 = 105 N/mm^2

$\sigma cmax$ = -64 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 105 N/mm^2

τmax = 13 N/mm^2

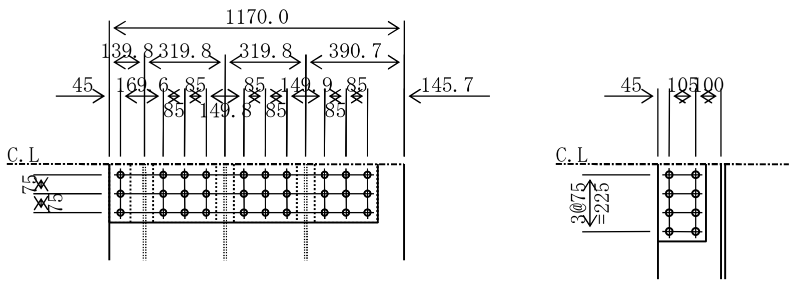
(b) Section area of main plate

1-DECK PL 1170 * 16 Ag = 187.2 cm^2 (SM400)

3-RIB PL 250 * 24 Agr = 180.0 cm^2 (SM400)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 1170 * 16 A = 187.2

(187.2 - (10* 2.5)* 1.6) * 1.1 = 161.9 < 187.2 $\therefore$An = 161.9 cm^2

3-RIB PL 250 * 24 Ar = 180.0

(180.0 - 3*(2* 2.7)* 2.4) * 1.1 = 155.2 < 180.0 $\therefore$Anr = 155.2 cm^2

ΣAn = An + Anr = 161.9 + 155.2 = 317.2 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 76 * 367.2 / 317.2 = 88 N/mm^2

< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σta * An / 1.1 = 105 * 16192 / 1.1 = 1545634 N

> σtn * An = 88 * 16192 = 1429406 N

Pc = σc * Ag = 105 * 18720 = 1965634 N

・Rib Ptr = 0.75 σta * Anr / 1.1 = 105 * 15523 / 1.1 = 1481760 N

> σtn * Anr = 88 * 15523 = 1370335 N

Pcr = σc * Agr = 105 * 18000 = 1890000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 161.9 / 2 = 81.0 cm^2

AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2

・Rib AnrR = Anr = 155.2 cm^2

AgrR = Agr = 180.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1965634 / 108000 = 18.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 30 = 1965634 / 30 = 65521$ N

$\rho s = \tau * Ag / 30 = 13 * 18720 / 30 = 8418$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(65521^2 + 8418^2)} = 66060$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	1064 * 9	(95.8 -	(10*2.5)* 0.9)*1.1=	80.6<	95.8	∴ 80.6
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
3-SPL PL	250 * 14	(105.0 -	3*(3*2.5)* 1.4)*1.1=	80.9<	105.0	∴ 80.9
		116.9				90.1
6-SPL PL	185 * 18	(199.8 -	6*(2*2.7)* 1.8)*1.1=	155.6<	199.8	∴155.6
		> AgrR				>AnrR

(459) D-5 J-11(Sec-12) DECK

(a) Acting stress

σtmax = 42 N/mm^2 0.75σta = 0.75 * 140 = 105 N/mm^2

σcmax = -64 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2

$\therefore$ σc = 105 N/mm^2

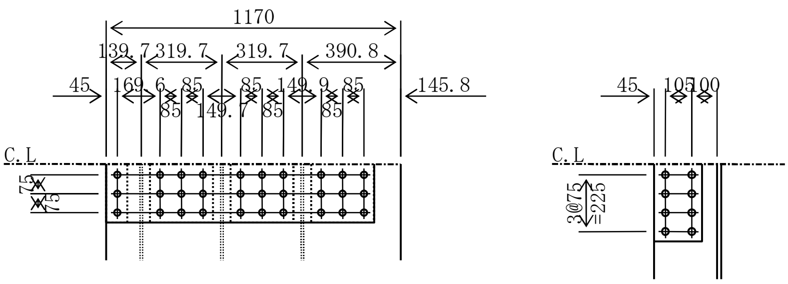
τ max = 11 N/mm^2

(b) Section area of main plate

1-DECK	PL	1170 * 16	Ag =	187.2 cm^2	(SM400)
3-RIB	PL	250 * 24	Agr =	180.0 cm^2	(SM400)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 1170 * 16 A = 187.2

(187.2 - (10* 2.5)* 1.6) * 1.1 = 161.9 < 187.2 $\therefore$An = 161.9 cm^2

3-RIB PL 250 * 24 Ar = 180.0

(180.0 - 3*(2* 2.7)* 2.4) * 1.1 = 155.2 < 180.0 $\therefore$Anr = 155.2 cm^2

ΣAn = An + Anr = 161.9 + 155.2 = 317.2 cm^2

σtn = σtmax * ΣAg / ΣAn = 42 * 367.2 / 317.2 = 48 N/mm^2

< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 105 * 16192 / 1.1 = 1545600 N

> σtn * An = 48 * 16192 = 781813 N

Pc = σc * Ag = 105 * 18720 = 1965600 N

・Rib Ptr = 0.75σta * Anr / 1.1 = 105 * 15523 / 1.1 = 1481760 N

> σtn * Anr = 48 * 15523 = 749521 N

Pcr = σc * Agr = 105 * 18000 = 1890000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 161.9 / 2 = 81.0 cm^2

AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2

・Rib AnrR = Anr = 155.2 cm^2

AgrR = Agr = 180.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1965600 / 108000 = 18.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 30 = 1965600 / 30 = 65520$ N

$\rho s = \tau * Ag / 30 = 11 * 18720 / 30 = 6579$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(65520^2 + 6579^2)} = 65849$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	1064 * 9	(95.8 -	(10*2.5)* 0.9)*1.1=	80.6<	95.8	∴ 80.6
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
3-SPL PL	250 * 14	(105.0 -	3*(3*2.5)* 1.4)*1.1=	80.9<	105.0	∴ 80.9
		116.9				90.1
6-SPL PL	185 * 18	(199.8 -	6*(2*2.7)* 1.8)*1.1=	155.6<	199.8	∴155.6
		> AgrR				>AnrR

(460) D-5 J-12(Sec-12) DECK

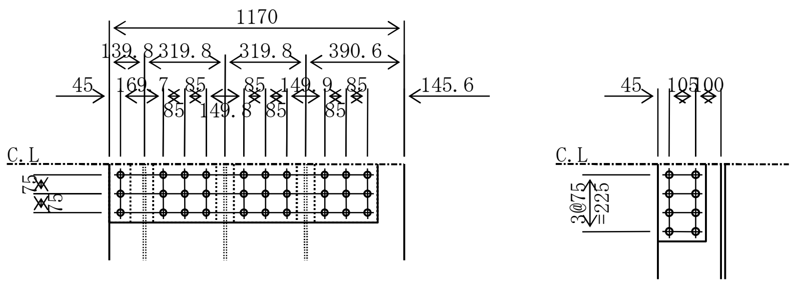
(a) Acting stress

$\sigma tmax$ = 16 N/mm^2 0.75σta = 0.75 * 140 = 105 N/mm^2
$\sigma cmax$ = -64 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma c$ = 105 N/mm^2
τmax = 7 N/mm^2

(b) Section area of main plate

1-DECK PL 1170 * 16 Ag = 187.2 cm^2 (SM400)
3-RIB PL 250 * 24 Agr = 180.0 cm^2 (SM400)
ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 1170 * 16 A = 187.2
(187.2 - (10* 2.5)* 1.6) * 1.1 = 161.9 < 187.2 $\therefore$An = 161.9 cm^2
3-RIB PL 250 * 24 Ar = 180.0
(180.0 - 3*(2* 2.7)* 2.4) * 1.1 = 155.2 < 180.0 $\therefore$Anr = 155.2 cm^2
ΣAn = An + Anr = 161.9 + 155.2 = 317.2 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 16 * 367.2 / 317.2 = 19 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 105 * 16192 / 1.1 = 1545600 N
> σtn * An = 19 * 16192 = 303854 N
Pc = σc * Ag = 105 * 18720 = 1965600 N
・Rib Ptr = 0.75σta * Anr / 1.1 = 105 * 15523 / 1.1 = 1481760 N
> σtn * Anr = 19 * 15523 = 291304 N
Pcr = σc * Agr = 105 * 18000 = 1890000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 161.9 / 2 = 81.0 cm^2
AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2
・Rib AnrR = Anr = 155.2 cm^2
AgrR = Agr = 180.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1965600 / 108000 = 18.2 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 30 = 1965600 / 30 = 65520$ N

$\rho s = \tau * Ag / 30 = 7 * 18720 / 30 = 4337$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(65520^2 + 4337^2)} = 65663$ N

(i) Check of splice plates

	(SS400)	Ags(cm²)	deduction of bolt holes			Ans(cm²)
1-SPL PL	1064 * 9	(95.8 -	(10*2.5)* 0.9)*1.1=	80.6<	95.8	∴ 80.6
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
3-SPL PL	250 * 14	(105.0 -	3*(3*2.5)* 1.4)*1.1=	80.9<	105.0	∴ 80.9
		116.9				90.1
6-SPL PL	185 * 18	(199.8 -	6*(2*2.7)* 1.8)*1.1=	155.6<	199.8	∴155.6
		> AgrR				>AnrR

(461) D-5 J-13(Sec-13) DECK

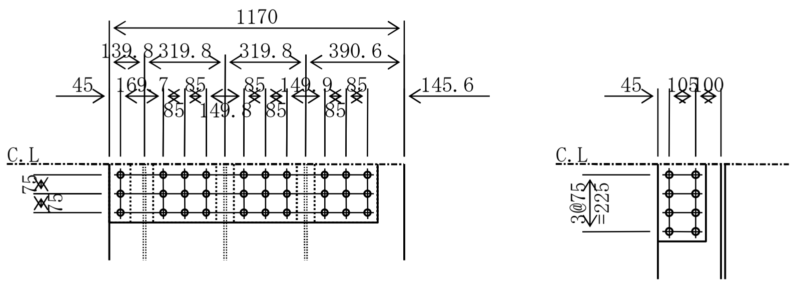
(a) Acting stress

σ tmax = 6 N/mm² 0.75 σ ta = 0.75 * 140 = 105 N/mm²
σ cmax = -64 N/mm² 0.75 σ ca = 0.75 * 140 = 105 N/mm²
∴ σ c = 105 N/mm²
τ max = 4 N/mm²

(b) Section area of main plate

1-DECK PL 1170 * 16 Ag = 187.2 cm² (SM400)
3-RIB PL 250 * 24 Agr = 180.0 cm² (SM400)
ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm²

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 1170 * 16 A = 187.2
(187.2 - (10* 2.5)* 1.6) * 1.1 = 161.9 < 187.2 ∴An = 161.9 cm²
3-RIB PL 250 * 24 Ar = 180.0
(180.0 - 3*(2* 2.7)* 2.4) * 1.1 = 155.2 < 180.0 ∴Anr = 155.2 cm²
ΣAn = An + Anr = 161.9 + 155.2 = 317.2 cm²
σ tn = σ tmax * ΣAg / ΣAn = 6 * 367.2 / 317.2 = 7 N/mm²
< σ ta = 140 N/mm²

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 16192 / 1.1 = 1545600 N
> σ tn * An = 7 * 16192 = 106728 N
Pc = σ c * Ag = 105 * 18720 = 1965600 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 15523 / 1.1 = 1481760 N
> σ tn * Anr = 7 * 15523 = 102319 N
Pcr = σ c * Agr = 105 * 18000 = 1890000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 161.9 / 2 = 81.0 cm²
AgR = Ag / 2 = 187.2 / 2 = 93.6 cm²
・Rib AnrR = Anr = 155.2 cm²
AgrR = Agr = 180.0 cm²

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1965600 / 108000 = 18.2 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 30 = 1965600 / 30 = 65520$ N

$\rho s = \tau * Ag / 30 = 4 * 18720 / 30 = 2489$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(65520^2 + 2489^2)} = 65567$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			$Ans(cm^2)$
1-SPL PL	1064 * 9	(95.8 -	(10*2.5)* 0.9)*1.1=	80.6<	95.8	∴ 80.6
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
3-SPL PL	250 * 14	(105.0 -	3*(3*2.5)* 1.4)*1.1=	80.9<	105.0	∴ 80.9
		116.9				90.1
6-SPL PL	185 * 18	(199.8 -	6*(2*2.7)* 1.8)*1.1=	155.6<	199.8	∴155.6
		> AgrR				>AnrR

(462) D-5 J-14(Sec-14) DECK

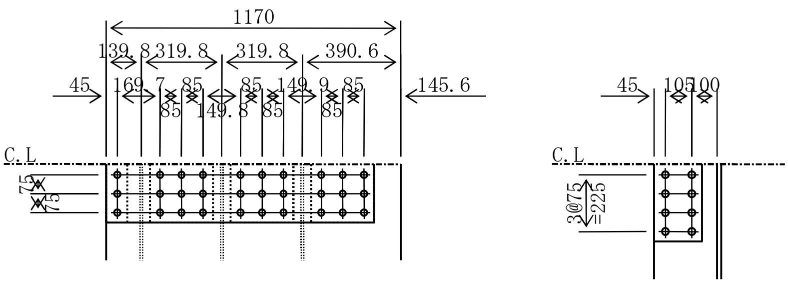
(a) Acting stress

σ tmax = 4 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2
∴ σ c = 105 N/mm^2
τ max = 3 N/mm^2

(b) Section area of main plate

1-DECK PL 1170 * 16 Ag = 187.2 cm^2 (SM400)
3-RIB PL 250 * 24 Agr = 180.0 cm^2 (SM400)
ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 1170 * 16 A = 187.2
(187.2 - (10* 2.5)* 1.6) * 1.1 = 161.9 < 187.2 ∴An = 161.9 cm^2
3-RIB PL 250 * 24 Ar = 180.0
(180.0 - 3*(2* 2.7)* 2.4) * 1.1 = 155.2 < 180.0 ∴Anr = 155.2 cm^2
ΣAn = An + Anr = 161.9 + 155.2 = 317.2 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 4 * 367.2 / 317.2 = 4 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 16192 / 1.1 = 1545600 N
> σ tn * An = 4 * 16192 = 68221 N
Pc = σ c * Ag = 105 * 18720 = 1965600 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 15523 / 1.1 = 1481760 N
> σ tn * Anr = 4 * 15523 = 65403 N
Pcr = σ c * Agr = 105 * 18000 = 1890000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 161.9 / 2 = 81.0 cm^2
AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2
・Rib AnrR = Anr = 155.2 cm^2
AgrR = Agr = 180.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1965600 / 108000 = 18.2 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 30 = 1965600 / 30 = 65520$ N

$\rho s = \tau * Ag / 30 = 3 * 18720 / 30 = 1607$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(65520^2 + 1607^2)} = 65540$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	1064 * 9	(95.8 -	(10*2.5)* 0.9)*1.1=	80.6<	95.8	∴ 80.6
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
3-SPL PL	250 * 14	(105.0 -	3*(3*2.5)* 1.4)*1.1=	80.9<	105.0	∴ 80.9
		116.9				90.1
6-SPL PL	185 * 18	(199.8 -	6*(2*2.7)* 1.8)*1.1=	155.6<	199.8	∴155.6
		> AgrR				>AnrR

(463) D-5 J-15(Sec-15) DECK

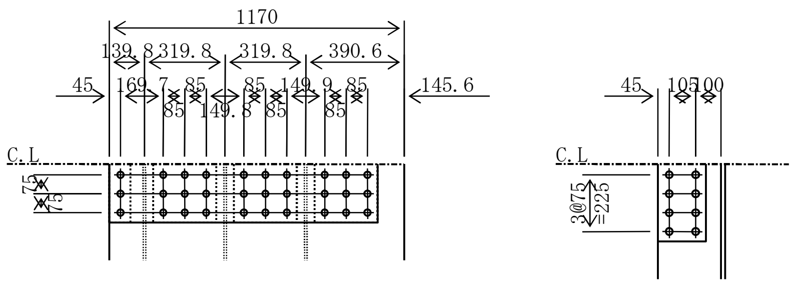
(a) Acting stress

$\sigma tmax$ = 12 N/mm^2 $0.75\sigma ta$ = 0.75 * 140 = 105 N/mm^2
$\sigma cmax$ = -64 N/mm^2 $0.75\sigma ca$ = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma c$ = 105 N/mm^2
τmax = 5 N/mm^2

(b) Section area of main plate

1-DECK PL 1170 * 16 Ag = 187.2 cm^2 (SM400)
3-RIB PL 250 * 24 Agr = 180.0 cm^2 (SM400)
ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 1170 * 16 A = 187.2
(187.2 - (10* 2.5)* 1.6) * 1.1 = 161.9 < 187.2 $\therefore$An = 161.9 cm^2
3-RIB PL 250 * 24 Ar = 180.0
(180.0 - 3*(2* 2.7)* 2.4) * 1.1 = 155.2 < 180.0 $\therefore$Anr = 155.2 cm^2
ΣAn = An + Anr = 161.9 + 155.2 = 317.2 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 12 * 367.2 / 317.2 = 14 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = $0.75\sigma ta$ * An / 1.1 = 105 * 16192 / 1.1 = 1545600 N
> σtn * An = 14 * 16192 = 221310 N
Pc = σc * Ag = 105 * 18720 = 1965600 N
・Rib Ptr = $0.75\sigma ta$ * Anr / 1.1 = 105 * 15523 / 1.1 = 1481760 N
> σtn * Anr = 14 * 15523 = 212169 N
Pcr = σc * Agr = 105 * 18000 = 1890000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 161.9 / 2 = 81.0 cm^2
AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2
・Rib AnrR = Anr = 155.2 cm^2
AgrR = Agr = 180.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1965600 / 108000 = 18.2 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 30 = 1965600 / 30 = 65520$ N

$\rho s = \tau * Ag / 30 = 5 * 18720 / 30 = 3089$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(65520^2 + 3089^2)} = 65593$ N

(i) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	1064 * 9	(95.8 -	(10*2.5)* 0.9)*1.1=	80.6<	95.8	∴ 80.6
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
3-SPL PL	250 * 14	(105.0 -	3*(3*2.5)* 1.4)*1.1=	80.9<	105.0	∴ 80.9
		116.9				90.1
6-SPL PL	185 * 18	(199.8 -	6*(2*2.7)* 1.8)*1.1=	155.6<	199.8	∴155.6
		> AgrR				>AnrR

(464) D-5 J-16(Sec-16) DECK

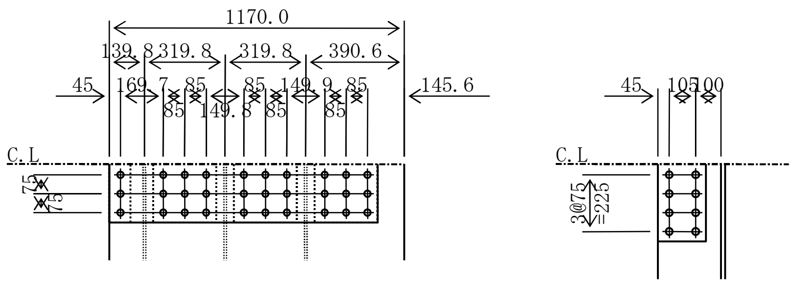
(a) Acting stress

$\sigma tmax$ = 26 N/mm^2 0.75σta = 0.75 * 140 = 105 N/mm^2
$\sigma cmax$ = -64 N/mm^2 0.75σca = 0.75 * 140 = 105 N/mm^2
∴ σc = 105 N/mm^2
τmax = 7 N/mm^2

(b) Section area of main plate

1-DECK PL 1170 * 16   Ag = 187.2 cm^2 (SM400)
3-RIB PL 250 * 24   Agr = 180.0 cm^2 (SM400)
ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 1170 * 16   A = 187.2
(187.2 - (10* 2.5)* 1.6) * 1.1 = 161.9 < 187.2 ∴An = 161.9 cm^2
3-RIB PL 250 * 24   Ar = 180.0
(180.0 - 3*(2* 2.7)* 2.4) * 1.1 = 155.2 < 180.0 ∴Anr = 155.2 cm^2
ΣAn = An + Anr = 161.9 + 155.2 = 317.2 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 26 * 367.2 / 317.2 = 30 N/mm^2
< σta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 105 * 16192 / 1.1 = 1545583 N
> σtn * An = 30 * 16192 = 479267 N
Pc = σc * Ag = 105 * 18720 = 1965583 N
・Rib Ptr = 0.75σta * Anr / 1.1 = 105 * 15523 / 1.1 = 1481760 N
> σtn * Anr = 30 * 15523 = 459476 N
Pcr = σc * Agr = 105 * 18000 = 1890000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 161.9 / 2 = 81.0 cm^2
AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2
・Rib AnrR = Anr = 155.2 cm^2
AgrR = Agr = 180.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1965583 / 108000 = 18.2 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 30 = 1965583 / 30 = 65519$ N

$\rho s = \tau * Ag / 30 = 7 * 18720 / 30 = 4406$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(65519^2 + 4406^2)} = 65667$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			$Ans(cm^2)$
1-SPL PL	1064 * 9	(95.8 -	(10*2.5)* 0.9)*1.1=	80.6<	95.8	∴ 80.6
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
3-SPL PL	250 * 14	(105.0 -	3*(3*2.5)* 1.4)*1.1=	80.9<	105.0	∴ 80.9
		116.9				90.1
6-SPL PL	185 * 18	(199.8 -	6*(2*2.7)* 1.8)*1.1=	155.6<	199.8	∴155.6
		> AgrR				>AnrR

(465) D-5 J-17(Sec-17) DECK

(a) Acting stress

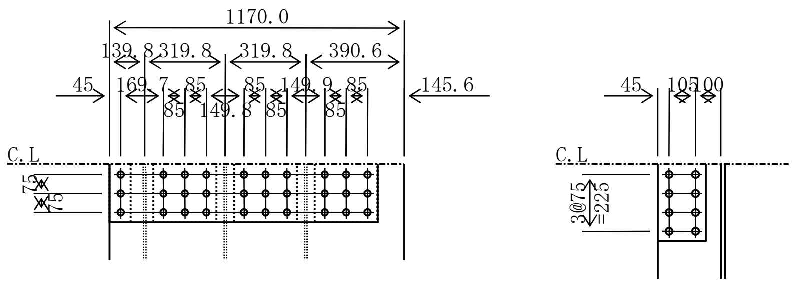
σ tmax = 53 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2
∴ σ c = 105 N/mm^2
τ max = 11 N/mm^2

(b) Section area of main plate

1-DECK	PL	1170 * 16	Ag =	187.2 cm^2	(SM400)
3-RIB	PL	250 * 24	Agr =	180.0 cm^2	(SM400)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 1170 * 16 A = 187.2
(187.2 - (10* 2.5)* 1.6) * 1.1 = 161.9 < 187.2 ∴An = 161.9 cm^2
3-RIB PL 250 * 24 Ar = 180.0
(180.0 - 3*(2* 2.7)* 2.4) * 1.1 = 155.2 < 180.0 ∴Anr = 155.2 cm^2
ΣAn = An + Anr = 161.9 + 155.2 = 317.2 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 53 * 367.2 / 317.2 = 62 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 16192 / 1.1 = 1545583 N
> σ tn * An = 62 * 16192 = 1000152 N
Pc = σ c * Ag = 105 * 18720 = 1965583 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 15523 / 1.1 = 1481760 N
> σ tn * Anr = 62 * 15523 = 958852 N
Pcr = σ c * Agr = 105 * 18000 = 1890000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 161.9 / 2 = 81.0 cm^2
AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2
・Rib AnrR = Anr = 155.2 cm^2
AgrR = Agr = 180.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1965583 / 108000 = 18.2 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 30 = 1965583 / 30 = 65519$ N

$\rho s = \tau * Ag / 30 = 11 * 18720 / 30 = 6749$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(65519^2 + 6749^2)} = 65866$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			$Ans(cm^2)$
1-SPL PL	1064 * 9	(95.8 -	(10*2.5)* 0.9)*1.1=	80.6<	95.8	∴ 80.6
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
3-SPL PL	250 * 14	(105.0 -	3*(3*2.5)* 1.4)*1.1=	80.9<	105.0	∴ 80.9
		116.9				90.1
6-SPL PL	185 * 18	(199.8 -	6*(2*2.7)* 1.8)*1.1=	155.6<	199.8	∴155.6
		> AgrR				>AnrR

(466) D-5 J-18(Sec-18) DECK

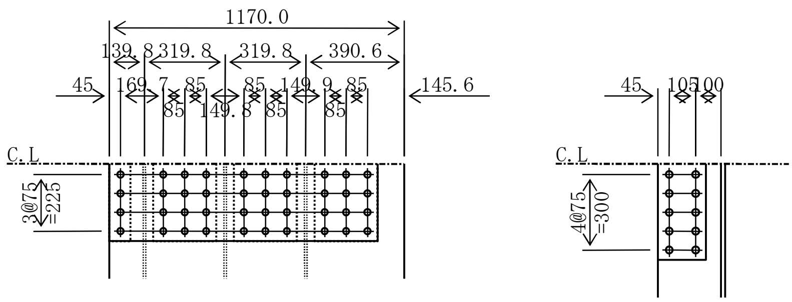
(a) Acting stress

σ tmax = 97 N/mm² 0.75 σ ta = 0.75 * 210 = 158 N/mm²
σ cmax = -64 N/mm² 0.75 σ ca = 0.75 * 210 = 158 N/mm²
∴ σ c = 158 N/mm²
τ max = 14 N/mm²

(b) Section area of main plate

1-DECK PL 1170 * 16 Ag = 187.2 cm² (SM490Y)
3-RIB PL 250 * 24 Agr = 180.0 cm² (SM490Y)
Σ Ag = Ag + Agr = 187.2 + 180.0 = 367.2 cm²

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 1170 * 16 A = 187.2
(187.2 - (10* 2.5)* 1.6) * 1.1 = 161.9 < 187.2 ∴An = 161.9 cm²
3-RIB PL 250 * 24 Ar = 180.0
(180.0 - 3*(2* 2.7)* 2.4) * 1.1 = 155.2 < 180.0 ∴Anr = 155.2 cm²
Σ An = An + Anr = 161.9 + 155.2 = 317.2 cm²
σ tn = σ tmax * Σ Ag / Σ An = 97 * 367.2 / 317.2 = 112 N/mm²
< σ ta = 210 N/mm²

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 158 * 16192 / 1.1 = 2318375 N
> σ tn * An = 112 * 16192 = 1812628 N
Pc = σ c * Ag = 158 * 18720 = 2948375 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 158 * 15523 / 1.1 = 2222640 N
> σ tn * Anr = 112 * 15523 = 1737777 N
Pcr = σ c * Agr = 158 * 18000 = 2835000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 161.9 / 2 = 81.0 cm²
AgR = Ag / 2 = 187.2 / 2 = 93.6 cm²
・Rib AnrR = Anr = 155.2 cm²
AgrR = Agr = 180.0 cm²

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2948375 / 108000 = 27.3 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 2835000 / 108000 = 26.3 pcs. (3 @ 10 = 30 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 40 = 2948375 / 40 = 73709$ N

$\rho s = \tau * Ag / 40 = 14 * 18720 / 40 = 6669$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(73709^2 + 6669^2)} = 74010$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	1064 * 9	(95.8 -	(10*2.5)* 0.9)*1.1=	80.6<	95.8	∴ 80.6
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
3-SPL PL	250 * 14	(105.0 -	3*(3*2.5)* 1.4)*1.1=	80.9<	105.0	∴ 80.9
		116.9				90.1
6-SPL PL	185 * 18	(199.8 -	6*(2*2.7)* 1.8)*1.1=	155.6<	199.8	∴155.6
		> AgrR				>AnrR

(467) D-5 J-19(Sec-19) DECK

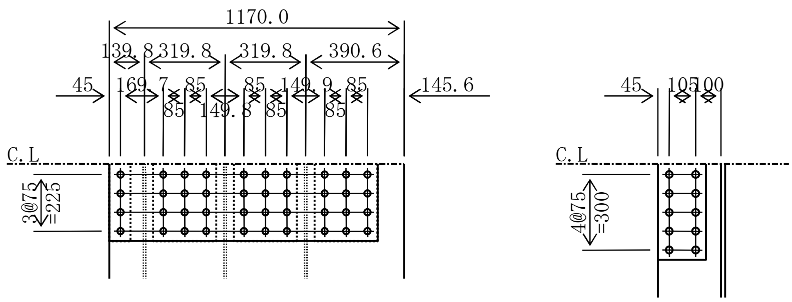
(a) Acting stress

σ_{tmax} = 137 N/mm^2 0.75 σ_{ta} = 0.75 * 210 = 158 N/mm^2
σ_{cmax} = -64 N/mm^2 0.75 σ_{ca} = 0.75 * 210 = 158 N/mm^2
$\therefore \sigma_c$ = 158 N/mm^2
τ_{max} = 17 N/mm^2

(b) Section area of main plate

1-DECK PL 1170 * 16 Ag = 187.2 cm^2 (SM490Y)
3-RIB PL 250 * 24 Agr = 180.0 cm^2 (SM490Y)
ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 1170 * 16 A = 187.2
(187.2 - (10* 2.5)* 1.6) * 1.1 = 161.9 < 187.2 $\therefore$An = 161.9 cm^2
3-RIB PL 250 * 24 Ar = 180.0
(180.0 - 3*(2* 2.7)* 2.4) * 1.1 = 155.2 < 180.0 $\therefore$Anr = 155.2 cm^2
ΣAn = An + Anr = 161.9 + 155.2 = 317.1 cm^2
σ_{tn} = σ_{tmax} * ΣAg / ΣAn = 137 * 367.2 / 317.1 = 158 N/mm^2
< σ_{ta} = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ_{tn} * An = 158 * 16191 = 2560702 N
> 0.75 σ_{ta} * An / 1.1 = 158 * 16191 / 1.1 = 2318274 N
Pc = σ_c * Ag = 158 * 18719 = 2948274 N
・Rib Ptr = σ_{tn} * Anr = 158 * 15523 = 2455067 N
> 0.75 σ_{ta} * Anr/ 1.1 = 158 * 15523 / 1.1 = 2222640 N
Pcr = σ_c * Agr = 158 * 18000 = 2835000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 161.9 / 2 = 81.0 cm^2
AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2
・Rib AnrR = Anr = 155.2 cm^2
AgrR = Agr = 180.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2948274 / 108000 = 27.3 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 2835000 / 108000 = 26.3 pcs. (3 @ 10 = 30 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ_a = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 40 = 2948274 / 40 = 73707$ N

$\rho s = \tau * Ag / 40 = 17 * 18719 / 40 = 8043$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(73707^2 + 8043^2)} = 74144$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	1064 * 9	(95.8 -	(10*2.5)* 0.9)*1.1=	80.6<	95.8	∴ 80.6
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
3-SPL PL	250 * 14	(105.0 -	3*(3*2.5)* 1.4)*1.1=	80.9<	105.0	∴ 80.9
		116.9				90.1
6-SPL PL	185 * 18	(199.8 -	6*(2*2.7)* 1.8)*1.1=	155.6<	199.8	∴155.6
		> AgrR				>AnrR

(468) D-5 J-20(Sec-21) DECK

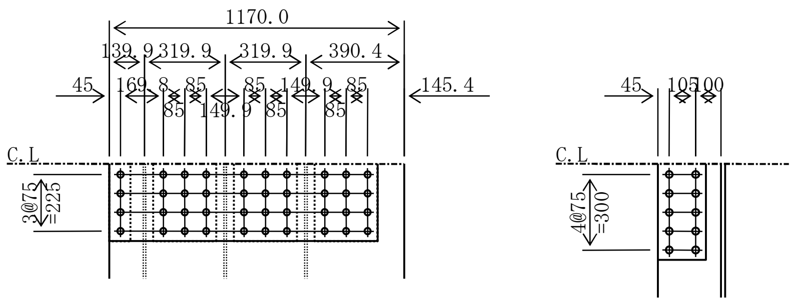
(a) Acting stress

σ tmax = 137 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 210 = 158 N/mm^2
∴ σ c = 158 N/mm^2
τ max = 22 N/mm^2

(b) Section area of main plate

1-DECK PL 1170 * 16 Ag = 187.2 cm^2 (SM490Y)
3-RIB PL 250 * 24 Agr = 180.0 cm^2 (SM490Y)
ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 1170 * 16 A = 187.2
(187.2 - (10* 2.5)* 1.6) * 1.1 = 161.9 < 187.2 ∴An = 161.9 cm^2
3-RIB PL 250 * 24 Ar = 180.0
(180.0 - 3*(2* 2.7)* 2.4) * 1.1 = 155.2 < 180.0 ∴Anr = 155.2 cm^2
ΣAn = An + Anr = 161.9 + 155.2 = 317.2 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 137 * 367.2 / 317.2 = 158 N/mm^2
< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 158 * 16192 = 2559244 N
> 0.75 σ ta * An / 1.1 = 158 * 16192 / 1.1 = 2318450 N
Pc = σ c * Ag = 158 * 18720 = 2948450 N
・Rib Ptr = σ tn * Anr = 158 * 15523 = 2453483 N
> 0.75 σ ta * Anr/ 1.1 = 158 * 15523 / 1.1 = 2222640 N
Pcr = σ c * Agr = 158 * 18000 = 2835000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 161.9 / 2 = 81.0 cm^2
AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2
・Rib AnrR = Anr = 155.2 cm^2
AgrR = Agr = 180.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2948450 / 108000 = 27.3 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 2835000 / 108000 = 26.3 pcs. (3 @ 10 = 30 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 40 = 2948450 / 40 = 73711$ N

$\rho s = \tau * Ag / 40 = 22 * 18720 / 40 = 10254$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(73711^2 + 10254^2)} = 74421$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
1-SPL PL	1065 * 9	(95.8 -	(10*2.5)* 0.9)*1.1=	80.6<	95.8	∴ 80.6
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
3-SPL PL	250 * 14	(105.0 -	3*(3*2.5)* 1.4)*1.1=	80.9<	105.0	∴ 80.9
		116.9				90.1
6-SPL PL	185 * 18	(199.8 -	6*(2*2.7)* 1.8)*1.1=	155.6<	199.8	∴155.6
		> AgrR				>AnrR

(469) D-5 J-21(Sec-22) DECK

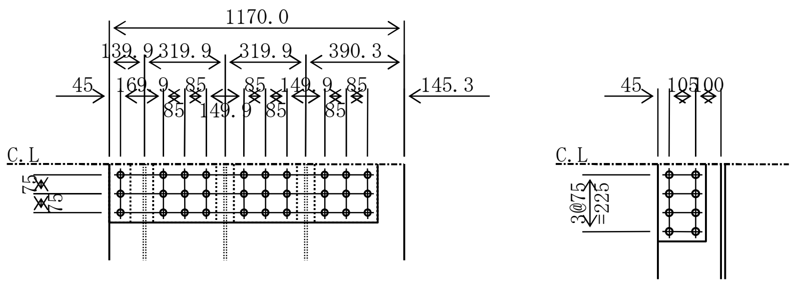
(a) Acting stress

σ tmax = 85 N/mm² 0.75 σ ta = 0.75 * 140 = 105 N/mm²
σ cmax = -64 N/mm² 0.75 σ ca = 0.75 * 140 = 105 N/mm²
∴ σ c = 105 N/mm²
τ max = 21 N/mm²

(b) Section area of main plate

1-DECK PL 1170 * 16 Ag = 187.2 cm² (SM400)
3-RIB PL 250 * 24 Agr = 180.0 cm² (SM400)
Σ Ag = Ag + Agr = 187.2 + 180.0 = 367.2 cm²

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 1170 * 16 A = 187.2
(187.2 - (10* 2.5)* 1.6) * 1.1 = 161.9 < 187.2 ∴An = 161.9 cm²
3-RIB PL 250 * 24 Ar = 180.0
(180.0 - 3*(2* 2.7)* 2.4) * 1.1 = 155.2 < 180.0 ∴Anr = 155.2 cm²
Σ An = An + Anr = 161.9 + 155.2 = 317.1 cm²
σ tn = σ tmax * Σ Ag / Σ An = 85 * 367.2 / 317.1 = 99 N/mm²
< σ ta = 140 N/mm²

(e) Design axial force

・Main plate Pt = σ tn * An = 99 * 16192 = 1602777 N
> 0.75 σ ta * An / 1.1 = 105 * 16192 / 1.1 = 1545566 N
Pc = σ c * Ag = 105 * 18720 = 1965566 N
・Rib Ptr = σ tn * Anr = 99 * 15523 = 1536609 N
> 0.75 σ ta * Anr/ 1.1 = 105 * 15523 / 1.1 = 1481760 N
Pcr = σ c * Agr = 105 * 18000 = 1890000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 161.9 / 2 = 81.0 cm²
AgR = Ag / 2 = 187.2 / 2 = 93.6 cm²
・Rib AnrR = Anr = 155.2 cm²
AgrR = Agr = 180.0 cm²

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1965566 / 108000 = 18.2 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 30 = 1965566 / 30 = 65519$ N

$\rho s = \tau * Ag / 30 = 21 * 18720 / 30 = 13211$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(65519^2 + 13211^2)} = 66838$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			$Ans(cm^2)$
1-SPL PL	1065 * 9	(95.8 -	(10*2.5)* 0.9)*1.1=	80.7<	95.8	∴ 80.7
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
3-SPL PL	250 * 14	(105.0 -	3*(3*2.5)* 1.4)*1.1=	80.8<	105.0	∴ 80.8
		116.9				90.1
6-SPL PL	185 * 18	(199.8 -	6*(2*2.7)* 1.8)*1.1=	155.6<	199.8	∴155.6
		> AgrR				>AnrR

(470) D-5 J-22(Sec-23) DECK

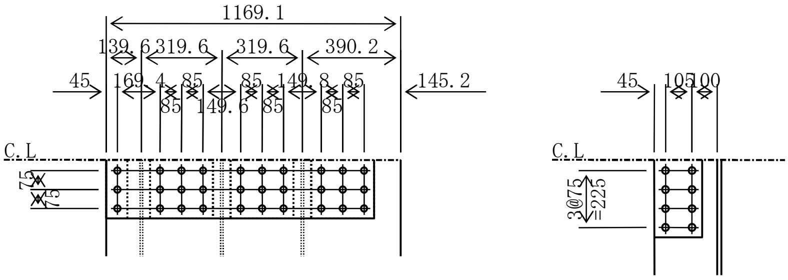
(a) Acting stress

σ tmax = 29 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2
σ cmax = -64 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2
$\therefore \sigma$ c = 105 N/mm^2
τ max = 19 N/mm^2

(b) Section area of main plate

1-DECK PL 1169 * 16 Ag = 187.1 cm^2 (SM400)
3-RIB PL 250 * 24 Agr = 180.0 cm^2 (SM400)
ΣAg = Ag + Agr = 187.1 + 180.0 = 367.1 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- DECK PL 1169 * 16 A = 187.1
(187.1 - (10* 2.5)* 1.6) * 1.1 = 161.8 < 187.1 $\therefore$An = 161.8 cm^2
3-RIB PL 250 * 24 Ar = 180.0
(180.0 - 3*(2* 2.7)* 2.4) * 1.1 = 155.2 < 180.0 $\therefore$Anr = 155.2 cm^2
ΣAn = An + Anr = 161.8 + 155.2 = 317.0 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 29 * 367.1 / 317.0 = 34 N/mm^2
< σ ta = 140 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 105 * 16176 / 1.1 = 1544071 N
> σ tn * An = 34 * 16176 = 544706 N
Pc = σ c * Ag = 105 * 18705 = 1964071 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 105 * 15523 / 1.1 = 1481760 N
> σ tn * Anr = 34 * 15523 = 522725 N
Pcr = σ c * Agr = 105 * 18000 = 1890000 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 161.8 / 2 = 80.9 cm^2
AgR = Ag / 2 = 187.1 / 2 = 93.5 cm^2
・Rib AnrR = Anr = 155.2 cm^2
AgrR = Agr = 180.0 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1964071 / 108000 = 18.2 pcs.
・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 30 = 1964071 / 30 = 65469$ N

$\rho s = \tau * Ag / 30 = 19 * 18705 / 30 = 11845$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(65469^2 + 11845^2)} = 66532$ N

(i) Check of splice plates

	(SS400)	$Ags(cm^2)$	deduction of bolt holes			$Ans(cm^2)$
1-SPL PL	1064 * 9	(95.7 -	(10*2.5)* 0.9)*1.1=	80.6<	95.7	∴ 80.6
1-SPL PL	85 * 14	(11.9 -	(1*2.5)* 1.4)*1.1=	9.2<	11.9	∴ 9.2
3-SPL PL	250 * 14	(105.0 -	3*(3*2.5)* 1.4)*1.1=	80.9<	105.0	∴ 80.9
		116.9				90.1
6-SPL PL	185 * 18	(199.8 -	6*(2*2.7)* 1.8)*1.1=	155.6<	199.8	∴155.6
		> AgrR				>AnrR

(471) D-5 J-23(Sec-23) DECK

(a) Acting stress

σ cmax = -88 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2

∴ σ c = 105 N/mm^2

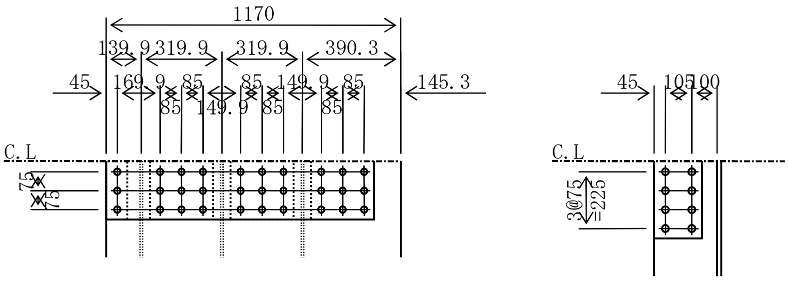
τ max = 16 N/mm^2

(b) Section area of main plate

1-DECK	PL	1170 * 16	Ag =	187.2 cm^2	(SM400)
3-RIB	PL	250 * 24	Agr =	180.0 cm^2	(SM400)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σ c * Ag = 105 * 18720 = 1965600 N

・Rib Pcr = σ c * Agr = 105 * 18000 = 1890000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2

・Rib AgrR = Agr = 180.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1965600 / 108000 = 18.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 30 = 1965600 / 30 = 65520 N

ρs = τ * Ag / 30 = 16 * 18720 / 30 = 10119 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(65520^2 + 10119^2)}$ = 66297 N

(h) Check of splice plates

	(SS400)	Ags(cm^2)	
1-SPL PL	1065 * 9	95.8	
1-SPL PL	85 * 14	11.9	
3-SPL PL	250 * 14	105.0	
		116.9	
6-SPL PL	185 * 18	199.8	＞ AgrR = 180.0cm2

(472) D-5 J-24(Sec-24) DECK

(a) Acting stress

$\sigma cmax$ = -117 N/mm² 0.75 σca = 0.75 * 140 = 105 N/mm²

∴ σc = 117 N/mm²

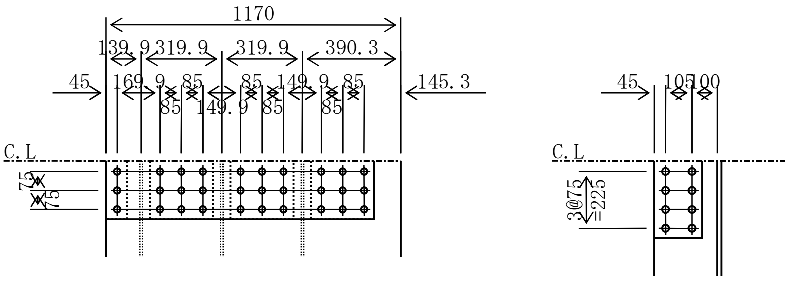
τmax = 11 N/mm²

(b) Section area of main plate

1-DECK	PL	1170 * 16	Ag =	187.2 cm²	(SM400)
3-RIB	PL	250 * 24	Agr =	180.0 cm²	(SM400)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm²

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 117 * 18720 = 2189828 N

・Rib Pcr = σc * Agr = 117 * 18000 = 2105604 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 187.2 / 2 = 93.6 cm²

・Rib AgrR = Agr = 180.0 cm²

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2189828 / 108000 = 20.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2105604 / 108000 = 19.5 pcs. (3 @ 8 = 24 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 30 = 2189828 / 30 = 72994 N

ρs = τ * Ag / 30 = 11 * 18720 / 30 = 7009 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(72994^2 + 7009^2)}$ = 73330 N

(h) Check of splice plates

	(SS400)	Ags(cm²)	
1-SPL PL	1065 * 9	95.8	
1-SPL PL	85 * 14	11.9	
3-SPL PL	250 * 14	105.0	
		116.9	
6-SPL PL	185 * 18	199.8	＞ AgrR = 180.0cm2

(473) D-5　J-25(Sec-25)　DECK

(a) Acting stress

$\sigma cmax$ = -138 N/mm^2　　0.75 σca = 0.75 ＊ 210 = 158 N/mm^2

∴ σc = 158 N/mm^2

τmax = 8 N/mm^2

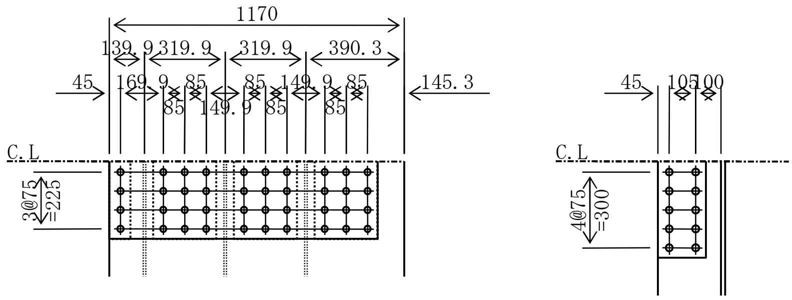
(b) Section area of main plate

1-DECK　PL　1170 ＊ 16　　Ag = 187.2 cm^2　(SM490Y)

3-RIB　PL　250 ＊ 24　　Agr = 180.0 cm^2　(SM490Y)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate　Pc = σc ＊ Ag = 158 ＊ 18720 = 2948400 N

・Rib　Pcr = σc ＊ Agr = 158 ＊ 18000 = 2835000 N

(e) Required section area of the splice plates

・Mother material(One side)　AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2

・Rib　　AgrR = Agr = 180.0 cm^2

(f) Required bolt number

・Main plate　n = Pc / (108000 ＊ 1.00) = 2948400 / 108000 = 27.3 pcs.

・Rib　nr = Pcr / (108000 ＊ 1.00) = 2835000 / 108000 = 26.3 pcs.　(3 @ 10 = 30 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 4,5 unites)

(g) Tensile force per one bolt

ρp = Pc / 40 = 2948400 / 40 = 73710 N

ρs = τ ＊ Ag / 40 = 8 ＊ 18720 / 40 = 3931 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(73710^2 + 3931^2)}$ = 73815 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
1-SPL PL	1065 ＊ 9	95.8	
1-SPL PL	85 ＊ 14	11.9	
3-SPL PL	250 ＊ 14	105.0	
		116.9	
6-SPL PL	185 ＊ 18	199.8	＞ AgrR = 180.0cm2

(474) D-5 J-26(Sec-26) DECK

(a) Acting stress

$\sigma cmax$ = -149 N/mm² 0.75 σca = 0.75 * 210 = 158 N/mm²

∴ σc = 158 N/mm²

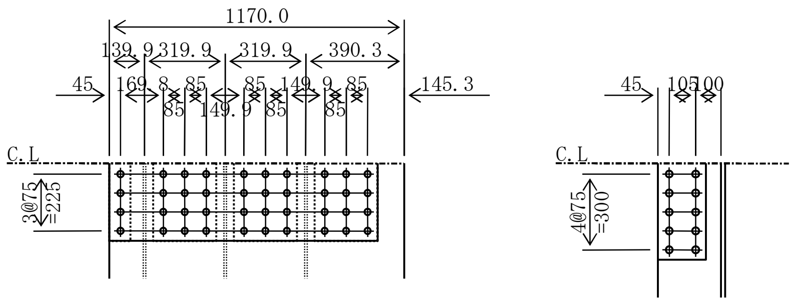
τmax = 6 N/mm²

(b) Section area of main plate

1-DECK	PL	1170 * 16	Ag =	187.2 cm²	(SM490Y)
3-RIB	PL	250 * 24	Agr =	180.0 cm²	(SM490Y)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm²

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 18719 = 2948299 N

・Rib Pcr = σc * Agr = 158 * 18000 = 2835000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 187.2 / 2 = 93.6 cm²

・Rib AgrR = Agr = 180.0 cm²

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2948299 / 108000 = 27.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2835000 / 108000 = 26.3 pcs. (3 @ 10 = 30 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(g) Tensile force per one bolt

ρp = Pc / 40 = 2948299 / 40 = 73707 N

ρs = τ * Ag / 40 = 6 * 18719 / 40 = 2909 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(73707^2 + 2909^2)}$ = 73765 N

(h) Check of splice plates

(SM490Y)	Ags(cm²)	
1-SPL PL 1065 * 9	95.8	
1-SPL PL 85 * 14	11.9	
3-SPL PL 250 * 14	105.0	
	116.9	
6-SPL PL 185 * 18	199.8	＞ AgrR = 180.0cm2

(475) D-5 J-27(Sec-27) DECK

(a) Acting stress

$\sigma cmax$ = -154 N/mm² 0.75 σca = 0.75 * 210 = 158 N/mm²

∴ σc = 158 N/mm²

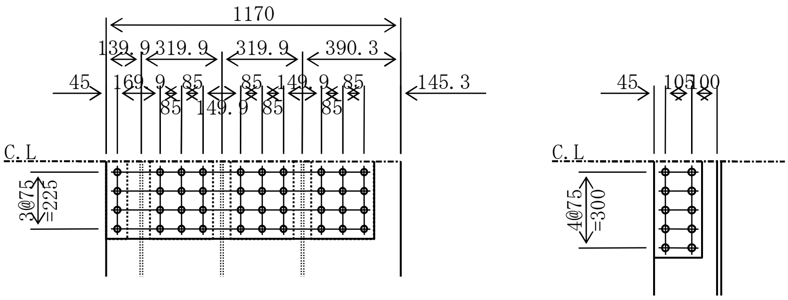
τmax = 4 N/mm²

(b) Section area of main plate

1-DECK	PL	1170 * 16	Ag =	187.2 cm²	(SM490Y)
3-RIB	PL	250 * 24	Agr =	180.0 cm²	(SM490Y)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm²

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 18720 = 2948400 N

・Rib Pcr = σc * Agr = 158 * 18000 = 2835000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 187.2 / 2 = 93.6 cm²

・Rib AgrR = Agr = 180.0 cm²

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2948400 / 108000 = 27.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2835000 / 108000 = 26.3 pcs. (3 @ 10 = 30 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(g) Tensile force per one bolt

ρp = Pc / 40 = 2948400 / 40 = 73710 N

ρs = τ * Ag / 40 = 4 * 18720 / 40 = 1843 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(73710^2 + 1843^2)}$ = 73733 N

(h) Check of splice plates

(SM490Y)	Ags(cm²)	
1-SPL PL 1065 * 9	95.8	
1-SPL PL 85 * 14	11.9	
3-SPL PL 250 * 14	105.0	
	116.9	
6-SPL PL 185 * 18	199.8	＞ AgrR = 180.0cm2

(476) D-5 J-28(Sec-29) DECK

(a) Acting stress

$\sigma cmax$ = -153 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma c$ = 158 N/mm^2

τmax = 4 N/mm^2

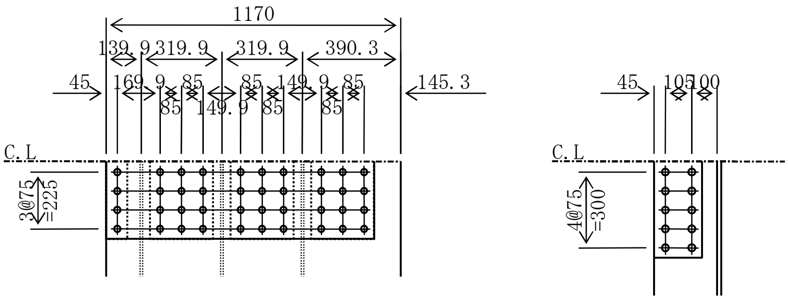
(b) Section area of main plate

1-DECK PL 1170 * 16 Ag = 187.2 cm^2 (SM490Y)

3-RIB PL 250 * 24 Agr = 180.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 18720 = 2948400 N

・Rib Pcr = σc * Agr = 158 * 18000 = 2835000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2

・Rib AgrR = Agr = 180.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2948400 / 108000 = 27.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2835000 / 108000 = 26.3 pcs. (3 @ 10 = 30 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(g) Tensile force per one bolt

ρp = Pc / 40 = 2948400 / 40 = 73710 N

ρs = τ * Ag / 40 = 4 * 18720 / 40 = 1993 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(73710^2 + 1993^2)}$ = 73737 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
1-SPL PL	1065 * 9	95.8	
1-SPL PL	85 * 14	11.9	
3-SPL PL	250 * 14	105.0	
		116.9	
6-SPL PL	185 * 18	199.8	> AgrR = 180.0cm2

(477) D-5 J-29(Sec-30) DECK

(a) Acting stress

$\sigma cmax$ = -147 N/mm^2 0.75 σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 158 N/mm^2

τmax = 6 N/mm^2

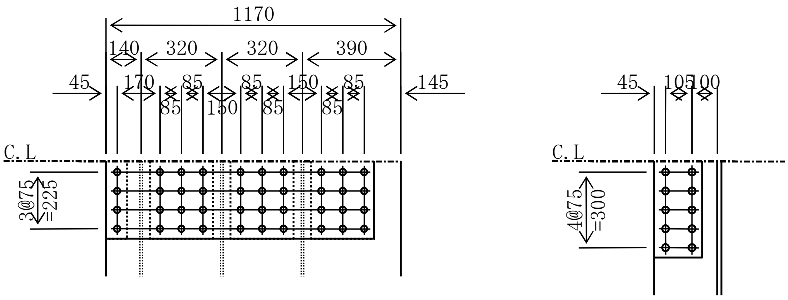
(b) Section area of main plate

1-DECK PL 1170 * 16   Ag = 187.2 cm^2 (SM490Y)

3-RIB PL 250 * 24   Agr = 180.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 18720 = 2948400 N

・Rib Pcr = σc * Agr = 158 * 18000 = 2835000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2

・Rib AgrR = Agr = 180.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2948400 / 108000 = 27.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2835000 / 108000 = 26.3 pcs. (3 @ 10 = 30 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(g) Tensile force per one bolt

ρp = Pc / 40 = 2948400 / 40 = 73710 N

ρs = τ * Ag / 40 = 6 * 18720 / 40 = 3001 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(73710^2 + 3001^2)}$ = 73771 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
1-SPL PL	1065 * 9	95.8	
1-SPL PL	85 * 14	11.9	
3-SPL PL	250 * 14	105.0	
		116.9	
6-SPL PL	185 * 18	199.8	＞ AgrR = 180.0cm2

(478) D-5 J-30(Sec-31) DECK

(a) Acting stress

σ cmax = -134 N/mm^2 0.75 σ ca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma$ c = 158 N/mm^2

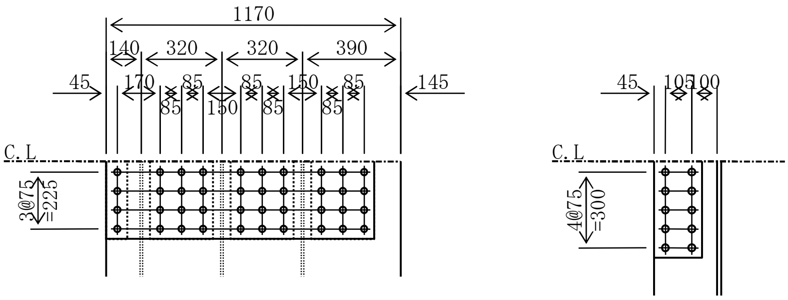
τ max = 9 N/mm^2

(b) Section area of main plate

1-DECK	PL	1170 * 16	Ag =	187.2 cm^2	(SM490Y)
3-RIB	PL	250 * 24	Agr =	180.0 cm^2	(SM490Y)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σ c * Ag = 158 * 18720 = 2948400 N

・Rib Pcr = σ c * Agr = 158 * 18000 = 2835000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2

・Rib AgrR = Agr = 180.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2948400 / 108000 = 27.3 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2835000 / 108000 = 26.3 pcs. (3 @ 10 = 30 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(g) Tensile force per one bolt

ρ p = Pc / 40 = 2948400 / 40 = 73710 N

ρ s = τ * Ag / 40 = 9 * 18720 / 40 = 4060 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(73710^2 + 4060^2)}$ = 73822 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
1-SPL PL	1065 * 9	95.8	
1-SPL PL	85 * 14	11.9	
3-SPL PL	250 * 14	105.0	
		116.9	
6-SPL PL	185 * 18	199.8	＞ AgrR = 180.0cm2

(479) D-5 J-31(Sec-32) DECK

(a) Acting stress

$\sigma cmax$ = -113 N/mm^2 0.75 σca = 0.75 * 140 = 105 N/mm^2

$\therefore \sigma c$ = 113 N/mm^2

τmax = 10 N/mm^2

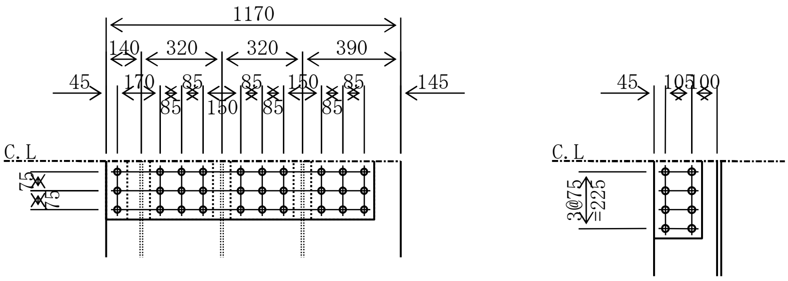
(b) Section area of main plate

1-DECK PL 1170 * 16 Ag = 187.2 cm^2 (SM400)

3-RIB PL 250 * 24 Agr = 180.0 cm^2 (SM400)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 113 * 18720 = 2107947 N

・Rib Pcr = σc * Agr = 113 * 18000 = 2026872 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2

・Rib AgrR = Agr = 180.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2107947 / 108000 = 19.5 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 2026872 / 108000 = 18.8 pcs. (3 @ 8 = 24 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 30 = 2107947 / 30 = 70265 N

ρs = τ * Ag / 30 = 10 * 18720 / 30 = 6471 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(70265^2 + 6471^2)}$ = 70562 N

(h) Check of splice plates

(SS400)	Ags(cm^2)
1-SPL PL 1065 * 9	95.8
1-SPL PL 85 * 14	11.9
3-SPL PL 250 * 14	105.0
	116.9
6-SPL PL 185 * 18	199.8 ＞ AgrR = 180.0cm2

(480) D-5 J-32(Sec-33) DECK

(a) Acting stress

σ cmax = -83 N/mm^2 0.75 σ ca = 0.75 * 140 = 105 N/mm^2

∴ σ c = 105 N/mm^2

τ max = 16 N/mm^2

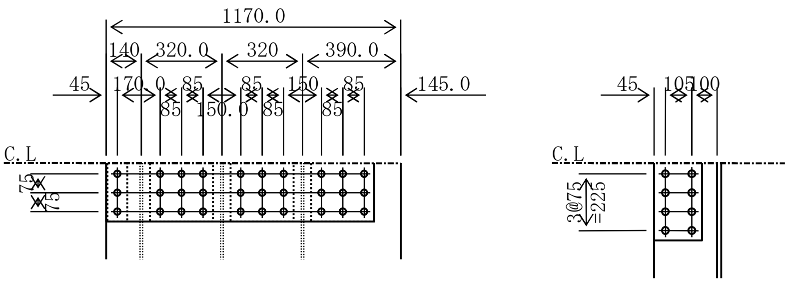
(b) Section area of main plate

1-DECK PL 1170 * 16 Ag = 187.2 cm^2 (SM400)

3-RIB PL 250 * 24 Agr = 180.0 cm^2 (SM400)

ΣAg = Ag + Agr = 187.2 + 180.0 = 367.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σ c * Ag = 105 * 18720 = 1965566 N

・Rib Pcr = σ c * Agr = 105 * 18000 = 1890000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 187.2 / 2 = 93.6 cm^2

・Rib AgrR = Agr = 180.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 1965566 / 108000 = 18.2 pcs.

・Rib nr = Pcr / (108000 * 1.00) = 1890000 / 108000 = 17.5 pcs. (3 @ 8 = 24 bolts)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 30 = 1965566 / 30 = 65519 N

ρs = τ * Ag / 30 = 16 * 18720 / 30 = 9694 N

$\rho = \sqrt{}(\rho p^2 + \rho s^2) = \sqrt{}(65519^2 + 9694^2) = 66232$ N

(h) Check of splice plates

(SS400)	Ags(cm^2)
1-SPL PL 1065 * 9	95.8
1-SPL PL 80 * 14	11.2
3-SPL PL 250 * 14	105.0
	116.2
6-SPL PL 185 * 18	199.8 ＞ AgrR = 180.0cm2

（4） Number of bolt and thickness of splice plate of deck

※ Due to usage of the software, because the calculations will be done divided by forms of longitudinal rib, inve
will be implemented in the later section that required quantity and thickness of splice plate is fulfilled in each b
as a total.

＜Number of bolts and thickness of splice plate of deck＞

	Required number of bolts				number of bolts used			
	D-1	G1	D-2(1)	total	numbers per row	number of rows	total	
J1	18.2	52.3	10.0	80.5	43	3	129	OK
J2	19.0	57.1	11.1	87.2	43	3	129	OK
J3	21.2	63.7	12.3	97.2	43	3	129	OK
J4	21.9	65.6	12.7	100.2	43	3	129	OK
J5	21.1	63.3	12.2	96.6	43	3	129	OK
J6	18.7	56.4	10.9	86.0	43	3	129	OK
J7	18.2	52.3	10.0	80.5	43	3	129	OK
J8	18.2	52.3	10.0	80.5	43	3	129	OK
J9	18.2	52.3	10.0	80.5	43	3	129	OK
J10	18.2	52.7	10.3	81.2	43	3	129	OK
J11	18.2	52.3	10.0	80.5	43	3	129	OK
J12	18.2	52.3	10.0	80.5	43	3	129	OK
J13	18.2	52.3	10.0	80.5	43	3	129	OK
J14	18.2	52.3	10.0	80.5	43	3	129	OK
J15	18.2	52.3	10.0	80.5	43	3	129	OK
J16	18.2	52.3	10.0	80.5	43	3	129	OK
J17	18.2	52.3	10.0	80.5	43	3	129	OK
J18	27.3	78.4	15.1	120.8	43	4	172	OK
J19	27.9	88.4	17.3	133.6	43	4	172	OK
J20	27.3	85.6	16.7	129.6	43	4	172	OK
J21	18.2	52.3	10.1	80.6	43	3	129	OK
J22	18.2	52.3	10.0	80.5	43	3	129	OK
J23	18.2	52.3	10.0	80.5	43	3	129	OK
J24	21.8	65.4	12.7	99.9	43	3	129	OK
J25	27.3	78.4	15.1	120.8	43	4	172	OK
J26	27.6	83.0	16.1	126.7	43	4	172	OK
J27	28.5	86.6	16.8	131.9	43	4	172	OK
J28	28.1	85.3	16.6	130.0	43	4	172	OK
J29	27.3	80.9	15.7	123.9	43	4	172	OK
J30	27.3	78.4	15.0	120.7	43	4	172	OK
J31	20.5	61.5	11.9	93.9	43	3	129	OK
J32	18.2	52.3	10.0	80.5	43	3	129	OK

	Required number of bolts						number of bolts used			
	D-2(2)	D-2(3)	G2	D-3(1)	D-3(2)/2	total	numbers per row	number of rows	total	
J1	2.8	7.2	47.6	12.0	13.3	82.9	48	3	144	OK
J2	3.1	7.9	50.5	12.9	14.4	88.8	48	3	144	OK
J3	3.5	8.8	56.0	14.4	16.0	98.7	48	3	144	OK
J4	3.6	9.1	58.4	15.0	16.6	102.7	48	3	144	OK
J5	3.5	8.8	56.0	14.3	15.9	98.5	48	3	144	OK
J6	3.1	7.8	50.5	13.0	14.4	88.8	48	3	144	OK
J7	2.8	7.2	47.6	12.0	13.3	82.9	48	3	144	OK
J8	2.8	7.2	47.6	12.0	13.3	82.9	48	3	144	OK
J9	2.8	7.2	47.6	12.0	13.3	82.9	48	3	144	OK
J10	3.0	7.4	47.6	12.3	13.3	83.6	48	3	144	OK
J11	2.8	7.2	47.6	12.0	13.3	82.9	48	3	144	OK
J12	2.8	7.2	47.6	12.0	13.3	82.9	48	3	144	OK
J13	2.8	7.2	47.6	12.0	13.3	82.9	48	3	144	OK
J14	2.8	7.2	47.6	12.0	13.3	82.9	48	3	144	OK
J15	2.8	7.2	47.6	12.0	13.3	82.9	48	3	144	OK
J16	2.8	7.2	47.6	12.0	13.3	82.9	48	3	144	OK
J17	2.8	7.2	47.6	12.0	13.3	82.9	48	3	144	OK
J18	4.3	10.8	71.4	18.0	20.0	124.5	48	4	192	OK
J19	5.0	12.4	74.4	19.2	20.6	131.6	48	4	192	OK
J20	4.8	12.0	71.5	18.5	20.0	126.8	48	4	192	OK
J21	2.9	7.3	47.6	12.0	13.3	83.1	48	3	144	OK
J22	2.8	7.2	47.6	12.0	13.3	82.9	48	3	144	OK
J23	2.8	7.2	47.6	12.0	13.3	82.9	48	3	144	OK
J24	3.6	9.1	59.1	15.1	16.8	103.7	48	3	144	OK
J25	4.3	10.8	71.4	18.2	20.2	124.9	48	4	192	OK
J26	4.6	11.5	78.1	20.0	22.9	137.1	49	4	196	OK
J27	4.8	12.0	81.4	21.0	28.4	147.6	51	4	204	OK
J28	4.7	11.9	77.6	20.1	31.9	146.2	52	4	208	OK
J29	4.5	11.3	73.3	19.0	34.6	142.7	54	4	216	OK
J30	4.3	10.8	71.4	18.0	37.6	142.1	55	4	220	OK
J31	3.4	8.5	52.5	13.7	32.3	110.4	57	3	171	OK
J32	2.8	7.2	47.6	12.0	30.3	99.9	58	3	174	OK

	Required number of bolts						number of bolts used			
	D-3(2)/2	D-3(3)	G3	D-4(1)	D-4(2)/2	total	numbers per row	number of rows	total	
J1	13.3	7.2	47.6	21.9	70.6	160.6	81	3	243	OK
J2	14.4	7.8	47.6	14.9	44.7	129.3	78	3	234	OK
J3	16.0	8.6	50.5	16.6	46.2	137.8	76	3	228	OK
J4	16.6	9.0	52.2	17.1	44.5	139.4	74	3	222	OK
J5	15.9	8.6	50.7	16.6	40.2	132.0	72	3	216	OK
J6	14.4	7.8	47.6	15.0	34.0	118.7	70	3	210	OK
J7	13.3	7.2	47.6	14.6	31.1	113.8	70	3	210	OK
J8	13.3	7.2	47.6	14.6	29.4	112.1	68	3	204	OK
J9	13.3	7.2	47.6	14.6	28.1	110.8	67	3	201	OK
J10	13.3	7.5	47.6	14.6	27.2	110.2	67	3	201	OK
J11	13.3	7.2	47.6	14.6	26.3	109.0	66	3	198	OK
J12	13.3	7.2	47.6	14.6	25.4	108.1	65	3	195	OK
J13	13.3	7.2	47.6	14.6	24.8	107.5	66	3	198	OK
J14	13.3	7.2	47.6	14.6	24.5	107.2	65	3	195	OK
J15	13.3	7.2	47.6	14.6	24.4	107.1	65	3	195	OK
J16	13.3	7.2	47.6	14.6	22.6	105.3	63	3	189	OK
J17	13.3	7.2	47.6	14.6	17.8	100.5	60	3	180	OK
J18	20.0	10.8	71.4	21.9	19.6	143.7	56	4	224	OK
J19	20.6	11.7	71.4	22.5	14.0	140.2	54	4	216	OK
J20	20.0	11.3	71.4	18.9	11.0	132.5	50	4	200	OK
J21	13.3	7.2	47.6	11.7	3.6	83.4	48	3	144	OK
J22	13.3	7.2	47.6	10.6	1.4	80.1	46	3	138	OK
J23	13.3	7.2	47.6	10.0	1.4	79.5	45	3	135	OK
J24	16.8	9.1	58.5	12.2	1.8	98.4	45	3	135	OK
J25	20.2	10.9	71.4	15.1	2.2	119.7	45	4	180	OK
J26	22.9	12.0	78.1	15.8	2.3	131.1	46	4	184	OK
J27	28.4	12.6	79.4	16.4	2.4	139.2	48	4	192	OK
J28	31.9	12.1	75.9	16.3	2.3	138.5	49	4	196	OK
J29	34.6	11.4	71.8	15.5	2.2	135.5	51	4	204	OK
J30	37.6	10.8	71.4	15.1	2.2	137.0	52	4	208	OK
J31	32.3	8.2	52.7	11.7	1.7	106.5	54	3	162	OK
J32	30.3	7.2	47.6	10.0	1.4	96.5	55	3	165	OK

	Required number of bolts					number of bolts used			
	D-4(2)/2	D-4(3)	G4	D-5	total	numbers per row	number of rows	total	
J1	70.6	10.8	52.3	18.2	151.9	73	3	219	OK
J2	44.7	7.3	52.3	18.2	122.5	70	3	210	OK
J3	46.2	8.1	57.1	19.1	130.5	68	3	204	OK
J4	44.5	8.4	59.2	19.8	131.9	66	3	198	OK
J5	40.2	8.2	57.4	19.2	125.0	64	3	192	OK
J6	34.0	7.4	52.3	18.2	111.9	62	3	186	OK
J7	31.1	7.2	52.3	18.2	108.8	62	3	186	OK
J8	29.4	7.2	52.3	18.2	107.1	60	3	180	OK
J9	28.1	7.2	52.3	18.2	105.8	59	3	177	OK
J10	27.2	7.2	52.3	18.2	104.9	59	3	177	OK
J11	26.3	7.2	52.3	18.2	104.0	58	3	174	OK
J12	25.4	7.2	52.3	18.2	103.1	57	3	171	OK
J13	24.8	7.2	52.3	18.2	102.5	58	3	174	OK
J14	24.5	7.2	52.3	18.2	102.2	57	3	171	OK
J15	24.4	7.2	52.3	18.2	102.1	57	3	171	OK
J16	22.6	7.2	52.3	18.2	100.3	55	3	165	OK
J17	17.8	7.2	52.3	18.2	95.5	52	3	156	OK
J18	19.6	10.8	78.4	27.3	136.1	48	4	192	OK
J19	14.0	11.4	81.0	27.3	133.7	46	4	184	OK
J20	11.0	11.4	81.2	27.3	130.9	44	4	176	OK
J21	3.6	7.3	52.3	18.2	81.4	42	3	126	OK
J22	1.4	7.2	52.3	18.2	79.1	41	3	123	OK
J23	1.4	7.2	52.3	18.2	79.1	41	3	123	OK
J24	1.8	8.8	63.3	21.1	95.0	41	3	123	OK
J25	2.2	10.8	78.4	27.3	118.7	41	4	164	OK
J26	2.3	11.4	80.4	27.3	121.4	41	4	164	OK
J27	2.4	11.7	84.5	27.8	126.4	41	4	164	OK
J28	2.3	11.6	83.8	27.5	125.2	41	4	164	OK
J29	2.2	11.1	79.6	27.3	120.2	41	4	164	OK
J30	2.2	10.8	78.4	27.3	118.7	41	4	164	OK
J31	1.7	8.4	60.7	20.2	91.0	41	3	123	OK
J32	1.4	7.2	52.3	18.2	79.1	41	3	123	OK

＜Investigation on bolt stress intensity of deck＞　High strength friction grip bolt, S10T, M22 will be used.

	stress intensity per bolt (cm4)					acceptable value	
	D-1	G1	D-2(1)	total	average	ρ a(cm4)	
J1	66022	69865	72379	208266	69422	108000	OK
J2	68644	74902	79681	223227	74409	108000	OK
J3	76513	82398	88747	247658	82553	108000	OK
J4	78827	84519	91416	254762	84921	108000	OK
J5	76019	81804	88177	246000	82000	108000	OK
J6	67797	73730	78684	220211	73404	108000	OK
J7	66021	69447	72375	207843	69281	108000	OK
J8	66452	70579	72488	209519	69840	108000	OK
J9	66832	71716	72587	211135	70378	108000	OK
J10	66399	71048	74620	212067	70689	108000	OK
J11	66056	69224	72383	207663	69221	108000	OK
J12	65738	68340	72309	206387	68796	108000	OK
J13	65599	67720	72262	205581	68527	108000	OK
J14	65557	67472	72251	205280	68427	108000	OK
J15	65638	67747	72273	205658	68553	108000	OK
J16	65783	68248	72306	206337	68779	108000	OK
J17	66107	69865	72396	208368	69456	108000	OK
J18	74193	74902	81393	230488	76829	108000	OK
J19	76001	82398	93404	251803	83934	108000	OK
J20	74680	84519	90504	249703	83234	108000	OK
J21	67170	81804	73250	222224	74075	108000	OK
J22	66751	73730	72563	213044	71015	108000	OK
J23	66426	69447	72481	208354	69451	108000	OK
J24	78887	70579	91193	240659	80220	108000	OK
J25	73832	71716	81302	226850	75617	108000	OK
J26	74519	71048	86750	232317	77439	108000	OK
J27	76928	69224	90704	236856	78952	108000	OK
J28	75835	68340	89410	233585	77862	108000	OK
J29	73787	67720	84853	226360	75453	108000	OK
J30	73849	67472	81304	222625	74208	108000	OK
J31	74146	67747	85728	227621	75874	108000	OK
J32	66369	68248	72477	207094	69031	108000	OK

	stress intensity per bolt (cm4)							acceptable value	
	D-2(2)	D-2(3)	G2	D-3(1)	D-3(2)	total	average	ρ a(cm4)	
J1	102641	64810	61465	62354	64544	355814	71163	108000	OK
J2	112997	71349	63737	66853	69201	384137	76827	108000	OK
J3	125854	79467	70041	73963	76560	425885	85177	108000	OK
J4	129639	81857	72691	77088	79795	441070	88214	108000	OK
J5	125045	78956	69844	73864	76459	424168	84834	108000	OK
J6	111584	70456	63648	66977	69329	381994	76399	108000	OK
J7	102636	64807	61284	62479	64674	355880	71176	108000	OK
J8	102797	64908	61867	62860	65067	357499	71500	108000	OK
J9	102937	64997	62642	63293	65516	359385	71877	108000	OK
J10	107262	66870	61556	64431	64848	364967	72993	108000	OK
J11	102648	64814	60824	62347	64537	355170	71034	108000	OK
J12	102543	64748	60351	62054	64233	353929	70786	108000	OK
J13	102477	64706	59677	61771	63940	352571	70514	108000	OK
J14	102461	64696	59322	61645	63810	351934	70387	108000	OK
J15	102491	64715	59631	61809	63979	352625	70525	108000	OK
J16	102538	64745	60078	62032	64211	353604	70721	108000	OK
J17	102666	64826	60939	62309	64497	355237	71047	108000	OK
J18	115425	72882	67663	69810	72262	398042	79608	108000	OK
J19	134268	83703	70845	74751	74760	438327	87665	108000	OK
J20	130097	81105	68936	72287	72834	425259	85052	108000	OK
J21	105284	65642	63299	63562	65794	363581	72716	108000	OK
J22	102903	64975	62711	63220	65441	359250	71850	108000	OK
J23	102786	64902	61594	62747	64951	356980	71396	108000	OK
J24	129323	81657	74812	78553	81312	445657	89131	108000	OK
J25	115296	72800	67012	70317	72786	398211	79642	108000	OK
J26	123033	77675	73039	77245	77362	428354	85671	108000	OK
J27	128647	81222	75967	81021	76766	443623	88725	108000	OK
J28	126794	80061	72406	77476	74768	431505	86301	108000	OK
J29	120331	75980	68496	73480	71881	410168	82034	108000	OK
J30	115315	72804	67117	69695	70319	395250	79050	108000	OK
J31	121572	76763	67705	72236	74437	412713	82543	108000	OK
J32	102787	64884	63008	65182	65812	361673	72335	108000	OK

	stress intensity per bolt (cm4)							acceptable value	
	D-3(2)	D-3(3)	G3	D-4(1)	D-4(2)	total	average	ρ a(cm4)	
J1	64544	65479	60956	89859	80203	361041	72208	108000	OK
J2	69201	70204	60246	60988	55776	316415	63283	108000	OK
J3	76560	77669	63140	66676	60822	344867	68973	108000	OK
J4	79795	80951	64943	68634	64152	358475	71695	108000	OK
J5	76459	77566	63276	66888	63384	347573	69515	108000	OK
J6	69329	70333	59945	61286	58129	319022	63804	108000	OK
J7	64674	65610	60532	60787	55429	307032	61406	108000	OK
J8	65067	66010	61059	62134	57584	311854	62371	108000	OK
J9	65516	66465	61582	63364	60881	317808	63562	108000	OK
J10	64848	68874	60817	61232	55373	311144	62229	108000	OK
J11	64537	65471	60394	60234	57226	307862	61572	108000	OK
J12	64233	65163	60001	59302	56148	304847	60969	108000	OK
J13	63940	64866	59577	58735	52735	299853	59971	108000	OK
J14	63810	64735	59293	58582	53546	299966	59993	108000	OK
J15	63979	64906	59428	58797	53534	300644	60129	108000	OK
J16	64211	65141	59722	58874	56355	304303	60861	108000	OK
J17	64497	65431	60232	59630	59485	309275	61855	108000	OK
J18	72262	73309	67369	66467	71510	350917	70183	108000	OK
J19	74760	79926	67807	68329	76204	367026	73405	108000	OK
J20	72834	77275	68397	73760	99841	392107	78421	108000	OK
J21	65794	66747	62651	61058	86589	342839	68568	108000	OK
J22	65441	66388	62762	63977	103270	361838	72368	108000	OK
J23	64951	65892	61725	72478	102783	367829	73566	108000	OK
J24	81312	82490	73949	88200	125078	451029	90206	108000	OK
J25	72786	73841	66971	81303	115297	410198	82040	108000	OK
J26	77362	81132	72947	85596	121395	438432	87686	108000	OK
J27	76766	85089	74154	88565	125614	450188	90038	108000	OK
J28	74768	81382	70889	87782	124485	439306	87861	108000	OK
J29	71881	77193	67300	83488	118395	418257	83651	108000	OK
J30	70319	73180	67318	81306	115302	407425	81485	108000	OK
J31	74437	75798	68063	84654	120050	423002	84600	108000	OK
J32	65812	68450	62766	72474	102772	372274	74455	108000	OK

	stress intensity per bolt (cm4)						acceptable value	
	D-4(2)	D-4(3)	G4	D-5	total	average	ρ a(cm4)	
J1	80203	99522	73884	65867	319476	79869	108000	OK
J2	55776	67534	71735	65699	260744	65186	108000	OK
J3	60822	73815	76909	68859	280405	70101	108000	OK
J4	64152	75969	79188	71362	290671	72668	108000	OK
J5	63384	74030	77189	69180	283783	70946	108000	OK
J6	58129	67817	71472	65741	263159	65790	108000	OK
J7	55429	67259	72667	65950	261305	65326	108000	OK
J8	57584	68740	74402	66242	266968	66742	108000	OK
J9	60881	70090	75976	66547	273494	68374	108000	OK
J10	55373	67729	73260	66221	262583	65646	108000	OK
J11	57226	66630	72136	65955	261947	65487	108000	OK
J12	56148	65595	71242	65730	258715	64679	108000	OK
J13	52735	64967	70402	65597	253701	63425	108000	OK
J14	53546	64791	70002	65549	253888	63472	108000	OK
J15	53534	65028	70187	65616	254365	63591	108000	OK
J16	56355	65226	70908	65715	258204	64551	108000	OK
J17	59485	66125	71840	65966	263416	65854	108000	OK
J18	71510	73705	79715	74078	299008	74752	108000	OK
J19	76204	77784	82511	74239	310738	77685	108000	OK
J20	99841	78000	83212	74539	335592	83898	108000	OK
J21	86589	66274	74146	67061	294070	73518	108000	OK
J22	103270	65213	74494	66718	309695	77424	108000	OK
J23	102783	64899	73121	66425	307228	76807	108000	OK
J24	125078	78977	85819	76489	366363	91591	108000	OK
J25	115297	72801	78974	73836	340908	85227	108000	OK
J26	121395	76641	80717	73776	352529	88132	108000	OK
J27	125614	79307	84836	75022	364779	91195	108000	OK
J28	124485	78603	84110	74369	361567	90392	108000	OK
J29	118395	74757	80236	73786	347174	86794	108000	OK
J30	115302	72804	79344	73846	341296	85324	108000	OK
J31	120050	75802	82929	73219	352000	88000	108000	OK
J32	102772	64895	73486	66353	307506	76877	108000	OK

＜Thickness of splice plate of deck＞

	required cross-sectional area				thickness of slpice plate used(upperside)				thickness of slpice plate used(downside)			
	D-1	G1	D-2(1)	計	splice plate width	splice plate thickness	cross-section		splice plate width	splice plate thickness	cross-section	
	(cm2)	(cm2)	(cm2)	(cm2)	(mm)	(mm)	(cm2)		(mm)	(mm)	(cm2)	
J1	93.6	268.8	51.6	414.0	4925.0	9	443.3	OK	3522.0	14	493.1	OK
J2	93.6	268.8	51.6	414.0	4925.0	9	443.3	OK	3522.0	14	493.1	OK
J3	93.6	268.8	51.6	414.0	4925.0	9	443.3	OK	3522.0	14	493.1	OK
J4	93.6	268.8	51.6	414.0	4925.0	9	443.3	OK	3522.0	14	493.1	OK
J5	93.6	268.8	51.6	414.0	4925.0	9	443.3	OK	3522.0	14	493.1	OK
J6	93.6	268.8	51.6	414.0	4925.0	9	443.3	OK	3522.0	14	493.1	OK
J7	93.6	268.8	51.6	414.0	4925.0	9	443.3	OK	3522.0	14	493.1	OK
J8	81.0	234.1	45.8	360.9	4235.0	9	381.2	OK	2691.7	14	376.8	OK
J9	81.0	234.1	45.8	360.9	4235.0	9	381.2	OK	2691.7	14	376.8	OK
J10	81.0	234.1	45.8	360.9	4235.0	9	381.2	OK	2691.7	14	376.8	OK
J11	81.0	234.1	45.8	360.9	4235.0	9	381.2	OK	2691.7	14	376.8	OK
J12	81.0	234.1	45.8	360.9	4235.0	9	381.2	OK	2691.7	14	376.8	OK
J13	81.0	234.1	45.8	360.9	4235.0	9	381.2	OK	2691.7	14	376.8	OK
J14	81.0	234.1	45.8	360.9	4235.0	9	381.2	OK	2691.7	14	376.8	OK
J15	81.0	234.1	45.8	360.9	4235.0	9	381.2	OK	2691.7	14	376.8	OK
J16	81.0	234.1	45.8	360.9	4235.0	9	381.2	OK	2691.7	14	376.8	OK
J17	81.0	234.1	45.8	360.9	4235.0	9	381.2	OK	2691.7	14	376.8	OK
J18	81.0	234.1	45.8	360.9	4235.0	9	381.2	OK	2691.7	14	376.8	OK
J19	81.0	234.1	45.8	360.9	4235.0	9	381.2	OK	2691.7	14	376.8	OK
J20	81.0	234.1	45.8	360.9	4235.0	9	381.2	OK	2691.7	14	376.8	OK
J21	81.0	234.1	45.8	360.9	4235.0	9	381.2	OK	2691.7	14	376.8	OK
J22	81.0	234.1	45.8	360.9	4235.0	9	381.2	OK	2691.7	14	376.8	OK
J23	93.6	268.8	51.6	414.0	4925.0	9	443.3	OK	3522.0	14	493.1	OK
J24	93.6	268.8	51.6	414.0	4925.0	9	443.3	OK	3522.0	14	493.1	OK
J25	93.6	268.8	51.6	414.0	4925.0	9	443.3	OK	3522.0	14	493.1	OK
J26	93.6	268.8	51.6	414.0	4925.0	9	443.3	OK	3522.0	14	493.1	OK
J27	93.6	268.8	51.6	414.0	4925.0	9	443.3	OK	3522.0	14	493.1	OK
J28	93.6	268.8	51.6	414.0	4925.0	9	443.3	OK	3522.0	14	493.1	OK
J29	93.6	268.8	51.6	414.0	4925.0	9	443.3	OK	3522.0	14	493.1	OK
J30	93.6	268.8	51.6	414.0	4925.0	9	443.3	OK	3522.0	14	493.1	OK
J31	93.6	268.8	51.6	414.0	4925.0	9	443.3	OK	3522.0	14	493.1	OK
J32	93.6	268.8	51.6	414.0	4925.0	9	443.3	OK	3522.0	14	493.1	OK

	required cross-sectional area						thickness of slpice plate used(upperside)				thickness of slpice plate used(downside)			
	D-2(2)	D-2(3)	G2	D-3(1)	D-3(2)/2	計	splice plate width	splice plate thickness	cross-section		splice plate width	splice plate thickness	cross-section	
	(cm2)	(cm2)	(cm2)	(cm2)	(cm2)	(cm2)	(mm)	(mm)	(cm2)		(mm)	(mm)	(cm2)	
J1	14.6	37.0	244.8	61.6	68.3	426.3	5198.0	9	467.8	OK	4097.0	14	573.6	OK
J2	14.6	37.0	244.8	61.6	68.3	426.3	5198.0	9	467.8	OK	4097.0	14	573.6	OK
J3	14.6	37.0	244.8	61.6	68.3	426.3	5198.0	9	467.8	OK	4097.0	14	573.6	OK
J4	14.6	37.0	244.8	61.6	68.3	426.3	5198.0	9	467.8	OK	4097.0	14	573.6	OK
J5	14.6	37.0	244.8	61.6	68.3	426.3	5198.0	9	467.8	OK	4097.0	14	573.6	OK
J6	14.6	37.0	244.8	61.6	68.3	426.3	5198.0	9	467.8	OK	4097.0	14	573.6	OK
J7	14.6	37.0	244.8	61.6	68.3	426.3	5198.0	9	467.8	OK	4097.0	14	573.6	OK
J8	13.9	31.9	205.5	52.4	58.7	362.4	4384.1	9	394.6	OK	3173.0	14	444.2	OK
J9	13.9	31.9	205.5	52.4	58.7	362.4	4384.1	9	394.6	OK	3173.0	14	444.2	OK
J10	13.9	31.9	205.5	52.4	58.7	362.4	4384.1	9	394.6	OK	3173.0	14	444.2	OK
J11	13.9	31.9	205.5	52.4	58.7	362.4	4384.1	9	394.6	OK	3173.0	14	444.2	OK
J12	13.9	31.9	205.5	52.4	58.7	362.4	4384.1	9	394.6	OK	3173.0	14	444.2	OK
J13	13.9	31.9	205.5	52.4	58.7	362.4	4384.1	9	394.6	OK	3173.0	14	444.2	OK
J14	13.9	31.9	205.5	52.4	58.7	362.4	4384.1	9	394.6	OK	3173.0	14	444.2	OK
J15	13.9	31.9	205.5	52.4	58.7	362.4	4384.1	9	394.6	OK	3173.0	14	444.2	OK
J16	13.9	31.9	205.5	52.4	58.7	362.4	4384.1	9	394.6	OK	3173.0	14	444.2	OK
J17	13.9	31.9	205.5	52.4	58.7	362.4	4384.1	9	394.6	OK	3173.0	14	444.2	OK
J18	13.9	31.9	205.5	52.4	58.7	362.4	4384.1	9	394.6	OK	3173.0	14	444.2	OK
J19	13.9	31.9	205.5	52.4	58.7	362.4	4384.1	9	394.6	OK	3173.0	14	444.2	OK
J20	13.9	31.9	205.5	52.4	58.7	362.4	4384.1	9	394.6	OK	3173.0	14	444.2	OK
J21	13.9	31.9	205.5	52.4	58.7	362.4	4384.1	9	394.6	OK	3173.0	14	444.2	OK
J22	13.9	31.9	205.5	52.4	58.7	362.4	4384.1	9	394.6	OK	3173.0	14	444.2	OK
J23	14.6	37.0	244.8	61.6	68.3	426.3	5198.0	9	467.8	OK	4097.0	14	573.6	OK
J24	14.6	37.0	244.8	61.6	68.3	426.3	5198.0	9	467.8	OK	4097.0	14	573.6	OK
J25	14.6	37.0	244.8	61.6	68.3	426.3	5198.0	9	467.8	OK	4097.0	14	573.6	OK
J26	14.6	37.0	244.8	61.6	70.5	428.5	5225.5	9	470.3	OK	4132.0	14	578.5	OK
J27	14.6	37.0	244.8	61.6	83.4	441.4	5386.5	9	484.8	OK	4259.5	14	596.3	OK
J28	14.6	37.0	244.8	61.6	97.7	455.7	5535.0	9	498.2	OK	4384.5	14	613.8	OK
J29	14.6	37.0	244.8	61.6	111.9	469.9	5711.5	9	514.0	OK	4549.5	14	636.9	OK
J30	14.6	37.0	244.8	61.6	128.8	486.8	5921.5	9	532.9	OK	4694.5	14	657.2	OK
J31	14.6	37.0	244.8	61.6	145.2	503.2	6127.5	9	551.5	OK	4869.5	14	681.7	OK
J32	14.6	37.0	244.8	61.6	155.5	513.5	6256.5	9	563.1	OK	5004.5	14	700.6	OK

	required cross-sectional area						thickness of slpice plate used(upperside)				thickness of slpice plate used(downside)			
	D-3(2)/2	D-3(3)	G3	D-4(1)	D-4(2)/2	計	splice plate width	splice plate thickness	cross-section		splice plate width	splice plate thickness	cross-section	
	(cm2)	(cm2)	(cm2)	(cm2)	(cm2)	(cm2)	(mm)	(mm)	(cm2)		(mm)	(mm)	(cm2)	
J1	68.3	37.0	244.8	75.1	242.1	667.3	8091.0	9	728.2	OK	6797.0	14	951.6	OK
J2	68.3	37.0	244.8	75.1	225.2	650.4	7884.0	9	709.6	OK	6592.0	14	922.9	OK
J3	68.3	37.0	244.8	75.1	209.4	634.6	7722.0	9	695.0	OK	6389.5	14	894.5	OK
J4	68.3	37.0	244.8	75.1	195.1	620.3	7543.0	9	678.9	OK	6207.0	14	869.0	OK
J5	68.3	37.0	244.8	75.1	182.0	607.2	7384.0	9	664.6	OK	6057.0	14	848.0	OK
J6	68.3	37.0	244.8	75.2	170.3	595.6	7238.5	9	651.5	OK	5927.0	14	829.8	OK
J7	68.3	37.0	244.8	75.2	160.0	585.3	7108.0	9	639.7	OK	5882.0	14	823.5	OK
J8	58.7	31.9	205.5	62.9	123.2	482.1	5804.7	9	522.4	OK	4457.2	14	624.0	OK
J9	58.7	31.9	205.5	62.9	119.3	478.3	5789.9	9	521.1	OK	4355.5	14	609.8	OK
J10	58.7	31.9	205.5	62.9	113.1	472.0	5711.2	9	514.0	OK	4374.7	14	612.5	OK
J11	58.7	31.9	205.5	62.9	111.1	470.0	5686.5	9	511.8	OK	4319.7	14	604.8	OK
J12	58.7	31.9	205.5	62.9	107.3	466.2	5639.2	9	507.5	OK	4275.7	14	598.6	OK
J13	58.7	31.9	205.5	62.9	102.9	461.9	5581.4	9	502.3	OK	4273.0	14	598.2	OK
J14	58.7	31.9	205.5	62.9	102.3	461.3	5577.0	9	501.9	OK	4262.0	14	596.7	OK
J15	58.7	31.9	205.5	62.9	101.8	460.8	5570.4	9	501.3	OK	4262.0	14	596.7	OK
J16	58.7	31.9	205.5	62.9	95.7	454.6	5494.0	9	494.5	OK	4121.7	14	577.0	OK
J17	58.7	31.9	205.5	62.7	76.4	435.2	5257.5	9	473.2	OK	3932.0	14	550.5	OK
J18	58.7	31.9	205.5	62.7	57.5	416.2	5006.7	9	450.6	OK	3720.2	14	520.8	OK
J19	58.7	31.9	205.5	62.7	41.2	399.9	4854.3	9	436.9	OK	3613.0	14	505.8	OK
J20	58.7	31.9	205.5	53.1	33.0	382.1	4631.0	9	416.8	OK	3327.0	14	465.8	OK
J21	58.7	31.9	205.5	50.9	16.9	363.8	4403.3	9	396.3	OK	3214.2	14	450.0	OK
J22	58.7	31.9	205.5	46.6	7.0	349.6	4225.7	9	380.3	OK	3082.2	14	431.5	OK
J23	68.3	37.0	244.8	51.6	7.3	409.0	4981.5	9	448.3	OK	3897.0	14	545.6	OK
J24	68.3	37.0	244.8	51.6	7.3	409.0	4981.5	9	448.3	OK	3897.0	14	545.6	OK
J25	68.3	37.0	244.8	51.6	7.3	409.0	4981.5	9	448.3	OK	3897.0	14	545.6	OK
J26	70.5	37.0	244.8	51.6	7.3	411.2	5009.0	9	450.8	OK	3932.0	14	550.5	OK
J27	83.4	37.0	244.8	51.6	7.3	424.1	5170.0	9	465.3	OK	4059.5	14	568.3	OK
J28	97.7	37.0	244.8	51.6	7.3	438.4	5318.5	9	478.7	OK	4184.5	14	585.8	OK
J29	111.9	37.0	244.8	51.6	7.3	452.6	5495.0	9	494.6	OK	4349.5	14	608.9	OK
J30	128.8	37.0	244.8	51.6	7.3	469.5	5705.0	9	513.5	OK	4494.5	14	629.2	OK
J31	145.2	37.0	244.8	51.6	7.3	485.9	5911.0	9	532.0	OK	4669.5	14	653.7	OK
J32	155.5	37.0	244.8	51.6	7.3	496.2	6040.0	9	543.6	OK	4804.5	14	672.6	OK

	required cross-sectional area					thickness of slpice plate used(upperside)				thickness of slpice plate used(downside)			
	D-4(2)/2	D-4(3)	G4	D-5	計	splice plate width	splice plate thickness	cross-section		splice plate width	splice plate thickness	cross-section	
	(cm2)	(cm2)	(cm2)	(cm2)	(cm2)	(mm)	(mm)	(cm2)		(mm)	(mm)	(cm2)	
J1	242.1	37.0	268.8	93.6	641.5	7656.0	9	689.0	OK	6052.0	14	847.3	OK
J2	225.2	37.0	268.8	93.6	624.6	7449.0	9	670.4	OK	5847.0	14	818.6	OK
J3	209.4	37.0	268.8	93.6	608.8	7287.0	9	655.8	OK	5644.5	14	790.2	OK
J4	195.1	37.0	268.8	93.6	594.5	7108.0	9	639.7	OK	5462.0	14	764.7	OK
J5	182.0	37.0	268.8	93.6	581.4	6949.0	9	625.4	OK	5312.0	14	743.7	OK
J6	170.3	37.0	268.8	93.6	569.7	6802.5	9	612.2	OK	5182.0	14	725.5	OK
J7	160.0	37.0	268.8	93.6	559.4	6672.0	9	600.5	OK	5137.0	14	719.2	OK
J8	123.2	31.9	236.3	81.0	472.4	5558.9	9	500.3	OK	3871.5	14	542.0	OK
J9	119.3	31.9	236.3	81.0	468.5	5544.0	9	499.0	OK	3769.7	14	527.8	OK
J10	113.1	31.9	236.3	81.0	462.3	5465.4	9	491.9	OK	3789.0	14	530.5	OK
J11	111.1	31.9	236.3	81.0	460.3	5440.6	9	489.7	OK	3734.0	14	522.8	OK
J12	107.3	31.9	236.3	81.0	456.5	5393.3	9	485.4	OK	3690.0	14	516.6	OK
J13	102.9	31.9	236.3	81.0	452.1	5335.6	9	480.2	OK	3687.2	14	516.2	OK
J14	102.3	31.9	236.3	81.0	451.5	5331.2	9	479.8	OK	3676.2	14	514.7	OK
J15	101.8	31.9	236.3	81.0	451.0	5324.6	9	479.2	OK	3676.2	14	514.7	OK
J16	95.7	31.9	236.3	81.0	444.9	5248.1	9	472.3	OK	3536.0	14	495.0	OK
J17	76.4	31.9	236.3	81.0	425.6	5013.8	9	451.2	OK	3346.2	14	468.5	OK
J18	57.5	31.9	236.3	81.0	406.7	4764.1	9	428.8	OK	3134.5	14	438.8	OK
J19	41.2	31.9	236.3	81.0	390.4	4610.7	9	415.0	OK	3027.2	14	423.8	OK
J20	33.0	31.9	236.3	81.0	382.2	4508.4	9	405.8	OK	2862.2	14	400.7	OK
J21	16.9	31.9	236.3	81.0	366.1	4307.1	9	387.6	OK	2782.5	14	389.5	OK
J22	7.0	31.9	236.3	80.9	356.1	4183.3	9	376.5	OK	2700.0	14	378.0	OK
J23	7.3	37.0	268.8	93.6	406.7	4841.5	9	435.7	OK	3492.0	14	488.9	OK
J24	7.3	37.0	268.8	93.6	406.7	4841.5	9	435.7	OK	3492.0	14	488.9	OK
J25	7.3	37.0	268.8	93.6	406.7	4841.5	9	435.7	OK	3492.0	14	488.9	OK
J26	7.3	37.0	268.8	93.6	406.7	4841.5	9	435.7	OK	3492.0	14	488.9	OK
J27	7.3	37.0	268.8	93.6	406.7	4841.5	9	435.7	OK	3492.0	14	488.9	OK
J28	7.3	37.0	268.8	93.6	406.7	4841.5	9	435.7	OK	3492.0	14	488.9	OK
J29	7.3	37.0	268.8	93.6	406.7	4841.5	9	435.7	OK	3492.0	14	488.9	OK
J30	7.3	37.0	268.8	93.6	406.7	4841.5	9	435.7	OK	3492.0	14	488.9	OK
J31	7.3	37.0	268.8	93.6	406.7	4841.5	9	435.7	OK	3492.0	14	488.9	OK
J32	7.3	37.0	268.8	93.6	406.7	4841.5	9	435.7	OK	3492.0	14	488.9	OK

4．7．3．Calculation of web and bottom flange

Design policy

Stress check method for joints on tensile flange and longitudinal ribs without bolt hole area

Checking formula：$\sigma tn=\sigma tmax*Ag/An \leqq \sigma ta$

Where
σtn ：Acting stress without bolt hole area
$\sigma tmax$：Acting stress
Ag ：Gross section area (Flange section area + longitudinal rib section area)
An ：Net section area (Flange section area without bolt hole area + longitudinal rib section area without bolt holes)
σta ：Allowable tensile stress

Required number of bolts for tensile flange and longitudinal ribs

$\sigma tn=\sigma tmax*Ag/An$
When $\sigma tn \geqq 0.75\sigma ta$ $\sigma t=\sigma tn$
When $\sigma tn < 0.75\sigma ta$ $\sigma t=0.75\sigma ta$
Required number of bolts $\sigma t*AnS/\rho a$

Where
$0.75\sigma ta$ ：75% of allowable stress
σt :Design tensile stress for bolts
AnS ：Net area of flange and longitudinal ribs respectively

(1) G1　J-1(Sec-1)　LWEB

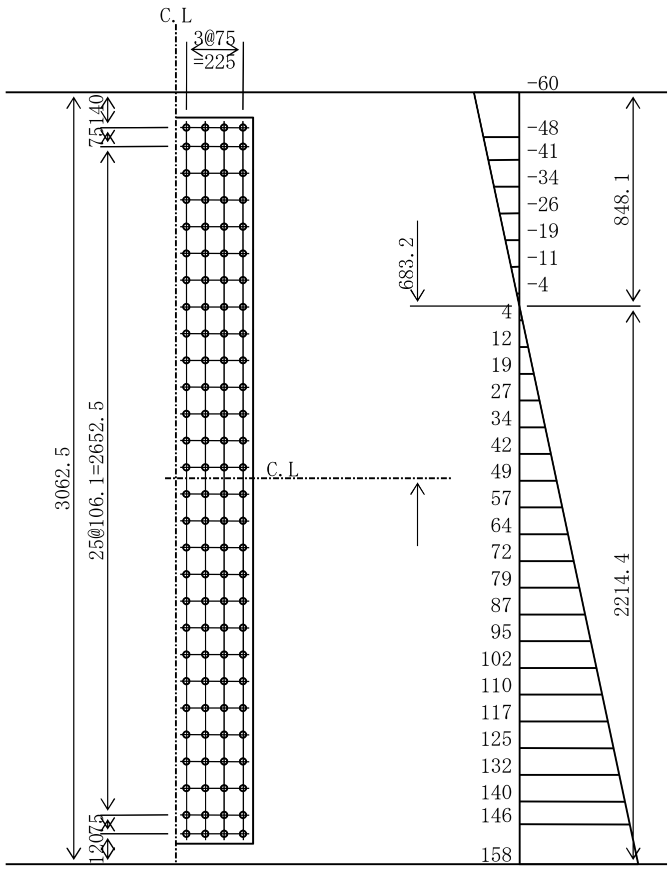
(a) Section area of main plate (Web plate)

1-LWEB　PL　3062 * 15　　A =　459.4 cm^2　　　(SM490Y)

(b) Design stress

σU =　 -46 N/mm^2 ＜ σa * 0.75 =　 210 * 0.75 =　 158 N/mm^2
σL =　 121 N/mm^2 ＜ σa * 0.75 =　 210 * 0.75 =　 158 N/mm^2
σUn =　 158 *　 46 /　 121 =　　60 N/mm^2
σLn =　 158 N/mm^2
τ　 =　　37 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row
　Sharing width:　 b1 = 15.8 cm
　Total force to be shared
　　P1 =　 158 *　15 * (　146 +　158) / 2 =　358861 N
　Required bolt number (Bolt number to be used)
　　N1 =　358861 / (108000 * 1.00) = 3.3 pcs.　(4 bolts will be used.)

Check of shear force
　$\rho s = \tau * A / 112$ =　 37 *　 45937 / 112 =　 15131 N ＜ ρa =　108000 N
Combined stress
　$\rho c28 = \sqrt{((358861 / 4)^2 + 15131^2)}$ =　 90982 N ＜ ρa =　108000 N
(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2882 ＊ 9 　 As = 518.8 cm^2 (SM490Y)

Moment of inertia of splice plates 　 Is = 6085488 cm^4 ＞ Iw

Moment of inertia of web plate 　 Iw = 5734340 cm^4

Bending moment to be shared by the web

$Mw = 158 * 5734340*10^4 / 2214 = 4079*10^6$ N･mm

Bending stress of splice plates

$\sigma sp = 4079*10^6 / (6085488*10^4) * 2134 = 143$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(2) G1 J-1(Sec-1) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2730 * 15   A = 409.5 cm^2 (SM490Y)

(b) Design stress

σU = -50 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

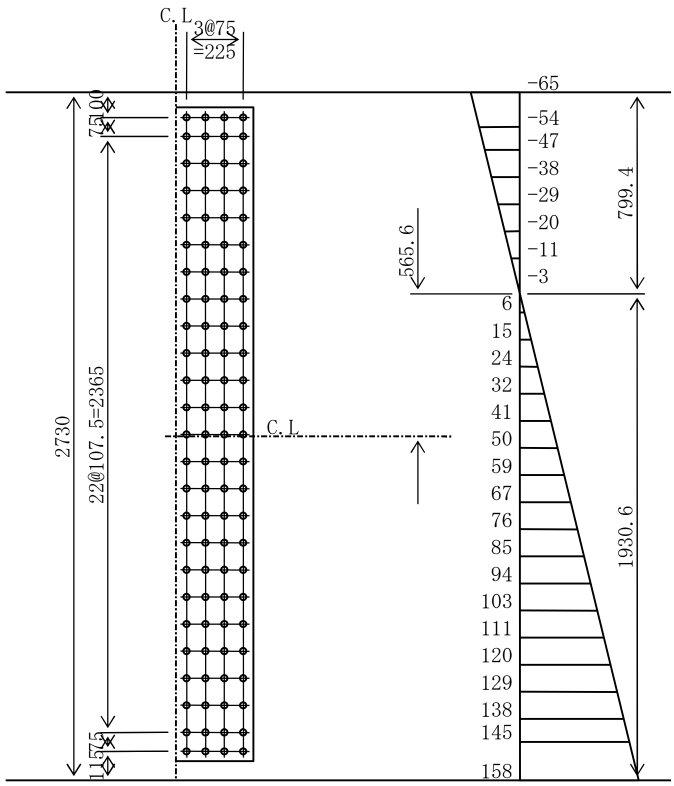
σL = 121 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 50 / 121 = 65 N/mm^2

σLn = 158 N/mm^2

τ = 36 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (145 + 158) / 2 = 346052 N

Required bolt number (Bolt number to be used)

N1 = 346052 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

$\rho s = \tau * A / 100$ = 36 * 40950 / 100 = 14796 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((346052 / 4)^2 + 14796^2)}$ = 87769 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2595 ＊ 9 As = 467.1 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4076280 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3853447 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ 3853447*10^4 / 1931 = 3144*10^6 N·mm

Bending stress of splice plates

σsp = 3144*10^6 / (4076280*10^4) ＊ 1856 = 143 N/mm^2 ＜ σa = 210 N/mm^2

(3) G1 J-1(Sec-1) LFLG

(a) Acting stress

σ tmax = 122 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

τ max = 32 N/mm^2

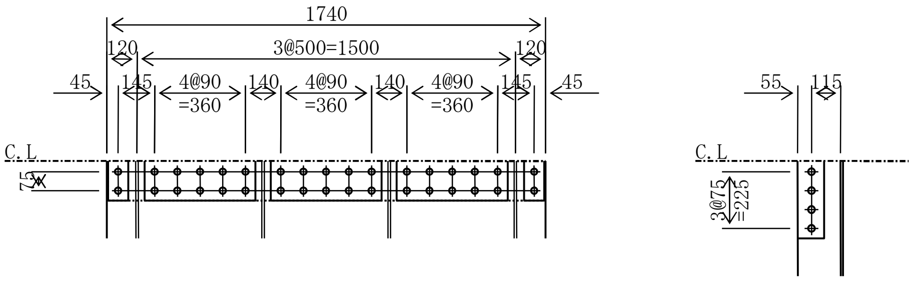
(b) Section area of main plate

1-LFLG PL 1740 * 10 Ag = 174.0 cm^2 (SM490Y)

2-RIB PL 170 * 17 Agr = 57.8 cm^2 (SM490Y)

ΣAg = Ag + Agr = 174.0 + 57.8 = 231.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 10 A = 174.0

(174.0 - (17* 2.5)* 1.0) * 1.1 = 144.7 < 174.0 ∴An = 144.7 cm^2

2-RIB PL 170 * 17 Ar = 57.8

(57.8 - 2*(1* 2.7)* 1.7) * 1.1 = 53.5 < 57.8 ∴Anr = 53.5 cm^2

ΣAn = An + Anr = 144.7 + 53.5 = 198.1 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 122 * 231.8 / 198.1 = 142 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 158 * 14465 / 1.1 = 2071125 N

> σ tn * An = 142 * 14465 = 2058209 N

・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 158 * 5348 / 1.1 = 765765 N

> σ tn * Anr = 142 * 5348 = 760989 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 144.7 / 2 = 72.3 cm^2

・Rib AnrR = Anr = 53.5 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 2071125 / 108000 = 19.2 pcs. (34 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 765765 / 108000 = 7.1 pcs. (2 @ 4 = 8 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(h) Tensile force per one bolt

ρ p = Pt / 34 = 2071125 / 34 = 60915 N

ρ s = τ * Ag / 34 = 32 * 17400 / 34 = 16426 N

ρ = $\sqrt{}$(ρ p^2 + ρ s^2) = $\sqrt{}$(60915^2 + 16426^2) = 63091 N < ρ a = 108000 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
2-SPL PL	80 * 9	(14.4 -	2*(1*2.5)* 0.9)*1.1=	10.9<	14.4	∴ 10.9
3-SPL PL	440 * 9	(118.8 -	3*(5*2.5)* 0.9)*1.1=	93.6<	118.8	∴ 93.6
		133.2				104.4 > AnR
1-SPL PL	1730 * 9	(155.7 -	(17*2.5)* 0.9)*1.1=	129.2<	155.7	∴129.2 > AnR
4-SPL PL	100 * 17	(68.0 -	4*(1*2.7)* 1.7)*1.1=	54.6<	68.0	∴ 54.6 >AnrR

(4) G1 J-2(Sec-2) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 3062 * 15 A = 459.4 cm^2 (SM490Y)

(b) Design stress

σU = -79 N/mm^2 ＜ σa * 0.75 = 210 * 0.75 = 158 N/mm^2

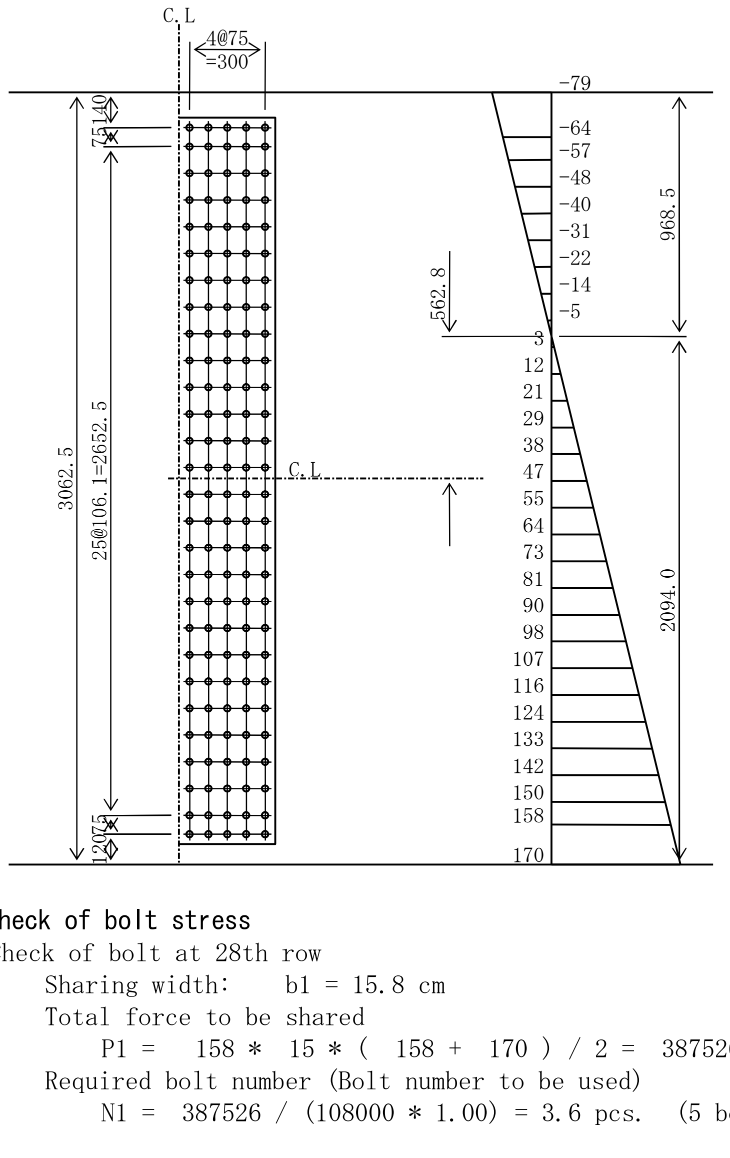
σL = 170 N/mm^2 ＞ σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 79 N/mm^2

σLn = 170 N/mm^2

τ = 28 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 15 * (158 + 170) / 2 = 387526 N

Required bolt number (Bolt number to be used)

N1 = 387526 / (108000 * 1.00) = 3.6 pcs. (5 bolts will be used.)

Check of shear force

$\rho s = \tau * A / 140$ = 28 * 45937 / 140 = 9069 N ＜ ρa = 108000 N

Combined stress

$\rho c28 = \sqrt{((387526 / 5)^2 + 9069^2)}$ = 78034 N ＜ ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 5 unites)

(e) Check of splice plates

2-SPL PL 2882 ＊ 9 As = 518.8 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 5294586 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 5045161 cm^4

Bending moment to be shared by the web

Mw = 170 ＊ 5045161*10^4 / 2094 = 4107*10^6 N･mm

Bending stress of splice plates

σsp = 4107*10^6 / (5294586*10^4) ＊ 2014 = 156 N/mm^2 ＜ σa = 210 N/mm^2

(5) G1 J-2(Sec-2) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2730 * 15 A = 409.5 cm^2 (SM490Y)

(b) Design stress

σU = -84 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

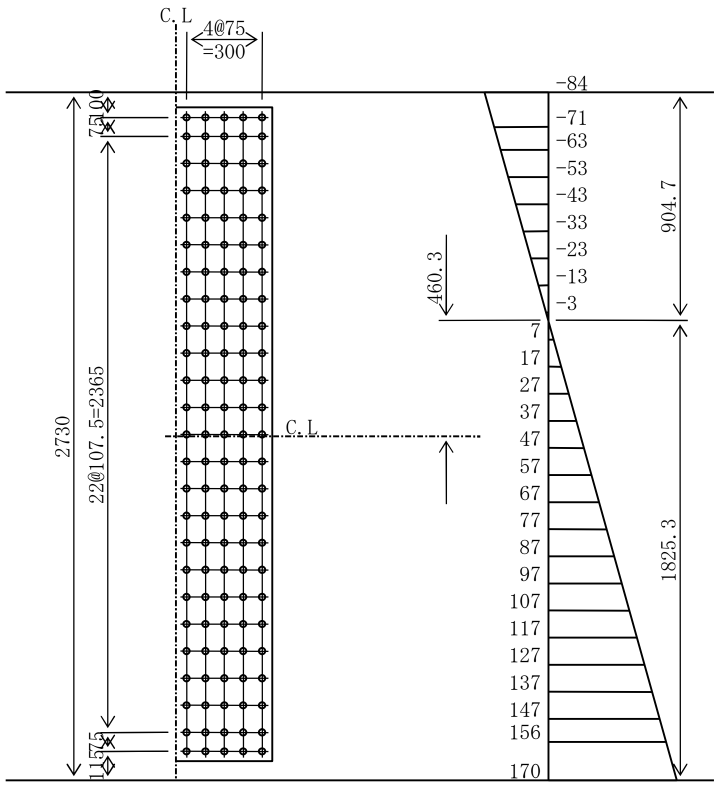
σL = 170 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 84 N/mm^2

σLn = 170 N/mm^2

τ = 27 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (156 + 170) / 2 = 372880 N

Required bolt number (Bolt number to be used)

N1 = 372880 / (108000 * 1.00) = 3.5 pcs. (5 bolts will be used.)

Check of shear force

ρs = τ * A / 125 = 27 * 40950 / 125 = 8937 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((372880 / 5)^2 + 8937^2)}$ = 75110 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 5 unites)

(e) Check of splice plates

2-SPL PL 2595 ＊ 9 As = 467.1 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3578998 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3411018 cm^4

Bending moment to be shared by the web

$Mw = 170 * 3411018*10^4 / 1825 = 3179*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 3179*10^6 / (3578998*10^4) * 1750 = 155$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(6) G1 J-2(Sec-2) LFLG

(a) Acting stress

σ tmax = 172 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

τ max = 15 N/mm^2

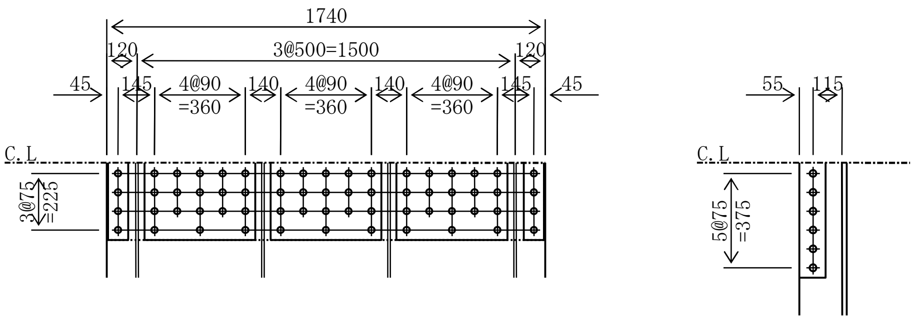
(b) Section area of main plate

1-LFLG PL 1740 * 18 Ag = 313.2 cm^2 (SM490Y)

2-RIB PL 170 * 17 Agr = 57.8 cm^2 (SM490Y)

ΣAg = Ag + Agr = 313.2 + 57.8 = 371.0 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 18 A = 313.2

(313.2 - (11* 2.5)* 1.8) * 1.1 = 290.1 < 313.2 ∴An = 290.1 cm^2

2-RIB PL 170 * 17 Ar = 57.8

(57.8 - 2*(1* 2.7)* 1.7) * 1.1 = 53.5 < 57.8 ∴Anr = 53.5 cm^2

ΣAn = An + Anr = 290.1 + 53.5 = 343.6 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 172 * 371.0 / 343.6 = 186 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 186 * 29007 = 5381582 N

> 0.75 σ ta * An / 1.1 = 158 * 29007 / 1.1 = 4153275 N

・Rib Ptr = σ tn * Anr = 186 * 5348 = 992235 N

> 0.75 σ ta * Anr/ 1.1 = 158 * 5348 / 1.1 = 765765 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 290.1 / 2 = 145.0 cm^2

・Rib AnrR = Anr = 53.5 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 5381582 / 108000 = 49.8 pcs. (62 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 992235 / 108000 = 9.2 pcs. (2 @ 6 = 12 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 4,6 unites)

(h) Tensile force per one bolt

ρ p = Pt / 62 = 5381582 / 62 = 86800 N

ρ s = τ * Ag / 62 = 15 * 31320 / 62 = 7710 N

ρ = $\sqrt{}$(ρ p^2 + ρ s^2) = $\sqrt{}$(86800^2 + 7710^2) = 87141 N < ρ a = 108000 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 13	(20.8 -	2*(1*2.5)* 1.3)*1.1= 15.7＜	20.8	∴ 15.7
3-SPL PL	440 * 13	(171.6 -	3*(5*2.5)* 1.3)*1.1= 135.1＜	171.6	∴135.1
		192.4			150.9 ＞ AnR
1-SPL PL	1730 * 11	(190.3 -	(17*2.5)* 1.1)*1.1= 157.9＜	190.3	∴157.9 ＞ AnR
4-SPL PL	100 * 17	(68.0 -	4*(1*2.7)* 1.7)*1.1= 54.6＜	68.0	∴ 54.6 ＞AnrR

(7) G1 J-3(Sec-3) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 3062 * 15 A = 459.4 cm^2 (SM490Y)

(b) Design stress

σU = -94 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

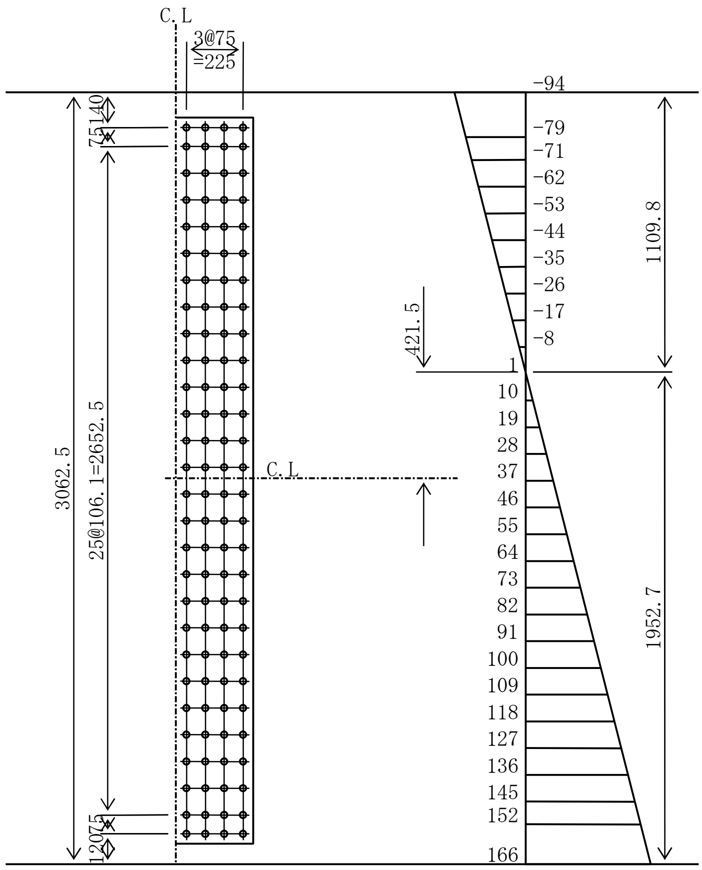
σL = 166 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 94 N/mm^2

σLn = 166 N/mm^2

τ = 17 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 15 * (152 + 166) / 2 = 375505 N

Required bolt number (Bolt number to be used)

N1 = 375505 / (108000 * 1.00) = 3.5 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 112 = 17 * 45937 / 112 = 6769 N < ρa = 108000 N

Combined stress

$\rho c28 = \sqrt{((375505 / 4)^2 + 6769^2)}$ = 94120 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2882 * 9 As = 518.8 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4558498 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4406428 cm^4

Bending moment to be shared by the web

$Mw = 166 * 4406428*10^4 / 1953 = 3737*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 3737*10^6 / (4558498*10^4) * 1873 = 154$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(8) G1 J-3(Sec-3) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2730 * 15 A = 409.5 cm^2 (SM490Y)

(b) Design stress

σU = -100 N/mm^2 ＜ σa * 0.75 = 210 * 0.75 = 158 N/mm^2

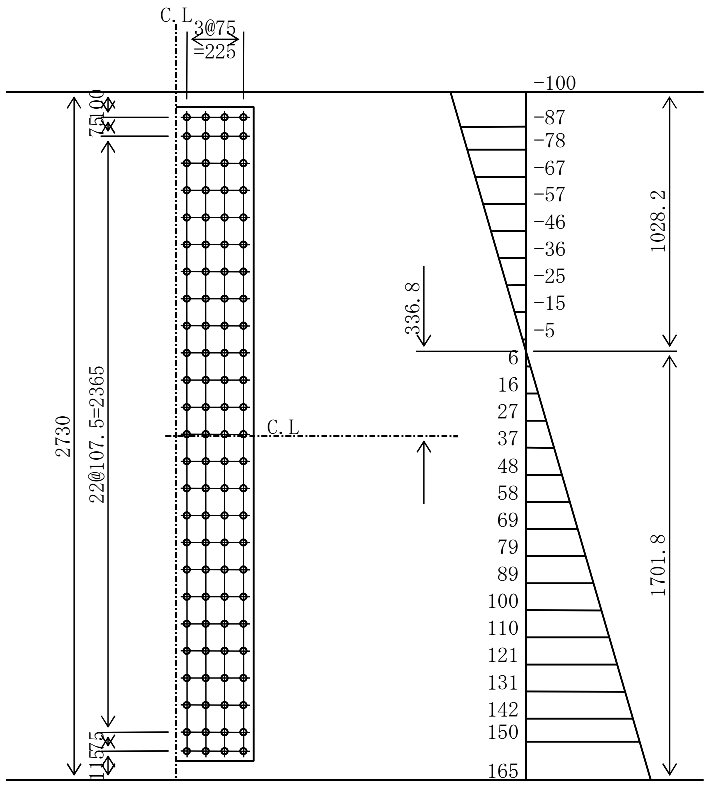
σL = 165 N/mm^2 ＞ σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 100 N/mm^2

σLn = 165 N/mm^2

τ = 16 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (150 + 165) / 2 = 361123 N

Required bolt number (Bolt number to be used)

N1 = 361123 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 16 * 40950 / 100 = 6703 N ＜ ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((361123 / 4)^2 + 6703^2)}$ = 90529 N ＜ ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.：Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2595 ＊ 9 As = 467.1 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3127721 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3007802 cm^4

Bending moment to be shared by the web

Mw = 165 ＊ 3007802*10^4 / 1702 = 2921*10^6 N･mm

Bending stress of splice plates

σsp = 2921*10^6 / (3127721*10^4) ＊ 1627 = 152 N/mm^2 ＜ σa = 210 N/mm^2

(9) G1 J-3(Sec-3) LFLG

(a) Acting stress

$\sigma tmax$ = 168 N/mm^2 0.75 σta = 0.75 ∗ 210 = 158 N/mm^2

τmax = 7 N/mm^2

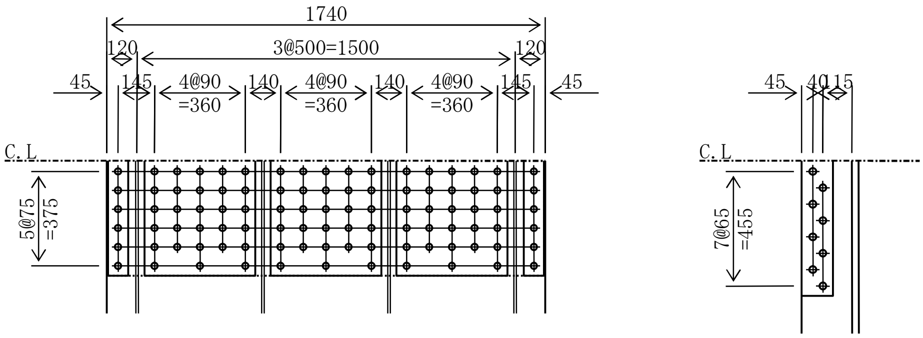
(b) Section area of main plate

1-LFLG PL 1740 ∗ 27 Ag = 469.8 cm^2 (SM490Y)

2-RIB PL 200 ∗ 22 Agr = 88.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 469.8 + 88.0 = 557.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 ∗ 27 A = 469.8

(469.8 - (11∗ 2.5)∗ 2.7) ∗ 1.1 = 435.1 < 469.8 ∴An = 435.1 cm^2

2-RIB PL 200 ∗ 22 Ar = 88.0

(88.0 - 2∗(1∗ 2.7+ 1∗0.059)∗ 2.2) ∗ 1.1 = 83.4 < 88.0 ∴Anr = 83.4 cm^2

ΣAn = An + Anr = 435.1 + 83.4 = 518.5 cm^2

σtn = $\sigma tmax$ ∗ ΣAg / ΣAn = 168 ∗ 557.8 / 518.5 = 181 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σtn ∗ An = 181 ∗ 43511 = 7858566 N

> 0.75 σta ∗ An / 1.1 = 158 ∗ 43511 / 1.1 = 6229912 N

・Rib Ptr = σtn ∗ Anr = 181 ∗ 8344 = 1507119 N

> 0.75 σta ∗ Anr/ 1.1 = 158 ∗ 8344 / 1.1 = 1194775 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 435.1 / 2 = 217.6 cm^2

・Rib AnrR = Anr = 83.4 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 ∗ 1.00) = 7858566 / 108000 = 72.8 pcs. (96 bolts will be used.)

・Rib nr = Ptr / (108000 ∗ 1.00) = 1507119 / 108000 = 14.0 pcs. (2 @ 8 = 16 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 6,8 unites)

(h) Tensile force per one bolt

ρp = Pt / 96 = 7858566 / 96 = 81860 N

ρs = τ ∗ Ag / 96 = 7 ∗ 46980 / 96 = 3356 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(81860^2 + 3356^2)}$ = 81929 N < ρa = 108000 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
2-SPL PL	80 * 19	(30.4 -	2*(1*2.5)* 1.9)*1.1=	23.0＜	30.4	∴ 23.0
3-SPL PL	440 * 19	(250.8 -	3*(5*2.5)* 1.9)*1.1=	197.5＜	250.8	∴197.5
		281.2				220.5 ＞ AnR
1-SPL PL	1730 * 16	(276.8 -	(17*2.5)* 1.6)*1.1=	229.7＜	276.8	∴229.7 ＞ AnR
4-SPL PL	120 * 21	(100.8 -	4*(1*2.7+ 1*0.059)* 2.1)*1.1=	85.4＜	100.8	∴ 85.4 ＞AnrR

(10) G1 J-4(Sec-5) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 3062 * 15 A = 459.4 cm^2 (SM490Y)

(b) Design stress

σU = -99 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

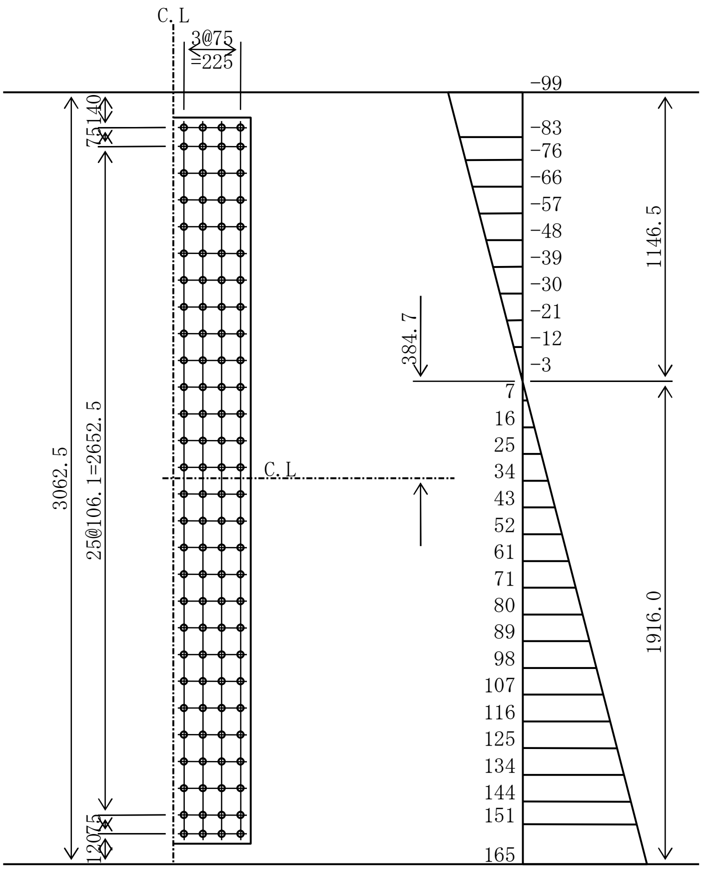
σL = 165 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 99 N/mm^2

σLn = 165 N/mm^2

τ = 9 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 15 * (151 + 165) / 2 = 373641 N

Required bolt number (Bolt number to be used)

N1 = 373641 / (108000 * 1.00) = 3.5 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 112 = 9 * 45937 / 112 = 3525 N < ρa = 108000 N

Combined stress

$\rho c28$ = $\sqrt{((373641 / 4)^2 + 3525^2)}$ = 93477 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2882 ＊ 9 As = 518.8 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4400894 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4270268 cm^4

Bending moment to be shared by the web

Mw = 165 ＊ 4270268*10^4 / 1916 = 3676*10^6 N·mm

Bending stress of splice plates

σsp = 3676*10^6 / (4400894*10^4) ＊ 1836 = 153 N/mm^2 ＜ σa = 210 N/mm^2

(11) G1 J-4(Sec-5) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2730 * 15 A = 409.5 cm^2 (SM490Y)

(b) Design stress

σU = -105 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

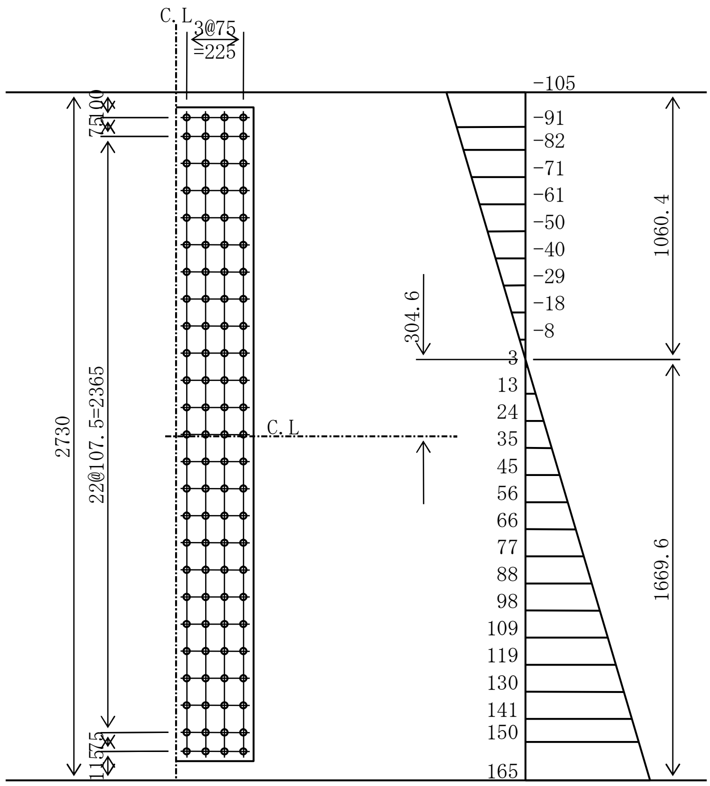
σL = 165 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 105 N/mm^2

σLn = 165 N/mm^2

τ = 9 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (150 + 165) / 2 = 359275 N

Required bolt number (Bolt number to be used)

N1 = 359275 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 9 * 40950 / 100 = 3492 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((359275 / 4)^2 + 3492^2)}$ = 89887 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2595 ＊ 9 As = 467.1 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3033639 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2923347 cm^4

Bending moment to be shared by the web

Mw = 165 ＊ 2923347*10^4 / 1670 = 2882*10^6 N･mm

Bending stress of splice plates

σsp = 2882*10^6 / (3033639*10^4) ＊ 1595 = 151 N/mm^2 ＜ σa = 210 N/mm^2

(12) G1 J-4(Sec-5) LFLG

(a) Acting stress

σ tmax = 168 N/mm² 0.75 σ ta = 0.75 * 210 = 158 N/mm²

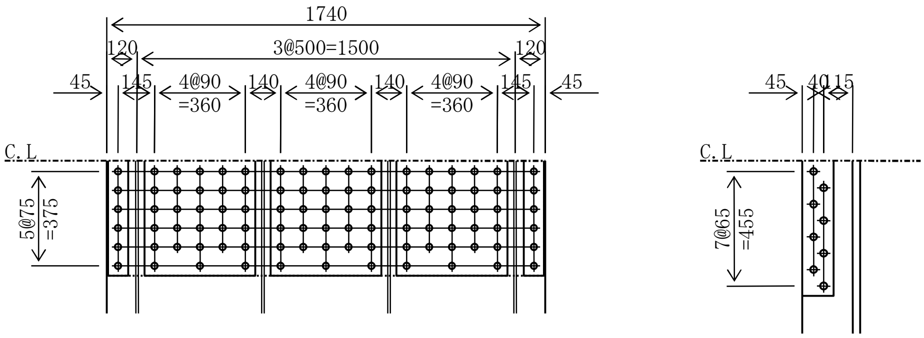
τ max = 3 N/mm²

(b) Section area of main plate

1-LFLG	PL	1740 * 30	Ag =	522.0 cm²	(SM490Y)
2-RIB	PL	200 * 22	Agr =	88.0 cm²	(SM490Y)

ΣAg = Ag + Agr = 522.0 + 88.0 = 610.0 cm²

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 30 A = 522.0

(522.0 - (11* 2.5)* 3.0) * 1.1 = 483.5 < 522.0 ∴An = 483.5 cm²

2-RIB PL 200 * 22 Ar = 88.0

(88.0 - 2*(1* 2.7+ 1*0.059)* 2.2) * 1.1 = 83.4 < 88.0 ∴Anr = 83.4 cm²

ΣAn = An + Anr = 483.5 + 83.4 = 566.9 cm²

σ tn = σ tmax * ΣAg / ΣAn = 168 * 610.0 / 566.9 = 180 N/mm²

< σ ta = 210 N/mm²

(e) Design axial force

・Main plate Pt = σ tn * An = 180 * 48345 = 8715762 N

> 0.75 σ ta * An / 1.1 = 158 * 48345 / 1.1 = 6922125 N

・Rib Ptr = σ tn * Anr = 180 * 8344 = 1504361 N

> 0.75 σ ta * Anr/ 1.1 = 158 * 8344 / 1.1 = 1194775 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 483.5 / 2 = 241.7 cm²

・Rib AnrR = Anr = 83.4 cm²

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 8715762 / 108000 = 80.7 pcs. (96 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 1504361 / 108000 = 13.9 pcs. (2 @ 8 = 16 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 6,8 unites)

(h) Tensile force per one bolt

ρp = Pt / 96 = 8715762 / 96 = 90789 N

ρs = τ * Ag / 96 = 3 * 52200 / 96 = 1748 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(90789^2 + 1748^2)}$ = 90806 N < ρa = 108000 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
2-SPL PL	80 ＊ 21	(33.6 -	2*(1*2.5)＊ 2.1)*1.1=	25.4＜	33.6	∴ 25.4
3-SPL PL	440 ＊ 21	(277.2 -	3*(5*2.5)＊ 2.1)*1.1=	218.3＜	277.2	∴218.3
		310.8				243.7 ＞ AnR
1-SPL PL	1730 ＊ 17	(294.1 -	(17*2.5)＊ 1.7)*1.1=	244.0＜	294.1	∴244.0 ＞ AnR
4-SPL PL	120 ＊ 21	(100.8 -	4*(1*2.7+ 1*0.059)＊ 2.1)*1.1=	85.4＜	100.8	∴ 85.4 ＞AnrR

(13) G1　J-5(Sec-6)　LWEB

(a) Section area of main plate (Web plate)

1-LWEB　PL　3062 * 15　　A =　459.4 cm^2　　　(SM490Y)

(b) Design stress

σU =　 -93 N/mm^2 ＜　σa * 0.75 =　 210 * 0.75 =　 158 N/mm^2

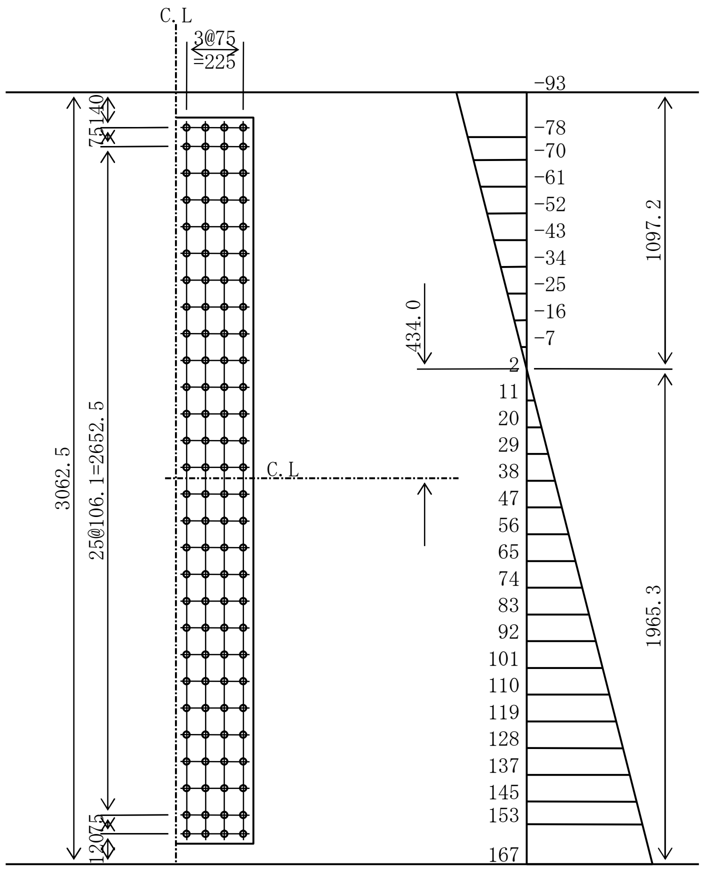
σL =　 167 N/mm^2 ＞　σa * 0.75 =　 210 * 0.75 =　 158 N/mm^2

σUn =　　93 N/mm^2

σLn =　 167 N/mm^2

τ　 =　　17 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width:　　b1 = 15.8 cm

Total force to be shared

P1 =　 158 *　15 * (　153 +　167) / 2 =　377624 N

Required bolt number (Bolt number to be used)

N1 =　377624 / (108000 * 1.00) = 3.5 pcs.　(4 bolts will be used.)

Check of shear force

ρs = τ * A / 112 =　 17 *　 45937 / 112 =　　6841 N ＜　ρa =　108000 N

Combined stress

$\rho c28$ = $\sqrt{((377624 / 4)^2 + 6841^2)}$ =　 94653 N ＜　ρa =　108000 N

(High strength friction grip bolt, S10T, M22 will be used.：Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2882 * 9 As = 518.8 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4615513 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4455755 cm^4

Bending moment to be shared by the web

Mw = 167 * 4455755*10^4 / 1965 = 3775*10^6 N·mm

Bending stress of splice plates

σsp = 3775*10^6 / (4615513*10^4) * 1885 = 154 N/mm^2 ＜ σa = 210 N/mm^2

(14) G1 J-5(Sec-6) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2730 * 15 A = 409.5 cm^2 (SM490Y)

(b) Design stress

σU = -99 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

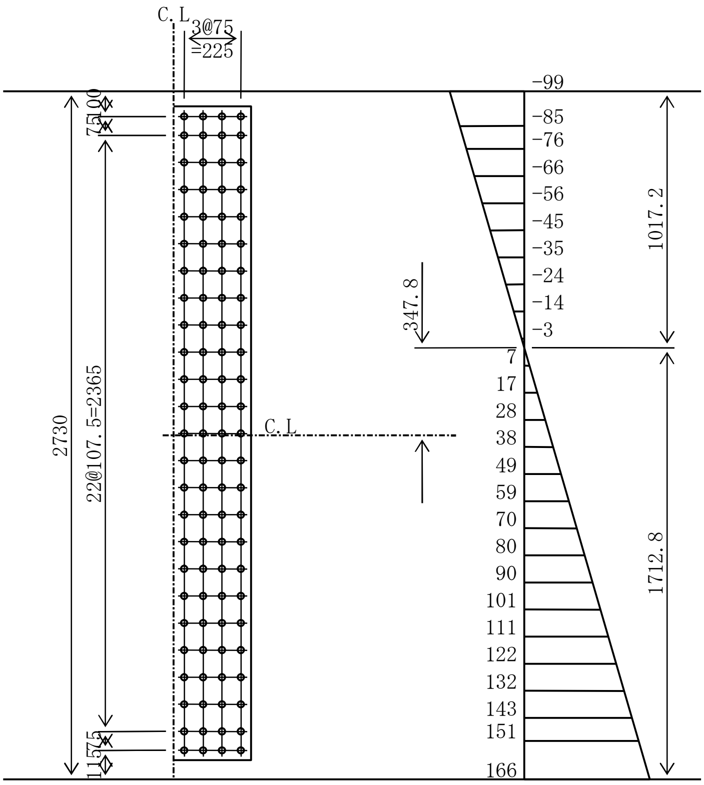
σL = 166 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 99 N/mm^2

σLn = 166 N/mm^2

τ = 17 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (151 + 166) / 2 = 363179 N

Required bolt number (Bolt number to be used)

N1 = 363179 / (108000 * 1.00) = 3.4 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 17 * 40950 / 100 = 6761 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((363179 / 4)^2 + 6761^2)}$ = 91046 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2595 ＊ 9 As = 467.1 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3162052 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3038574 cm^4

Bending moment to be shared by the web

$Mw = 166 * 3038574*10^4 / 1713 = 2948*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 2948*10^6 / (3162052*10^4) * 1638 = 153$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(15) G1 J-5(Sec-6) LFLG

(a) Acting stress

σ tmax = 169 N/mm^2 0.75σ ta = 0.75 * 210 = 158 N/mm^2

τ max = 7 N/mm^2

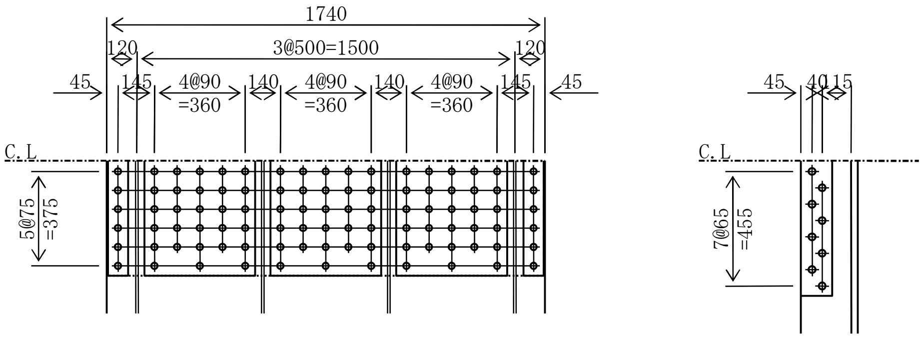
(b) Section area of main plate

1-LFLG PL 1740 * 26 Ag = 452.4 cm^2 (SM490Y)

2-RIB PL 200 * 22 Agr = 88.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 452.4 + 88.0 = 540.4 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 26 A = 452.4

(452.4 - (11* 2.5)* 2.6) * 1.1 = 419.0 < 452.4 ∴An = 419.0 cm^2

2-RIB PL 200 * 22 Ar = 88.0

(88.0 - 2*(1* 2.7+ 1*0.059)* 2.2) * 1.1 = 83.4 < 88.0 ∴Anr = 83.4 cm^2

ΣAn = An + Anr = 419.0 + 83.4 = 502.4 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 169 * 540.4 / 502.4 = 181 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 181 * 41899 = 7602286 N

> 0.75σ ta * An / 1.1 = 158 * 41899 / 1.1 = 5999175 N

・Rib Ptr = σ tn * Anr = 181 * 8344 = 1514046 N

> 0.75σ ta * Anr/ 1.1 = 158 * 8344 / 1.1 = 1194775 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 419.0 / 2 = 209.5 cm^2

・Rib AnrR = Anr = 83.4 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 7602286 / 108000 = 70.4 pcs. (96 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 1514046 / 108000 = 14.0 pcs. (2 @ 8 = 16 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 6,8 unites)

(h) Tensile force per one bolt

ρp = Pt / 96 = 7602286 / 96 = 79190 N

ρs = τ * Ag / 96 = 7 * 45240 / 96 = 3178 N

$\rho = \sqrt{}(\rho p^2 + \rho s^2) = \sqrt{}(79190^2 + 3178^2) = 79254$ N < ρa = 108000 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 ＊ 19	(30.4 -	2*(1*2.5)＊ 1.9)*1.1= 23.0＜	30.4	∴ 23.0
3-SPL PL	440 ＊ 19	(250.8 -	3*(5*2.5)＊ 1.9)*1.1= 197.5＜	250.8	∴197.5
		281.2			220.5 ＞ AnR
1-SPL PL	1730 ＊ 15	(259.5 -	(17*2.5)＊ 1.5)*1.1= 215.3＜	259.5	∴215.3 ＞ AnR
4-SPL PL	120 ＊ 21	(100.8 -	4*(1*2.7+ 1*0.059)＊ 2.1)*1.1= 85.4＜	100.8	∴ 85.4 ＞AnrR

(16) G1 J-6(Sec-7) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 3062 * 15 A = 459.4 cm^2 (SM490Y)

(b) Design stress

σU = -76 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

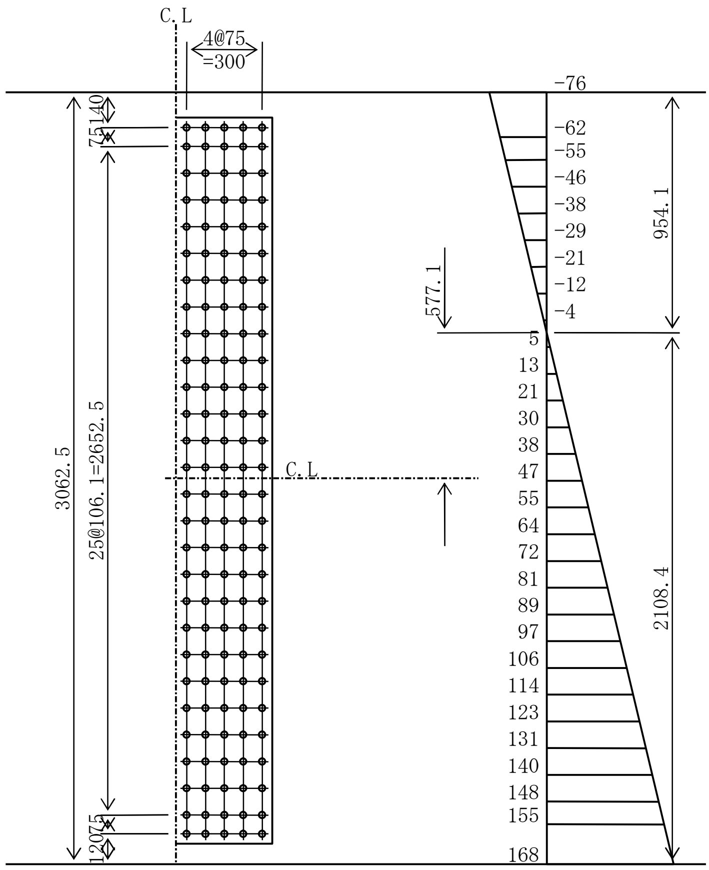
σL = 168 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 76 N/mm^2

σLn = 168 N/mm^2

τ = 27 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 15 * (155 + 168) / 2 = 381946 N

Required bolt number (Bolt number to be used)

N1 = 381946 / (108000 * 1.00) = 3.5 pcs. (5 bolts will be used.)

Check of shear force

ρs = τ * A / 140 = 27 * 45937 / 140 = 8734 N < ρa = 108000 N

Combined stress

$\rho c28$ = $\sqrt{((381946 / 5)^2 + 8734^2)}$ = 76887 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 5 unites)

(e) Check of splice plates

2-SPL PL 2882 ＊ 9 As = 518.8 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 5381020 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 5120367 cm^4

Bending moment to be shared by the web

Mw = 168 ＊ 5120367×10^4 / 2108 = 4079×10^6 N･mm

Bending stress of splice plates

σsp = 4079×10^6 / (5381020×10^4) ＊ 2028 = 154 N/mm^2 ＜ σa = 210 N/mm^2

(17) G1 J-6(Sec-7) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2730 * 15 A = 409.5 cm^2 (SM490Y)

(b) Design stress

σU = -81 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

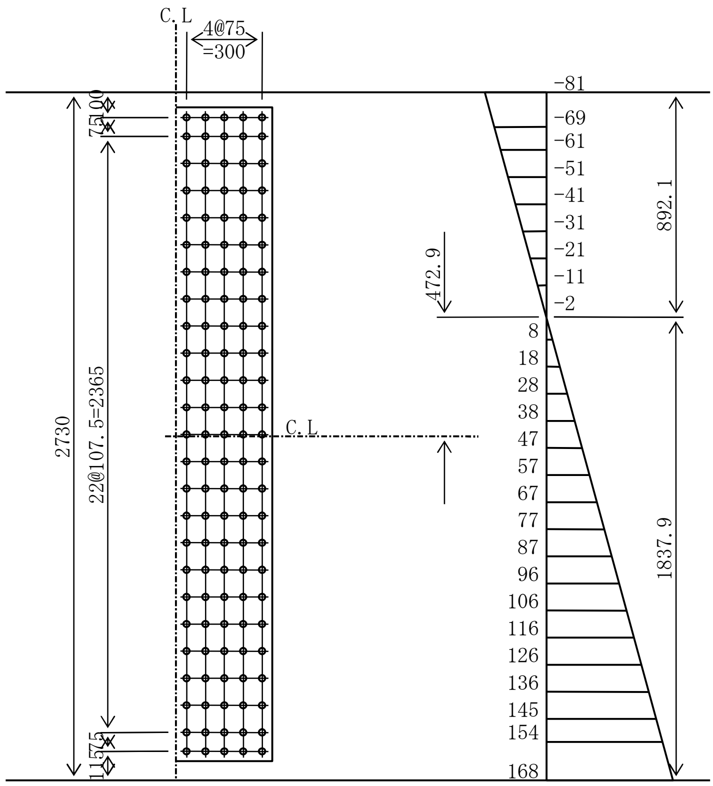
σL = 168 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 81 N/mm^2

σLn = 168 N/mm^2

τ = 26 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (154 + 168) / 2 = 367530 N

Required bolt number (Bolt number to be used)

N1 = 367530 / (108000 * 1.00) = 3.4 pcs. (5 bolts will be used.)

Check of shear force

ρs = τ * A / 125 = 26 * 40950 / 125 = 8587 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((367530 / 5)^2 + 8587^2)}$ = 74006 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 5 unites)

(e) Check of splice plates

2-SPL PL 2595 ＊ 9 As = 467.1 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3632870 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3459019 cm^4

Bending moment to be shared by the web

$Mw = 168 * 3459019*10^4 / 1838 = 3155*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 3155*10^6 / (3632870*10^4) * 1763 = 153$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(18) G1 J-6(Sec-7) LFLG

(a) Acting stress

σ tmax = 169 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

τ max = 15 N/mm^2

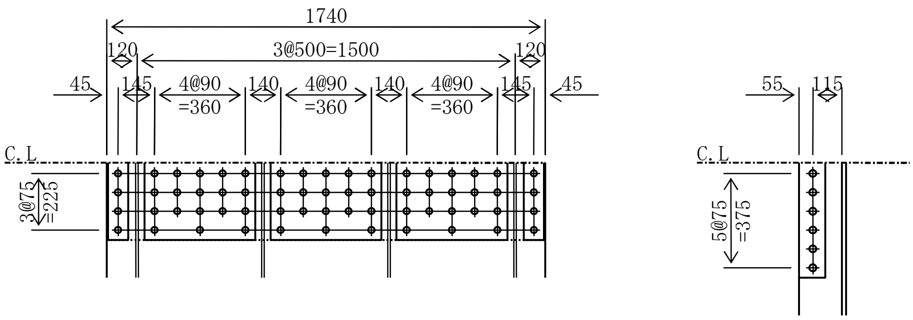
(b) Section area of main plate

1-LFLG PL 1740 * 17 Ag = 295.8 cm^2 (SM490Y)

2-RIB PL 170 * 17 Agr = 57.8 cm^2 (SM490Y)

ΣAg = Ag + Agr = 295.8 + 57.8 = 353.6 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 17 A = 295.8

(295.8 - (11* 2.5)* 1.7) * 1.1 = 274.0 < 295.8 ∴An = 274.0 cm^2

2-RIB PL 170 * 17 Ar = 57.8

(57.8 - 2*(1* 2.7)* 1.7) * 1.1 = 53.5 < 57.8 ∴Anr = 53.5 cm^2

ΣAn = An + Anr = 274.0 + 53.5 = 327.4 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 169 * 353.6 / 327.4 = 183 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 183 * 27396 = 5005189 N

> 0.75 σ ta * An / 1.1 = 158 * 27396 / 1.1 = 3922538 N

・Rib Ptr = σ tn * Anr = 183 * 5348 = 977122 N

> 0.75 σ ta * Anr/ 1.1 = 158 * 5348 / 1.1 = 765765 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 274.0 / 2 = 137.0 cm^2

・Rib AnrR = Anr = 53.5 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 5005189 / 108000 = 46.3 pcs. (62 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 977122 / 108000 = 9.0 pcs. (2 @ 6 = 12 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 4,6 unites)

(h) Tensile force per one bolt

ρ p = Pt / 62 = 5005189 / 62 = 80729 N

ρ s = τ * Ag / 62 = 15 * 29580 / 62 = 6947 N

ρ = $\sqrt{}$ (ρ p^2 + ρ s^2) = $\sqrt{}$ (80729^2 + 6947^2) = 81027 N < ρ a = 108000 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 12	(19.2 -	2*(1*2.5)* 1.2)*1.1= 14.5<	19.2	∴ 14.5
3-SPL PL	440 * 12	(158.4 -	3*(5*2.5)* 1.2)*1.1= 124.7<	158.4	∴124.7
		177.6			139.3 > AnR
1-SPL PL	1730 * 10	(173.0 -	(17*2.5)* 1.0)*1.1= 143.6<	173.0	∴143.6 > AnR
4-SPL PL	100 * 17	(68.0 -	4*(1*2.7)* 1.7)*1.1= 54.6<	68.0	∴ 54.6 >AnrR

(19) G1 J-7(Sec-8) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 3062 * 15 A = 459.4 cm^2 (SM490Y)

(b) Design stress

σU = -41 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

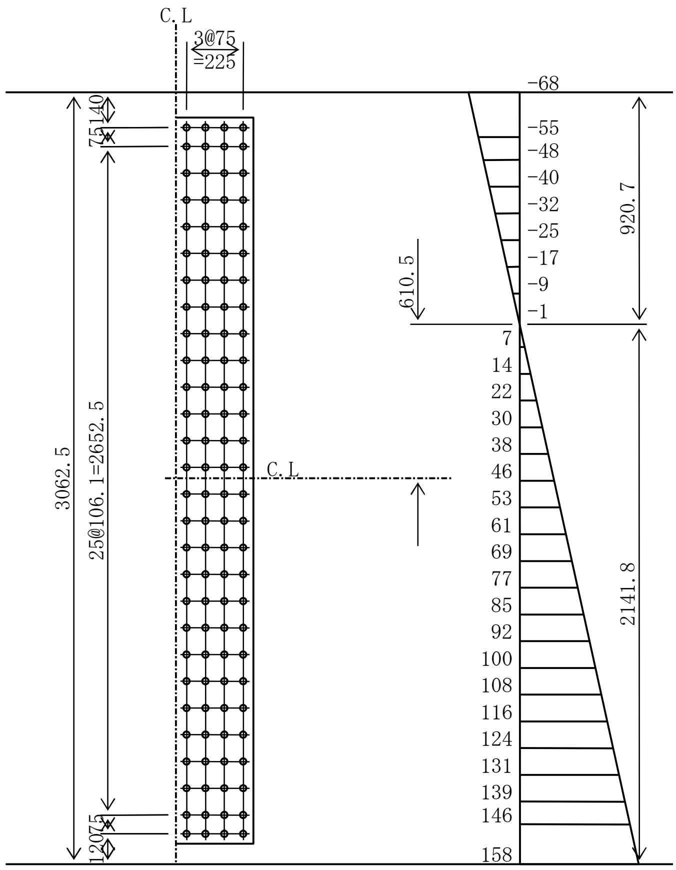
σL = 95 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 41 / 95 = 68 N/mm^2

σLn = 158 N/mm^2

τ = 34 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 15 * (146 + 158) / 2 = 358412 N

Required bolt number (Bolt number to be used)

N1 = 358412 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 112 = 34 * 45937 / 112 = 14145 N < ρa = 108000 N

Combined stress

$\rho c28$ = $\sqrt{((358412 / 4)^2 + 14145^2)}$ = 90713 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2882 * 9 As = 518.8 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 5590285 cm^4 > Iw

Moment of inertia of web plate Iw = 5302576 cm^4

Bending moment to be shared by the web

Mw = 158 * 5302576*10^4 / 2142 = 3899*10^6 N·mm

Bending stress of splice plates

σsp = 3899*10^6 / (5590285*10^4) * 2062 = 144 N/mm^2 < σa = 210 N/mm^2

(20) G1 J-7(Sec-8) RWEB

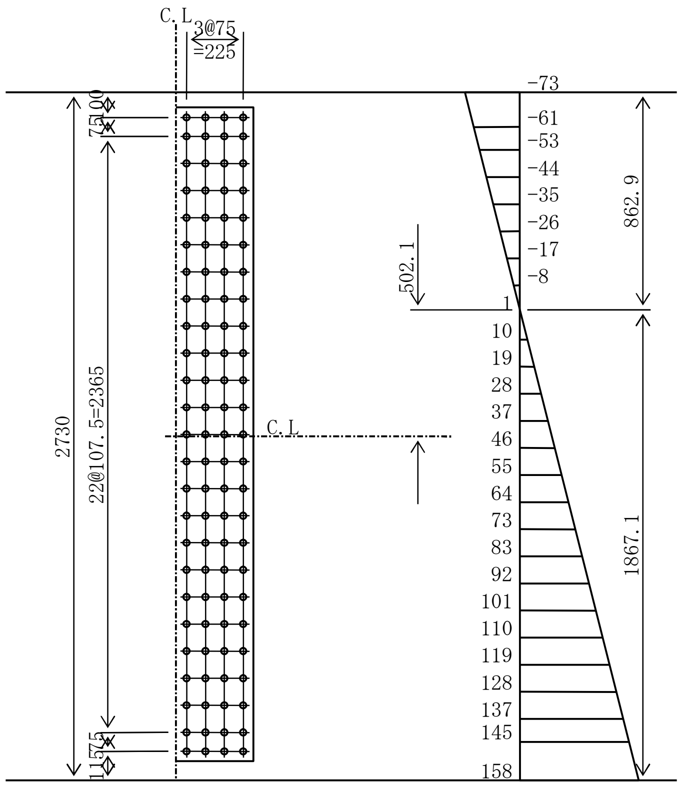
(a) Section area of main plate (Web plate)

1-RWEB PL 2730 ＊ 15   A = 409.5 cm^2 (SM490Y)

(b) Design stress

σU = -44 N/mm^2 ＜ σa ＊ 0.75 = 210 ＊ 0.75 = 158 N/mm^2
σL = 95 N/mm^2 ＜ σa ＊ 0.75 = 210 ＊ 0.75 = 158 N/mm^2
σUn = 158 ＊ 44 / 95 = 73 N/mm^2
σLn = 158 N/mm^2
τ = 34 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row
    Sharing width: b1 = 15.3 cm
    Total force to be shared
        P1 = 153 ＊ 15 ＊ (145 + 158) / 2 = 345568 N
    Required bolt number (Bolt number to be used)
        N1 = 345568 / (108000 ＊ 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force
    ρs = τ ＊ A / 100 = 34 ＊ 40950 / 100 = 13856 N ＜ ρa = 108000 N
Combined stress
    $\rho c25 = \sqrt{(345568 / 4)^2 + 13856^2} = 87496$ N ＜ ρa = 108000 N
(High strength friction grip bolt, S10T, M22 will be used.：Allowable friction forces with double surfaces:
  ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2595 ＊ 9 As = 467.1 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3763817 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3575612 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ $3575612*10^4$ / 1867 = $3016*10^6$ N·mm

Bending stress of splice plates

σsp = $3016*10^6$ / ($3763817*10^4$) ＊ 1792 = 144 N/mm^2 ＜ σa = 210 N/mm^2

(21) G1 J-7(Sec-8) LFLG

(a) Acting stress

$\sigma tmax$ = 95 N/mm^2 0.75 σta = 0.75 * 210 = 158 N/mm^2

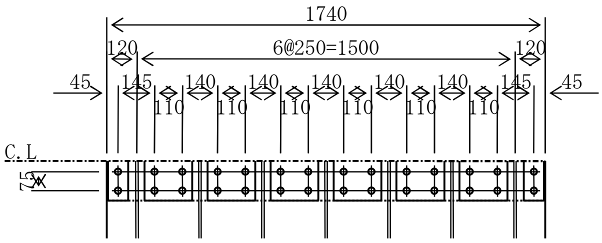
τmax = 32 N/mm^2

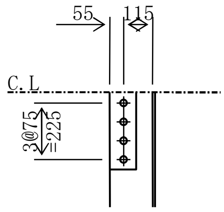
(b) Section area of main plate

1-LFLG	PL	1740 * 10	Ag = 174.0 cm^2	(SM490Y)
5-RIB	PL	170 * 17	Agr = 144.5 cm^2	(SM490Y)

ΣAg = Ag + Agr = 174.0 + 144.5 = 318.5 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 1740 * 10 A = 174.0

(174.0 - (14* 2.5)* 1.0) * 1.1 = 152.9 < 174.0 ∴An = 152.9 cm^2

5-RIB PL 170 * 17 Ar = 144.5

(144.5 - 5*(1* 2.7)* 1.7) * 1.1 = 133.7 < 144.5 ∴Anr = 133.7 cm^2

ΣAn = An + Anr = 152.9 + 133.7 = 286.6 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 95 * 318.5 / 286.6 = 106 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σta * An / 1.1 = 158 * 15290 / 1.1 = 2189250 N

> σtn * An = 106 * 15290 = 1614945 N

・Rib Ptr = 0.75 σta * Anr / 1.1 = 158 * 13371 / 1.1 = 1914413 N

> σtn * Anr = 106 * 13371 = 1412206 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 152.9 / 2 = 76.5 cm^2

・Rib AnrR = Anr = 133.7 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 2189250 / 108000 = 20.3 pcs. (28 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 1914413 / 108000 = 17.7 pcs. (5 @ 4 = 20 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(h) Tensile force per one bolt

ρp = Pt / 28 = 2189250 / 28 = 78188 N

ρs = τ * Ag / 28 = 32 * 17400 / 28 = 19789 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(78188^2 + 19789^2)}$ = 80653 N < ρa = 108000 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 ＊ 9	(14.4 -	2＊(1*2.5)＊ 0.9)*1.1= 10.9＜	14.4	∴ 10.9
6-SPL PL	190 ＊ 9	(102.6 -	6＊(2*2.5)＊ 0.9)*1.1= 83.2＜	102.6	∴ 83.2
		117.0			94.1 ＞ AnR
1-SPL PL	1730 ＊ 9	(155.7 -	(14*2.5)＊ 0.9)*1.1= 136.6＜	155.7	∴136.6 ＞ AnR
10-SPL PL	100 ＊ 17	(170.0 -	10＊(1*2.7)＊ 1.7)*1.1= 136.5＜	170.0	∴136.5 ＞AnrR

(22) G1 J-8(Sec-8) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 3062 * 15 A = 459.4 cm^2 (SM490Y)

(b) Design stress

σU = 27 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

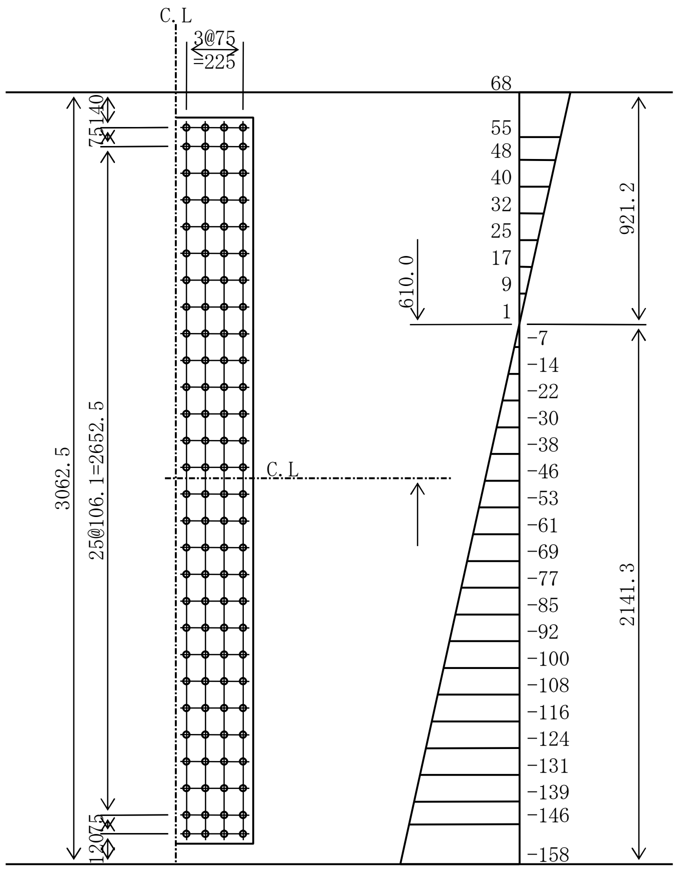
σL = -63 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 27 / 63 = 68 N/mm^2

σLn = 158 N/mm^2

τ = 45 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 15 * (146 + 158) / 2 = 358409 N

Required bolt number (Bolt number to be used)

N1 = 358409 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 112 = 45 * 45937 / 112 = 18645 N < ρa = 108000 N

Combined stress

$\rho c28$ = $\sqrt{((358409 / 4)^2 + 18645^2)}$ = 91522 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2882 * 9   As = 518.8 cm^2 (SM490Y)

Moment of inertia of splice plates   Is = 5587288 cm^4 > Iw

Moment of inertia of web plate   Iw = 5299965 cm^4

Bending moment to be shared by the web

M_w = 158 * 5299965*10^4 / 2141 = 3898*10^6 N·mm

Bending stress of splice plates

σ_{sp} = 3898*10^6 / (5587288*10^4) * 2061 = 144 N/mm^2 < σ_a = 210 N/mm^2

(23) G1 J-8(Sec-8) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2730 * 15   A = 409.5 cm^2 (SM490Y)

(b) Design stress

σU = 29 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

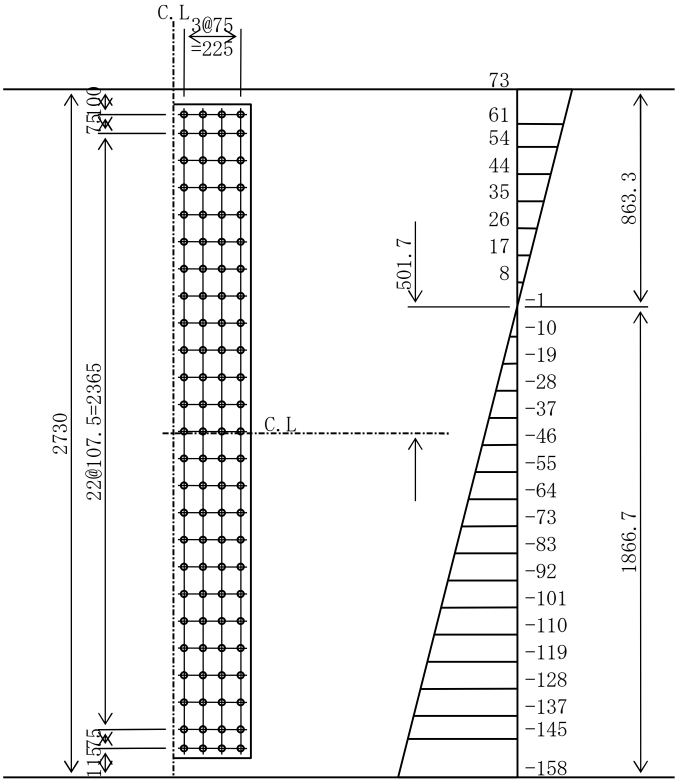
σL = -63 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 29 / 63 = 73 N/mm^2

σLn = 158 N/mm^2

τ = 45 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (145 + 158) / 2 = 345565 N

Required bolt number (Bolt number to be used)

N1 = 345565 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 45 * 40950 / 100 = 18233 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((345565 / 4)^2 + 18233^2)}$ = 88294 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2595 ＊ 9 As = 467.1 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3762073 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3574059 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ $3574059*10^4$ / 1867 = $3016*10^6$ N･mm

Bending stress of splice plates

σsp = $3016*10^6$ / ($3762073*10^4$) ＊ 1792 = 144 N/mm^2 ＜ σa = 210 N/mm^2

(24) G1 J-8(Sec-8) LFLG

(a) Acting stress

$\sigma cmax$ = -63 N/mm² 0.75 σca = 0.75 * 190 = 143 N/mm²

∴ σc = 143 N/mm²

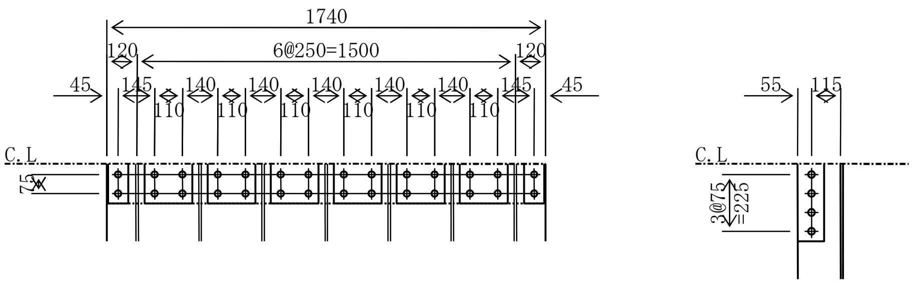
τmax = 40 N/mm²

(b) Section area of main plate

1-LFLG	PL	1740 * 10	Ag =	174.0 cm²	(SM490Y)
5-RIB	PL	170 * 17	Agr =	144.5 cm²	(SM490Y)

ΣAg = Ag + Agr = 174.0 + 144.5 = 318.5 cm²

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 143 * 17400 = 2480583 N

・Rib Pcr = σc * Agr = 143 * 14450 = 2060025 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 174.0 / 2 = 87.0 cm²

・Rib AgrR = Agr = 144.5 cm²

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2480583 / 108000 = 23.0 pcs. (28 bolts will be used.)

・Rib nr = Pcr / (108000 * 1.00) = 2060025 / 108000 = 19.1 pcs. (5 @ 4 = 20 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 28 = 2480583 / 28 = 88592 N

ρs = τ * Ag / 28 = 40 * 17400 / 28 = 24769 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(88592^2 + 24769^2)}$ = 91990 N < ρa = 108000 N

(h) Check of splice plates

	(SM490Y)	Ags(cm²)	
2-SPL PL	80 * 9	14.4	
6-SPL PL	190 * 9	102.6	
		117.0	
			> AgR = 87.0cm²
1-SPL PL	1730 * 9	155.7	> AgR = 87.0cm²
10-SPL PL	100 * 17	170.0	> AgrR = 144.5cm²

(25) G1 J-9(Sec-9) LWEB

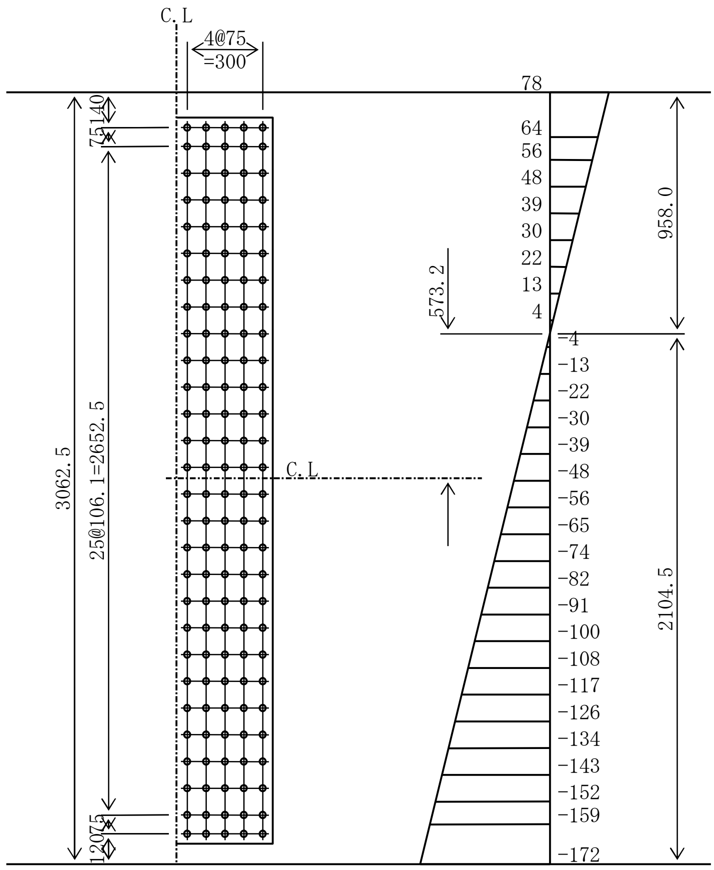
(a) Section area of main plate (Web plate)

1-LWEB PL 3062 * 17   A = 520.6 cm^2 (SM490Y)

(b) Design stress

σU =   78 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = -172 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn =   78 N/mm^2
σLn = 172 N/mm^2
τ =   47 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 17 * (159 + 172) / 2 = 442797 N

Required bolt number (Bolt number to be used)

N1 = 442797 / (108000 * 1.00) = 4.1 pcs. (5 bolts will be used.)

Check of shear force

ρs = τ * A / 140 = 47 * 52062 / 140 = 17521 N < ρa = 108000 N

Combined stress

$\rho c28$ = $\sqrt{((442797 / 5)^2 + 17521^2)}$ = 90276 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 5 unites)

(e) Check of splice plates

2-SPL PL 2882 * 10 As = 576.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 5952805 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 5779910 cm^4

Bending moment to be shared by the web

Mw = 172 ＊ 5779910*10^4 / 2104 = 4719*10^6 N･mm

Bending stress of splice plates

σsp = 4719*10^6 / (5952805*10^4) ＊ 2024 = 160 N/mm^2 ＜ σa = 210 N/mm^2

(26) G1 J-9(Sec-9) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2730 * 17 A = 464.1 cm^2 (SM490Y)

(b) Design stress

σU = 84 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

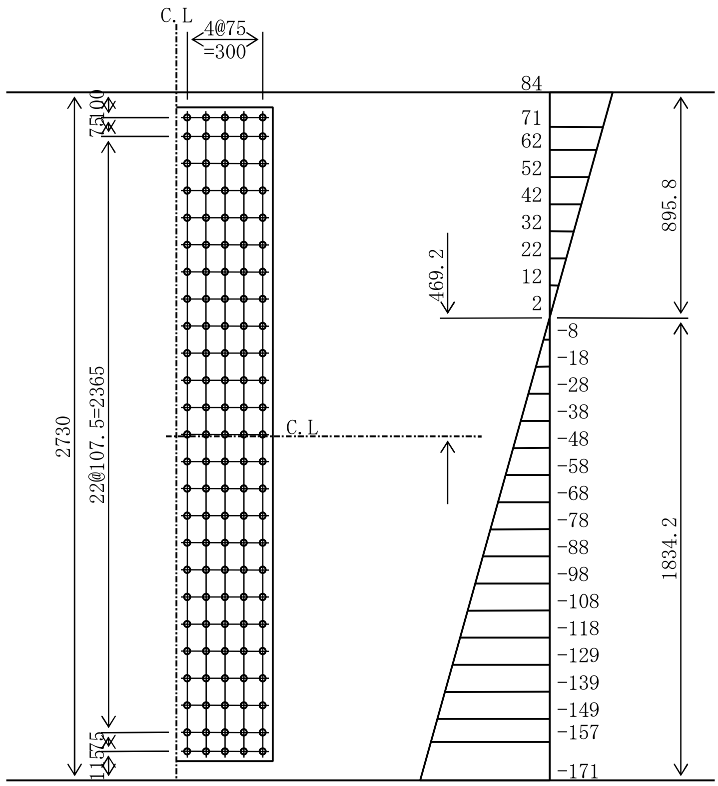
σL = -171 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 84 N/mm^2

σLn = 171 N/mm^2

τ = 46 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 17 * (157 + 171) / 2 = 425850 N

Required bolt number (Bolt number to be used)

N1 = 425850 / (108000 * 1.00) = 3.9 pcs. (5 bolts will be used.)

Check of shear force

ρs = τ * A / 125 = 46 * 46410 / 125 = 16996 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((425850 / 5)^2 + 16996^2)}$ = 86849 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 5 unites)

(e) Check of splice plates

2-SPL PL 2595 * 10 As = 519.0 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4018776 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3904095 cm^4

Bending moment to be shared by the web

Mw = 171 * 3904095×10^4 / 1834 = 3648×10^6 N·mm

Bending stress of splice plates

σsp = 3648×10^6 / (4018776×10^4) * 1759 = 160 N/mm^2 ＜ σa = 210 N/mm^2

(27) G1 J-9(Sec-9) LFLG

(a) Acting stress

σ cmax = -172 N/mm^2 0.75σca = 0.75 * 196 = 147 N/mm^2

∴ σc = 172 N/mm^2

τ max = 43 N/mm^2

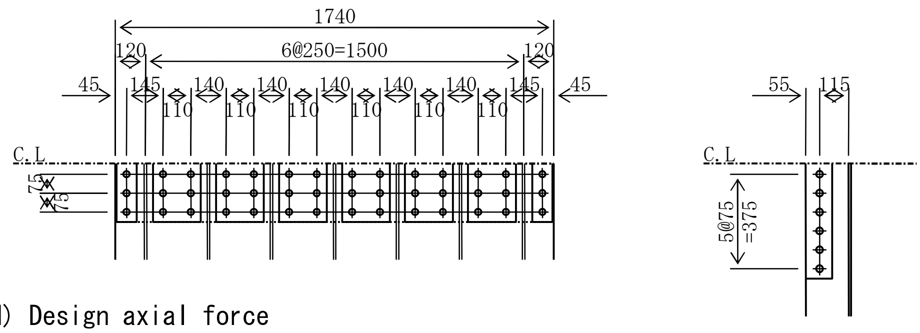
(b) Section area of main plate

1-LFLG PL 1740 * 10 Ag = 174.0 cm^2 (SM490Y)

5-RIB PL 170 * 17 Agr = 144.5 cm^2 (SM490Y)

ΣAg = Ag + Agr = 174.0 + 144.5 = 318.5 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 172 * 17400 = 2998559 N

・Rib Pcr = σc * Agr = 172 * 14450 = 2490183 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 174.0 / 2 = 87.0 cm^2

・Rib AgrR = Agr = 144.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2998559 / 108000 = 27.8 pcs. (42 bolts will be used.)

・Rib nr = Pcr / (108000 * 1.00) = 2490183 / 108000 = 23.1 pcs. (5 @ 6 = 30 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,6 unites)

(g) Tensile force per one bolt

ρp = Pc / 42 = 2998559 / 42 = 71394 N

ρs = τ * Ag / 42 = 43 * 17400 / 42 = 18000 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(71394^2 + 18000^2)}$ = 73628 N < ρa = 108000 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)
2-SPL PL	80 * 9	14.4
6-SPL PL	190 * 9	102.6
		117.0

> AgR = 87.0cm^2

1-SPL PL 1730 * 9 155.7 > AgR = 87.0cm^2

10-SPL PL 100 * 15 150.0 > AgrR = 144.5cm^2

(28) G1 J-10(Sec-11) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 3062 * 17 A = 520.6 cm^2 (SM490Y)

(b) Design stress

σU = 82 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

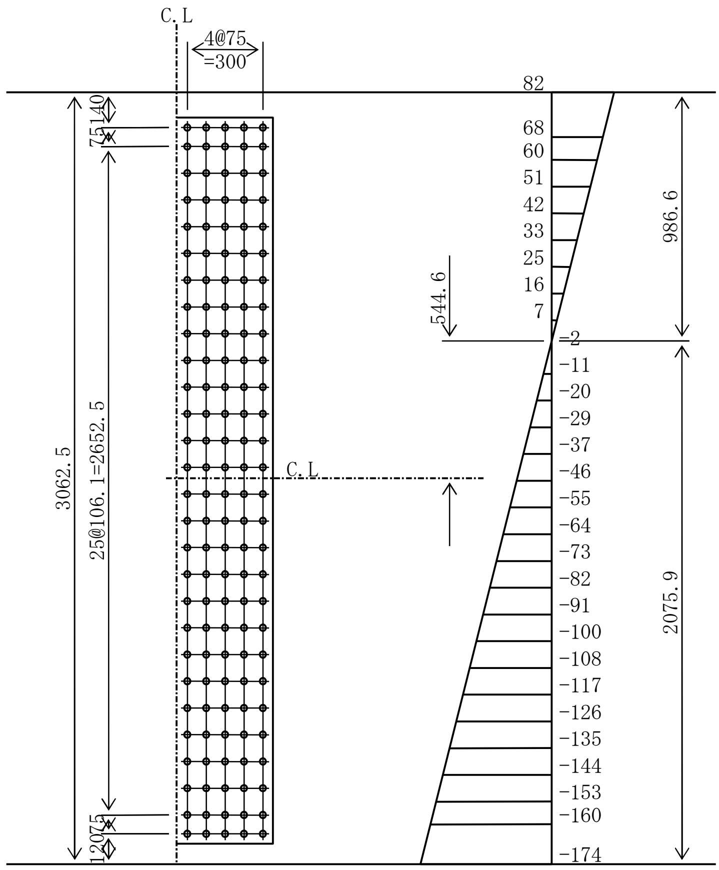
σL = -174 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 82 N/mm^2

σLn = 174 N/mm^2

τ = 38 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 17 * (160 + 174) / 2 = 446934 N

Required bolt number (Bolt number to be used)

N1 = 446934 / (108000 * 1.00) = 4.1 pcs. (5 bolts will be used.)

Check of shear force

ρs = τ * A / 140 = 38 * 52062 / 140 = 14231 N < ρa = 108000 N

Combined stress

$\rho c28$ = $\sqrt{((446934 / 5)^2 + 14231^2)}$ = 90513 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 5 unites)

(e) Check of splice plates

2-SPL PL 2882 * 10 As = 576.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 5765113 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 5613388 cm^4

Bending moment to be shared by the web

Mw = 174 * 5613388*10^4 / 2076 = 4692*10^6 N·mm

Bending stress of splice plates

σsp = 4692*10^6 / (5765113*10^4) * 1996 = 162 N/mm^2 ＜ σa = 210 N/mm^2

(29) G1 J-10(Sec-11) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2730 * 17 A = 464.1 cm^2 (SM490Y)

(b) Design stress

σU = 88 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

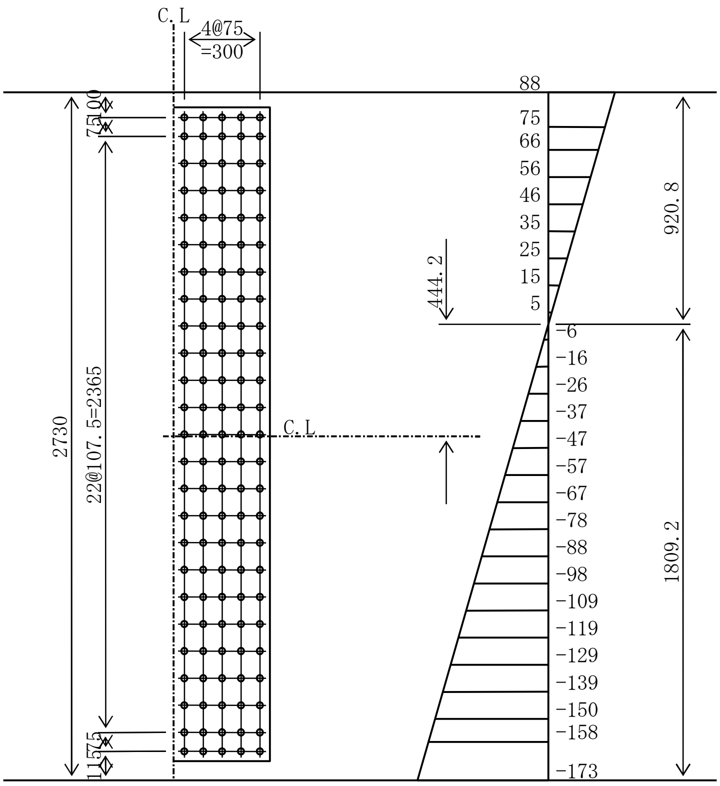
σL = -173 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 88 N/mm^2

σLn = 173 N/mm^2

τ = 37 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 17 * (158 + 173) / 2 = 429781 N

Required bolt number (Bolt number to be used)

N1 = 429781 / (108000 * 1.00) = 4.0 pcs. (5 bolts will be used.)

Check of shear force

ρs = τ * A / 125 = 37 * 46410 / 125 = 13840 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((429781 / 5)^2 + 13840^2)}$ = 87063 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 5 unites)

(e) Check of splice plates

2-SPL PL 2595 * 10 As = 519.0 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3902085 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3798006 cm^4

Bending moment to be shared by the web

$Mw = 173 * 3798006*10^4 / 1809 = 3633*10^6$ N･mm

Bending stress of splice plates

$\sigma sp = 3633*10^6 / (3902085*10^4) * 1734 = 161$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(30) G1 J-10(Sec-11) LFLG

(a) Acting stress

σ cmax = -174 N/mm^2 0.75 σ ca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma$ c = 174 N/mm^2

τ max = 31 N/mm^2

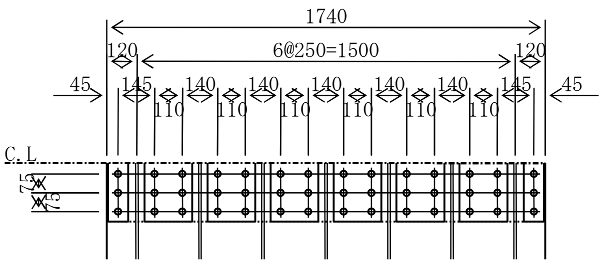
(b) Section area of main plate

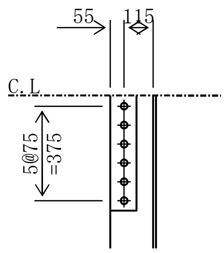
1-LFLG PL 1740 * 12 Ag = 208.8 cm^2 (SM490Y)

5-RIB PL 170 * 17 Agr = 144.5 cm^2 (SM490Y)

ΣAg = Ag + Agr = 208.8 + 144.5 = 353.3 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σ c * Ag = 174 * 20880 = 3637922 N

・Rib Pcr = σ c * Agr = 174 * 14450 = 2517624 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 208.8 / 2 = 104.4 cm^2

・Rib AgrR = Agr = 144.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 3637922 / 108000 = 33.7 pcs. (42 bolts will be used.)

・Rib nr = Pcr / (108000 * 1.00) = 2517624 / 108000 = 23.3 pcs. (5 @ 6 = 30 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,6 unites)

(g) Tensile force per one bolt

ρ p = Pc / 42 = 3637922 / 42 = 86617 N

ρ s = τ * Ag / 42 = 31 * 20880 / 42 = 15218 N

$\rho = \sqrt{}(\rho p^2 + \rho s^2) = \sqrt{}(86617^2 + 15218^2)$ = 87944 N < ρ a = 108000 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)
2-SPL PL	80 * 9	14.4
6-SPL PL	190 * 9	102.6
		117.0

> AgR = 104.4cm^2

1-SPL PL 1730 * 9		155.7	> AgR = 104.4cm^2
10-SPL PL	100 * 15	150.0	> AgrR = 144.5cm^2

(31) G1 J-11(Sec-12) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 3062 * 15 A = 459.4 cm^2 (SM490Y)

(b) Design stress

σU = 44 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

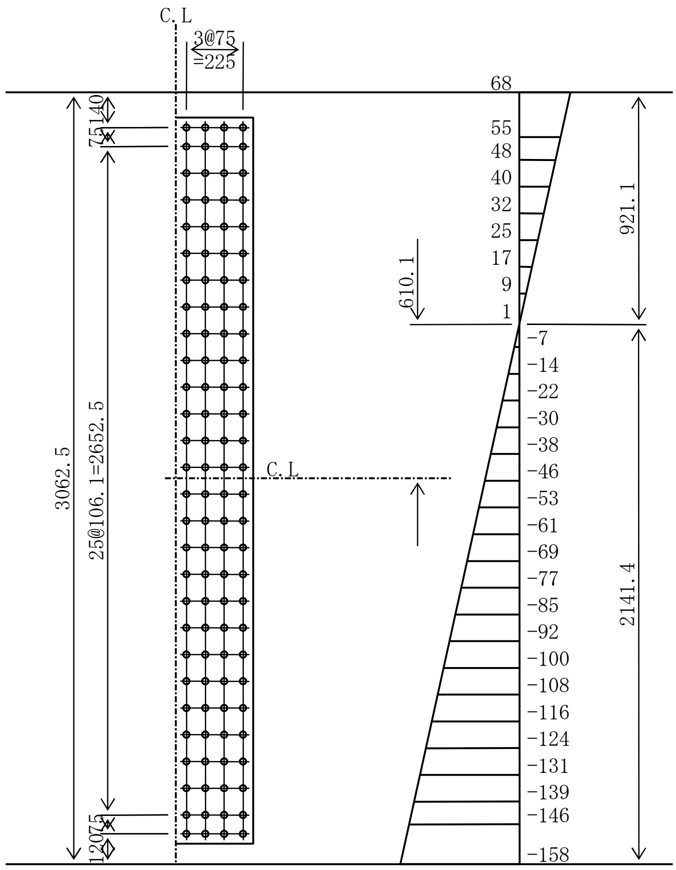
σL = -103 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 44 / 103 = 68 N/mm^2

σLn = 158 N/mm^2

τ = 33 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 15 * (146 + 158) / 2 = 358410 N

Required bolt number (Bolt number to be used)

N1 = 358410 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 112 = 33 * 45937 / 112 = 13655 N < ρa = 108000 N

Combined stress

$\rho c28$ = $\sqrt{}$((358410 / 4)^2 + 13655^2) = 90637 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2882 ＊ 9 As = 518.8 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 5587842 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 5300448 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ 5300448*10^4 / 2141 = 3899*10^6 N·mm

Bending stress of splice plates

σsp = 3899*10^6 / (5587842*10^4) ＊ 2061 = 144 N/mm^2 ＜ σa = 210 N/mm^2

(32) G1 J-11(Sec-12) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2730 * 15 A = 409.5 cm^2 (SM490Y)

(b) Design stress

σU = 47 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

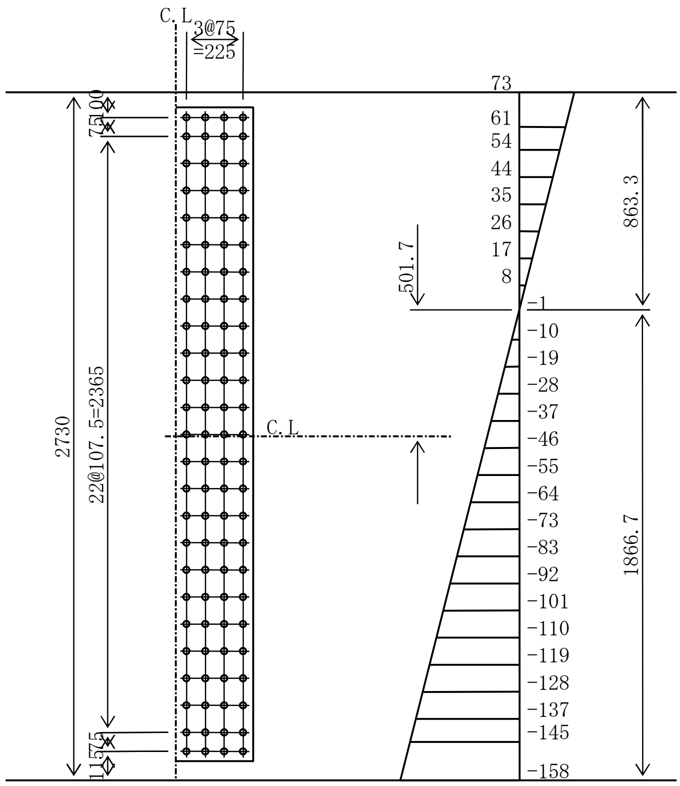
σL = -103 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 47 / 103 = 73 N/mm^2

σLn = 158 N/mm^2

τ = 33 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (145 + 158) / 2 = 345565 N

Required bolt number (Bolt number to be used)

N1 = 345565 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

$\rho s = \tau * A / 100$ = 33 * 40950 / 100 = 13347 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((345565 / 4)^2 + 13347^2)}$ = 87416 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2595 * 9 As = 467.1 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3762262 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3574228 cm^4

Bending moment to be shared by the web

Mw = 158 * 3574228*10^4 / 1867 = 3016*10^6 N·mm

Bending stress of splice plates

σsp = 3016*10^6 / (3762262*10^4) * 1792 = 144 N/mm^2 ＜ σa = 210 N/mm^2

(33) G1 J-11(Sec-12) LFLG

(a) Acting stress

σ cmax = -103 N/mm^2 0.75 σ ca = 0.75 * 190 = 143 N/mm^2

∴ σ c = 143 N/mm^2

τ max = 29 N/mm^2

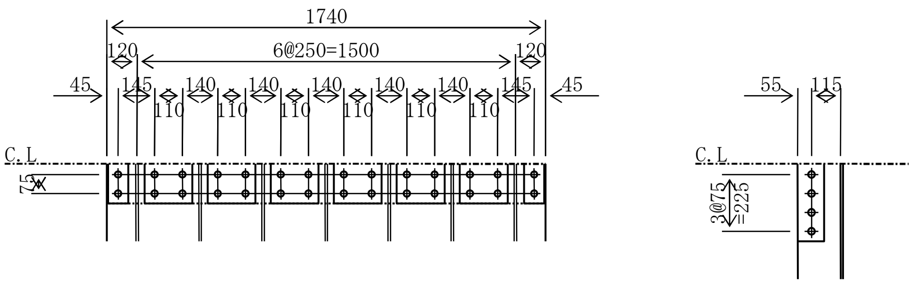
(b) Section area of main plate

1-LFLG PL 1740 * 10 Ag = 174.0 cm^2 (SM490Y)

5-RIB PL 170 * 17 Agr = 144.5 cm^2 (SM490Y)

ΣAg = Ag + Agr = 174.0 + 144.5 = 318.5 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σ c * Ag = 143 * 17400 = 2480583 N

・Rib Pcr = σ c * Agr = 143 * 14450 = 2060025 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 174.0 / 2 = 87.0 cm^2

・Rib AgrR = Agr = 144.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2480583 / 108000 = 23.0 pcs. (28 bolts will be used.)

・Rib nr = Pcr / (108000 * 1.00) = 2060025 / 108000 = 19.1 pcs. (5 @ 4 = 20 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(g) Tensile force per one bolt

ρ p = Pc / 28 = 2480583 / 28 = 88592 N

ρ s = τ * Ag / 28 = 29 * 17400 / 28 = 17886 N

ρ = $\sqrt{}$(ρ p^2 + ρ s^2) = $\sqrt{}$(88592^2 + 17886^2) = 90380 N < ρ a = 108000 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)
2-SPL PL	80 * 9	14.4
6-SPL PL	190 * 9	102.6
		117.0

> AgR = 87.0cm^2

1-SPL PL 1730 * 9 155.7 > AgR = 87.0cm^2

10-SPL PL 100 * 15 150.0 > AgrR = 144.5cm^2

(34) G1 J-12(Sec-12) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 3062 * 15 A = 459.4 cm^2 (SM490Y)

(b) Design stress

σU = 18 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

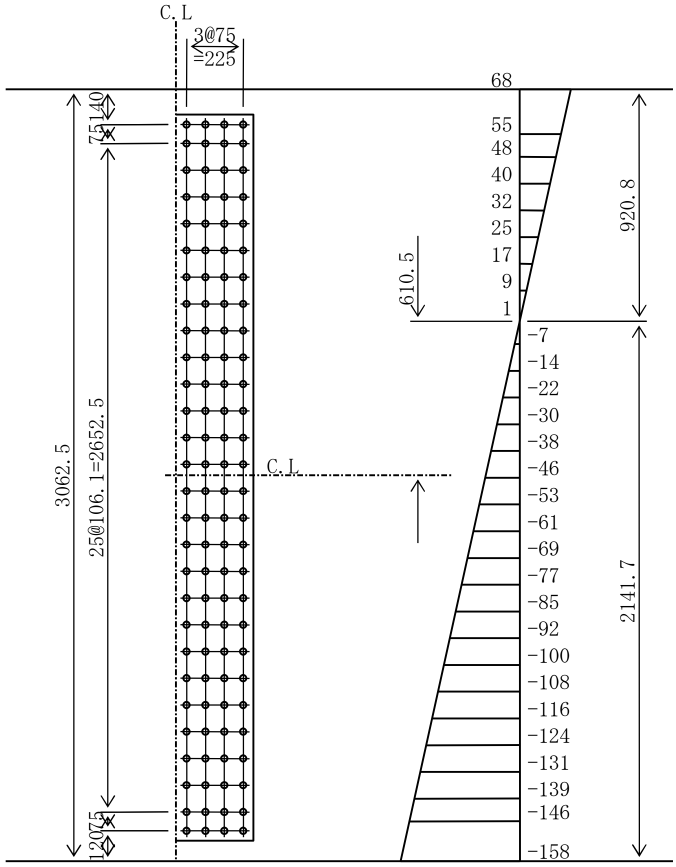
σL = -42 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 18 / 42 = 68 N/mm^2

σLn = 158 N/mm^2

τ = 22 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 15 * (146 + 158) / 2 = 358412 N

Required bolt number (Bolt number to be used)

N1 = 358412 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 112 = 22 * 45937 / 112 = 9072 N < ρa = 108000 N

Combined stress

$\rho c28$ = $\sqrt{((358412 / 4)^2 + 9072^2)}$ = 90061 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2882 * 9 As = 518.8 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 5590143 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 5302453 cm^4

Bending moment to be shared by the web

Mw = 158 * 5302453*10^4 / 2142 = 3899*10^6 N･mm

Bending stress of splice plates

σsp = 3899*10^6 / (5590143*10^4) * 2062 = 144 N/mm^2 ＜ σa = 210 N/mm^2

(35) G1 J-12(Sec-12) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2730 * 15 A = 409.5 cm^2 (SM490Y)

(b) Design stress

σU = 20 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

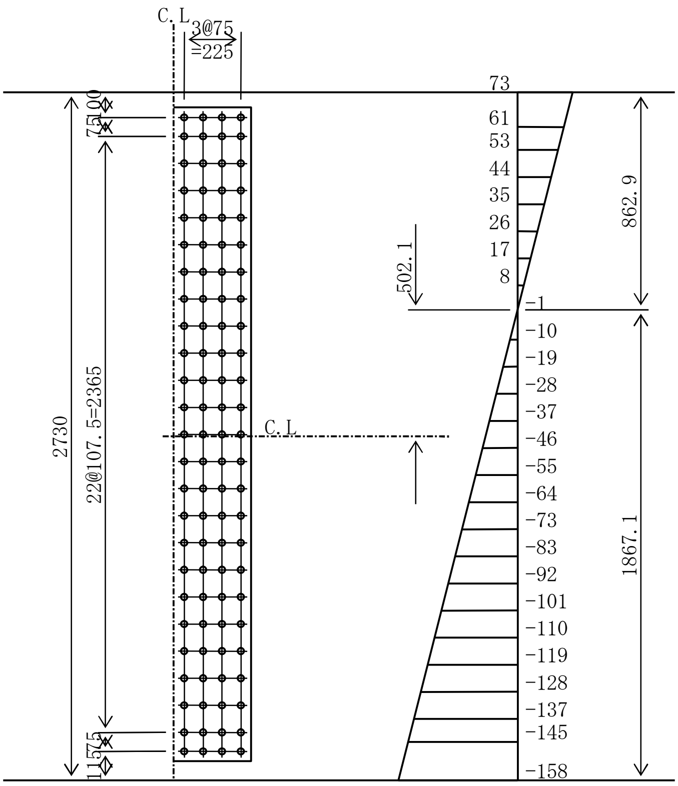
σL = -42 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 20 / 42 = 73 N/mm^2

σLn = 158 N/mm^2

τ = 22 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (145 + 158) / 2 = 345568 N

Required bolt number (Bolt number to be used)

N1 = 345568 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 22 * 40950 / 100 = 8890 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((345568 / 4)^2 + 8890^2)}$ = 86848 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2595 ＊ 9 As = 467.1 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3763858 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3575648 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ $3575648*10^4$ / 1867 = $3016*10^6$ N･mm

Bending stress of splice plates

σsp = $3016*10^6$ / ($3763858*10^4$) ＊ 1792 = 144 N/mm^2 ＜ σa = 210 N/mm^2

(36) G1 J-12(Sec-12) LFLG

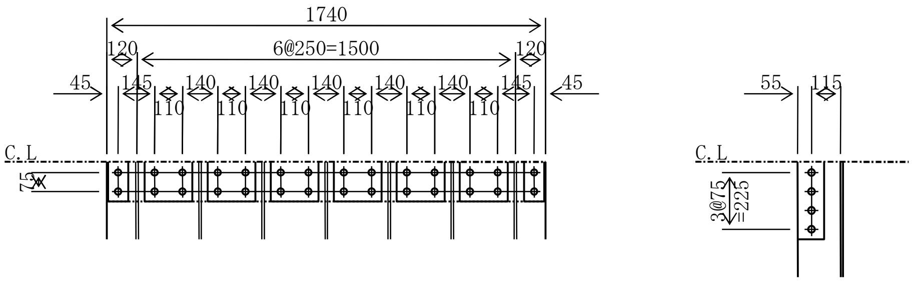
(a) Acting stress

$\sigma tmax$ = 15 N/mm^2 0.75σta = 0.75 * 210 = 158 N/mm^2
$\sigma cmax$ = -43 N/mm^2 0.75σca = 0.75 * 190 = 143 N/mm^2
∴σc = 143 N/mm^2
τmax = 21 N/mm^2

(b) Section area of main plate

1-LFLG PL 1740 * 10 Ag = 174.0 cm^2 (SM490Y)
5-RIB PL 170 * 17 Agr = 144.5 cm^2 (SM490Y)
ΣAg = Ag + Agr = 174.0 + 144.5 = 318.5 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 10 A = 174.0
(174.0 - (14* 2.5)* 1.0) * 1.1 = 152.9 < 174.0 ∴An = 152.9 cm^2
5-RIB PL 170 * 17 Ar = 144.5
(144.5 - 5*(1* 2.7)* 1.7) * 1.1 = 133.7 < 144.5 ∴Anr = 133.7 cm^2
ΣAn = An + Anr = 152.9 + 133.7 = 286.6 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 15 * 318.5 / 286.6 = 16 N/mm^2
< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 158 * 15290 / 1.1 = 2189250 N
> σtn * An = 16 * 15290 = 248569 N
Pc = σc * Ag = 143 * 17400 = 2480583 N
・Rib Ptr = 0.75σta * Anr / 1.1 = 158 * 13371 / 1.1 = 1914413 N
> σtn * Anr = 16 * 13371 = 217364 N
Pcr = σc * Agr = 143 * 14450 = 2060025 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 152.9 / 2 = 76.5 cm^2
AgR = Ag / 2 = 174.0 / 2 = 87.0 cm^2
・Rib AnrR = Anr = 133.7 cm^2
AgrR = Agr = 144.5 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2480583 / 108000 = 23.0 pcs. (28 bolts will be used.)
・Rib nr = Pcr / (108000 * 1.00) = 2060025 / 108000 = 19.1 pcs. (5 @ 4 = 20 bolts will be used.)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 28 = 2480583 / 28 = 88592$ N

$\rho s = \tau * Ag / 28 = 21 * 17400 / 28 = 12816$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(88592^2 + 12816^2)} = 89515$ N $< \rho a = 108000$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm²)	deduction of bolt holes			Ans(cm²)
2-SPL PL	80 ＊ 9	(14.4 -	2*(1*2.5)＊ 0.9)*1.1=	10.9＜	14.4	∴ 10.9
6-SPL PL	190 ＊ 9	(102.6 -	6*(2*2.5)＊ 0.9)*1.1=	83.2＜	102.6	∴ 83.2
		117.0				94.1
		＞ AgR				＞ AnR
1-SPL PL	1730 ＊ 9	(155.7 -	(14*2.5)＊ 0.9)*1.1=	136.6＜	155.7	∴136.6
		＞ AgR				＞ AnR
10-SPL PL	100 ＊ 17	(170.0 -	10*(1*2.7)＊ 1.7)*1.1=	136.5＜	170.0	∴136.5
		＞ AgrR				＞AnrR

(37) G1 J-13(Sec-13) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 3062 * 15 A = 459.4 cm^2 (SM490Y)

(b) Design stress

σU = -23 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

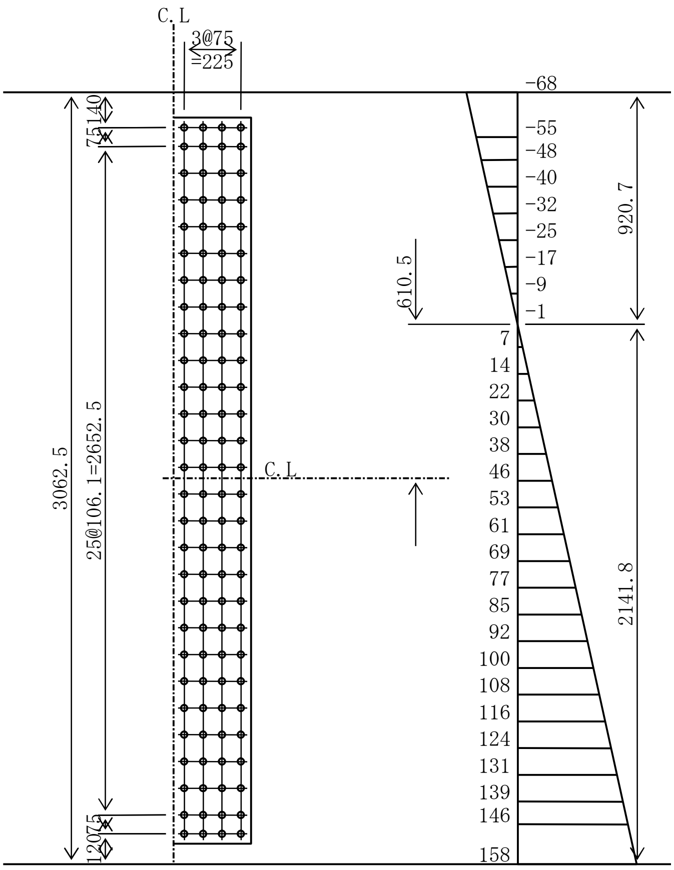
σL = 54 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 23 / 54 = 68 N/mm^2

σLn = 158 N/mm^2

τ = 14 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 15 * (146 + 158) / 2 = 358412 N

Required bolt number (Bolt number to be used)

N1 = 358412 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 112 = 14 * 45937 / 112 = 5755 N < ρa = 108000 N

Combined stress

$\rho c28$ = $\sqrt{((358412 / 4)^2 + 5755^2)}$ = 89788 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2882 ＊ 9 As = 518.8 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 5590248 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 5302544 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ $5302544*10^4$ / 2142 = $3899*10^6$ N･mm

Bending stress of splice plates

σsp = $3899*10^6$ / ($5590248*10^4$) ＊ 2062 = 144 N/mm^2 ＜ σa = 210 N/mm^2

(38) G1 J-13(Sec-13) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2730 * 15 A = 409.5 cm^2 (SM490Y)

(b) Design stress

σU = -25 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

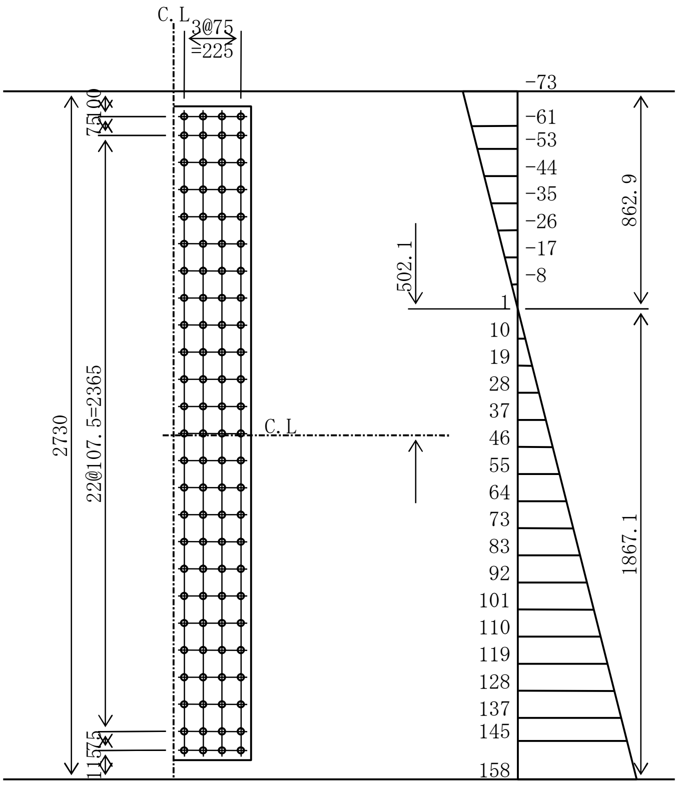
σL = 54 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 25 / 54 = 73 N/mm^2

σLn = 158 N/mm^2

τ = 14 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (145 + 158) / 2 = 345568 N

Required bolt number (Bolt number to be used)

N1 = 345568 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 14 * 40950 / 100 = 5652 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((345568 / 4)^2 + 5652^2)}$ = 86577 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2595 ＊ 9 As = 467.1 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3763836 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3575628 cm^4

Bending moment to be shared by the web

$Mw = 158 * 3575628*10^4 / 1867 = 3016*10^6$ N･mm

Bending stress of splice plates

$\sigma sp = 3016*10^6 / (3763836*10^4) * 1792 = 144$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(39) G1 J-13(Sec-13) LFLG

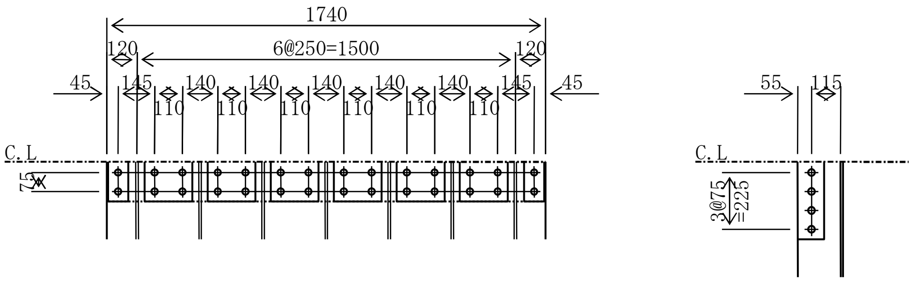
(a) Acting stress

σ tmax = 55 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2
σ cmax = -16 N/mm^2 0.75 σ ca = 0.75 * 190 = 143 N/mm^2
$\therefore$ σ c = 143 N/mm^2
τ max = 14 N/mm^2

(b) Section area of main plate

1-LFLG PL 1740 * 10 Ag = 174.0 cm^2 (SM490Y)
5-RIB PL 170 * 17 Agr = 144.5 cm^2 (SM490Y)
ΣAg = Ag + Agr = 174.0 + 144.5 = 318.5 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 10 A = 174.0
(174.0 - (14* 2.5)* 1.0) * 1.1 = 152.9 < 174.0 $\therefore$An = 152.9 cm^2
5-RIB PL 170 * 17 Ar = 144.5
(144.5 - 5*(1* 2.7)* 1.7) * 1.1 = 133.7 < 144.5 $\therefore$Anr = 133.7 cm^2
ΣAn = An + Anr = 152.9 + 133.7 = 286.6 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 55 * 318.5 / 286.6 = 61 N/mm^2
< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 158 * 15290 / 1.1 = 2189250 N
> σ tn * An = 61 * 15290 = 926159 N
Pc = σ c * Ag = 143 * 17400 = 2480583 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 158 * 13371 / 1.1 = 1914413 N
> σ tn * Anr = 61 * 13371 = 809889 N
Pcr = σ c * Agr = 143 * 14450 = 2060025 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 152.9 / 2 = 76.5 cm^2
AgR = Ag / 2 = 174.0 / 2 = 87.0 cm^2
・Rib AnrR = Anr = 133.7 cm^2
AgrR = Agr = 144.5 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2480583 / 108000 = 23.0 pcs. (28 bolts will be used.)
・Rib nr = Pcr / (108000 * 1.00) = 2060025 / 108000 = 19.1 pcs. (5 @ 4 = 20 bolts will be used.)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 28 = 2480583 / 28 = 88592$ N

$\rho s = \tau * Ag / 28 = 14 * 17400 / 28 = 8640$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(88592^2 + 8640^2)} = 89013$ N $< \rho a = 108000$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 9	(14.4 -	2*(1*2.5)* 0.9)*1.1= 10.9<	14.4	∴ 10.9
6-SPL PL	190 * 9	(102.6 -	6*(2*2.5)* 0.9)*1.1= 83.2<	102.6	∴ 83.2
		117.0			94.1
		> AgR			> AnR
1-SPL PL	1730 * 9	(155.7 -	(14*2.5)* 0.9)*1.1= 136.6<	155.7	∴136.6
		> AgR			> AnR
10-SPL PL	100 * 17	(170.0 -	10*(1*2.7)* 1.7)*1.1= 136.5<	170.0	∴136.5
		> AgrR			>AnrR

(40) G1 J-14(Sec-14) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 3062 * 15 A = 459.4 cm^2 (SM490Y)

(b) Design stress

σU = -28 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

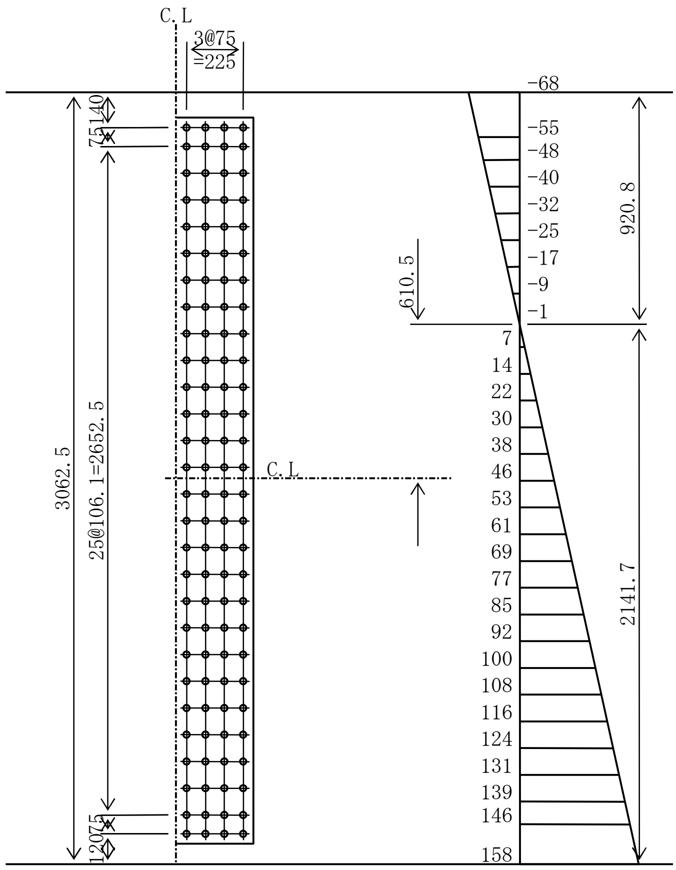
σL = 65 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 28 / 65 = 68 N/mm^2

σLn = 158 N/mm^2

τ = 10 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 15 * (146 + 158) / 2 = 358412 N

Required bolt number (Bolt number to be used)

N1 = 358412 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 112 = 10 * 45937 / 112 = 4306 N < ρa = 108000 N

Combined stress

$\rho c28 = \sqrt{((358412 / 4)^2 + 4306^2)}$ = 89706 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2882 ＊ 9 As = 518.8 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 5590190 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 5302493 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ $5302493*10^4$ / 2142 = $3899*10^6$ N･mm

Bending stress of splice plates

σsp = $3899*10^6$ / ($5590190*10^4$) ＊ 2062 = 144 N/mm^2 ＜ σa = 210 N/mm^2

(41) G1　J-14(Sec-14)　RWEB

(a) Section area of main plate (Web plate)

1-RWEB　PL　2730 * 15　　A = 409.5 cm^2　　(SM490Y)

(b) Design stress

σU = -30 N/mm^2 ＜ σa * 0.75 = 210 * 0.75 = 158 N/mm^2

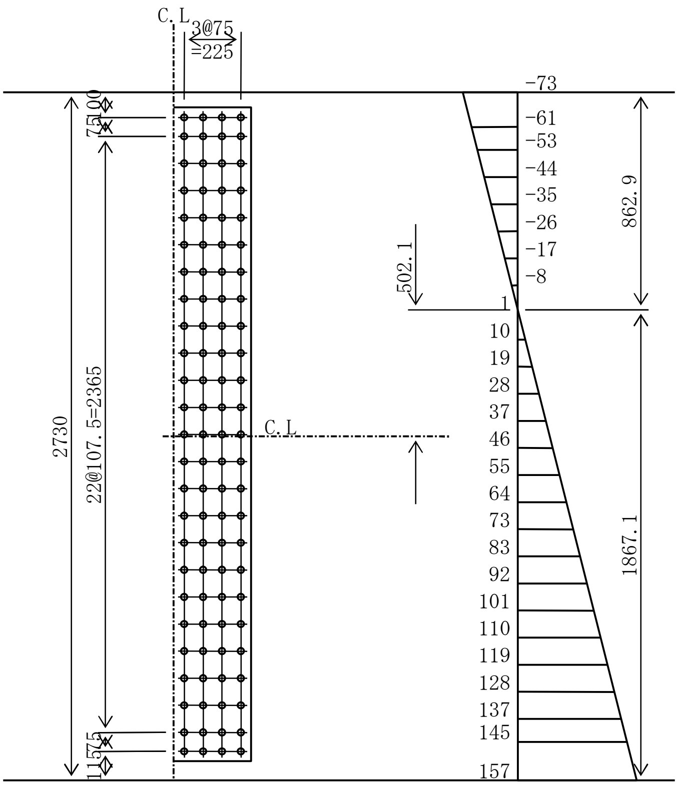
σL = 65 N/mm^2 ＜ σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 30 / 65 = 73 N/mm^2

σLn = 158 N/mm^2

τ = 10 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width:　　b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (145 + 157) / 2 = 345568 N

Required bolt number (Bolt number to be used)

N1 = 345568 / (108000 * 1.00) = 3.2 pcs.　(4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 10 * 40950 / 100 = 4229 N ＜ ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((345568 / 4)^2 + 4229^2)}$ = 86495 N ＜ ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.：Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2595 ＊ 9 As = 467.1 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3763764 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3575565 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ $3575565 \ast 10^4$ / 1867 = $3016 \ast 10^6$ N·mm

Bending stress of splice plates

σsp = $3016 \ast 10^6$ / ($3763764 \ast 10^4$) ＊ 1792 = 144 N/mm^2 ＜ σa = 210 N/mm^2

(42) G1 J-14(Sec-14) LFLG

(a) Acting stress

σ tmax = 66 N/mm^2 0.75 σ ta = 0.75 ＊ 210 = 158 N/mm^2

σ cmax = −12 N/mm^2 0.75 σ ca = 0.75 ＊ 190 = 143 N/mm^2

∴ σ c = 143 N/mm^2

τ max = 10 N/mm^2

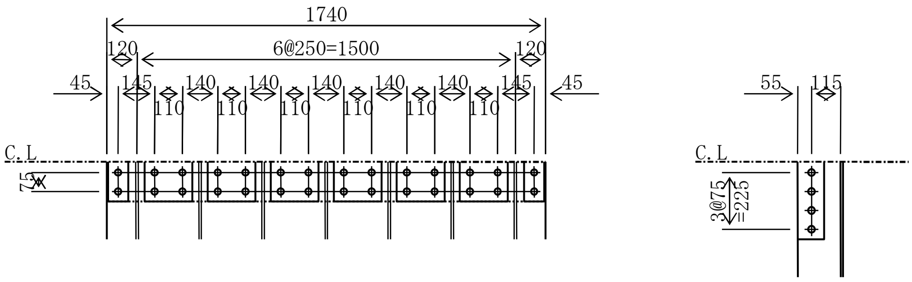
(b) Section area of main plate

1-LFLG PL 1740 ＊ 10   Ag = 174.0 cm^2 (SM490Y)

5-RIB PL 170 ＊ 17   Agr = 144.5 cm^2 (SM490Y)

ΣAg = Ag + Agr = 174.0 + 144.5 = 318.5 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 ＊ 10   A = 174.0

(174.0 − (14＊ 2.5)＊ 1.0) ＊ 1.1 = 152.9 ＜ 174.0 ∴An = 152.9 cm^2

5-RIB PL 170 ＊ 17   Ar = 144.5

(144.5 − 5＊(1＊ 2.7)＊ 1.7) ＊ 1.1 = 133.7 ＜ 144.5 ∴Anr = 133.7 cm^2

ΣAn = An + Anr = 152.9 + 133.7 = 286.6 cm^2

σ tn = σ tmax ＊ ΣAg / ΣAn = 66 ＊ 318.5 / 286.6 = 73 N/mm^2

＜ σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta ＊ An / 1.1 = 158 ＊ 15290 / 1.1 = 2189250 N

＞ σ tn ＊ An = 73 ＊ 15290 = 1115496 N

Pc = σ c ＊ Ag = 143 ＊ 17400 = 2480583 N

・Rib Ptr = 0.75 σ ta ＊ Anr / 1.1 = 158 ＊ 13371 / 1.1 = 1914413 N

＞ σ tn ＊ Anr = 73 ＊ 13371 = 975457 N

Pcr = σ c ＊ Agr = 143 ＊ 14450 = 2060025 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 152.9 / 2 = 76.5 cm^2

AgR = Ag / 2 = 174.0 / 2 = 87.0 cm^2

・Rib AnrR = Anr = 133.7 cm^2

AgrR = Agr = 144.5 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 ＊ 1.00) = 2480583 / 108000 = 23.0 pcs. (28 bolts will be used.)

・Rib nr = Pcr / (108000 ＊ 1.00) = 2060025 / 108000 = 19.1 pcs. (5 @ 4 = 20 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 28 = 2480583 / 28 = 88592$ N

$\rho s = \tau * Ag / 28 = 10 * 17400 / 28 = 6471$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(88592^2 + 6471^2)} = 88828$ N $< \rho a = 108000$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 9	(14.4 -	2*(1*2.5)* 0.9)*1.1= 10.9	< 14.4	∴ 10.9
6-SPL PL	190 * 9	(102.6 -	6*(2*2.5)* 0.9)*1.1= 83.2	< 102.6	∴ 83.2
		117.0			94.1
		> AgR			> AnR
1-SPL PL	1730 * 9	(155.7 -	(14*2.5)* 0.9)*1.1= 136.6	< 155.7	∴136.6
		> AgR			> AnR
10-SPL PL	100 * 17	(170.0 -	10*(1*2.7)* 1.7)*1.1= 136.5	< 170.0	∴136.5
		> AgrR			>AnrR

(43) G1 J-15(Sec-15) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 3062 * 15   A = 459.4 cm^2 (SM490Y)

(b) Design stress

σU = -22 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

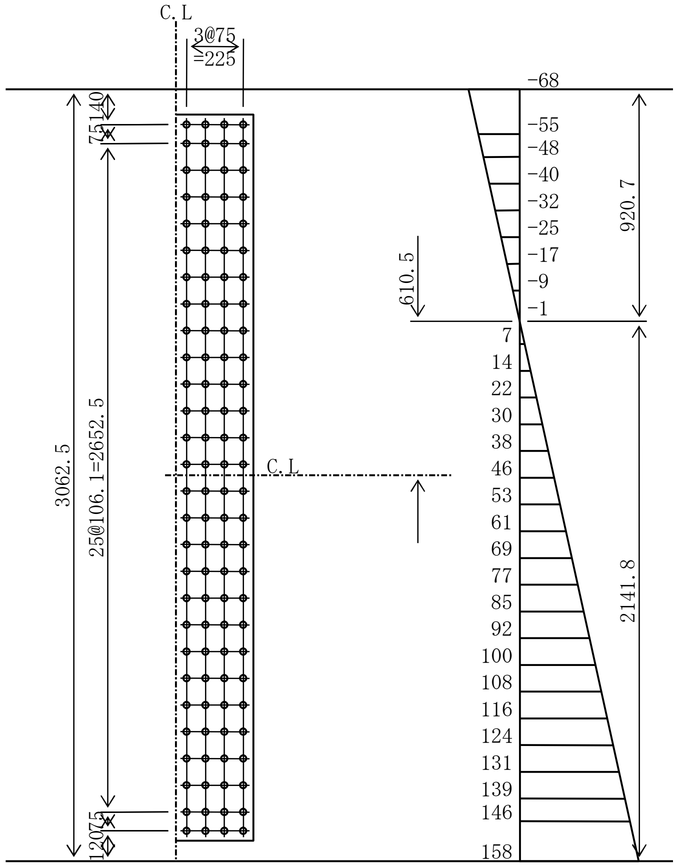
σL = 50 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 22 / 50 = 68 N/mm^2

σLn = 158 N/mm^2

τ = 17 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 15 * (146 + 158) / 2 = 358412 N

Required bolt number (Bolt number to be used)

N1 = 358412 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 112 = 17 * 45937 / 112 = 6786 N < ρa = 108000 N

Combined stress

$\rho c28$ = $\sqrt{((358412 / 4)^2 + 6786^2)}$ = 89860 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2882 ＊ 9 As = 518.8 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 5590210 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 5302511 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ 5302511*10^4 / 2142 = 3899*10^6 N·mm

Bending stress of splice plates

σsp = 3899*10^6 / (5590210*10^4) ＊ 2062 = 144 N/mm^2 ＜ σa = 210 N/mm^2

(44) G1 J-15(Sec-15) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2730 * 15 A = 409.5 cm^2 (SM490Y)

(b) Design stress

σU = -23 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

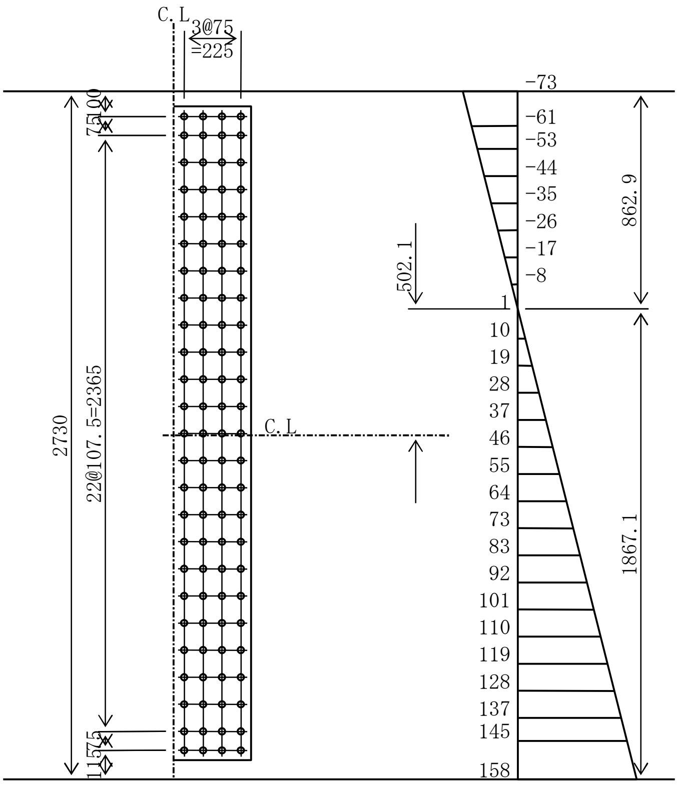
σL = 50 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 23 / 50 = 73 N/mm^2

σLn = 158 N/mm^2

τ = 16 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (145 + 158) / 2 = 345568 N

Required bolt number (Bolt number to be used)

N1 = 345568 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 16 * 40950 / 100 = 6643 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((345568 / 4)^2 + 6643^2)}$ = 86647 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2595 ＊ 9 As = 467.1 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3763756 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3575558 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ $3575558*10^4$ / 1867 = $3016*10^6$ N·mm

Bending stress of splice plates

σsp = $3016*10^6$ / ($3763756*10^4$) ＊ 1792 = 144 N/mm^2 ＜ σa = 210 N/mm^2

(45) G1 J-15(Sec-15) LFLG

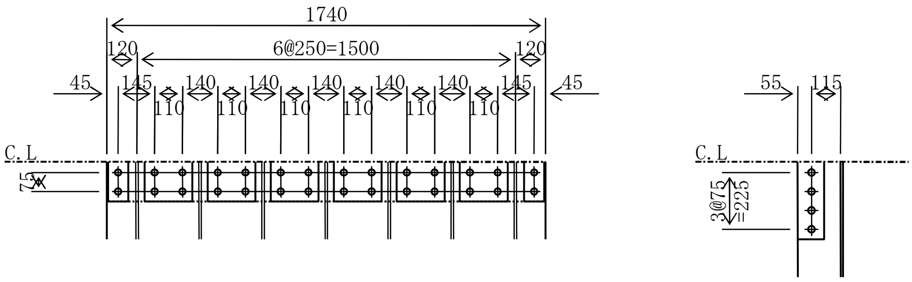
(a) Acting stress

σ tmax = 50 N/mm^2 0.75 σ ta = 0.75 ＊ 210 = 158 N/mm^2
σ cmax = −34 N/mm^2 0.75 σ ca = 0.75 ＊ 190 = 143 N/mm^2
∴ σ c = 143 N/mm^2
τ max = 15 N/mm^2

(b) Section area of main plate

1-LFLG PL 1740 ＊ 10 Ag = 174.0 cm^2 (SM490Y)
5-RIB PL 170 ＊ 17 Agr = 144.5 cm^2 (SM490Y)
ΣAg = Ag + Agr = 174.0 + 144.5 = 318.5 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 ＊ 10 A = 174.0
(174.0 − (14＊ 2.5)＊ 1.0) ＊ 1.1 = 152.9 ＜ 174.0 ∴An = 152.9 cm^2
5-RIB PL 170 ＊ 17 Ar = 144.5
(144.5 − 5＊(1＊ 2.7)＊ 1.7) ＊ 1.1 = 133.7 ＜ 144.5 ∴Anr = 133.7 cm^2
ΣAn = An + Anr = 152.9 + 133.7 = 286.6 cm^2
σ tn = σ tmax ＊ ΣAg / ΣAn = 50 ＊ 318.5 / 286.6 = 56 N/mm^2
＜ σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta ＊ An / 1.1 = 158 ＊ 15290 / 1.1 = 2189250 N
＞ σ tn ＊ An = 56 ＊ 15290 = 855797 N
Pc = σ c ＊ Ag = 143 ＊ 17400 = 2480583 N
・Rib Ptr = 0.75 σ ta ＊ Anr / 1.1 = 158 ＊ 13371 / 1.1 = 1914413 N
＞ σ tn ＊ Anr = 56 ＊ 13371 = 748360 N
Pcr = σ c ＊ Agr = 143 ＊ 14450 = 2060025 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 152.9 / 2 = 76.5 cm^2
AgR = Ag / 2 = 174.0 / 2 = 87.0 cm^2
・Rib AnrR = Anr = 133.7 cm^2
AgrR = Agr = 144.5 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 ＊ 1.00) = 2480583 / 108000 = 23.0 pcs. (28 bolts will be used.)
・Rib nr = Pcr / (108000 ＊ 1.00) = 2060025 / 108000 = 19.1 pcs. (5 @ 4 = 20 bolts will be used.)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 28 = 2480583 / 28 = 88592$ N

$\rho s = \tau * Ag / 28 = 15 * 17400 / 28 = 9305$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(88592^2 + 9305^2)} = 89080 \text{ N} < \rho a = 108000$ N

(i) Check of splice plates

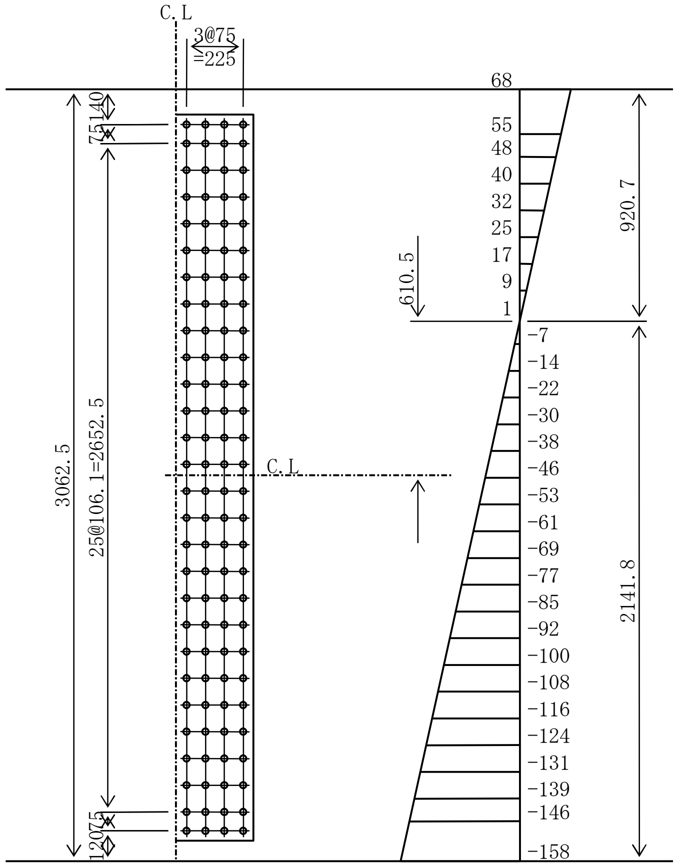
	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 9	(14.4 -	2*(1*2.5)* 0.9)*1.1= 10.9<	14.4	∴ 10.9
6-SPL PL	190 * 9	(102.6 -	6*(2*2.5)* 0.9)*1.1= 83.2<	102.6	∴ 83.2
		117.0			94.1
		> AgR			> AnR
1-SPL PL	1730 * 9	(155.7 -	(14*2.5)* 0.9)*1.1= 136.6<	155.7	∴136.6
		> AgR			> AnR
10-SPL PL	100 * 17	(170.0 -	10*(1*2.7)* 1.7)*1.1= 136.5<	170.0	∴136.5
		> AgrR			>AnrR

(46) G1 J-16(Sec-16) LWEB

(a) Section area of main plate (Web plate)
1-LWEB PL 3062 * 15 A = 459.4 cm^2 (SM490Y)

(b) Design stress
σU = 31 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = -72 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 158 * 31 / 72 = 68 N/mm^2
σLn = 158 N/mm^2
τ = 24 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress
Check of bolt at 28th row
Sharing width: b1 = 15.8 cm
Total force to be shared
P1 = 158 * 15 * (146 + 158) / 2 = 358412 N
Required bolt number (Bolt number to be used)
N1 = 358412 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force
ρs = τ * A / 112 = 24 * 45937 / 112 = 9758 N < ρa = 108000 N
Combined stress
$\rho c28$ = $\sqrt{((358412 / 4)^2 + 9758^2)}$ = 90133 N < ρa = 108000 N
(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2882 * 9 As = 518.8 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 5590277 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 5302569 cm^4

Bending moment to be shared by the web

Mw = 158 * 5302569*10^4 / 2142 = 3899*10^6 N·mm

Bending stress of splice plates

σsp = 3899*10^6 / (5590277*10^4) * 2062 = 144 N/mm^2 ＜ σa = 210 N/mm^2

(47) G1 J-16(Sec-16) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2730 * 15 A = 409.5 cm^2 (SM490Y)

(b) Design stress

σU = 33 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

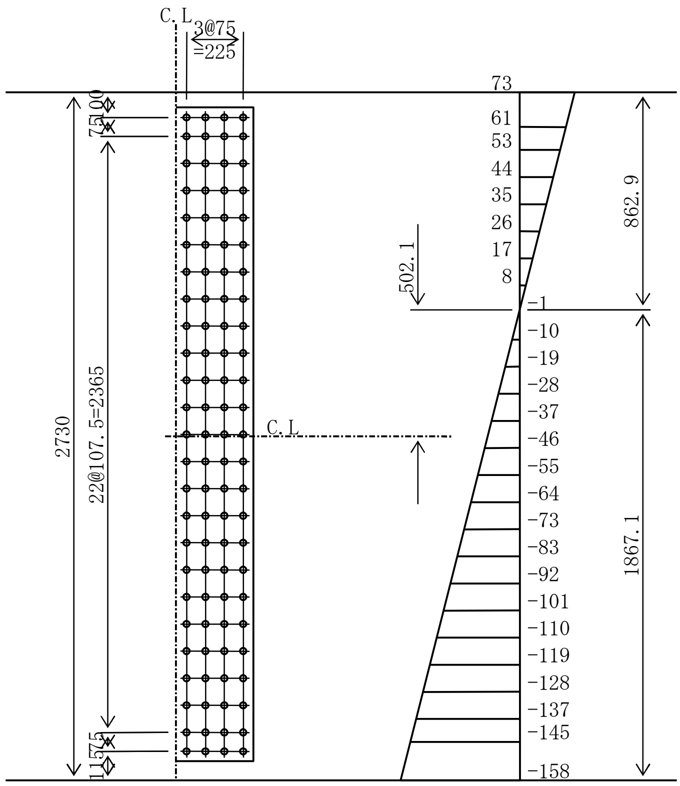
σL = -72 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 33 / 72 = 73 N/mm^2

σLn = 158 N/mm^2

τ = 23 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (145 + 158) / 2 = 345568 N

Required bolt number (Bolt number to be used)

N1 = 345568 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 23 * 40950 / 100 = 9544 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((345568 / 4)^2 + 9544^2)}$ = 86918 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2595 ＊ 9 As = 467.1 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3763793 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3575590 cm^4

Bending moment to be shared by the web

$Mw = 158 * 3575590*10^4 / 1867 = 3016*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 3016*10^6 / (3763793*10^4) * 1792 = 144$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(48) G1 J-16(Sec-16) LFLG

(a) Acting stress

σ tmax = 12 N/mm^2 0.75σ ta = 0.75 * 210 = 158 N/mm^2

σ cmax = -73 N/mm^2 0.75σ ca = 0.75 * 190 = 143 N/mm^2

∴ σ c = 143 N/mm^2

τ max = 21 N/mm^2

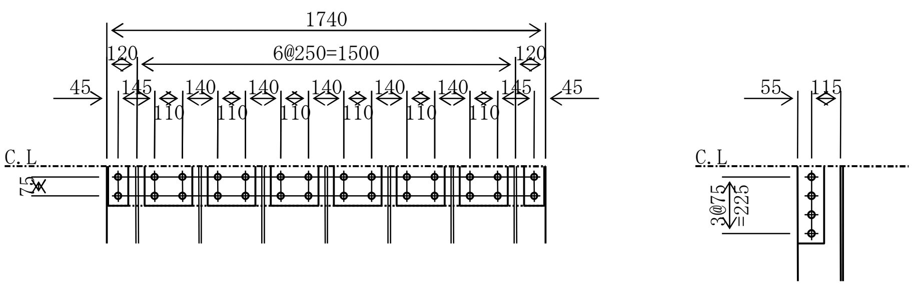
(b) Section area of main plate

1-LFLG PL 1740 * 10 Ag = 174.0 cm^2 (SM490Y)

5-RIB PL 170 * 17 Agr = 144.5 cm^2 (SM490Y)

ΣAg = Ag + Agr = 174.0 + 144.5 = 318.5 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 10 A = 174.0

(174.0 - (14* 2.5)* 1.0) * 1.1 = 152.9 < 174.0 ∴An = 152.9 cm^2

5-RIB PL 170 * 17 Ar = 144.5

(144.5 - 5*(1* 2.7)* 1.7) * 1.1 = 133.7 < 144.5 ∴Anr = 133.7 cm^2

ΣAn = An + Anr = 152.9 + 133.7 = 286.6 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 12 * 318.5 / 286.6 = 13 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σ ta * An / 1.1 = 158 * 15290 / 1.1 = 2189250 N

> σ tn * An = 13 * 15290 = 205428 N

Pc = σ c * Ag = 143 * 17400 = 2480583 N

・Rib Ptr = 0.75σ ta * Anr / 1.1 = 158 * 13371 / 1.1 = 1914413 N

> σ tn * Anr = 13 * 13371 = 179639 N

Pcr = σ c * Agr = 143 * 14450 = 2060025 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 152.9 / 2 = 76.5 cm^2

AgR = Ag / 2 = 174.0 / 2 = 87.0 cm^2

・Rib AnrR = Anr = 133.7 cm^2

AgrR = Agr = 144.5 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2480583 / 108000 = 23.0 pcs. (28 bolts will be used.)

・Rib nr = Pcr / (108000 * 1.00) = 2060025 / 108000 = 19.1 pcs. (5 @ 4 = 20 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 28 = 2480583 / 28 = 88592$ N

$\rho s = \tau * Ag / 28 = 21 * 17400 / 28 = 13049$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(88592^2 + 13049^2)} = 89548$ N $< \rho a = 108000$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm²)	deduction of bolt holes		Ans(cm²)
2-SPL PL	80 * 9	(14.4 -	2*(1*2.5)* 0.9)*1.1= 10.9<	14.4	∴ 10.9
6-SPL PL	190 * 9	(102.6 -	6*(2*2.5)* 0.9)*1.1= 83.2<	102.6	∴ 83.2
		117.0			94.1
		> AgR			> AnR
1-SPL PL	1730 * 9	(155.7 -	(14*2.5)* 0.9)*1.1= 136.6<	155.7	∴136.6
		> AgR			> AnR
10-SPL PL	100 * 17	(170.0 -	10*(1*2.7)* 1.7)*1.1= 136.5<	170.0	∴136.5
		> AgrR			>AnrR

(49) G1 J-17(Sec-17) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 3062 * 15   A = 459.4 cm^2 (SM490Y)

(b) Design stress

σU = 62 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

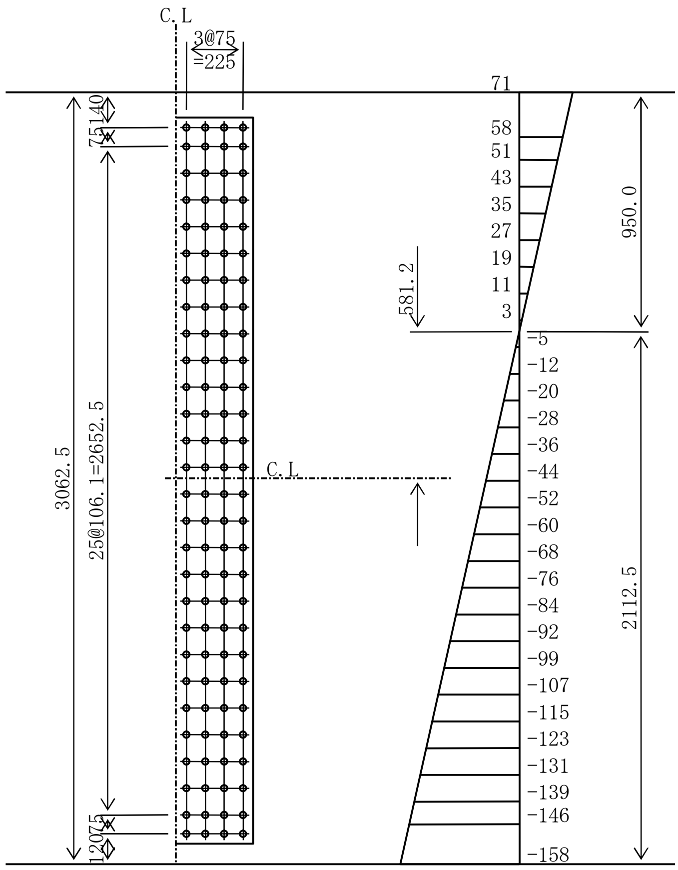
σL = -137 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 62 / 137 = 71 N/mm^2

σLn = 158 N/mm^2

τ = 36 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 15 * (146 + 158) / 2 = 358223 N

Required bolt number (Bolt number to be used)

N1 = 358223 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 112 = 36 * 45937 / 112 = 14739 N < ρa = 108000 N

Combined stress

$\rho c28$ = $\sqrt{((358223 / 4)^2 + 14739^2)}$ = 90760 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2882 * 9 As = 518.8 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 5406181 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 5142266 cm^4

Bending moment to be shared by the web

Mw = 158 * 5142266*10^4 / 2112 = 3834*10^6 N·mm

Bending stress of splice plates

σsp = 3834*10^6 / (5406181*10^4) * 2032 = 144 N/mm^2 ＜ σa = 210 N/mm^2

(50) G1 J-17(Sec-17) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2730 * 15 A = 409.5 cm^2 (SM490Y)

(b) Design stress

σU = 66 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

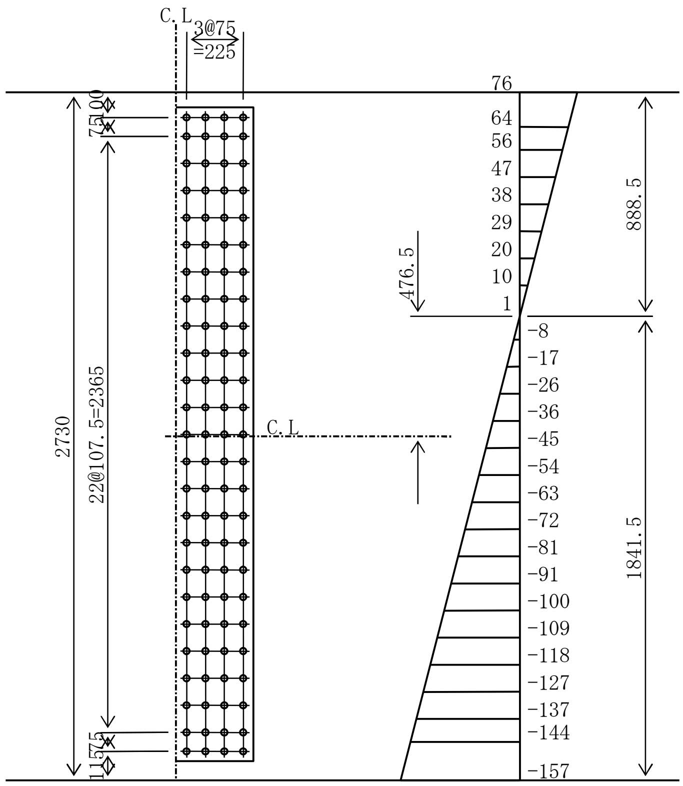
σL = -137 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 66 / 137 = 76 N/mm^2

σLn = 158 N/mm^2

τ = 35 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (144 + 157) / 2 = 345363 N

Required bolt number (Bolt number to be used)

N1 = 345363 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 35 * 40950 / 100 = 14450 N < ρa = 108000 N

Combined stress

ρc25 = $\sqrt{((345363 / 4)^2 + 14450^2)}$ = 87542 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2595 * 9 As = 467.1 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3648598 cm^4 > Iw

Moment of inertia of web plate Iw = 3473028 cm^4

Bending moment to be shared by the web

Mw = 158 * 3473028*10^4 / 1841 = 2970*10^6 N·mm

Bending stress of splice plates

σsp = 2970*10^6 / (3648598*10^4) * 1766 = 144 N/mm^2 < σa = 210 N/mm^2

(51) G1 J-17(Sec-17) LFLG

(a) Acting stress

σ cmax = -138 N/mm^2 0.75 σ ca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma$ c = 158 N/mm^2

τ max = 27 N/mm^2

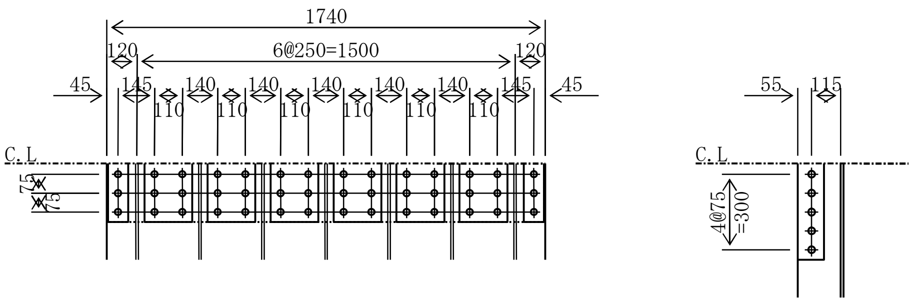
(b) Section area of main plate

1-LFLG PL 1740 * 12 Ag = 208.8 cm^2 (SM490Y)

5-RIB PL 170 * 17 Agr = 144.5 cm^2 (SM490Y)

ΣAg = Ag + Agr = 208.8 + 144.5 = 353.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σ c * Ag = 158 * 20880 = 3288600 N

・Rib Pcr = σ c * Agr = 158 * 14450 = 2275875 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 208.8 / 2 = 104.4 cm^2

・Rib AgrR = Agr = 144.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 3288600 / 108000 = 30.4 pcs. (42 bolts will be used.)

・Rib nr = Pcr / (108000 * 1.00) = 2275875 / 108000 = 21.1 pcs. (5 @ 5 = 25 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,5 unites)

(g) Tensile force per one bolt

ρ p = Pc / 42 = 3288600 / 42 = 78300 N

ρ s = τ * Ag / 42 = 27 * 20880 / 42 = 13573 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(78300^2 + 13573^2)}$ = 79468 N < ρ a = 108000 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)
2-SPL PL	80 * 9	14.4
6-SPL PL	190 * 9	102.6
		117.0

> AgR = 104.4cm^2

1-SPL PL 1730 * 9 155.7 > AgR = 104.4cm^2

10-SPL PL 100 * 15 150.0 > AgrR = 144.5cm^2

(52) G1 J-18(Sec-18) LWEB

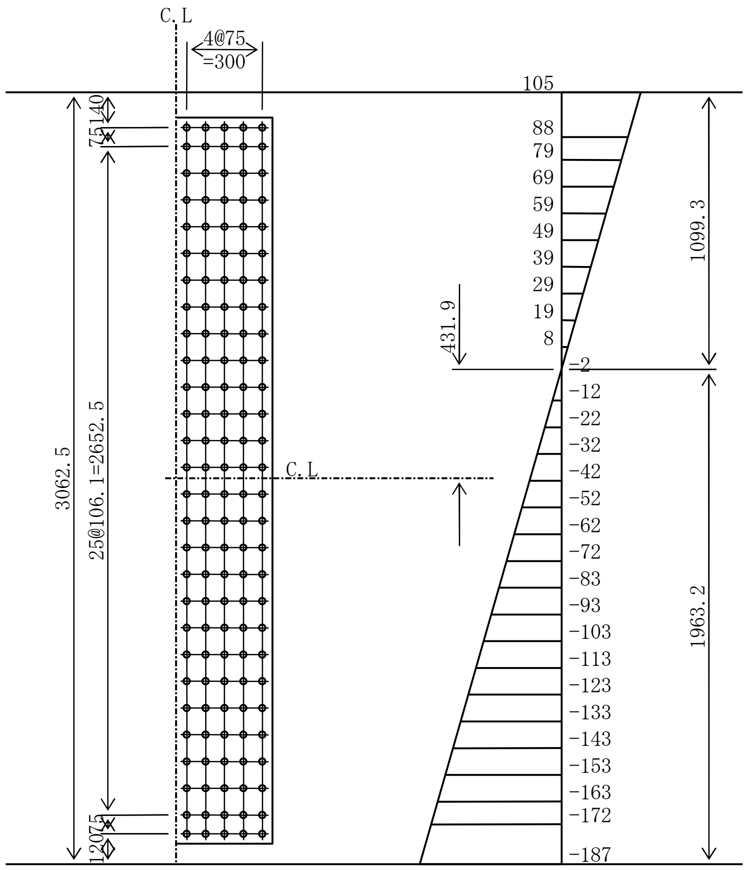
(a) Section area of main plate (Web plate)

1-LWEB PL 3062 * 15 A = 459.4 cm^2 (SM490Y)

(b) Design stress

σU = 105 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = -187 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 105 N/mm^2
σLn = 187 N/mm^2
τ = 45 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row
Sharing width: b1 = 15.8 cm
Total force to be shared
P1 = 158 * 15 * (172 + 187) / 2 = 424120 N
Required bolt number (Bolt number to be used)
N1 = 424120 / (108000 * 1.00) = 3.9 pcs. (5 bolts will be used.)

Check of shear force
ρs = τ * A / 140 = 45 * 45937 / 140 = 14917 N < ρa = 108000 N
Combined stress
$\rho c28$ = $\sqrt{((424120 / 5)^2 + 14917^2)}$ = 86126 N < ρa = 108000 N
(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 5 unites)

(e) Check of splice plates

2-SPL PL 2882 ＊ 9 As = 518.8 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4605922 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4447455 cm^4

Bending moment to be shared by the web

Mw = 187 ＊ $4447455*10^4$ / 1963 = $4237*10^6$ N・mm

Bending stress of splice plates

σsp = $4237*10^6$ / ($4605922*10^4$) ＊ 1883 = 173 N/mm^2 ＜ σa = 210 N/mm^2

(53) G1 J-18(Sec-18) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2730 * 15 A = 409.5 cm^2 (SM490Y)

(b) Design stress

σU = 111 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

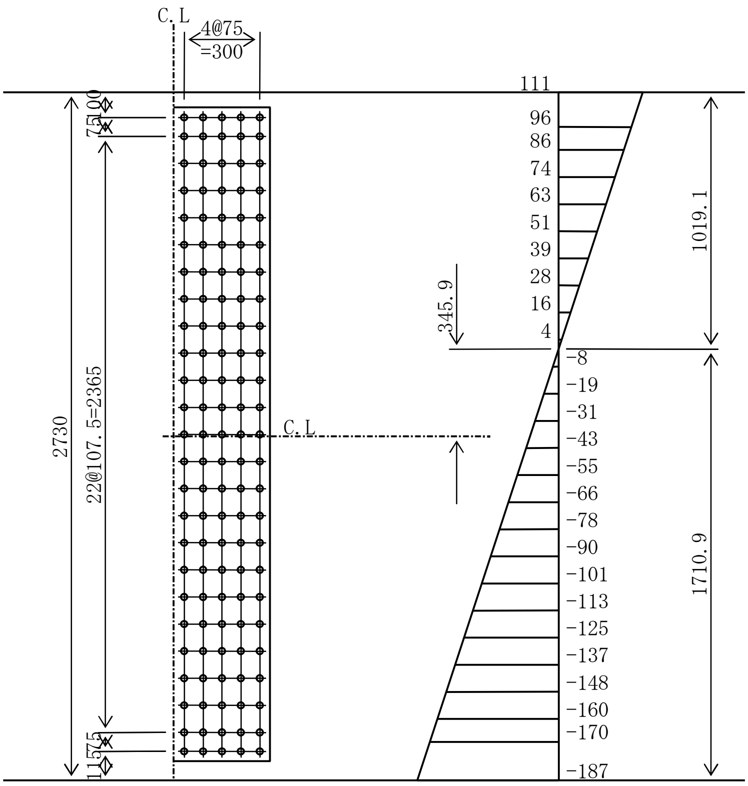
σL = -187 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 111 N/mm^2

σLn = 187 N/mm^2

τ = 45 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (170 + 187) / 2 = 407892 N

Required bolt number (Bolt number to be used)

N1 = 407892 / (108000 * 1.00) = 3.8 pcs. (5 bolts will be used.)

Check of shear force

ρs = τ * A / 125 = 45 * 40950 / 125 = 14720 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((407892 / 5)^2 + 14720^2)}$ = 82896 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 5 unites)

(e) Check of splice plates

2-SPL PL 2595 ＊ 9 As = 467.1 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3156262 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3033386 cm^4

Bending moment to be shared by the web

Mw = 187 ＊ $3033386*10^4$ / 1711 = $3309*10^6$ N･mm

Bending stress of splice plates

σsp = $3309*10^6$ / ($3156262*10^4$) ＊ 1636 = 172 N/mm^2 ＜ σa = 210 N/mm^2

(54) G1　J-18(Sec-18)　LFLG

(a) Acting stress

$\sigma cmax$ = −189 N/mm^2　　0.75 σca = 0.75 ＊ 210 = 158 N/mm^2

∴ σc = 189 N/mm^2

τmax = 22 N/mm^2

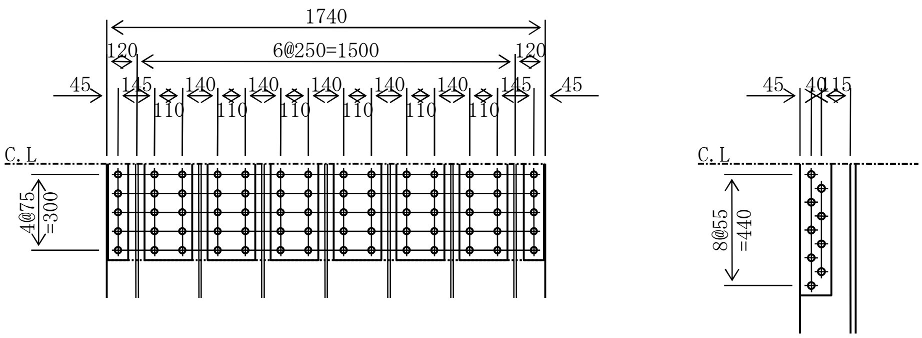
(b) Section area of main plate

1-LFLG　PL　1740 ＊ 21　　Ag = 365.4 cm^2　(SM490Y)

5-RIB　PL　200 ＊ 22　　Agr = 220.0 cm^2　(SM490Y)

ΣAg = Ag + Agr = 365.4 + 220.0 = 585.4 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate　Pc = σc ＊ Ag = 189 ＊ 36540 = 6903575 N

・Rib　Pcr = σc ＊ Agr = 189 ＊ 22000 = 4156504 N

(e) Required section area of the splice plates

・Mother material(One side)　AgR = Ag / 2 = 365.4 / 2 = 182.7 cm^2

・Rib　　AgrR = Agr = 220.0 cm^2

(f) Required bolt number

・Main plate　n = Pc / (108000 ＊ 1.00) = 6903575 / 108000 = 63.9 pcs. (70 bolts will be used.)

・Rib　nr = Pcr / (108000 ＊ 0.98) = 4156504 / 105840 = 39.3 pcs. (5 @ 9 = 45 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 5,9 unites)

(g) Tensile force per one bolt

ρp = Pc / 70 = 6903575 / 70 = 98623 N

ρs = τ ＊ Ag / 70 = 22 ＊ 36540 / 70 = 11698 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(98623^2 + 11698^2)}$ = 99314 N ＜ ρa = 108000 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)
2-SPL PL	80 ＊ 15	24.0
6-SPL PL	190 ＊ 15	171.0
		195.0

＞ AgR = 182.7cm^2

1-SPL PL 1730 ＊ 11　　190.3 ＞ AgR = 182.7cm^2

10-SPL PL　120 ＊ 19　　228.0 ＞ AgrR = 220.0cm^2

(55) G1 J-19(Sec-19) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 3062 * 17 A = 520.6 cm^2 (SM490Y)

(b) Design stress

σU = 148 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

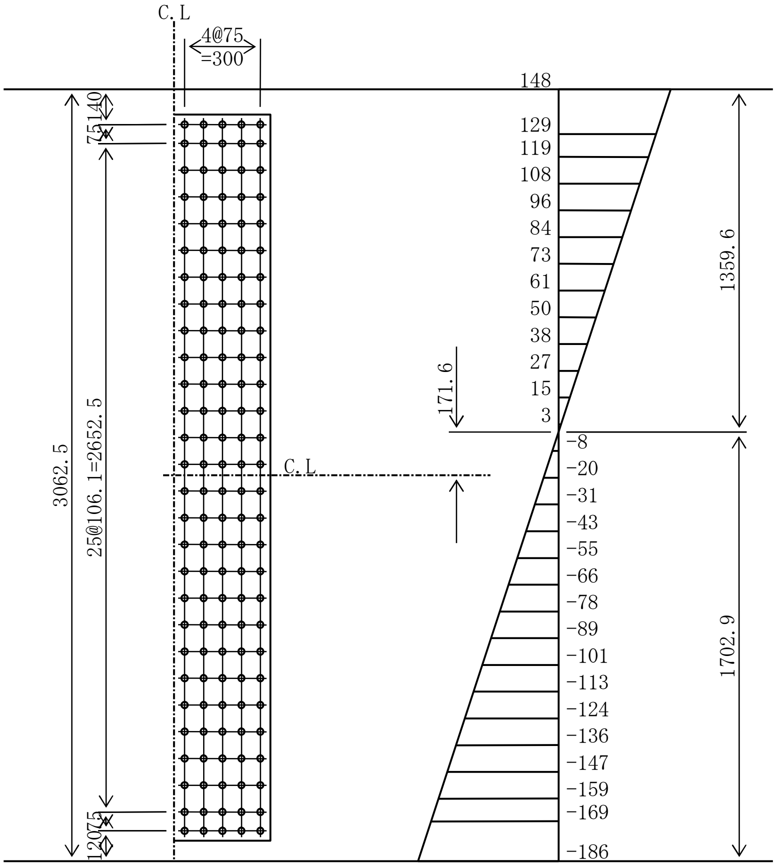
σL = -186 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 148 N/mm^2

σLn = 186 N/mm^2

τ = 48 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 17 * (169 + 186) / 2 = 474795 N

Required bolt number (Bolt number to be used)

N1 = 474795 / (108000 * 1.00) = 4.4 pcs. (5 bolts will be used.)

Check of shear force

ρs = τ * A / 140 = 48 * 52062 / 140 = 17907 N < ρa = 108000 N

Combined stress

$\rho c28$ = $\sqrt{((474795 / 5)^2 + 17907^2)}$ = 96633 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 5 unites)

(e) Check of splice plates

2-SPL PL 2882 * 11 As = 634.1 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4599994 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4222385 cm^4

Bending moment to be shared by the web

$Mw = 186 * 4222385*10^4 / 1703 = 4610*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 4610*10^6 / (4599994*10^4) * 1623 = 163$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(56) G1 J-19(Sec-19) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2730 * 17 A = 464.1 cm^2 (SM490Y)

(b) Design stress

σU = 156 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

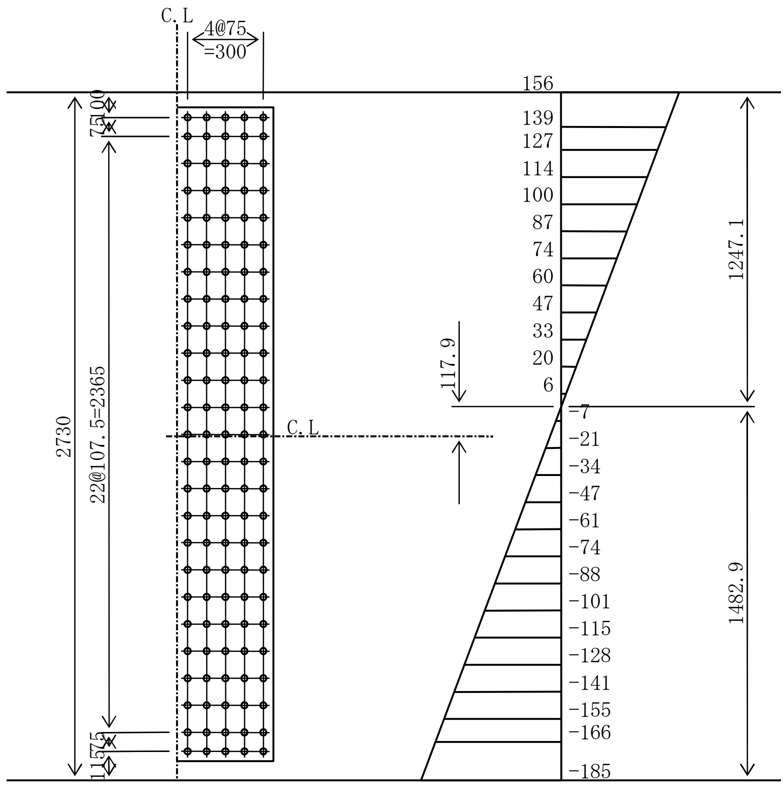
σL = -185 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 156 N/mm^2

σLn = 185 N/mm^2

τ = 47 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 17 * (166 + 185) / 2 = 455770 N

Required bolt number (Bolt number to be used)

N1 = 455770 / (108000 * 1.00) = 4.2 pcs. (5 bolts will be used.)

Check of shear force

ρs = τ * A / 125 = 47 * 46410 / 125 = 17620 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{}$((455770 / 5)^2 + 17620^2) = 92841 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 5 unites)

(e) Check of splice plates

2-SPL PL 2595 * 11 As = 570.9 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3273266 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2946896 cm^4

Bending moment to be shared by the web

Mw = 185 * 2946896*10^4 / 1483 = 3683*10^6 N·mm

Bending stress of splice plates

σsp = 3683*10^6 / (3273266*10^4) * 1408 = 158 N/mm^2 ＜ σa = 210 N/mm^2

(57) G1 J-19(Sec-19) LFLG

(a) Acting stress

$\sigma cmax$ = -190 N/mm² 0.75 σca = 0.75 * 210 = 158 N/mm²

∴ σc = 190 N/mm²

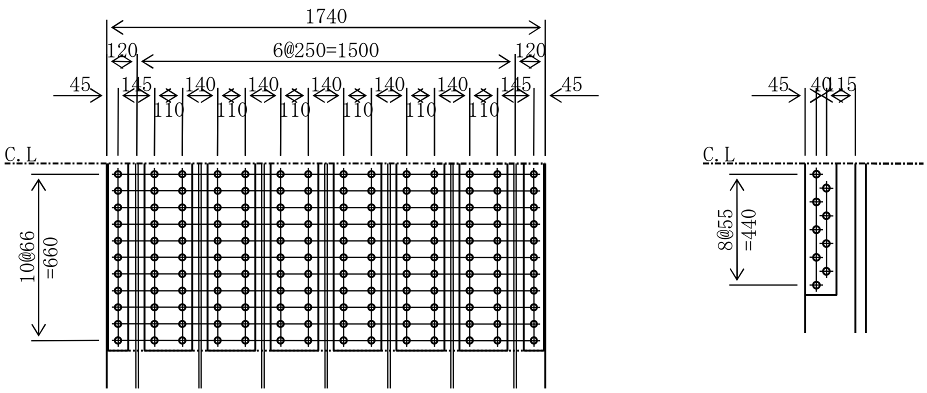
τmax = 15 N/mm²

(b) Section area of main plate

1-LFLG	PL	1740 * 41	Ag =	713.4 cm²	(SM520-H)
5-RIB	PL	200 * 22	Agr =	220.0 cm²	(SM490Y)

ΣAg = Ag + Agr = 713.4 + 220.0 = 933.4 cm²

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 190 * 71340 = 13587987 N

・Rib Pcr = σc * Agr = 190 * 22000 = 4190296 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 713.4 / 2 = 356.7 cm²

・Rib AgrR = Agr = 220.0 cm²

(f) Required bolt number

・Main plate n = Pc / (108000 * 0.94) = 13587987 / 101520 = 133.8 pcs. (154 bolts will be used.)

・Rib nr = Pcr / (108000 * 0.98) = 4190296 / 105840 = 39.6 pcs. (5 @ 9 = 45 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 11,9 unites)

(g) Tensile force per one bolt

ρp = Pc / 154 = 13587987 / 154 = 88234 N

ρs = τ * Ag / 154 = 15 * 71340 / 154 = 6890 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(88234^2 + 6890^2)}$ = 88502 N < ρa = 101520 N

(h) Check of splice plates

	(SM490Y)	Ags(cm²)
2-SPL PL	80 * 28	44.8
6-SPL PL	190 * 28	319.2
		364.0

> AgR = 356.7cm²

1-SPL PL 1730 * 21 363.3 > AgR = 356.7cm²

10-SPL PL 120 * 19 228.0 ＞ AgrR = 220.0cm^2

(58) G1 J-20(Sec-21) LWEB

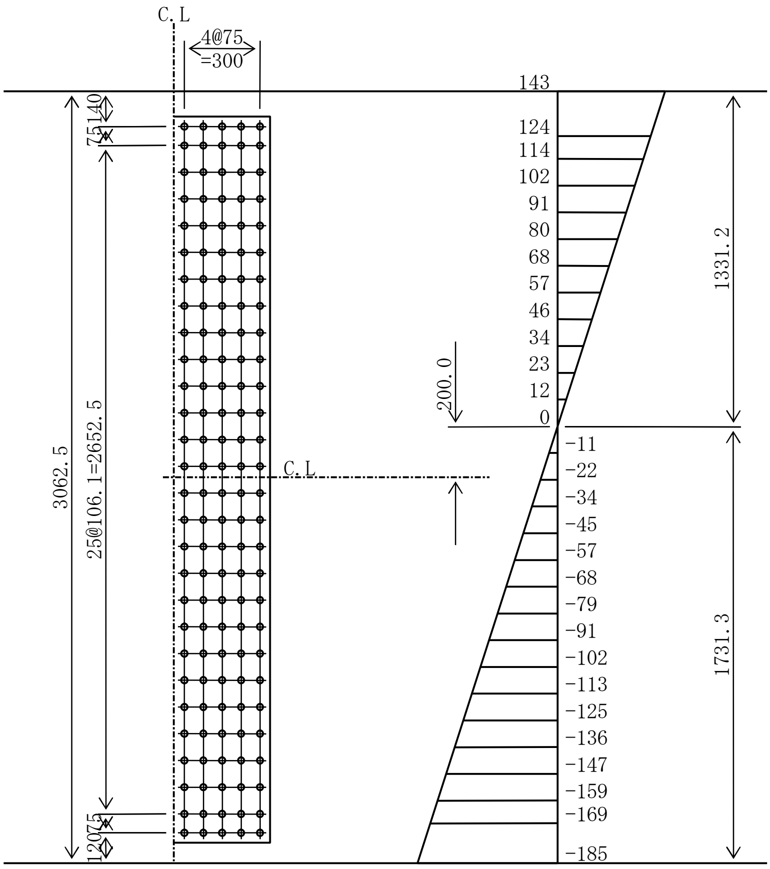
(a) Section area of main plate (Web plate)

1-LWEB PL 3062 * 17 A = 520.6 cm^2 (SM490Y)

(b) Design stress

σU = 143 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = -185 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 143 N/mm^2
σLn = 185 N/mm^2
τ = 60 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 17 * (169 + 185) / 2 = 473849 N

Required bolt number (Bolt number to be used)

N1 = 473849 / (108000 * 1.00) = 4.4 pcs. (5 bolts will be used.)

Check of shear force

ρs = τ * A / 140 = 60 * 52062 / 140 = 22142 N < ρa = 108000 N

Combined stress

$\rho c28$ = $\sqrt{((473849 / 5)^2 + 22142^2)}$ = 97322 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 5 unites)

(e) Check of splice plates

2-SPL PL 2882 * 11 As = 634.1 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4670570 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4277368 cm^4

Bending moment to be shared by the web

Mw = 185 ＊ 4277368*10^4 / 1731 = 4581*10^6 N･mm

Bending stress of splice plates

σsp = 4581*10^6 / (4670570*10^4) ＊ 1651 = 162 N/mm^2 ＜ σa = 210 N/mm^2

(59) G1 J-20(Sec-21) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2730 * 17 A = 464.1 cm^2 (SM490Y)

(b) Design stress

σU = 150 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

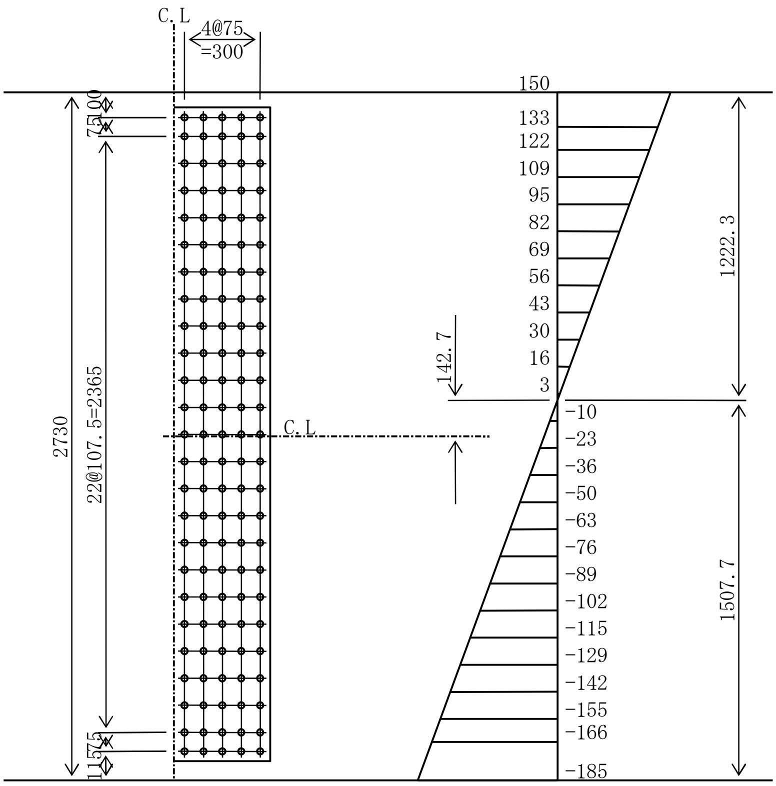
σL = -185 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 150 N/mm^2

σLn = 185 N/mm^2

τ = 59 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 17 * (166 + 185) / 2 = 454934 N

Required bolt number (Bolt number to be used)

N1 = 454934 / (108000 * 1.00) = 4.2 pcs. (5 bolts will be used.)

Check of shear force

ρs = τ * A / 125 = 59 * 46410 / 125 = 21775 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{}$((454934 / 5)^2 + 21775^2) = 93556 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 5 unites)

(e) Check of splice plates

2-SPL PL 2595 * 11 As = 570.9 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3308109 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2976951 cm^4

Bending moment to be shared by the web

Mw = 185 * 2976951*10^4 / 1508 = 3649*10^6 N･mm

Bending stress of splice plates

σsp = 3649*10^6 / (3308109*10^4) * 1433 = 158 N/mm^2 ＜ σa = 210 N/mm^2

(60) G1 J-20(Sec-21) LFLG

(a) Acting stress

σ cmax = -189 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma$ c = 189 N/mm^2

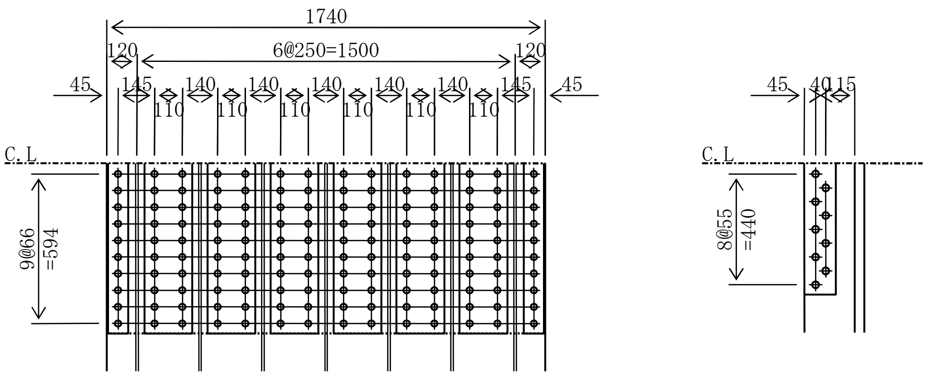
τ max = 20 N/mm^2

(b) Section area of main plate

1-LFLG	PL	1740 * 38	Ag =	661.2 cm^2	(SM490Y)
5-RIB	PL	200 * 22	Agr =	220.0 cm^2	(SM490Y)

ΣAg = Ag + Agr = 661.2 + 220.0 = 881.2 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 189 * 66120 = 12529542 N

・Rib Pcr = σc * Agr = 189 * 22000 = 4168934 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 661.2 / 2 = 330.6 cm^2

・Rib AgrR = Agr = 220.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 0.96) = 12529542 / 103680 = 120.8 pcs. (140 bolts will be used.)

・Rib nr = Pcr / (108000 * 0.98) = 4168934 / 105840 = 39.4 pcs. (5 @ 9 = 45 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 10,9 unites)

(g) Tensile force per one bolt

ρp = Pc / 140 = 12529542 / 140 = 89497 N

ρs = τ * Ag / 140 = 20 * 66120 / 140 = 9221 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(89497^2 + 9221^2) = 89971 N < ρa = 103680 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)
2-SPL PL	80 * 26	41.6
6-SPL PL	190 * 26	296.4
		338.0

> AgR = 330.6cm^2

1-SPL PL 1730 * 20 346.0 > AgR = 330.6cm^2

10-SPL PL 120 * 19 228.0 ＞ AgrR = 220.0cm^2

(61) G1 J-21(Sec-22) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 3062 * 15   A = 459.4 cm^2 (SM490Y)

(b) Design stress

σU =   84 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

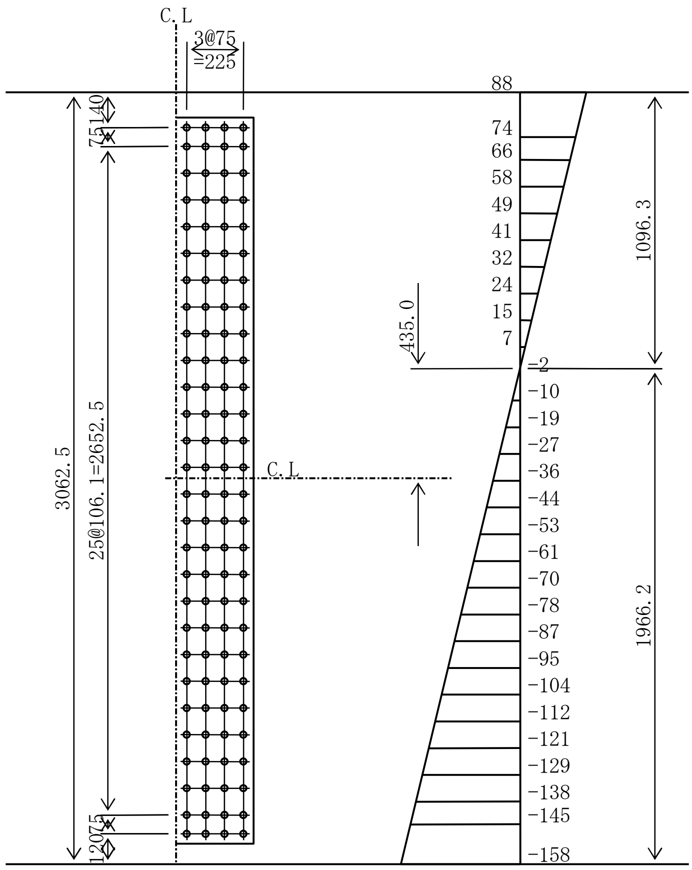
σL = -150 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 *   84 /   150 =   88 N/mm^2

σLn = 158 N/mm^2

τ =   62 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 15 * (145 + 158) / 2 = 357191 N

Required bolt number (Bolt number to be used)

N1 = 357191 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 112 = 62 * 45937 / 112 = 25395 N < ρa = 108000 N

Combined stress

$\rho c28$ = $\sqrt{((357191 / 4)^2 + 25395^2)}$ = 92839 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2882 ＊ 9   As = 518.8 cm^2 (SM490Y)

Moment of inertia of splice plates   Is = 4619807 cm^4 ＞ Iw

Moment of inertia of web plate   Iw = 4459471 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ $4459471*10^4$ / 1966 = $3572*10^6$ N･mm

Bending stress of splice plates

σsp = $3572*10^6$ / ($4619807*10^4$) ＊ 1886 = 146 N/mm^2 ＜ σa = 210 N/mm^2

(62) G1 J-21(Sec-22) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2730 * 15 A = 409.5 cm^2 (SM490Y)

(b) Design stress

σU = 89 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

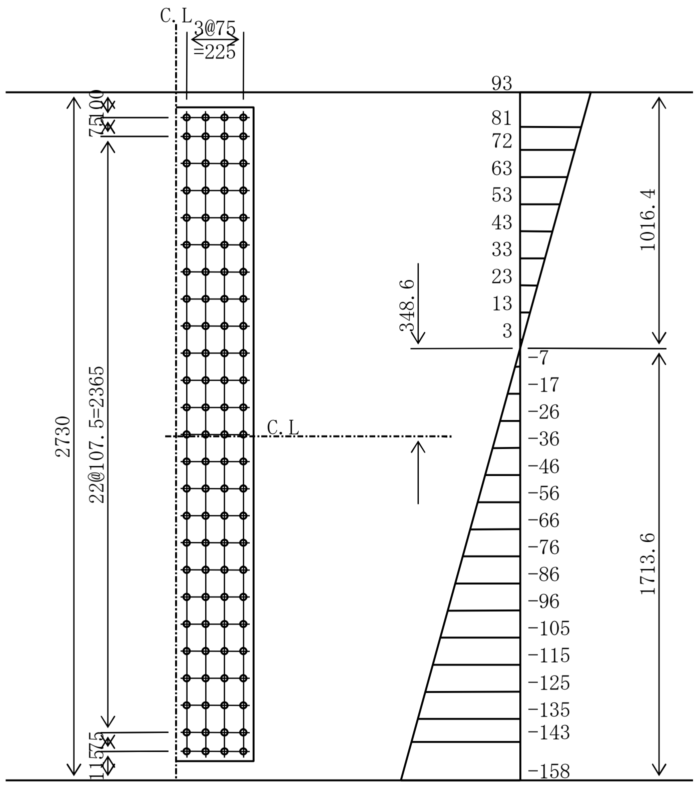
σL = -150 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 89 / 150 = 93 N/mm^2

σLn = 158 N/mm^2

τ = 61 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (143 + 158) / 2 = 344250 N

Required bolt number (Bolt number to be used)

N1 = 344250 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 61 * 40950 / 100 = 25047 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((344250 / 4)^2 + 25047^2)}$ = 89633 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2595 ＊ 9   As = 467.1 cm^2 (SM490Y)

Moment of inertia of splice plates   Is = 3164629 cm^4 ＞ Iw

Moment of inertia of web plate   Iw = 3040883 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ $3040883*10^4$ / 1714 = $2795*10^6$ N･mm

Bending stress of splice plates

σsp = $2795*10^6$ / ($3164629*10^4$) ＊ 1639 = 145 N/mm^2 ＜ σa = 210 N/mm^2

(63) G1　J-21(Sec-22)　LFLG

(a) Acting stress

σ cmax = -152 N/mm^2　　0.75 σ ca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma$ c = 158 N/mm^2

τ max = 34 N/mm^2

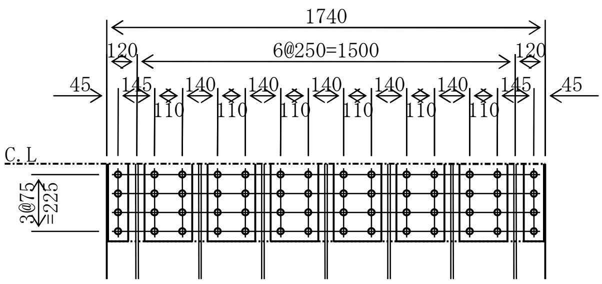
(b) Section area of main plate

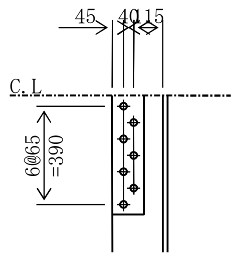
1-LFLG　PL　1740 * 19　　Ag = 330.6 cm^2　(SM490Y)

5-RIB　PL　200 * 22　　Agr = 220.0 cm^2　(SM490Y)

ΣAg = Ag + Agr = 330.6 + 220.0 = 550.6 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate　Pc = σ c * Ag = 158 * 33060 = 5206950 N

・Rib　Pcr = σ c * Agr = 158 * 22000 = 3465000 N

(e) Required section area of the splice plates

・Mother material(One side)　AgR = Ag / 2 = 330.6 / 2 = 165.3 cm^2

・Rib　AgrR = Agr = 220.0 cm^2

(f) Required bolt number

・Main plate　n = Pc / (108000 * 1.00) = 5206950 / 108000 = 48.2 pcs. (56 bolts will be used.)

・Rib　nr = Pcr / (108000 * 1.00) = 3465000 / 108000 = 32.1 pcs. (5 @ 7 = 35 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.)　Nmax = 4,7 unites)

(g) Tensile force per one bolt

ρ p = Pc / 56 = 5206950 / 56 = 92981 N

ρ s = τ * Ag / 56 = 34 * 33060 / 56 = 19837 N

$\rho = \sqrt{}(\rho p^2 + \rho s^2) = \sqrt{}(92981^2 + 19837^2) = 95074$ N $< \rho$ a = 108000 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)
2-SPL PL	80 * 13	20.8
6-SPL PL	190 * 13	148.2
		169.0

> AgR = 165.3cm^2

1-SPL PL 1730 * 10　　173.0　> AgR = 165.3cm^2

10-SPL PL　120 * 19　　228.0　> AgrR = 220.0cm^2

(64) G1 J-22(Sec-23) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 3062 * 15 A = 459.4 cm^2 (SM490Y)

(b) Design stress

σU = 25 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

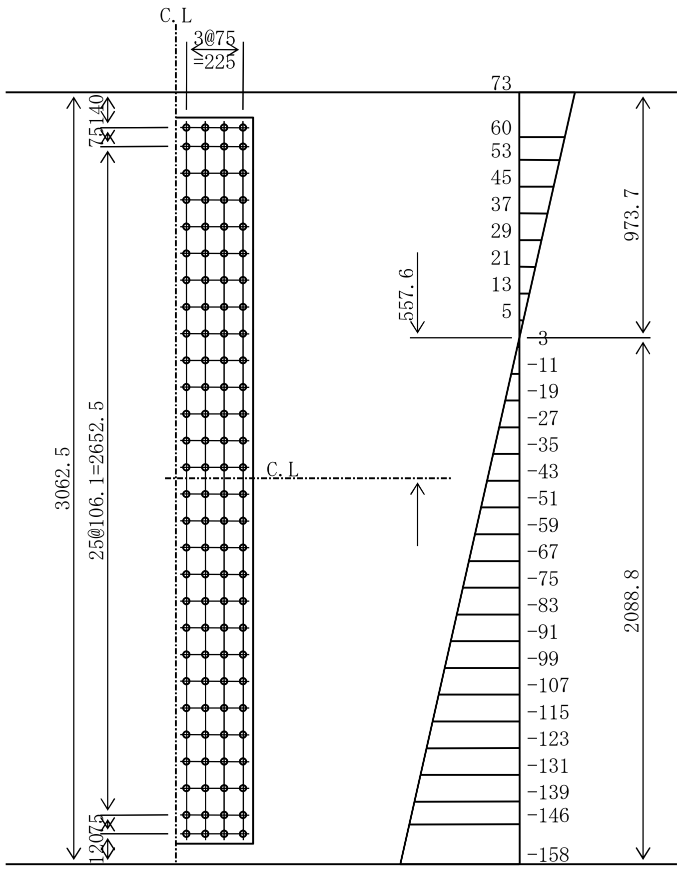
σL = -53 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 25 / 53 = 73 N/mm^2

σLn = 158 N/mm^2

τ = 55 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 15 * (146 + 158) / 2 = 358066 N

Required bolt number (Bolt number to be used)

N1 = 358066 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 112 = 55 * 45937 / 112 = 22439 N < ρa = 108000 N

Combined stress

$\rho c28$ = $\sqrt{((358066 / 4)^2 + 22439^2)}$ = 92286 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2882 * 9 As = 518.8 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 5263949 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 5018511 cm^4

Bending moment to be shared by the web

$Mw = 158 * 5018511*10^4 / 2089 = 3784*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 3784*10^6 / (5263949*10^4) * 2009 = 144$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(65) G1 J-22(Sec-23) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2730 * 15   A = 409.5 cm^2 (SM490Y)

(b) Design stress

σU =   27 N/mm^2 < σa * 0.75 =   210 * 0.75 =   158 N/mm^2

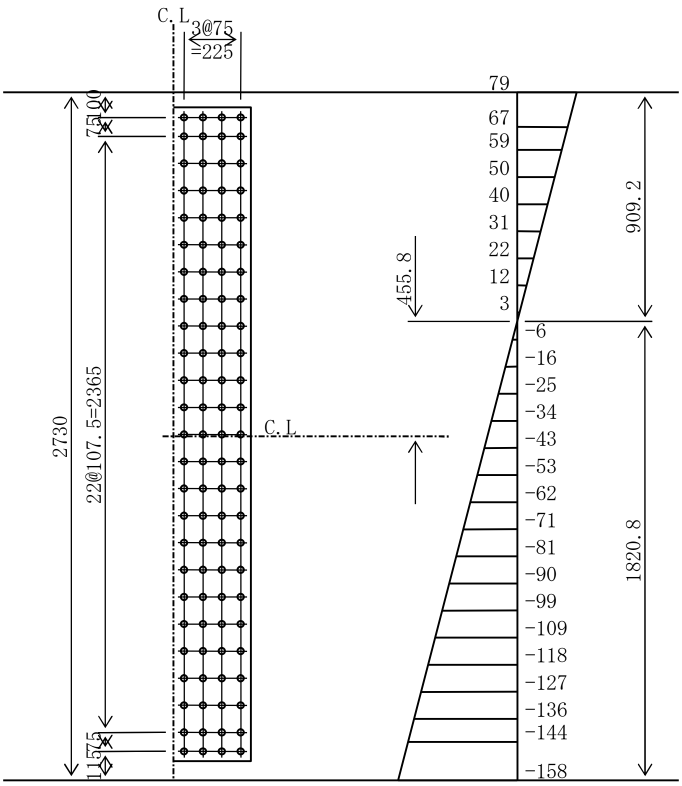
σL =   -53 N/mm^2 < σa * 0.75 =   210 * 0.75 =   158 N/mm^2

σUn =   158 *   27 /   53 =   79 N/mm^2

σLn =   158 N/mm^2

τ =   54 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 =   153 * 15 * (144 + 158) / 2 = 345194 N

Required bolt number (Bolt number to be used)

N1 = 345194 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 =   54 *   40950 / 100 =   22062 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((345194 / 4)^2 + 22062^2)}$ =   89074 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2595 ＊ 9 As = 467.1 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3559951 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3394042 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ 3394042*10^4 / 1821 = 2936*10^6 N·mm

Bending stress of splice plates

σsp = 2936*10^6 / (3559951*10^4) ＊ 1746 = 144 N/mm^2 ＜ σa = 210 N/mm^2

(66) G1 J-22(Sec-23) LFLG

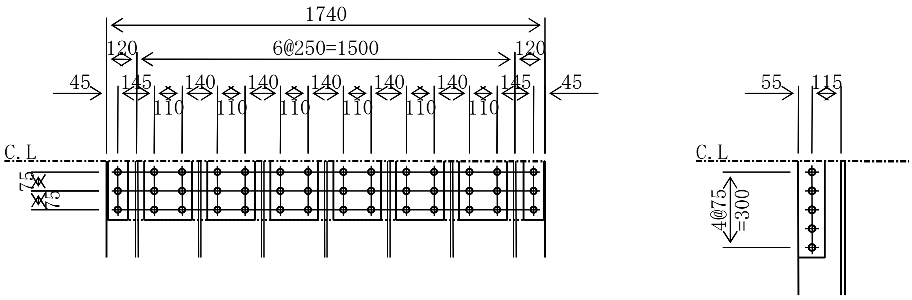
(a) Acting stress

σ tmax = 0 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2
σ cmax = -54 N/mm^2 0.75 σ ca = 0.75 * 210 = 158 N/mm^2
∴ σ c = 158 N/mm^2
τ max = 35 N/mm^2

(b) Section area of main plate

1-LFLG PL 1740 * 15 Ag = 261.0 cm^2 (SM490Y)
5-RIB PL 170 * 17 Agr = 144.5 cm^2 (SM490Y)
ΣAg = Ag + Agr = 261.0 + 144.5 = 405.5 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 15 A = 261.0
(261.0 - (14* 2.5)* 1.5) * 1.1 = 229.4 < 261.0 ∴An = 229.4 cm^2
5-RIB PL 170 * 17 Ar = 144.5
(144.5 - 5*(1* 2.7)* 1.7) * 1.1 = 133.7 < 144.5 ∴Anr = 133.7 cm^2
ΣAn = An + Anr = 229.4 + 133.7 = 363.1 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 0 * 405.5 / 363.1 = 0 N/mm^2
< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 158 * 22935 / 1.1 = 3283875 N
> σ tn * An = 0 * 22935 = 7429 N
Pc = σ c * Ag = 158 * 26100 = 4110750 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 158 * 13371 / 1.1 = 1914413 N
> σ tn * Anr = 0 * 13371 = 4331 N
Pcr = σ c * Agr = 158 * 14450 = 2275875 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 229.4 / 2 = 114.7 cm^2
AgR = Ag / 2 = 261.0 / 2 = 130.5 cm^2
・Rib AnrR = Anr = 133.7 cm^2
AgrR = Agr = 144.5 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 4110750 / 108000 = 38.1 pcs. (42 bolts will be used.)
・Rib nr = Pcr / (108000 * 1.00) = 2275875 / 108000 = 21.1 pcs. (5 @ 5 = 25 bolts will be used.)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,5 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 42 = 4110750 / 42 = 97875$ N

$\rho s = \tau * Ag / 42 = 35 * 26100 / 42 = 21685$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(97875^2 + 21685^2)} = 100248 \text{ N} < \rho a = 108000$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm²)	deduction of bolt holes		Ans(cm²)
2-SPL PL	80 * 11	(17.6 -	2*(1*2.5)* 1.1)*1.1= 13.3<	17.6	∴ 13.3
6-SPL PL	190 * 11	(125.4 -	6*(2*2.5)* 1.1)*1.1= 101.6<	125.4	∴101.6
		143.0			115.0
		> AgR			> AnR
1-SPL PL	1730 * 9	(155.7 -	(14*2.5)* 0.9)*1.1= 136.6<	155.7	∴136.6
		> AgR			> AnR
10-SPL PL	100 * 17	(170.0 -	10*(1*2.7)* 1.7)*1.1= 136.5<	170.0	∴136.5
		> AgrR			>AnrR

(67) G1 J-23(Sec-23) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 3062 * 15 A = 459.4 cm^2 (SM490Y)

(b) Design stress

σU = -63 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

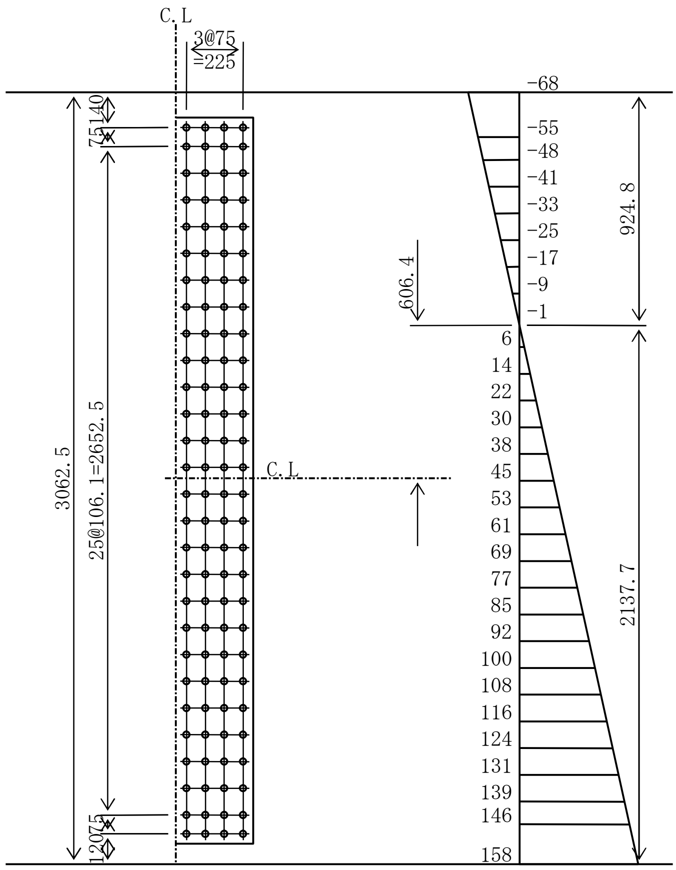
σL = 146 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 63 / 146 = 68 N/mm^2

σLn = 158 N/mm^2

τ = 46 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 15 * (146 + 158) / 2 = 358386 N

Required bolt number (Bolt number to be used)

N1 = 358386 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

$\rho s = \tau$ * A / 112 = 46 * 45937 / 112 = 18872 N < ρa = 108000 N

Combined stress

$\rho c28 = \sqrt{((358386 / 4)^2 + 18872^2)}$ = 91562 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2882 ＊ 9 As = 518.8 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 5563909 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 5279601 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ 5279601*10^4 / 2138 = 3890*10^6 N･mm

Bending stress of splice plates

σsp = 3890*10^6 / (5563909*10^4) ＊ 2058 = 144 N/mm^2 ＜ σa = 210 N/mm^2

(68) G1 J-23(Sec-23) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2730 * 15 A = 409.5 cm^2 (SM490Y)

(b) Design stress

σU = -68 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

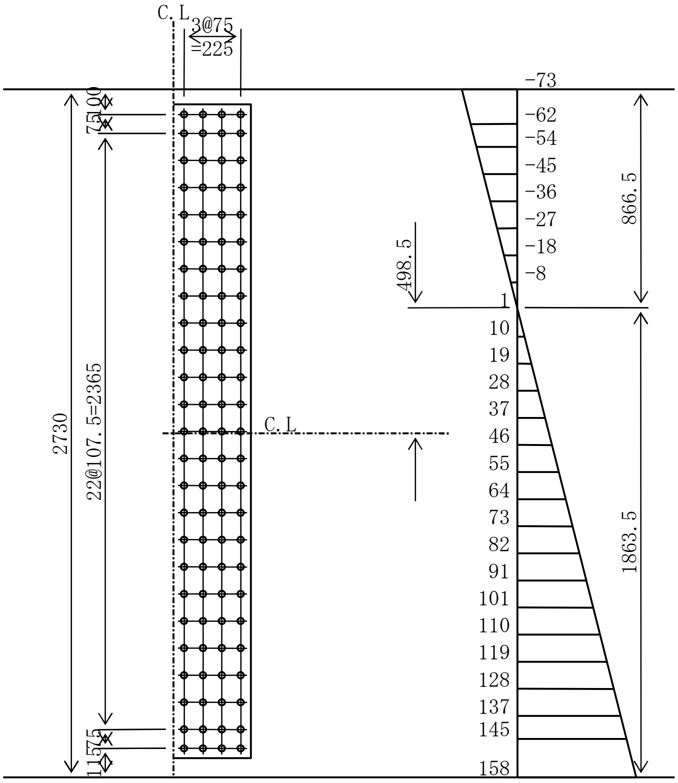
σL = 146 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 68 / 146 = 73 N/mm^2

σLn = 158 N/mm^2

τ = 45 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (145 + 158) / 2 = 345539 N

Required bolt number (Bolt number to be used)

N1 = 345539 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 45 * 40950 / 100 = 18502 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((345539 / 4)^2 + 18502^2)}$ = 88344 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2595 ＊ 9 　 As = 467.1 cm^2 (SM490Y)

Moment of inertia of splice plates 　 Is = 3747337 cm^4 ＞ Iw

Moment of inertia of web plate 　 Iw = 3560944 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ 3560944*10^4 / 1864 = 3010*10^6 N･mm

Bending stress of splice plates

σsp = 3010*10^6 / (3747337*10^4) ＊ 1789 = 144 N/mm^2 ＜ σa = 210 N/mm^2

(69) G1 J-23(Sec-23) LFLG

(a) Acting stress

$\sigma tmax$ = 147 N/mm^2 0.75σta = 0.75 * 210 = 158 N/mm^2

τmax = 26 N/mm^2

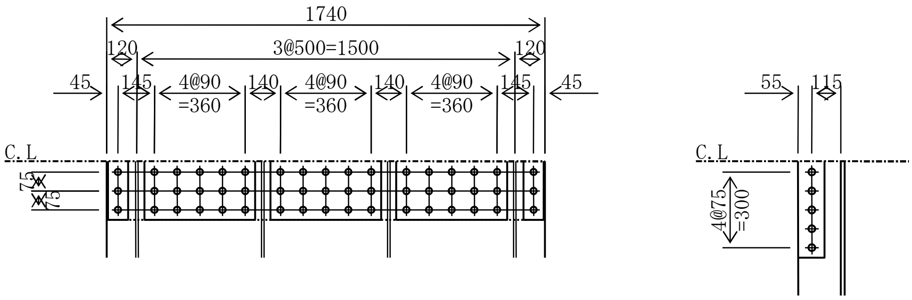
(b) Section area of main plate

1-LFLG PL 1740 * 15 Ag = 261.0 cm^2 (SM490Y)

2-RIB PL 170 * 17 Agr = 57.8 cm^2 (SM490Y)

ΣAg = Ag + Agr = 261.0 + 57.8 = 318.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 15 A = 261.0

(261.0 - (17* 2.5)* 1.5) * 1.1 = 217.0 < 261.0 ∴An = 217.0 cm^2

2-RIB PL 170 * 17 Ar = 57.8

(57.8 - 2*(1* 2.7)* 1.7) * 1.1 = 53.5 < 57.8 ∴Anr = 53.5 cm^2

ΣAn = An + Anr = 217.0 + 53.5 = 270.5 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 147 * 318.8 / 270.5 = 173 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 173 * 21698 = 3764456 N

> 0.75σta * An / 1.1 = 158 * 21698 / 1.1 = 3106688 N

・Rib Ptr = σtn * Anr = 173 * 5348 = 927898 N

> 0.75σta * Anr/ 1.1 = 158 * 5348 / 1.1 = 765765 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 217.0 / 2 = 108.5 cm^2

・Rib AnrR = Anr = 53.5 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 3764456 / 108000 = 34.9 pcs. (51 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 927898 / 108000 = 8.6 pcs. (2 @ 5 = 10 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,5 unites)

(h) Tensile force per one bolt

ρp = Pt / 51 = 3764456 / 51 = 73813 N

ρs = τ * Ag / 51 = 26 * 26100 / 51 = 13516 N

ρ = $\sqrt{}$ (ρp^2 + ρs^2) = $\sqrt{}$ (73813^2 + 13516^2) = 75040 N < ρa = 108000 N

(i) Check of splice plates

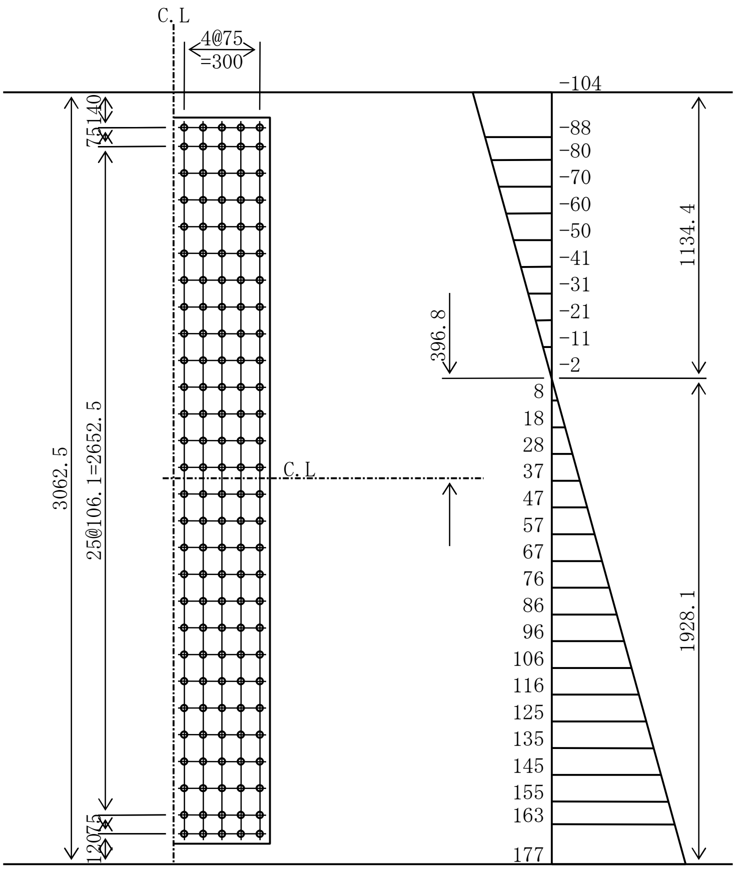
	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 10	(16.0 -	2*(1*2.5)* 1.0)*1.1= 12.1＜	16.0	∴ 12.1
3-SPL PL	440 * 10	(132.0 -	3*(5*2.5)* 1.0)*1.1= 104.0＜	132.0	∴104.0
		148.0			116.1 ＞ AnR
1-SPL PL	1730 * 9	(155.7 -	(17*2.5)* 0.9)*1.1= 129.2＜	155.7	∴129.2 ＞ AnR
4-SPL PL	100 * 17	(68.0 -	4*(1*2.7)* 1.7)*1.1= 54.6＜	68.0	∴ 54.6 ＞AnrR

(70) G1 J-24(Sec-24) LWEB

(a) Section area of main plate (Web plate)
1-LWEB PL 3062 * 15 A = 459.4 cm^2 (SM490Y)

(b) Design stress
σU = -104 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = 177 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 104 N/mm^2
σLn = 177 N/mm^2
τ = 34 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress
Check of bolt at 28th row
Sharing width: b1 = 15.8 cm
Total force to be shared
P1 = 158 * 15 * (163 + 177) / 2 = 402019 N
Required bolt number (Bolt number to be used)
N1 = 402019 / (108000 * 1.00) = 3.7 pcs. (5 bolts will be used.)

Check of shear force
ρs = τ * A / 140 = 34 * 45937 / 140 = 11050 N < ρa = 108000 N
Combined stress
$\rho c28$ = $\sqrt{((402019 / 5)^2 + 11050^2)}$ = 81160 N < ρa = 108000 N
(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 5 unites)

(e) Check of splice plates

2-SPL PL 2882 ＊ 9 As = 518.8 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4451270 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4313757 cm^4

Bending moment to be shared by the web

$Mw = 177 * 4313757*10^4 / 1928 = 3969*10^6$ N･mm

Bending stress of splice plates

$\sigma sp = 3969*10^6 / (4451270*10^4) * 1848 = 165$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(71) G1 J-24(Sec-24) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2730 * 15 A = 409.5 cm^2 (SM490Y)

(b) Design stress

σU = -111 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

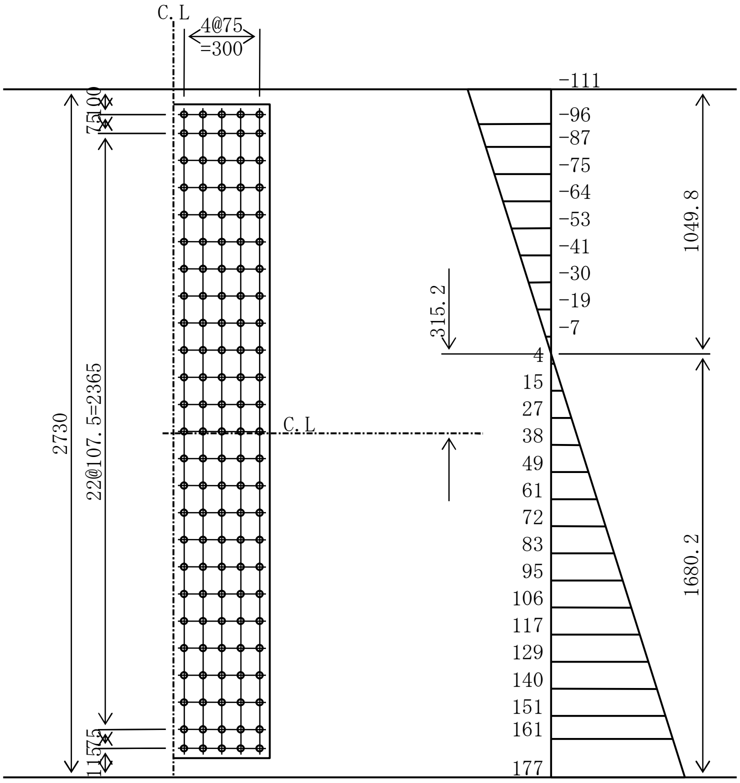
σL = 177 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 111 N/mm^2

σLn = 177 N/mm^2

τ = 33 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (161 + 177) / 2 = 386583 N

Required bolt number (Bolt number to be used)

N1 = 386583 / (108000 * 1.00) = 3.6 pcs. (5 bolts will be used.)

Check of shear force

ρs = τ * A / 125 = 33 * 40950 / 125 = 10923 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((386583 / 5)^2 + 10923^2)}$ = 78085 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 5 unites)

(e) Check of splice plates

2-SPL PL 2595 * 9 As = 467.1 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3063580 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2950247 cm^4

Bending moment to be shared by the web

Mw = 177 * 2950247*10^4 / 1680 = 3108*10^6 N･mm

Bending stress of splice plates

σsp = 3108*10^6 / (3063580*10^4) * 1605 = 163 N/mm^2 ＜ σa = 210 N/mm^2

(72) G1 J-24(Sec-24) LFLG

(a) Acting stress

σ tmax = 180 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

τ max = 12 N/mm^2

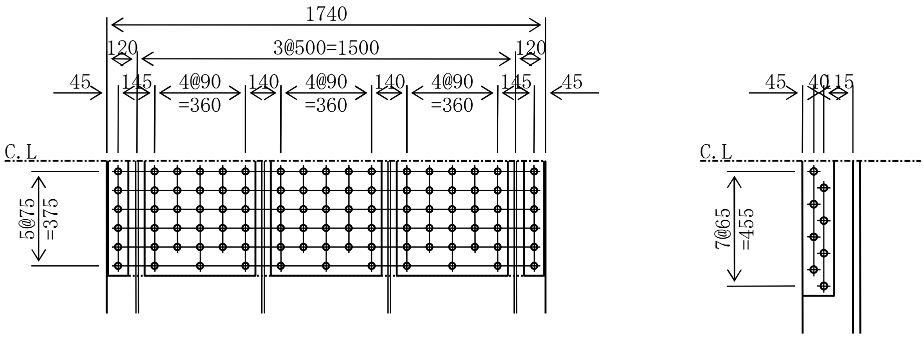
(b) Section area of main plate

1-LFLG PL 1740 * 29 Ag = 504.6 cm^2 (SM490Y)

2-RIB PL 200 * 22 Agr = 88.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 504.6 + 88.0 = 592.6 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 29 A = 504.6

(504.6 - (11* 2.5)* 2.9) * 1.1 = 467.3 < 504.6 ∴An = 467.3 cm^2

2-RIB PL 200 * 22 Ar = 88.0

(88.0 - 2*(1* 2.7+ 1*0.059)* 2.2) * 1.1 = 83.4 < 88.0 ∴Anr = 83.4 cm^2

ΣAn = An + Anr = 467.3 + 83.4 = 550.8 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 180 * 592.6 / 550.8 = 194 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 194 * 46734 = 9055628 N

> 0.75 σ ta * An / 1.1 = 158 * 46734 / 1.1 = 6691387 N

・Rib Ptr = σ tn * Anr = 194 * 8344 = 1616920 N

> 0.75 σ ta * Anr/ 1.1 = 158 * 8344 / 1.1 = 1194775 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 467.3 / 2 = 233.7 cm^2

・Rib AnrR = Anr = 83.4 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 9055628 / 108000 = 83.8 pcs. (96 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 1616920 / 108000 = 15.0 pcs. (2 @ 8 = 16 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 6,8 unites)

(h) Tensile force per one bolt

ρ p = Pt / 96 = 9055628 / 96 = 94329 N

ρ s = τ * Ag / 96 = 12 * 50460 / 96 = 6410 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(94329^2 + 6410^2)}$ = 94547 N < ρ a = 108000 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 ＊ 21	(33.6 -	2*(1*2.5)＊ 2.1)*1.1= 25.4＜	33.6	∴ 25.4
3-SPL PL	440 ＊ 21	(277.2 -	3*(5*2.5)＊ 2.1)*1.1= 218.3＜	277.2	∴218.3
		310.8			243.7 ＞ AnR
1-SPL PL	1730 ＊ 17	(294.1 -	(17*2.5)＊ 1.7)*1.1= 244.0＜	294.1	∴244.0 ＞ AnR
4-SPL PL	120 ＊ 21	(100.8 -	4*(1*2.7+ 1*0.059)＊ 2.1)*1.1= 85.4＜	100.8	∴ 85.4 ＞AnrR

(73) G1 J-25(Sec-25) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 3062 * 17 A = 520.6 cm^2 (SM570)

(b) Design stress

σU = -133 N/mm^2 < σa * 0.75 = 255 * 0.75 = 191 N/mm^2

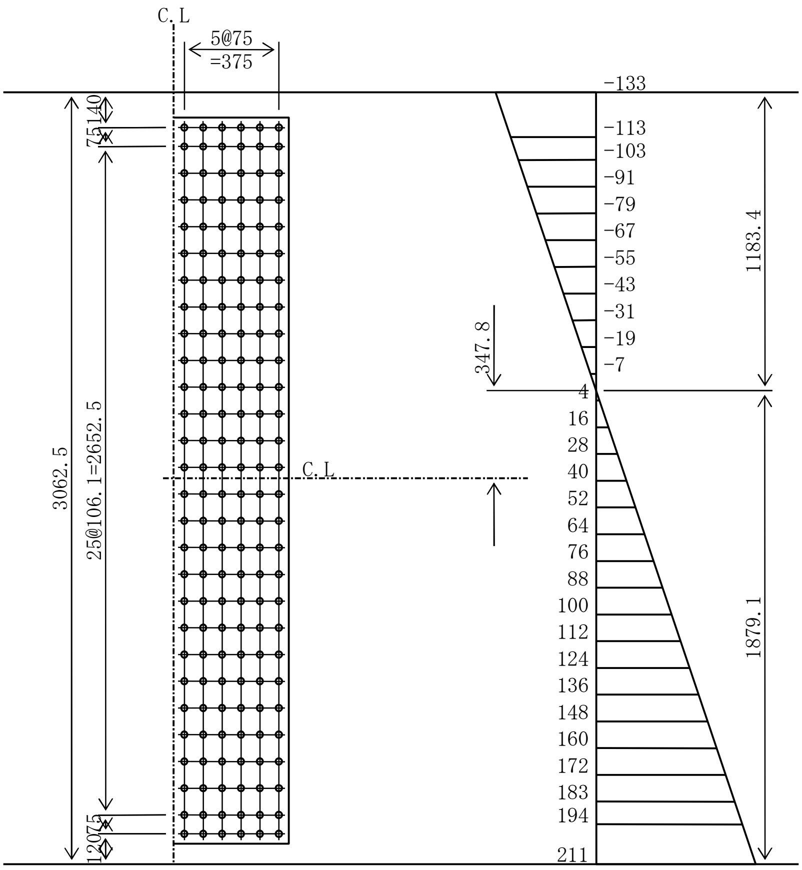
σL = 211 N/mm^2 > σa * 0.75 = 255 * 0.75 = 191 N/mm^2

σUn = 133 N/mm^2

σLn = 211 N/mm^2

τ = 22 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 17 * (194 + 211) / 2 = 542181 N

Required bolt number (Bolt number to be used)

N1 = 542181 / (108000 * 1.00) = 5.0 pcs. (6 bolts will be used.)

Check of shear force

ρs = τ * A / 168 = 22 * 52062 / 168 = 6706 N < ρa = 108000 N

Combined stress

$\rho c28$ = $\sqrt{((542181 / 6)^2 + 6706^2)}$ = 90612 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 6 unites)

(e) Check of splice plates

2-SPL PL 2882 * 10 As = 576.5 cm^2 (SM570)

Moment of inertia of splice plates Is = 4729788 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4698903 cm^4

Bending moment to be shared by the web

Mw = 211 ＊ 4698903*10^4 / 1879 = 5285*10^6 N·mm

Bending stress of splice plates

σsp = 5285*10^6 / (4729788*10^4) ＊ 1799 = 201 N/mm^2 ＜ σa = 255 N/mm^2

(74) G1　J-25(Sec-25)　RWEB

(a) Section area of main plate (Web plate)

1-RWEB　PL　2730 ＊ 17　　A = 464.1 cm^2　　(SM570)

(b) Design stress

σU = -141 N/mm^2 ＜ σa ＊ 0.75 = 255 ＊ 0.75 = 191 N/mm^2

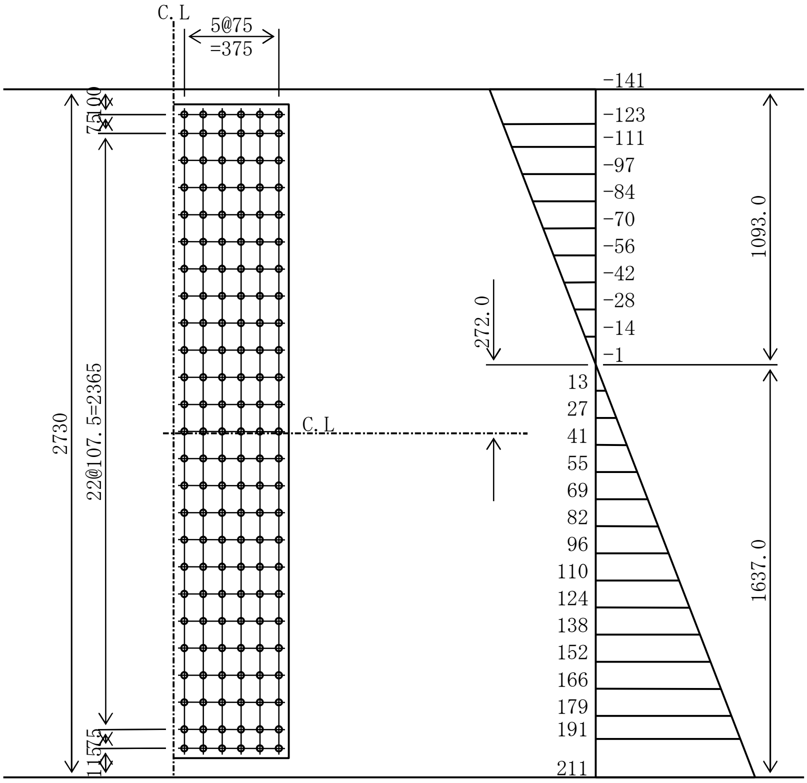
σL = 211 N/mm^2 ＞ σa ＊ 0.75 = 255 ＊ 0.75 = 191 N/mm^2

σUn = 141 N/mm^2

σLn = 211 N/mm^2

τ = 21 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width:　b1 = 15.3 cm

Total force to be shared

P1 = 153 ＊ 17 ＊ (191 + 211) / 2 = 520937 N

Required bolt number (Bolt number to be used)

N1 = 520937 / (108000 ＊ 1.00) = 4.8 pcs.　(6 bolts will be used.)

Check of shear force

ρs = τ ＊ A / 150 = 21 ＊ 46410 / 150 = 6587 N ＜ ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((520937 / 6)^2 + 6587^2)}$ = 87072 N ＜ ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 6 unites)

(e) Check of splice plates

2-SPL PL 2595 * 10 As = 519.0 cm^2 (SM570)

Moment of inertia of splice plates Is = 3275563 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3225772 cm^4

Bending moment to be shared by the web

Mw = 211 * 3225772*10^4 / 1637 = 4153*10^6 N·mm

Bending stress of splice plates

σsp = 4153*10^6 / (3275563*10^4) * 1562 = 198 N/mm^2 ＜ σa = 255 N/mm^2

(75) G1 J-25(Sec-25) LFLG

(a) Acting stress

σ tmax = 215 N/mm^2 0.75 σ ta = 0.75 * 255 = 191 N/mm^2

τ max = 8 N/mm^2

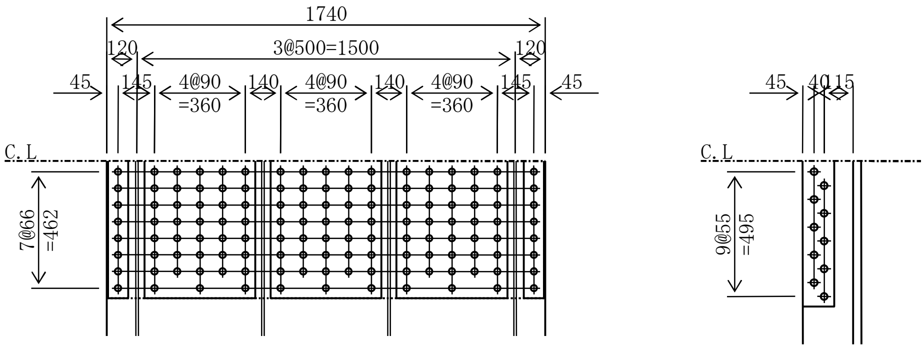
(b) Section area of main plate

1-LFLG PL 1740 * 32 Ag = 556.8 cm^2 (SM570)

2-RIB PL 200 * 22 Agr = 88.0 cm^2 (SM570)

ΣAg = Ag + Agr = 556.8 + 88.0 = 644.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 32 A = 556.8

(556.8 - (17* 2.5)* 3.2) * 1.1 = 462.9 < 556.8 ∴An = 462.9 cm^2

2-RIB PL 200 * 22 Ar = 88.0

(88.0 - 2*(1* 2.7+ 1*0.809)* 2.2) * 1.1 = 79.8 < 88.0 ∴Anr = 79.8 cm^2

ΣAn = An + Anr = 462.9 + 79.8 = 542.7 cm^2

σ tn = σ tmax * ΣAg / ΣAn * 139 / 150

= 215 * 644.8 / 542.7 * 139 / 150 = 237 N/mm^2

< σ ta = 255 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 237 * 46288 * 130 / 119 = 11963824 N

> 0.75 σ ta * An / 1.1 = 191 * 46288 * 130 / 119 / 1.1 = 8791714 N

・Rib Ptr = σ tn * Anr = 237 * 7981 = 1888373 N

> 0.75 σ ta * Anr/ 1.1 = 191 * 7981 / 1.1 = 1387686 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 462.9 * 130 / 119 / 2 = 252.8 cm^2

・Rib AnrR = Anr = 79.8 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 11963824 / 108000 = 110.8 pcs. (130 bolts will be used.)

・Rib nr = Ptr / (108000 * 0.96) = 1888373 / 103680 = 18.2 pcs. (2 @ 10 = 20 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 8,10 unites)

(h) Tensile force per one bolt

ρ p = Pt / 130 = 11963824 / 130 = 92029 N

ρ s = τ * Ag / 130 = 8 * 55680 / 130 = 3389 N

ρ = $\sqrt{}$(ρ p^2 + ρ s^2) = $\sqrt{}$(92029^2 + 3389^2) = 92092 N < ρ a = 108000 N

(i) Check of splice plates

	(SM570)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
2-SPL PL	80 * 22	(35.2 -	2*(1*2.5)* 2.2)*1.1=	26.6＜	35.2	∴ 26.6
3-SPL PL	440 * 22	(290.4 -	3*(5*2.5)* 2.2)*1.1=	228.7＜	290.4	∴228.7
		325.6				255.3 ＞ AnR
1-SPL PL	1730 * 18	(311.4 -	(17*2.5)* 1.8)*1.1=	258.4＜	311.4	∴258.4 ＞ AnR
4-SPL PL	120 * 22	(105.6 -	4*(1*2.7+ 1*0.809)* 2.2)*1.1=	82.2＜	105.6	∴ 82.2 ＞AnrR

(76) G1 J-26(Sec-26) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 3063 * 17 A = 520.6 cm^2 (SM570)

(b) Design stress

σU = -149 N/mm^2 < σa * 0.75 = 255 * 0.75 = 191 N/mm^2

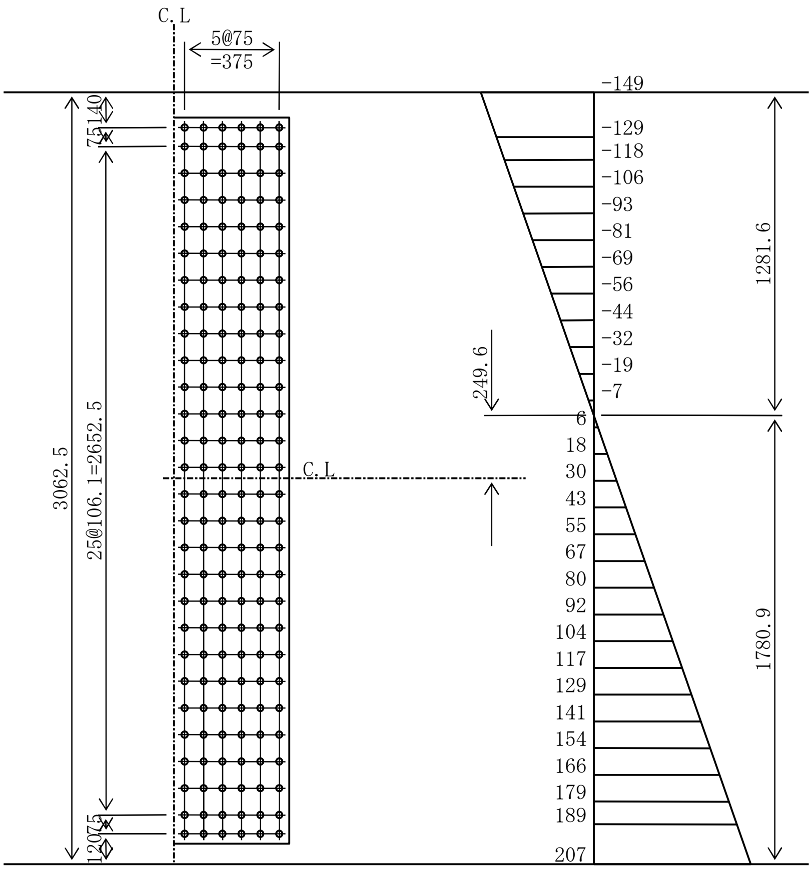
σL = 207 N/mm^2 > σa * 0.75 = 255 * 0.75 = 191 N/mm^2

σUn = 149 N/mm^2

σLn = 207 N/mm^2

τ = 18 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 17 * (189 + 207) / 2 = 530796 N

Required bolt number (Bolt number to be used)

N1 = 530796 / (108000 * 1.00) = 4.9 pcs. (6 bolts will be used.)

Check of shear force

ρs = τ * A / 168 = 18 * 52063 / 168 = 5493 N < ρa = 108000 N

Combined stress

$\rho c28$ = $\sqrt{((530796 / 6)^2 + 5493^2)}$ = 88636 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 6 unites)

(e) Check of splice plates

2-SPL PL 2883 * 11 As = 634.2 cm^2 (SM570)

Moment of inertia of splice plates Is = 4818274 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4393467 cm^4

Bending moment to be shared by the web

$Mw = 207 * 4393467*10^4 / 1781 = 5117*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 5117*10^6 / (4818274*10^4) * 1701 = 181$ N/mm^2 ＜ $\sigma a = 255$ N/mm^2

(77) G1 J-26(Sec-26) RWEB

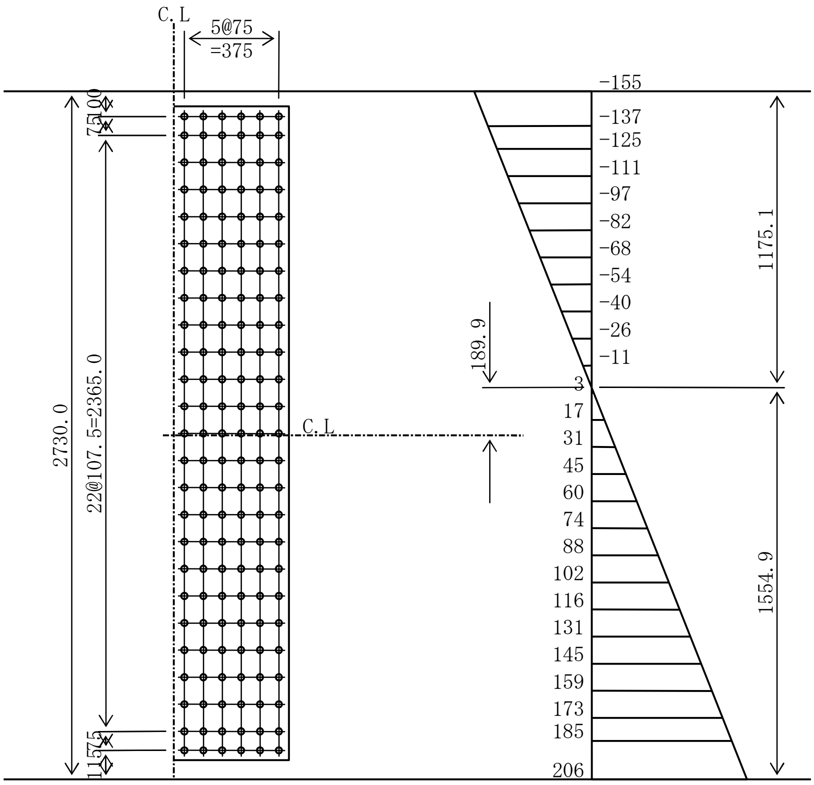
(a) Section area of main plate (Web plate)

1-RWEB PL 2730 * 17 A = 464.1 cm^2 (SM570)

(b) Design stress

σU = -155 N/mm^2 < σa * 0.75 = 255 * 0.75 = 191 N/mm^2
σL = 206 N/mm^2 > σa * 0.75 = 255 * 0.75 = 191 N/mm^2
σUn = 155 N/mm^2
σLn = 206 N/mm^2
τ = 17 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 17 * (185 + 206) / 2 = 506825 N

Required bolt number (Bolt number to be used)

N1 = 506825 / (108000 * 1.00) = 4.7 pcs. (6 bolts will be used.)

Check of shear force

$\rho s = \tau * A / 150$ = 17 * 46410 / 150 = 5379 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((506825 / 6)^2 + 5379^2)}$ = 84642 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 6 unites)

(e) Check of splice plates

2-SPL PL 2595 * 11 As = 570.9 cm^2 (SM570)

Moment of inertia of splice plates Is = 3393624 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3049751 cm^4

Bending moment to be shared by the web

Mw = 206 ＊ 3049751*10^4 / 1555 = 4032*10^6 N·mm

Bending stress of splice plates

σsp = 4032*10^6 / (3393624*10^4) ＊ 1480 = 176 N/mm^2 ＜ σa = 255 N/mm^2

(78) G1 J-26(Sec-26) LFLG

(a) Acting stress

$\sigma tmax$ = 212 N/mm^2 0.75σta = 0.75 * 255 = 191 N/mm^2

τmax = 6 N/mm^2

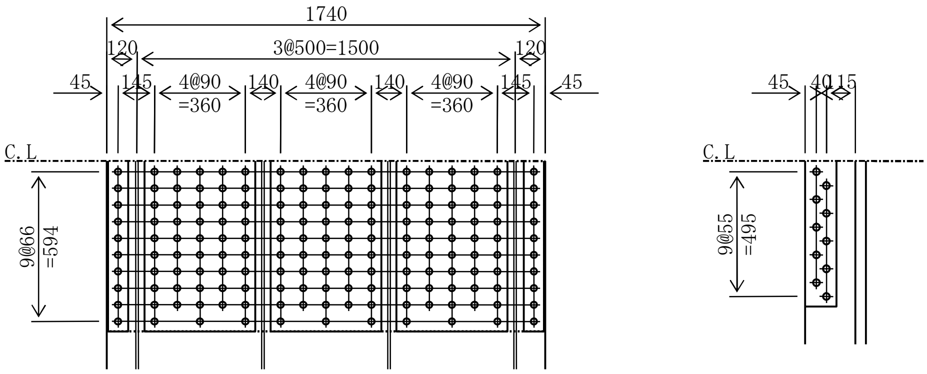
(b) Section area of main plate

1-LFLG PL 1740 * 41 Ag = 713.4 cm^2 (SM570-H)

2-RIB PL 200 * 22 Agr = 88.0 cm^2 (SM570)

ΣAg = Ag + Agr = 713.4 + 88.0 = 801.4 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 41 A = 713.4

(713.4 - (17* 2.5)* 4.1) * 1.1 = 593.1 < 713.4 ∴An = 593.1 cm^2

2-RIB PL 200 * 22 Ar = 88.0

(88.0 - 2*(1* 2.7+ 1*0.809)* 2.2) * 1.1 = 79.8 < 88.0 ∴Anr = 79.8 cm^2

ΣAn = An + Anr = 593.1 + 79.8 = 672.9 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn * 173 / 184

= 212 * 801.4 / 672.9 * 173 / 184 = 238 N/mm^2

< σta = 255 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 238 * 59307 * 164 / 153 = 15102906 N

> 0.75σta * An / 1.1 = 191 * 59307 * 164 / 153 / 1.1 = 11052575 N

・Rib Ptr = σtn * Anr = 238 * 7981 = 1896218 N

> 0.75σta * Anr/ 1.1 = 191 * 7981 / 1.1 = 1387686 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 593.1 * 164 / 153 / 2 = 317.9 cm^2

・Rib AnrR = Anr = 79.8 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 0.96) = 15102906 / 103680 = 145.7 pcs. (164 bolts will be used.)

・Rib nr = Ptr / (108000 * 0.96) = 1896218 / 103680 = 18.3 pcs. (2 @ 10 = 20 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 10,10 unites)

(h) Tensile force per one bolt

ρp = Pt / 164 = 15102906 / 164 = 92091 N

ρs = τ * Ag / 164 = 6 * 71340 / 164 = 2431 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(92091^2 + 2431^2)}$ = 92123 N < ρa = 103680 N

(i) Check of splice plates

	(SM570)	Ags(cm²)	deduction of bolt holes		Ans(cm²)
2-SPL PL	80 * 28	(44.8 -	2*(1*2.5)* 2.8)*1.1= 33.9＜	44.8	∴ 33.9
3-SPL PL	440 * 28	(369.6 -	3*(5*2.5)* 2.8)*1.1= 291.1＜	369.6	∴291.1
		414.4			324.9 ＞ AnR
1-SPL PL	1730 * 23	(397.9 -	(17*2.5)* 2.3)*1.1= 330.2＜	397.9	∴330.2 ＞ AnR
4-SPL PL	120 * 22	(105.6 -	4*(1*2.7+ 1*0.809)* 2.2)*1.1= 82.2＜	105.6	∴ 82.2 ＞AnrR

(79) G1 J-27(Sec-27) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 3062 * 17 A = 520.6 cm^2 (SM570)

(b) Design stress

σU = -155 N/mm^2 < σa * 0.75 = 255 * 0.75 = 191 N/mm^2

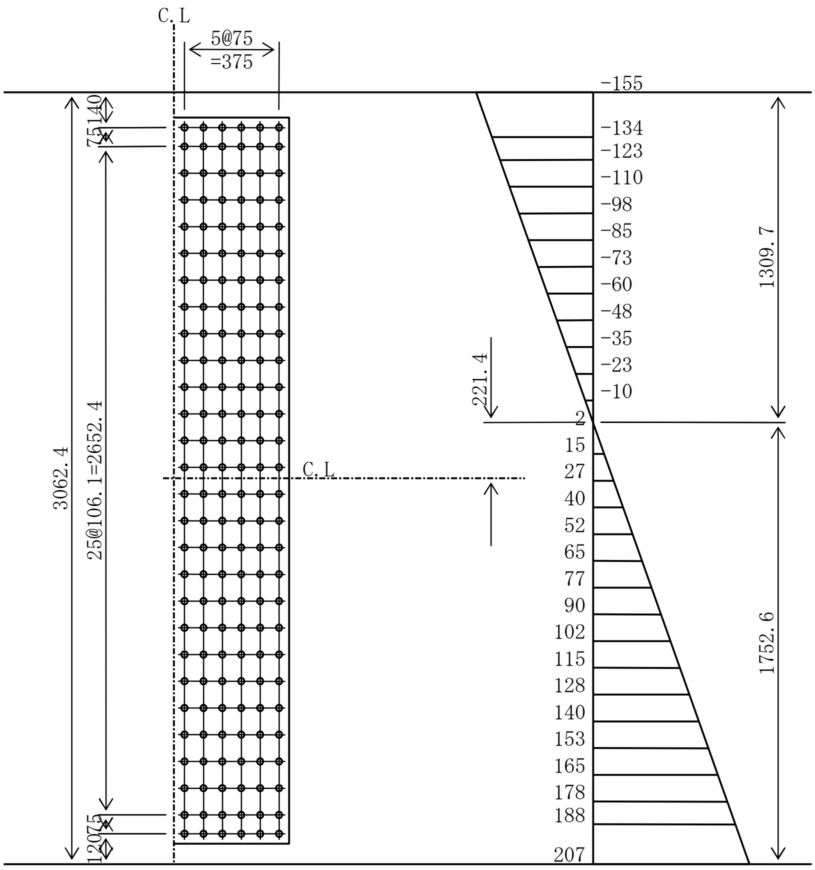
σL = 207 N/mm^2 > σa * 0.75 = 255 * 0.75 = 191 N/mm^2

σUn = 155 N/mm^2

σLn = 207 N/mm^2

τ = 11 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 17 * (188 + 207) / 2 = 529106 N

Required bolt number (Bolt number to be used)

N1 = 529106 / (108000 * 1.00) = 4.9 pcs. (6 bolts will be used.)

Check of shear force

ρs = τ * A / 168 = 11 * 52060 / 168 = 3505 N < ρa = 108000 N

Combined stress

ρc28 = $\sqrt{((529106 / 6)^2 + 3505^2)}$ = 88254 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 6 unites)

(e) Check of splice plates

2-SPL PL 2882 * 11 As = 634.1 cm^2 (SM570)

Moment of inertia of splice plates Is = 4729939 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4323850 cm^4

Bending moment to be shared by the web

Mw = 207 ＊ $4323850*10^4$ / 1753 = $5105*10^6$ N·mm

Bending stress of splice plates

σsp = $5105*10^6$ / ($4729939*10^4$) ＊ 1673 = 181 N/mm^2 ＜ σa = 255 N/mm^2

(80) G1 J-27(Sec-27) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2730 * 17 A = 464.1 cm^2 (SM570)

(b) Design stress

σU = -162 N/mm^2 < σa * 0.75 = 255 * 0.75 = 191 N/mm^2

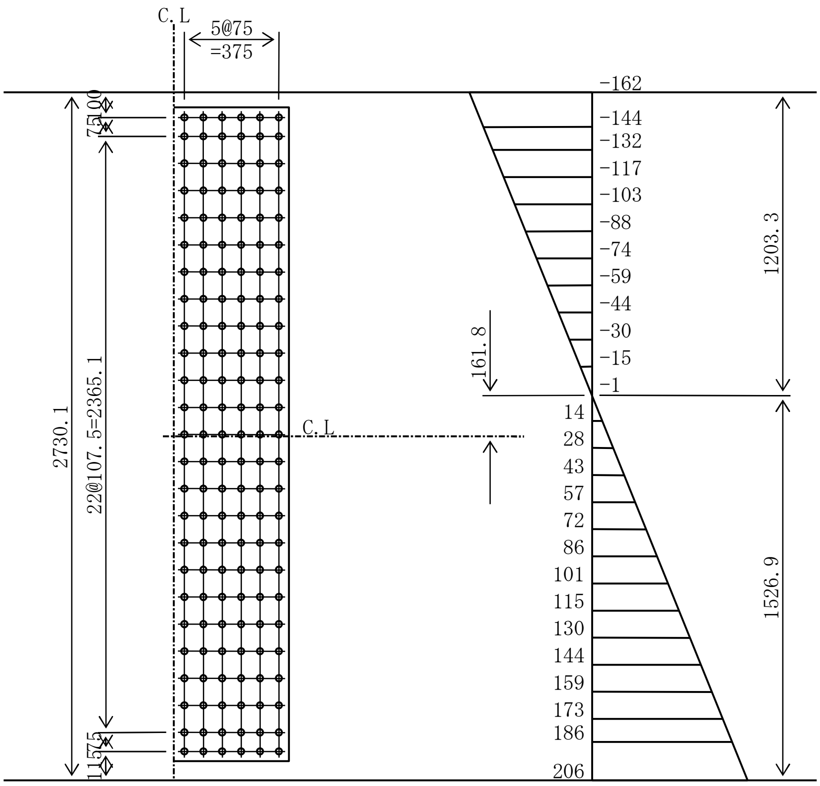
σL = 206 N/mm^2 > σa * 0.75 = 255 * 0.75 = 191 N/mm^2

σUn = 162 N/mm^2

σLn = 206 N/mm^2

τ = 11 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 17 * (186 + 206) / 2 = 507671 N

Required bolt number (Bolt number to be used)

N1 = 507671 / (108000 * 1.00) = 4.7 pcs. (6 bolts will be used.)

Check of shear force

ρs = τ * A / 150 = 11 * 46412 / 150 = 3458 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((507671 / 6)^2 + 3458^2)}$ = 84682 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 6 unites)

(e) Check of splice plates

2-SPL PL 2595 * 11 As = 570.9 cm^2 (SM570)

Moment of inertia of splice plates Is = 3340187 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3004379 cm^4

Bending moment to be shared by the web

$Mw = 206 * 3004379*10^4 / 1527 = 4056*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 4056*10^6 / (3340187*10^4) * 1452 = 176$ N/mm^2 ＜ $\sigma a = 255$ N/mm^2

(81) G1 J-27(Sec-27) LFLG

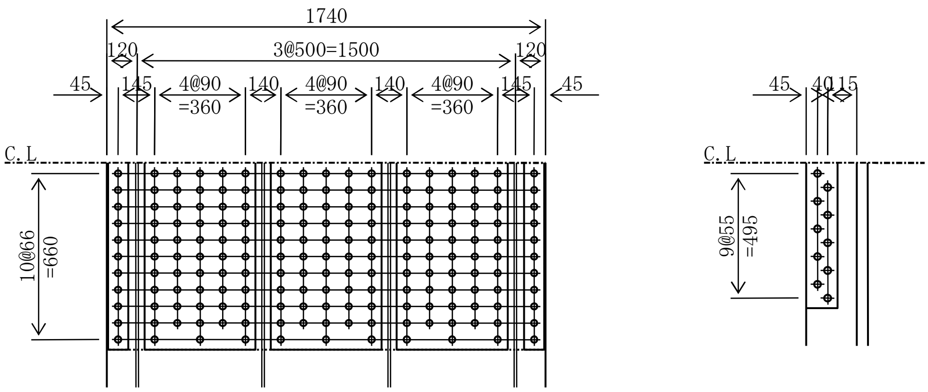
(a) Acting stress

$\sigma tmax$ = 212 N/mm^2 0.75σta = 0.75 * 255 = 191 N/mm^2
τmax = 3 N/mm^2

(b) Section area of main plate

1-LFLG PL 1740 * 44 Ag = 765.6 cm^2 (SM570-H)
2-RIB PL 200 * 22 Agr = 88.0 cm^2 (SM570)
ΣAg = Ag + Agr = 765.6 + 88.0 = 853.6 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 44 A = 765.6
(765.6 - (17* 2.5)* 4.4) * 1.1 = 636.5 < 765.6 ∴An = 636.5 cm^2
2-RIB PL 200 * 22 Ar = 88.0
(88.0 - 2*(1* 2.7+ 1*0.809)* 2.2) * 1.1 = 79.8 < 88.0 ∴Anr = 79.8 cm^2
ΣAn = An + Anr = 636.5 + 79.8 = 716.3 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn * 190 / 201
= 212 * 853.6 / 716.3 * 190 / 201 = 239 N/mm^2
< σta = 255 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 239 * 63646 * 181 / 170 = 16187570 N
> 0.75σta * An / 1.1 = 191 * 63646 * 181 / 170 / 1.1 = 11781742 N
・Rib Ptr = σtn * Anr = 239 * 7981 = 1906617 N
> 0.75σta * Anr/ 1.1 = 191 * 7981 / 1.1 = 1387686 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 636.5 * 181 / 170 / 2 = 338.8 cm^2
・Rib AnrR = Anr = 79.8 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 0.94) = 16187570 / 101520 = 159.5 pcs. (181 bolts will be used.)
・Rib nr = Ptr / (108000 * 0.96) = 1906617 / 103680 = 18.4 pcs. (2 @ 10 = 20 bolts will be used.)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 11,10 unites)

(h) Tensile force per one bolt

$\rho p = Pt / 181 = 16187570 / 181 = 89434$ N

$\rho s = \tau * Ag / 181 = 3 * 76560 / 181 = 1430$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(89434^2 + 1430^2)} = 89446$ N $< \rho a = 101520$ N

(i) Check of splice plates

	(SM570)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
2-SPL PL	80 * 30	(48.0 -	2*(1*2.5)* 3.0)*1.1=	36.3<	48.0	∴ 36.3
3-SPL PL	440 * 30	(396.0 -	3*(5*2.5)* 3.0)*1.1=	311.9<	396.0	∴311.9
		444.0				348.2 > AnR
1-SPL PL	1730 * 24	(415.2 -	(17*2.5)* 2.4)*1.1=	344.5<	415.2	∴344.5 > AnR
4-SPL PL	120 * 22	(105.6 -	4*(1*2.7+ 1*0.809)* 2.2)*1.1=	82.2<	105.6	∴ 82.2 >AnrR

(82) G1 J-28(Sec-29) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 3062 * 17 A = 520.6 cm^2 (SM570)

(b) Design stress

σU = -153 N/mm^2 < σa * 0.75 = 255 * 0.75 = 191 N/mm^2

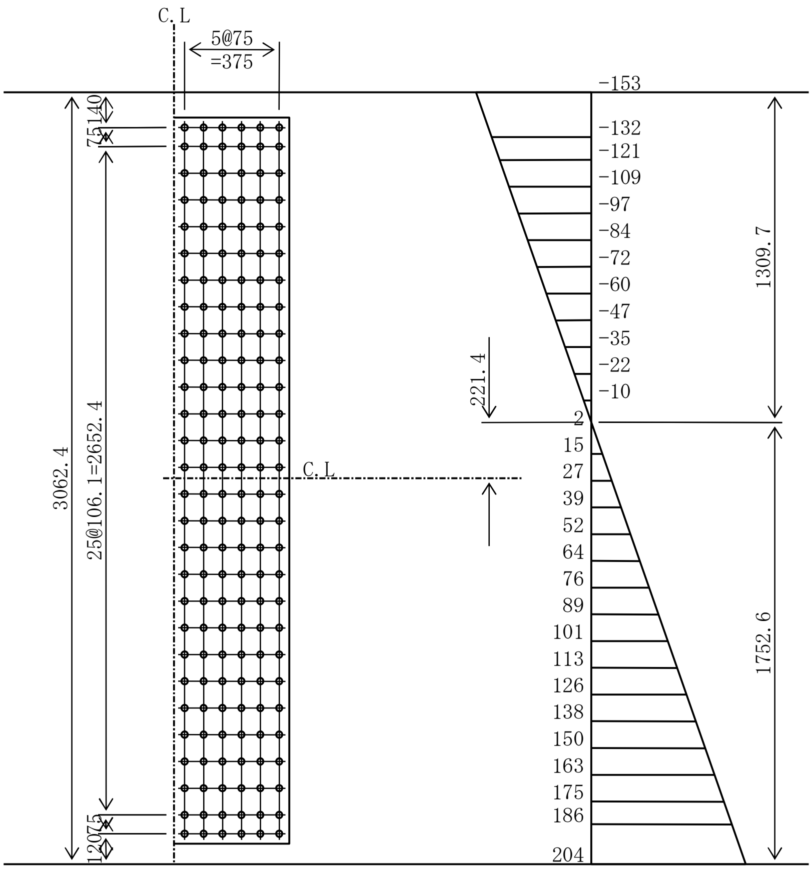
σL = 204 N/mm^2 > σa * 0.75 = 255 * 0.75 = 191 N/mm^2

σUn = 153 N/mm^2

σLn = 204 N/mm^2

τ = 13 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 17 * (186 + 204) / 2 = 521885 N

Required bolt number (Bolt number to be used)

N1 = 521885 / (108000 * 1.00) = 4.8 pcs. (6 bolts will be used.)

Check of shear force

ρs = τ * A / 168 = 13 * 52060 / 168 = 4002 N < ρa = 108000 N

Combined stress

$\rho c28$ = $\sqrt{((521885 / 6)^2 + 4002^2)}$ = 87073 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 6 unites)

(e) Check of splice plates

2-SPL PL 2882 * 11 As = 634.1 cm^2 (SM570)

Moment of inertia of splice plates Is = 4729903 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4323817 cm^4

Bending moment to be shared by the web

Mw = 204 ＊ $4323817*10^4$ / 1753 = $5035*10^6$ N･mm

Bending stress of splice plates

σsp = $5035*10^6$ / ($4729903*10^4$) ＊ 1673 = 178 N/mm^2 ＜ σa = 255 N/mm^2

(83) G1 J-28(Sec-29) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2730 * 17 A = 464.1 cm^2 (SM570)

(b) Design stress

σU = -160 N/mm^2 < σa * 0.75 = 255 * 0.75 = 191 N/mm^2

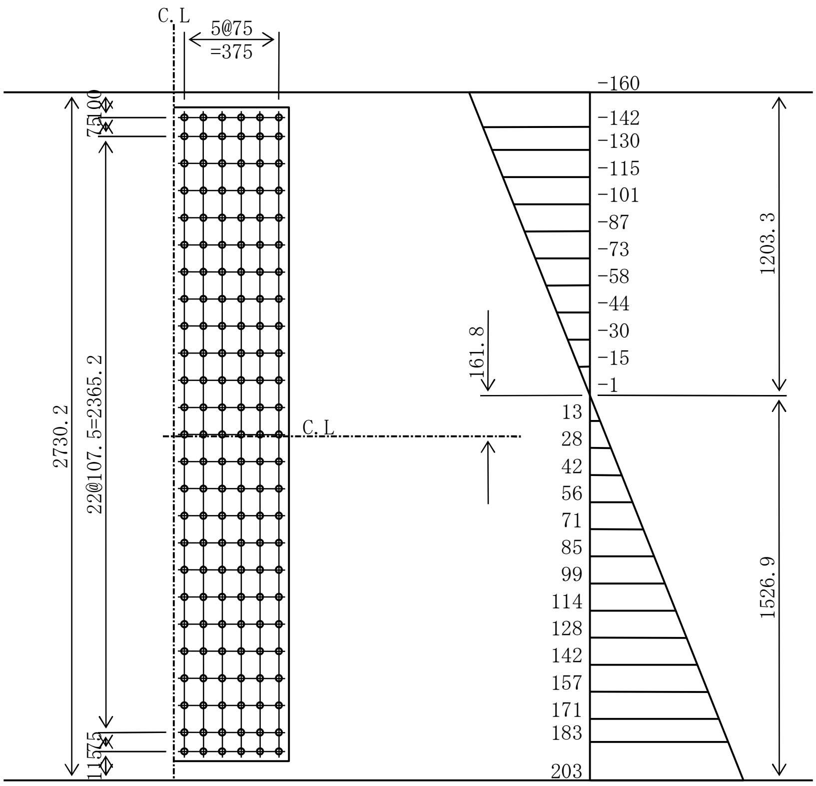
σL = 203 N/mm^2 > σa * 0.75 = 255 * 0.75 = 191 N/mm^2

σUn = 160 N/mm^2

σLn = 203 N/mm^2

τ = 13 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 17 * (183 + 203) / 2 = 500742 N

Required bolt number (Bolt number to be used)

N1 = 500742 / (108000 * 1.00) = 4.6 pcs. (6 bolts will be used.)

Check of shear force

ρs = τ * A / 150 = 13 * 46413 / 150 = 3945 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((500742 / 6)^2 + 3945^2)}$ = 83550 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 6 unites)

(e) Check of splice plates

2-SPL PL 2595 * 11 As = 570.9 cm^2 (SM570)

Moment of inertia of splice plates Is = 3340224 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3004411 cm^4

Bending moment to be shared by the web

Mw = 203 * 3004411*10^4 / 1527 = 4000*10^6 N·mm

Bending stress of splice plates

σsp = 4000*10^6 / (3340224*10^4) * 1452 = 174 N/mm^2 ＜ σa = 255 N/mm^2

(84) G1　J-28(Sec-29)　LFLG

(a) Acting stress

σtmax = 209 N/mm^2　　0.75σta = 0.75 * 255 = 191 N/mm^2

τmax = 4 N/mm^2

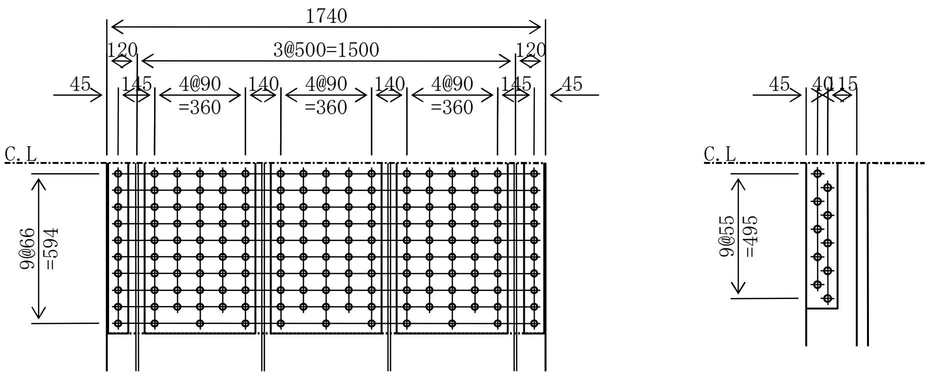
(b) Section area of main plate

1-LFLG　PL　1740 * 44　　　Ag = 765.6 cm^2　(SM570-H)

2-RIB　PL　200 * 22　　　Agr = 88.0 cm^2　(SM570)

ΣAg = Ag + Agr = 765.6 + 88.0 = 853.6 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG　PL　1740 * 44　　　A = 765.6

(765.6 - (17* 2.5)* 4.4) * 1.1 = 636.5 ＜ 765.6　∴An = 636.5 cm^2

2-RIB　PL　200 * 22　　　Ar = 88.0

(88.0 - 2*(1* 2.7+ 1*0.809)* 2.2) * 1.1 = 79.8 ＜ 88.0　∴Anr = 79.8 cm^2

ΣAn = An + Anr = 636.5 + 79.8 = 716.3 cm^2

σtn = σtmax * ΣAg / ΣAn * 173 / 184

= 209 * 853.6 / 716.3 * 173 / 184 = 234 N/mm^2

＜ σta = 255 N/mm^2

(e) Design axial force

・Main plate　Pt = σtn * An = 234 * 63646 * 164 / 153 = 15988487 N

＞ 0.75σta * An / 1.1 = 191 * 63646 * 164 / 153 / 1.1 = 11861300 N

・Rib　Ptr = σtn * Anr = 234 * 7981 = 1870537 N

＞ 0.75σta * Anr/ 1.1 = 191 * 7981 / 1.1 = 1387686 N

(f) Required section area of the splice plates

・Mother material(One side)　AnR = An / 2 = 636.5 * 164 / 153 / 2 = 341.1 cm^2

・Rib　　AnrR = Anr = 79.8 cm^2

(g) Required bolt number

・Main plate　n = Pt / (108000 * 0.96) = 15988487 / 103680 = 154.2 pcs. (164 bolts will be used.)

・Rib　nr = Ptr / (108000 * 0.96) = 1870537 / 103680 = 18.0 pcs. (2 @ 10 = 20 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 10,10 unites)

(h) Tensile force per one bolt

ρp = Pt / 164 = 15988487 / 164 = 97491 N

ρs = τ * Ag / 164 = 4 * 76560 / 164 = 1769 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(97491^2 + 1769^2) = 97507 N ＜ ρa = 103680 N

(i) Check of splice plates

	(SM570)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
2-SPL PL	80 * 30	(48.0 -	2*(1*2.5)* 3.0)*1.1=	36.3<	48.0	∴ 36.3
3-SPL PL	440 * 30	(396.0 -	3*(5*2.5)* 3.0)*1.1=	311.9<	396.0	∴311.9
		444.0				348.2 > AnR
1-SPL PL	1730 * 24	(415.2 -	(17*2.5)* 2.4)*1.1=	344.5<	415.2	∴344.5 > AnR
4-SPL PL	120 * 22	(105.6 -	4*(1*2.7+ 1*0.809)* 2.2)*1.1=	82.2<	105.6	∴ 82.2 >AnrR

(85) G1 J-29(Sec-30) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 3062 * 17 A = 520.6 cm^2 (SM570)

(b) Design stress

σU = -144 N/mm^2 < σa * 0.75 = 255 * 0.75 = 191 N/mm^2

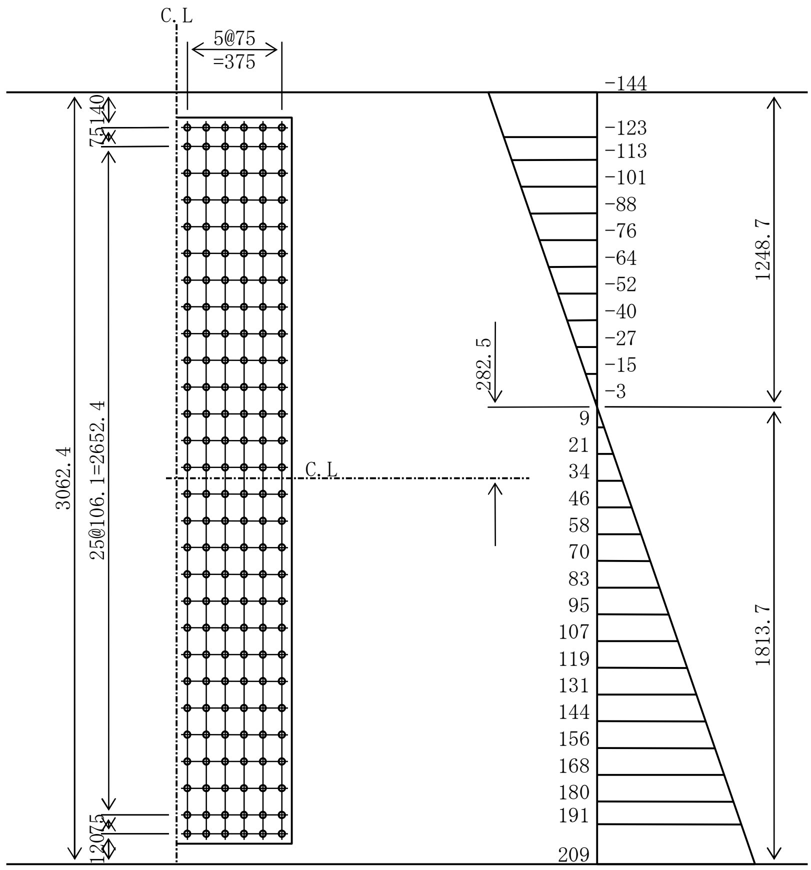
σL = 209 N/mm^2 > σa * 0.75 = 255 * 0.75 = 191 N/mm^2

σUn = 144 N/mm^2

σLn = 209 N/mm^2

τ = 18 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 17 * (191 + 209) / 2 = 534729 N

Required bolt number (Bolt number to be used)

N1 = 534729 / (108000 * 1.00) = 5.0 pcs. (6 bolts will be used.)

Check of shear force

ρs = τ * A / 168 = 18 * 52060 / 168 = 5552 N < ρa = 108000 N

Combined stress

ρc28 = $\sqrt{((534729 / 6)^2 + 5552^2)}$ = 89294 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 6 unites)

(e) Check of splice plates

2-SPL PL 2882 * 10 As = 576.5 cm^2 (SM570)

Moment of inertia of splice plates Is = 4484314 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4483988 cm^4

Bending moment to be shared by the web

Mw = 209 ＊ 4483988*10^4 / 1814 = 5162*10^6 N·mm

Bending stress of splice plates

σsp = 5162*10^6 / (4484314*10^4) ＊ 1734 = 200 N/mm^2 ＜ σa = 255 N/mm^2

(86) G1 J-29(Sec-30) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2730 * 17   A = 464.1 cm^2 (SM570)

(b) Design stress

σU = -151 N/mm^2 < σa * 0.75 = 255 * 0.75 = 191 N/mm^2

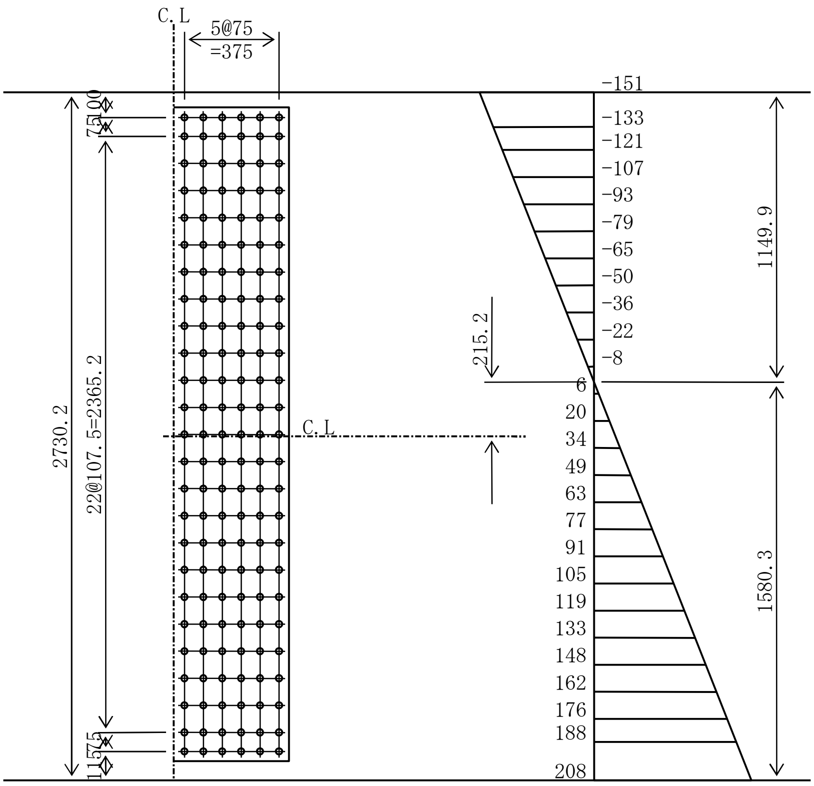
σL = 208 N/mm^2 > σa * 0.75 = 255 * 0.75 = 191 N/mm^2

σUn = 151 N/mm^2

σLn = 208 N/mm^2

τ = 18 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 17 * (188 + 208) / 2 = 513228 N

Required bolt number (Bolt number to be used)

N1 = 513228 / (108000 * 1.00) = 4.8 pcs. (6 bolts will be used.)

Check of shear force

$\rho s = \tau * A / 150$ = 18 * 46413 / 150 = 5466 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((513228 / 6)^2 + 5466^2)}$ = 85713 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 6 unites)

(e) Check of splice plates

2-SPL PL 2595 * 10 As = 519.0 cm^2 (SM570)

Moment of inertia of splice plates Is = 3136898 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3097846 cm^4

Bending moment to be shared by the web

Mw = 208 * 3097846*10^4 / 1580 = 4078*10^6 N·mm

Bending stress of splice plates

σsp = 4078*10^6 / (3136898*10^4) * 1505 = 196 N/mm^2 ＜ σa = 255 N/mm^2

(87) G1 J-29(Sec-30) LFLG

(a) Acting stress

$\sigma tmax$ = 213 N/mm^2 0.75σta = 0.75 * 255 = 191 N/mm^2

τmax = 6 N/mm^2

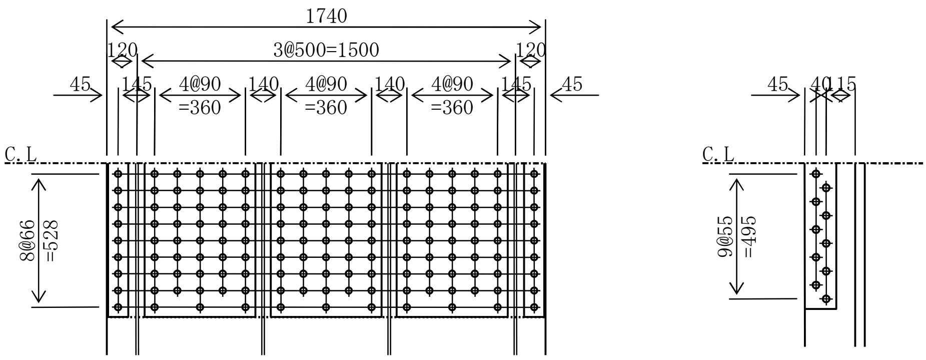
(b) Section area of main plate

1-LFLG PL 1740 * 38 Ag = 661.2 cm^2 (SM570)

2-RIB PL 200 * 22 Agr = 88.0 cm^2 (SM570)

ΣAg = Ag + Agr = 661.2 + 88.0 = 749.2 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 38 A = 661.2

(661.2 - (17* 2.5)* 3.8) * 1.1 = 549.7 < 661.2 ∴An = 549.7 cm^2

2-RIB PL 200 * 22 Ar = 88.0

(88.0 - 2*(1* 2.7+ 1*0.809)* 2.2) * 1.1 = 79.8 < 88.0 ∴Anr = 79.8 cm^2

ΣAn = An + Anr = 549.7 + 79.8 = 629.5 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn * 156 / 167

= 213 * 749.2 / 629.5 * 156 / 167 = 237 N/mm^2

< σta = 255 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 237 * 54967 * 147 / 136 = 14069901 N

> 0.75σta * An / 1.1 = 191 * 54967 * 147 / 136 / 1.1 = 10329736 N

・Rib Ptr = σtn * Anr = 237 * 7981 = 1890136 N

> 0.75σta * Anr/ 1.1 = 191 * 7981 / 1.1 = 1387686 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 549.7 * 147 / 136 / 2 = 297.1 cm^2

・Rib AnrR = Anr = 79.8 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 0.98) = 14069901 / 105840 = 132.9 pcs. (147 bolts will be used.)

・Rib nr = Ptr / (108000 * 0.96) = 1890136 / 103680 = 18.2 pcs. (2 @ 10 = 20 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 9,10 unites)

(h) Tensile force per one bolt

ρp = Pt / 147 = 14069901 / 147 = 95714 N

ρs = τ * Ag / 147 = 6 * 66120 / 147 = 2633 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(95714^2 + 2633^2) = 95750 N < ρa = 105840 N

(i) Check of splice plates

	(SM570)	Ags(cm²)	deduction of bolt holes			Ans(cm²)
2-SPL PL	80 * 26	(41.6 -	2*(1*2.5)* 2.6)*1.1=	31.5<	41.6	∴ 31.5
3-SPL PL	440 * 26	(343.2 -	3*(5*2.5)* 2.6)*1.1=	270.3<	343.2	∴270.3
		384.8				301.7 > AnR
1-SPL PL	1730 * 21	(363.3 -	(17*2.5)* 2.1)*1.1=	301.5<	363.3	∴301.5 > AnR
4-SPL PL	120 * 22	(105.6 -	4*(1*2.7+ 1*0.809)* 2.2)*1.1=	82.2<	105.6	∴ 82.2 >AnrR

(88) G1 J-30(Sec-31) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 3062 * 17 A = 520.6 cm^2 (SM570)

(b) Design stress

σU = -125 N/mm^2 < σa * 0.75 = 255 * 0.75 = 191 N/mm^2

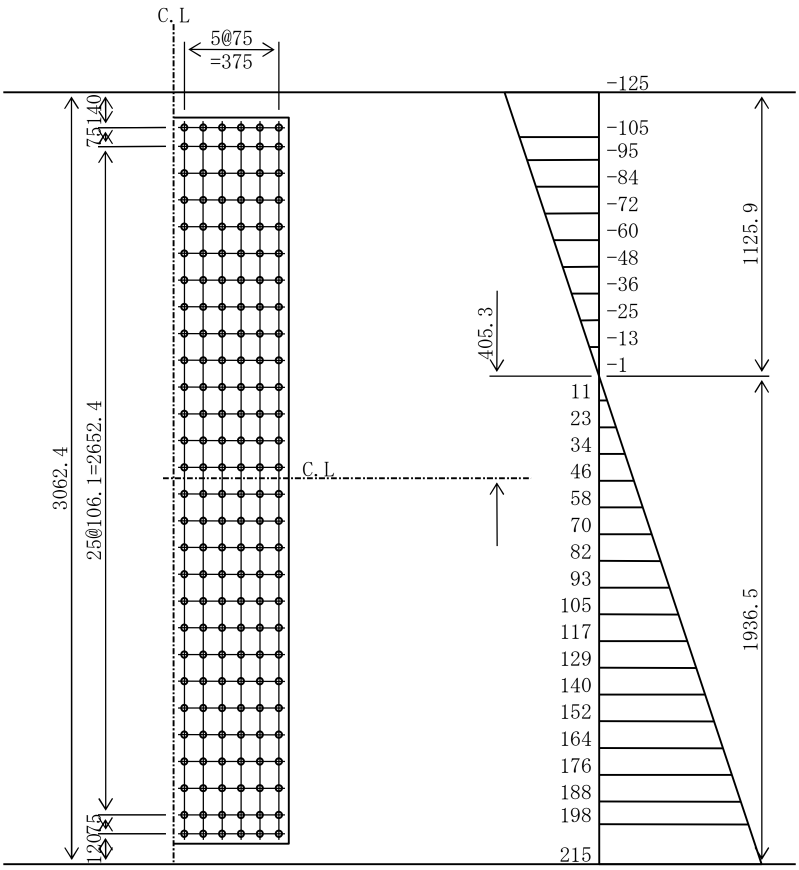
σL = 215 N/mm^2 > σa * 0.75 = 255 * 0.75 = 191 N/mm^2

σUn = 125 N/mm^2

σLn = 215 N/mm^2

τ = 25 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 17 * (198 + 215) / 2 = 552807 N

Required bolt number (Bolt number to be used)

N1 = 552807 / (108000 * 1.00) = 5.1 pcs. (6 bolts will be used.)

Check of shear force

ρs = τ * A / 168 = 25 * 52060 / 168 = 7653 N < ρa = 108000 N

Combined stress

$\rho c28$ = $\sqrt{((552807 / 6)^2 + 7653^2)}$ = 92452 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 6 unites)

(e) Check of splice plates

2-SPL PL 2882 * 10 As = 576.5 cm^2 (SM570)

Moment of inertia of splice plates Is = 4985428 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4923748 cm^4

Bending moment to be shared by the web

Mw = 215 * 4923748*10^4 / 1936 = 5472*10^6 N·mm

Bending stress of splice plates

σsp = 5472*10^6 / (4985428*10^4) * 1856 = 204 N/mm^2 ＜ σa = 255 N/mm^2

(89) G1 J-30(Sec-31) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2730 * 17 A = 464.1 cm^2 (SM570)

(b) Design stress

σU = -132 N/mm^2 < σa * 0.75 = 255 * 0.75 = 191 N/mm^2

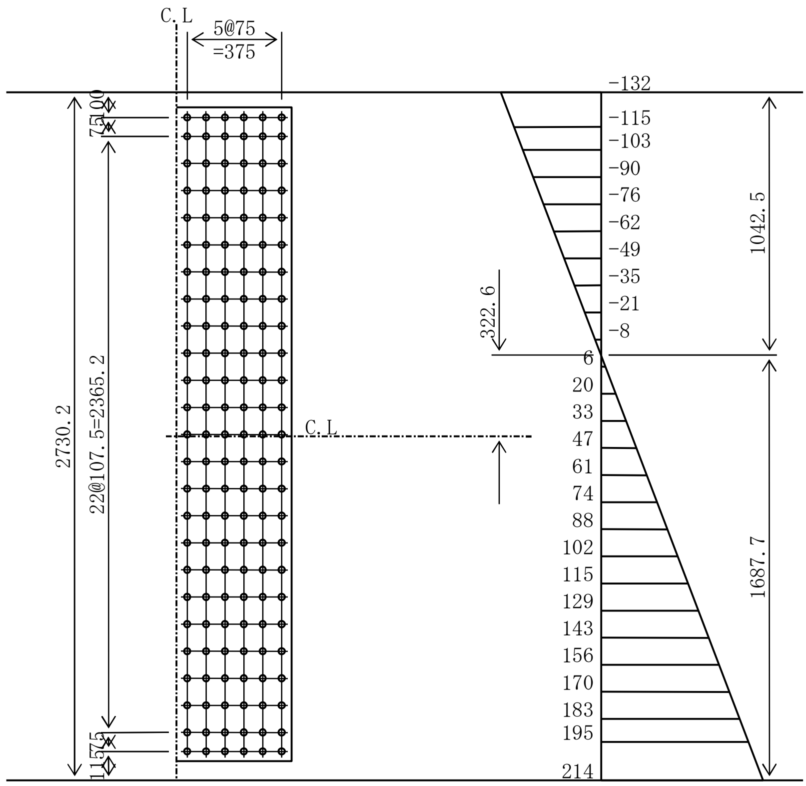
σL = 214 N/mm^2 > σa * 0.75 = 255 * 0.75 = 191 N/mm^2

σUn = 132 N/mm^2

σLn = 214 N/mm^2

τ = 24 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 17 * (195 + 214) / 2 = 530890 N

Required bolt number (Bolt number to be used)

N1 = 530890 / (108000 * 1.00) = 4.9 pcs. (6 bolts will be used.)

Check of shear force

ρs = τ * A / 150 = 24 * 46413 / 150 = 7518 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((530890 / 6)^2 + 7518^2)}$ = 88800 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 6 unites)

(e) Check of splice plates

2-SPL PL 2595 * 10 As = 519.0 cm^2 (SM570)

Moment of inertia of splice plates Is = 3428321 cm^4 > Iw

Moment of inertia of web plate Iw = 3365919 cm^4

Bending moment to be shared by the web

Mw = 214 * 3365919*10^4 / 1688 = 4277*10^6 N·mm

Bending stress of splice plates

σ sp = 4277*10^6 / (3428321*10^4) * 1613 = 201 N/mm^2 < σ a = 255 N/mm^2

(90) G1 J-30(Sec-31) LFLG

(a) Acting stress

σ tmax = 218 N/mm^2 0.75 σ ta = 0.75 * 255 = 191 N/mm^2

τ max = 11 N/mm^2

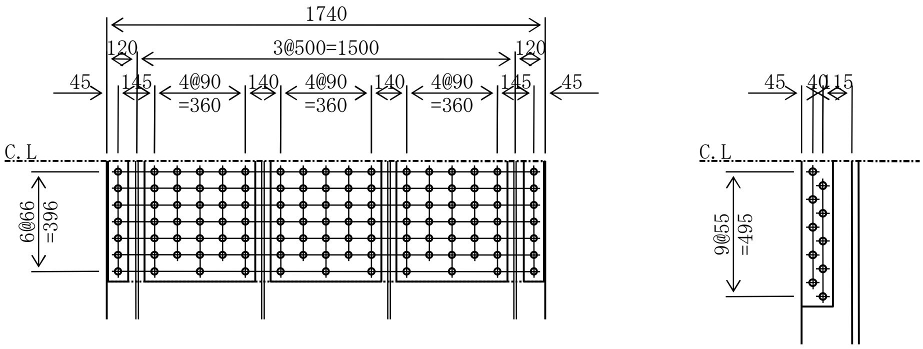
(b) Section area of main plate

1-LFLG PL 1740 * 27 Ag = 469.8 cm^2 (SM570)

2-RIB PL 200 * 22 Agr = 88.0 cm^2 (SM570)

ΣAg = Ag + Agr = 469.8 + 88.0 = 557.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 27 A = 469.8

(469.8 - (17* 2.5)* 2.7) * 1.1 = 390.6 < 469.8 ∴An = 390.6 cm^2

2-RIB PL 200 * 22 Ar = 88.0

(88.0 - 2*(1* 2.7+ 1*0.809)* 2.2) * 1.1 = 79.8 < 88.0 ∴Anr = 79.8 cm^2

ΣAn = An + Anr = 390.6 + 79.8 = 470.4 cm^2

σ tn = σ tmax * ΣAg / ΣAn * 122 / 133

= 218 * 557.8 / 470.4 * 122 / 133 = 237 N/mm^2

< σ ta = 255 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 237 * 39056 * 113 / 102 = 10255696 N

> 0.75 σ ta * An / 1.1 = 191 * 39056 * 113 / 102 / 1.1 = 7522622 N

・Rib Ptr = σ tn * Anr = 237 * 7981 = 1891852 N

> 0.75 σ ta * Anr/ 1.1 = 191 * 7981 / 1.1 = 1387686 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 390.6 * 113 / 102 / 2 = 216.3 cm^2

・Rib AnrR = Anr = 79.8 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 10255696 / 108000 = 95.0 pcs. (113 bolts will be used.)

・Rib nr = Ptr / (108000 * 0.96) = 1891852 / 103680 = 18.2 pcs. (2 @ 10 = 20 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 7,10 unites)

(h) Tensile force per one bolt

ρ p = Pt / 113 = 10255696 / 113 = 90758 N

ρ s = τ * Ag / 113 = 11 * 46980 / 113 = 4461 N

ρ = $\sqrt{}$ (ρ p^2 + ρ s^2) = $\sqrt{}$ (90758^2 + 4461^2) = 90868 N < ρ a = 108000 N

(i) Check of splice plates

	(SM570)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
2-SPL PL	80 * 19	(30.4 -	2*(1*2.5)* 1.9)*1.1=	23.0<	30.4	∴ 23.0
3-SPL PL	440 * 19	(250.8 -	3*(5*2.5)* 1.9)*1.1=	197.5<	250.8	∴197.5
		281.2				220.5 > AnR
1-SPL PL	1730 * 16	(276.8 -	(17*2.5)* 1.6)*1.1=	229.7<	276.8	∴229.7 > AnR
4-SPL PL	120 * 22	(105.6 -	4*(1*2.7+ 1*0.809)* 2.2)*1.1=	82.2<	105.6	∴ 82.2 >AnrR

(91) G1 J-31(Sec-32) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 3062 * 15 A = 459.4 cm^2 (SM490Y)

(b) Design stress

σU = -95 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

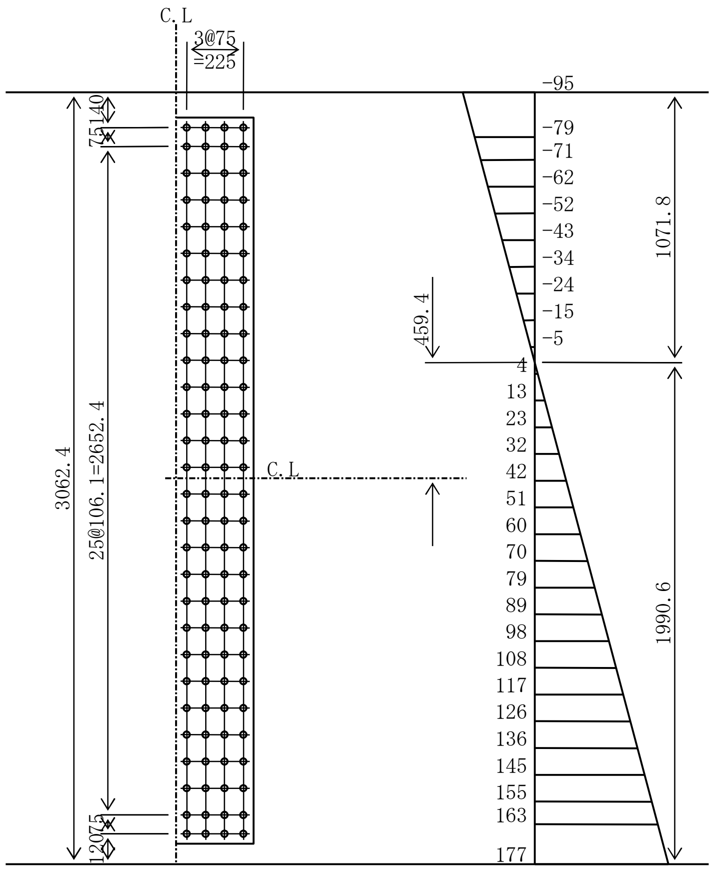
σL = 177 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 95 N/mm^2

σLn = 177 N/mm^2

τ = 34 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 15 * (163 + 177) / 2 = 400705 N

Required bolt number (Bolt number to be used)

N1 = 400705 / (108000 * 1.00) = 3.7 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 112 = 34 * 45935 / 112 = 13962 N < ρa = 108000 N

Combined stress

$\rho c28$ = $\sqrt{((400705 / 4)^2 + 13962^2)}$ = 101145 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2882 * 9 As = 518.8 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4735249 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4559408 cm^4

Bending moment to be shared by the web

Mw = 177 * 4559408*10^4 / 1991 = 4045*10^6 N·mm

Bending stress of splice plates

σsp = 4045*10^6 / (4735249*10^4) * 1911 = 163 N/mm^2 ＜ σa = 210 N/mm^2

(92) G1 J-31(Sec-32) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2730 * 15 A = 409.5 cm^2 (SM490Y)

(b) Design stress

σU = -101 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

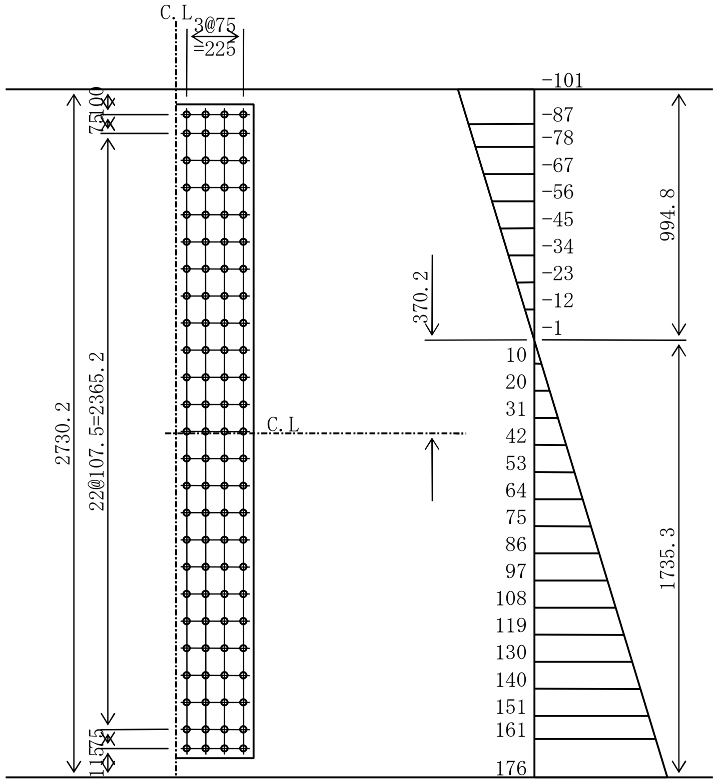
σL = 176 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 101 N/mm^2

σLn = 176 N/mm^2

τ = 34 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (161 + 176) / 2 = 385129 N

Required bolt number (Bolt number to be used)

N1 = 385129 / (108000 * 1.00) = 3.6 pcs. (4 bolts will be used.)

Check of shear force

$\rho s = \tau * A / 100 =$ 34 * 40953 / 100 = 13798 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((385129 / 4)^2 + 13798^2)}$ = 97266 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2595 ＊ 9 As = 467.1 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3236405 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3105162 cm^4

Bending moment to be shared by the web

$Mw = 176 * 3105162*10^4 / 1735 = 3151*10^6$ N･mm

Bending stress of splice plates

$\sigma sp = 3151*10^6 / (3236405*10^4) * 1660 = 162$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(93) G1 J-31(Sec-32) LFLG

(a) Acting stress

σ tmax = 179 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

τ max = 15 N/mm^2

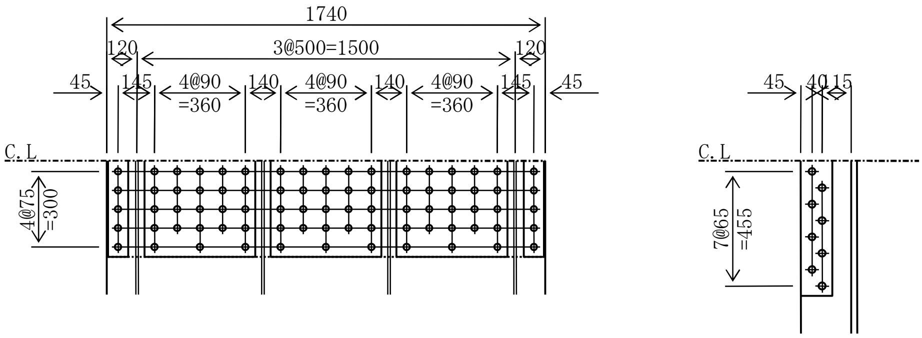
(b) Section area of main plate

1-LFLG PL 1740 * 24   Ag = 417.6 cm^2 (SM490Y)

2-RIB PL 200 * 22   Agr = 88.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 417.6 + 88.0 = 505.6 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 24   A = 417.6

(417.6 - (11* 2.5)* 2.4) * 1.1 = 386.8 < 417.6 ∴An = 386.8 cm^2

2-RIB PL 200 * 22   Ar = 88.0

(88.0 - 2*(1* 2.7+ 1*0.059)* 2.2) * 1.1 = 83.4 < 88.0 ∴Anr = 83.4 cm^2

ΣAn = An + Anr = 386.8 + 83.4 = 470.2 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 179 * 505.6 / 470.2 = 192 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 192 * 38676 = 7424847 N

> 0.75 σ ta * An / 1.1 = 158 * 38676 / 1.1 = 5537700 N

・Rib Ptr = σ tn * Anr = 192 * 8344 = 1601933 N

> 0.75 σ ta * Anr/ 1.1 = 158 * 8344 / 1.1 = 1194775 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 386.8 / 2 = 193.4 cm^2

・Rib AnrR = Anr = 83.4 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 7424847 / 108000 = 68.7 pcs. (79 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 1601933 / 108000 = 14.8 pcs. (2 @ 8 = 16 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 5,8 unites)

(h) Tensile force per one bolt

ρ p = Pt / 79 = 7424847 / 79 = 93985 N

ρ s = τ * Ag / 79 = 15 * 41760 / 79 = 7987 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(93985^2 + 7987^2)}$ = 94324 N < ρ a = 108000 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 17	(27.2 -	2*(1*2.5)* 1.7)*1.1= 20.6<	27.2	∴ 20.6
3-SPL PL	440 * 17	(224.4 -	3*(5*2.5)* 1.7)*1.1= 176.7<	224.4	∴176.7
		251.6			197.3 > AnR
1-SPL PL	1730 * 14	(242.2 -	(17*2.5)* 1.4)*1.1= 201.0<	242.2	∴201.0 > AnR
4-SPL PL	120 * 21	(100.8 -	4*(1*2.7+ 1*0.059)* 2.1)*1.1= 85.4<	100.8	∴ 85.4 >AnrR

(94) G1 J-32(Sec-33) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 3062 * 15 A = 459.4 cm^2 (SM490Y)

(b) Design stress

σU = -53 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

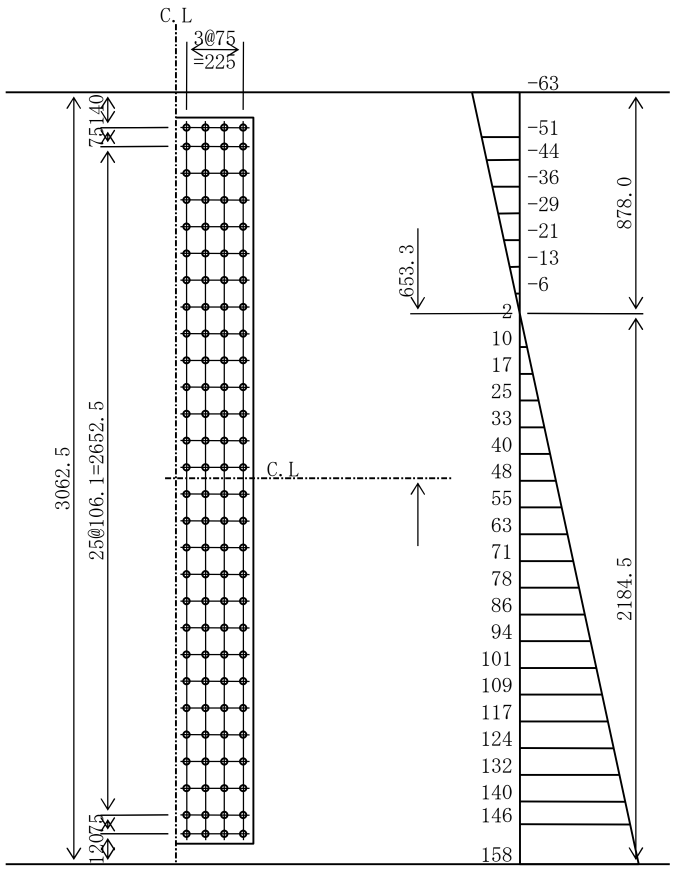
σL = 133 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 53 / 133 = 63 N/mm^2

σLn = 158 N/mm^2

τ = 48 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 15 * (146 + 158) / 2 = 358680 N

Required bolt number (Bolt number to be used)

N1 = 358680 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

$\rho s = \tau$ * A / 112 = 48 * 45937 / 112 = 19600 N < ρa = 108000 N

Combined stress

$\rho c28 = \sqrt{((358680 / 4)^2 + 19600^2)}$ = 91787 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2882 $*$ 9   As = 518.8 cm^2 (SM490Y)

Moment of inertia of splice plates   Is = 5874944 cm^4 $>$ Iw

Moment of inertia of web plate   Iw = 5550671 cm^4

Bending moment to be shared by the web

$Mw = 158 * 5550671*10^4 / 2185 = 4002*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 4002*10^6 / (5874944*10^4) * 2105 = 143$ N/mm^2 $<$ $\sigma a = 210$ N/mm^2

(95) G1 J-32(Sec-33) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2730 * 15 A = 409.5 cm^2 (SM490Y)

(b) Design stress

σU = -58 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

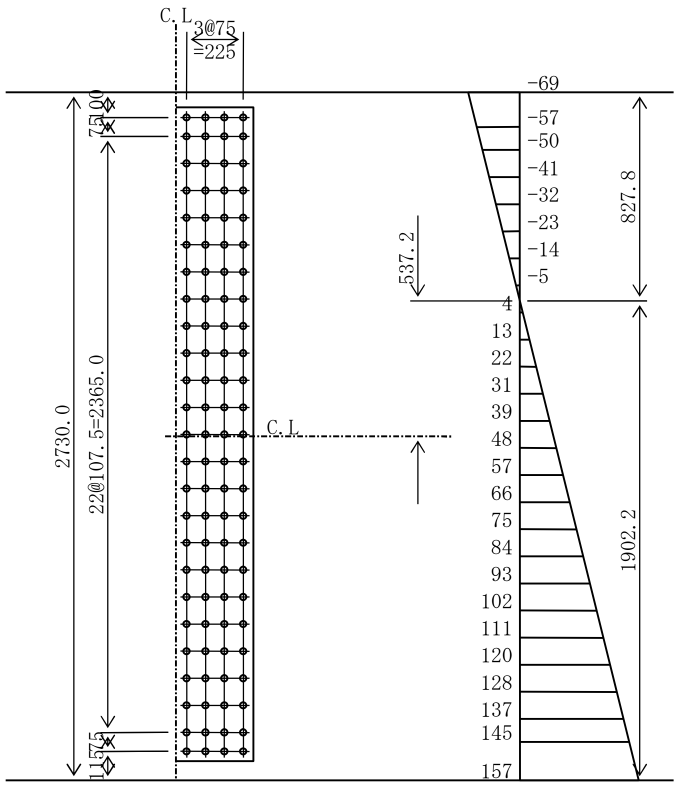
σL = 133 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 58 / 133 = 69 N/mm^2

σLn = 158 N/mm^2

τ = 47 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (145 + 157) / 2 = 345839 N

Required bolt number (Bolt number to be used)

N1 = 345839 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 47 * 40951 / 100 = 19225 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((345839 / 4)^2 + 19225^2)}$ = 88572 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2595 * 9 As = 467.1 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3931936 cm^4 > Iw

Moment of inertia of web plate Iw = 3725162 cm^4

Bending moment to be shared by the web

Mw = 158 * 3725162*10^4 / 1902 = 3084*10^6 N·mm

Bending stress of splice plates

σsp = 3084*10^6 / (3931936*10^4) * 1827 = 143 N/mm^2 < σa = 210 N/mm^2

(96) G1 J-32(Sec-33) LFLG

(a) Acting stress

σ tmax = 134 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

τ max = 34 N/mm^2

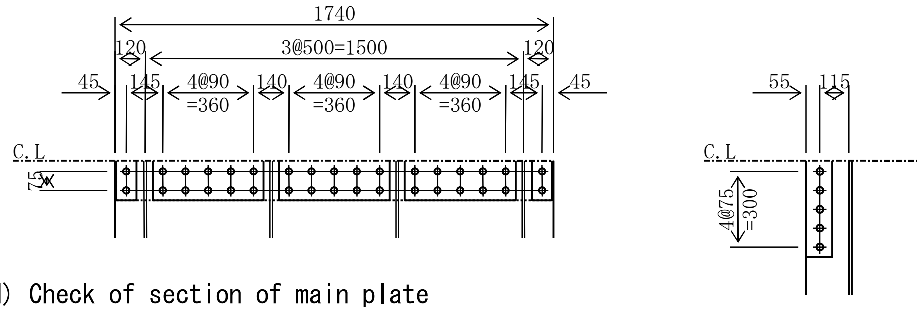
(b) Section area of main plate

1-LFLG PL 1740 * 12 Ag = 208.8 cm^2 (SM490Y)

2-RIB PL 170 * 17 Agr = 57.8 cm^2 (SM490Y)

ΣAg = Ag + Agr = 208.8 + 57.8 = 266.6 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 12 A = 208.8

(208.8 - (17* 2.5)* 1.2) * 1.1 = 173.6 < 208.8 ∴An = 173.6 cm^2

2-RIB PL 170 * 17 Ar = 57.8

(57.8 - 2*(1* 2.7)* 1.7) * 1.1 = 53.5 < 57.8 ∴Anr = 53.5 cm^2

ΣAn = An + Anr = 173.6 + 53.5 = 227.1 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 134 * 266.6 / 227.1 = 157 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 157 * 17358 = 2730787 N

> 0.75 σ ta * An / 1.1 = 158 * 17358 / 1.1 = 2485350 N

・Rib Ptr = σ tn * Anr = 157 * 5348 = 841387 N

> 0.75 σ ta * Anr/ 1.1 = 158 * 5348 / 1.1 = 765765 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 173.6 / 2 = 86.8 cm^2

・Rib AnrR = Anr = 53.5 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 2730787 / 108000 = 25.3 pcs. (34 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 841387 / 108000 = 7.8 pcs. (2 @ 5 = 10 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 2,5 unites)

(h) Tensile force per one bolt

ρ p = Pt / 34 = 2730787 / 34 = 80317 N

ρ s = τ * Ag / 34 = 34 * 20880 / 34 = 20745 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(80317^2 + 20745^2)}$ = 82953 N < ρ a = 108000 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
2-SPL PL	80 ＊ 9	(14.4 -	2*(1*2.5)＊ 0.9)*1.1=	10.9＜	14.4	∴ 10.9
3-SPL PL	440 ＊ 9	(118.8 -	3*(5*2.5)＊ 0.9)*1.1=	93.6＜	118.8	∴ 93.6
		133.2				104.4 ＞ AnR
1-SPL PL	1730 ＊ 9	(155.7 -	(17*2.5)＊ 0.9)*1.1=	129.2＜	155.7	∴129.2 ＞ AnR
4-SPL PL	100 ＊ 17	(68.0 -	4*(1*2.7)＊ 1.7)*1.1=	54.6＜	68.0	∴ 54.6 ＞AnrR

(97) G2 J-1(Sec-1) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -44 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

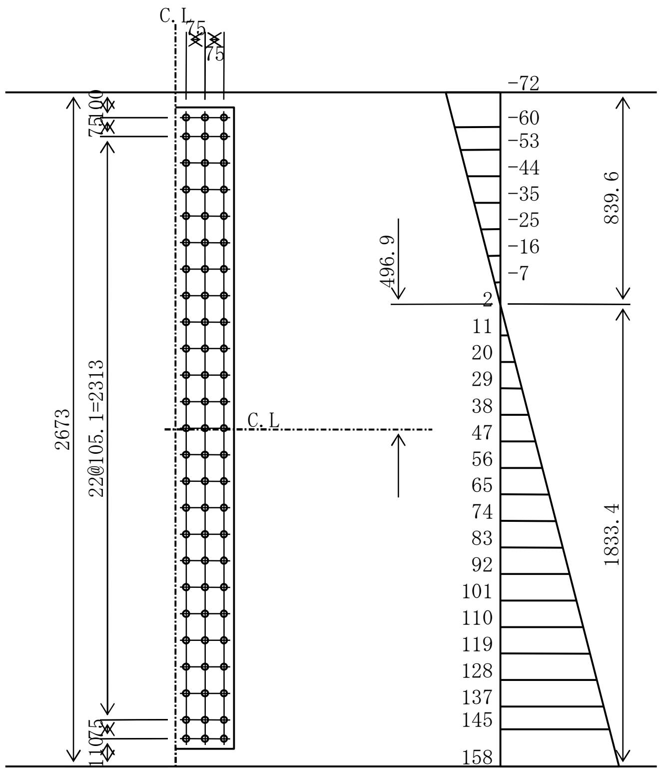
σL = 97 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 44 / 97 = 72 N/mm^2

σLn = 158 N/mm^2

τ = 38 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (145 + 158) / 2 = 312155 N

Required bolt number (Bolt number to be used)

N1 = 312155 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

ρs = τ * A / 75 = 38 * 37422 / 75 = 18962 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((312155 / 3)^2 + 18962^2)}$ = 105765 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2543 * 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3574405 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3152174 cm^4

Bending moment to be shared by the web

$Mw = 158 * 3152174*10^4 / 1833 = 2708*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 2708*10^6 / (3574405*10^4) * 1763 = 134$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(98) G2 J-1(Sec-1) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -47 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

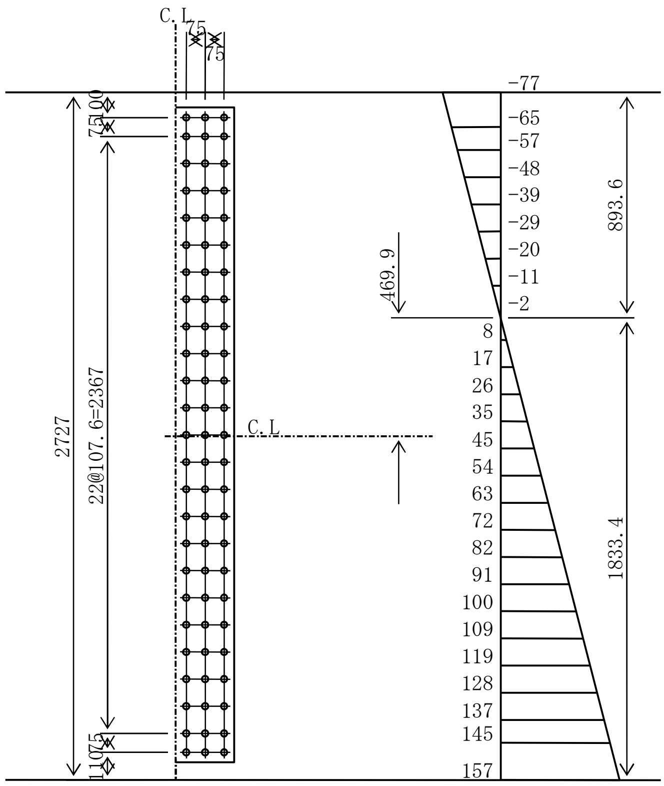
σL = 97 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 47 / 97 = 77 N/mm^2

σLn = 158 N/mm^2

τ = 40 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (145 + 157) / 2 = 312155 N

Required bolt number (Bolt number to be used)

N1 = 312155 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

ρs = τ * A / 75 = 40 * 38178 / 75 = 20420 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((312155 / 3)^2 + 20420^2)}$ = 106036 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3637665 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3208966 cm^4

Bending moment to be shared by the web

$Mw = 158 * 3208966*10^4 / 1833 = 2757*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 2757*10^6 / (3637665*10^4) * 1763 = 134$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(99) G2 J-1(Sec-1) LFLG

(a) Acting stress

σ tmax = 98 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

τ max = 40 N/mm^2

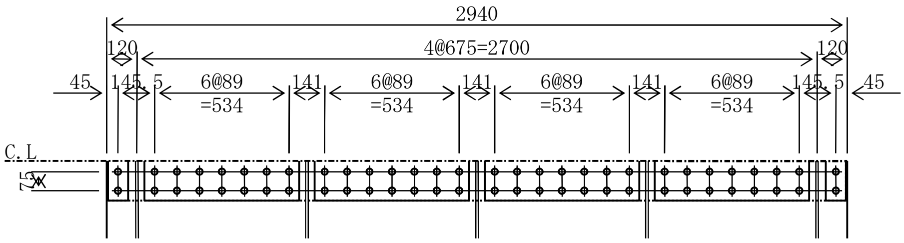
(b) Section area of main plate

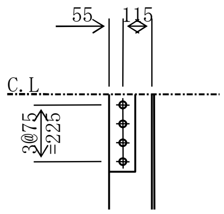
1-LFLG PL 2940 * 10 Ag = 294.0 cm^2 (SM490Y)

3-RIB PL 170 * 17 Agr = 86.7 cm^2 (SM490Y)

ΣAg = Ag + Agr = 294.0 + 86.7 = 380.7 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 10 A = 294.0

(294.0 - (30* 2.5)* 1.0) * 1.1 = 240.9 < 294.0 ∴An = 240.9 cm^2

3-RIB PL 170 * 17 Ar = 86.7

(86.7 - 3*(1* 2.7)* 1.7) * 1.1 = 80.2 < 86.7 ∴Anr = 80.2 cm^2

ΣAn = An + Anr = 240.9 + 80.2 = 321.1 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 98 * 380.7 / 321.1 = 116 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 158 * 24090 / 1.1 = 3449250 N

> σ tn * An = 116 * 24090 = 2786535 N

・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 158 * 8022 / 1.1 = 1148648 N

> σ tn * Anr = 116 * 8022 = 927954 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 240.9 / 2 = 120.5 cm^2

・Rib AnrR = Anr = 80.2 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 3449250 / 108000 = 31.9 pcs. (60 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 1148648 / 108000 = 10.6 pcs. (3 @ 4 = 12 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(h) Tensile force per one bolt

$\rho p = Pt / 60 = 3449250 / 60 = 57487$ N

$\rho s = \tau * Ag / 60 = 40 * 29400 / 60 = 19373$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(57487^2 + 19373^2)} = 60664$ N $< \rho a = 108000$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 ＊ 9	(14.4 -	2＊(1*2.5)＊ 0.9)＊1.1= 10.9＜	14.4	∴ 10.9
4-SPL PL	614 ＊ 9	(221.0 -	4＊(7*2.5)＊ 0.9)＊1.1= 173.8＜	221.0	∴173.8
		235.4			184.7 ＞ AnR
1-SPL PL	2930 ＊ 9	(263.7 -	(30*2.5)＊ 0.9)＊1.1= 215.8＜	263.7	∴215.8 ＞ AnR
6-SPL PL	100 ＊ 17	(102.0 -	6＊(1*2.7)＊ 1.7)＊1.1= 81.9＜	102.0	∴ 81.9 ＞AnrR

(100) G2 J-2(Sec-2) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -76 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

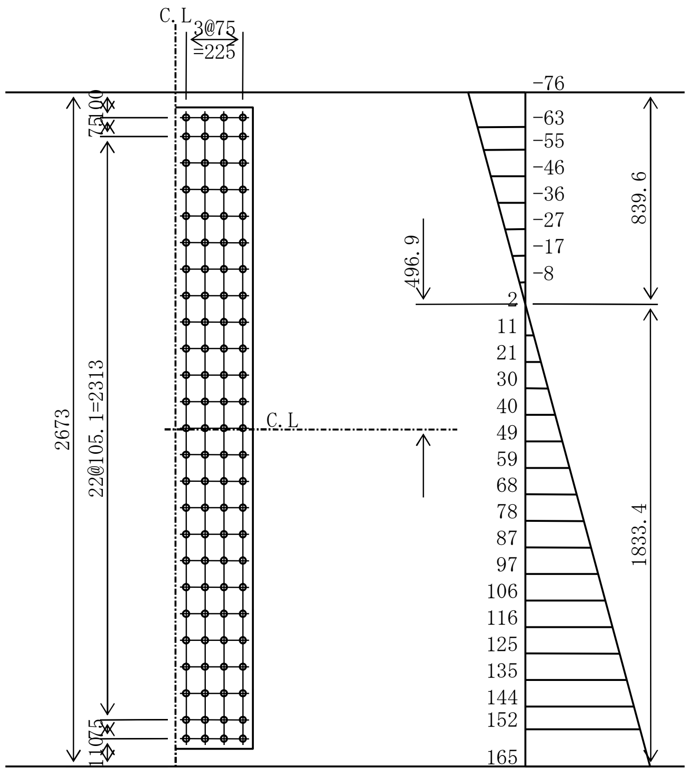
σL = 165 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 76 N/mm^2

σLn = 165 N/mm^2

τ = 26 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (152 + 165) / 2 = 327982 N

Required bolt number (Bolt number to be used)

N1 = 327982 / (108000 * 1.00) = 3.0 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 26 * 37422 / 100 = 9544 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((327982 / 4)^2 + 9544^2)}$ = 82549 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3574415 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3152183 cm^4

Bending moment to be shared by the web

Mw = 165 ＊ 3152183*10^4 / 1833 = 2845*10^6 N･mm

Bending stress of splice plates

σsp = 2845*10^6 / (3574415*10^4) ＊ 1763 = 140 N/mm^2 ＜ σa = 210 N/mm^2

(101) G2 J-2(Sec-2) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -81 N/mm^2 ＜ σa * 0.75 = 210 * 0.75 = 158 N/mm^2

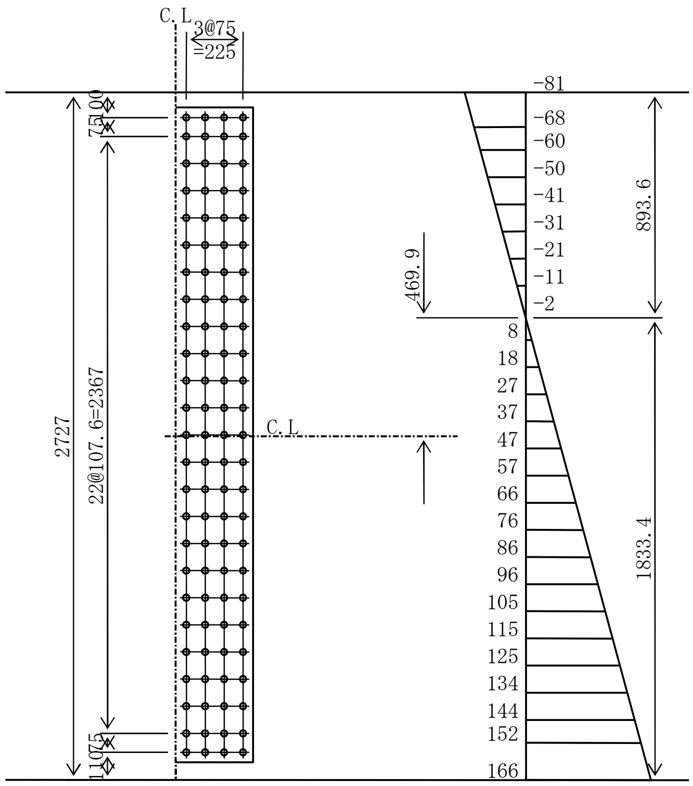
σL = 166 N/mm^2 ＞ σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 81 N/mm^2

σLn = 166 N/mm^2

τ = 27 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (152 + 166) / 2 = 328424 N

Required bolt number (Bolt number to be used)

N1 = 328424 / (108000 * 1.00) = 3.0 pcs. (4 bolts will be used.)

Check of shear force

$\rho s = \tau$ * A / 100 = 27 * 38178 / 100 = 10245 N ＜ ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((328424 / 4)^2 + 10245^2)}$ = 82743 N ＜ ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 * 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3637668 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3208969 cm^4

Bending moment to be shared by the web

Mw = 166 * 3208969*10^4 / 1833 = 2900*10^6 N·mm

Bending stress of splice plates

σsp = 2900*10^6 / (3637668*10^4) * 1763 = 141 N/mm^2 ＜ σa = 210 N/mm^2

(102) G2 J-2(Sec-2) LFLG

(a) Acting stress

σ tmax = 167 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

τ max = 27 N/mm^2

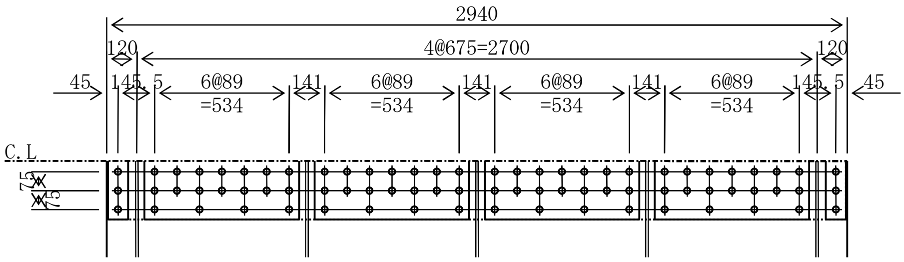
(b) Section area of main plate

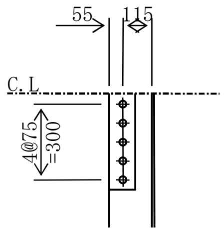
1-LFLG PL 2940 * 10 Ag = 294.0 cm^2 (SM490Y)

3-RIB PL 170 * 17 Agr = 86.7 cm^2 (SM490Y)

ΣAg = Ag + Agr = 294.0 + 86.7 = 380.7 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 10 A = 294.0

(294.0 - (18* 2.5)* 1.0) * 1.1 = 273.9 < 294.0 ∴An = 273.9 cm^2

3-RIB PL 170 * 17 Ar = 86.7

(86.7 - 3*(1* 2.7)* 1.7) * 1.1 = 80.2 < 86.7 ∴Anr = 80.2 cm^2

ΣAn = An + Anr = 273.9 + 80.2 = 354.1 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 167 * 380.7 / 354.1 = 179 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 179 * 27390 = 4906289 N

> 0.75 σ ta * An / 1.1 = 158 * 27390 / 1.1 = 3921750 N

・Rib Ptr = σ tn * Anr = 179 * 8022 = 1437011 N

> 0.75 σ ta * Anr/ 1.1 = 158 * 8022 / 1.1 = 1148648 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 273.9 / 2 = 137.0 cm^2

・Rib AnrR = Anr = 80.2 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 4906289 / 108000 = 45.4 pcs. (78 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 1437011 / 108000 = 13.3 pcs. (3 @ 5 = 15 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,5 unites)

(h) Tensile force per one bolt

$\rho p = Pt / 78 = 4906289 / 78 = 62901$ N

$\rho s = \tau * Ag / 78 = 27 * 29400 / 78 = 10221$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(62901^2 + 10221^2)} = 63726$ N $< \rho a = 108000$ N

(i) Check of splice plates

	(SM490Y)	$Ags(cm^2)$	deduction of bolt holes			$Ans(cm^2)$
2-SPL PL	80 * 9	(14.4 -	2*(1*2.5)* 0.9)*1.1=	10.9<	14.4	∴ 10.9
4-SPL PL	614 * 9	(221.0 -	4*(7*2.5)* 0.9)*1.1=	173.8<	221.0	∴173.8
		235.4				184.7 > AnR
1-SPL PL	2930 * 9	(263.7 -	(30*2.5)* 0.9)*1.1=	215.8<	263.7	∴215.8 > AnR
6-SPL PL	100 * 17	(102.0 -	6*(1*2.7)* 1.7)*1.1=	81.9<	102.0	∴ 81.9 >AnrR

(103) G2 J-3(Sec-3) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -91 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

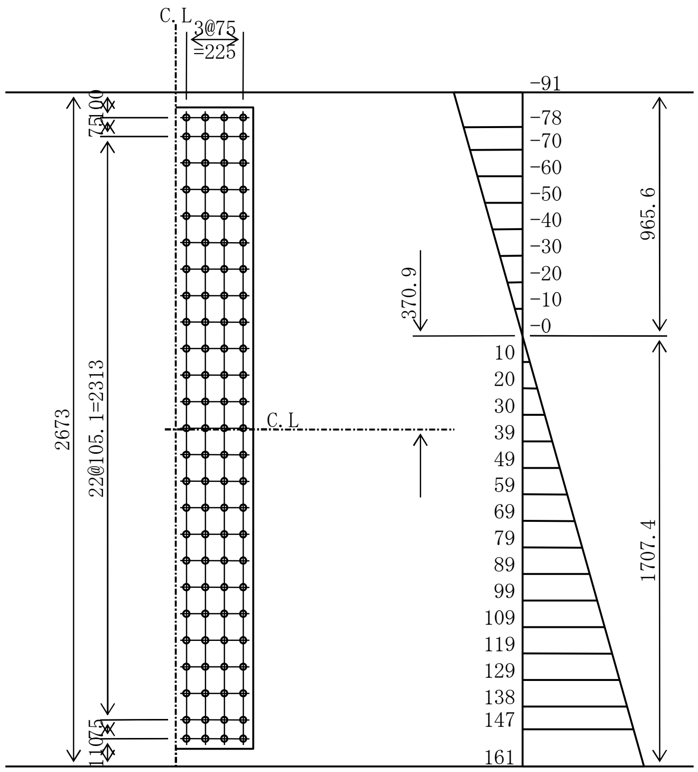
σL = 161 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 91 N/mm^2

σLn = 161 N/mm^2

τ = 17 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (147 + 161) / 2 = 317850 N

Required bolt number (Bolt number to be used)

N1 = 317850 / (108000 * 1.00) = 2.9 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 17 * 37422 / 100 = 6267 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((317850 / 4)^2 + 6267^2)}$ = 79709 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3079653 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2742981 cm^4

Bending moment to be shared by the web

$Mw = 161 * 2742981 * 10^4 / 1707 = 2584 * 10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 2584 * 10^6 / (3079653 * 10^4) * 1637 = 137$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(104) G2 J-3(Sec-3) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2727 * 14   A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -96 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

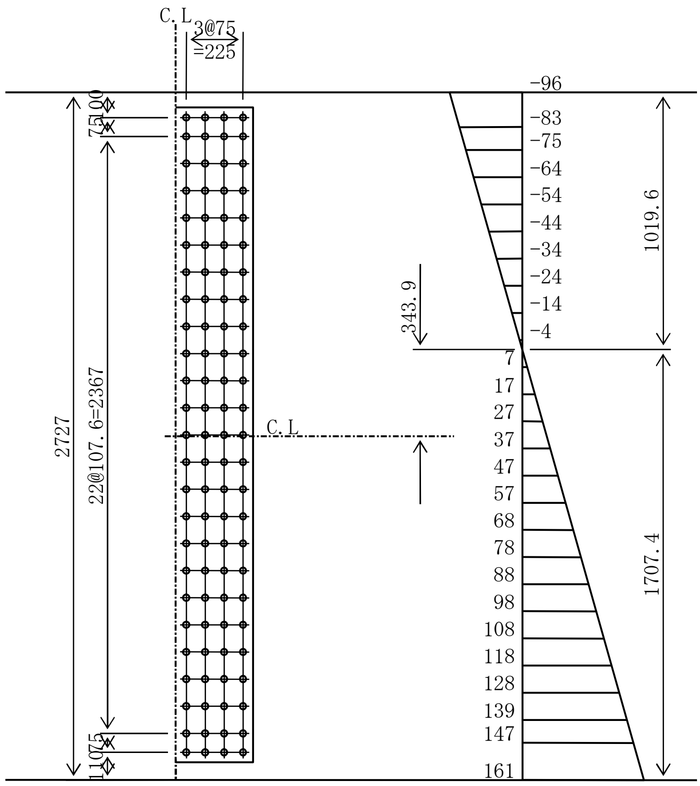
σL = 161 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 96 N/mm^2

σLn = 161 N/mm^2

τ = 18 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (147 + 161) / 2 = 318278 N

Required bolt number (Bolt number to be used)

N1 = 318278 / (108000 * 1.00) = 2.9 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 18 * 38178 / 100 = 6743 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((318278 / 4)^2 + 6743^2)}$ = 79855 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 * 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3164223 cm^4 > Iw

Moment of inertia of web plate Iw = 2817490 cm^4

Bending moment to be shared by the web

Mw = 161 * 2817490*10^4 / 1707 = 2658*10^6 N·mm

Bending stress of splice plates

σsp = 2658*10^6 / (3164223*10^4) * 1637 = 138 N/mm^2 < σa = 210 N/mm^2

(105) G2 J-3(Sec-3) LFLG

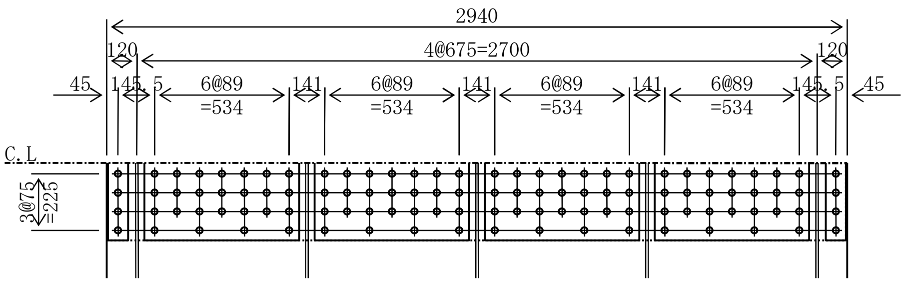
(a) Acting stress

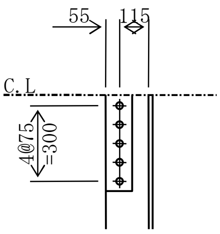
$\sigma tmax$ = 163 N/mm^2 0.75σta = 0.75 * 210 = 158 N/mm^2
τmax = 12 N/mm^2

(b) Section area of main plate

1-LFLG PL 2940 * 16 Ag = 470.4 cm^2 (SM490Y)
3-RIB PL 170 * 17 Agr = 86.7 cm^2 (SM490Y)
ΣAg = Ag + Agr = 470.4 + 86.7 = 557.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 16 A = 470.4
(470.4 - (18* 2.5)* 1.6) * 1.1 = 438.2 < 470.4 ∴An = 438.2 cm^2
3-RIB PL 170 * 17 Ar = 86.7
(86.7 - 3*(1* 2.7)* 1.7) * 1.1 = 80.2 < 86.7 ∴Anr = 80.2 cm^2
ΣAn = An + Anr = 438.2 + 80.2 = 518.5 cm^2
σtn = $\sigma tmax$ * ΣAg / ΣAn = 163 * 557.1 / 518.5 = 175 N/mm^2
< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 175 * 43824 = 7657141 N
> 0.75σta * An / 1.1 = 158 * 43824 / 1.1 = 6274800 N
・Rib Ptr = σtn * Anr = 175 * 8022 = 1401695 N
> 0.75σta * Anr/ 1.1 = 158 * 8022 / 1.1 = 1148648 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 438.2 / 2 = 219.1 cm^2
・Rib AnrR = Anr = 80.2 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 7657141 / 108000 = 70.9 pcs. (108 bolts will be used.)
・Rib nr = Ptr / (108000 * 1.00) = 1401695 / 108000 = 13.0 pcs. (3 @ 5 = 15 bolts will be used.)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(h) Tensile force per one bolt

ρp = Pt / 108 = 7657141 / 108 = 70899 N

ρs = τ * Ag / 108 = 12 * 47040 / 108 = 5329 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(70899^2 + 5329^2)}$ = 71099 N < ρa = 108000 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 11	(17.6 -	2*(1*2.5)* 1.1)*1.1= 13.3<	17.6	∴ 13.3
4-SPL PL	614 * 11	(270.2 -	4*(7*2.5)* 1.1)*1.1= 212.5<	270.2	∴212.5
		287.8			225.8 > AnR
1-SPL PL	2930 * 10	(293.0 -	(30*2.5)* 1.0)*1.1= 239.8<	293.0	∴239.8 > AnR
6-SPL PL	100 * 17	(102.0 -	6*(1*2.7)* 1.7)*1.1= 81.9<	102.0	∴ 81.9 >AnrR

(106) G2 J-4(Sec-5) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2673 * 14   A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -97 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

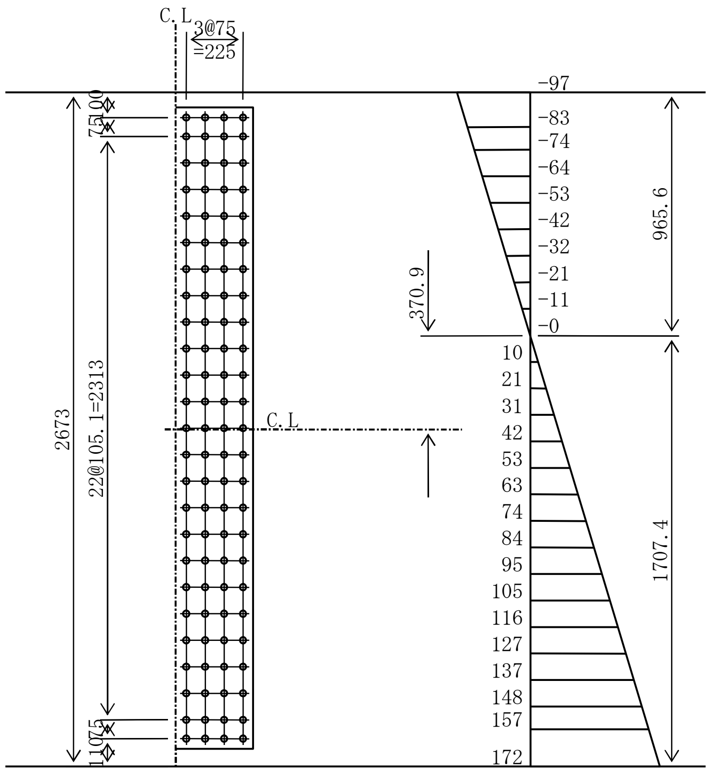
σL = 172 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 97 N/mm^2

σLn = 172 N/mm^2

τ = 8 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (157 + 172) / 2 = 339086 N

Required bolt number (Bolt number to be used)

N1 = 339086 / (108000 * 1.00) = 3.1 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 =   8 * 37422 / 100 =   2987 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{}$((339086 / 4)^2 +   2987^2) = 84824 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3079660 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2742986 cm^4

Bending moment to be shared by the web

Mw = 172 ＊ $2742986*10^4$ / 1707 = $2757*10^6$ N・mm

Bending stress of splice plates

σsp = $2757*10^6$ / ($3079660*10^4$) ＊ 1637 = 147 N/mm^2 ＜ σa = 210 N/mm^2

(107) G2 J-4(Sec-5) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -103 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

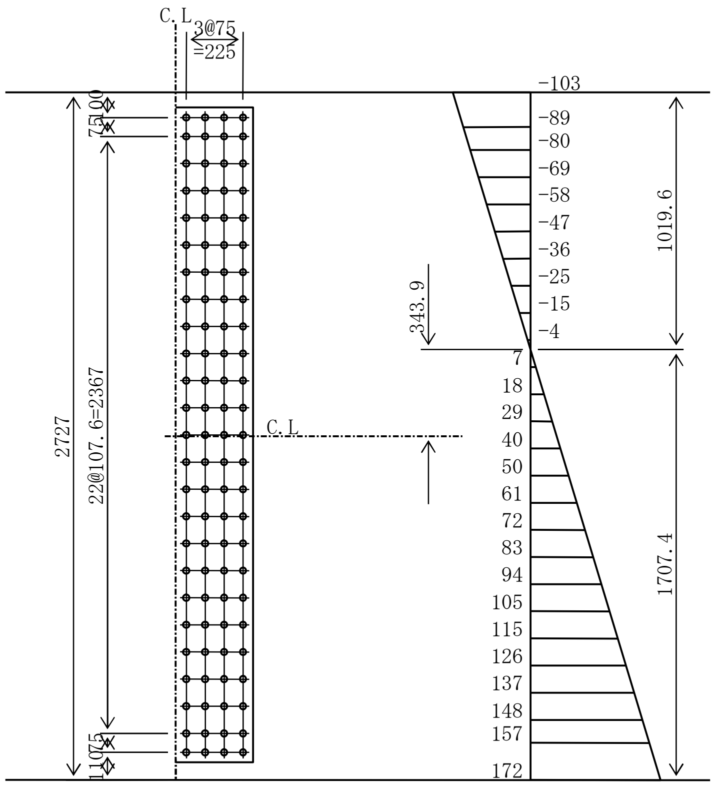
σL = 172 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 103 N/mm^2

σLn = 172 N/mm^2

τ = 8 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (157 + 172) / 2 = 339544 N

Required bolt number (Bolt number to be used)

N1 = 339544 / (108000 * 1.00) = 3.1 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 8 * 38178 / 100 = 3214 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((339544 / 4)^2 + 3214^2)}$ = 84947 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3164226 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2817492 cm^4

Bending moment to be shared by the web

Mw = 172 ＊ $2817492*10^4$ / 1707 = $2836*10^6$ N·mm

Bending stress of splice plates

σsp = $2836*10^6$ / ($3164226*10^4$) ＊ 1637 = 147 N/mm^2 ＜ σa = 210 N/mm^2

(108) G2 J-4(Sec-5) LFLG

(a) Acting stress

σ tmax = 173 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

τ max = 6 N/mm^2

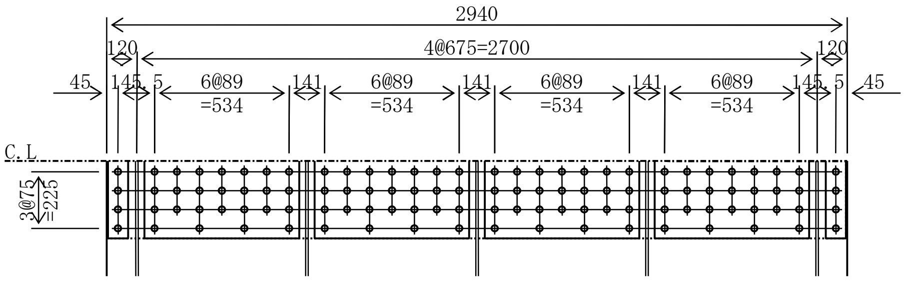
(b) Section area of main plate

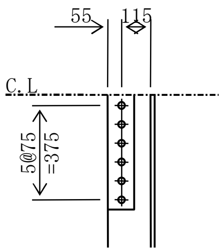
1-LFLG PL 2940 * 16 Ag = 470.4 cm^2 (SM490Y)

3-RIB PL 170 * 17 Agr = 86.7 cm^2 (SM490Y)

ΣAg = Ag + Agr = 470.4 + 86.7 = 557.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 16 A = 470.4

(470.4 - (18* 2.5)* 1.6) * 1.1 = 438.2 < 470.4 ∴An = 438.2 cm^2

3-RIB PL 170 * 17 Ar = 86.7

(86.7 - 3*(1* 2.7)* 1.7) * 1.1 = 80.2 < 86.7 ∴Anr = 80.2 cm^2

ΣAn = An + Anr = 438.2 + 80.2 = 518.5 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 173 * 557.1 / 518.5 = 186 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 186 * 43824 = 8168725 N

> 0.75 σ ta * An / 1.1 = 158 * 43824 / 1.1 = 6274800 N

・Rib Ptr = σ tn * Anr = 186 * 8022 = 1495344 N

> 0.75 σ ta * Anr/ 1.1 = 158 * 8022 / 1.1 = 1148648 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 438.2 / 2 = 219.1 cm^2

・Rib AnrR = Anr = 80.2 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 8168725 / 108000 = 75.6 pcs. (108 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 1495344 / 108000 = 13.8 pcs. (3 @ 6 = 18 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,6 unites)

(h) Tensile force per one bolt

$\rho p = Pt / 108 = 8168725 / 108 = 75636$ N

$\rho s = \tau * Ag / 108 = 6 * 47040 / 108 = 2540$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(75636^2 + 2540^2)} = 75679 \text{ N} < \rho a = 108000$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm²)	deduction of bolt holes		Ans(cm²)
2-SPL PL	80 * 11	(17.6 -	2*(1*2.5)* 1.1)*1.1= 13.3<	17.6	∴ 13.3
4-SPL PL	614 * 11	(270.2 -	4*(7*2.5)* 1.1)*1.1= 212.5<	270.2	∴212.5
		287.8			225.8 > AnR
1-SPL PL	2930 * 10	(293.0 -	(30*2.5)* 1.0)*1.1= 239.8<	293.0	∴239.8 > AnR
6-SPL PL	100 * 17	(102.0 -	6*(1*2.7)* 1.7)*1.1= 81.9<	102.0	∴ 81.9 >AnrR

(109) G2 J-5(Sec-6) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -91 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

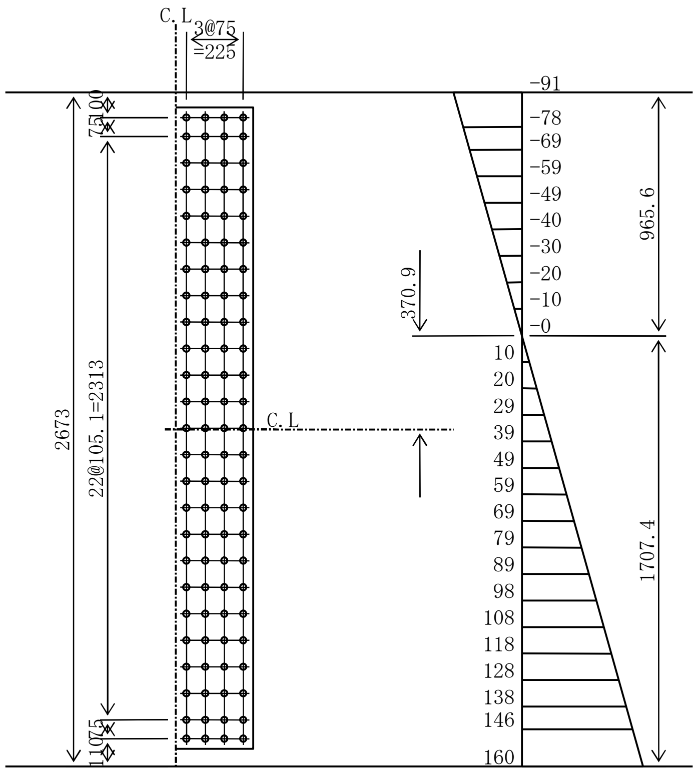
σL = 160 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 91 N/mm^2

σLn = 160 N/mm^2

τ = 16 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (146 + 160) / 2 = 316334 N

Required bolt number (Bolt number to be used)

N1 = 316334 / (108000 * 1.00) = 2.9 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 16 * 37422 / 100 = 6025 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{}$((316334 / 4)^2 + 6025^2) = 79313 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3079659 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2742985 cm^4

Bending moment to be shared by the web

Mw = 160 ＊ 2742985×10^4 / 1707 = 2572×10^6 N·mm

Bending stress of splice plates

σsp = 2572×10^6 / (3079659×10^4) ＊ 1637 = 137 N/mm^2 ＜ σa = 210 N/mm^2

(110) G2 J-5(Sec-6) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -96 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

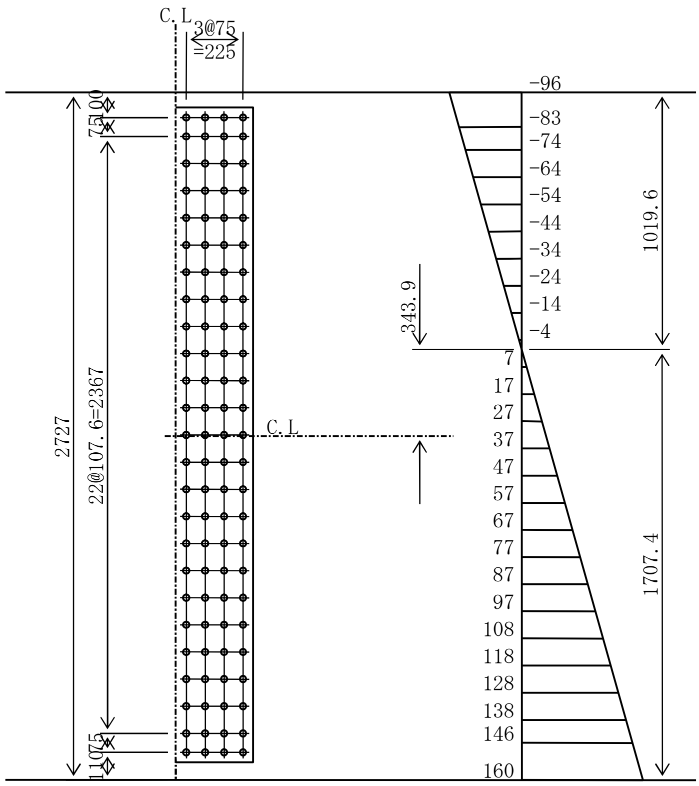
σL = 160 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 96 N/mm^2

σLn = 160 N/mm^2

τ = 17 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (146 + 160) / 2 = 316763 N

Required bolt number (Bolt number to be used)

N1 = 316763 / (108000 * 1.00) = 2.9 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 17 * 38178 / 100 = 6535 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((316763 / 4)^2 + 6535^2)}$ = 79460 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3164222 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2817490 cm^4

Bending moment to be shared by the web

M_w = 160 ＊ 2817490*10^4 / 1707 = 2646*10^6 N･mm

Bending stress of splice plates

σsp = 2646*10^6 / (3164222*10^4) ＊ 1637 = 137 N/mm^2 ＜ σa = 210 N/mm^2

(111) G2 J-5(Sec-6) LFLG

(a) Acting stress

σtmax = 162 N/mm^2 0.75σta = 0.75 * 210 = 158 N/mm^2

τmax = 11 N/mm^2

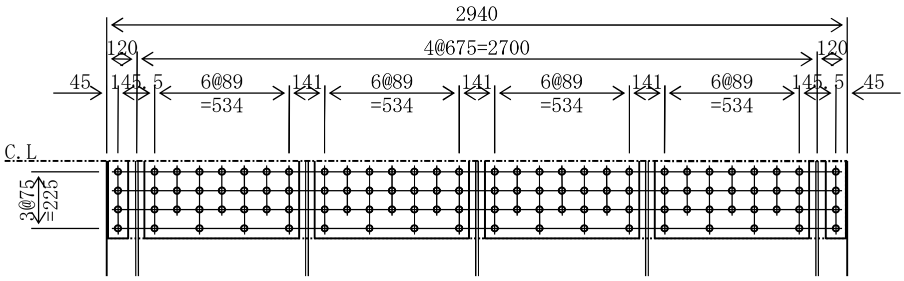
(b) Section area of main plate

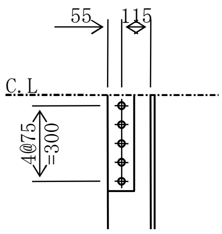
1-LFLG PL 2940 * 16 Ag = 470.4 cm^2 (SM490Y)

3-RIB PL 170 * 17 Agr = 86.7 cm^2 (SM490Y)

ΣAg = Ag + Agr = 470.4 + 86.7 = 557.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 16 A = 470.4

(470.4 - (18* 2.5)* 1.6) * 1.1 = 438.2 < 470.4 ∴An = 438.2 cm^2

3-RIB PL 170 * 17 Ar = 86.7

(86.7 - 3*(1* 2.7)* 1.7) * 1.1 = 80.2 < 86.7 ∴Anr = 80.2 cm^2

ΣAn = An + Anr = 438.2 + 80.2 = 518.5 cm^2

σtn = σtmax * ΣAg / ΣAn = 162 * 557.1 / 518.5 = 174 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 174 * 43824 = 7620646 N

> 0.75σta * An / 1.1 = 158 * 43824 / 1.1 = 6274800 N

・Rib Ptr = σtn * Anr = 174 * 8022 = 1395014 N

> 0.75σta * Anr/ 1.1 = 158 * 8022 / 1.1 = 1148648 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 438.2 / 2 = 219.1 cm^2

・Rib AnrR = Anr = 80.2 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 7620646 / 108000 = 70.6 pcs. (108 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 1395014 / 108000 = 12.9 pcs. (3 @ 5 = 15 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,5 unites)

(h) Tensile force per one bolt

ρp = Pt / 108 = 7620646 / 108 = 70562 N

ρs = τ * Ag / 108 = 11 * 47040 / 108 = 4959 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(70562^2 + 4959^2)}$ = 70736 N < ρa = 108000 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 11	(17.6 -	2*(1*2.5)* 1.1)*1.1= 13.3<	17.6	∴ 13.3
4-SPL PL	614 * 11	(270.2 -	4*(7*2.5)* 1.1)*1.1= 212.5<	270.2	∴212.5
		287.8			225.8 > AnR
1-SPL PL	2930 * 10	(293.0 -	(30*2.5)* 1.0)*1.1= 239.8<	293.0	∴239.8 > AnR
6-SPL PL	100 * 17	(102.0 -	6*(1*2.7)* 1.7)*1.1= 81.9<	102.0	∴ 81.9 >AnrR

(112) G2 J-6(Sec-7) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -75 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

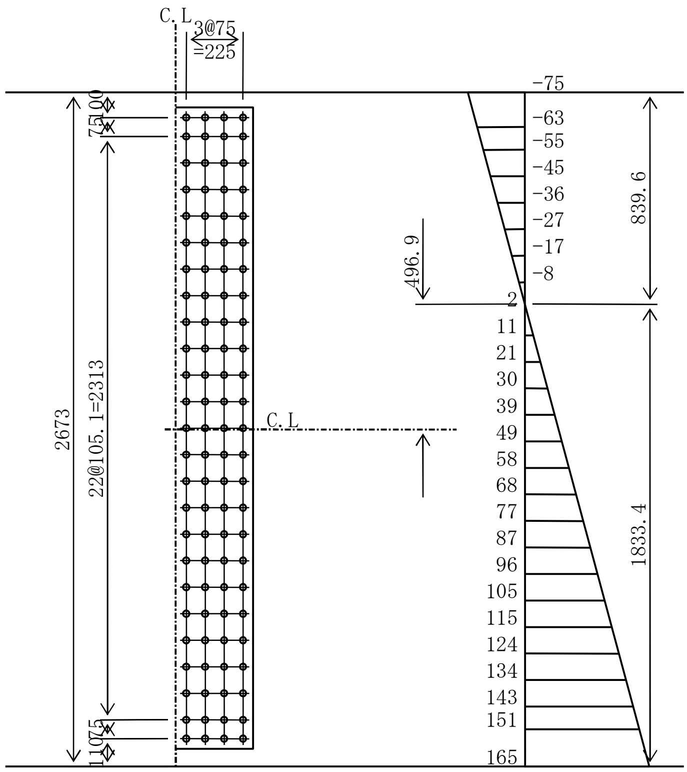
σL = 165 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 75 N/mm^2

σLn = 165 N/mm^2

τ = 26 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (151 + 165) / 2 = 326078 N

Required bolt number (Bolt number to be used)

N1 = 326078 / (108000 * 1.00) = 3.0 pcs. (4 bolts will be used.)

Check of shear force

$\rho s = \tau * A / 100$ = 26 * 37422 / 100 = 9609 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((326078 / 4)^2 + 9609^2)}$ = 82084 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 * 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3574412 cm^4 > Iw

Moment of inertia of web plate Iw = 3152180 cm^4

Bending moment to be shared by the web

Mw = 165 * 3152180*10^4 / 1833 = 2829*10^6 N·mm

Bending stress of splice plates

σsp = 2829*10^6 / (3574412*10^4) * 1763 = 140 N/mm^2 < σa = 210 N/mm^2

(113) G2 J-6(Sec-7) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -80 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

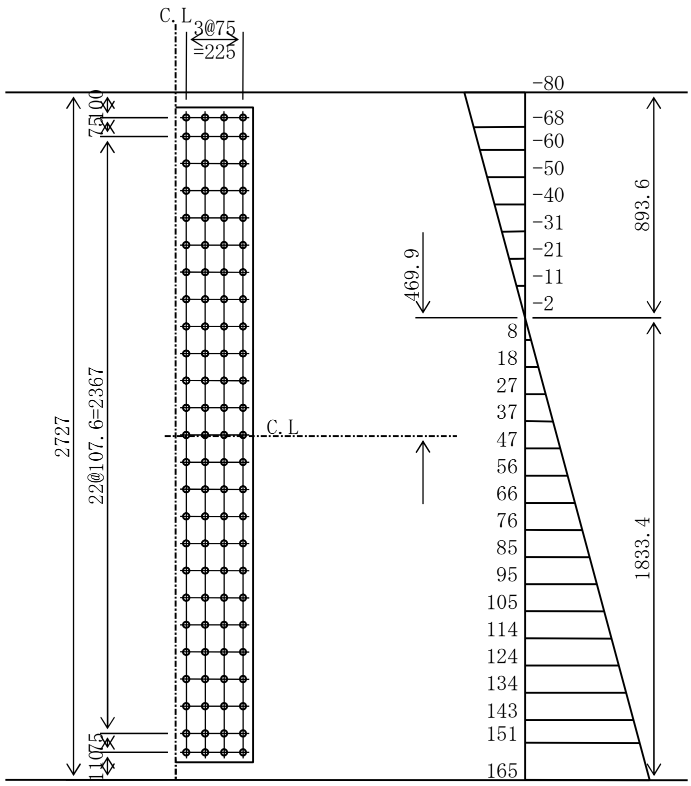
σL = 165 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 80 N/mm^2

σLn = 165 N/mm^2

τ = 27 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (151 + 165) / 2 = 326518 N

Required bolt number (Bolt number to be used)

N1 = 326518 / (108000 * 1.00) = 3.0 pcs. (4 bolts will be used.)

Check of shear force

$\rho s = \tau * A / 100$ = 27 * 38178 / 100 = 10384 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((326518 / 4)^2 + 10384^2)}$ = 82287 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 * 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3637673 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3208972 cm^4

Bending moment to be shared by the web

Mw = 165 * 3208972*10^4 / 1833 = 2884*10^6 N·mm

Bending stress of splice plates

σsp = 2884*10^6 / (3637673*10^4) * 1763 = 140 N/mm^2 ＜ σa = 210 N/mm^2

(114) G2 J-6(Sec-7) LFLG

(a) Acting stress

σ tmax = 166 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

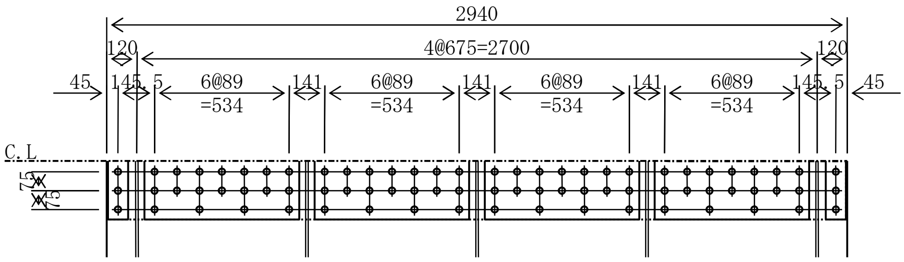
τ max = 26 N/mm^2

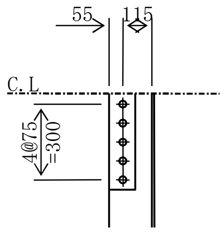
(b) Section area of main plate

1-LFLG	PL 2940 * 10	Ag	= 294.0 cm^2	(SM490Y)
3-RIB	PL 170 * 17	Agr	= 86.7 cm^2	(SM490Y)

ΣAg = Ag + Agr = 294.0 + 86.7 = 380.7 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 10 A = 294.0

(294.0 - (18* 2.5)* 1.0) * 1.1 = 273.9 < 294.0 ∴An = 273.9 cm^2

3-RIB PL 170 * 17 Ar = 86.7

(86.7 - 3*(1* 2.7)* 1.7) * 1.1 = 80.2 < 86.7 ∴Anr = 80.2 cm^2

ΣAn = An + Anr = 273.9 + 80.2 = 354.1 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 166 * 380.7 / 354.1 = 178 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 178 * 27390 = 4877815 N

> 0.75 σ ta * An / 1.1 = 158 * 27390 / 1.1 = 3921750 N

・Rib Ptr = σ tn * Anr = 178 * 8022 = 1428671 N

> 0.75 σ ta * Anr/ 1.1 = 158 * 8022 / 1.1 = 1148648 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 273.9 / 2 = 137.0 cm^2

・Rib AnrR = Anr = 80.2 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 4877815 / 108000 = 45.2 pcs. (78 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 1428671 / 108000 = 13.2 pcs. (3 @ 5 = 15 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,5 unites)

(h) Tensile force per one bolt

ρp = Pt / 78 = 4877815 / 78 = 62536 N

ρs = τ * Ag / 78 = 26 * 29400 / 78 = 9826 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(62536^2 + 9826^2)} = 63303$ N $< \rho a = 108000$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm²)	deduction of bolt holes		Ans(cm²)
2-SPL PL	80 * 9	(14.4 -	2*(1*2.5)* 0.9)*1.1= 10.9<	14.4	∴ 10.9
4-SPL PL	614 * 9	(221.0 -	4*(7*2.5)* 0.9)*1.1= 173.8<	221.0	∴173.8
		235.4			184.7 > AnR
1-SPL PL	2930 * 9	(263.7 -	(30*2.5)* 0.9)*1.1= 215.8<	263.7	∴215.8 > AnR
6-SPL PL	100 * 17	(102.0 -	6*(1*2.7)* 1.7)*1.1= 81.9<	102.0	∴ 81.9 >AnrR

(115) G2 J-7(Sec-8) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -43 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

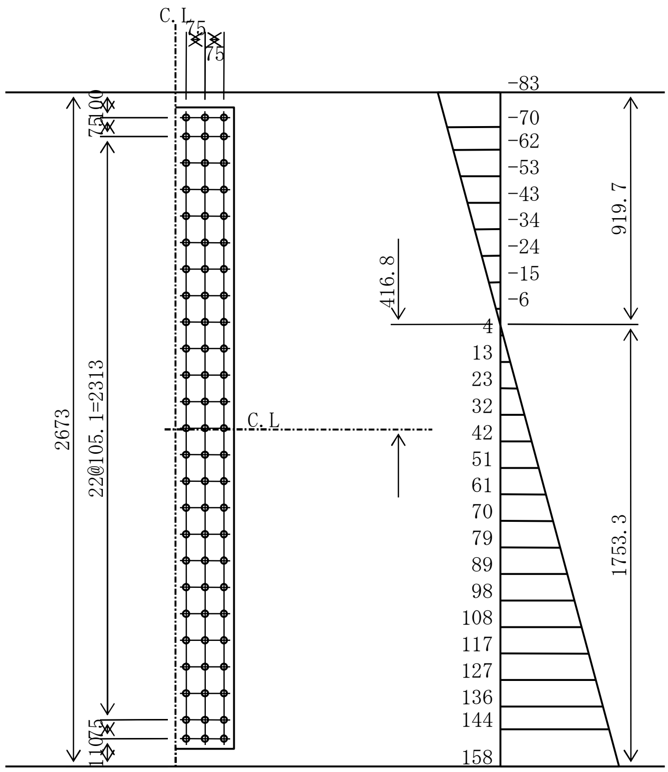
σL = 82 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 43 / 82 = 83 N/mm^2

σLn = 158 N/mm^2

τ = 38 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (144 + 158) / 2 = 311557 N

Required bolt number (Bolt number to be used)

N1 = 311557 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

ρs = τ * A / 75 = 38 * 37422 / 75 = 18972 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((311557 / 3)^2 + 18972^2)}$ = 105571 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3243167 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2878378 cm^4

Bending moment to be shared by the web

$Mw = 158 * 2878378*10^4 / 1753 = 2586*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 2586*10^6 / (3243167*10^4) * 1683 = 134$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(116) G2 J-7(Sec-8) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -45 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

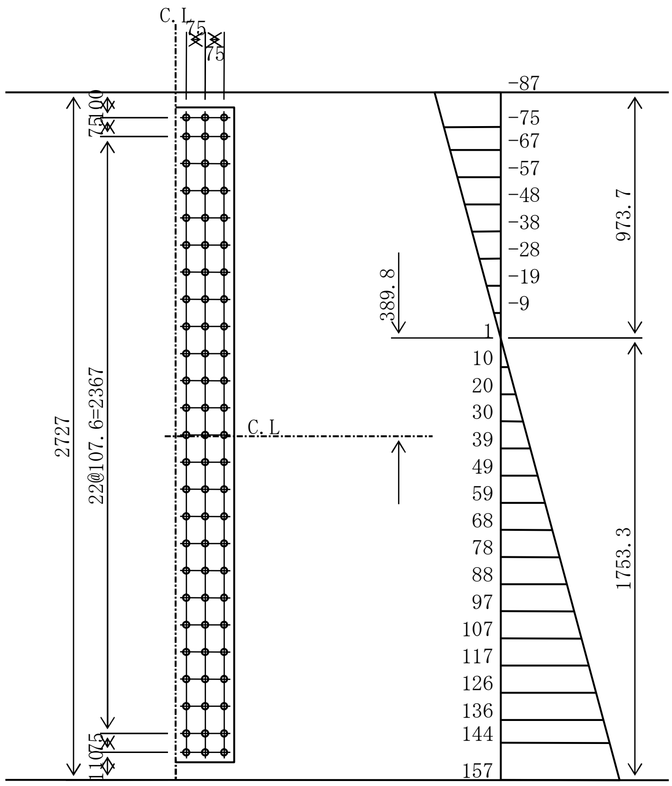
σL = 82 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 45 / 82 = 87 N/mm^2

σLn = 158 N/mm^2

τ = 40 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (144 + 157) / 2 = 311557 N

Required bolt number (Bolt number to be used)

N1 = 311557 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

$\rho s = \tau * A / 75$ = 40 * 38178 / 75 = 20510 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((311557 / 3)^2 + 20510^2)}$ = 105858 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3319595 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2946138 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ $2946138*10^4$ / 1753 = $2646*10^6$ N・mm

Bending stress of splice plates

σsp = $2646*10^6$ / ($3319595*10^4$) ＊ 1683 = 134 N/mm^2 ＜ σa = 210 N/mm^2

(117) G2 J-7(Sec-8) LFLG

(a) Acting stress

σ tmax = 82 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

τ max = 41 N/mm^2

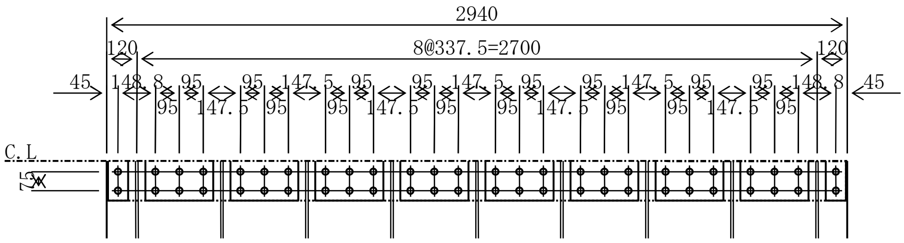
(b) Section area of main plate

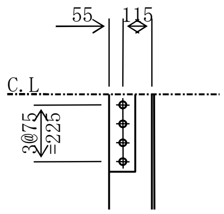
1-LFLG PL 2940 * 10 Ag = 294.0 cm^2 (SM490Y)

7-RIB PL 170 * 17 Agr = 202.3 cm^2 (SM490Y)

ΣAg = Ag + Agr = 294.0 + 202.3 = 496.3 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 10 A = 294.0

(294.0 - (26* 2.5)* 1.0) * 1.1 = 251.9 < 294.0 ∴An = 251.9 cm^2

7-RIB PL 170 * 17 Ar = 202.3

(202.3 - 7*(1* 2.7)* 1.7) * 1.1 = 187.2 < 202.3 ∴Anr = 187.2 cm^2

ΣAn = An + Anr = 251.9 + 187.2 = 439.1 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 82 * 496.3 / 439.1 = 93 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 158 * 25190 / 1.1 = 3606750 N

> σ tn * An = 93 * 25190 = 2338540 N

・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 158 * 18719 / 1.1 = 2680178 N

> σ tn * Anr = 93 * 18719 = 1737770 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 251.9 / 2 = 126.0 cm^2

・Rib AnrR = Anr = 187.2 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 3606750 / 108000 = 33.4 pcs. (52 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 2680178 / 108000 = 24.8 pcs. (7 @ 4 = 28 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(h) Tensile force per one bolt

$\rho p = Pt / 52 = 3606750 / 52 = 69361$ N

$\rho s = \tau * Ag / 52 = 41 * 29400 / 52 = 23302$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(69361^2 + 23302^2)} = 73170$ N $< \rho a = 108000$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 9	(14.4 -	2*(1*2.5)* 0.9)*1.1= 10.9<	14.4	∴ 10.9
8-SPL PL	270 * 9	(194.4 -	8*(3*2.5)* 0.9)*1.1= 154.4<	194.4	∴154.4
		208.8			165.3 > AnR
1-SPL PL	2930 * 9	(263.7 -	(26*2.5)* 0.9)*1.1= 225.7<	263.7	∴225.7 > AnR
14-SPL PL	100 * 17	(238.0 -	14*(1*2.7)* 1.7)*1.1= 191.1<	238.0	∴191.1 >AnrR

(118) G2 J-8(Sec-8) LWEB

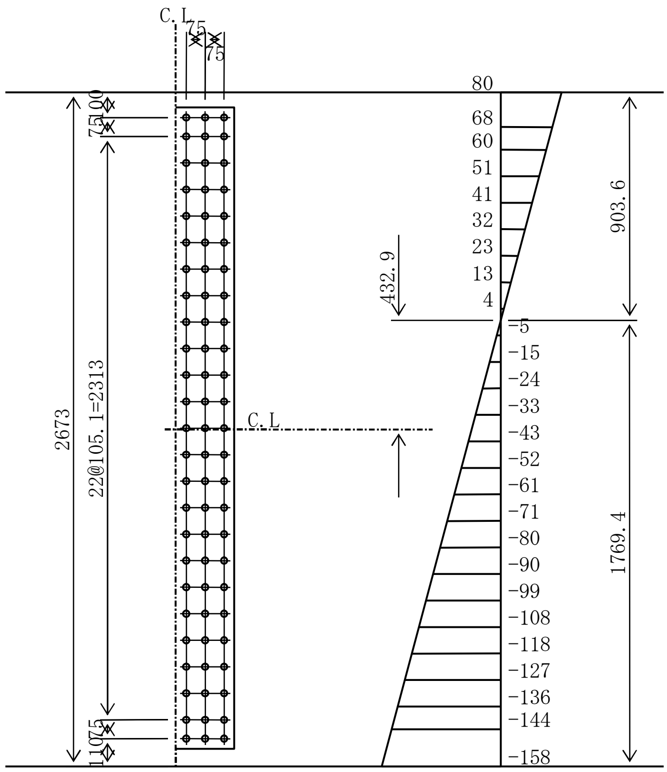
(a) Section area of main plate (Web plate)

1-LWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = 29 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = -57 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 158 * 29 / 57 = 80 N/mm^2
σLn = 158 N/mm^2
τ = 45 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (144 + 158) / 2 = 311681 N

Required bolt number (Bolt number to be used)

N1 = 311681 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

ρs = τ * A / 75 = 45 * 37422 / 75 = 22241 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{}$((311681 / 3$)^2$ + 22241^2) = 106248 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2543 * 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3304779 cm^4 $>$ Iw

Moment of inertia of web plate Iw = 2929348 cm^4

Bending moment to be shared by the web

Mw = 158 * 2929348*10^4 / 1769 = 2608*10^6 N·mm

Bending stress of splice plates

σ sp = 2608*10^6 / (3304779*10^4) * 1699 = 134 N/mm^2 $<$ σ a = 210 N/mm^2

(119) G2 J-8(Sec-8) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = 31 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

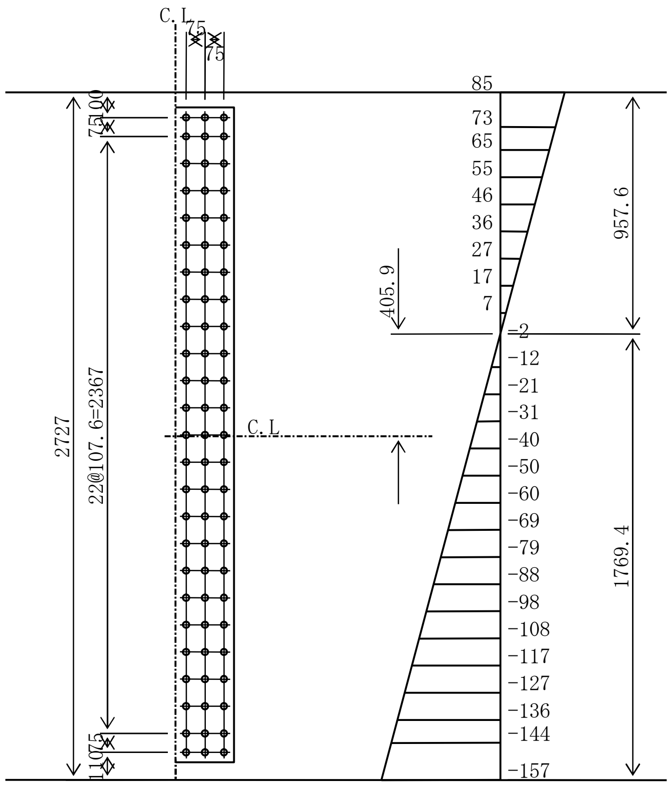
σL = -57 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 31 / 57 = 85 N/mm^2

σLn = 158 N/mm^2

τ = 47 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (144 + 157) / 2 = 311681 N

Required bolt number (Bolt number to be used)

N1 = 311681 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

$\rho s = \tau * A / 75$ = 47 * 38178 / 75 = 24106 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((311681 / 3)^2 + 24106^2)}$ = 106654 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3378452 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2994818 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ 2994818*10^4 / 1769 = 2666*10^6 N･mm

Bending stress of splice plates

σsp = 2666*10^6 / (3378452*10^4) ＊ 1699 = 134 N/mm^2 ＜ σa = 210 N/mm^2

(120) G2　J-8(Sec-8)　LFLG

(a) Acting stress

$\sigma cmax$ = -57 N/mm^2　　0.75σca = 0.75 * 156 = 117 N/mm^2

$\therefore \sigma c$ = 117 N/mm^2

τmax = 48 N/mm^2

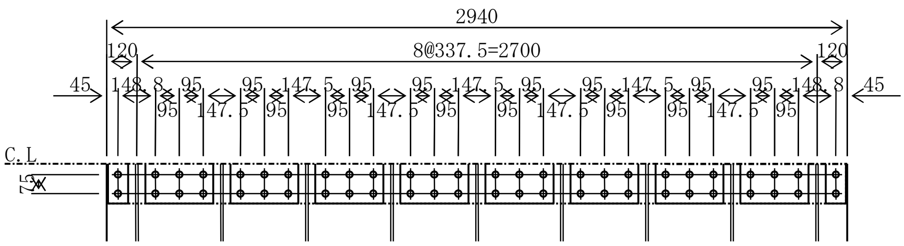
(b) Section area of main plate

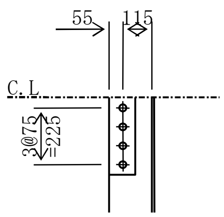
1-LFLG　PL　2940 * 10　　Ag = 294.0 cm^2　(SM490Y)

7-RIB　PL　170 * 17　　Agr = 202.3 cm^2　(SM490Y)

ΣAg = Ag + Agr = 294.0 + 202.3 = 496.3 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate　Pc = σc * Ag = 117 * 29400 = 3438764 N

・Rib　Pcr = σc * Agr = 117 * 20230 = 2366197 N

(e) Required section area of the splice plates

・Mother material(One side)　AgR = Ag / 2 = 294.0 / 2 = 147.0 cm^2

・Rib　　AgrR = Agr = 202.3 cm^2

(f) Required bolt number

・Main plate　n = Pc / (108000 * 1.00) = 3438764 / 108000 = 31.8 pcs. (52 bolts will be used.)

・Rib　nr = Pcr / (108000 * 1.00) = 2366197 / 108000 = 21.9 pcs. (7 @ 4 = 28 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 2,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 52 = 3438764 / 52 = 66130 N

ρs = τ * Ag / 52 = 48 * 29400 / 52 = 26925 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(66130^2 + 26925^2)}$ = 71401 N ＜ ρa = 108000 N

(h) Check of splice plates

	(SM490Y)	A_{gs} (cm^2)	
2-SPL PL	80 * 9	14.4	
8-SPL PL	270 * 9	194.4	
		208.8	
			> AgR = 147.0cm^2
1-SPL PL	2930 * 9	263.7	> AgR = 147.0cm^2
14-SPL PL	100 * 17	238.0	> AgrR = 202.3cm^2

(121) G2 J-9(Sec-9) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = 77 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

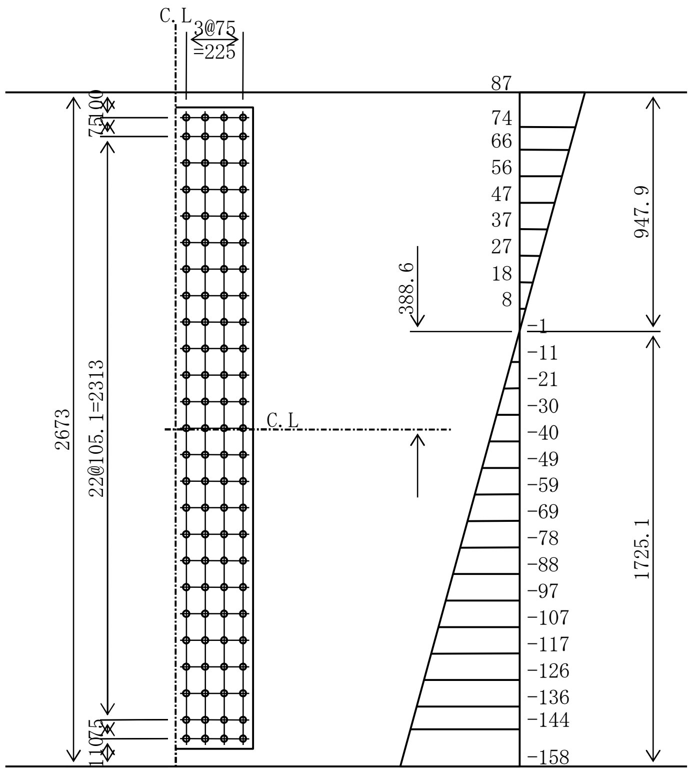
σL = -141 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 77 / 141 = 87 N/mm^2

σLn = 158 N/mm^2

τ = 50 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (144 + 158) / 2 = 311333 N

Required bolt number (Bolt number to be used)

N1 = 311333 / (108000 * 1.00) = 2.9 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 50 * 37422 / 100 = 18624 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((311333 / 4)^2 + 18624^2)}$ = 80030 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3140362 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2793274 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ 2793274*10^4 / 1725 = 2550*10^6 N･mm

Bending stress of splice plates

σsp = 2550*10^6 / (3140362*10^4) ＊ 1655 = 134 N/mm^2 ＜ σa = 210 N/mm^2

(122) G2 J-9(Sec-9) RWEB

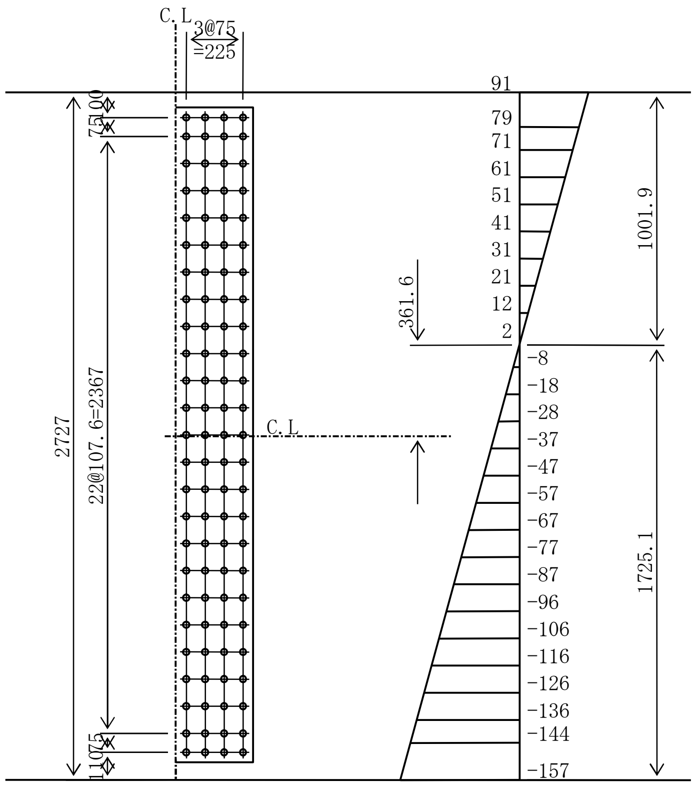
(a) Section area of main plate (Web plate)

1-RWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = 82 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = -141 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 158 * 82 / 141 = 91 N/mm^2
σLn = 158 N/mm^2
τ = 53 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (144 + 157) / 2 = 311333 N

Required bolt number (Bolt number to be used)

N1 = 311333 / (108000 * 1.00) = 2.9 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 53 * 38178 / 100 = 20296 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((311333 / 4)^2 + 20296^2)}$ = 80436 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3221754 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2865152 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ $2865152 * 10^4$ / 1725 = $2616 * 10^6$ N・mm

Bending stress of splice plates

σsp = $2616 * 10^6$ / ($3221754 * 10^4$) ＊ 1655 = 134 N/mm^2 ＜ σa = 210 N/mm^2

(123) G2 J-9(Sec-9) LFLG

(a) Acting stress

σcmax = -142 N/mm^2 0.75σca = 0.75 * 182 = 136 N/mm^2

∴σc = 142 N/mm^2

τmax = 45 N/mm^2

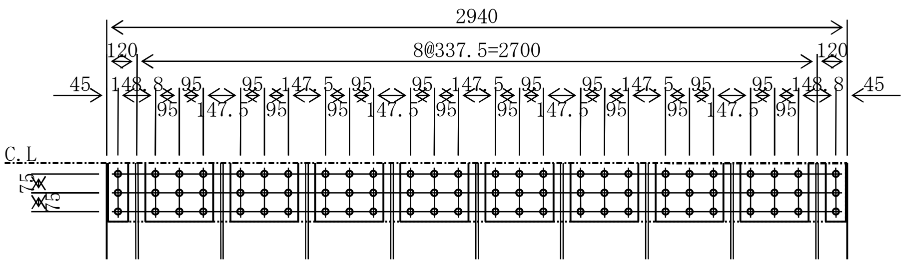
(b) Section area of main plate

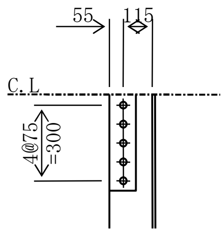
1-LFLG PL 2940 * 12 Ag = 352.8 cm^2 (SM490Y)

7-RIB PL 170 * 17 Agr = 202.3 cm^2 (SM490Y)

ΣAg = Ag + Agr = 352.8 + 202.3 = 555.1 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 142 * 35280 = 5010219 N

・Rib Pcr = σc * Agr = 142 * 20230 = 2872923 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 352.8 / 2 = 176.4 cm^2

・Rib AgrR = Agr = 202.3 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5010219 / 108000 = 46.4 pcs. (78 bolts will be used.)

・Rib nr = Pcr / (108000 * 1.00) = 2872923 / 108000 = 26.6 pcs. (7 @ 5 = 35 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,5 unites)

(g) Tensile force per one bolt

ρp = Pc / 78 = 5010219 / 78 = 64234 N

ρs = τ * Ag / 78 = 45 * 35280 / 78 = 20408 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(64234^2 + 20408^2) = 67398 N < ρa = 108000 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)
2-SPL PL	80 * 9	14.4
8-SPL PL	270 * 9	194.4
		208.8

> AgR = 176.4cm^2

1-SPL PL 2930 * 9 263.7 > AgR = 176.4cm^2

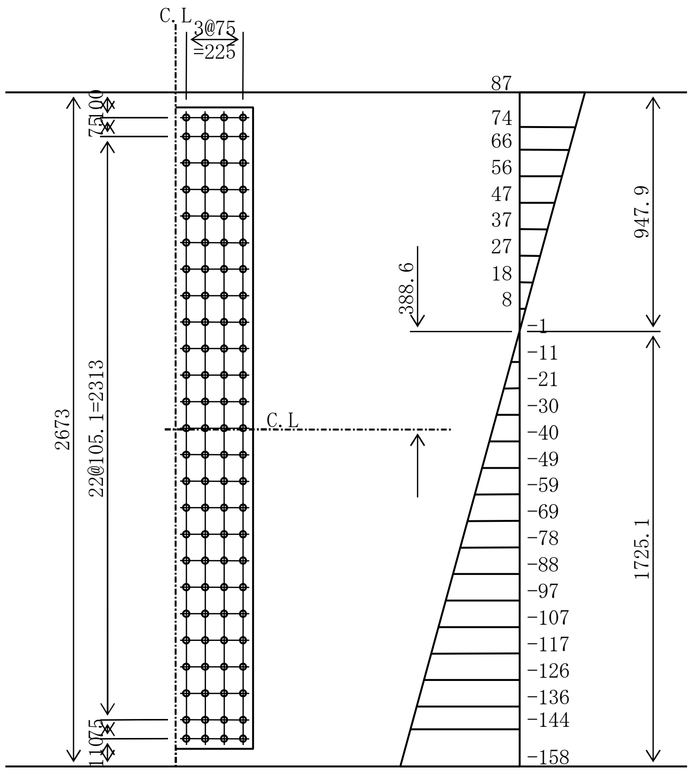
14-SPL PL 100 * 15 210.0 > AgrR = 202.3cm^2

(124) G2 J-10(Sec-11) LWEB

(a) Section area of main plate (Web plate)
1-LWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress
σU = 83 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = -152 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 158 * 83 / 152 = 87 N/mm^2
σLn = 158 N/mm^2
τ = 39 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress
Check of bolt at 25th row
Sharing width: b1 = 14.8 cm
Total force to be shared
P1 = 148 * 14 * (144 + 158) / 2 = 311333 N
Required bolt number (Bolt number to be used)
N1 = 311333 / (108000 * 1.00) = 2.9 pcs. (4 bolts will be used.)

Check of shear force
ρs = τ * A / 100 = 39 * 37422 / 100 = 14613 N < ρa = 108000 N
Combined stress
$\rho c25$ = $\sqrt{}$((311333 / 4)^2 + 14613^2) = 79193 N < ρa = 108000 N
(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 * 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3140388 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2793296 cm^4

Bending moment to be shared by the web

Mw = 158 * 2793296*10^4 / 1725 = 2550*10^6 N･mm

Bending stress of splice plates

σsp = 2550*10^6 / (3140388*10^4) * 1655 = 134 N/mm^2 ＜ σa = 210 N/mm^2

(125) G2 J-10(Sec-11) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = 88 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

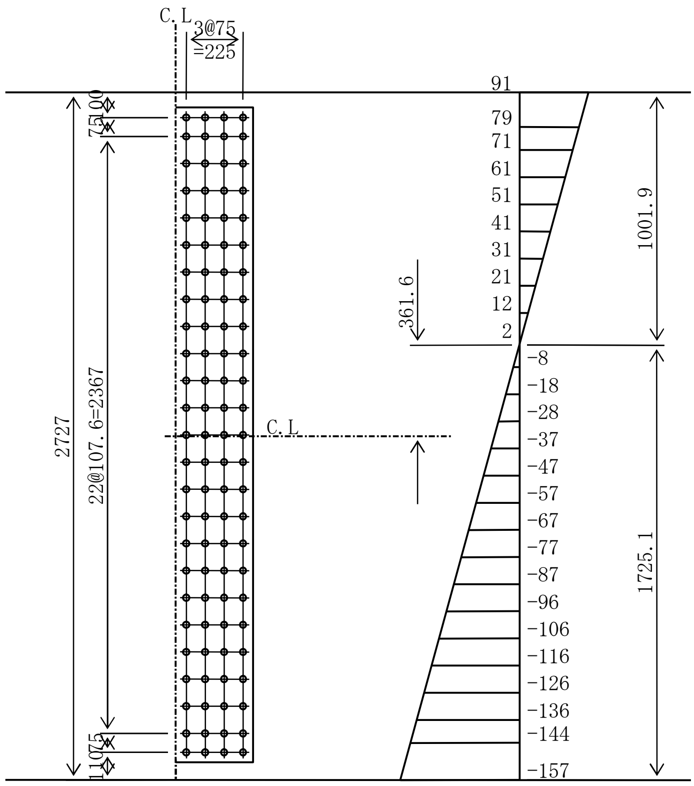
σL = -152 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 88 / 152 = 91 N/mm^2

σLn = 158 N/mm^2

τ = 42 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (144 + 157) / 2 = 311333 N

Required bolt number (Bolt number to be used)

N1 = 311333 / (108000 * 1.00) = 2.9 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 42 * 38178 / 100 = 15906 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((311333 / 4)^2 + 15906^2)}$ = 79442 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 * 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3221770 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2865165 cm^4

Bending moment to be shared by the web

Mw = 158 * 2865165*10^4 / 1725 = 2616*10^6 N·mm

Bending stress of splice plates

σsp = 2616*10^6 / (3221770*10^4) * 1655 = 134 N/mm^2 ＜ σa = 210 N/mm^2

(126) G2 J-10(Sec-11) LFLG

(a) Acting stress

$\sigma cmax$ = -153 N/mm² $0.75\sigma ca$ = 0.75 * 182 = 136 N/mm²

$\therefore \sigma c$ = 153 N/mm²

τmax = 36 N/mm²

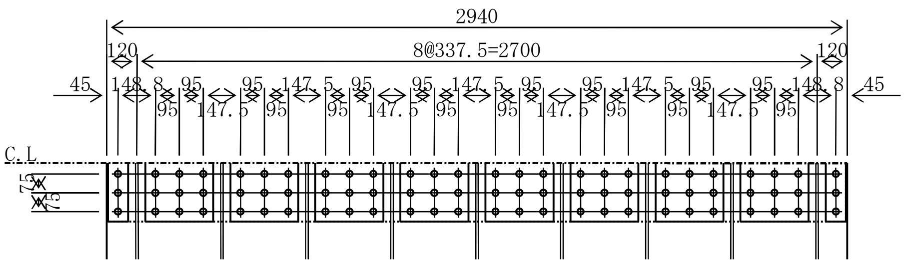
(b) Section area of main plate

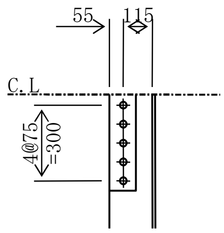
1-LFLG PL 2940 * 12 Ag = 352.8 cm² (SM490Y)

7-RIB PL 170 * 17 Agr = 202.3 cm² (SM490Y)

ΣAg = Ag + Agr = 352.8 + 202.3 = 555.1 cm²

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 153 * 35280 = 5401791 N

・Rib Pcr = σc * Agr = 153 * 20230 = 3097456 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 352.8 / 2 = 176.4 cm²

・Rib AgrR = Agr = 202.3 cm²

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5401791 / 108000 = 50.0 pcs. (78 bolts will be used.)

・Rib nr = Pcr / (108000 * 1.00) = 3097456 / 108000 = 28.7 pcs. (7 @ 5 = 35 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,5 unites)

(g) Tensile force per one bolt

ρp = Pc / 78 = 5401791 / 78 = 69254 N

ρs = τ * Ag / 78 = 36 * 35280 / 78 = 16099 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(69254^2 + 16099^2)}$ = 71100 N < ρa = 108000 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
2-SPL PL	80 * 9	14.4	
8-SPL PL	270 * 9	194.4	
		208.8	
			> AgR = 176.4cm^2
1-SPL PL	2930 * 9	263.7	> AgR = 176.4cm^2
14-SPL PL	100 * 15	210.0	> AgrR = 202.3cm^2

(127) G2 J-11(Sec-12) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = 49 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

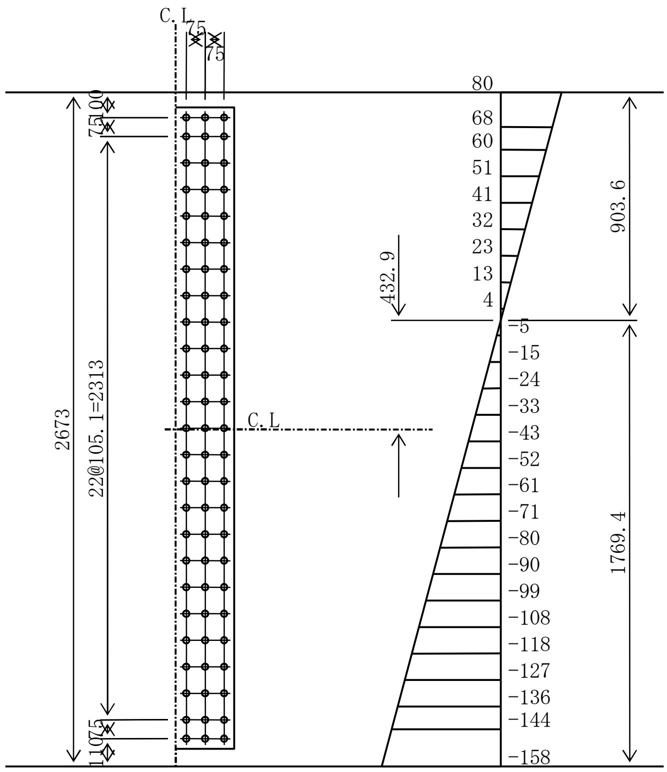
σL = -95 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 49 / 95 = 80 N/mm^2

σLn = 158 N/mm^2

τ = 33 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (144 + 158) / 2 = 311681 N

Required bolt number (Bolt number to be used)

N1 = 311681 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

ρs = τ * A / 75 = 33 * 37422 / 75 = 16525 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((311681 / 3)^2 + 16525^2)}$ = 105200 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3304838 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2929397 cm^4

Bending moment to be shared by the web

$Mw = 158 * 2929397*10^4 / 1769 = 2608*10^6$ N･mm

Bending stress of splice plates

$\sigma sp = 2608*10^6 / (3304838*10^4) * 1699 = 134$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(128) G2 J-11(Sec-12) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = 52 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

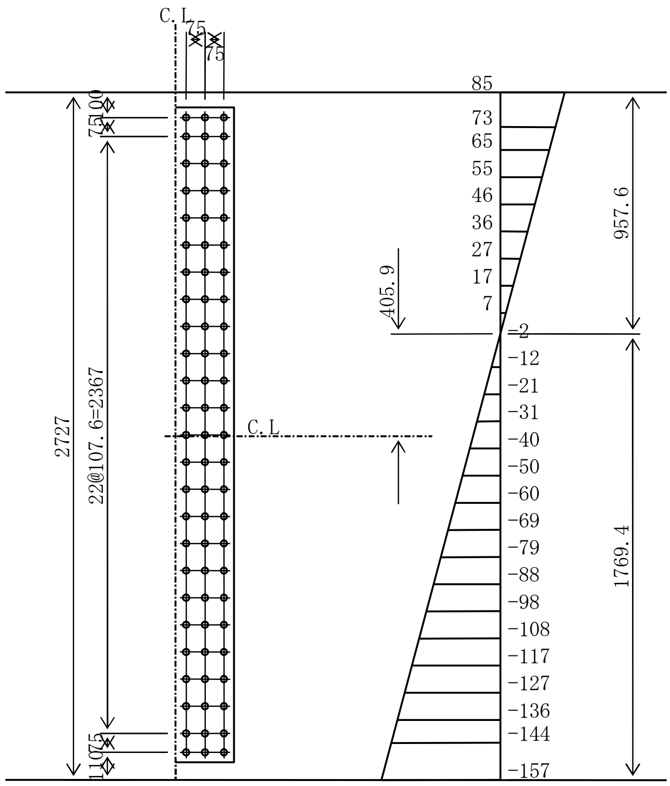
σL = -95 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 52 / 95 = 85 N/mm^2

σLn = 158 N/mm^2

τ = 35 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (144 + 157) / 2 = 311681 N

Required bolt number (Bolt number to be used)

N1 = 311681 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

ρs = τ * A / 75 = 35 * 38178 / 75 = 17926 N < ρa = 108000 N

Combined stress

ρc25 = $\sqrt{((311681 / 3)^2 + 17926^2)}$ = 105429 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3378532 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2994885 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ 2994885×10^4 / 1769 = 2666×10^6 N·mm

Bending stress of splice plates

σsp = 2666×10^6 / (3378532×10^4) ＊ 1699 = 134 N/mm^2 ＜ σa = 210 N/mm^2

(129) G2 J-11(Sec-12) LFLG

(a) Acting stress

σcmax = -96 N/mm^2 0.75σca = 0.75 * 156 = 117 N/mm^2

∴σc = 117 N/mm^2

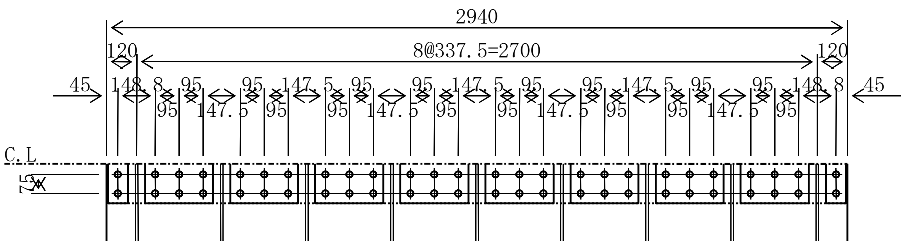
τmax = 35 N/mm^2

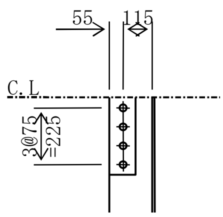
(b) Section area of main plate

1-LFLG	PL	2940 * 10	Ag =	294.0 cm^2	(SM490Y)
7-RIB	PL	170 * 17	Agr =	202.3 cm^2	(SM490Y)

ΣAg = Ag + Agr = 294.0 + 202.3 = 496.3 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 117 * 29400 = 3438764 N

・Rib Pcr = σc * Agr = 117 * 20230 = 2366197 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 294.0 / 2 = 147.0 cm^2

・Rib AgrR = Agr = 202.3 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 3438764 / 108000 = 31.8 pcs. (52 bolts will be used.)

・Rib nr = Pcr / (108000 * 1.00) = 2366197 / 108000 = 21.9 pcs. (7 @ 4 = 28 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 52 = 3438764 / 52 = 66130 N

ρs = τ * Ag / 52 = 35 * 29400 / 52 = 19908 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(66130^2 + 19908^2)}$ = 69062 N < ρa = 108000 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
2-SPL PL	80 * 9	14.4	
8-SPL PL	270 * 9	194.4	
		208.8	> AgR = 147.0cm^2
1-SPL PL	2930 * 9	263.7	> AgR = 147.0cm^2
14-SPL PL	100 * 15	210.0	> AgrR = 202.3cm^2

(130) G2 J-12(Sec-12) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2673 * 14   A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU =   21 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

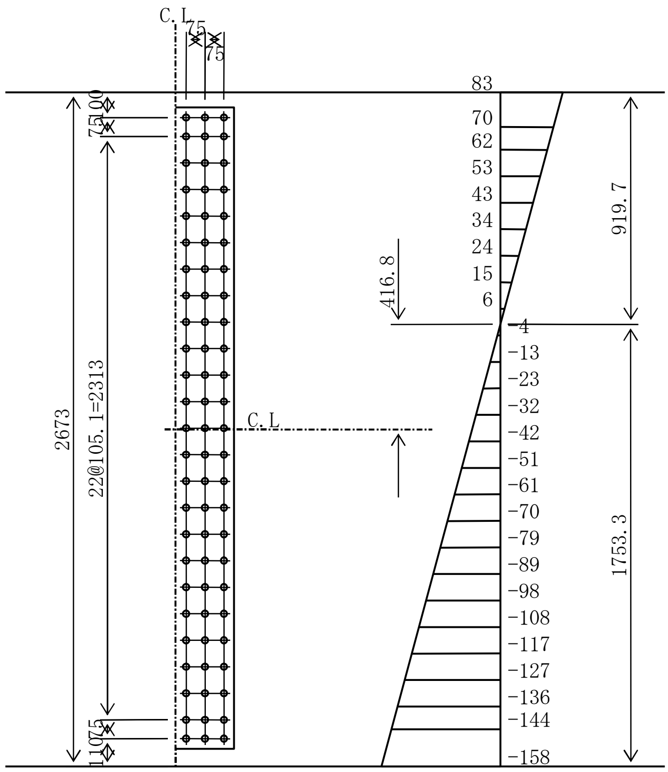
σL = -40 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 21 / 40 = 83 N/mm^2

σLn = 158 N/mm^2

τ = 26 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (144 + 158) / 2 = 311557 N

Required bolt number (Bolt number to be used)

N1 = 311557 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

ρs = τ * A / 75 = 26 * 37422 / 75 = 13189 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((311557 / 3)^2 + 13189^2)}$ = 104687 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3243180 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2878388 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ $2878388*10^4$ / 1753 = $2586*10^6$ N･mm

Bending stress of splice plates

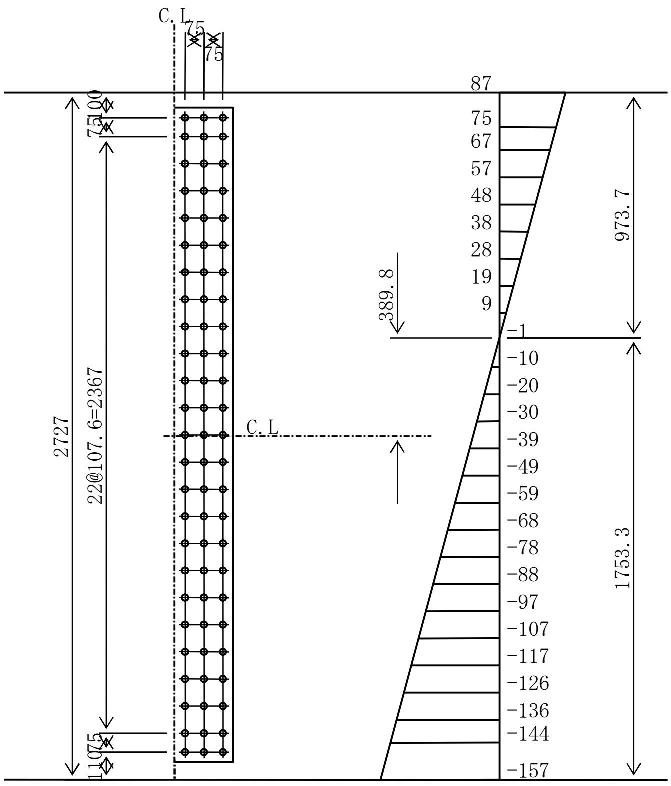
σsp = $2586*10^6$ / ($3243180*10^4$) ＊ 1683 = 134 N/mm^2 ＜ σa = 210 N/mm^2

(131) G2 J-12(Sec-12) RWEB

(a) Section area of main plate (Web plate)
1-RWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress
σU = 22 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = -40 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 158 * 22 / 40 = 87 N/mm^2
σLn = 158 N/mm^2
τ = 28 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress
Check of bolt at 25th row
Sharing width: b1 = 14.8 cm
Total force to be shared
P1 = 148 * 14 * (144 + 157) / 2 = 311557 N
Required bolt number (Bolt number to be used)
N1 = 311557 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force
ρs = τ * A / 75 = 28 * 38178 / 75 = 14257 N < ρa = 108000 N
Combined stress
$\rho c25$ = $\sqrt{((311557 / 3)^2 + 14257^2)}$ = 104826 N < ρa = 108000 N
(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3319628 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2946165 cm^4

Bending moment to be shared by the web

$Mw = 158 * 2946165*10^4 / 1753 = 2646*10^6$ N・mm

Bending stress of splice plates

$\sigma sp = 2646*10^6 / (3319628*10^4) * 1683 = 134$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(132) G2 J-12(Sec-12) LFLG

(a) Acting stress

$\sigma tmax$ = 13 N/mm^2 0.75σta = 0.75 * 210 = 158 N/mm^2

$\sigma cmax$ = -40 N/mm^2 0.75σca = 0.75 * 156 = 117 N/mm^2

$\therefore \sigma c$ = 117 N/mm^2

τmax = 29 N/mm^2

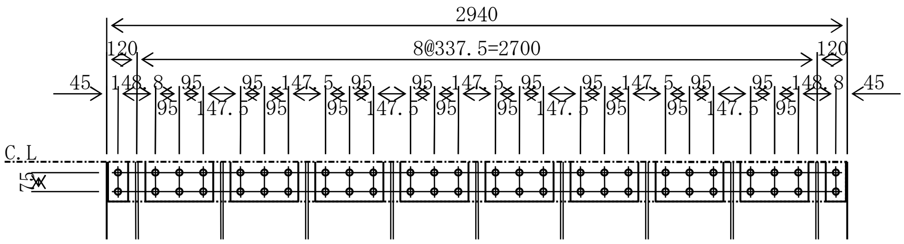
(b) Section area of main plate

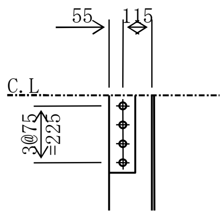
1-LFLG PL 2940 * 10 Ag = 294.0 cm^2 (SM490Y)

7-RIB PL 170 * 17 Agr = 202.3 cm^2 (SM490Y)

ΣAg = Ag + Agr = 294.0 + 202.3 = 496.3 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 10 A = 294.0

(294.0 - (26* 2.5)* 1.0) * 1.1 = 251.9 < 294.0 $\therefore$An = 251.9 cm^2

7-RIB PL 170 * 17 Ar = 202.3

(202.3 - 7*(1* 2.7)* 1.7) * 1.1 = 187.2 < 202.3 $\therefore$Anr = 187.2 cm^2

ΣAn = An + Anr = 251.9 + 187.2 = 439.1 cm^2

$\sigma tn = \sigma tmax * \Sigma Ag / \Sigma An$ = 13 * 496.3 / 439.1 = 15 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 158 * 25190 / 1.1 = 3606750 N

> σtn * An = 15 * 25190 = 377286 N

Pc = σc * Ag = 117 * 29400 = 3438764 N

・Rib Ptr = 0.75σta * Anr / 1.1 = 158 * 18719 / 1.1 = 2680178 N

> σtn * Anr = 15 * 18719 = 280361 N

Pcr = σc * Agr = 117 * 20230 = 2366197 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 251.9 / 2 = 126.0 cm^2

AgR = Ag / 2 = 294.0 / 2 = 147.0 cm^2

・Rib AnrR = Anr = 187.2 cm^2

AgrR = Agr = 202.3 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 3606750 / 108000 = 33.4 pcs. (52 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 2680178 / 108000 = 24.8 pcs. (7 @ 4 = 28 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(h) Tensile force per one bolt

$\rho p = Pt / 52 = 3606750 / 52 = 69361$ N

$\rho s = \tau * Ag / 52 = 29 * 29400 / 52 = 16209$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(69361^2 + 16209^2)} = 71229$ N $<$ ρa = 108000 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 9	(14.4 -	2*(1*2.5)* 0.9)*1.1= 10.9<	14.4	∴ 10.9
8-SPL PL	270 * 9	(194.4 -	8*(3*2.5)* 0.9)*1.1= 154.4<	194.4	∴154.4
		208.8			165.3
		> AgR			> AnR
1-SPL PL	2930 * 9	(263.7 -	(26*2.5)* 0.9)*1.1= 225.7<	263.7	∴225.7
		> AgR			> AnR
14-SPL PL	100 * 17	(238.0 -	14*(1*2.7)* 1.7)*1.1= 191.1<	238.0	∴191.1
		> AgrR			>AnrR

(133) G2 J-13(Sec-13) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -26 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

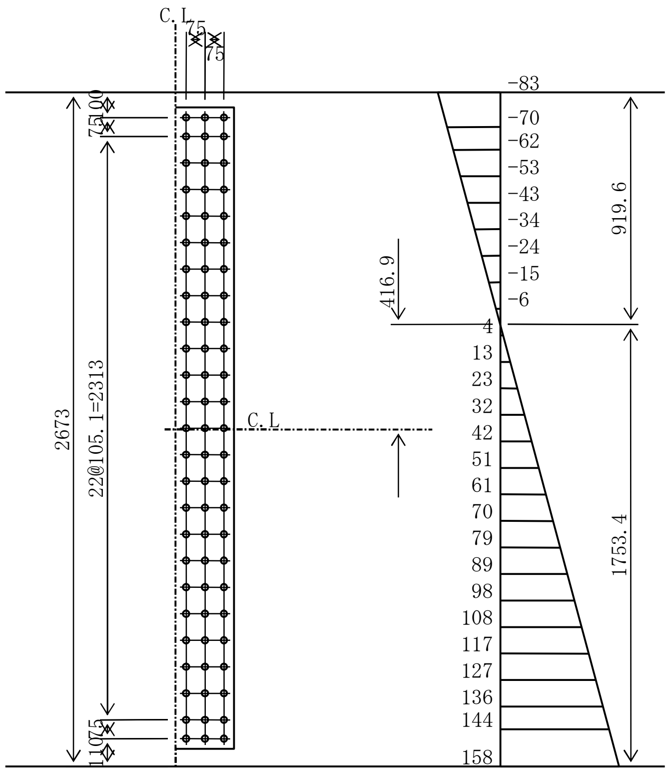
σL = 51 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 26 / 51 = 83 N/mm^2

σLn = 158 N/mm^2

τ = 17 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (144 + 158) / 2 = 311557 N

Required bolt number (Bolt number to be used)

N1 = 311557 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

ρs = τ * A / 75 = 17 * 37422 / 75 = 8581 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{}$((311557 / 3)^2 + 8581^2) = 104206 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3243205 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2878410 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ 2878410*10^4 / 1753 = 2586*10^6 N･mm

Bending stress of splice plates

σsp = 2586*10^6 / (3243205*10^4) ＊ 1683 = 134 N/mm^2 ＜ σa = 210 N/mm^2

(134) G2 J-13(Sec-13) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -28 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

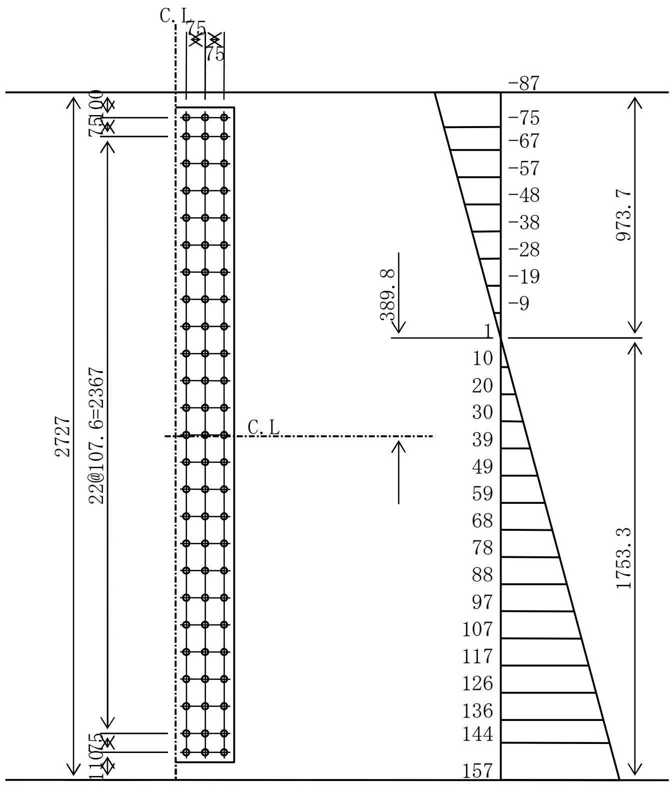
σL = 51 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 28 / 51 = 87 N/mm^2

σLn = 158 N/mm^2

τ = 18 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (144 + 157) / 2 = 311557 N

Required bolt number (Bolt number to be used)

N1 = 311557 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

ρs = τ * A / 75 = 18 * 38178 / 75 = 9230 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((311557 / 3)^2 + 9230^2)}$ = 104262 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3319597 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2946139 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ $2946139*10^4$ / 1753 = $2646*10^6$ N･mm

Bending stress of splice plates

σsp = $2646*10^6$ / ($3319597*10^4$) ＊ 1683 = 134 N/mm^2 ＜ σa = 210 N/mm^2

(135) G2 J-13(Sec-13) LFLG

(a) Acting stress

σtmax = 51 N/mm^2 0.75σta = 0.75 * 210 = 158 N/mm^2

σcmax = -16 N/mm^2 0.75σca = 0.75 * 156 = 117 N/mm^2

∴σc = 117 N/mm^2

τmax = 19 N/mm^2

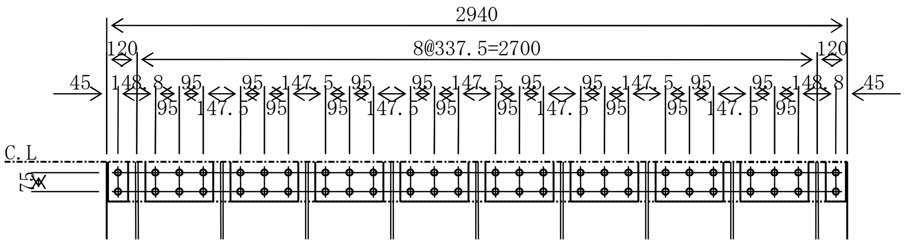
(b) Section area of main plate

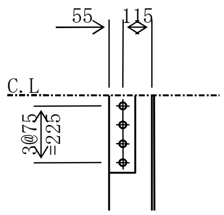
1-LFLG PL 2940 * 10 Ag = 294.0 cm^2 (SM490Y)

7-RIB PL 170 * 17 Agr = 202.3 cm^2 (SM490Y)

ΣAg = Ag + Agr = 294.0 + 202.3 = 496.3 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 10 A = 294.0

(294.0 - (26* 2.5)* 1.0) * 1.1 = 251.9 < 294.0 ∴An = 251.9 cm^2

7-RIB PL 170 * 17 Ar = 202.3

(202.3 - 7*(1* 2.7)* 1.7) * 1.1 = 187.2 < 202.3 ∴Anr = 187.2 cm^2

ΣAn = An + Anr = 251.9 + 187.2 = 439.1 cm^2

σtn = σtmax * ΣAg / ΣAn = 51 * 496.3 / 439.1 = 57 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 158 * 25190 / 1.1 = 3606750 N

> σtn * An = 57 * 25190 = 1448412 N

Pc = σc * Ag = 117 * 29400 = 3438764 N

・Rib Ptr = 0.75σta * Anr / 1.1 = 158 * 18719 / 1.1 = 2680178 N

> σtn * Anr = 57 * 18719 = 1076316 N

Pcr = σc * Agr = 117 * 20230 = 2366197 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 251.9 / 2 = 126.0 cm^2

AgR = Ag / 2 = 294.0 / 2 = 147.0 cm^2

・Rib AnrR = Anr = 187.2 cm^2

AgrR = Agr = 202.3 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 3606750 / 108000 = 33.4 pcs. (52 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 2680178 / 108000 = 24.8 pcs. (7 @ 4 = 28 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(h) Tensile force per one bolt

$\rho p = Pt / 52 = 3606750 / 52 = 69361$ N

$\rho s = \tau * Ag / 52 = 19 * 29400 / 52 = 10829$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(69361^2 + 10829^2)} = 70201$ N $<$ ρa = 108000 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
2-SPL PL	80 * 9	(14.4 -	2*(1*2.5)* 0.9)*1.1=	10.9<	14.4	∴ 10.9
8-SPL PL	270 * 9	(194.4 -	8*(3*2.5)* 0.9)*1.1=	154.4<	194.4	∴154.4
		208.8				165.3
		> AgR				> AnR
1-SPL PL	2930 * 9	(263.7 -	(26*2.5)* 0.9)*1.1=	225.7<	263.7	∴225.7
		> AgR				> AnR
14-SPL PL	100 * 17	(238.0 -	14*(1*2.7)* 1.7)*1.1=	191.1<	238.0	∴191.1
		> AgrR				>AnrR

(136) G2 J-14(Sec-14) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2673 * 14   A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -31 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

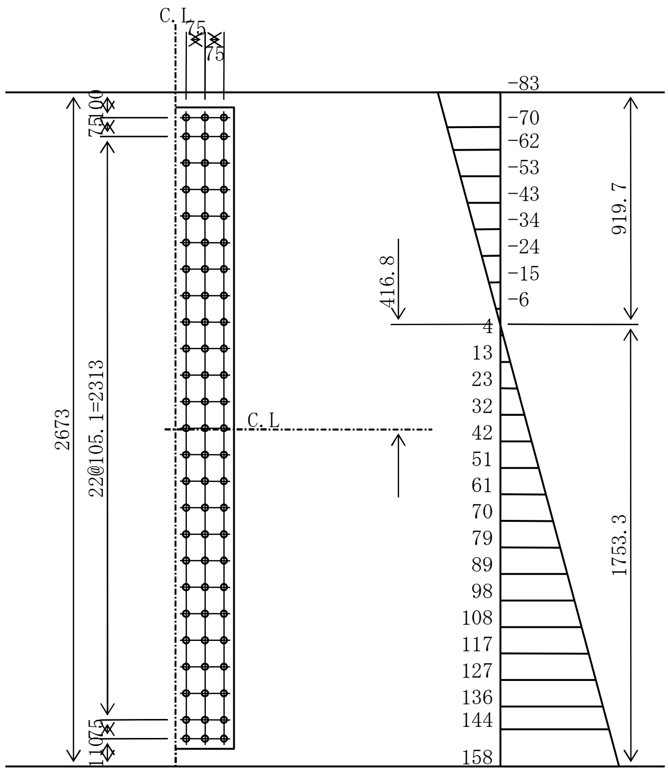
σL = 60 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 31 / 60 = 83 N/mm^2

σLn = 158 N/mm^2

τ = 10 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (144 + 158) / 2 = 311557 N

Required bolt number (Bolt number to be used)

N1 = 311557 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

ρs = τ * A / 75 = 10 * 37422 / 75 = 5045 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((311557 / 3)^2 + 5045^2)}$ = 103975 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3243177 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2878386 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ 2878386*10^4 / 1753 = 2586*10^6 N･mm

Bending stress of splice plates

σsp = 2586*10^6 / (3243177*10^4) ＊ 1683 = 134 N/mm^2 ＜ σa = 210 N/mm^2

(137) G2 J-14(Sec-14) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -33 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

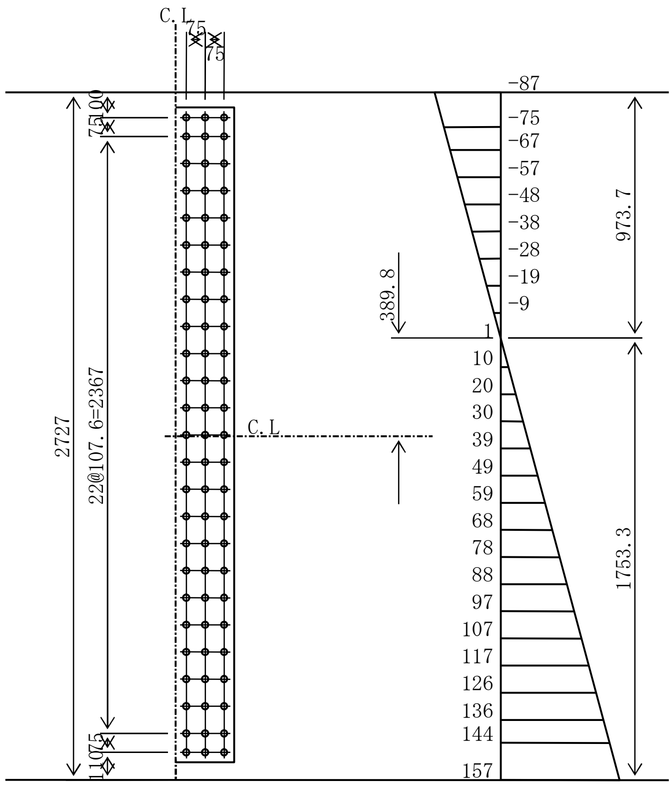
σL = 60 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 33 / 60 = 87 N/mm^2

σLn = 158 N/mm^2

τ = 11 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (144 + 157) / 2 = 311557 N

Required bolt number (Bolt number to be used)

N1 = 311557 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

ρs = τ * A / 75 = 11 * 38178 / 75 = 5395 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{}$((311557 / 3)^2 + 5395^2) = 103992 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3319576 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2946122 cm^4

Bending moment to be shared by the web

$Mw = 158 * 2946122*10^4 / 1753 = 2646*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 2646*10^6 / (3319576*10^4) * 1683 = 134$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(138) G2 J-14(Sec-14) LFLG

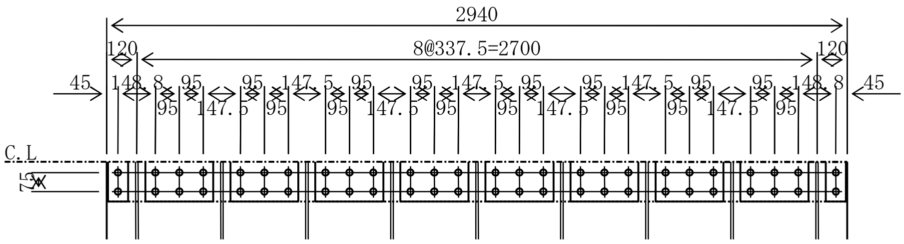
(a) Acting stress

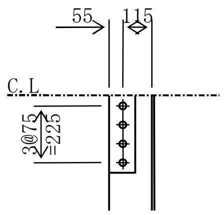
σ tmax = 60 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2
σ cmax = -12 N/mm^2 0.75 σ ca = 0.75 * 156 = 117 N/mm^2
∴ σ c = 117 N/mm^2
τ max = 12 N/mm^2

(b) Section area of main plate

1-LFLG PL 2940 * 10 Ag = 294.0 cm^2 (SM490Y)
7-RIB PL 170 * 17 Agr = 202.3 cm^2 (SM490Y)
ΣAg = Ag + Agr = 294.0 + 202.3 = 496.3 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 10 A = 294.0
(294.0 - (26* 2.5)* 1.0) * 1.1 = 251.9 < 294.0 ∴An = 251.9 cm^2
7-RIB PL 170 * 17 Ar = 202.3
(202.3 - 7*(1* 2.7)* 1.7) * 1.1 = 187.2 < 202.3 ∴Anr = 187.2 cm^2
ΣAn = An + Anr = 251.9 + 187.2 = 439.1 cm^2
σ tn = σ tmax * ΣAg / ΣAn = 60 * 496.3 / 439.1 = 68 N/mm^2
< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 158 * 25190 / 1.1 = 3606750 N
> σ tn * An = 68 * 25190 = 1713574 N
Pc = σ c * Ag = 117 * 29400 = 3438764 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 158 * 18719 / 1.1 = 2680178 N
> σ tn * Anr = 68 * 18719 = 1273358 N
Pcr = σ c * Agr = 117 * 20230 = 2366197 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 251.9 / 2 = 126.0 cm^2
AgR = Ag / 2 = 294.0 / 2 = 147.0 cm^2
・Rib AnrR = Anr = 187.2 cm^2
AgrR = Agr = 202.3 cm^2

(g) Required bolt number

・Main plate $n = Pt / (108000 * 1.00) = 3606750 / 108000 = 33.4$ pcs. (52 bolts will be used.)

・Rib $nr = Ptr / (108000 * 1.00) = 2680178 / 108000 = 24.8$ pcs. (7 @ 4 = 28 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(h) Tensile force per one bolt

$\rho p = Pt / 52 = 3606750 / 52 = 69361$ N

$\rho s = \tau * Ag / 52 = 12 * 29400 / 52 = 6565$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(69361^2 + 6565^2)} = 69671 \text{ N} < \rho a = 108000$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 9	(14.4 -	2*(1*2.5)* 0.9)*1.1= 10.9<	14.4	∴ 10.9
8-SPL PL	270 * 9	(194.4 -	8*(3*2.5)* 0.9)*1.1= 154.4<	194.4	∴154.4
		208.8			165.3
		> AgR			> AnR
1-SPL PL	2930 * 9	(263.7 -	(26*2.5)* 0.9)*1.1= 225.7<	263.7	∴225.7
		> AgR			> AnR
14-SPL PL	100 * 17	(238.0 -	14*(1*2.7)* 1.7)*1.1= 191.1<	238.0	∴191.1
		> AgrR			>AnrR

(139) G2 J-15(Sec-15) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -24 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

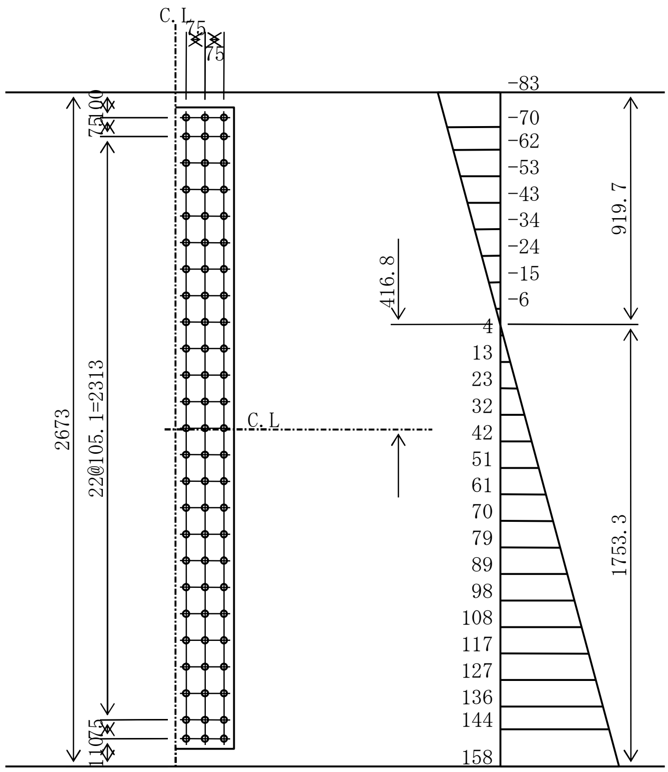
σL = 45 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 24 / 45 = 83 N/mm^2

σLn = 158 N/mm^2

τ = 18 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (144 + 158) / 2 = 311557 N

Required bolt number (Bolt number to be used)

N1 = 311557 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

ρs = τ * A / 75 = 18 * 37422 / 75 = 9001 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((311557 / 3)^2 + 9001^2)}$ = 104242 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3243149 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2878364 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ $2878364*10^4$ / 1753 = $2586*10^6$ N・mm

Bending stress of splice plates

σsp = $2586*10^6$ / ($3243149*10^4$) ＊ 1683 = 134 N/mm^2 ＜ σa = 210 N/mm^2

(140) G2 J-15(Sec-15) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -25 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

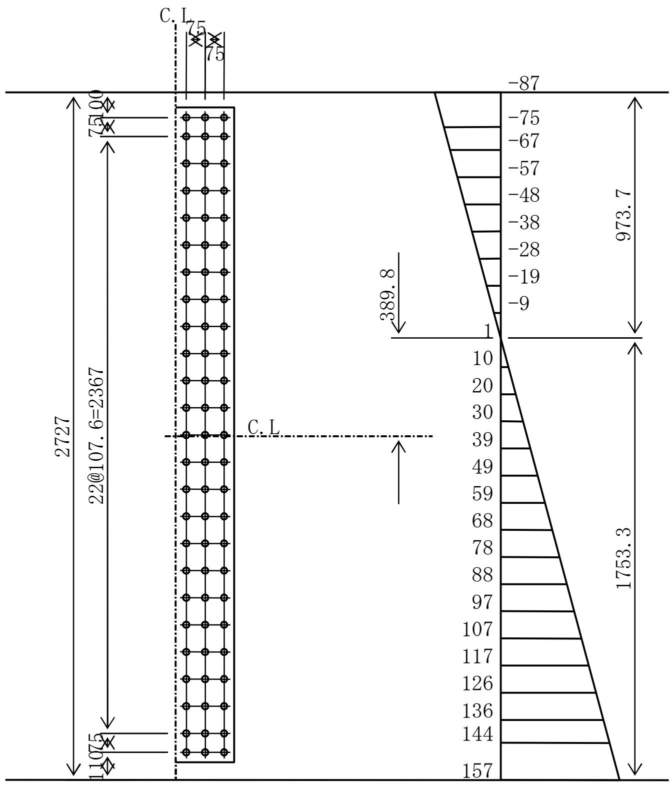
σL = 45 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 25 / 45 = 87 N/mm^2

σLn = 158 N/mm^2

τ = 19 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (144 + 157) / 2 = 311557 N

Required bolt number (Bolt number to be used)

N1 = 311557 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

$\rho s = \tau$ * A / 75 = 19 * 38178 / 75 = 9747 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((311557 / 3)^2 + 9747^2)}$ = 104309 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3319567 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2946114 cm^4

Bending moment to be shared by the web

$Mw = 158 * 2946114*10^4 / 1753 = 2646*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 2646*10^6 / (3319567*10^4) * 1683 = 134$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(141) G2 J-15(Sec-15) LFLG

(a) Acting stress

$\sigma tmax$ = 46 N/mm^2 0.75 σta = 0.75 * 210 = 158 N/mm^2

$\sigma cmax$ = −33 N/mm^2 0.75 σca = 0.75 * 156 = 117 N/mm^2

$\therefore \sigma c$ = 117 N/mm^2

τmax = 19 N/mm^2

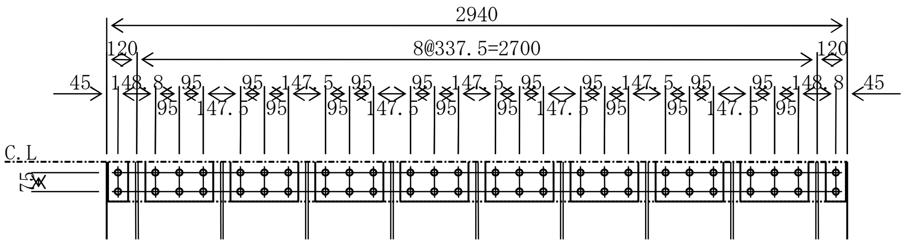
(b) Section area of main plate

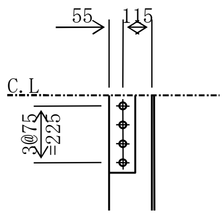
1-LFLG PL 2940 * 10 Ag = 294.0 cm^2 (SM490Y)

7-RIB PL 170 * 17 Agr = 202.3 cm^2 (SM490Y)

ΣAg = Ag + Agr = 294.0 + 202.3 = 496.3 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 10 A = 294.0

(294.0 − (26* 2.5)* 1.0) * 1.1 = 251.9 < 294.0 $\therefore$An = 251.9 cm^2

7-RIB PL 170 * 17 Ar = 202.3

(202.3 − 7*(1* 2.7)* 1.7) * 1.1 = 187.2 < 202.3 $\therefore$Anr = 187.2 cm^2

ΣAn = An + Anr = 251.9 + 187.2 = 439.1 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 46 * 496.3 / 439.1 = 52 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σta * An / 1.1 = 158 * 25190 / 1.1 = 3606750 N

> σtn * An = 52 * 25190 = 1301495 N

Pc = σc * Ag = 117 * 29400 = 3438764 N

・Rib Ptr = 0.75 σta * Anr / 1.1 = 158 * 18719 / 1.1 = 2680178 N

> σtn * Anr = 52 * 18719 = 967142 N

Pcr = σc * Agr = 117 * 20230 = 2366197 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 251.9 / 2 = 126.0 cm^2

AgR = Ag / 2 = 294.0 / 2 = 147.0 cm^2

・Rib AnrR = Anr = 187.2 cm^2

AgrR = Agr = 202.3 cm^2

(g) Required bolt number

・Main plate $n = Pt / (108000 * 1.00) = 3606750 / 108000 = 33.4$ pcs. (52 bolts will be used.)

・Rib $nr = Ptr / (108000 * 1.00) = 2680178 / 108000 = 24.8$ pcs. (7 @ 4 = 28 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(h) Tensile force per one bolt

$\rho p = Pt / 52 = 3606750 / 52 = 69361$ N

$\rho s = \tau * Ag / 52 = 19 * 29400 / 52 = 10959$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(69361^2 + 10959^2)} = 70221 \text{ N} < \rho a = 108000$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm²)	deduction of bolt holes		Ans(cm²)
2-SPL PL	80 * 9	(14.4 -	2*(1*2.5)* 0.9)*1.1= 10.9<	14.4	∴ 10.9
8-SPL PL	270 * 9	(194.4 -	8*(3*2.5)* 0.9)*1.1= 154.4<	194.4	∴154.4
		208.8			165.3
		> AgR			> AnR
1-SPL PL	2930 * 9	(263.7 -	(26*2.5)* 0.9)*1.1= 225.7<	263.7	∴225.7
		> AgR			> AnR
14-SPL PL	100 * 17	(238.0 -	14*(1*2.7)* 1.7)*1.1= 191.1<	238.0	∴191.1
		> AgrR			>AnrR

(142) G2 J-16(Sec-16) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = 35 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

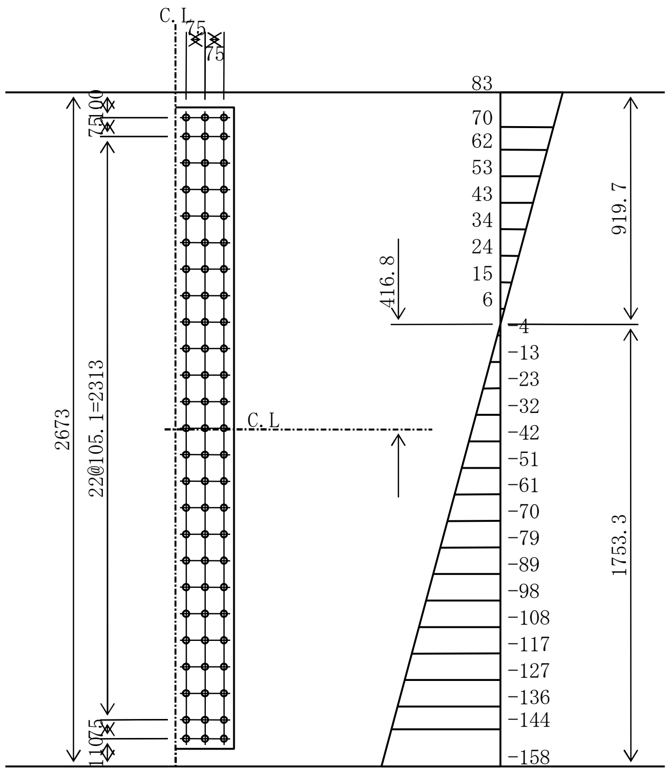
σL = -67 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 35 / 67 = 83 N/mm^2

σLn = 158 N/mm^2

τ = 26 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (144 + 158) / 2 = 311557 N

Required bolt number (Bolt number to be used)

N1 = 311557 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

ρs = τ * A / 75 = 26 * 37422 / 75 = 12737 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((311557 / 3)^2 + 12737^2)}$ = 104631 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2543 * 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3243139 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2878355 cm^4

Bending moment to be shared by the web

Mw = 158 * 2878355*10^4 / 1753 = 2586*10^6 N·mm

Bending stress of splice plates

σsp = 2586*10^6 / (3243139*10^4) * 1683 = 134 N/mm^2 ＜ σa = 210 N/mm^2

(143) G2 J-16(Sec-16) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = 37 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

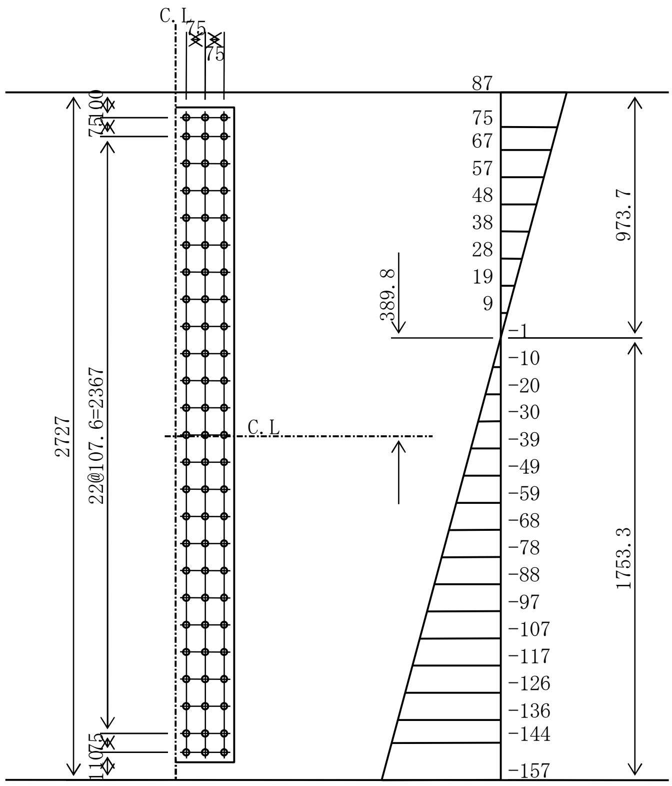
σL = -67 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 37 / 67 = 87 N/mm^2

σLn = 158 N/mm^2

τ = 27 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (144 + 157) / 2 = 311557 N

Required bolt number (Bolt number to be used)

N1 = 311557 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

$\rho s = \tau * A / 75$ = 27 * 38178 / 75 = 13815 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((311557 / 3)^2 + 13815^2)}$ = 104767 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2597 $*$ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3319581 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2946126 cm^4

Bending moment to be shared by the web

$Mw = 158 * 2946126*10^4 / 1753 = 2646*10^6$ N･mm

Bending stress of splice plates

$\sigma sp = 2646*10^6 / (3319581*10^4) * 1683 = 134$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(144) G2 J-16(Sec-16) LFLG

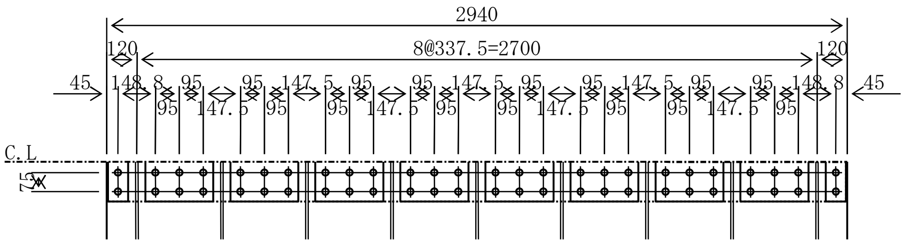
(a) Acting stress

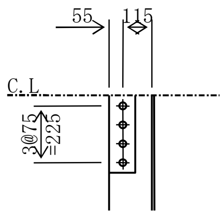
$\sigma tmax$ = 12 N/mm^2 0.75σta = 0.75 ＊ 210 = 158 N/mm^2
$\sigma cmax$ = -67 N/mm^2 0.75σca = 0.75 ＊ 156 = 117 N/mm^2
$\therefore \sigma c$ = 117 N/mm^2
τmax = 27 N/mm^2

(b) Section area of main plate

1-LFLG PL 2940 ＊ 10 Ag = 294.0 cm^2 (SM490Y)
7-RIB PL 170 ＊ 17 Agr = 202.3 cm^2 (SM490Y)
ΣAg = Ag + Agr = 294.0 + 202.3 = 496.3 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 ＊ 10 A = 294.0
(294.0 - (26＊ 2.5)＊ 1.0) ＊ 1.1 = 251.9 ＜ 294.0 ∴An = 251.9 cm^2
7-RIB PL 170 ＊ 17 Ar = 202.3
(202.3 - 7＊(1＊ 2.7)＊ 1.7) ＊ 1.1 = 187.2 ＜ 202.3 ∴Anr = 187.2 cm^2
ΣAn = An + Anr = 251.9 + 187.2 = 439.1 cm^2
σtn = $\sigma tmax$ ＊ ΣAg / ΣAn = 12 ＊ 496.3 / 439.1 = 14 N/mm^2
＜ σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta ＊ An / 1.1 = 158 ＊ 25190 / 1.1 = 3606750 N
＞ σtn ＊ An = 14 ＊ 25190 = 342692 N
Pc = σc ＊ Ag = 117 ＊ 29400 = 3438764 N
・Rib Ptr = 0.75σta ＊ Anr / 1.1 = 158 ＊ 18719 / 1.1 = 2680178 N
＞ σtn ＊ Anr = 14 ＊ 18719 = 254655 N
Pcr = σc ＊ Agr = 117 ＊ 20230 = 2366197 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 251.9 / 2 = 126.0 cm^2
AgR = Ag / 2 = 294.0 / 2 = 147.0 cm^2
・Rib AnrR = Anr = 187.2 cm^2
AgrR = Agr = 202.3 cm^2

(g) Required bolt number

・Main plate $n = Pt / (108000 * 1.00) = 3606750 / 108000 = 33.4$ pcs. (52 bolts will be used.)

・Rib $nr = Ptr / (108000 * 1.00) = 2680178 / 108000 = 24.8$ pcs. (7 @ 4 = 28 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(h) Tensile force per one bolt

$\rho p = Pt / 52 = 3606750 / 52 = 69361$ N

$\rho s = \tau * Ag / 52 = 27 * 29400 / 52 = 15358$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(69361^2 + 15358^2)} = 71041 \text{ N} < \rho a = 108000$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 9	(14.4 -	2*(1*2.5)* 0.9)*1.1= 10.9<	14.4	∴ 10.9
8-SPL PL	270 * 9	(194.4 -	8*(3*2.5)* 0.9)*1.1= 154.4<	194.4	∴154.4
		208.8			165.3
		> AgR			> AnR
1-SPL PL	2930 * 9	(263.7 -	(26*2.5)* 0.9)*1.1= 225.7<	263.7	∴225.7
		> AgR			> AnR
14-SPL PL	100 * 17	(238.0 -	14*(1*2.7)* 1.7)*1.1= 191.1<	238.0	∴191.1
		> AgrR			>AnrR

(145) G2 J-17(Sec-17) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = 64 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

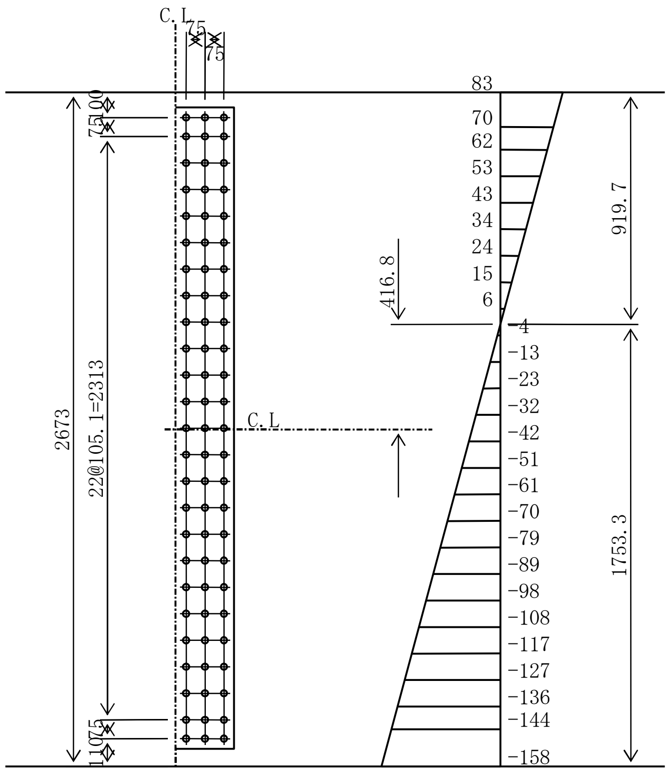
σL = -123 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 64 / 123 = 83 N/mm^2

σLn = 158 N/mm^2

τ = 34 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (144 + 158) / 2 = 311557 N

Required bolt number (Bolt number to be used)

N1 = 311557 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

ρs = τ * A / 75 = 34 * 37422 / 75 = 16903 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{}$((311557 / 3)^2 + 16903^2) = 105219 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3243162 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2878374 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ $2878374*10^4$ / 1753 = $2586*10^6$ N·mm

Bending stress of splice plates

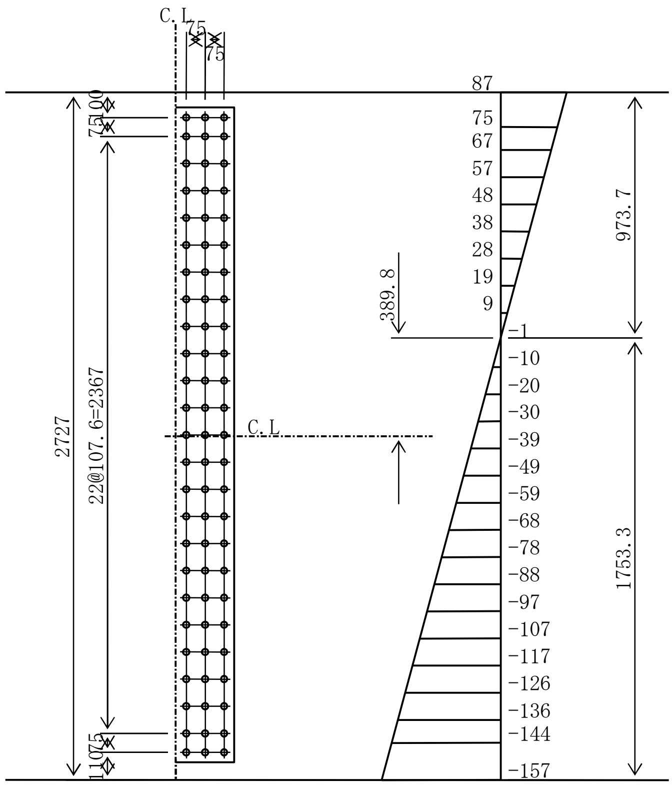
σsp = $2586*10^6$ / ($3243162*10^4$) ＊ 1683 = 134 N/mm^2 ＜ σa = 210 N/mm^2

(146) G2 J-17(Sec-17) RWEB

(a) Section area of main plate (Web plate)
1-RWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress
σU = 68 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = -123 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 158 * 68 / 123 = 87 N/mm^2
σLn = 158 N/mm^2
τ = 36 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress
Check of bolt at 25th row
Sharing width: b1 = 14.8 cm
Total force to be shared
P1 = 148 * 14 * (144 + 157) / 2 = 311557 N
Required bolt number (Bolt number to be used)
N1 = 311557 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force
$\rho s = \tau * A / 75$ = 36 * 38178 / 75 = 18296 N < ρa = 108000 N
Combined stress
$\rho c25 = \sqrt{((311557 / 3)^2 + 18296^2)}$ = 105452 N < ρa = 108000 N
(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3319599 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2946140 cm^4

Bending moment to be shared by the web

$Mw = 158 * 2946140*10^4 / 1753 = 2646*10^6$ N･mm

Bending stress of splice plates

$\sigma sp = 2646*10^6 / (3319599*10^4) * 1683 = 134$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(147) G2 J-17(Sec-17) LFLG

(a) Acting stress

σ cmax = -124 N/mm^2 0.75 σ ca = 0.75 * 156 = 117 N/mm^2

$\therefore \sigma$ c = 124 N/mm^2

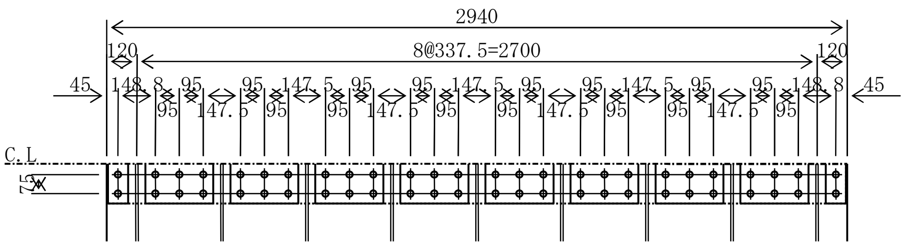
τ max = 36 N/mm^2

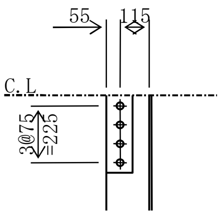
(b) Section area of main plate

1-LFLG	PL	2940 * 10	Ag =	294.0 cm^2	(SM490Y)
7-RIB	PL	170 * 17	Agr =	202.3 cm^2	(SM490Y)

ΣAg = Ag + Agr = 294.0 + 202.3 = 496.3 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σ c * Ag = 124 * 29400 = 3636692 N

・Rib Pcr = σ c * Agr = 124 * 20230 = 2502390 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 294.0 / 2 = 147.0 cm^2

・Rib AgrR = Agr = 202.3 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 3636692 / 108000 = 33.7 pcs. (52 bolts will be used.)

・Rib nr = Pcr / (108000 * 1.00) = 2502390 / 108000 = 23.2 pcs. (7 @ 4 = 28 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(g) Tensile force per one bolt

ρ p = Pc / 52 = 3636692 / 52 = 69936 N

ρ s = τ * Ag / 52 = 36 * 29400 / 52 = 20616 N

ρ = $\sqrt{}$ (ρ p^2 + ρ s^2) = $\sqrt{}$ (69936^2 + 20616^2) = 72912 N < ρ a = 108000 N

(h) Check of splice plates

	Plate (SM490Y)	Ags(cm^2)		
2-SPL	PL 80 * 9	14.4		
8-SPL	PL 270 * 9	194.4		
		208.8	> AgR =	147.0cm^2
1-SPL	PL 2930 * 9	263.7	> AgR =	147.0cm^2
14-SPL	PL 100 * 15	210.0	> AgrR =	202.3cm^2

(148) G2 J-18(Sec-18) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = 102 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

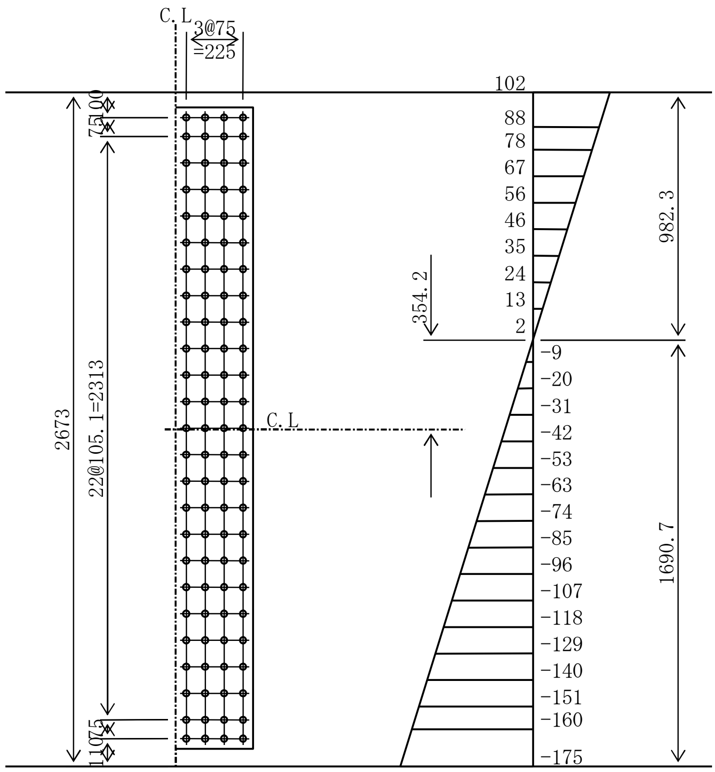
σL = -175 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 102 N/mm^2

σLn = 175 N/mm^2

τ = 40 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (160 + 175) / 2 = 346216 N

Required bolt number (Bolt number to be used)

N1 = 346216 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

$\rho s = \tau * A / 100$ = 40 * 37422 / 100 = 15020 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((346216 / 4)^2 + 15020^2)}$ = 87847 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 * 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3024895 cm^4 > Iw

Moment of inertia of web plate Iw = 2697587 cm^4

Bending moment to be shared by the web

$Mw = 175 * 2697587*10^4 / 1691 = 2797*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 2797*10^6 / (3024895*10^4) * 1621 = 150$ N/mm^2 < $\sigma a = 210$ N/mm^2

(149) G2 J-18(Sec-18) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = 108 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

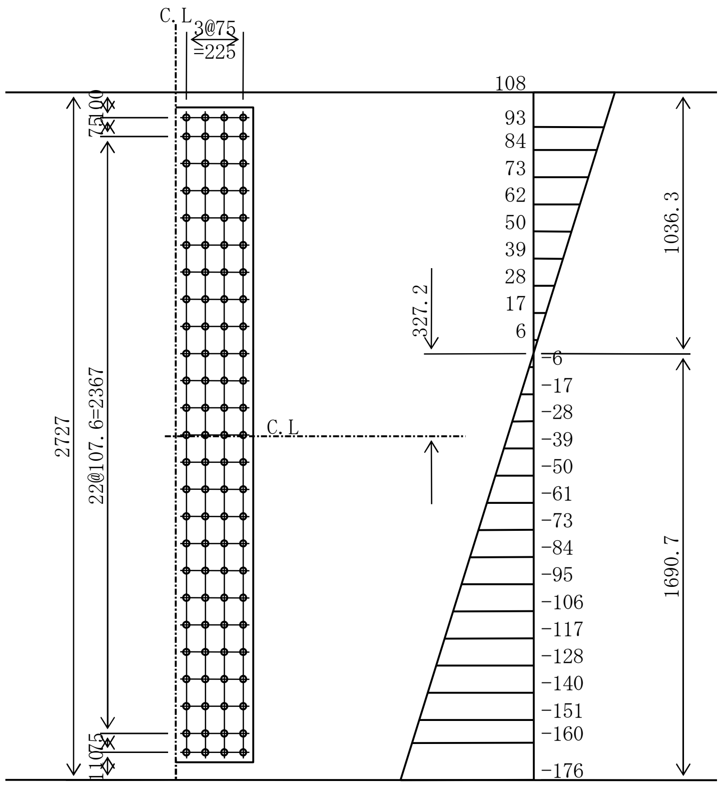
σL = -176 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 108 N/mm^2

σLn = 176 N/mm^2

τ = 43 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (160 + 176) / 2 = 346684 N

Required bolt number (Bolt number to be used)

N1 = 346684 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 43 * 38178 / 100 = 16378 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{}$((346684 / 4)^2 + 16378^2) = 88205 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3112506 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2774614 cm^4

Bending moment to be shared by the web

Mw = 176 ＊ 2774614*10^4 / 1691 = 2881*10^6 N·mm

Bending stress of splice plates

σsp = 2881*10^6 / (3112506*10^4) ＊ 1621 = 150 N/mm^2 ＜ σa = 210 N/mm^2

(150) G2 J-18(Sec-18) LFLG

(a) Acting stress

$\sigma cmax$ = -177 N/mm^2 0.75σca = 0.75 * 200 = 150 N/mm^2

$\therefore \sigma c$ = 177 N/mm^2

τmax = 32 N/mm^2

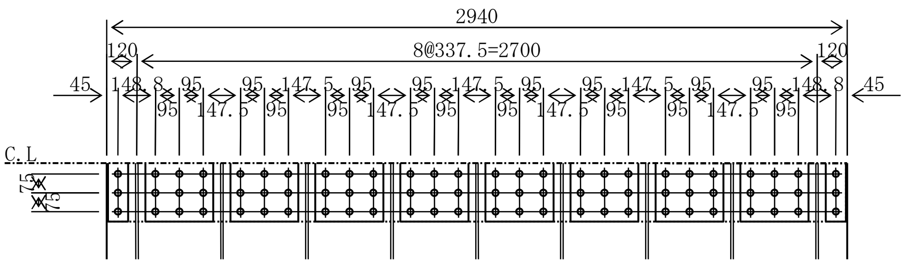
(b) Section area of main plate

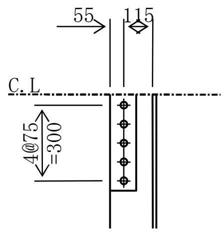
1-LFLG PL 2940 * 14   Ag = 411.6 cm^2 (SM490Y)

7-RIB PL 170 * 17   Agr = 202.3 cm^2 (SM490Y)

ΣAg = Ag + Agr = 411.6 + 202.3 = 613.9 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 177 * 41160 = 7285567 N

・Rib Pcr = σc * Agr = 177 * 20230 = 3580831 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 411.6 / 2 = 205.8 cm^2

・Rib AgrR = Agr = 202.3 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 7285567 / 108000 = 67.5 pcs. (78 bolts will be used.)

・Rib nr = Pcr / (108000 * 1.00) = 3580831 / 108000 = 33.2 pcs. (7 @ 5 = 35 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,5 unites)

(g) Tensile force per one bolt

ρp = Pc / 78 = 7285567 / 78 = 93405 N

ρs = τ * Ag / 78 = 32 * 41160 / 78 = 17022 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(93405^2 + 17022^2)}$ = 94943 N $<$ ρa = 108000 N

(h) Check of splice plates

	(SM490Y)	A_{gs} (cm^2)	
2-SPL PL	80 * 9	14.4	
8-SPL PL	270 * 9	194.4	
		208.8	> AgR = 205.8cm^2
1-SPL PL	2930 * 9	263.7	> AgR = 205.8cm^2
14-SPL PL	100 * 15	210.0	> AgrR = 202.3cm^2

(151) G2 J-19(Sec-19) LWEB

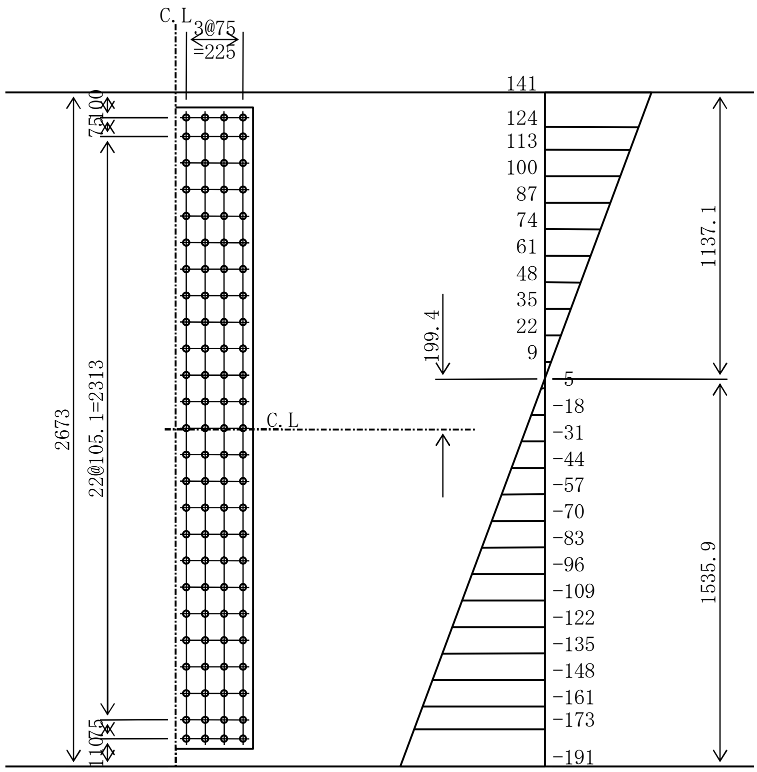
(a) Section area of main plate (Web plate)

1-LWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = 141 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = -191 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 141 N/mm^2
σLn = 191 N/mm^2
τ = 47 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (173 + 191) / 2 = 375488 N

Required bolt number (Bolt number to be used)

N1 = 375488 / (108000 * 1.00) = 3.5 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 47 * 37422 / 100 = 17659 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{}$((375488 / 4)^2 + 17659^2) = 95519 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 2639822 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2376985 cm^4

Bending moment to be shared by the web

Mw = 191 ＊ $2376985 * 10^4$ / 1536 = $2956 * 10^6$ N·mm

Bending stress of splice plates

σsp = $2956 * 10^6$ / ($2639822 * 10^4$) ＊ 1466 = 164 N/mm^2 ＜ σa = 210 N/mm^2

(152) G2 J-19(Sec-19) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = 148 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

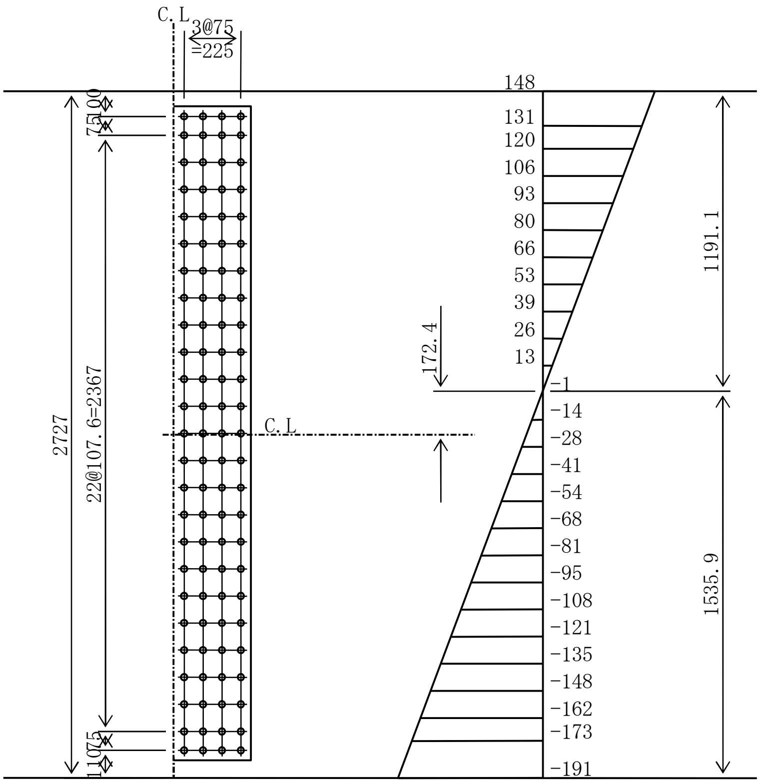
σL = -191 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 148 N/mm^2

σLn = 191 N/mm^2

τ = 51 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (173 + 191) / 2 = 375996 N

Required bolt number (Bolt number to be used)

N1 = 375996 / (108000 * 1.00) = 3.5 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 51 * 38178 / 100 = 19296 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((375996 / 4)^2 + 19296^2)}$ = 95959 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 * 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 2758325 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2479442 cm^4

Bending moment to be shared by the web

Mw = 191 * 2479442*10^4 / 1536 = 3088*10^6 N·mm

Bending stress of splice plates

σsp = 3088*10^6 / (2758325*10^4) * 1466 = 164 N/mm^2 ＜ σa = 210 N/mm^2

(153) G2 J-19(Sec-19) LFLG

(a) Acting stress

σ cmax = -194 N/mm^2 0.75 σ ca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma$ c = 194 N/mm^2

τ max = 29 N/mm^2

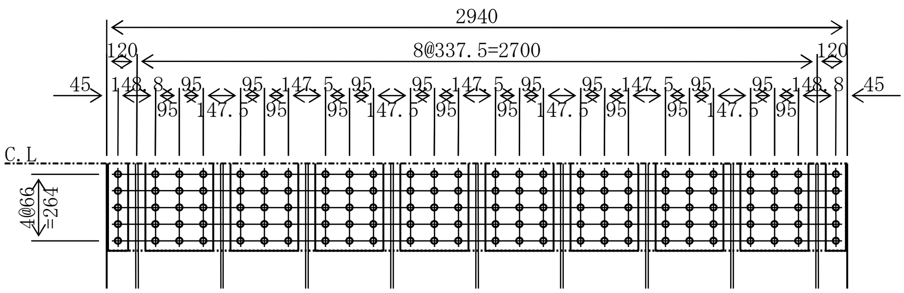
(b) Section area of main plate

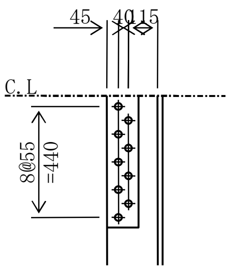
1-LFLG PL 2940 * 20 Ag = 588.0 cm^2 (SM490Y)

7-RIB PL 200 * 22 Agr = 308.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 588.0 + 308.0 = 896.0 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σ c * Ag = 194 * 58800 = 11393382 N

・Rib Pcr = σ c * Agr = 194 * 30800 = 5967962 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 588.0 / 2 = 294.0 cm^2

・Rib AgrR = Agr = 308.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 11393382 / 108000 = 105.5 pcs. (130 bolts will be used.)

・Rib nr = Pcr / (108000 * 0.98) = 5967962 / 105840 = 56.4 pcs. (7 @ 9 = 63 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 5,9 unites)

(g) Tensile force per one bolt

ρ p = Pc / 130 = 11393382 / 130 = 87641 N

ρ s = τ * Ag / 130 = 29 * 58800 / 130 = 13088 N

ρ = $\sqrt{}$(ρ p^2 + ρ s^2) = $\sqrt{}$(87641^2 + 13088^2) = 88613 N < ρ a = 108000 N

(h) Check of splice plates

		Ags(cm^2)	
	(SM490Y)		
2-SPL PL	80 * 13	20.8	
8-SPL PL	270 * 13	280.8	
		301.6	
			> AgR = 294.0cm^2
1-SPL PL	2930 * 11	322.3	> AgR = 294.0cm^2
14-SPL PL	120 * 19	319.2	> AgrR = 308.0cm^2

(154) G2 J-20(Sec-21) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = 135 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

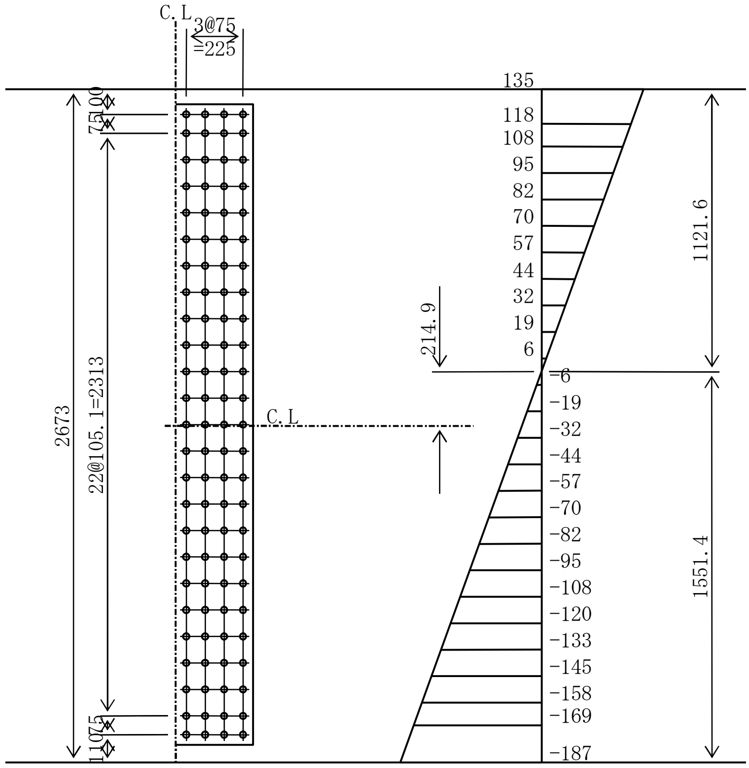
σL = -187 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 135 N/mm^2

σLn = 187 N/mm^2

τ = 61 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (169 + 187) / 2 = 367246 N

Required bolt number (Bolt number to be used)

N1 = 367246 / (108000 * 1.00) = 3.4 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 61 * 37422 / 100 = 22715 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{}$((367246 / 4)^2 + 22715^2) = 94580 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 2668500 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2401010 cm^4

Bending moment to be shared by the web

$Mw = 187 * 2401010*10^4 / 1551 = 2890*10^6$ N・mm

Bending stress of splice plates

$\sigma sp = 2890*10^6 / (2668500*10^4) * 1481 = 160$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(155) G2 J-20(Sec-21) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = 142 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

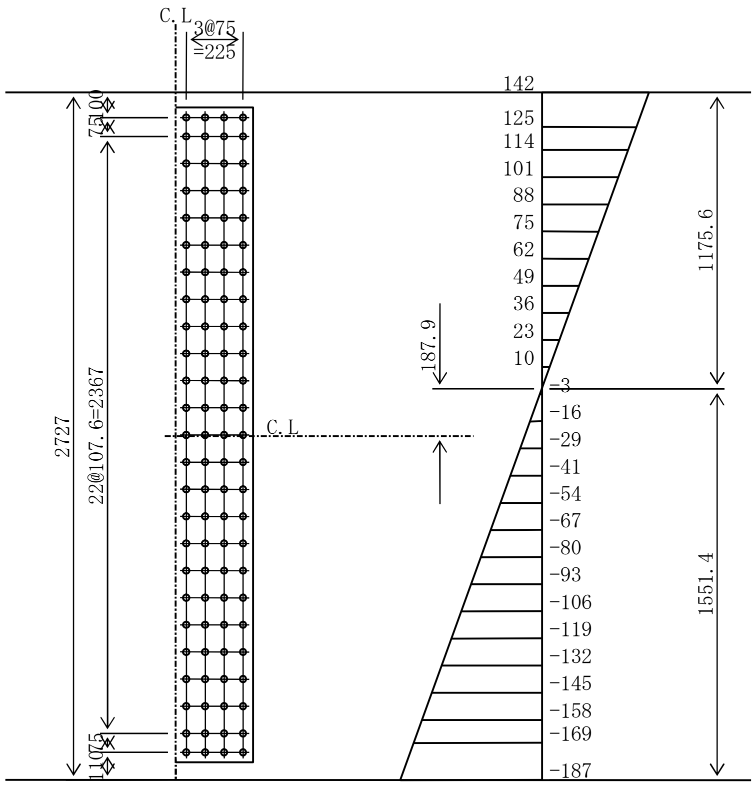
σL = -187 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 142 N/mm^2

σLn = 187 N/mm^2

τ = 65 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (169 + 187) / 2 = 367741 N

Required bolt number (Bolt number to be used)

N1 = 367741 / (108000 * 1.00) = 3.4 pcs. (4 bolts will be used.)

Check of shear force

$\rho s = \tau$ * A / 100 = 65 * 38178 / 100 = 24857 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((367741 / 4)^2 + 24857^2)}$ = 95237 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 * 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 2783705 cm^4 > Iw

Moment of inertia of web plate Iw = 2500762 cm^4

Bending moment to be shared by the web

$Mw = 187 * 2500762*10^4 / 1551 = 3014*10^6$ N・mm

Bending stress of splice plates

$\sigma sp = 3014*10^6 / (2783705*10^4) * 1481 = 160$ N/mm^2 < $\sigma a = 210$ N/mm^2

(156) G2 J-20(Sec-21) LFLG

(a) Acting stress

σcmax = -189 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma$c = 189 N/mm^2

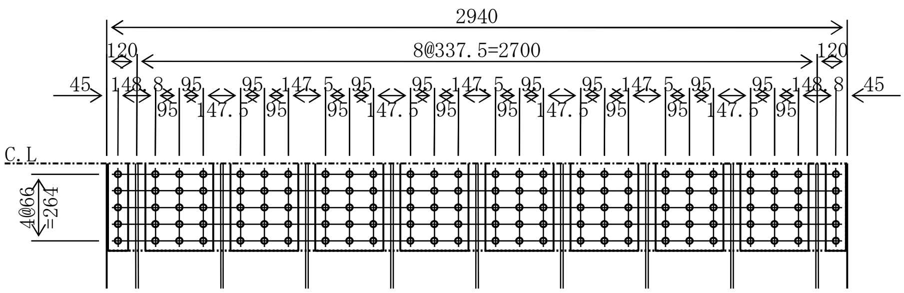
τmax = 39 N/mm^2

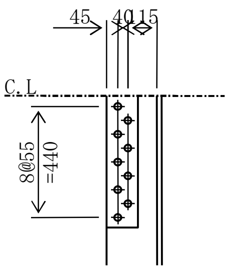
(b) Section area of main plate

1-LFLG	PL	2940 * 19	Ag =	558.6 cm^2	(SM490Y)
7-RIB	PL	200 * 22	Agr =	308.0 cm^2	(SM490Y)

ΣAg = Ag + Agr = 558.6 + 308.0 = 866.6 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 189 * 55860 = 10572734 N

・Rib Pcr = σc * Agr = 189 * 30800 = 5829578 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 558.6 / 2 = 279.3 cm^2

・Rib AgrR = Agr = 308.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 10572734 / 108000 = 97.9 pcs. (130 bolts will be used.)

・Rib nr = Pcr / (108000 * 0.98) = 5829578 / 105840 = 55.1 pcs. (7 @ 9 = 63 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 5,9 unites)

(g) Tensile force per one bolt

ρp = Pc / 130 = 10572734 / 130 = 81329 N

ρs = τ * Ag / 130 = 39 * 55860 / 130 = 16656 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(81329^2 + 16656^2) = 83017 N < ρa = 108000 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
2-SPL PL	80 * 13	20.8	
8-SPL PL	270 * 13	280.8	
		301.6	
			> AgR = 279.3cm^2
1-SPL PL	2930 * 10	293.0	> AgR = 279.3cm^2
14-SPL PL	120 * 19	319.2	> AgrR = 308.0cm^2

(157) G2 J-21(Sec-22) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = 79 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

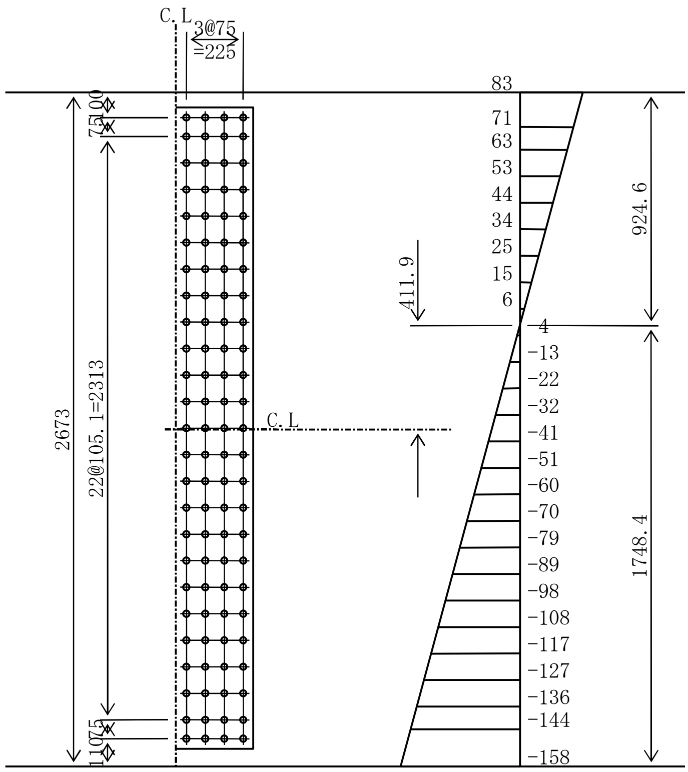
σL = -150 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 79 / 150 = 83 N/mm^2

σLn = 158 N/mm^2

τ = 58 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (144 + 158) / 2 = 311518 N

Required bolt number (Bolt number to be used)

N1 = 311518 / (108000 * 1.00) = 2.9 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 58 * 37422 / 100 = 21844 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((311518 / 4)^2 + 21844^2)}$ = 80885 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9　As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates　Is = 3224574 cm^4 ＞ Iw

Moment of inertia of web plate　Iw = 2862992 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ 2862992*10^4 / 1748 = 2579*10^6 N·mm

Bending stress of splice plates

σsp = 2579*10^6 / (3224574*10^4) ＊ 1678 = 134 N/mm^2 ＜ σa = 210 N/mm^2

(158) G2 J-21(Sec-22) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = 84 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

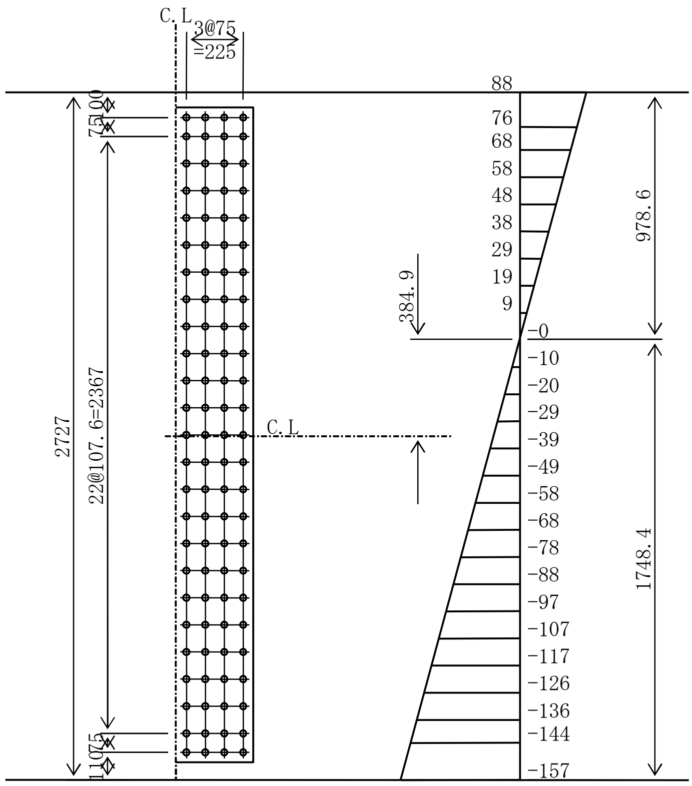
σL = -150 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 84 / 150 = 88 N/mm^2

σLn = 158 N/mm^2

τ = 62 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (144 + 157) / 2 = 311518 N

Required bolt number (Bolt number to be used)

N1 = 311518 / (108000 * 1.00) = 2.9 pcs. (4 bolts will be used.)

Check of shear force

$\rho s = \tau * A / 100$ = 62 * 38178 / 100 = 23733 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((311518 / 4)^2 + 23733^2)}$ = 81415 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3301873 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2931474 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ $2931474{*}10^4$ / 1748 = $2641{*}10^6$ N・mm

Bending stress of splice plates

σsp = $2641{*}10^6$ / ($3301873{*}10^4$) ＊ 1678 = 134 N/mm^2 ＜ σa = 210 N/mm^2

(159) G2 J-21(Sec-22) LFLG

(a) Acting stress

σcmax = -151 N/mm^2 0.75σca = 0.75 * 170 = 128 N/mm^2

$\therefore \sigma$c = 151 N/mm^2

τmax = 57 N/mm^2

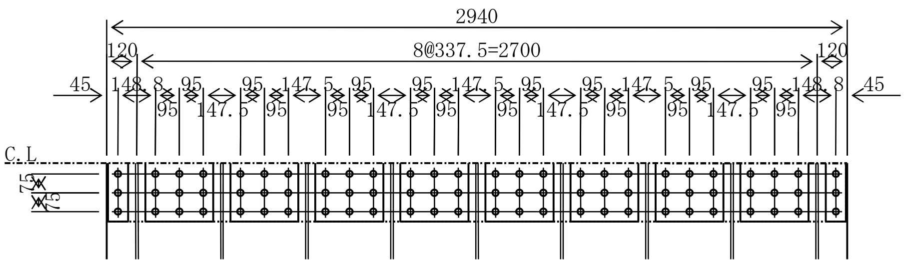
(b) Section area of main plate

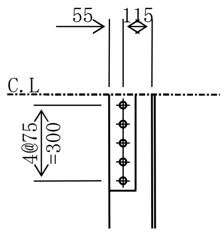
1-LFLG PL 2940 * 11 Ag = 323.4 cm^2 (SM490Y)

7-RIB PL 170 * 17 Agr = 202.3 cm^2 (SM490Y)

ΣAg = Ag + Agr = 323.4 + 202.3 = 525.7 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 151 * 32340 = 4884343 N

・Rib Pcr = σc * Agr = 151 * 20230 = 3055357 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 323.4 / 2 = 161.7 cm^2

・Rib AgrR = Agr = 202.3 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 4884343 / 108000 = 45.2 pcs. (78 bolts will be used.)

・Rib nr = Pcr / (108000 * 1.00) = 3055357 / 108000 = 28.3 pcs. (7 @ 5 = 35 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,5 unites)

(g) Tensile force per one bolt

ρp = Pc / 78 = 4884343 / 78 = 62620 N

ρs = τ * Ag / 78 = 57 * 32340 / 78 = 23777 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(62620^2 + 23777^2)}$ = 66982 N < ρa = 108000 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)
2-SPL PL	80 * 9	14.4
8-SPL PL	270 * 9	194.4
		208.8
		> AgR = 161.7cm^2
1-SPL PL	2930 * 9	263.7 > AgR = 161.7cm^2
14-SPL PL	100 * 15	210.0 > AgrR = 202.3cm^2

(160) G2 J-22(Sec-22) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = 25 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

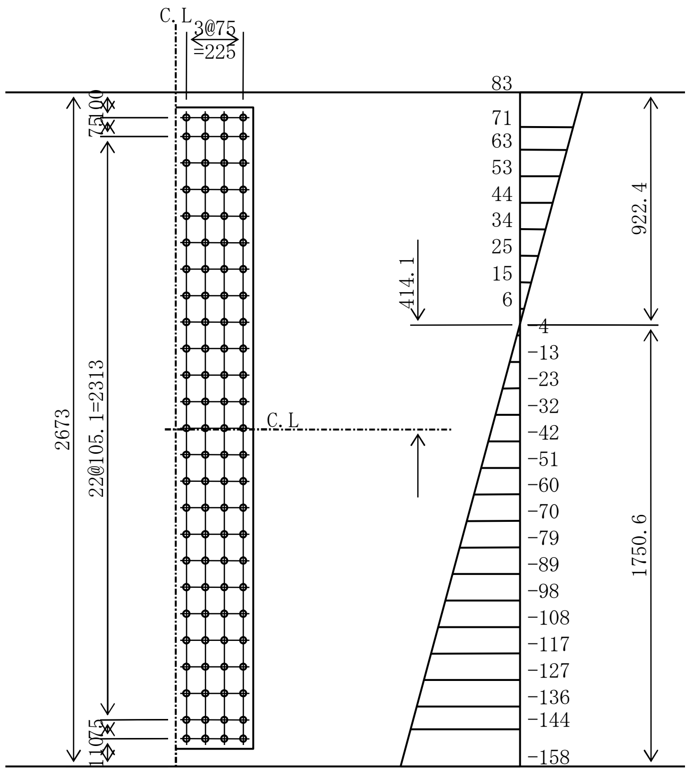
σL = -48 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 25 / 48 = 83 N/mm^2

σLn = 158 N/mm^2

τ = 53 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (144 + 158) / 2 = 311536 N

Required bolt number (Bolt number to be used)

N1 = 311536 / (108000 * 1.00) = 2.9 pcs. (4 bolts will be used.)

Check of shear force

$\rho s = \tau * A / 100$ = 53 * 37422 / 100 = 19781 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((311536 / 4)^2 + 19781^2)}$ = 80357 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3232946 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2869920 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ 2869920*10^4 / 1751 = 2582*10^6 N･mm

Bending stress of splice plates

σsp = 2582*10^6 / (3232946*10^4) ＊ 1681 = 134 N/mm^2 ＜ σa = 210 N/mm^2

(161) G2 J-22(Sec-22) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = 27 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

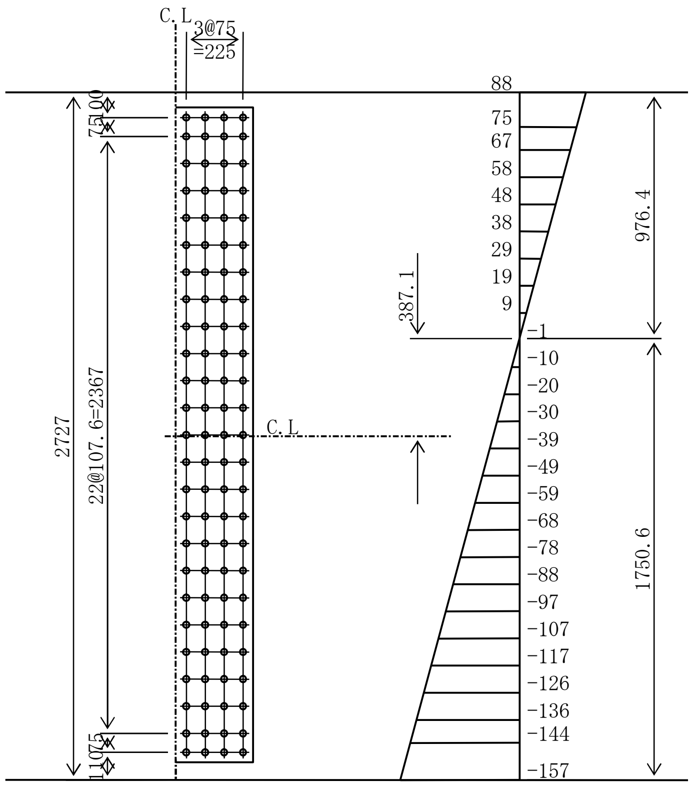
σL = -48 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 27 / 48 = 88 N/mm^2

σLn = 158 N/mm^2

τ = 56 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (144 + 157) / 2 = 311536 N

Required bolt number (Bolt number to be used)

N1 = 311536 / (108000 * 1.00) = 2.9 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 56 * 38178 / 100 = 21454 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((311536 / 4)^2 + 21454^2)}$ = 80785 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3309932 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2938143 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ $2938143*10^4$ / 1751 = $2643*10^6$ N･mm

Bending stress of splice plates

σsp = $2643*10^6$ / ($3309932*10^4$) ＊ 1681 = 134 N/mm^2 ＜ σa = 210 N/mm^2

(162) G2 J-22(Sec-22) LFLG

(a) Acting stress

$\sigma tmax$ = 0 N/mm^2 0.75σta = 0.75 * 210 = 158 N/mm^2

$\sigma cmax$ = -48 N/mm^2 0.75σca = 0.75 * 170 = 128 N/mm^2

$\therefore \sigma c$ = 128 N/mm^2

τmax = 52 N/mm^2

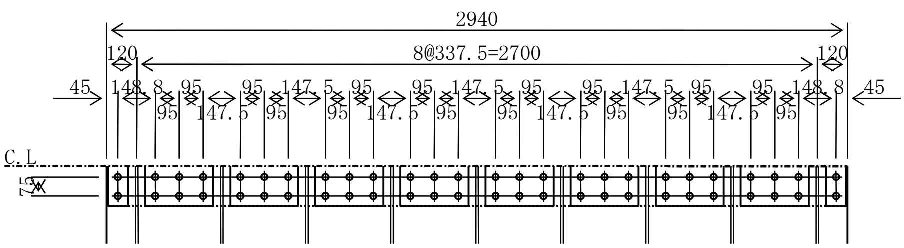
(b) Section area of main plate

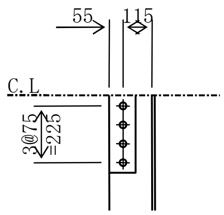
1-LFLG PL 2940 * 11   Ag = 323.4 cm^2 (SM490Y)

7-RIB PL 170 * 17   Agr = 202.3 cm^2 (SM490Y)

ΣAg = Ag + Agr = 323.4 + 202.3 = 525.7 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 11   A = 323.4

(323.4 - (26* 2.5)* 1.1) * 1.1 = 277.1 < 323.4 $\therefore$An = 277.1 cm^2

7-RIB PL 170 * 17   Ar = 202.3

(202.3 - 7*(1* 2.7)* 1.7) * 1.1 = 187.2 < 202.3 $\therefore$Anr = 187.2 cm^2

ΣAn = An + Anr = 277.1 + 187.2 = 464.3 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 0 * 525.7 / 464.3 = 0 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 158 * 27709 / 1.1 = 3967425 N

> σtn * An = 0 * 27709 = 2228 N

Pc = σc * Ag = 128 * 32340 = 4124975 N

・Rib Ptr = 0.75σta * Anr / 1.1 = 158 * 18719 / 1.1 = 2680178 N

> σtn * Anr = 0 * 18719 = 1505 N

Pcr = σc * Agr = 128 * 20230 = 2580342 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 277.1 / 2 = 138.5 cm^2

AgR = Ag / 2 = 323.4 / 2 = 161.7 cm^2

・Rib AnrR = Anr = 187.2 cm^2

AgrR = Agr = 202.3 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 4124975 / 108000 = 38.2 pcs. (52 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 2680178 / 108000 = 24.8 pcs. (7 @ 4 = 28 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(h) Tensile force per one bolt

ρp = Pc / 52 = 4124975 / 52 = 79326 N

ρs = τ * Ag / 52 = 52 * 32340 / 52 = 32588 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(79326^2 + 32588^2)}$ = 85759 N < ρa = 108000 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 9	(14.4 -	2*(1*2.5)* 0.9)*1.1= 10.9<	14.4	∴ 10.9
8-SPL PL	270 * 9	(194.4 -	8*(3*2.5)* 0.9)*1.1= 154.4<	194.4	∴154.4
		208.8			165.3
		> AgR			> AnR
1-SPL PL	2930 * 9	(263.7 -	(26*2.5)* 0.9)*1.1= 225.7<	263.7	∴225.7
		> AgR			> AnR
14-SPL PL	100 * 17	(238.0 -	14*(1*2.7)* 1.7)*1.1= 191.1<	238.0	∴191.1
		> AgrR			>AnrR

(163) G2 J-23(Sec-23) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -58 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

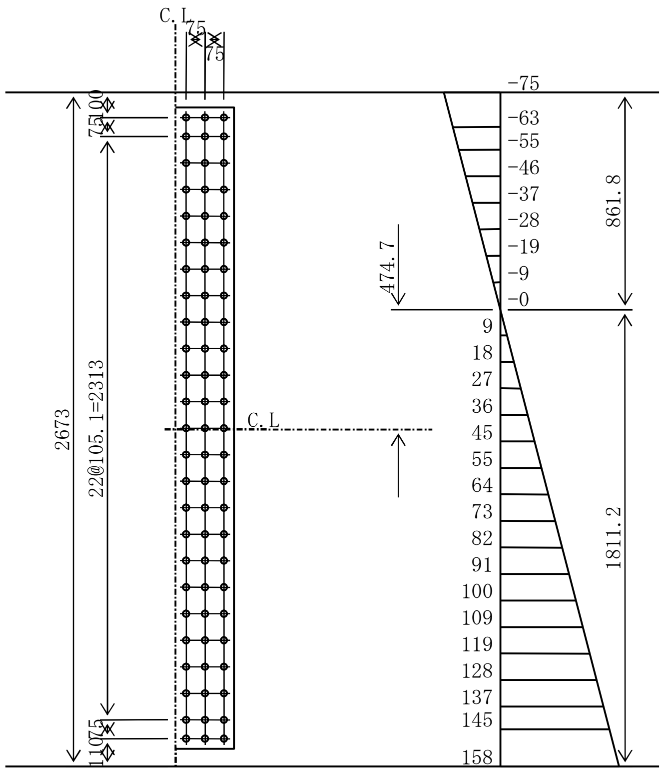
σL = 122 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 58 / 122 = 75 N/mm^2

σLn = 158 N/mm^2

τ = 45 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (145 + 158) / 2 = 311994 N

Required bolt number (Bolt number to be used)

N1 = 311994 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

ρs = τ * A / 75 = 45 * 37422 / 75 = 22231 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((311994 / 3)^2 + 22231^2)}$ = 106348 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3476550 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3071342 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ 3071342×10^4 / 1811 = 2671×10^6 N·mm

Bending stress of splice plates

σsp = 2671×10^6 / (3476550×10^4) ＊ 1741 = 134 N/mm^2 ＜ σa = 210 N/mm^2

(164) G2 J-23(Sec-23) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -62 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

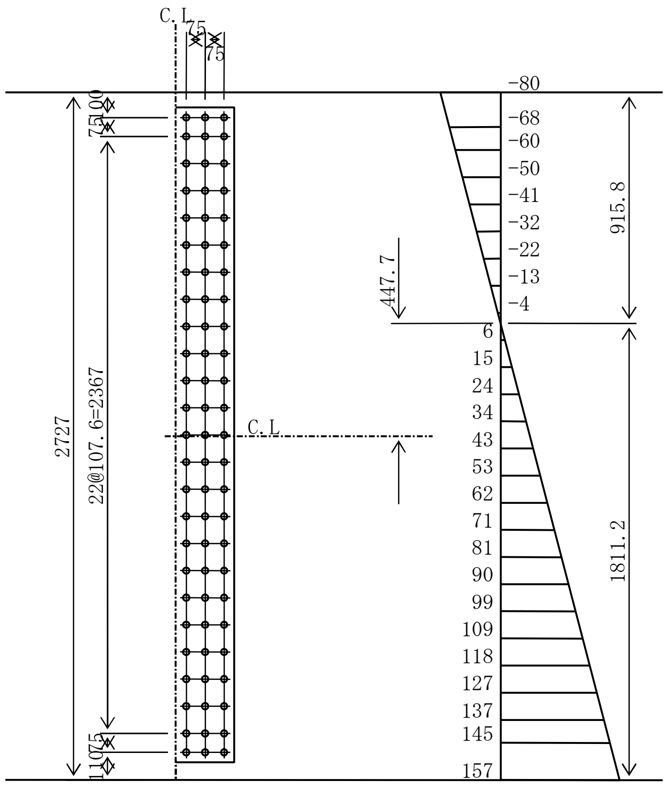
σL = 122 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 62 / 122 = 80 N/mm^2

σLn = 158 N/mm^2

τ = 47 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (145 + 157) / 2 = 311994 N

Required bolt number (Bolt number to be used)

N1 = 311994 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

ρs = τ * A / 75 = 47 * 38178 / 75 = 24161 N < ρa = 108000 N

Combined stress

ρc25 = $\sqrt{((311994 / 3)^2 + 24161^2)}$ = 106768 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3543305 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3131052 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ $3131052*10^4$ / 1811 = $2723*10^6$ N･mm

Bending stress of splice plates

σsp = $2723*10^6$ / ($3543305*10^4$) ＊ 1741 = 134 N/mm^2 ＜ σa = 210 N/mm^2

(165) G2 J-23(Sec-23) LFLG

(a) Acting stress

σ tmax = 123 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

τ max = 41 N/mm^2

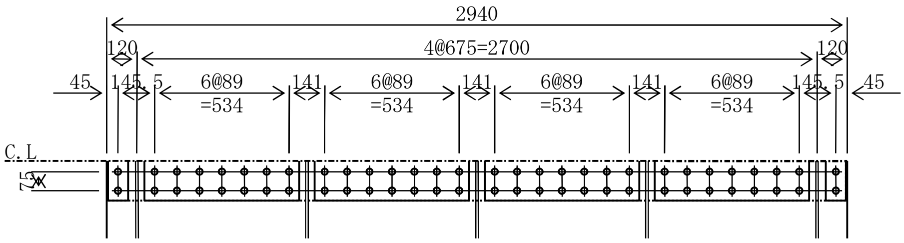
(b) Section area of main plate

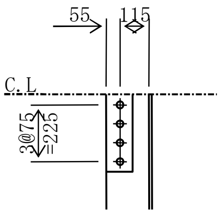
1-LFLG PL 2940 * 11 Ag = 323.4 cm^2 (SM490Y)

3-RIB PL 170 * 17 Agr = 86.7 cm^2 (SM490Y)

ΣAg = Ag + Agr = 323.4 + 86.7 = 410.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 11 A = 323.4

(323.4 - (30* 2.5)* 1.1) * 1.1 = 265.0 < 323.4 ∴An = 265.0 cm^2

3-RIB PL 170 * 17 Ar = 86.7

(86.7 - 3*(1* 2.7)* 1.7) * 1.1 = 80.2 < 86.7 ∴Anr = 80.2 cm^2

ΣAn = An + Anr = 265.0 + 80.2 = 345.2 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 123 * 410.1 / 345.2 = 146 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 146 * 26499 = 3863643 N

> 0.75 σ ta * An / 1.1 = 158 * 26499 / 1.1 = 3794175 N

・Rib Ptr = σ tn * Anr = 146 * 8022 = 1169678 N

> 0.75 σ ta * Anr/ 1.1 = 158 * 8022 / 1.1 = 1148648 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 265.0 / 2 = 132.5 cm^2

・Rib AnrR = Anr = 80.2 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 3863643 / 108000 = 35.8 pcs. (60 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 1169678 / 108000 = 10.8 pcs. (3 @ 4 = 12 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(h) Tensile force per one bolt

$\rho p = Pt / 60 = 3863643 / 60 = 64394$ N

$\rho s = \tau * Ag / 60 = 41 * 32340 / 60 = 21992$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(64394^2 + 21992^2)} = 68046 \text{ N} < \rho a = 108000$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 9	(14.4 -	2*(1*2.5)* 0.9)*1.1= 10.9<	14.4	∴ 10.9
4-SPL PL	614 * 9	(221.0 -	4*(7*2.5)* 0.9)*1.1= 173.8<	221.0	∴173.8
		235.4			184.7 ＞ AnR
1-SPL PL	2930 * 9	(263.7 -	(30*2.5)* 0.9)*1.1= 215.8<	263.7	∴215.8 ＞ AnR
6-SPL PL	100 * 17	(102.0 -	6*(1*2.7)* 1.7)*1.1= 81.9<	102.0	∴ 81.9 ＞AnrR

(166) G2 J-24(Sec-24) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -105 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

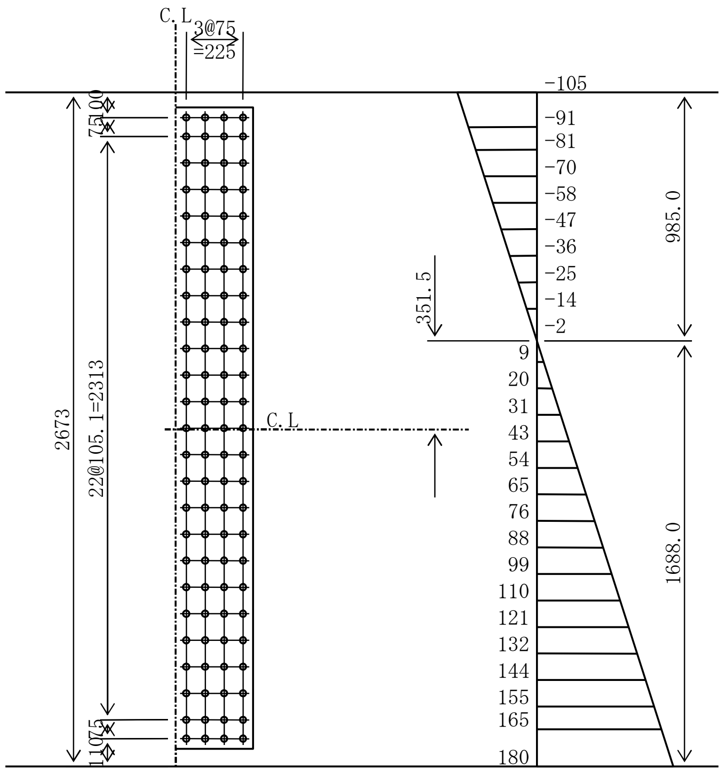
σL = 180 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 105 N/mm^2

σLn = 180 N/mm^2

τ = 38 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (165 + 180) / 2 = 356134 N

Required bolt number (Bolt number to be used)

N1 = 356134 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 38 * 37422 / 100 = 14138 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{}$((356134 / 4$)^2$ + 14138^2) = 90149 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3016437 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2690574 cm^4

Bending moment to be shared by the web

$Mw = 180 * 2690574*10^4 / 1688 = 2874*10^6$ N・mm

Bending stress of splice plates

$\sigma sp = 2874*10^6 / (3016437*10^4) * 1618 = 154$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(167) G2 J-24(Sec-24) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2727 * 14   A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -111 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

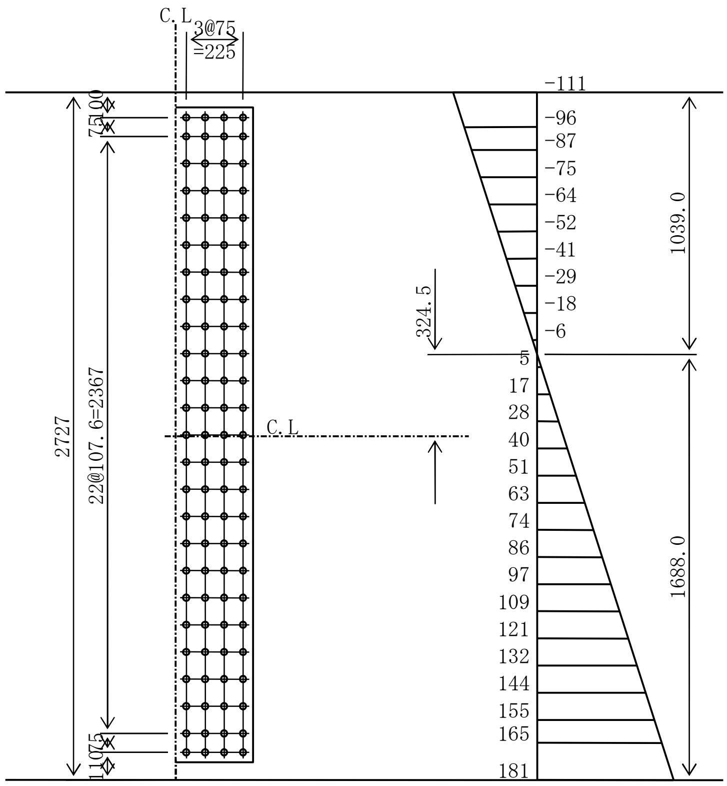
σL = 181 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 111 N/mm^2

σLn = 181 N/mm^2

τ = 40 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (165 + 181) / 2 = 356616 N

Required bolt number (Bolt number to be used)

N1 = 356616 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 40 * 38178 / 100 = 15458 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((356616 / 4)^2 + 15458^2)}$ = 90484 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3104554 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2768018 cm^4

Bending moment to be shared by the web

Mw = 181 ＊ 2768018×10^4 / 1688 = 2961×10^6 N･mm

Bending stress of splice plates

σsp = 2961×10^6 / (3104554×10^4) ＊ 1618 = 154 N/mm^2 ＜ σa = 210 N/mm^2

(168) G2 J-24(Sec-24) LFLG

(a) Acting stress

σtmax = 182 N/mm^2 0.75σta = 0.75 * 210 = 158 N/mm^2

τmax = 25 N/mm^2

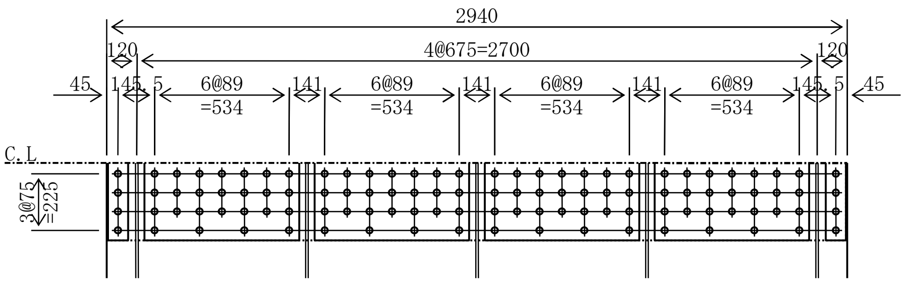
(b) Section area of main plate

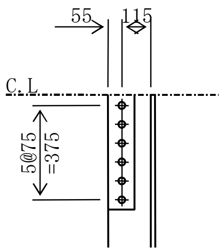
1-LFLG PL 2940 * 17 Ag = 499.8 cm^2 (SM490Y)

3-RIB PL 170 * 17 Agr = 86.7 cm^2 (SM490Y)

ΣAg = Ag + Agr = 499.8 + 86.7 = 586.5 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 17 A = 499.8

(499.8 - (18* 2.5)* 1.7) * 1.1 = 465.6 < 499.8 ∴An = 465.6 cm^2

3-RIB PL 170 * 17 Ar = 86.7

(86.7 - 3*(1* 2.7)* 1.7) * 1.1 = 80.2 < 86.7 ∴Anr = 80.2 cm^2

ΣAn = An + Anr = 465.6 + 80.2 = 545.9 cm^2

σtn = σtmax * ΣAg / ΣAn = 182 * 586.5 / 545.9 = 196 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 196 * 46563 = 9126231 N

> 0.75σta * An / 1.1 = 158 * 46563 / 1.1 = 6666975 N

・Rib Ptr = σtn * Anr = 196 * 8022 = 1572351 N

> 0.75σta * Anr/ 1.1 = 158 * 8022 / 1.1 = 1148648 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 465.6 / 2 = 232.8 cm^2

・Rib AnrR = Anr = 80.2 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 9126231 / 108000 = 84.5 pcs. (108 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 1572351 / 108000 = 14.6 pcs. (3 @ 6 = 18 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,6 unites)

(h) Tensile force per one bolt

$\rho p = Pt / 108 = 9126231 / 108 = 84502$ N

$\rho s = \tau * Ag / 108 = 25 * 49980 / 108 = 11419$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(84502^2 + 11419^2)} = 85270 \text{ N} < \rho a = 108000 \text{ N}$

(i) Check of splice plates

	(SM490Y)	Ags(cm²)	deduction of bolt holes		Ans(cm²)
2-SPL PL	80 * 12	(19.2 -	2*(1*2.5)* 1.2)*1.1= 14.5<	19.2	∴ 14.5
4-SPL PL	614 * 12	(294.7 -	4*(7*2.5)* 1.2)*1.1= 231.8<	294.7	∴231.8
		313.9			246.3 ＞ AnR
1-SPL PL	2930 * 10	(293.0 -	(30*2.5)* 1.0)*1.1= 239.8<	293.0	∴239.8 ＞ AnR
6-SPL PL	100 * 17	(102.0 -	6*(1*2.7)* 1.7)*1.1= 81.9<	102.0	∴ 81.9 ＞AnrR

(169) G2 J-25(Sec-25) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -140 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

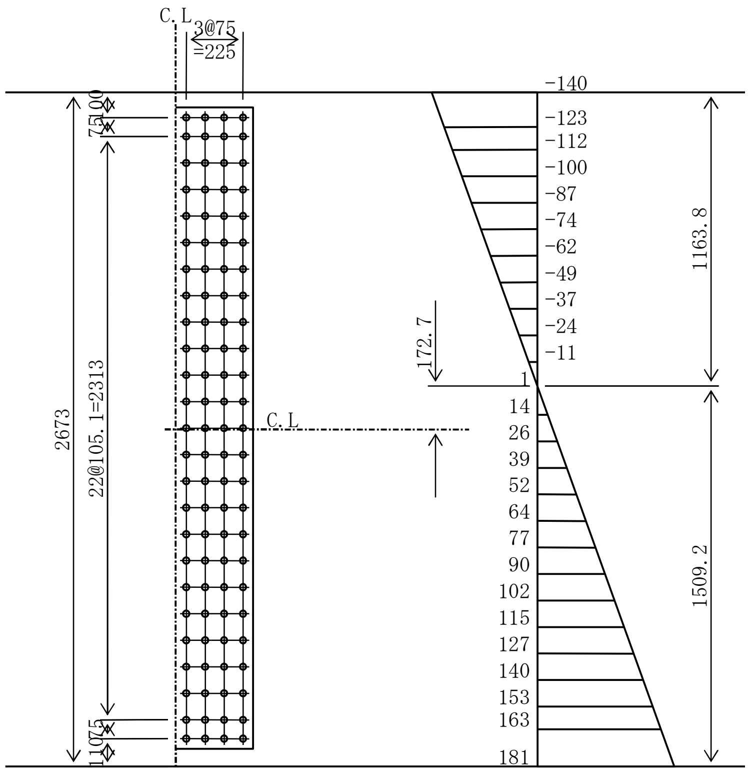
σL = 181 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 140 N/mm^2

σLn = 181 N/mm^2

τ = 29 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (163 + 181) / 2 = 355695 N

Required bolt number (Bolt number to be used)

N1 = 355695 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 29 * 37422 / 100 = 10911 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((355695 / 4)^2 + 10911^2)}$ = 89591 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 2595498 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2339747 cm^4

Bending moment to be shared by the web

Mw = 181 ＊ 2339747*10^4 / 1509 = 2808*10^6 N·mm

Bending stress of splice plates

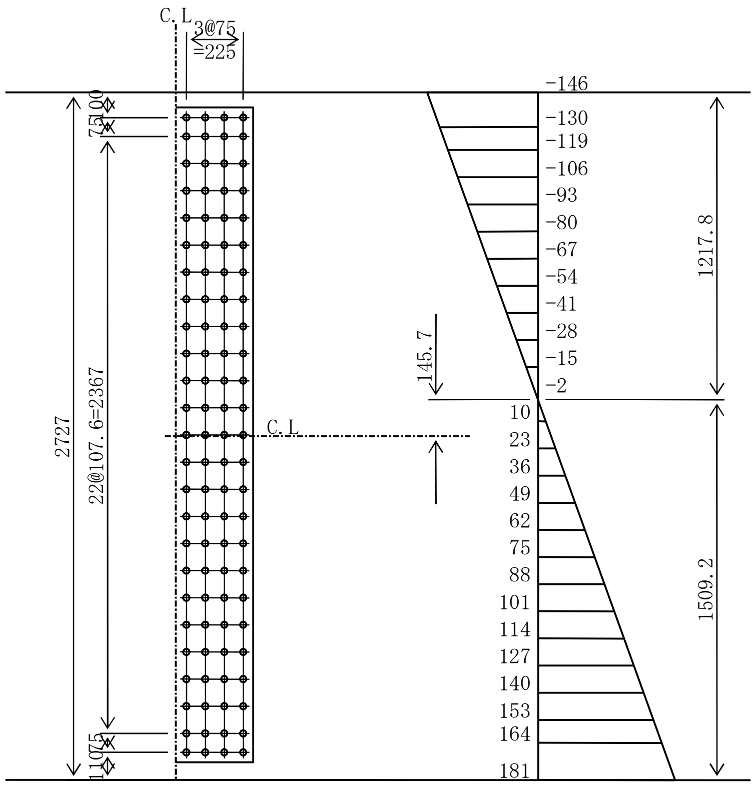
σsp = 2808*10^6 / (2595498*10^4) ＊ 1439 = 156 N/mm^2 ＜ σa = 210 N/mm^2

(170) G2 J-25(Sec-25) RWEB

(a) Section area of main plate (Web plate)
1-RWEB PL 2727 * 14   A = 381.8 cm^2 (SM490Y)

(b) Design stress
σU = -146 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = 181 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 146 N/mm^2
σLn = 181 N/mm^2
τ = 31 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress
Check of bolt at 25th row
Sharing width: b1 = 14.8 cm
Total force to be shared
P1 = 148 * 14 * (164 + 181) / 2 = 356174 N
Required bolt number (Bolt number to be used)
N1 = 356174 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force
$\rho s = \tau * A / 100$ = 31 * 38178 / 100 = 11989 N < ρa = 108000 N
Combined stress
$\rho c25 = \sqrt{((356174 / 4)^2 + 11989^2)}$ = 89847 N < ρa = 108000 N
(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 2719806 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2446962 cm^4

Bending moment to be shared by the web

Mw = 181 ＊ 2446962*10^4 / 1509 = 2940*10^6 N・mm

Bending stress of splice plates

σsp = 2940*10^6 / (2719806*10^4) ＊ 1439 = 156 N/mm^2 ＜ σa = 210 N/mm^2

(171) G2 J-25(Sec-25) LFLG

(a) Acting stress

σ tmax = 184 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

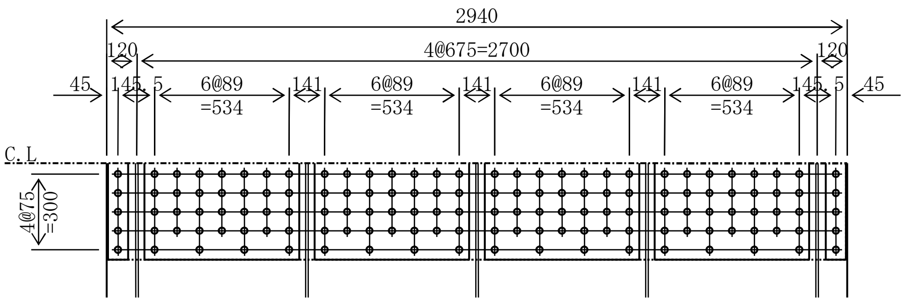
τ max = 14 N/mm^2

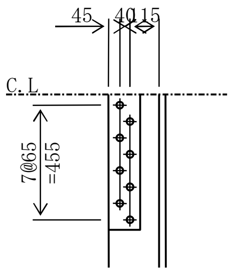
(b) Section area of main plate

1-LFLG	PL	2940 * 26	Ag =	764.4 cm^2	(SM490Y)
3-RIB	PL	200 * 22	Agr =	132.0 cm^2	(SM490Y)

ΣAg = Ag + Agr = 764.4 + 132.0 = 896.4 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 26 A = 764.4

(764.4 - (18* 2.5)* 2.6) * 1.1 = 712.1 < 764.4 ∴An = 712.1 cm^2

3-RIB PL 200 * 22 Ar = 132.0

(132.0 - 3*(1* 2.7+ 1*0.059)* 2.2) * 1.1 = 125.2 < 132.0 ∴Anr = 125.2 cm^2

ΣAn = An + Anr = 712.1 + 125.2 = 837.3 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 184 * 896.4 / 837.3 = 197 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 197 * 71214 = 14064591 N

> 0.75 σ ta * An / 1.1 = 158 * 71214 / 1.1 = 10196550 N

・Rib Ptr = σ tn * Anr = 197 * 12517 = 2472017 N

> 0.75 σ ta * Anr/ 1.1 = 158 * 12517 / 1.1 = 1792163 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 712.1 / 2 = 356.1 cm^2

・Rib AnrR = Anr = 125.2 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 14064591 / 108000 = 130.2 pcs. (138 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 2472017 / 108000 = 22.9 pcs. (3 @ 8 = 24 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 5,8 unites)

(h) Tensile force per one bolt

ρp = Pt / 138 = 14064591 / 138 = 101917 N

ρs = τ * Ag / 138 = 14 * 76440 / 138 = 7535 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(101917^2 + 7535^2)}$ = 102196 N < ρa = 108000 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 18	(28.8 -	2*(1*2.5)* 1.8)*1.1= 21.8<	28.8	∴ 21.8
4-SPL PL	614 * 18	(442.1 -	4*(7*2.5)* 1.8)*1.1= 347.7<	442.1	∴347.7
		470.9			369.5 > AnR
1-SPL PL	2930 * 15	(439.5 -	(30*2.5)* 1.5)*1.1= 359.7<	439.5	∴359.7 > AnR
6-SPL PL	120 * 21	(151.2 -	6*(1*2.7+ 1*0.059)* 2.1)*1.1= 128.1<	151.2	∴128.1 >AnrR

(172) G2 J-26(Sec-26) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2673 * 14   A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -158 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

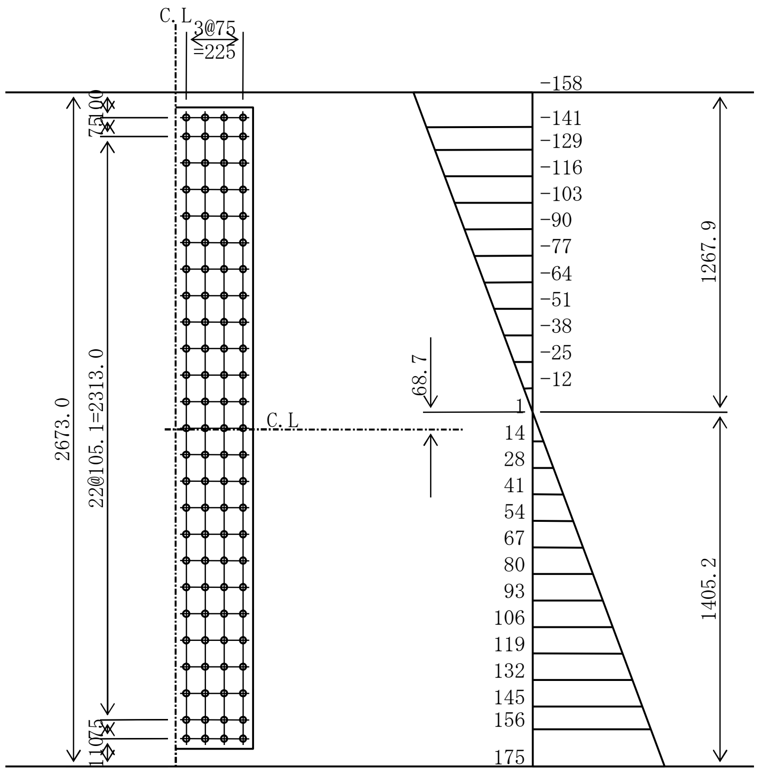
σL = 175 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 N/mm^2

σLn = 175 N/mm^2

τ = 21 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (156 + 175) / 2 = 341911 N

Required bolt number (Bolt number to be used)

N1 = 341911 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 21 * 37422 / 100 = 7837 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{}$((341911 / 4$)^2$ + 7837^2) = 85836 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 * 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 2485333 cm^4 > Iw

Moment of inertia of web plate Iw = 2245790 cm^4

Bending moment to be shared by the web

Mw = 175 * 2245790*10^4 / 1405 = 2793*10^6 N·mm

Bending stress of splice plates

σsp = 2793*10^6 / (2485333*10^4) * 1335 = 150 N/mm^2 < σa = 210 N/mm^2

(173) G2 J-26(Sec-26) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -163 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

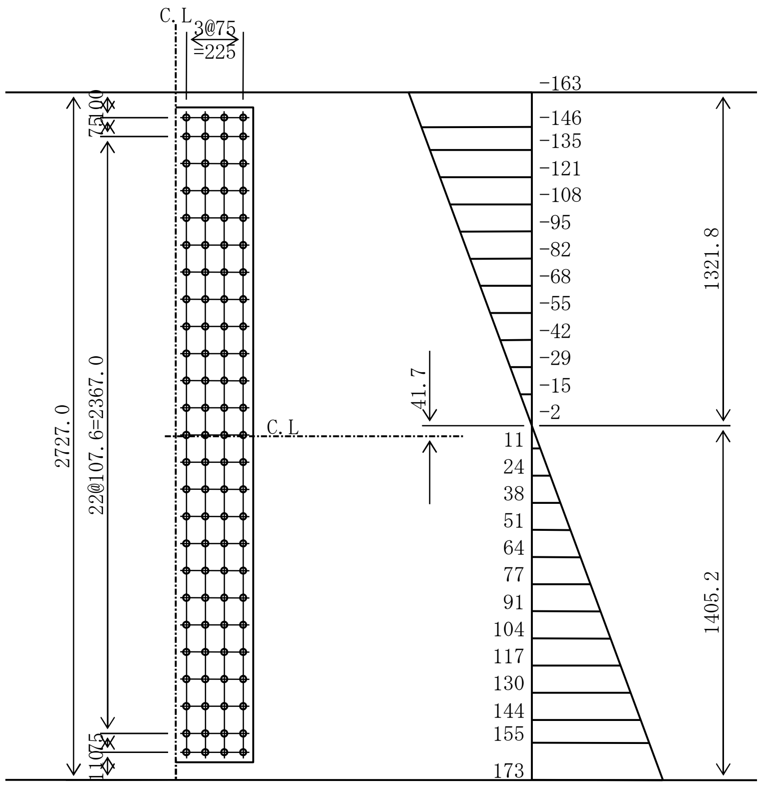
σL = 173 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 163 N/mm^2

σLn = 173 N/mm^2

τ = 22 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (155 + 173) / 2 = 338820 N

Required bolt number (Bolt number to be used)

N1 = 338820 / (108000 * 1.00) = 3.1 pcs. (4 bolts will be used.)

Check of shear force

$\rho s = \tau * A / 100$ = 22 * 38178 / 100 = 8569 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((338820 / 4)^2 + 8569^2)}$ = 85137 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 2633555 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2372547 cm^4

Bending moment to be shared by the web

$Mw = 173 * 2372547*10^4 / 1405 = 2924*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 2924*10^6 / (2633555*10^4) * 1335 = 148$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(174) G2　J-26(Sec-26)　LFLG

(a) Acting stress

σ tmax =　179 N/mm^2　　0.75 σ ta = 0.75 ＊　210 =　158 N/mm^2

τ max　=　　8 N/mm^2

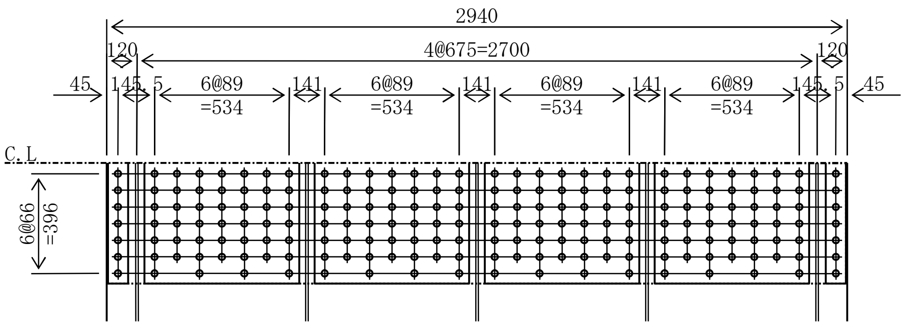
(b) Section area of main plate

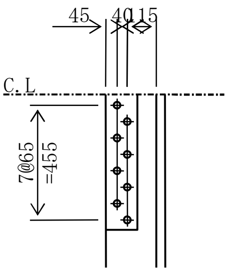
1-LFLG　PL　2940 ＊ 35　　　Ag　= 1029.0 cm^2　(SM490Y)

3-RIB　PL　200 ＊ 22　　　Agr =　132.0 cm^2　(SM490Y)

Σ Ag = Ag + Agr = 1029.0 +　132.0 = 1161.0 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG　PL　2940 ＊ 35　　　A　= 1029.0

(1029.0 -　　(30＊ 2.5)＊ 3.5) ＊ 1.1 =　843.2 ＜ 1029.0　∴An　=　843.2 cm^2

3-RIB　PL　200 ＊ 22　　　Ar =　132.0

(132.0 -　3＊(1＊ 2.7+ 1＊0.059)＊ 2.2) ＊ 1.1 =　125.2 ＜　132.0　∴Anr =　125.2 cm^2

Σ An = An + Anr = 843.2 +　125.2 =　968.3 cm^2

σ tn = σ tmax ＊ Σ Ag / Σ An ＊ 204 / 222

= 179 ＊ 1161.0 /　968.3 ＊ 204 / 222 =　197 N/mm^2

＜　σ ta =　210 N/mm^2

(e) Design axial force

・Main plate　Pt　= σ tn ＊ An　=　197 ＊　84315 ＊ 198 / 180 = 18308071 N

＞ 0.75 σ ta ＊ An / 1.1 =　158 ＊　84315 ＊ 198 / 180 / 1.1 = 13279613 N

・Rib　Ptr = σ tn ＊ Anr =　197 ＊　12517　=　2470783 N

＞ 0.75 σ ta ＊ Anr/ 1.1 =　158 ＊　12517 / 1.1 =　1792163 N

(f) Required section area of the splice plates

・Mother material(One side)　AnR　= An　/ 2 =　843.2 ＊ 198 / 180 / 2 =　463.7 cm^2

・Rib　　　AnrR = Anr =　125.2 cm^2

(g) Required bolt number

・Main plate $n = Pt / (108000 * 1.00) = 18308071 / 108000 = 169.5$ pcs. (198 bolts will be used.)

・Rib $nr = Ptr / (108000 * 1.00) = 2470783 / 108000 = 22.9$ pcs. (3 @ 8 = 24 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 7,8 unites)

(h) Tensile force per one bolt

$\rho p = Pt / 198 = 18308071 / 198 = 92465$ N

$\rho s = \tau * Ag / 198 = 8 * 102900 / 198 = 4039$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(92465^2 + 4039^2)} = 92553 \text{ N} < \rho a = 108000$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm²)	deduction of bolt holes	Ans(cm²)
2-SPL PL	80 * 23	(36.8 -	2*(1*2.5)* 2.3)*1.1= 27.8< 36.8	∴ 27.8
4-SPL PL	614 * 23	(564.9 -	4*(7*2.5)* 2.3)*1.1= 444.3< 564.9	∴444.3
		601.7		472.1 > AnR
1-SPL PL	2930 * 20	(586.0 -	(30*2.5)* 2.0)*1.1= 479.6< 586.0	∴479.6 > AnR
6-SPL PL	120 * 21	(151.2 -	6*(1*2.7+ 1*0.059)* 2.1)*1.1= 128.1< 151.2	∴128.1 >AnrR

(175) G2 J-27(Sec-27) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -163 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

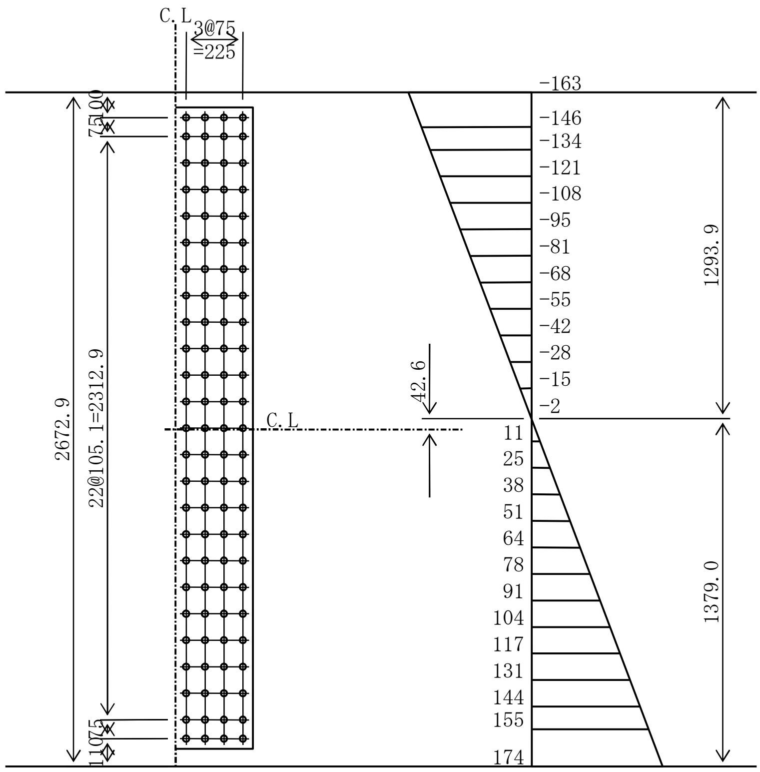
σL = 174 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 163 N/mm^2

σLn = 174 N/mm^2

τ = 13 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (155 + 174) / 2 = 339570 N

Required bolt number (Bolt number to be used)

N1 = 339570 / (108000 * 1.00) = 3.1 pcs. (4 bolts will be used.)

Check of shear force

$\rho s = \tau * A / 100$ = 13 * 37420 / 100 = 4857 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((339570 / 4)^2 + 4857^2)}$ = 85031 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 2472853 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2234594 cm^4

Bending moment to be shared by the web

Mw = 174 ＊ 2234594*10^4 / 1379 = 2815*10^6 N･mm

Bending stress of splice plates

σsp = 2815*10^6 / (2472853*10^4) ＊ 1309 = 149 N/mm^2 ＜ σa = 210 N/mm^2

(176) G2 J-27(Sec-27) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2727 * 14   A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -170 N/mm^2 ＞ σa * 0.75 = 210 * 0.75 = 158 N/mm^2

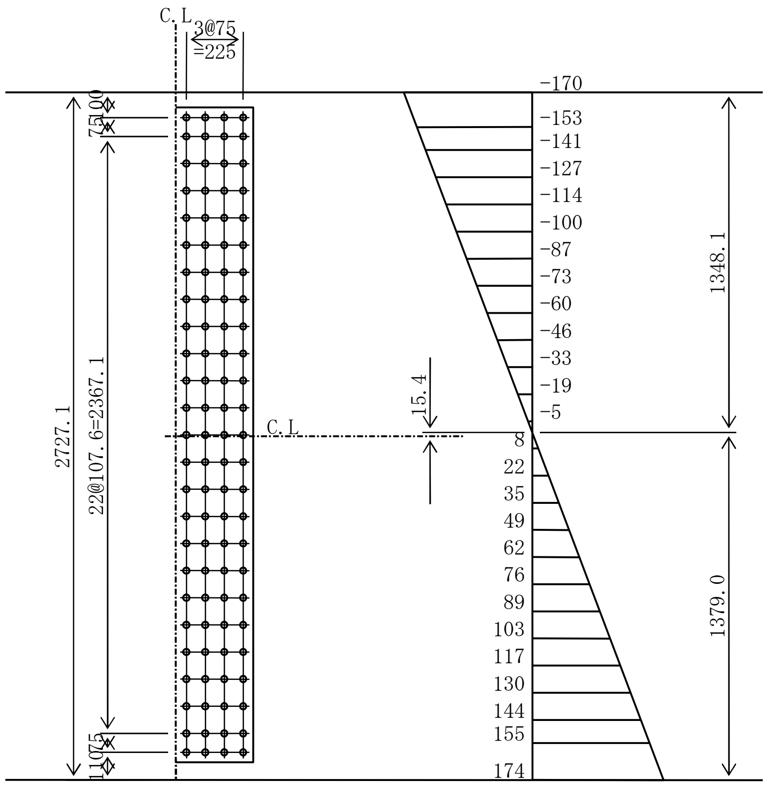
σL = 174 N/mm^2 ＞ σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 170 N/mm^2

σLn = 174 N/mm^2

τ = 14 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (155 + 174) / 2 = 339570 N

Required bolt number (Bolt number to be used)

N1 = 339570 / (108000 * 1.00) = 3.1 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 14 * 38180 / 100 = 5357 N ＜ ρa = 108000 N

Combined stress

ρc25 = $\sqrt{((339570 / 4)^2 + 5357^2)}$ = 85061 N ＜ ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 2628190 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2367181 cm^4

Bending moment to be shared by the web

$Mw = 174 * 2367181*10^4 / 1379 = 2982*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 2982*10^6 / (2628190*10^4) * 1309 = 149$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(177) G2 J-27(Sec-27) LFLG

(a) Acting stress

σtmax = 179 N/mm^2 0.75σta = 0.75 * 210 = 158 N/mm^2

τmax = 5 N/mm^2

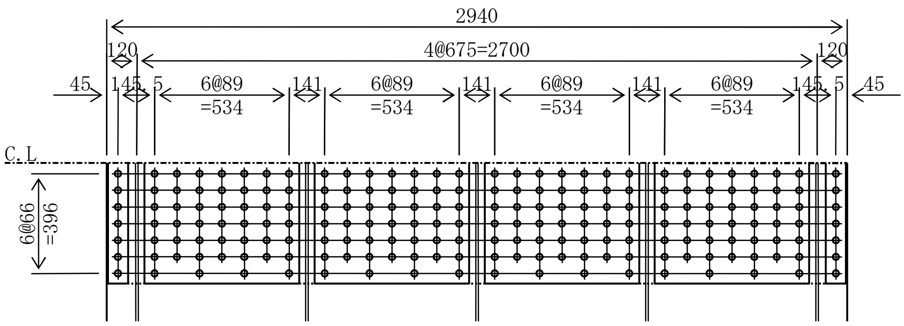
(b) Section area of main plate

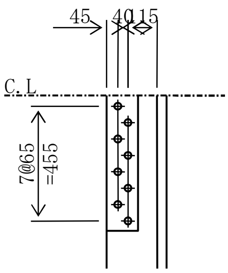
1-LFLG PL 2940 * 38 Ag = 1117.2 cm^2 (SM490Y)

3-RIB PL 200 * 22 Agr = 132.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 1117.2 + 132.0 = 1249.2 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 38 A = 1117.2

(1117.2 - (30* 2.5)* 3.8) * 1.1 = 915.4 < 1117.2 ∴An = 915.4 cm^2

3-RIB PL 200 * 22 Ar = 132.0

(132.0 - 3*(1* 2.7+ 1*0.059)* 2.2) * 1.1 = 125.2 < 132.0 ∴Anr = 125.2 cm^2

ΣAn = An + Anr = 915.4 + 125.2 = 1040.6 cm^2

σtn = σtmax * ΣAg / ΣAn * 204 / 222

= 179 * 1249.2 / 1040.6 * 204 / 222 = 197 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 197 * 91542 * 198 / 180 = 19830256 N

> 0.75σta * An / 1.1 = 158 * 91542 * 198 / 180 / 1.1 = 14417865 N

・Rib Ptr = σtn * Anr = 197 * 12517 = 2464932 N

> 0.75σta * Anr/ 1.1 = 158 * 12517 / 1.1 = 1792163 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 915.4 * 198 / 180 / 2 = 503.5 cm^2

・Rib AnrR = Anr = 125.2 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 19830256 / 108000 = 183.6 pcs. (198 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 2464932 / 108000 = 22.8 pcs. (3 @ 8 = 24 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 7,8 unites)

(h) Tensile force per one bolt

ρp = Pt / 198 = 19830256 / 198 = 100153 N

ρs = τ * Ag / 198 = 5 * 111720 / 198 = 2553 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(100153^2 + 2553^2)}$ = 100185 N < ρa = 108000 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 25	(40.0 -	2*(1*2.5)* 2.5)*1.1= 30.3<	40.0	∴ 30.3
4-SPL PL	614 * 25	(614.0 -	4*(7*2.5)* 2.5)*1.1= 482.9<	614.0	∴482.9
		654.0			513.2 > AnR
1-SPL PL	2930 * 21	(615.3 -	(30*2.5)* 2.1)*1.1= 503.6<	615.3	∴503.6 > AnR
6-SPL PL	120 * 21	(151.2 -	6*(1*2.7+ 1*0.059)* 2.1)*1.1= 128.1<	151.2	∴128.1 >AnrR

(178) G2 J-28(Sec-29) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -155 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

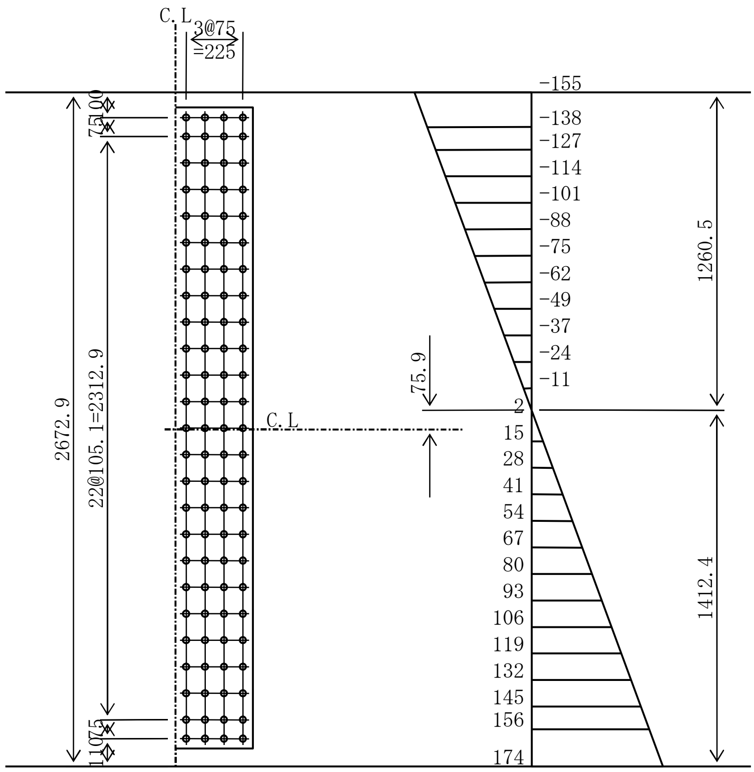
σL = 174 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 155 N/mm^2

σLn = 174 N/mm^2

τ = 11 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (156 + 174) / 2 = 340189 N

Required bolt number (Bolt number to be used)

N1 = 340189 / (108000 * 1.00) = 3.1 pcs. (4 bolts will be used.)

Check of shear force

$\rho s = \tau * A / 100$ = 11 * 37420 / 100 = 4126 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((340189 / 4)^2 + 4126^2)}$ = 85147 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 * 9 　As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates 　Is = 2489388 cm^4 ＞ Iw

Moment of inertia of web plate 　Iw = 2249360 cm^4

Bending moment to be shared by the web

Mw = 174 * 2249360*10^4 / 1412 = 2768*10^6 N・mm

Bending stress of splice plates

σsp = 2768*10^6 / (2489388*10^4) * 1342 = 149 N/mm^2 ＜ σa = 210 N/mm^2

(179) G2 J-28(Sec-29) RWEB

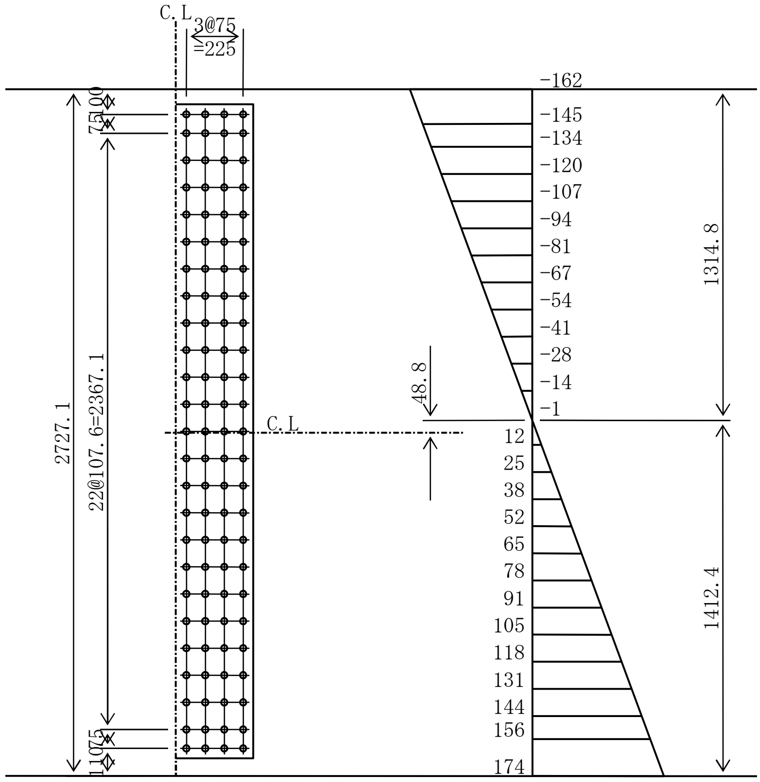
(a) Section area of main plate (Web plate)

1-RWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -162 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = 174 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 162 N/mm^2
σLn = 174 N/mm^2
τ = 12 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (156 + 174) / 2 = 340189 N

Required bolt number (Bolt number to be used)

N1 = 340189 / (108000 * 1.00) = 3.1 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 12 * 38180 / 100 = 4582 N < ρa = 108000 N

Combined stress

ρc25 = $\sqrt{((340189 / 4)^2 + 4582^2)}$ = 85171 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 2636679 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2375389 cm^4

Bending moment to be shared by the web

$Mw = 174 * 2375389*10^4 / 1412 = 2923*10^6$ N･mm

Bending stress of splice plates

$\sigma sp = 2923*10^6 / (2636679*10^4) * 1342 = 149$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(180) G2　J-28(Sec-29)　LFLG

(a) Acting stress

σ tmax = 178 N/mm^2　　0.75 σ ta = 0.75 * 210 = 158 N/mm^2

τ max = 4 N/mm^2

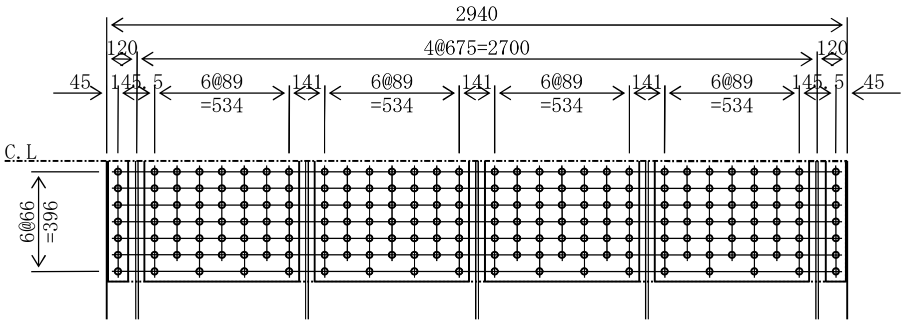
(b) Section area of main plate

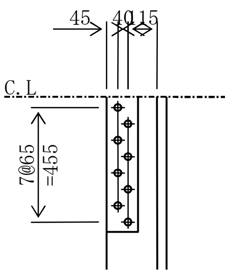
1-LFLG　PL　2940 * 38　　Ag = 1117.2 cm^2　(SM490Y)

3-RIB　PL　200 * 22　　Agr = 132.0 cm^2　(SM490Y)

ΣAg = Ag + Agr = 1117.2 + 132.0 = 1249.2 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG　PL　2940 * 38　　A = 1117.2

(1117.2 - (30* 2.5)* 3.8) * 1.1 = 915.4 < 1117.2　∴An = 915.4 cm^2

3-RIB　PL　200 * 22　　Ar = 132.0

(132.0 - 3*(1* 2.7+ 1*0.059)* 2.2) * 1.1 = 125.2 < 132.0　∴Anr = 125.2 cm^2

ΣAn = An + Anr = 915.4 + 125.2 = 1040.6 cm^2

σ tn = σ tmax * ΣAg / ΣAn * 204 / 222

= 178 * 1249.2 / 1040.6 * 204 / 222 = 197 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate　Pt = σ tn * An = 197 * 91542 * 198 / 180 = 19827479 N

> 0.75 σ ta * An / 1.1 = 158 * 91542 * 198 / 180 / 1.1 = 14417865 N

・Rib　Ptr = σ tn * Anr = 197 * 12517 = 2464586 N

> 0.75 σ ta * Anr/ 1.1 = 158 * 12517 / 1.1 = 1792163 N

(f) Required section area of the splice plates

・Mother material(One side)　AnR = An / 2 = 915.4 * 198 / 180 / 2 = 503.5 cm^2

・Rib　　AnrR = Anr = 125.2 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 19827479 / 108000 = 183.6 pcs. (198 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 2464586 / 108000 = 22.8 pcs. (3 @ 8 = 24 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 7,8 unites)

(h) Tensile force per one bolt

ρp = Pt / 198 = 19827479 / 198 = 100139 N
ρs = τ * Ag / 198 = 4 * 111720 / 198 = 2208 N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(100139^2 + 2208^2)}$ = 100163 N ＜ ρa = 108000 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 25	(40.0 -	2*(1*2.5)* 2.5)*1.1= 30.3＜	40.0	∴ 30.3
4-SPL PL	614 * 25	(614.0 -	4*(7*2.5)* 2.5)*1.1= 482.9＜	614.0	∴482.9
		654.0			513.2 ＞ AnR
1-SPL PL	2930 * 21	(615.3 -	(30*2.5)* 2.1)*1.1= 503.6＜	615.3	∴503.6 ＞ AnR
6-SPL PL	120 * 21	(151.2 -	6*(1*2.7+ 1*0.059)* 2.1)*1.1= 128.1＜	151.2	∴128.1 ＞AnrR

(181) G2 J-29(Sec-30) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -146 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

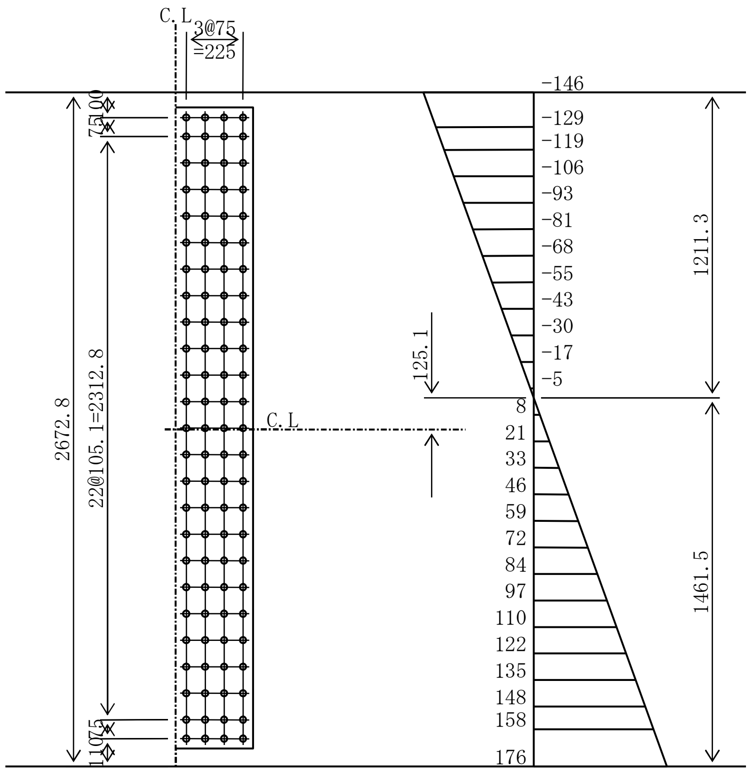
σL = 176 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 146 N/mm^2

σLn = 176 N/mm^2

τ = 18 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (158 + 176) / 2 = 345447 N

Required bolt number (Bolt number to be used)

N1 = 345447 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 18 * 37420 / 100 = 6570 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((345447 / 4)^2 + 6570^2)}$ = 86611 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 * 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 2532359 cm^4 > Iw

Moment of inertia of web plate Iw = 2286329 cm^4

Bending moment to be shared by the web

Mw = 176 * 2286329*10^4 / 1462 = 2756*10^6 N·mm

Bending stress of splice plates

σsp = 2756*10^6 / (2532359*10^4) * 1392 = 151 N/mm^2 < σa = 210 N/mm^2

(182) G2 J-29(Sec-30) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -153 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

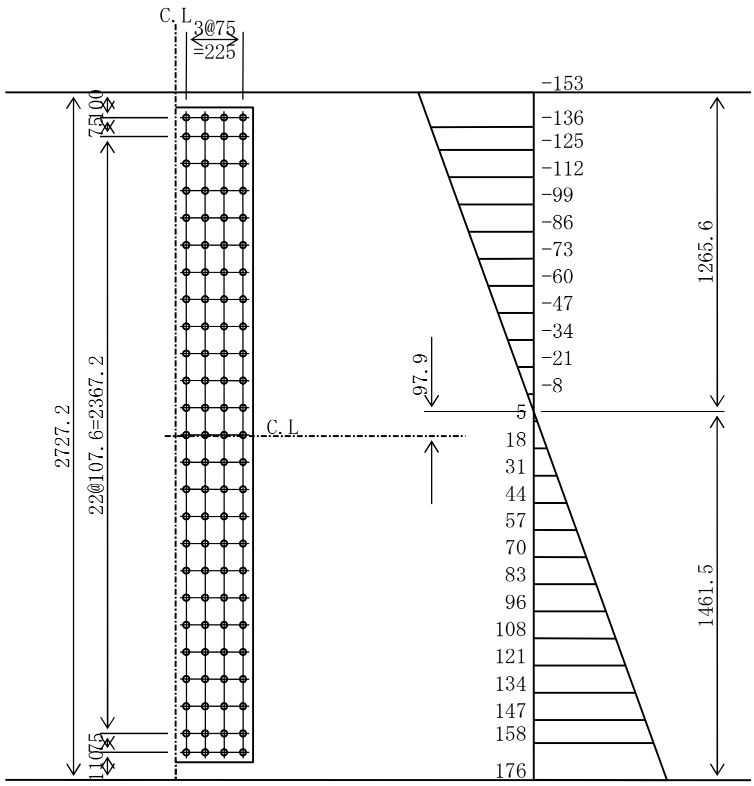
σL = 176 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 153 N/mm^2

σLn = 176 N/mm^2

τ = 19 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (158 + 176) / 2 = 345447 N

Required bolt number (Bolt number to be used)

N1 = 345447 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 19 * 38180 / 100 = 7414 N < ρa = 108000 N

Combined stress

ρc25 = $\sqrt{((345447 / 4)^2 + 7414^2)}$ = 86680 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 * 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 2668124 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2402948 cm^4

Bending moment to be shared by the web

Mw = 176 * 2402948*10^4 / 1462 = 2897*10^6 N·mm

Bending stress of splice plates

σsp = 2897*10^6 / (2668124*10^4) * 1392 = 151 N/mm^2 ＜ σa = 210 N/mm^2

(183) G2 J-29(Sec-30) LFLG

(a) Acting stress

σ tmax = 180 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

τ max = 7 N/mm^2

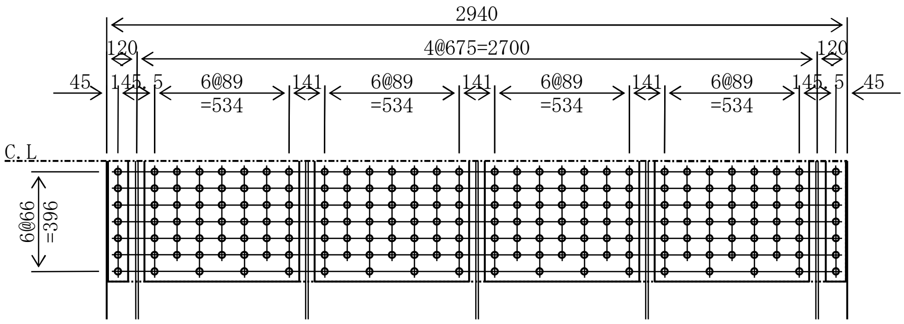
(b) Section area of main plate

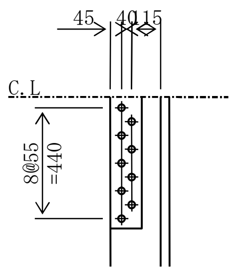
1-LFLG PL 2940 * 35 Ag = 1029.0 cm^2 (SM490Y)

3-RIB PL 200 * 22 Agr = 132.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 1029.0 + 132.0 = 1161.0 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 35 A = 1029.0

(1029.0 - (30* 2.5)* 3.5) * 1.1 = 843.2 < 1029.0 ∴An = 843.2 cm^2

3-RIB PL 200 * 22 Ar = 132.0

(132.0 - 3*(1* 2.7+ 1*0.809)* 2.2) * 1.1 = 119.7 < 132.0 ∴Anr = 119.7 cm^2

ΣAn = An + Anr = 843.2 + 119.7 = 962.9 cm^2

σ tn = σ tmax * ΣAg / ΣAn * 207 / 225

= 180 * 1161.0 / 962.9 * 207 / 225 = 200 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 200 * 84315 * 198 / 180 = 18559914 N

> 0.75 σ ta * An / 1.1 = 158 * 84315 * 198 / 180 / 1.1 = 13279613 N

・Rib Ptr = σ tn * Anr = 200 * 11972 = 2395809 N

> 0.75 σ ta * Anr/ 1.1 = 158 * 11972 / 1.1 = 1714200 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 843.2 * 198 / 180 / 2 = 463.7 cm^2

・Rib AnrR = Anr = 119.7 cm^2

(g) Required bolt number

・Main plate $n = Pt / (108000 * 1.00) = 18559914 / 108000 = 171.9$ pcs. (198 bolts will be used.)

・Rib $nr = Ptr / (108000 * 0.98) = 2395809 / 105840 = 22.6$ pcs. (3 @ 9 = 27 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 7,9 unites)

(h) Tensile force per one bolt

$\rho p = Pt / 198 = 18559914 / 198 = 93737$ N

$\rho s = \tau * Ag / 198 = 7 * 102900 / 198 = 3484$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(93737^2 + 3484^2)} = 93802 \text{ N} < \rho a = 108000$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 23	(36.8 -	2*(1*2.5)* 2.3)*1.1= 27.8<	36.8	∴ 27.8
4-SPL PL	614 * 23	(564.9 -	4*(7*2.5)* 2.3)*1.1= 444.3<	564.9	∴444.3
		601.7			472.1 > AnR
1-SPL PL	2930 * 20	(586.0 -	(30*2.5)* 2.0)*1.1= 479.6<	586.0	∴479.6 > AnR
6-SPL PL	120 * 22	(158.4 -	6*(1*2.7+ 1*0.809)* 2.2)*1.1= 123.3<	158.4	∴123.3 >AnrR

(184) G2 J-30(Sec-31) LWEB

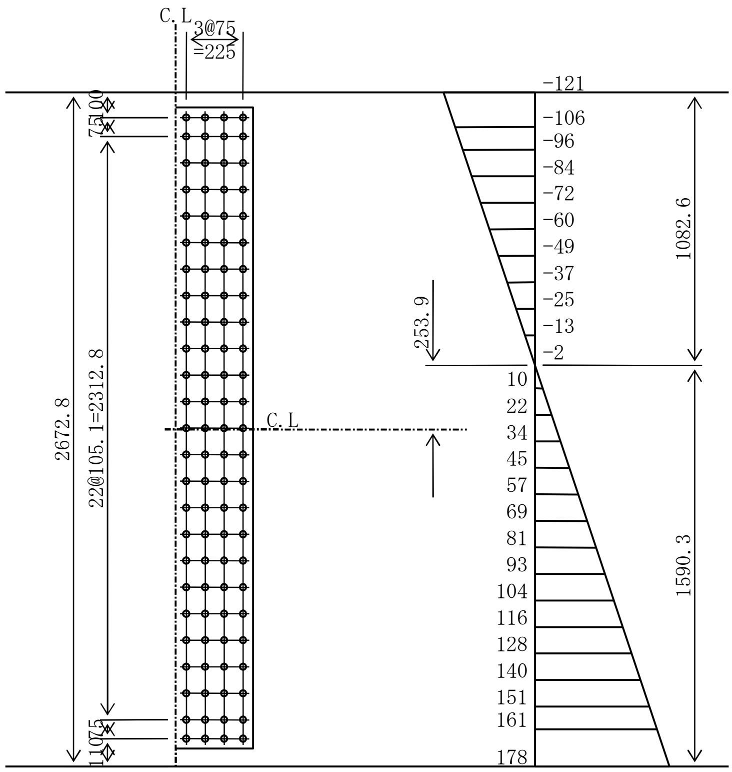
(a) Section area of main plate (Web plate)

1-LWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -121 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = 178 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 121 N/mm^2
σLn = 178 N/mm^2
τ = 28 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (161 + 178) / 2 = 350319 N

Required bolt number (Bolt number to be used)

N1 = 350319 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 28 * 37420 / 100 = 10609 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{}$((350319 / 4)^2 + 10609^2) = 88220 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 2749780 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2468898 cm^4

Bending moment to be shared by the web

Mw = 178 ＊ $2468898*10^4$ / 1590 = $2762*10^6$ N・mm

Bending stress of splice plates

σsp = $2762*10^6$ / ($2749780*10^4$) ＊ 1520 = 153 N/mm^2 ＜ σa = 210 N/mm^2

(185) G2 J-30(Sec-31) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2727 * 14   A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -127 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

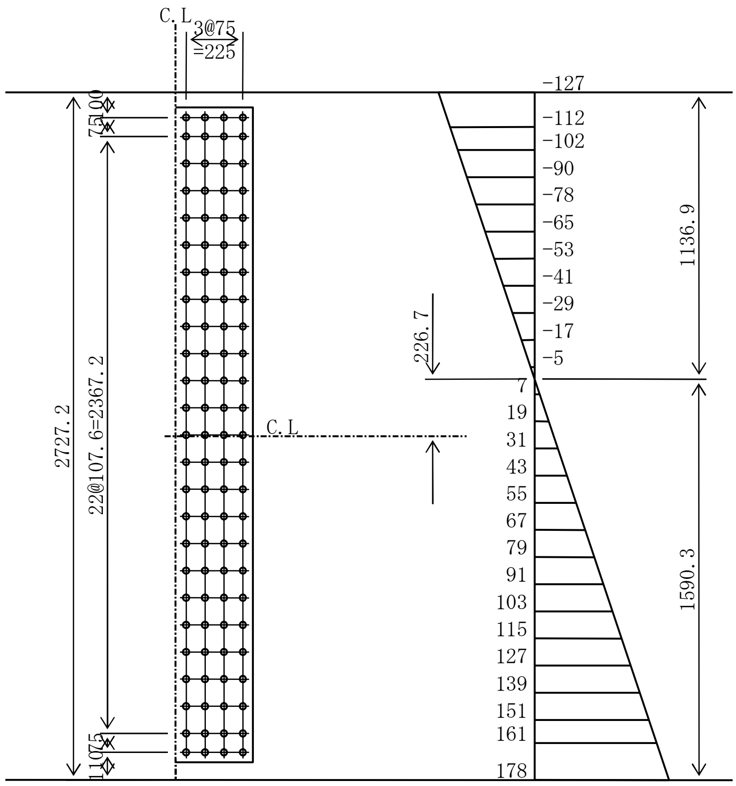
σL = 178 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 127 N/mm^2

σLn = 178 N/mm^2

τ = 32 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (161 + 178) / 2 = 350319 N

Required bolt number (Bolt number to be used)

N1 = 350319 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 32 * 38180 / 100 = 12198 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((350319 / 4)^2 + 12198^2)}$ = 88425 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 2857518 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2562544 cm^4

Bending moment to be shared by the web

Mw = 178 ＊ $2562544*10^4$ / 1590 = $2867*10^6$ N･mm

Bending stress of splice plates

σsp = $2867*10^6$ / ($2857518*10^4$) ＊ 1520 = 153 N/mm^2 ＜ σa = 210 N/mm^2

(186) G2 J-30(Sec-31) LFLG

(a) Acting stress

σtmax = 181 N/mm^2 0.75σta = 0.75 * 210 = 158 N/mm^2

τmax = 13 N/mm^2

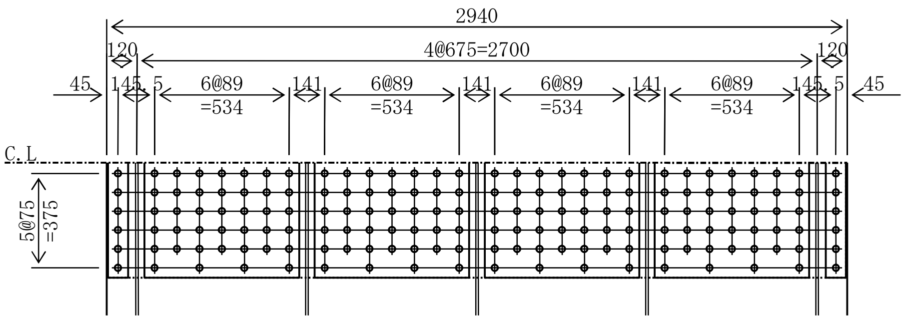
(b) Section area of main plate

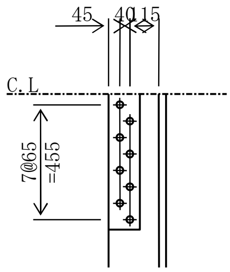
1-LFLG PL 2940 * 28 Ag = 823.2 cm^2 (SM490Y)

3-RIB PL 200 * 22 Agr = 132.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 823.2 + 132.0 = 955.2 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 28 A = 823.2

(823.2 - (30* 2.5)* 2.8) * 1.1 = 674.5 < 823.2 ∴An = 674.5 cm^2

3-RIB PL 200 * 22 Ar = 132.0

(132.0 - 3*(1* 2.7+ 1*0.059)* 2.2) * 1.1 = 125.2 < 132.0 ∴Anr = 125.2 cm^2

ΣAn = An + Anr = 674.5 + 125.2 = 799.7 cm^2

σtn = σtmax * ΣAg / ΣAn * 174 / 192

= 181 * 955.2 / 799.7 * 174 / 192 = 196 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 196 * 67452 * 168 / 150 = 14804063 N

> 0.75σta * An / 1.1 = 158 * 67452 * 168 / 150 / 1.1 = 10816848 N

・Rib Ptr = σtn * Anr = 196 * 12517 = 2452775 N

> 0.75σta * Anr/ 1.1 = 158 * 12517 / 1.1 = 1792163 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 674.5 * 168 / 150 / 2 = 377.7 cm^2

・Rib AnrR = Anr = 125.2 cm^2

(g) Required bolt number

・Main plate $n = Pt / (108000 * 1.00) = 14804063 / 108000 = 137.1$ pcs. (168 bolts will be used.)

・Rib $nr = Ptr / (108000 * 1.00) = 2452775 / 108000 = 22.7$ pcs. (3 @ 8 = 24 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 6,8 unites)

(h) Tensile force per one bolt

$\rho p = Pt / 168 = 14804063 / 168 = 88119$ N

$\rho s = \tau * Ag / 168 = 13 * 82320 / 168 = 6517$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(88119^2 + 6517^2)} = 88360 \text{ N} < \rho a = 108000$ N

(i) Check of splice plates

	(SM490Y)	$Ags(cm^2)$	deduction of bolt holes		$Ans(cm^2)$
2-SPL PL	80 * 19	(30.4 -	2*(1*2.5)* 1.9)*1.1= 23.0<	30.4	∴ 23.0
4-SPL PL	614 * 19	(466.6 -	4*(7*2.5)* 1.9)*1.1= 367.0<	466.6	∴367.0
		497.0			390.0 > AnR
1-SPL PL	2930 * 16	(468.8 -	(30*2.5)* 1.6)*1.1= 383.7<	468.8	∴383.7 > AnR
6-SPL PL	120 * 21	(151.2 -	6*(1*2.7+ 1*0.059)* 2.1)*1.1= 128.1<	151.2	∴128.1 >AnrR

(187) G2 J-31(Sec-32) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -87 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

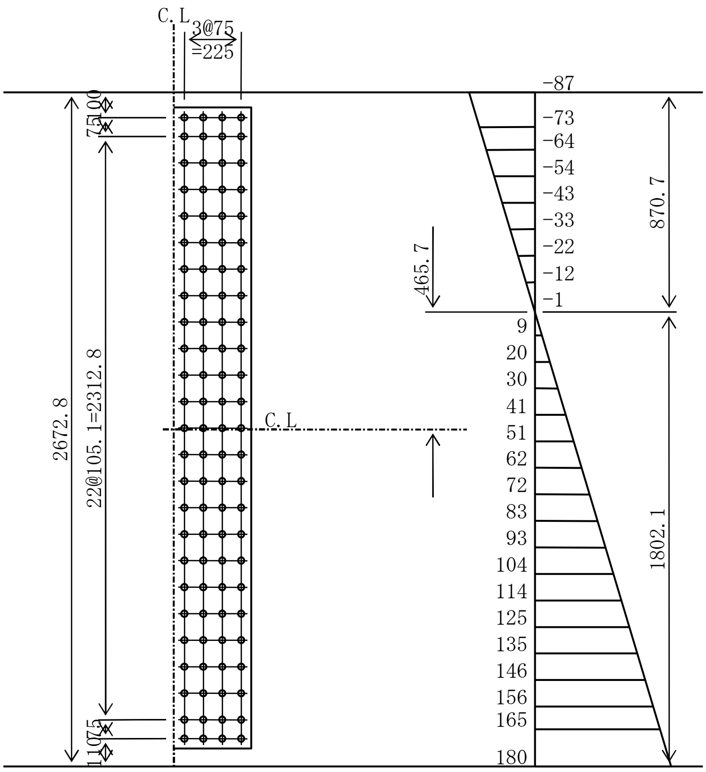
σL = 180 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 87 N/mm^2

σLn = 180 N/mm^2

τ = 42 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (165 + 180) / 2 = 356542 N

Required bolt number (Bolt number to be used)

N1 = 356542 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 42 * 37420 / 100 = 15821 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{}$((356542 / 4)^2 + 15821^2) = 90529 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3437806 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3039314 cm^4

Bending moment to be shared by the web

Mw = 180 ＊ $3039314*10^4$ / 1802 = $3036*10^6$ N·mm

Bending stress of splice plates

σsp = $3036*10^6$ / ($3437806*10^4$) ＊ 1732 = 153 N/mm^2 ＜ σa = 210 N/mm^2

(188) G2 J-31(Sec-32) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -92 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

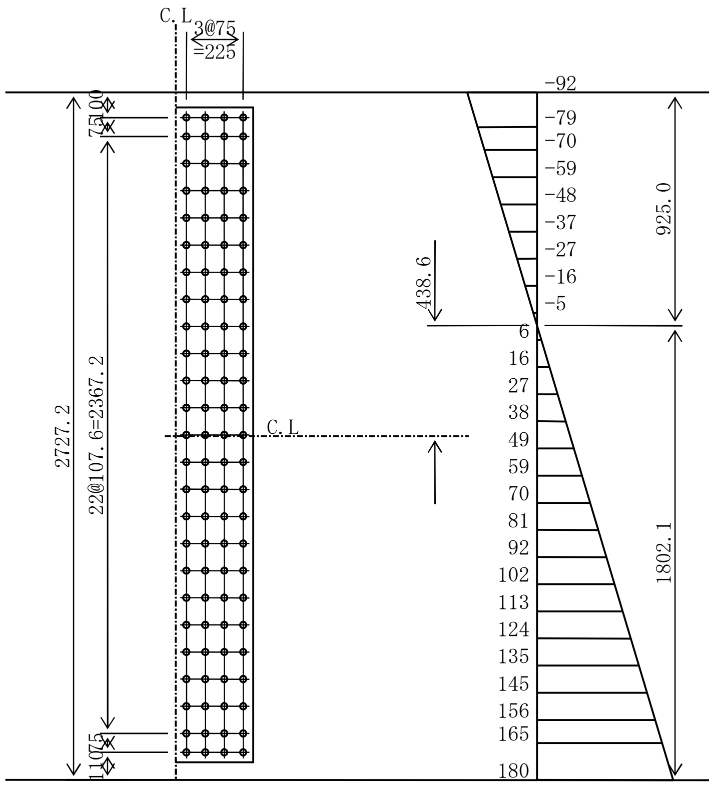
σL = 180 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 92 N/mm^2

σLn = 180 N/mm^2

τ = 48 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (165 + 180) / 2 = 356542 N

Required bolt number (Bolt number to be used)

N1 = 356542 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 48 * 38180 / 100 = 18393 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{}$((356542 / 4)^2 + 18393^2) = 91013 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3506466 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3100635 cm^4

Bending moment to be shared by the web

Mw = 180 ＊ 3100635*10^4 / 1802 = 3097*10^6 N·mm

Bending stress of splice plates

σsp = 3097*10^6 / (3506466*10^4) ＊ 1732 = 153 N/mm^2 ＜ σa = 210 N/mm^2

(189) G2 J-31(Sec-32) LFLG

(a) Acting stress

σ tmax = 182 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

τ max = 29 N/mm^2

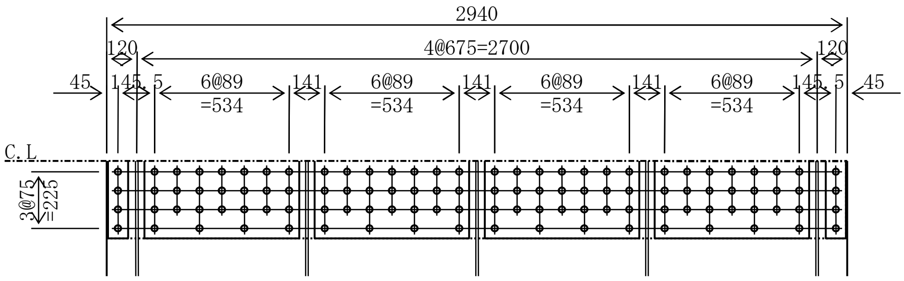
(b) Section area of main plate

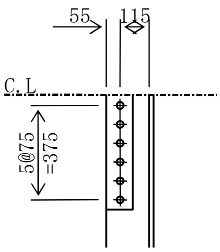
1-LFLG PL 2940 * 18 Ag = 529.2 cm^2 (SM490Y)

3-RIB PL 170 * 17 Agr = 86.7 cm^2 (SM490Y)

ΣAg = Ag + Agr = 529.2 + 86.7 = 615.9 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 18 A = 529.2

(529.2 - (18* 2.5)* 1.8) * 1.1 = 493.0 < 529.2 ∴An = 493.0 cm^2

3-RIB PL 170 * 17 Ar = 86.7

(86.7 - 3*(1* 2.7)* 1.7) * 1.1 = 80.2 < 86.7 ∴Anr = 80.2 cm^2

ΣAn = An + Anr = 493.0 + 80.2 = 573.2 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 182 * 615.9 / 573.2 = 195 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 195 * 49302 = 9631403 N

> 0.75 σ ta * An / 1.1 = 158 * 49302 / 1.1 = 7059150 N

・Rib Ptr = σ tn * Anr = 195 * 8022 = 1567198 N

> 0.75 σ ta * Anr/ 1.1 = 158 * 8022 / 1.1 = 1148648 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 493.0 / 2 = 246.5 cm^2

・Rib AnrR = Anr = 80.2 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 9631403 / 108000 = 89.2 pcs. (108 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 1567198 / 108000 = 14.5 pcs. (3 @ 6 = 18 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,6 unites)

(h) Tensile force per one bolt

$\rho p = Pt / 108 = 9631403 / 108 = 89180$ N

$\rho s = \tau * Ag / 108 = 29 * 52920 / 108 = 13973$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(89180^2 + 13973^2)} = 90268 \text{ N} < \rho a = 108000$ N

(i) Check of splice plates

	(SM490Y)	$Ags(cm^2)$	deduction of bolt holes		$Ans(cm^2)$
2-SPL PL	80 * 13	(20.8 -	2*(1*2.5)* 1.3)*1.1= 15.7<	20.8	∴ 15.7
4-SPL PL	614 * 13	(319.3 -	4*(7*2.5)* 1.3)*1.1= 251.1<	319.3	∴251.1
		340.1			266.8 > AnR
1-SPL PL	2930 * 11	(322.3 -	(30*2.5)* 1.1)*1.1= 263.8<	322.3	∴263.8 > AnR
6-SPL PL	100 * 17	(102.0 -	6*(1*2.7)* 1.7)*1.1= 81.9<	102.0	∴ 81.9 >AnrR

(190) G2 J-32(Sec-33) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -43 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

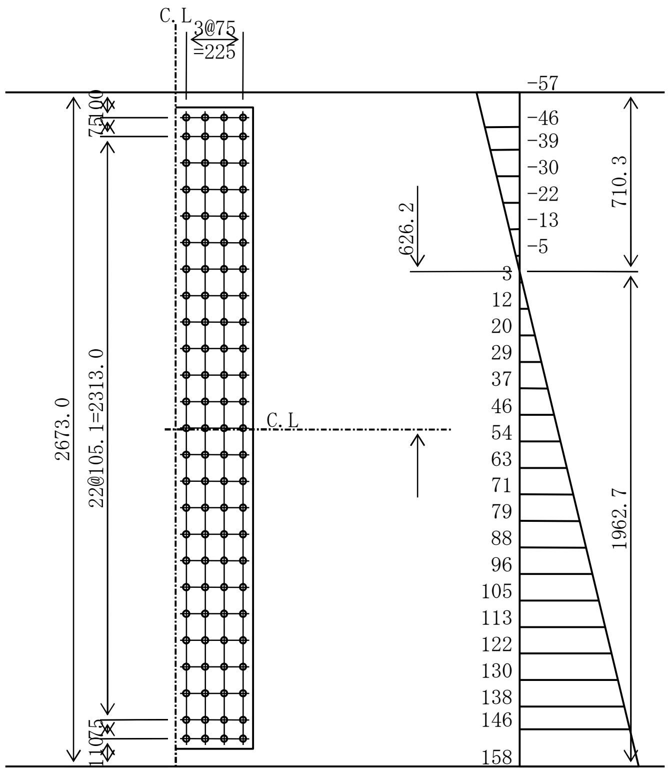
σL = 119 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 43 / 119 = 57 N/mm^2

σLn = 158 N/mm^2

τ = 50 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (146 + 158) / 2 = 313016 N

Required bolt number (Bolt number to be used)

N1 = 313016 / (108000 * 1.00) = 2.9 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 50 * 37421 / 100 = 18697 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{}((313016 / 4)^2 + 18697^2)$ = 80457 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4233036 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3695465 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ 3695465*10^4 / 1963 = 2966*10^6 N･mm

Bending stress of splice plates

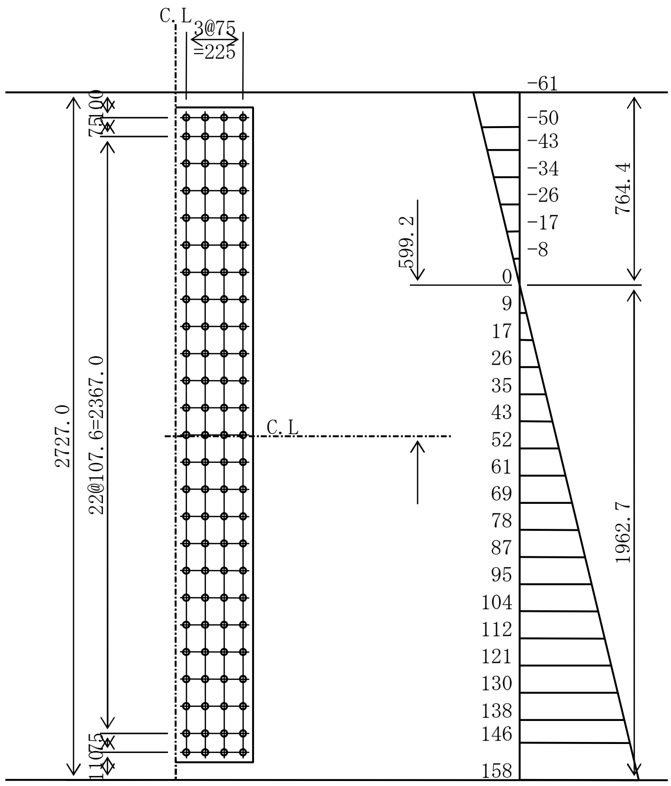
σsp = 2966*10^6 / (4233036*10^4) ＊ 1893 = 133 N/mm^2 ＜ σa = 210 N/mm^2

(191) G2 J-32(Sec-33) RWEB

(a) Section area of main plate (Web plate)
1-RWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress
σU = -47 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = 120 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 158 * 47 / 120 = 61 N/mm^2
σLn = 158 N/mm^2
τ = 57 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress
Check of bolt at 25th row
Sharing width: b1 = 14.8 cm
Total force to be shared
P1 = 148 * 14 * (146 + 158) / 2 = 313016 N
Required bolt number (Bolt number to be used)
N1 = 313016 / (108000 * 1.00) = 2.9 pcs. (4 bolts will be used.)

Check of shear force
ρs = τ * A / 100 = 57 * 38179 / 100 = 21685 N < ρa = 108000 N
Combined stress
$\rho c25$ = $\sqrt{((313016 / 4)^2 + 21685^2)}$ = 81203 N < ρa = 108000 N
(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4277672 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3736606 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ 3736606*10^4 / 1963 = 2999*10^6 N・mm

Bending stress of splice plates

σsp = 2999*10^6 / (4277672*10^4) ＊ 1893 = 133 N/mm^2 ＜ σa = 210 N/mm^2

(192) G2 J-32(Sec-33) LFLG

(a) Acting stress

σ tmax = 121 N/mm^2 0.75σ ta = 0.75 * 210 = 158 N/mm^2

τ max = 53 N/mm^2

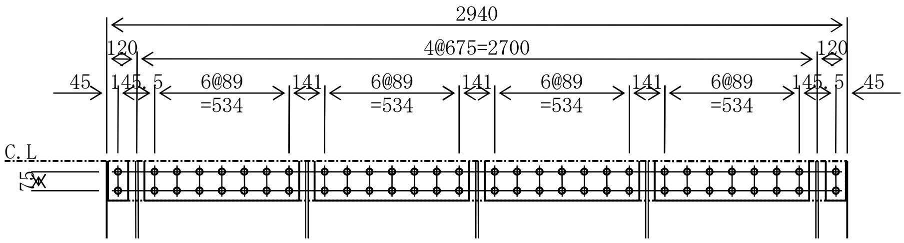
(b) Section area of main plate

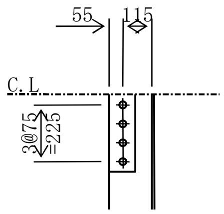
1-LFLG PL 2940 * 10 Ag = 294.0 cm^2 (SM490Y)

3-RIB PL 170 * 17 Agr = 86.7 cm^2 (SM490Y)

ΣAg = Ag + Agr = 294.0 + 86.7 = 380.7 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 10 A = 294.0

(294.0 - (30* 2.5)* 1.0) * 1.1 = 240.9 < 294.0 ∴An = 240.9 cm^2

3-RIB PL 170 * 17 Ar = 86.7

(86.7 - 3*(1* 2.7)* 1.7) * 1.1 = 80.2 < 86.7 ∴Anr = 80.2 cm^2

ΣAn = An + Anr = 240.9 + 80.2 = 321.1 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 121 * 380.7 / 321.1 = 143 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σ ta * An / 1.1 = 158 * 24090 / 1.1 = 3449250 N

> σ tn * An = 143 * 24090 = 3441515 N

・Rib Ptr = 0.75σ ta * Anr / 1.1 = 158 * 8022 / 1.1 = 1148648 N

> σ tn * Anr = 143 * 8022 = 1146072 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 240.9 / 2 = 120.5 cm^2

・Rib AnrR = Anr = 80.2 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 3449250 / 108000 = 31.9 pcs. (60 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 1148648 / 108000 = 10.6 pcs. (3 @ 4 = 12 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(h) Tensile force per one bolt

$\rho p = Pt / 60 = 3449250 / 60 = 57487$ N

$\rho s = \tau * Ag / 60 = 53 * 29400 / 60 = 25980$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(57487^2 + 25980^2)} = 63085$ N $< \rho a = 108000$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm²)	deduction of bolt holes		Ans(cm²)
2-SPL PL	80 * 9	(14.4 -	2*(1*2.5)* 0.9)*1.1= 10.9<	14.4	∴ 10.9
4-SPL PL	614 * 9	(221.0 -	4*(7*2.5)* 0.9)*1.1= 173.8<	221.0	∴173.8
		235.4			184.7 > AnR
1-SPL PL	2930 * 9	(263.7 -	(30*2.5)* 0.9)*1.1= 215.8<	263.7	∴215.8 > AnR
6-SPL PL	100 * 17	(102.0 -	6*(1*2.7)* 1.7)*1.1= 81.9<	102.0	∴ 81.9 >AnrR

(193) G3 J-1(Sec-1) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -39 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

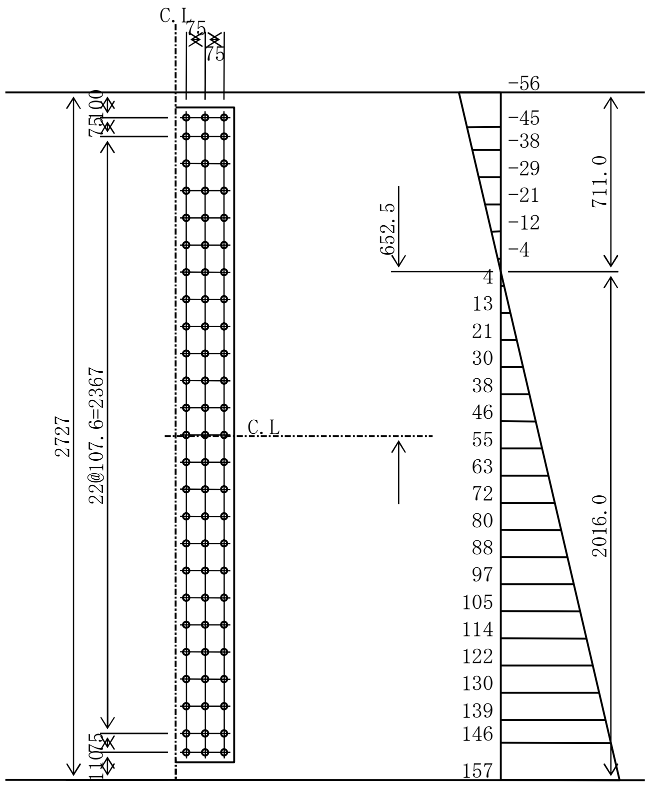
σL = 110 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 39 / 110 = 56 N/mm^2

σLn = 158 N/mm^2

τ = 41 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (146 + 157) / 2 = 313339 N

Required bolt number (Bolt number to be used)

N1 = 313339 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

ρs = τ * A / 75 = 41 * 38178 / 75 = 20819 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((313339 / 3)^2 + 20819^2)}$ = 106501 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4587064 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3991321 cm^4

Bending moment to be shared by the web

$Mw = 158 * 3991321*10^4 / 2016 = 3118*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 3118*10^6 / (4587064*10^4) * 1946 = 132$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(194) G3 J-1(Sec-1) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -36 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

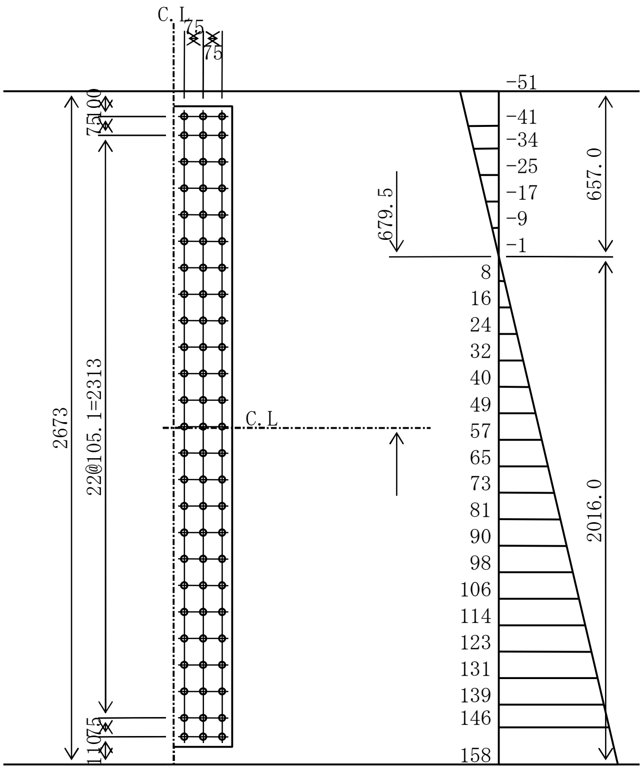
σL = 110 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 36 / 110 = 51 N/mm^2

σLn = 158 N/mm^2

τ = 44 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (146 + 158) / 2 = 313339 N

Required bolt number (Bolt number to be used)

N1 = 313339 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

ρs = τ * A / 75 = 44 * 37422 / 75 = 21759 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{}$((313339 / 3$)^2$ + 21759^2) = 106689 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4549176 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3955920 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ 3955920*10^4 / 2016 = 3091*10^6 N･mm

Bending stress of splice plates

σsp = 3091*10^6 / (4549176*10^4) ＊ 1946 = 132 N/mm^2 ＜ σa = 210 N/mm^2

(195) G3 J-1(Sec-1) LFLG

(a) Acting stress

σ tmax = 111 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

τ max = 41 N/mm^2

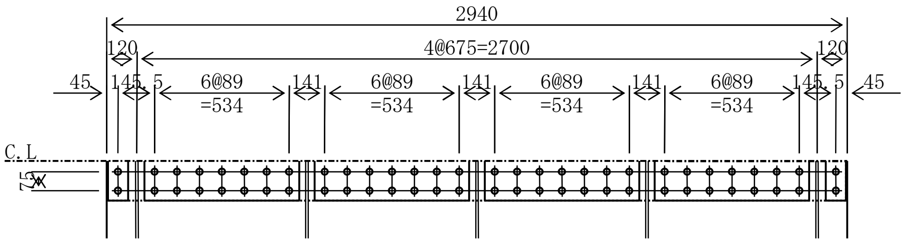
(b) Section area of main plate

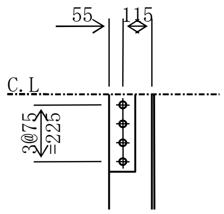
1-LFLG PL 2940 * 10 Ag = 294.0 cm^2 (SM490Y)

3-RIB PL 170 * 17 Agr = 86.7 cm^2 (SM490Y)

ΣAg = Ag + Agr = 294.0 + 86.7 = 380.7 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 10 A = 294.0

(294.0 - (30* 2.5)* 1.0) * 1.1 = 240.9 < 294.0 ∴An = 240.9 cm^2

3-RIB PL 170 * 17 Ar = 86.7

(86.7 - 3*(1* 2.7)* 1.7) * 1.1 = 80.2 < 86.7 ∴Anr = 80.2 cm^2

ΣAn = An + Anr = 240.9 + 80.2 = 321.1 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 111 * 380.7 / 321.1 = 131 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 158 * 24090 / 1.1 = 3449250 N

> σ tn * An = 131 * 24090 = 3166175 N

・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 158 * 8022 / 1.1 = 1148648 N

> σ tn * Anr = 131 * 8022 = 1054380 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 240.9 / 2 = 120.5 cm^2

・Rib AnrR = Anr = 80.2 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 3449250 / 108000 = 31.9 pcs. (60 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 1148648 / 108000 = 10.6 pcs. (3 @ 4 = 12 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(h) Tensile force per one bolt

ρp = Pt / 60 = 3449250 / 60 = 57487 N

ρs = τ * Ag / 60 = 41 * 29400 / 60 = 20108 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(57487^2 + 20108^2)} = 60903 \text{ N} < \rho a = 108000 \text{ N}$

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 9	(14.4 -	2*(1*2.5)* 0.9)*1.1= 10.9<	14.4	∴ 10.9
4-SPL PL	614 * 9	(221.0 -	4*(7*2.5)* 0.9)*1.1= 173.8<	221.0	∴173.8
		235.4			184.7 > AnR
1-SPL PL	2930 * 9	(263.7 -	(30*2.5)* 0.9)*1.1= 215.8<	263.7	∴215.8 > AnR
6-SPL PL	100 * 17	(102.0 -	6*(1*2.7)* 1.7)*1.1= 81.9<	102.0	∴ 81.9 >AnrR

(196) G3 J-2(Sec-2) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -68 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

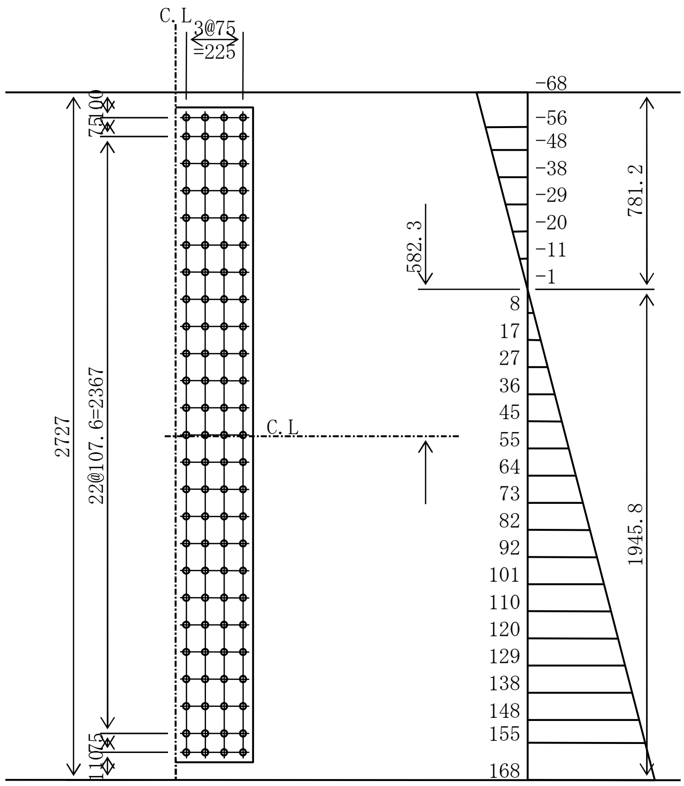
σL = 168 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 68 N/mm^2

σLn = 168 N/mm^2

τ = 30 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (155 + 168) / 2 = 334061 N

Required bolt number (Bolt number to be used)

N1 = 334061 / (108000 * 1.00) = 3.1 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 30 * 38178 / 100 = 11528 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((334061 / 4)^2 + 11528^2)}$ = 84307 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4185225 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3660456 cm^4

Bending moment to be shared by the web

Mw = 168 ＊ $3660456*10^4$ / 1946 = $3163*10^6$ N･mm

Bending stress of splice plates

σsp = $3163*10^6$ / ($4185225*10^4$) ＊ 1876 = 142 N/mm^2 ＜ σa = 210 N/mm^2

(197) G3 J-2(Sec-2) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2673 * 14   A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU =   -63 N/mm^2 < σa * 0.75 =   210 * 0.75 =   158 N/mm^2

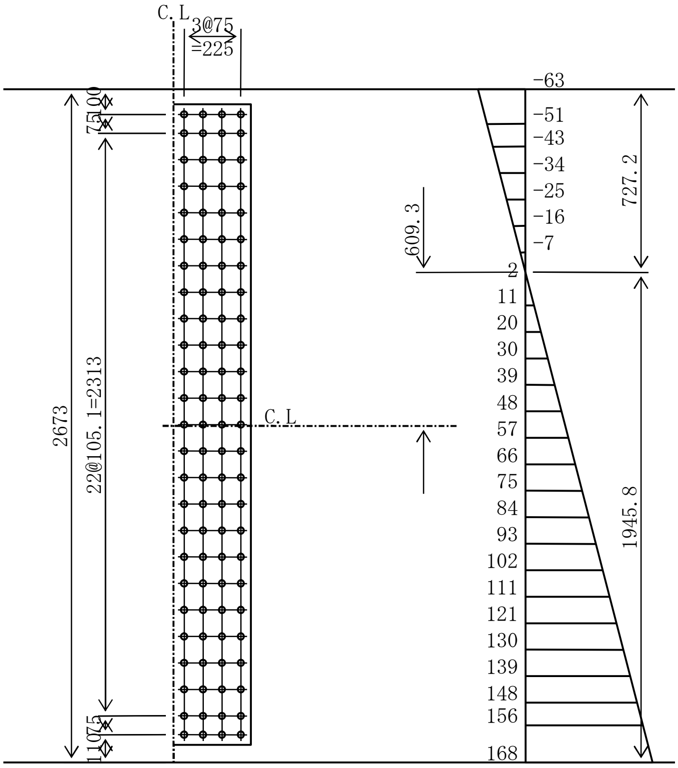
σL =   168 N/mm^2 > σa * 0.75 =   210 * 0.75 =   158 N/mm^2

σUn =   63 N/mm^2

σLn =   168 N/mm^2

τ =   32 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 =   148 * 14 * (156 + 168) / 2 = 334514 N

Required bolt number (Bolt number to be used)

N1 = 334514 / (108000 * 1.00) = 3.1 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 =   32 *   37422 / 100 =   12011 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((334514 / 4)^2 + 12011^2)}$ =   84487 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4138351 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3617428 cm^4

Bending moment to be shared by the web

Mw = 168 ＊ 3617428*10^4 / 1946 = 3130*10^6 N･mm

Bending stress of splice plates

σsp = 3130*10^6 / (4138351*10^4) ＊ 1876 = 142 N/mm^2 ＜ σa = 210 N/mm^2

(198) G3 J-2(Sec-2) LFLG

(a) Acting stress

σ tmax = 170 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

τ max = 25 N/mm^2

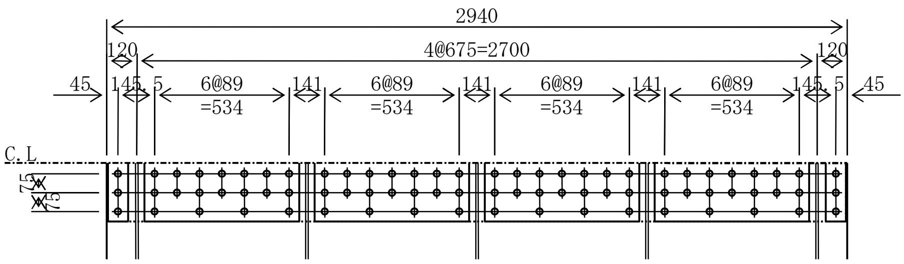
(b) Section area of main plate

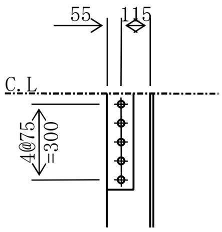
1-LFLG PL 2940 * 13 Ag = 382.2 cm^2 (SM490Y)

3-RIB PL 170 * 17 Agr = 86.7 cm^2 (SM490Y)

ΣAg = Ag + Agr = 382.2 + 86.7 = 468.9 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 13 A = 382.2

(382.2 - (18* 2.5)* 1.3) * 1.1 = 356.1 < 382.2 ∴An = 356.1 cm^2

3-RIB PL 170 * 17 Ar = 86.7

(86.7 - 3*(1* 2.7)* 1.7) * 1.1 = 80.2 < 86.7 ∴Anr = 80.2 cm^2

ΣAn = An + Anr = 356.1 + 80.2 = 436.3 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 170 * 468.9 / 436.3 = 182 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 182 * 35607 = 6486794 N

> 0.75 σ ta * An / 1.1 = 158 * 35607 / 1.1 = 5098275 N

・Rib Ptr = σ tn * Anr = 182 * 8022 = 1461483 N

> 0.75 σ ta * Anr/ 1.1 = 158 * 8022 / 1.1 = 1148648 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 356.1 / 2 = 178.0 cm^2

・Rib AnrR = Anr = 80.2 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 6486794 / 108000 = 60.1 pcs. (78 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 1461483 / 108000 = 13.5 pcs. (3 @ 5 = 15 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,5 unites)

(h) Tensile force per one bolt

$\rho p = Pt / 78 = 6486794 / 78 = 83164$ N

$\rho s = \tau * Ag / 78 = 25 * 38220 / 78 = 12428$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(83164^2 + 12428^2)} = 84088$ N $< \rho a = 108000$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm²)	deduction of bolt holes		Ans(cm²)
2-SPL PL	80 * 9	(14.4 -	2*(1*2.5)* 0.9)*1.1= 10.9<	14.4	∴ 10.9
4-SPL PL	614 * 9	(221.0 -	4*(7*2.5)* 0.9)*1.1= 173.8<	221.0	∴173.8
		235.4			184.7 > AnR
1-SPL PL	2930 * 9	(263.7 -	(30*2.5)* 0.9)*1.1= 215.8<	263.7	∴215.8 > AnR
6-SPL PL	100 * 17	(102.0 -	6*(1*2.7)* 1.7)*1.1= 81.9<	102.0	∴ 81.9 >AnrR

(199) G3 J-3(Sec-3) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -82 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

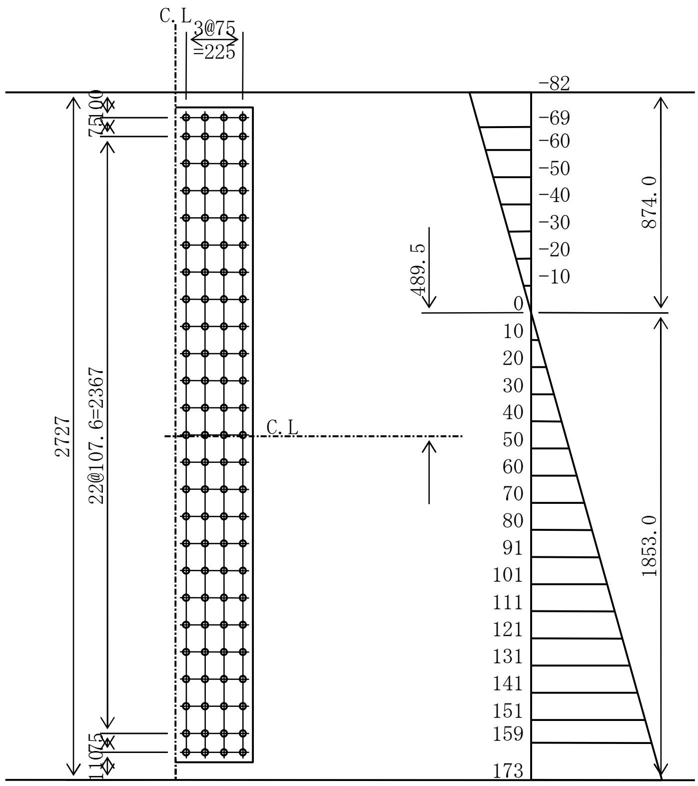
σL = 173 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 82 N/mm^2

σLn = 173 N/mm^2

τ = 18 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (159 + 173) / 2 = 343437 N

Required bolt number (Bolt number to be used)

N1 = 343437 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 18 * 38178 / 100 = 6881 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((343437 / 4)^2 + 6881^2)}$ = 86135 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9   As =   467.5 cm^2 (SM490Y)

Moment of inertia of splice plates   Is =   3724737 cm^4 ＞ Iw

Moment of inertia of web plate   Iw =   3280828 cm^4

Bending moment to be shared by the web

$Mw = 173 * 3280828*10^4 / 1853 = 3067*10^6$ N･mm

Bending stress of splice plates

$\sigma sp = 3067*10^6 / (3724737*10^4) * 1783 = 147$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(200) G3 J-3(Sec-3) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -77 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

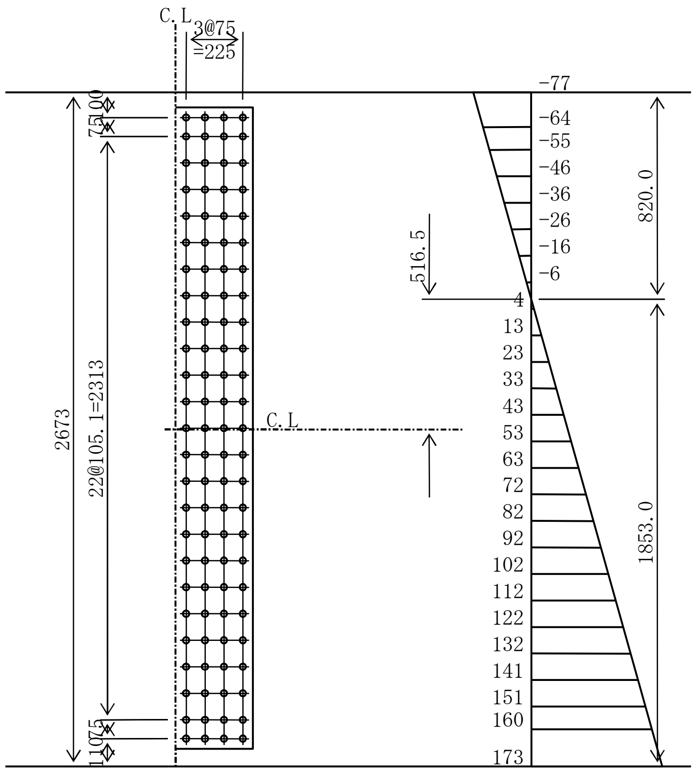
σL = 173 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 77 N/mm^2

σLn = 173 N/mm^2

τ = 19 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (160 + 173) / 2 = 343903 N

Required bolt number (Bolt number to be used)

N1 = 343903 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 19 * 37422 / 100 = 7129 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((343903 / 4)^2 + 7129^2)}$ = 86271 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 * 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3664532 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3226591 cm^4

Bending moment to be shared by the web

Mw = 173 * 3226591*10^4 / 1853 = 3020*10^6 N・mm

Bending stress of splice plates

σsp = 3020*10^6 / (3664532*10^4) * 1783 = 147 N/mm^2 ＜ σa = 210 N/mm^2

(201) G3 J-3(Sec-3) LFLG

(a) Acting stress

$\sigma tmax$ = 175 N/mm^2 0.75σta = 0.75 * 210 = 158 N/mm^2

τmax = 12 N/mm^2

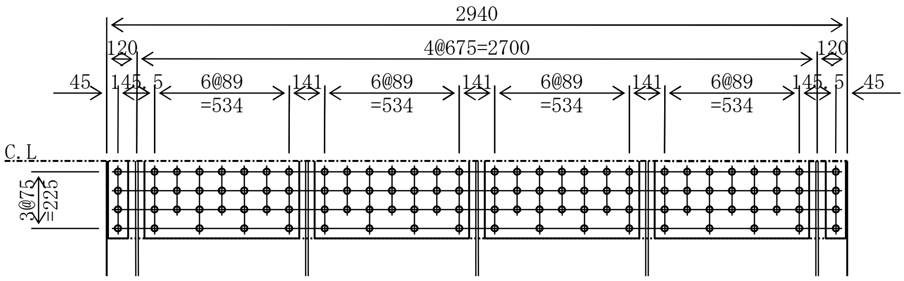
(b) Section area of main plate

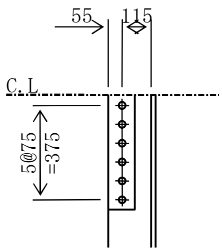
1-LFLG PL 2940 * 18 Ag = 529.2 cm^2 (SM490Y)

3-RIB PL 170 * 17 Agr = 86.7 cm^2 (SM490Y)

ΣAg = Ag + Agr = 529.2 + 86.7 = 615.9 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 18 A = 529.2

(529.2 - (18* 2.5)* 1.8) * 1.1 = 493.0 < 529.2 ∴An = 493.0 cm^2

3-RIB PL 170 * 17 Ar = 86.7

(86.7 - 3*(1* 2.7)* 1.7) * 1.1 = 80.2 < 86.7 ∴Anr = 80.2 cm^2

ΣAn = An + Anr = 493.0 + 80.2 = 573.2 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 175 * 615.9 / 573.2 = 188 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 188 * 49302 = 9277135 N

> 0.75σta * An / 1.1 = 158 * 49302 / 1.1 = 7059150 N

・Rib Ptr = σtn * Anr = 188 * 8022 = 1509553 N

> 0.75σta * Anr/ 1.1 = 158 * 8022 / 1.1 = 1148648 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 493.0 / 2 = 246.5 cm^2

・Rib AnrR = Anr = 80.2 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 9277135 / 108000 = 85.9 pcs. (108 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 1509553 / 108000 = 14.0 pcs. (3 @ 6 = 18 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,6 unites)

(h) Tensile force per one bolt

$\rho p = Pt / 108 = 9277135 / 108 = 85899$ N

$\rho s = \tau * Ag / 108 = 12 * 52920 / 108 = 5703$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(85899^2 + 5703^2)} = 86089 \text{ N} < \rho a = 108000$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm²)	deduction of bolt holes		Ans(cm²)
2-SPL PL	80 * 13	(20.8 -	2*(1*2.5)* 1.3)*1.1= 15.7<	20.8	∴ 15.7
4-SPL PL	614 * 13	(319.3 -	4*(7*2.5)* 1.3)*1.1= 251.1<	319.3	∴251.1
		340.1			266.8 > AnR
1-SPL PL	2930 * 11	(322.3 -	(30*2.5)* 1.1)*1.1= 263.8<	322.3	∴263.8 > AnR
6-SPL PL	100 * 17	(102.0 -	6*(1*2.7)* 1.7)*1.1= 81.9<	102.0	∴ 81.9 >AnrR

(202) G3 J-4(Sec-5) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -86 N/mm^2 ＜ σa * 0.75 = 210 * 0.75 = 158 N/mm^2

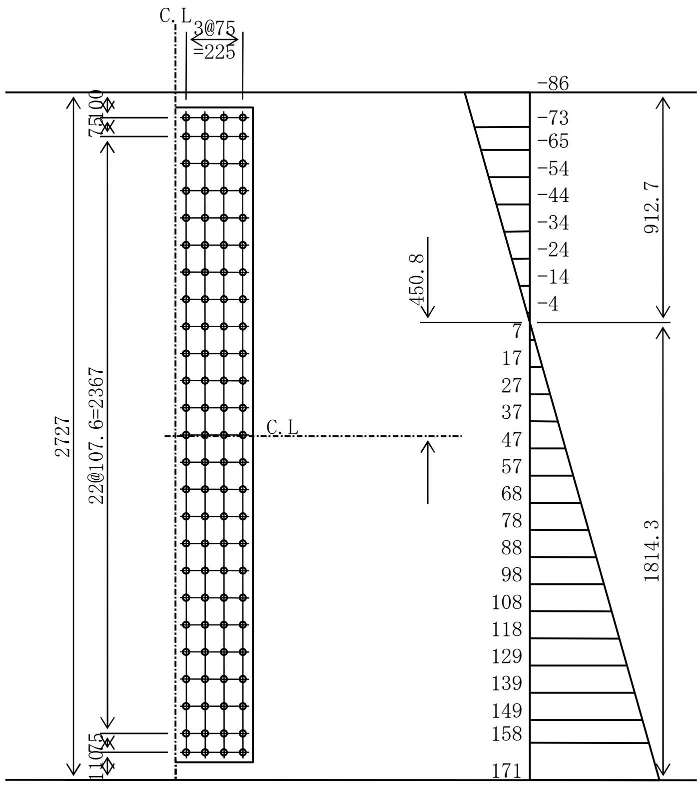
σL = 171 N/mm^2 ＞ σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 86 N/mm^2

σLn = 171 N/mm^2

τ = 9 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (158 + 171) / 2 = 339734 N

Required bolt number (Bolt number to be used)

N1 = 339734 / (108000 * 1.00) = 3.1 pcs. (4 bolts will be used.)

Check of shear force

$\rho s = \tau$ * A / 100 = 9 * 38178 / 100 = 3329 N ＜ ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{(339734 / 4)^2 + 3329^2}$ = 84999 N ＜ ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 　As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates 　Is = 3556365 cm^4 ＞ Iw

Moment of inertia of web plate 　Iw = 3141838 cm^4

Bending moment to be shared by the web

$Mw = 171 * 3141838*10^4 / 1814 = 2970*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 2970*10^6 / (3556365*10^4) * 1744 = 146$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(203) G3 J-4(Sec-5) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -81 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

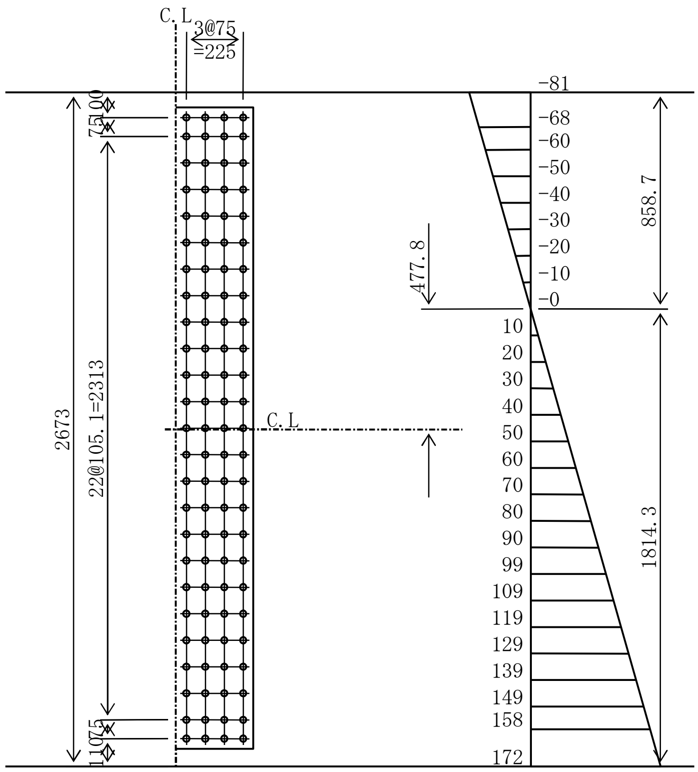
σL = 172 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 81 N/mm^2

σLn = 172 N/mm^2

τ = 9 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (158 + 172) / 2 = 340194 N

Required bolt number (Bolt number to be used)

N1 = 340194 / (108000 * 1.00) = 3.1 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 9 * 37422 / 100 = 3447 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((340194 / 4)^2 + 3447^2)}$ = 85118 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3490064 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3082508 cm^4

Bending moment to be shared by the web

Mw = 172 ＊ 3082508*10^4 / 1814 = 2918*10^6 N･mm

Bending stress of splice plates

σsp = 2918*10^6 / (3490064*10^4) ＊ 1744 = 146 N/mm^2 ＜ σa = 210 N/mm^2

(204) G3 J-4(Sec-5) LFLG

(a) Acting stress

$\sigma tmax$ = 174 N/mm^2 0.75σta = 0.75 * 210 = 158 N/mm^2

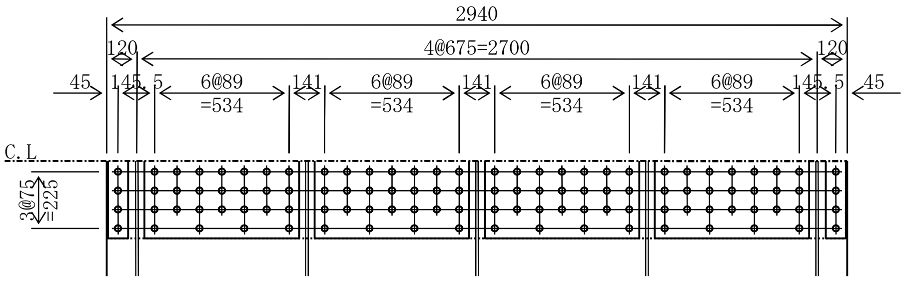
τmax = 5 N/mm^2

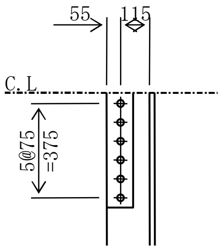
(b) Section area of main plate

1-LFLG	PL	2940 * 20	Ag =	588.0 cm^2	(SM490Y)
3-RIB	PL	170 * 17	Agr =	86.7 cm^2	(SM490Y)

ΣAg = Ag + Agr = 588.0 + 86.7 = 674.7 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 20 A = 588.0

(588.0 - (18* 2.5)* 2.0) * 1.1 = 547.8 < 588.0 ∴An = 547.8 cm^2

3-RIB PL 170 * 17 Ar = 86.7

(86.7 - 3*(1* 2.7)* 1.7) * 1.1 = 80.2 < 86.7 ∴Anr = 80.2 cm^2

ΣAn = An + Anr = 547.8 + 80.2 = 628.0 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 174 * 674.7 / 628.0 = 187 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 187 * 54780 = 10218142 N

> 0.75σta * An / 1.1 = 158 * 54780 / 1.1 = 7843500 N

・Rib Ptr = σtn * Anr = 187 * 8022 = 1496404 N

> 0.75σta * Anr/ 1.1 = 158 * 8022 / 1.1 = 1148648 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 547.8 / 2 = 273.9 cm^2

・Rib AnrR = Anr = 80.2 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 10218142 / 108000 = 94.6 pcs. (108 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 1496404 / 108000 = 13.9 pcs. (3 @ 6 = 18 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,6 unites)

(h) Tensile force per one bolt

ρp = Pt / 108 = 10218142 / 108 = 94612 N

ρs = τ * Ag / 108 = 5 * 58800 / 108 = 2784 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(94612^2 + 2784^2)} = 94653$ N < ρa = 108000 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 14	(22.4 -	2*(1*2.5)* 1.4)*1.1= 16.9<	22.4	∴ 16.9
4-SPL PL	614 * 14	(343.8 -	4*(7*2.5)* 1.4)*1.1= 270.4<	343.8	∴270.4
		366.2			287.4 > AnR
1-SPL PL	2930 * 12	(351.6 -	(30*2.5)* 1.2)*1.1= 287.8<	351.6	∴287.8 > AnR
6-SPL PL	100 * 17	(102.0 -	6*(1*2.7)* 1.7)*1.1= 81.9<	102.0	∴ 81.9 >AnrR

(205) G3 J-5(Sec-6) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -82 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

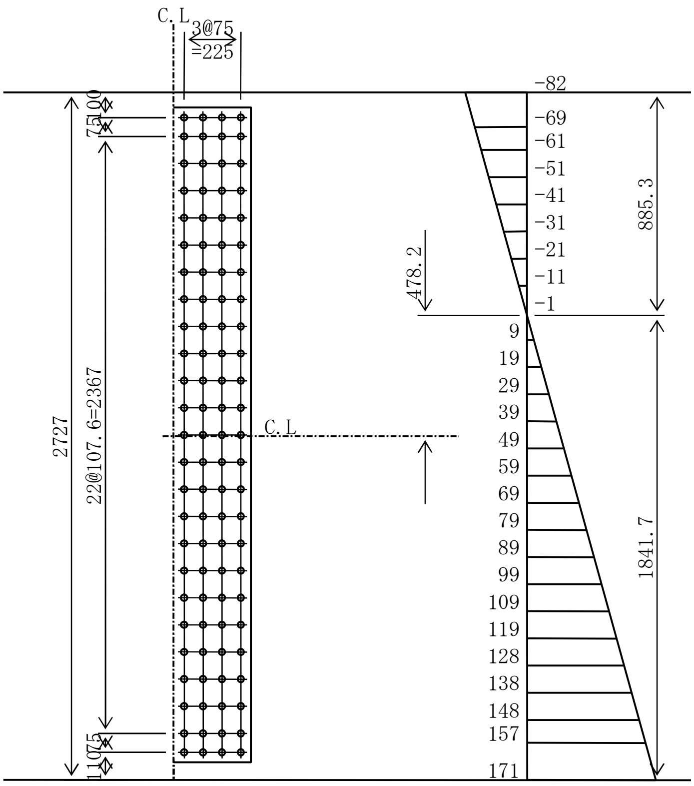
σL = 171 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 82 N/mm^2

σLn = 171 N/mm^2

τ = 19 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (157 + 171) / 2 = 338009 N

Required bolt number (Bolt number to be used)

N1 = 338009 / (108000 * 1.00) = 3.1 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 19 * 38178 / 100 = 7138 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((338009 / 4)^2 + 7138^2)}$ = 84803 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 $*$ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3673920 cm^4 $>$ Iw

Moment of inertia of web plate Iw = 3238891 cm^4

Bending moment to be shared by the web

M_w = 171 $*$ 3238891$*10^4$ / 1842 = 2999$*10^6$ N・mm

Bending stress of splice plates

σsp = 2999$*10^6$ / (3673920$*10^4$) $*$ 1772 = 145 N/mm^2 $<$ σa = 210 N/mm^2

(206) G3 J-5(Sec-6) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2673 * 14   A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -77 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

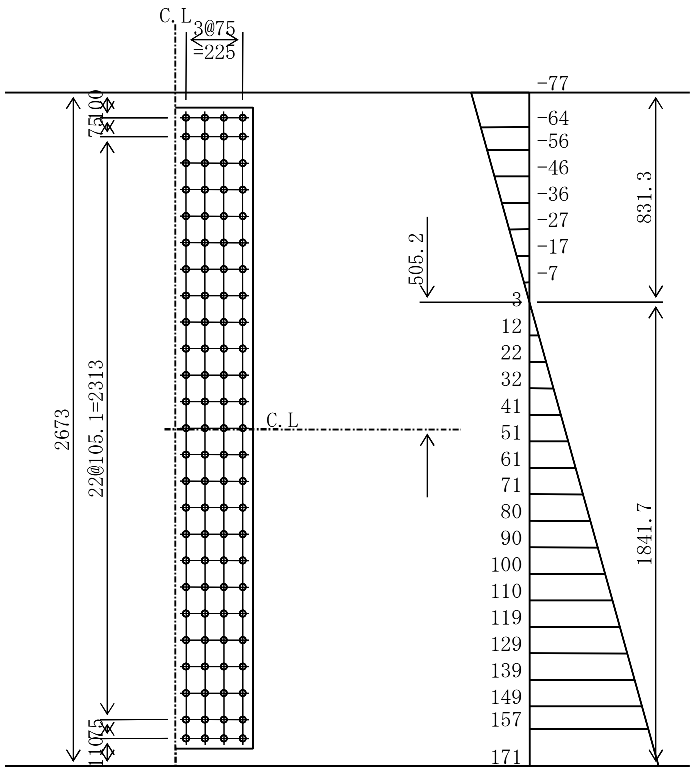
σL = 171 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 77 N/mm^2

σLn = 171 N/mm^2

τ = 20 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (157 + 171) / 2 = 338467 N

Required bolt number (Bolt number to be used)

N1 = 338467 / (108000 * 1.00) = 3.1 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 20 * 37422 / 100 = 7395 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((338467 / 4)^2 + 7395^2)}$ = 84939 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3611971 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3183195 cm^4

Bending moment to be shared by the web

Mw = 171 ＊ $3183195*10^4$ / 1842 = $2951*10^6$ N·mm

Bending stress of splice plates

σsp = $2951*10^6$ / ($3611971*10^4$) ＊ 1772 = 145 N/mm^2 ＜ σa = 210 N/mm^2

(207) G3 J-5(Sec-6) LFLG

(a) Acting stress

σtmax = 172 N/mm^2 0.75σta = 0.75 * 210 = 158 N/mm^2

τmax = 12 N/mm^2

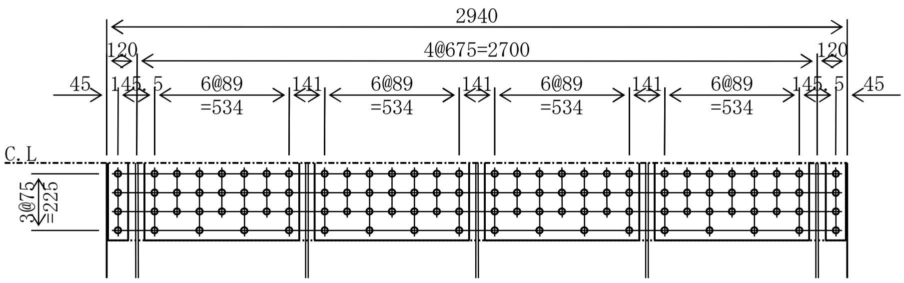
(b) Section area of main plate

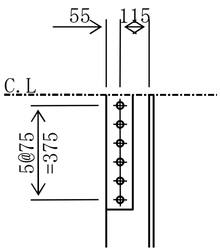
1-LFLG PL 2940 * 18 Ag = 529.2 cm^2 (SM490Y)

3-RIB PL 170 * 17 Agr = 86.7 cm^2 (SM490Y)

ΣAg = Ag + Agr = 529.2 + 86.7 = 615.9 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 18 A = 529.2

(529.2 - (18* 2.5)* 1.8) * 1.1 = 493.0 < 529.2 ∴An = 493.0 cm^2

3-RIB PL 170 * 17 Ar = 86.7

(86.7 - 3*(1* 2.7)* 1.7) * 1.1 = 80.2 < 86.7 ∴Anr = 80.2 cm^2

ΣAn = An + Anr = 493.0 + 80.2 = 573.2 cm^2

σtn = σtmax * ΣAg / ΣAn = 172 * 615.9 / 573.2 = 185 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 185 * 49302 = 9133373 N

> 0.75σta * An / 1.1 = 158 * 49302 / 1.1 = 7059150 N

・Rib Ptr = σtn * Anr = 185 * 8022 = 1486160 N

> 0.75σta * Anr/ 1.1 = 158 * 8022 / 1.1 = 1148648 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 493.0 / 2 = 246.5 cm^2

・Rib AnrR = Anr = 80.2 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 9133373 / 108000 = 84.6 pcs. (108 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 1486160 / 108000 = 13.8 pcs. (3 @ 6 = 18 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,6 unites)

(h) Tensile force per one bolt

ρp = Pt / 108 = 9133373 / 108 = 84568 N

ρs = τ * Ag / 108 = 12 * 52920 / 108 = 5689 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(84568^2 + 5689^2)}$ = 84759 N < ρa = 108000 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 13	(20.8 -	2*(1*2.5)* 1.3)*1.1= 15.7<	20.8	∴ 15.7
4-SPL PL	614 * 13	(319.3 -	4*(7*2.5)* 1.3)*1.1= 251.1<	319.3	∴251.1
		340.1			266.8 > AnR
1-SPL PL	2930 * 11	(322.3 -	(30*2.5)* 1.1)*1.1= 263.8<	322.3	∴263.8 > AnR
6-SPL PL	100 * 17	(102.0 -	6*(1*2.7)* 1.7)*1.1= 81.9<	102.0	∴ 81.9 >AnrR

(208) G3 J-6(Sec-7) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -70 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

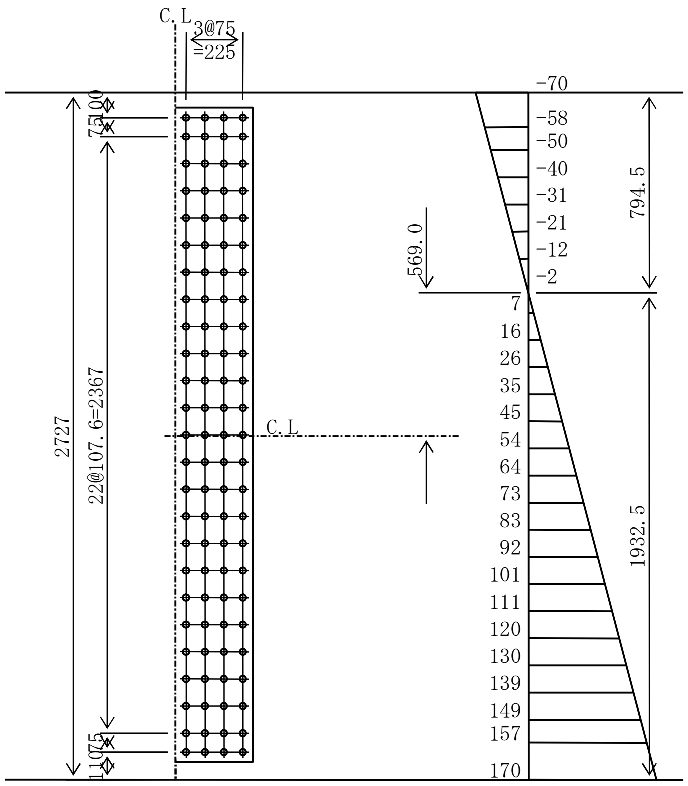
σL = 170 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 70 N/mm^2

σLn = 170 N/mm^2

τ = 30 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (157 + 170) / 2 = 336696 N

Required bolt number (Bolt number to be used)

N1 = 336696 / (108000 * 1.00) = 3.1 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 30 * 38178 / 100 = 11478 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((336696 / 4)^2 + 11478^2)}$ = 84953 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4114263 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3601992 cm^4

Bending moment to be shared by the web

Mw = 170 ＊ 3601992*10^4 / 1933 = 3160*10^6 N･mm

Bending stress of splice plates

σsp = 3160*10^6 / (4114263*10^4) ＊ 1863 = 143 N/mm^2 ＜ σa = 210 N/mm^2

(209) G3 J-6(Sec-7) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -65 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

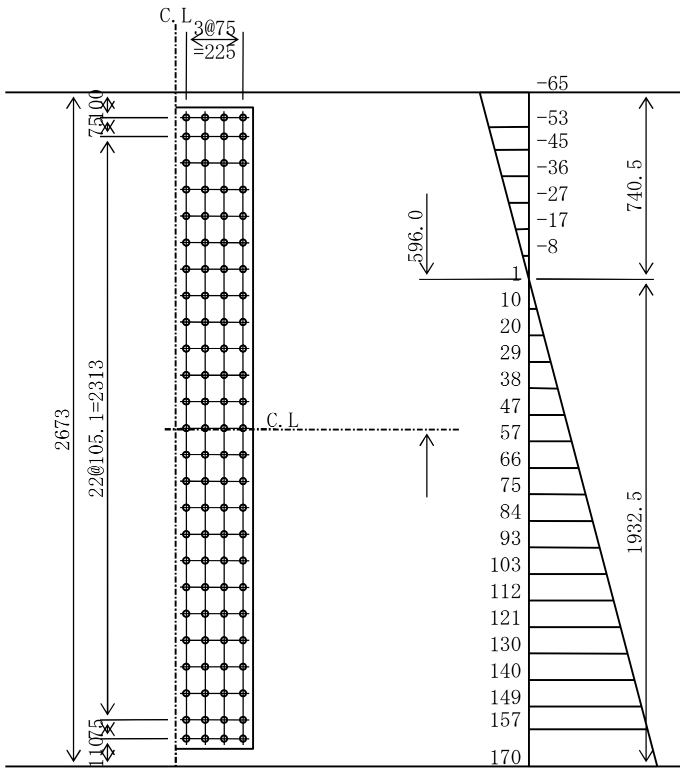
σL = 170 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 65 N/mm^2

σLn = 170 N/mm^2

τ = 31 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (157 + 170) / 2 = 337152 N

Required bolt number (Bolt number to be used)

N1 = 337152 / (108000 * 1.00) = 3.1 pcs. (4 bolts will be used.)

Check of shear force

$\rho s = \tau * A / 100$ = 31 * 37422 / 100 = 11706 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((337152 / 4)^2 + 11706^2)}$ = 85097 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 * 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4065598 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3557452 cm^4

Bending moment to be shared by the web

Mw = 170 * 3557452*10^4 / 1933 = 3125*10^6 N・mm

Bending stress of splice plates

σsp = 3125*10^6 / (4065598*10^4) * 1863 = 143 N/mm^2 ＜ σa = 210 N/mm^2

(210) G3 J-6(Sec-7) LFLG

(a) Acting stress

σ tmax = 171 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

τ max = 25 N/mm^2

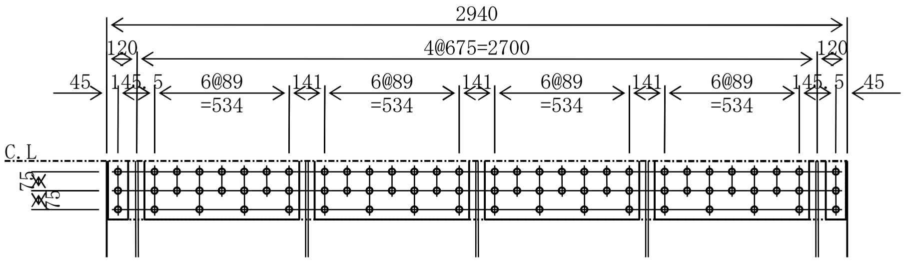
(b) Section area of main plate

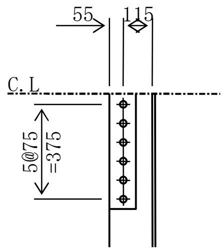
1-LFLG PL 2940 * 12 Ag = 352.8 cm^2 (SM490Y)

3-RIB PL 170 * 17 Agr = 86.7 cm^2 (SM490Y)

ΣAg = Ag + Agr = 352.8 + 86.7 = 439.5 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 12 A = 352.8

(352.8 - (18* 2.5)* 1.2) * 1.1 = 328.7 < 352.8 ∴An = 328.7 cm^2

3-RIB PL 170 * 17 Ar = 86.7

(86.7 - 3*(1* 2.7)* 1.7) * 1.1 = 80.2 < 86.7 ∴Anr = 80.2 cm^2

ΣAn = An + Anr = 328.7 + 80.2 = 408.9 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 171 * 439.5 / 408.9 = 184 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 184 * 32868 = 6034311 N

> 0.75 σ ta * An / 1.1 = 158 * 32868 / 1.1 = 4706100 N

・Rib Ptr = σ tn * Anr = 184 * 8022 = 1472832 N

> 0.75 σ ta * Anr/ 1.1 = 158 * 8022 / 1.1 = 1148648 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 328.7 / 2 = 164.3 cm^2

・Rib AnrR = Anr = 80.2 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 6034311 / 108000 = 55.9 pcs. (78 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 1472832 / 108000 = 13.6 pcs. (3 @ 6 = 18 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,6 unites)

(h) Tensile force per one bolt

$\rho p = Pt / 78 = 6034311 / 78 = 77363$ N

$\rho s = \tau * Ag / 78 = 25 * 35280 / 78 = 11454$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(77363^2 + 11454^2)} = 78206$ N $< \rho a = 108000$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 9	(14.4 -	2*(1*2.5)* 0.9)*1.1= 10.9<	14.4	∴ 10.9
4-SPL PL	614 * 9	(221.0 -	4*(7*2.5)* 0.9)*1.1= 173.8<	221.0	∴173.8
		235.4			184.7 > AnR
1-SPL PL	2930 * 9	(263.7 -	(30*2.5)* 0.9)*1.1= 215.8<	263.7	∴215.8 > AnR
6-SPL PL	100 * 17	(102.0 -	6*(1*2.7)* 1.7)*1.1= 81.9<	102.0	∴ 81.9 >AnrR

(211) G3 J-7(Sec-8) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -39 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

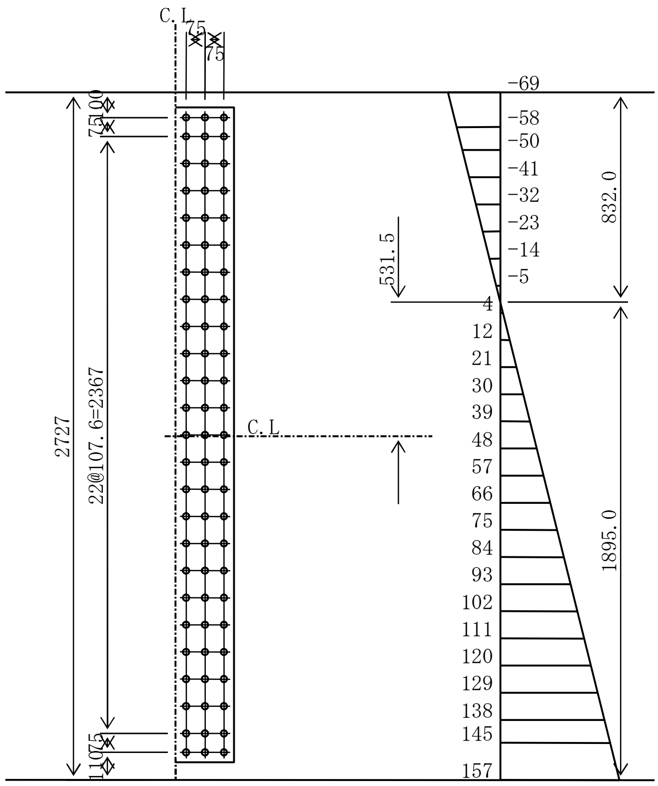
σL = 89 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 39 / 89 = 69 N/mm^2

σLn = 158 N/mm^2

τ = 40 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (145 + 157) / 2 = 312580 N

Required bolt number (Bolt number to be used)

N1 = 312580 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

ρs = τ * A / 75 = 40 * 38178 / 75 = 20394 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((312580 / 3)^2 + 20394^2)}$ = 106170 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3923243 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3444554 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ 3444554*10^4 / 1895 = 2863*10^6 N・mm

Bending stress of splice plates

σsp = 2863*10^6 / (3923243*10^4) ＊ 1825 = 133 N/mm^2 ＜ σa = 210 N/mm^2

(212) G3 J-7(Sec-8) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -37 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

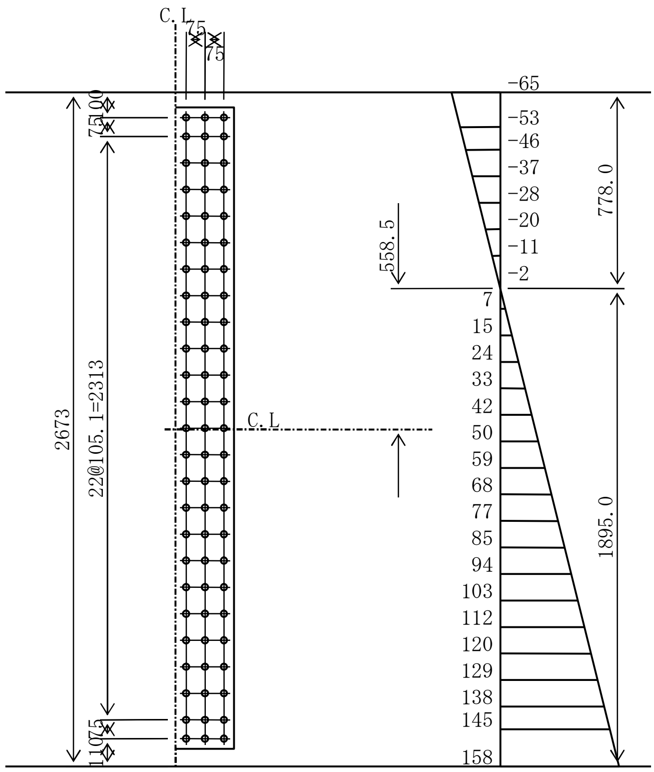
σL = 89 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 37 / 89 = 65 N/mm^2

σLn = 158 N/mm^2

τ = 42 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (145 + 158) / 2 = 312580 N

Required bolt number (Bolt number to be used)

N1 = 312580 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

ρs = τ * A / 75 = 42 * 37422 / 75 = 20737 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{}$((312580 / 3$)^2$ + 20737^2) = 106237 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9   As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates   Is = 3869273 cm^4 ＞ Iw

Moment of inertia of web plate   Iw = 3395546 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ 3395546*10^4 / 1895 = 2822*10^6 N･mm

Bending stress of splice plates

σsp = 2822*10^6 / (3869273*10^4) ＊ 1825 = 133 N/mm^2 ＜ σa = 210 N/mm^2

(213) G3 J-7(Sec-8) LFLG

(a) Acting stress

σ tmax = 90 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

τ max = 41 N/mm^2

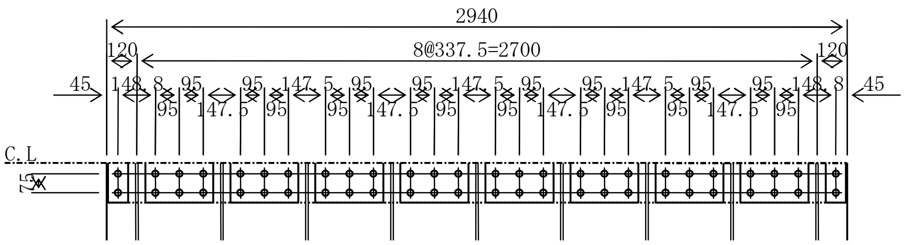
(b) Section area of main plate

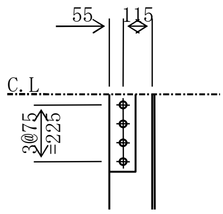
1-LFLG PL 2940 * 10   Ag = 294.0 cm^2 (SM490Y)

7-RIB PL 170 * 17   Agr = 202.3 cm^2 (SM490Y)

ΣAg = Ag + Agr = 294.0 + 202.3 = 496.3 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 10   A = 294.0

(294.0 - (26* 2.5)* 1.0) * 1.1 = 251.9 < 294.0 ∴An = 251.9 cm^2

7-RIB PL 170 * 17   Ar = 202.3

(202.3 - 7*(1* 2.7)* 1.7) * 1.1 = 187.2 < 202.3 ∴Anr = 187.2 cm^2

ΣAn = An + Anr = 251.9 + 187.2 = 439.1 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 90 * 496.3 / 439.1 = 102 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 158 * 25190 / 1.1 = 3606750 N

> σ tn * An = 102 * 25190 = 2559656 N

・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 158 * 18719 / 1.1 = 2680178 N

> σ tn * Anr = 102 * 18719 = 1902081 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 251.9 / 2 = 126.0 cm^2

・Rib AnrR = Anr = 187.2 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 3606750 / 108000 = 33.4 pcs. (52 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 2680178 / 108000 = 24.8 pcs. (7 @ 4 = 28 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(h) Tensile force per one bolt

ρp = Pt / 52 = 3606750 / 52 = 69361 N

ρs = τ * Ag / 52 = 41 * 29400 / 52 = 23330 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(69361^2 + 23330^2)}$ = 73179 N < ρa = 108000 N

(i) Check of splice plates

	(SM490Y)	Ags(cm²)	deduction of bolt holes		Ans(cm²)
2-SPL PL	80 * 9	(14.4 -	2*(1*2.5)* 0.9)*1.1= 10.9<	14.4	∴ 10.9
8-SPL PL	270 * 9	(194.4 -	8*(3*2.5)* 0.9)*1.1= 154.4<	194.4	∴154.4
		208.8			165.3 > AnR
1-SPL PL	2930 * 9	(263.7 -	(26*2.5)* 0.9)*1.1= 225.7<	263.7	∴225.7 > AnR
14-SPL PL	100 * 17	(238.0 -	14*(1*2.7)* 1.7)*1.1= 191.1<	238.0	∴191.1 >AnrR

(214) G3 J-8(Sec-8) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2727 ＊ 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = 26 N/mm^2 ＜ σa ＊ 0.75 = 210 ＊ 0.75 = 158 N/mm^2

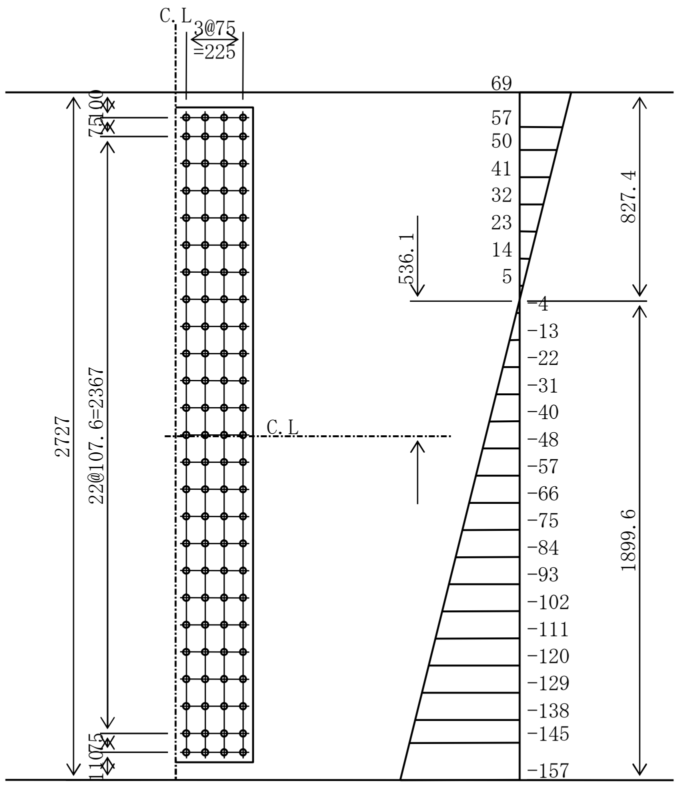
σL = -59 N/mm^2 ＜ σa ＊ 0.75 = 210 ＊ 0.75 = 158 N/mm^2

σUn = 158 ＊ 26 / 59 = 69 N/mm^2

σLn = 158 N/mm^2

τ = 49 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 ＊ 14 ＊ (145 + 157) / 2 = 312611 N

Required bolt number (Bolt number to be used)

N1 = 312611 / (108000 ＊ 1.00) = 2.9 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ ＊ A / 100 = 49 ＊ 38178 / 100 = 18857 N ＜ ρa = 108000 N

Combined stress

ρc25 = $\sqrt{((312611 / 4)^2 + 18857^2)}$ = 80395 N ＜ ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3945888 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3463222 cm^4

Bending moment to be shared by the web

$Mw = 158 * 3463222*10^4 / 1900 = 2871*10^6$ N･mm

Bending stress of splice plates

$\sigma sp = 2871*10^6 / (3945888*10^4) * 1830 = 133$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(215) G3 J-8(Sec-8) RWEB

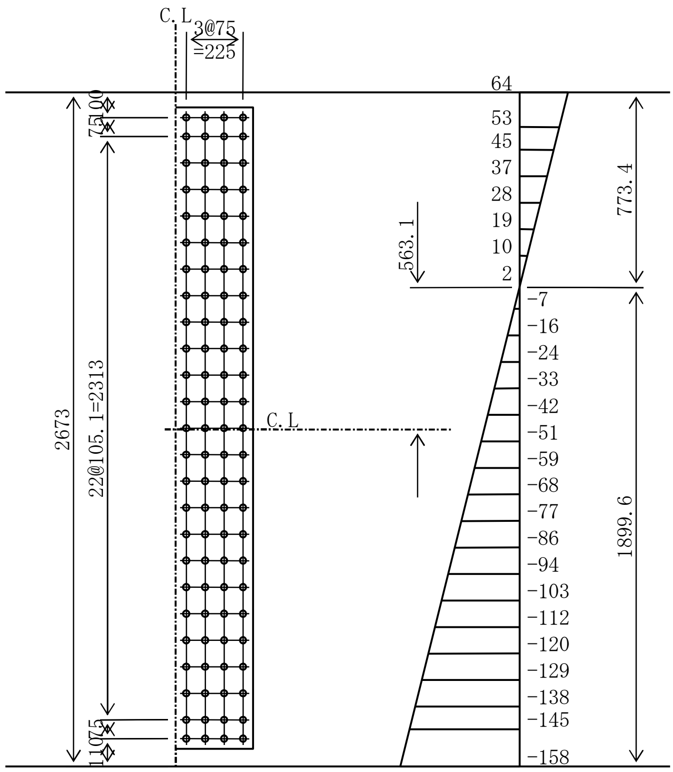
(a) Section area of main plate (Web plate)

1-RWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = 24 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = -59 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 158 * 24 / 59 = 64 N/mm^2
σLn = 158 N/mm^2
τ = 51 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (145 + 158) / 2 = 312611 N

Required bolt number (Bolt number to be used)

N1 = 312611 / (108000 * 1.00) = 2.9 pcs. (4 bolts will be used.)

Check of shear force

$\rho s = \tau * A / 100$ = 51 * 37422 / 100 = 19158 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((312611 / 4)^2 + 19158^2)}$ = 80467 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3892636 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3414818 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ $3414818*10^4$ / 1900 = $2831*10^6$ N･mm

Bending stress of splice plates

σsp = $2831*10^6$ / ($3892636*10^4$) ＊ 1830 = 133 N/mm^2 ＜ σa = 210 N/mm^2

(216) G3 J-8(Sec-8) LFLG

(a) Acting stress

$\sigma cmax$ = -60 N/mm^2 0.75σca = 0.75 * 156 = 117 N/mm^2

$\therefore \sigma c$ = 117 N/mm^2

τmax = 50 N/mm^2

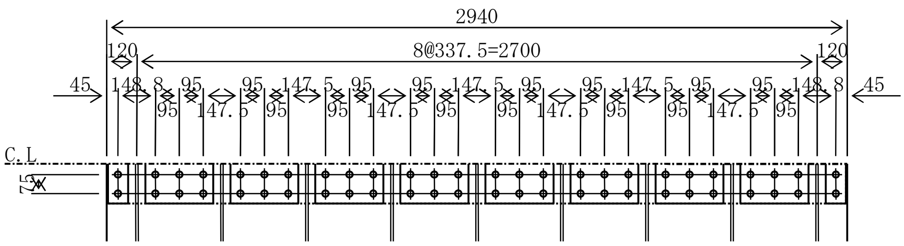
(b) Section area of main plate

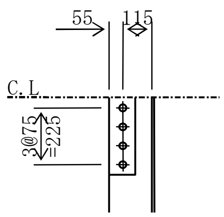
1-LFLG PL 2940 * 10 Ag = 294.0 cm^2 (SM490Y)

7-RIB PL 170 * 17 Agr = 202.3 cm^2 (SM490Y)

ΣAg = Ag + Agr = 294.0 + 202.3 = 496.3 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 117 * 29400 = 3438764 N

・Rib Pcr = σc * Agr = 117 * 20230 = 2366197 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 294.0 / 2 = 147.0 cm^2

・Rib AgrR = Agr = 202.3 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 3438764 / 108000 = 31.8 pcs. (52 bolts will be used.)

・Rib nr = Pcr / (108000 * 1.00) = 2366197 / 108000 = 21.9 pcs. (7 @ 4 = 28 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 52 = 3438764 / 52 = 66130 N

ρs = τ * Ag / 52 = 50 * 29400 / 52 = 28101 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(66130^2 + 28101^2)}$ = 71853 N < ρa = 108000 N

(h) Check of splice plates

	(SM490Y)	$Ags(cm^2)$	
2-SPL PL	80 * 9	14.4	
8-SPL PL	270 * 9	194.4	
		208.8	
			> AgR = 147.0cm^2
1-SPL PL	2930 * 9	263.7	> AgR = 147.0cm^2
14-SPL PL	100 * 17	238.0	> AgrR = 202.3cm^2

(217) G3 J-9(Sec-9) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = 72 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

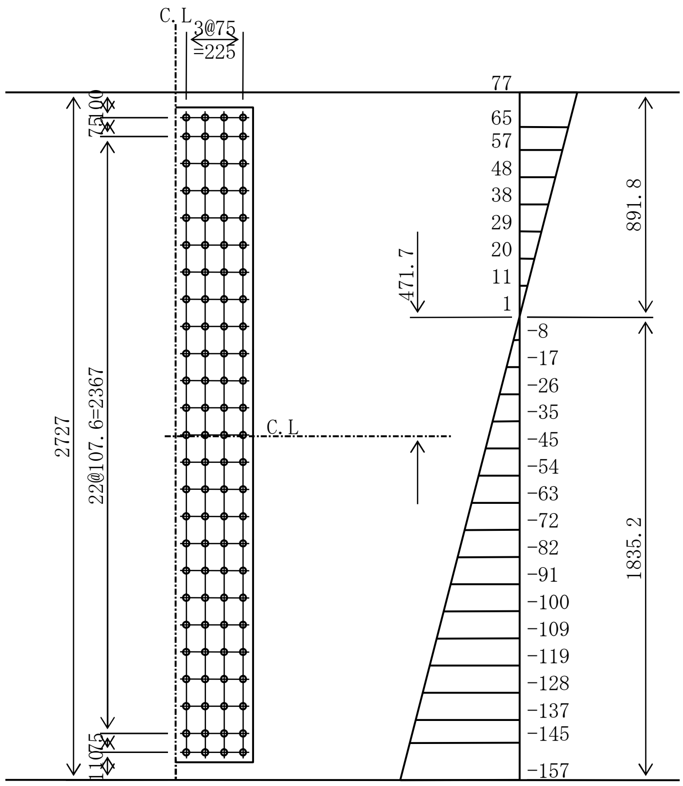
σL = -148 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 72 / 148 = 77 N/mm^2

σLn = 158 N/mm^2

τ = 54 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (145 + 157) / 2 = 312167 N

Required bolt number (Bolt number to be used)

N1 = 312167 / (108000 * 1.00) = 2.9 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 54 * 38178 / 100 = 20711 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((312167 / 4)^2 + 20711^2)}$ = 80743 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 * 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3645459 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3215399 cm^4

Bending moment to be shared by the web

$Mw = 158 * 3215399*10^4 / 1835 = 2760*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 2760*10^6 / (3645459*10^4) * 1765 = 134$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(218) G3 J-9(Sec-9) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = 68 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

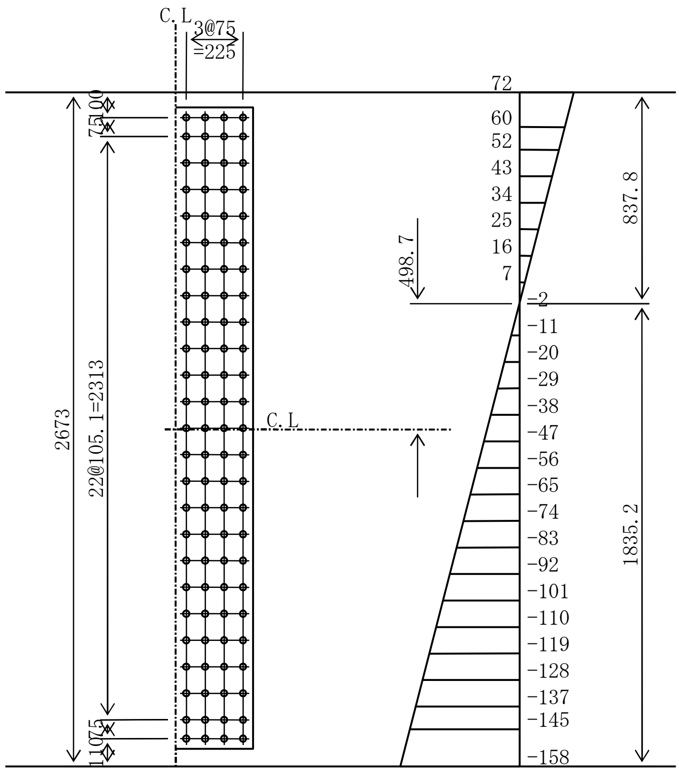
σL = -148 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 68 / 148 = 72 N/mm^2

σLn = 158 N/mm^2

τ = 56 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (145 + 158) / 2 = 312167 N

Required bolt number (Bolt number to be used)

N1 = 312167 / (108000 * 1.00) = 2.9 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 56 * 37422 / 100 = 21081 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((312167 / 4)^2 + 21081^2)}$ = 80839 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 * 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3582485 cm^4 > Iw

Moment of inertia of web plate Iw = 3158847 cm^4

Bending moment to be shared by the web

$Mw = 158 * 3158847*10^4 / 1835 = 2711*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 2711*10^6 / (3582485*10^4) * 1765 = 134$ N/mm^2 < $\sigma a = 210$ N/mm^2

(219) G3 J-9(Sec-9) LFLG

(a) Acting stress

σcmax = -149 N/mm^2 0.75σca = 0.75 * 182 = 136 N/mm^2

$\therefore \sigma$c = 149 N/mm^2

τmax = 46 N/mm^2

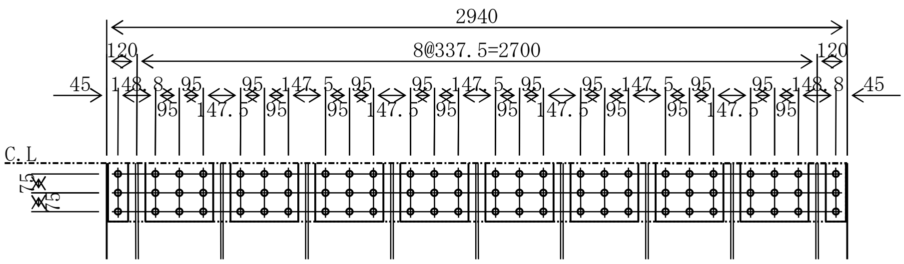
(b) Section area of main plate

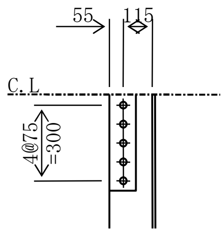
1-LFLG PL 2940 * 12 Ag = 352.8 cm^2 (SM490Y)

7-RIB PL 170 * 17 Agr = 202.3 cm^2 (SM490Y)

ΣAg = Ag + Agr = 352.8 + 202.3 = 555.1 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 149 * 35280 = 5258519 N

・Rib Pcr = σc * Agr = 149 * 20230 = 3015302 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 352.8 / 2 = 176.4 cm^2

・Rib AgrR = Agr = 202.3 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5258519 / 108000 = 48.7 pcs. (78 bolts will be used.)

・Rib nr = Pcr / (108000 * 1.00) = 3015302 / 108000 = 27.9 pcs. (7 @ 5 = 35 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,5 unites)

(g) Tensile force per one bolt

ρp = Pc / 78 = 5258519 / 78 = 67417 N

ρs = τ * Ag / 78 = 46 * 35280 / 78 = 20862 N

ρ = $\sqrt{}$ (ρp^2 + ρs^2) = $\sqrt{}$ (67417^2 + 20862^2) = 70571 N < ρa = 108000 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)
2-SPL PL	80 * 9	14.4
8-SPL PL	270 * 9	194.4
		208.8

> AgR = 176.4cm^2

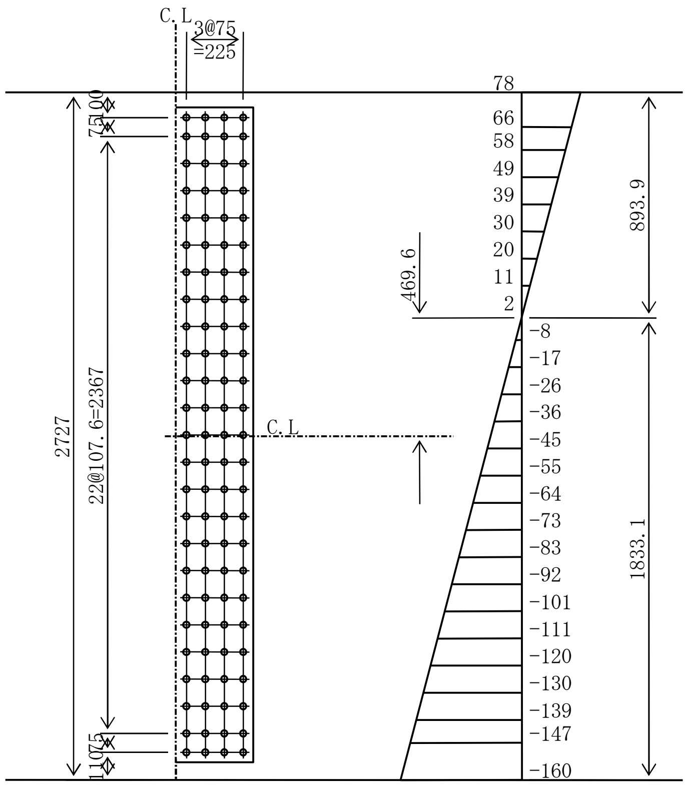
1-SPL PL	2930 * 9	263.7	> AgR = 176.4cm^2
14-SPL PL	100 * 15	210.0	> AgrR = 202.3cm^2

(220) G3 J-10(Sec-11) LWEB

(a) Section area of main plate (Web plate)
1-LWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress
σU = 78 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = -160 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 78 N/mm^2
σLn = 160 N/mm^2
τ = 43 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress
Check of bolt at 25th row
Sharing width: b1 = 14.8 cm
Total force to be shared
P1 = 148 * 14 * (147 + 160) / 2 = 316816 N
Required bolt number (Bolt number to be used)
N1 = 316816 / (108000 * 1.00) = 2.9 pcs. (4 bolts will be used.)

Check of shear force
ρs = τ * A / 100 = 43 * 38178 / 100 = 16337 N < ρa = 108000 N
Combined stress
$\rho c25$ = $\sqrt{((316816 / 4)^2 + 16337^2)}$ = 80871 N < ρa = 108000 N
(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3636122 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3207692 cm^4

Bending moment to be shared by the web

Mw = 160 ＊ $3207692 * 10^4$ / 1833 = $2797 * 10^6$ N･mm

Bending stress of splice plates

σsp = $2797 * 10^6$ / ($3636122 * 10^4$) ＊ 1763 = 136 N/mm^2 ＜ σa = 210 N/mm^2

(221) G3 J-10(Sec-11) RWEB

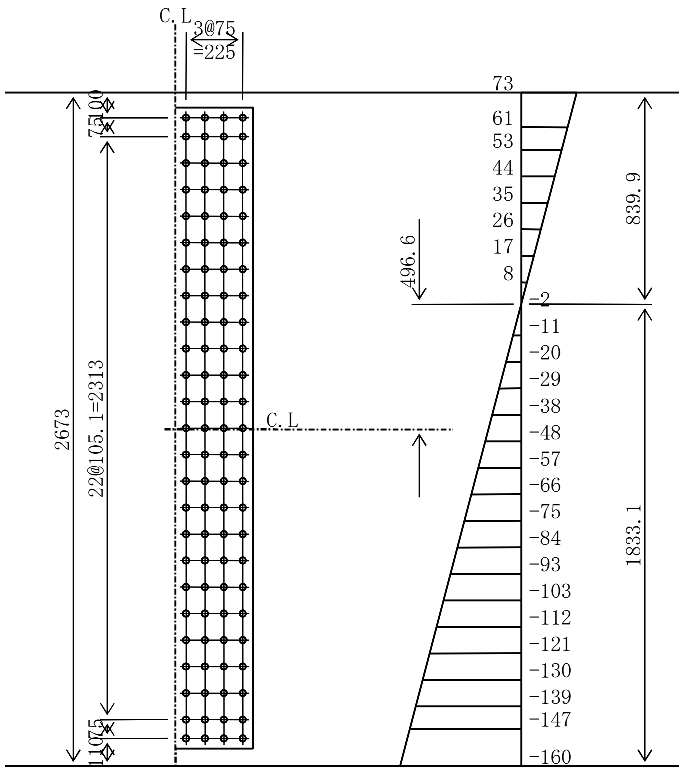
(a) Section area of main plate (Web plate)

1-RWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = 73 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = -160 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 73 N/mm^2
σLn = 160 N/mm^2
τ = 44 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (147 + 160) / 2 = 317246 N

Required bolt number (Bolt number to be used)

N1 = 317246 / (108000 * 1.00) = 2.9 pcs. (4 bolts will be used.)

Check of shear force

$\rho s = \tau * A / 100$ = 44 * 37422 / 100 = 16582 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((317246 / 4)^2 + 16582^2)}$ = 81026 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3572817 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3150863 cm^4

Bending moment to be shared by the web

Mw = 160 ＊ 3150863*10^4 / 1833 = 2751*10^6 N･mm

Bending stress of splice plates

σsp = 2751*10^6 / (3572817*10^4) ＊ 1763 = 136 N/mm^2 ＜ σa = 210 N/mm^2

(222) G3 J-10(Sec-11) LFLG

(a) Acting stress

$\sigma cmax$ = -161 N/mm^2 0.75σca = 0.75 * 182 = 136 N/mm^2

$\therefore \sigma c$ = 161 N/mm^2

τmax = 37 N/mm^2

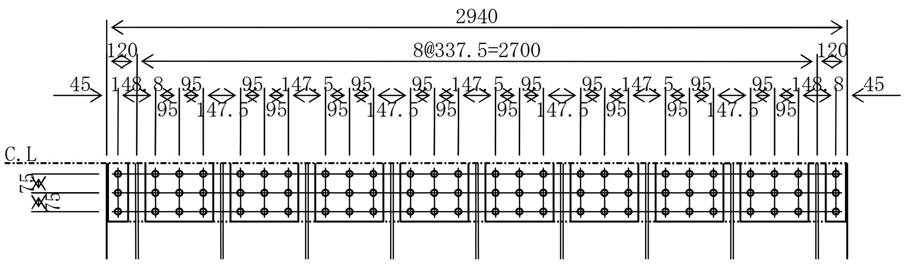
(b) Section area of main plate

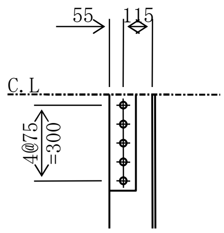
1-LFLG PL 2940 * 12   Ag = 352.8 cm^2 (SM490Y)

7-RIB PL 170 * 17   Agr = 202.3 cm^2 (SM490Y)

ΣAg = Ag + Agr = 352.8 + 202.3 = 555.1 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 161 * 35280 = 5684561 N

・Rib Pcr = σc * Agr = 161 * 20230 = 3259599 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 352.8 / 2 = 176.4 cm^2

・Rib AgrR = Agr = 202.3 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5684561 / 108000 = 52.6 pcs. (78 bolts will be used.)

・Rib nr = Pcr / (108000 * 1.00) = 3259599 / 108000 = 30.2 pcs. (7 @ 5 = 35 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,5 unites)

(g) Tensile force per one bolt

ρp = Pc / 78 = 5684561 / 78 = 72879 N

ρs = τ * Ag / 78 = 37 * 35280 / 78 = 16648 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(72879^2 + 16648^2)}$ = 74756 N < ρa = 108000 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
2-SPL PL	80 * 9	14.4	
8-SPL PL	270 * 9	194.4	
		208.8	
			> AgR = 176.4cm^2
1-SPL PL	2930 * 9	263.7	> AgR = 176.4cm^2
14-SPL PL	100 * 15	210.0	> AgrR = 202.3cm^2

(223) G3 J-11(Sec-12) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = 46 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

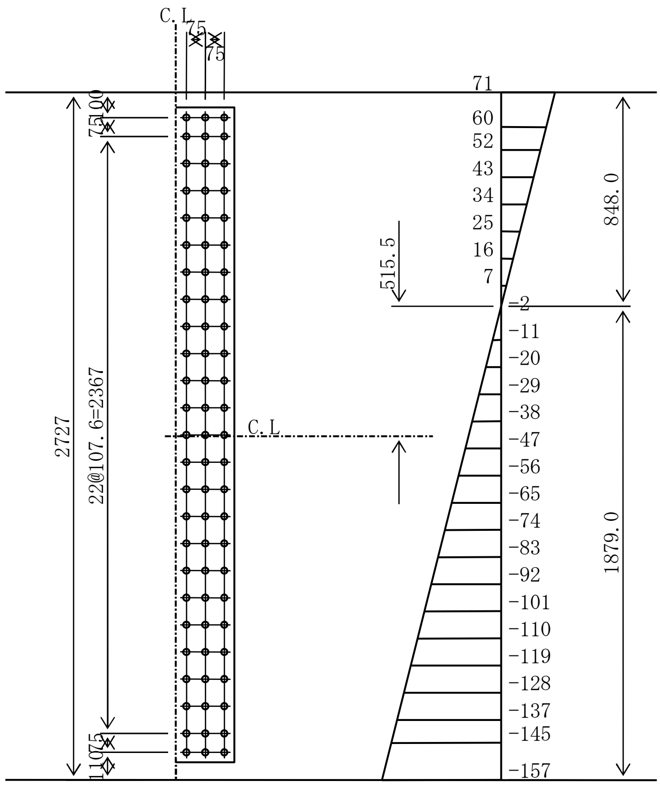
σL = -102 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 46 / 102 = 71 N/mm^2

σLn = 158 N/mm^2

τ = 38 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (145 + 157) / 2 = 312472 N

Required bolt number (Bolt number to be used)

N1 = 312472 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

ρs = τ * A / 75 = 38 * 38178 / 75 = 19184 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((312472 / 3)^2 + 19184^2)}$ = 105909 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2597 * 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3845361 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3380333 cm^4

Bending moment to be shared by the web

$Mw = 158 * 3380333*10^4 / 1879 = 2833*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 2833*10^6 / (3845361*10^4) * 1809 = 133$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(224) G3 J-11(Sec-12) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = 43 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

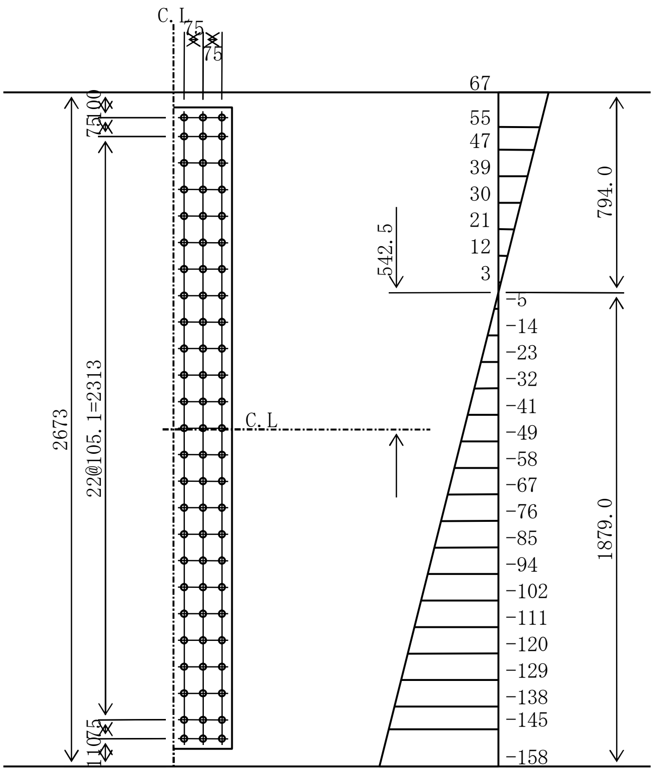
σL = -102 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 43 / 102 = 67 N/mm^2

σLn = 158 N/mm^2

τ = 39 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (145 + 158) / 2 = 312472 N

Required bolt number (Bolt number to be used)

N1 = 312472 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

ρs = τ * A / 75 = 39 * 37422 / 75 = 19382 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((312472 / 3)^2 + 19382^2)}$ = 105945 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2543 * 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3789055 cm^4 > Iw

Moment of inertia of web plate Iw = 3329363 cm^4

Bending moment to be shared by the web

$Mw = 158 * 3329363*10^4 / 1879 = 2791*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 2791*10^6 / (3789055*10^4) * 1809 = 133$ N/mm^2 < $\sigma a = 210$ N/mm^2

(225) G3 J-11(Sec-12) LFLG

(a) Acting stress

σcmax = -102 N/mm^2 0.75σca = 0.75 * 156 = 117 N/mm^2

$\therefore \sigma$c = 117 N/mm^2

τmax = 38 N/mm^2

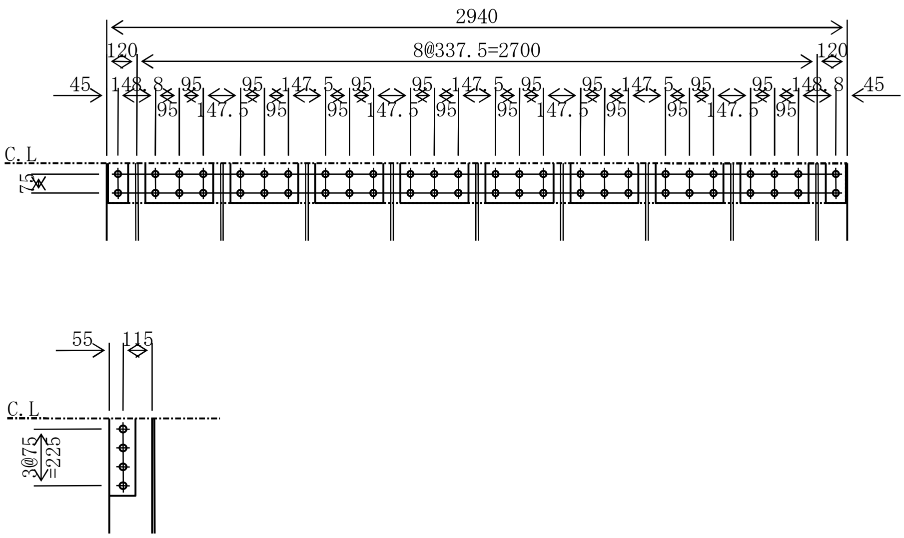
(b) Section area of main plate

1-LFLG PL 2940 * 10 Ag = 294.0 cm^2 (SM490Y)

7-RIB PL 170 * 17 Agr = 202.3 cm^2 (SM490Y)

ΣAg = Ag + Agr = 294.0 + 202.3 = 496.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 117 * 29400 = 3438764 N

・Rib Pcr = σc * Agr = 117 * 20230 = 2366197 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 294.0 / 2 = 147.0 cm^2

・Rib AgrR = Agr = 202.3 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 3438764 / 108000 = 31.8 pcs. (52 bolts will be used.)

・Rib nr = Pcr / (108000 * 1.00) = 2366197 / 108000 = 21.9 pcs. (7 @ 4 = 28 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 52 = 3438764 / 52 = 66130 N

ρs = τ * Ag / 52 = 38 * 29400 / 52 = 21497 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(66130^2 + 21497^2)}$ = 69536 N < ρa = 108000 N

(h) Check of splice plates

	(SM490Y)	$Ags(cm^2)$	
2-SPL PL	80 * 9	14.4	
8-SPL PL	270 * 9	194.4	
		208.8	> AgR = 147.0cm^2
1-SPL PL	2930 * 9	263.7	> AgR = 147.0cm^2
14-SPL PL	100 * 15	210.0	> AgrR = 202.3cm^2

(226) G3 J-12(Sec-12) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = 20 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

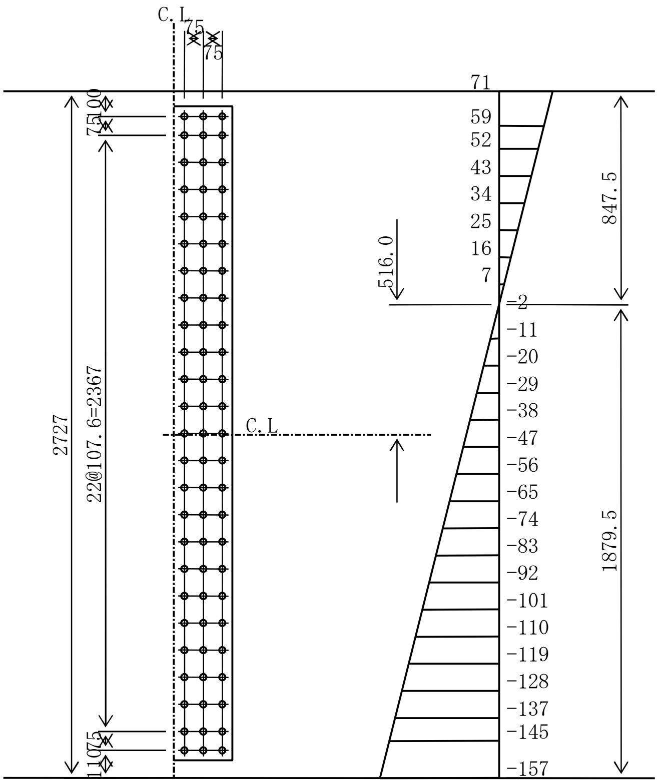
σL = -44 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 20 / 44 = 71 N/mm^2

σLn = 158 N/mm^2

τ = 29 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (145 + 157) / 2 = 312475 N

Required bolt number (Bolt number to be used)

N1 = 312475 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

ρs = τ * A / 75 = 29 * 38178 / 75 = 14575 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((312475 / 3)^2 + 14575^2)}$ = 105173 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3847892 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3382420 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ $3382420*10^4$ / 1879 = $2834*10^6$ N·mm

Bending stress of splice plates

σsp = $2834*10^6$ / ($3847892*10^4$) ＊ 1809 = 133 N/mm^2 ＜ σa = 210 N/mm^2

(227) G3 J-12(Sec-12) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = 19 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

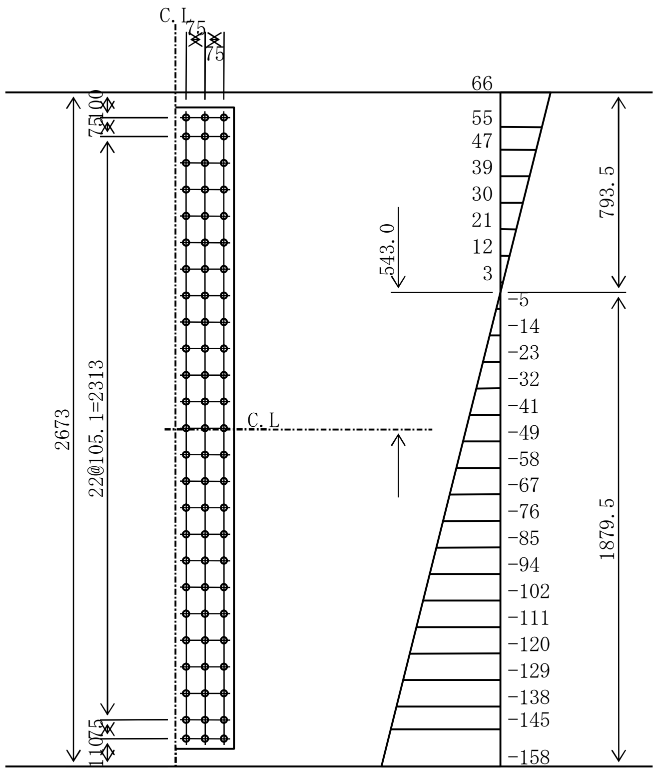
σL = -44 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 19 / 44 = 66 N/mm^2

σLn = 158 N/mm^2

τ = 29 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (145 + 158) / 2 = 312476 N

Required bolt number (Bolt number to be used)

N1 = 312476 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

ρs = τ * A / 75 = 29 * 37422 / 75 = 14675 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((312476 / 3)^2 + 14675^2)}$ = 105187 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9   As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates   Is = 3791717 cm^4 ＞ Iw

Moment of inertia of web plate   Iw = 3331560 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ 3331560×10^4 / 1880 = 2792×10^6 N·mm

Bending stress of splice plates

σsp = 2792×10^6 / (3791717×10^4) ＊ 1810 = 133 N/mm^2 ＜ σa = 210 N/mm^2

(228) G3 J-12(Sec-12) LFLG

(a) Acting stress

$\sigma tmax$ = 13 N/mm^2 0.75 σta = 0.75 * 210 = 158 N/mm^2

$\sigma cmax$ = -45 N/mm^2 0.75 σca = 0.75 * 156 = 117 N/mm^2

∴ σc = 117 N/mm^2

τmax = 30 N/mm^2

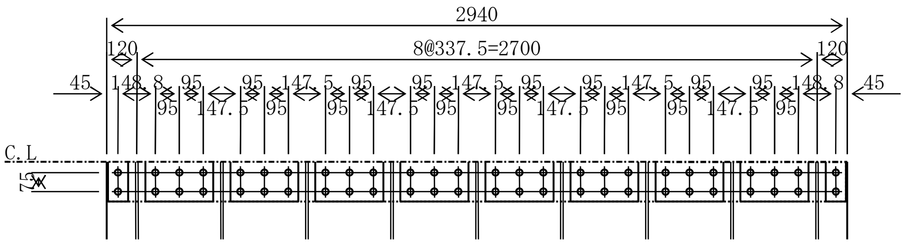
(b) Section area of main plate

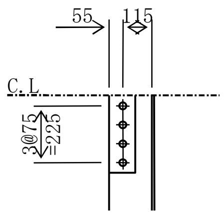
1-LFLG PL 2940 * 10 Ag = 294.0 cm^2 (SM490Y)

7-RIB PL 170 * 17 Agr = 202.3 cm^2 (SM490Y)

ΣAg = Ag + Agr = 294.0 + 202.3 = 496.3 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 10 A = 294.0

(294.0 - (26* 2.5)* 1.0) * 1.1 = 251.9 < 294.0 ∴An = 251.9 cm^2

7-RIB PL 170 * 17 Ar = 202.3

(202.3 - 7*(1* 2.7)* 1.7) * 1.1 = 187.2 < 202.3 ∴Anr = 187.2 cm^2

ΣAn = An + Anr = 251.9 + 187.2 = 439.1 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 13 * 496.3 / 439.1 = 15 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σta * An / 1.1 = 158 * 25190 / 1.1 = 3606750 N

> σtn * An = 15 * 25190 = 372189 N

Pc = σc * Ag = 117 * 29400 = 3438764 N

・Rib Ptr = 0.75 σta * Anr / 1.1 = 158 * 18719 / 1.1 = 2680178 N

> σtn * Anr = 15 * 18719 = 276574 N

Pcr = σc * Agr = 117 * 20230 = 2366197 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 251.9 / 2 = 126.0 cm^2

AgR = Ag / 2 = 294.0 / 2 = 147.0 cm^2

・Rib AnrR = Anr = 187.2 cm^2

AgrR = Agr = 202.3 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 3606750 / 108000 = 33.4 pcs. (52 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 2680178 / 108000 = 24.8 pcs. (7 @ 4 = 28 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(h) Tensile force per one bolt

$\rho p = Pt / 52 = 3606750 / 52 = 69361$ N

$\rho s = \tau * Ag / 52 = 30 * 29400 / 52 = 16821$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(69361^2 + 16821^2)} = 71371 \text{ N} < \rho a = 108000$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 9	(14.4 -	2*(1*2.5)* 0.9)*1.1= 10.9<	14.4	∴ 10.9
8-SPL PL	270 * 9	(194.4 -	8*(3*2.5)* 0.9)*1.1= 154.4<	194.4	∴154.4
		208.8			165.3
		> AgR			> AnR
1-SPL PL	2930 * 9	(263.7 -	(26*2.5)* 0.9)*1.1= 225.7<	263.7	∴225.7
		> AgR			> AnR
14-SPL PL	100 * 17	(238.0 -	14*(1*2.7)* 1.7)*1.1= 191.1<	238.0	∴191.1
		> AgrR			>AnrR

(229) G3 J-13(Sec-13) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -25 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

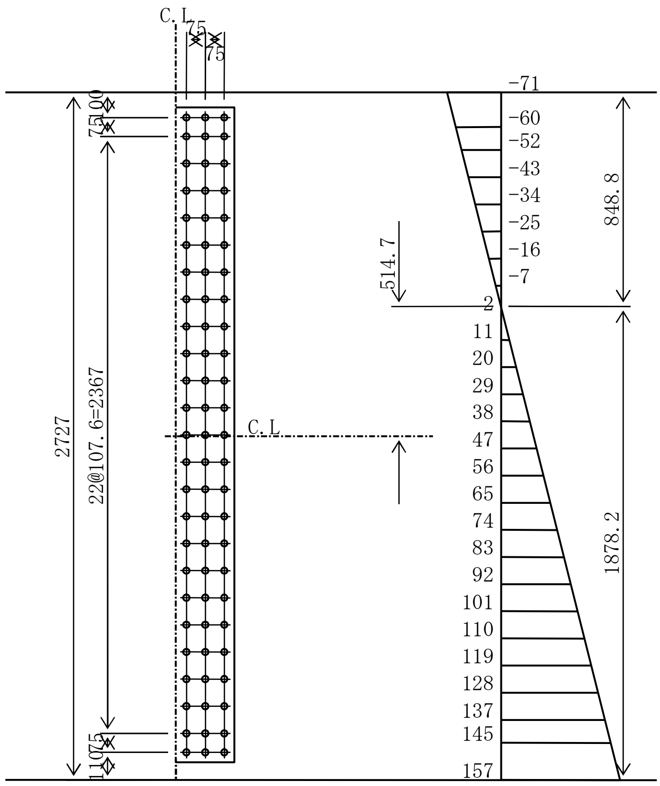
σL = 55 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 25 / 55 = 71 N/mm^2

σLn = 158 N/mm^2

τ = 20 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (145 + 157) / 2 = 312466 N

Required bolt number (Bolt number to be used)

N1 = 312466 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

ρs = τ * A / 75 = 20 * 38178 / 75 = 10049 N < ρa = 108000 N

Combined stress

ρc25 = $\sqrt{}$((312466 / 3)^2 + 10049^2) = 104639 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3841529 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3377173 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ 3377173*10^4 / 1878 = 2832*10^6 N･mm

Bending stress of splice plates

σsp = 2832*10^6 / (3841529*10^4) ＊ 1808 = 133 N/mm^2 ＜ σa = 210 N/mm^2

(230) G3 J-13(Sec-13) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -23 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

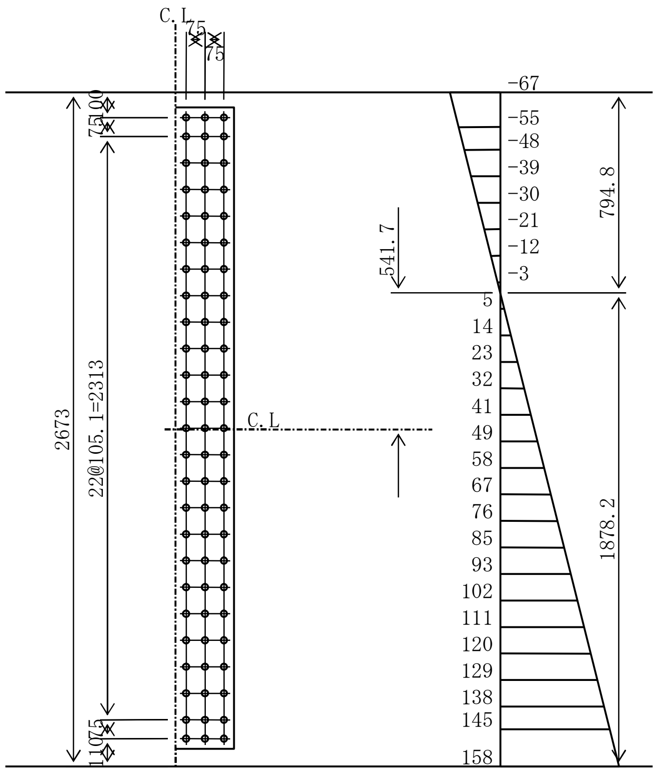
σL = 55 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 23 / 55 = 67 N/mm^2

σLn = 158 N/mm^2

τ = 20 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (145 + 158) / 2 = 312466 N

Required bolt number (Bolt number to be used)

N1 = 312466 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

ρs = τ * A / 75 = 20 * 37422 / 75 = 10089 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{}$((312466 / 3)^2 + 10089^2) = 104643 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2543 * 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3785097 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3326098 cm^4

Bending moment to be shared by the web

Mw = 158 * 3326098*10^4 / 1878 = 2789*10^6 N·mm

Bending stress of splice plates

σsp = 2789*10^6 / (3785097*10^4) * 1808 = 133 N/mm^2 ＜ σa = 210 N/mm^2

(231) G3 J-13(Sec-13) LFLG

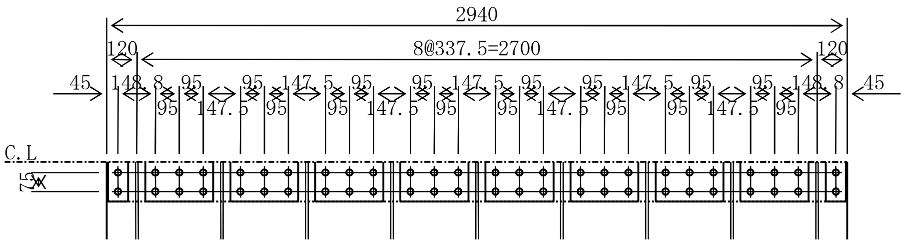
(a) Acting stress

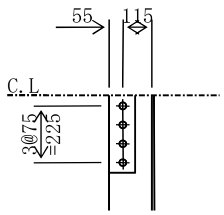
σtmax = 55 N/mm^2 0.75σta = 0.75 * 210 = 158 N/mm^2
σcmax = -17 N/mm^2 0.75σca = 0.75 * 156 = 117 N/mm^2
$\therefore\sigma$c = 117 N/mm^2
τmax = 21 N/mm^2

(b) Section area of main plate

1-LFLG PL 2940 * 10 Ag = 294.0 cm^2 (SM490Y)
7-RIB PL 170 * 17 Agr = 202.3 cm^2 (SM490Y)
ΣAg = Ag + Agr = 294.0 + 202.3 = 496.3 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 10 A = 294.0
(294.0 - (26* 2.5)* 1.0) * 1.1 = 251.9 < 294.0 $\therefore$An = 251.9 cm^2
7-RIB PL 170 * 17 Ar = 202.3
(202.3 - 7*(1* 2.7)* 1.7) * 1.1 = 187.2 < 202.3 $\therefore$Anr = 187.2 cm^2
ΣAn = An + Anr = 251.9 + 187.2 = 439.1 cm^2
σtn = σtmax * ΣAg / ΣAn = 55 * 496.3 / 439.1 = 62 N/mm^2
< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta * An / 1.1 = 158 * 25190 / 1.1 = 3606750 N
> σtn * An = 62 * 25190 = 1572893 N
Pc = σc * Ag = 117 * 29400 = 3438764 N
・Rib Ptr = 0.75σta * Anr / 1.1 = 158 * 18719 / 1.1 = 2680178 N
> σtn * Anr = 62 * 18719 = 1168817 N
Pcr = σc * Agr = 117 * 20230 = 2366197 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 251.9 / 2 = 126.0 cm^2
AgR = Ag / 2 = 294.0 / 2 = 147.0 cm^2
・Rib AnrR = Anr = 187.2 cm^2
AgrR = Agr = 202.3 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 3606750 / 108000 = 33.4 pcs. (52 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 2680178 / 108000 = 24.8 pcs. (7 @ 4 = 28 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(h) Tensile force per one bolt

ρp = Pt / 52 = 3606750 / 52 = 69361 N
ρs = τ * Ag / 52 = 21 * 29400 / 52 = 11934 N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(69361^2 + 11934^2)}$ = 70380 N < ρa = 108000 N

(i) Check of splice plates

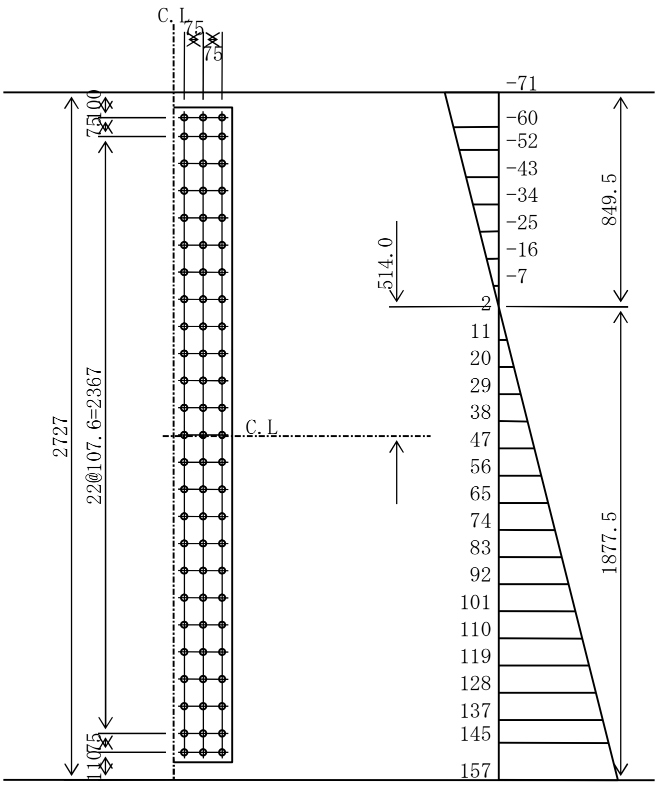
	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 9	(14.4 -	2*(1*2.5)* 0.9)*1.1= 10.9<	14.4	∴ 10.9
8-SPL PL	270 * 9	(194.4 -	8*(3*2.5)* 0.9)*1.1= 154.4<	194.4	∴154.4
		208.8 > AgR			165.3 > AnR
1-SPL PL	2930 * 9	(263.7 - > AgR	(26*2.5)* 0.9)*1.1= 225.7<	263.7	∴225.7 > AnR
14-SPL PL	100 * 17	(238.0 - > AgrR	14*(1*2.7)* 1.7)*1.1= 191.1<	238.0	∴191.1 >AnrR

(232) G3 J-14(Sec-14) LWEB

(a) Section area of main plate (Web plate)
1-LWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress
σU = -30 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = 66 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 158 * 30 / 66 = 71 N/mm^2
σLn = 158 N/mm^2
τ = 11 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress
Check of bolt at 25th row
Sharing width: b1 = 14.8 cm
Total force to be shared
P1 = 148 * 14 * (145 + 157) / 2 = 312462 N
Required bolt number (Bolt number to be used)
N1 = 312462 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force
ρs = τ * A / 75 = 11 * 38178 / 75 = 5743 N < ρa = 108000 N
Combined stress
$\rho c25$ = $\sqrt{((312462 / 3)^2 + 5743^2)}$ = 104312 N < ρa = 108000 N
(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3838239 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3374459 cm^4

Bending moment to be shared by the web

$Mw = 158 * 3374459*10^4 / 1877 = 2831*10^6$ N･mm

Bending stress of splice plates

$\sigma sp = 2831*10^6 / (3838239*10^4) * 1807 = 133$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(233) G3 J-14(Sec-14) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -28 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

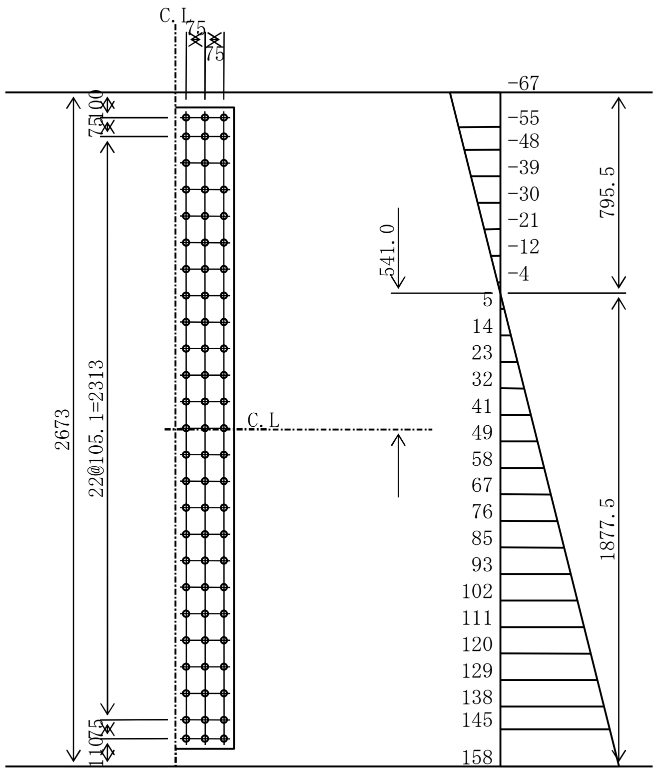
σL = 66 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 28 / 66 = 67 N/mm^2

σLn = 158 N/mm^2

τ = 12 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (145 + 158) / 2 = 312462 N

Required bolt number (Bolt number to be used)

N1 = 312462 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

$\rho s = \tau * A / 75$ = 12 * 37422 / 75 = 5755 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((312462 / 3)^2 + 5755^2)}$ = 104313 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2543 * 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3781718 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3323309 cm^4

Bending moment to be shared by the web

Mw = 158 * 3323309*10^4 / 1877 = 2788*10^6 N·mm

Bending stress of splice plates

σsp = 2788*10^6 / (3781718*10^4) * 1807 = 133 N/mm^2 ＜ σa = 210 N/mm^2

(234) G3 J-14(Sec-14) LFLG

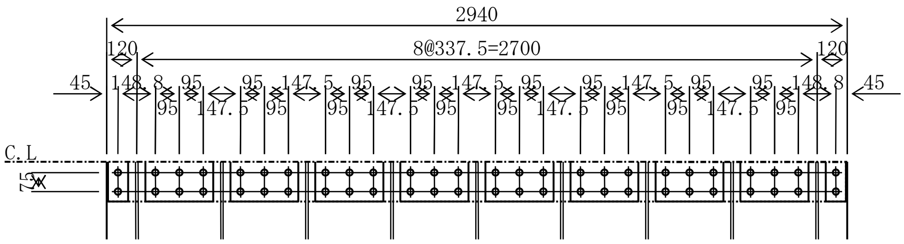
(a) Acting stress

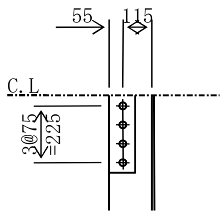
σ tmax = 67 N/mm² 0.75 σ ta = 0.75 * 210 = 158 N/mm²
σ cmax = -13 N/mm² 0.75 σ ca = 0.75 * 156 = 117 N/mm²
∴ σ c = 117 N/mm²
τ max = 12 N/mm²

(b) Section area of main plate

1-LFLG PL 2940 * 10 Ag = 294.0 cm² (SM490Y)
7-RIB PL 170 * 17 Agr = 202.3 cm² (SM490Y)
Σ Ag = Ag + Agr = 294.0 + 202.3 = 496.3 cm²

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 10 A = 294.0
(294.0 - (26* 2.5)* 1.0) * 1.1 = 251.9 < 294.0 ∴An = 251.9 cm²
7-RIB PL 170 * 17 Ar = 202.3
(202.3 - 7*(1* 2.7)* 1.7) * 1.1 = 187.2 < 202.3 ∴Anr = 187.2 cm²
Σ An = An + Anr = 251.9 + 187.2 = 439.1 cm²
σ tn = σ tmax * Σ Ag / Σ An = 67 * 496.3 / 439.1 = 75 N/mm²
< σ ta = 210 N/mm²

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 158 * 25190 / 1.1 = 3606750 N
> σ tn * An = 75 * 25190 = 1896480 N
Pc = σ c * Ag = 117 * 29400 = 3438764 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 158 * 18719 / 1.1 = 2680178 N
> σ tn * Anr = 75 * 18719 = 1409275 N
Pcr = σ c * Agr = 117 * 20230 = 2366197 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 251.9 / 2 = 126.0 cm²
AgR = Ag / 2 = 294.0 / 2 = 147.0 cm²
・Rib AnrR = Anr = 187.2 cm²
AgrR = Agr = 202.3 cm²

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 3606750 / 108000 = 33.4 pcs. (52 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 2680178 / 108000 = 24.8 pcs. (7 @ 4 = 28 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(h) Tensile force per one bolt

ρp = Pt / 52 = 3606750 / 52 = 69361 N

ρs = τ * Ag / 52 = 12 * 29400 / 52 = 6983 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(69361^2 + 6983^2)}$ = 69711 N < ρa = 108000 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 9	(14.4 -	2*(1*2.5)* 0.9)*1.1= 10.9<	14.4	∴ 10.9
8-SPL PL	270 * 9	(194.4 -	8*(3*2.5)* 0.9)*1.1= 154.4<	194.4	∴154.4
		208.8 > AgR			165.3 > AnR
1-SPL PL	2930 * 9	(263.7 - > AgR	(26*2.5)* 0.9)*1.1= 225.7<	263.7	∴225.7 > AnR
14-SPL PL	100 * 17	(238.0 - > AgrR	14*(1*2.7)* 1.7)*1.1= 191.1<	238.0	∴191.1 >AnrR

(235) G3 J-15(Sec-15) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -23 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

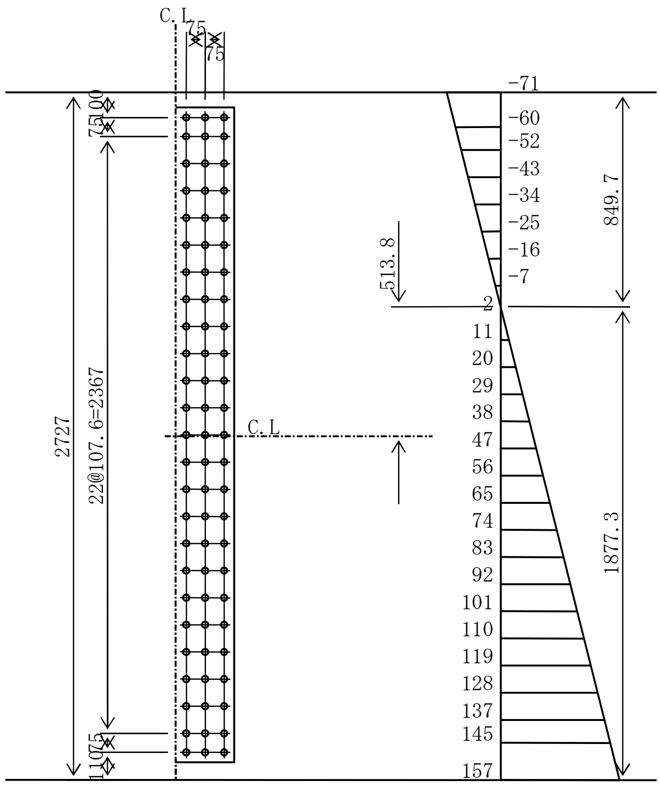
σL = 51 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 23 / 51 = 71 N/mm^2

σLn = 158 N/mm^2

τ = 19 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (145 + 157) / 2 = 312460 N

Required bolt number (Bolt number to be used)

N1 = 312460 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

ρs = τ * A / 75 = 19 * 38178 / 75 = 9672 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((312460 / 3)^2 + 9672^2)}$ = 104602 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3837217 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3373616 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ $3373616*10^4$ / 1877 = $2830*10^6$ N･mm

Bending stress of splice plates

σsp = $2830*10^6$ / ($3837217*10^4$) ＊ 1807 = 133 N/mm^2 ＜ σa = 210 N/mm^2

(236) G3 J-15(Sec-15) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -22 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

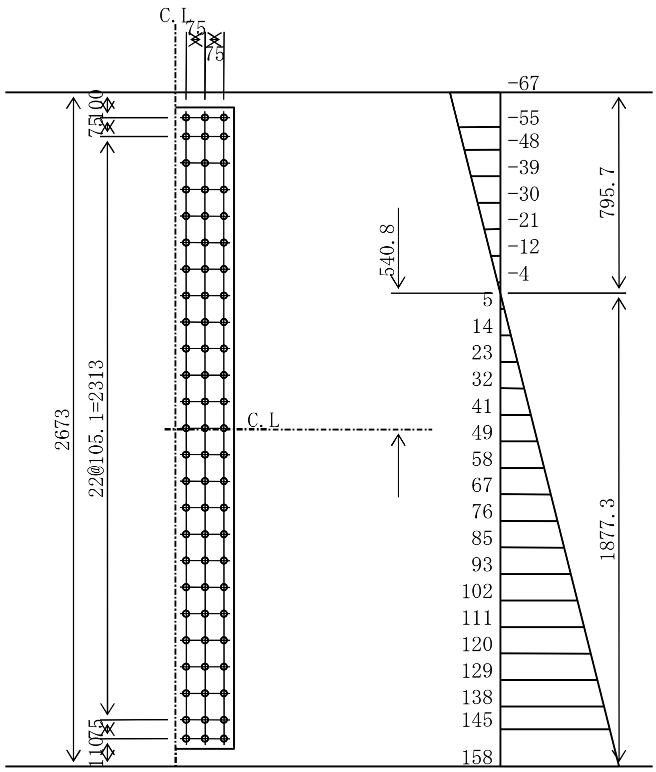
σL = 51 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 22 / 51 = 67 N/mm^2

σLn = 158 N/mm^2

τ = 20 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (145 + 158) / 2 = 312460 N

Required bolt number (Bolt number to be used)

N1 = 312460 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

ρs = τ * A / 75 = 20 * 37422 / 75 = 9750 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((312460 / 3)^2 + 9750^2)}$ = 104609 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3780689 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3322461 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ 3322461*10^4 / 1877 = 2788*10^6 N・mm

Bending stress of splice plates

σsp = 2788*10^6 / (3780689*10^4) ＊ 1807 = 133 N/mm^2 ＜ σa = 210 N/mm^2

(237) G3　J-15(Sec-15)　LFLG

(a) Acting stress

σtmax = 51 N/mm^2　　0.75σta = 0.75 * 210 = 158 N/mm^2

σcmax = -34 N/mm^2　　0.75σca = 0.75 * 156 = 117 N/mm^2

$\therefore\sigma$c = 117 N/mm^2

τmax = 19 N/mm^2

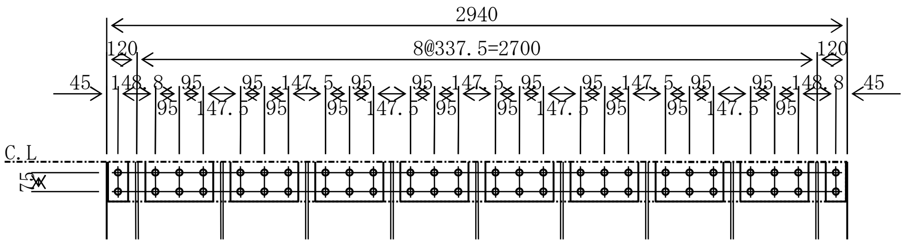
(b) Section area of main plate

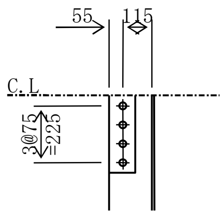
1-LFLG　PL　2940 * 10　　Ag = 294.0 cm^2　(SM490Y)

7-RIB　PL　170 * 17　　Agr = 202.3 cm^2　(SM490Y)

ΣAg = Ag + Agr = 294.0 + 202.3 = 496.3 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG　PL　2940 * 10　　A = 294.0

(294.0 - (26* 2.5)* 1.0) * 1.1 = 251.9 < 294.0　$\therefore$An = 251.9 cm^2

7-RIB　PL　170 * 17　　Ar = 202.3

(202.3 - 7*(1* 2.7)* 1.7) * 1.1 = 187.2 < 202.3　$\therefore$Anr = 187.2 cm^2

ΣAn = An + Anr = 251.9 + 187.2 = 439.1 cm^2

σtn = σtmax * ΣAg / ΣAn = 51 * 496.3 / 439.1 = 58 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate　Pt = 0.75σta * An / 1.1 = 158 * 25190 / 1.1 = 3606750 N

> σtn * An = 58 * 25190 = 1461168 N

Pc = σc * Ag = 117 * 29400 = 3438764 N

・Rib　Ptr = 0.75σta * Anr / 1.1 = 158 * 18719 / 1.1 = 2680178 N

> σtn * Anr = 58 * 18719 = 1085794 N

Pcr = σc * Agr = 117 * 20230 = 2366197 N

(f) Required section area of the splice plates

・Mother material(One side)　AnR = An / 2 = 251.9 / 2 = 126.0 cm^2

AgR = Ag / 2 = 294.0 / 2 = 147.0 cm^2

・Rib　AnrR = Anr = 187.2 cm^2

AgrR = Agr = 202.3 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 3606750 / 108000 = 33.4 pcs. (52 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 2680178 / 108000 = 24.8 pcs. (7 @ 4 = 28 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(h) Tensile force per one bolt

ρp = Pt / 52 = 3606750 / 52 = 69361 N

ρs = τ * Ag / 52 = 19 * 29400 / 52 = 10682 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(69361^2 + 10682^2)}$ = 70178 N < ρa = 108000 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 9	(14.4 -	2*(1*2.5)* 0.9)*1.1= 10.9<	14.4	∴ 10.9
8-SPL PL	270 * 9	(194.4 -	8*(3*2.5)* 0.9)*1.1= 154.4<	194.4	∴154.4
		208.8 > AgR			165.3 > AnR
1-SPL PL	2930 * 9	(263.7 -	(26*2.5)* 0.9)*1.1= 225.7<	263.7	∴225.7
		> AgR			> AnR
14-SPL PL	100 * 17	(238.0 -	14*(1*2.7)* 1.7)*1.1= 191.1<	238.0	∴191.1
		> AgrR			>AnrR

(238) G3 J-16(Sec-16) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = 32 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

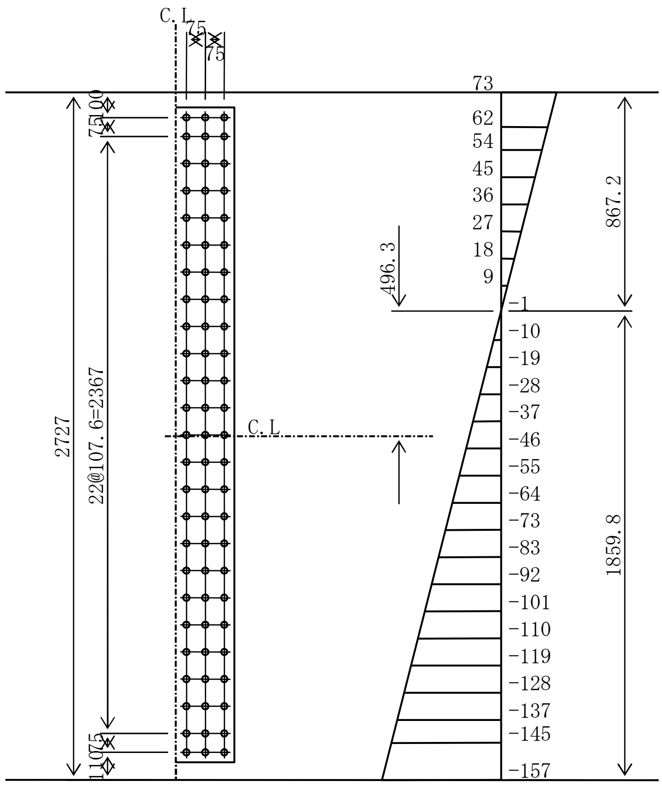
σL = -69 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 32 / 69 = 73 N/mm^2

σLn = 158 N/mm^2

τ = 28 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (145 + 157) / 2 = 312340 N

Required bolt number (Bolt number to be used)

N1 = 312340 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

$\rho s = \tau$ * A / 75 = 28 * 38178 / 75 = 14026 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{(312340 / 3)^2 + 14026^2}$ = 105054 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3755769 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3306431 cm^4

Bending moment to be shared by the web

$Mw = 158 * 3306431*10^4 / 1860 = 2800*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 2800*10^6 / (3755769*10^4) * 1790 = 133$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(239) G3 J-16(Sec-16) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = 30 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

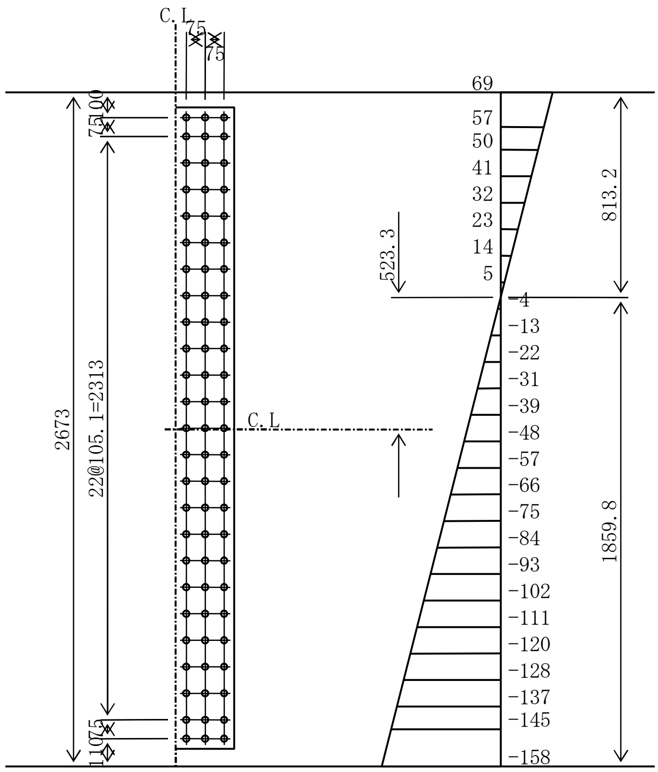
σL = -69 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 30 / 69 = 69 N/mm^2

σLn = 158 N/mm^2

τ = 28 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (145 + 158) / 2 = 312340 N

Required bolt number (Bolt number to be used)

N1 = 312340 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

ρs = τ * A / 75 = 28 * 37422 / 75 = 13966 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((312340 / 3)^2 + 13966^2)}$ = 105046 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2543 * 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3696553 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3253023 cm^4

Bending moment to be shared by the web

$Mw = 158 * 3253023*10^4 / 1860 = 2755*10^6$ N･mm

Bending stress of splice plates

$\sigma sp = 2755*10^6 / (3696553*10^4) * 1790 = 133$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(240) G3 J-16(Sec-16) LFLG

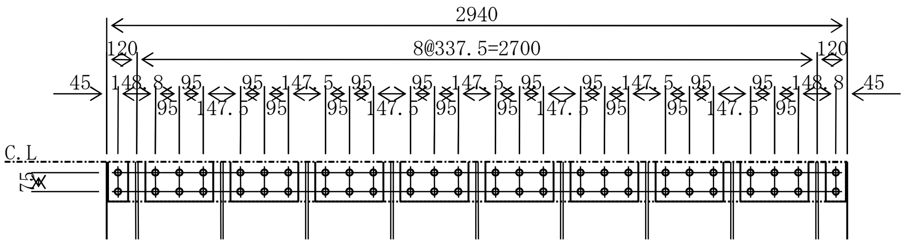
(a) Acting stress

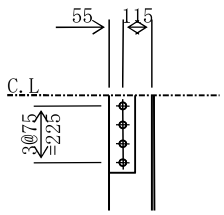
$\sigma tmax$ = 15 N/mm^2 $0.75\sigma ta$ = 0.75 * 210 = 158 N/mm^2
$\sigma cmax$ = -70 N/mm^2 $0.75\sigma ca$ = 0.75 * 156 = 117 N/mm^2
$\therefore \sigma c$ = 117 N/mm^2
τmax = 27 N/mm^2

(b) Section area of main plate

1-LFLG PL 2940 * 10 Ag = 294.0 cm^2 (SM490Y)
7-RIB PL 170 * 17 Agr = 202.3 cm^2 (SM490Y)
ΣAg = Ag + Agr = 294.0 + 202.3 = 496.3 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 10 A = 294.0
(294.0 - (26* 2.5)* 1.0) * 1.1 = 251.9 < 294.0 $\therefore$An = 251.9 cm^2
7-RIB PL 170 * 17 Ar = 202.3
(202.3 - 7*(1* 2.7)* 1.7) * 1.1 = 187.2 < 202.3 $\therefore$Anr = 187.2 cm^2
ΣAn = An + Anr = 251.9 + 187.2 = 439.1 cm^2
$\sigma tn = \sigma tmax * \Sigma Ag / \Sigma An$ = 15 * 496.3 / 439.1 = 17 N/mm^2
< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = $0.75\sigma ta$ * An / 1.1 = 158 * 25190 / 1.1 = 3606750 N
> σtn * An = 17 * 25190 = 417375 N
Pc = σc * Ag = 117 * 29400 = 3438764 N
・Rib Ptr = $0.75\sigma ta$ * Anr / 1.1 = 158 * 18719 / 1.1 = 2680178 N
> σtn * Anr = 17 * 18719 = 310151 N
Pcr = σc * Agr = 117 * 20230 = 2366197 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 251.9 / 2 = 126.0 cm^2
AgR = Ag / 2 = 294.0 / 2 = 147.0 cm^2
・Rib AnrR = Anr = 187.2 cm^2
AgrR = Agr = 202.3 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 3606750 / 108000 = 33.4 pcs. (52 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 2680178 / 108000 = 24.8 pcs. (7 @ 4 = 28 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(h) Tensile force per one bolt

ρp = Pt / 52 = 3606750 / 52 = 69361 N

ρs = τ * Ag / 52 = 27 * 29400 / 52 = 15544 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(69361^2 + 15544^2)}$ = 71081 N < ρa = 108000 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 9	(14.4 -	2*(1*2.5)* 0.9)*1.1= 10.9<	14.4	∴ 10.9
8-SPL PL	270 * 9	(194.4 -	8*(3*2.5)* 0.9)*1.1= 154.4<	194.4	∴154.4
		208.8			165.3
		> AgR			> AnR
1-SPL PL	2930 * 9	(263.7 -	(26*2.5)* 0.9)*1.1= 225.7<	263.7	∴225.7
		> AgR			> AnR
14-SPL PL	100 * 17	(238.0 -	14*(1*2.7)* 1.7)*1.1= 191.1<	238.0	∴191.1
		> AgrR			>AnrR

(241) G3 J-17(Sec-17) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2727 * 14   A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU =   61 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

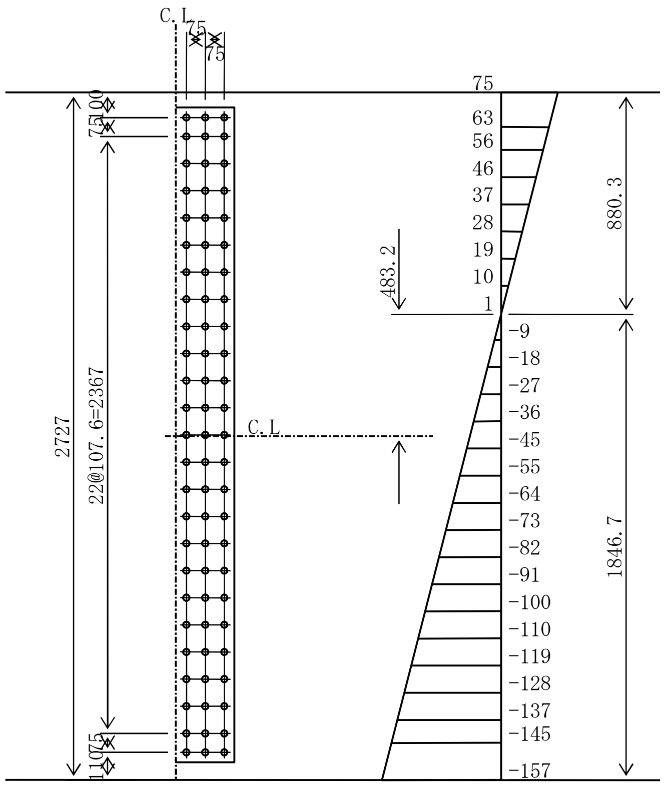
σL = -127 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 *   61 / 127 =   75 N/mm^2

σLn = 158 N/mm^2

τ =   36 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (145 + 157) / 2 = 312249 N

Required bolt number (Bolt number to be used)

N1 = 312249 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

$\rho s = \tau * A / 75$ = 36 * 38178 / 75 = 18276 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{(312249 / 3)^2 + 18276^2}$ = 105675 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3696101 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3257197 cm^4

Bending moment to be shared by the web

$Mw = 158 * 3257197*10^4 / 1847 = 2778*10^6$ N･mm

Bending stress of splice plates

$\sigma sp = 2778*10^6 / (3696101*10^4) * 1777 = 134$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(242) G3 J-17(Sec-17) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2673 * 14   A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU =   57 N/mm^2 < σa * 0.75 =   210 * 0.75 =   158 N/mm^2

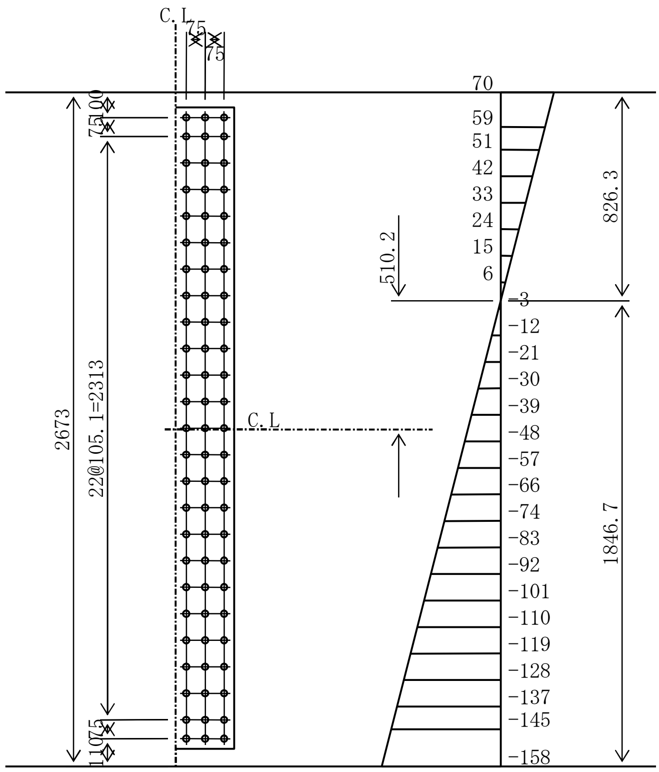
σL = -128 N/mm^2 < σa * 0.75 =   210 * 0.75 =   158 N/mm^2

σUn =   158 *   57 /   128 =   70 N/mm^2

σLn =   158 N/mm^2

τ =   36 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 =   148 * 14 * (145 + 158) / 2 = 312249 N

Required bolt number (Bolt number to be used)

N1 = 312249 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

ρs = τ * A / 75 =   36 *   37422 / 75 =   18040 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((312249 / 3)^2 + 18040^2)}$ = 105635 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3634924 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3202147 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ 3202147*10^4 / 1847 = 2731*10^6 N・mm

Bending stress of splice plates

σsp = 2731*10^6 / (3634924*10^4) ＊ 1777 = 133 N/mm^2 ＜ σa = 210 N/mm^2

(243) G3 J-17(Sec-17) LFLG

(a) Acting stress

σcmax = -128 N/mm^2 0.75σca = 0.75 * 156 = 117 N/mm^2

$\therefore \sigma$c = 128 N/mm^2

τmax = 36 N/mm^2

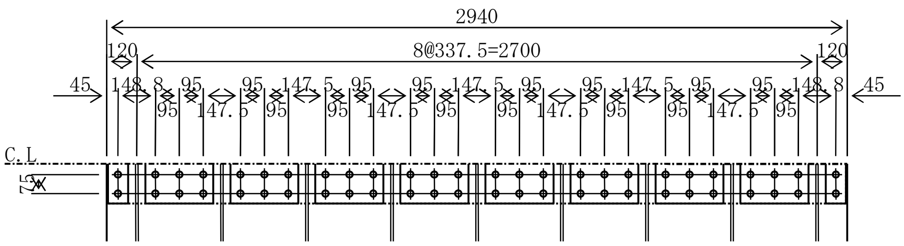
(b) Section area of main plate

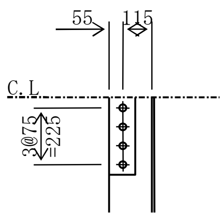
1-LFLG PL 2940 * 10 Ag = 294.0 cm^2 (SM490Y)

7-RIB PL 170 * 17 Agr = 202.3 cm^2 (SM490Y)

ΣAg = Ag + Agr = 294.0 + 202.3 = 496.3 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 128 * 29400 = 3769198 N

・Rib Pcr = σc * Agr = 128 * 20230 = 2593567 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 294.0 / 2 = 147.0 cm^2

・Rib AgrR = Agr = 202.3 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 3769198 / 108000 = 34.9 pcs. (52 bolts will be used.)

・Rib nr = Pcr / (108000 * 1.00) = 2593567 / 108000 = 24.0 pcs. (7 @ 4 = 28 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(g) Tensile force per one bolt

ρp = Pc / 52 = 3769198 / 52 = 72485 N

ρs = τ * Ag / 52 = 36 * 29400 / 52 = 20284 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(72485^2 + 20284^2)}$ = 75269 N < ρa = 108000 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
2-SPL PL	80 * 9	14.4	
8-SPL PL	270 * 9	194.4	
		208.8	
			> AgR = 147.0cm^2
1-SPL PL	2930 * 9	263.7	> AgR = 147.0cm^2
14-SPL PL	100 * 15	210.0	> AgrR = 202.3cm^2

(244) G3 J-18(Sec-18) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = 100 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

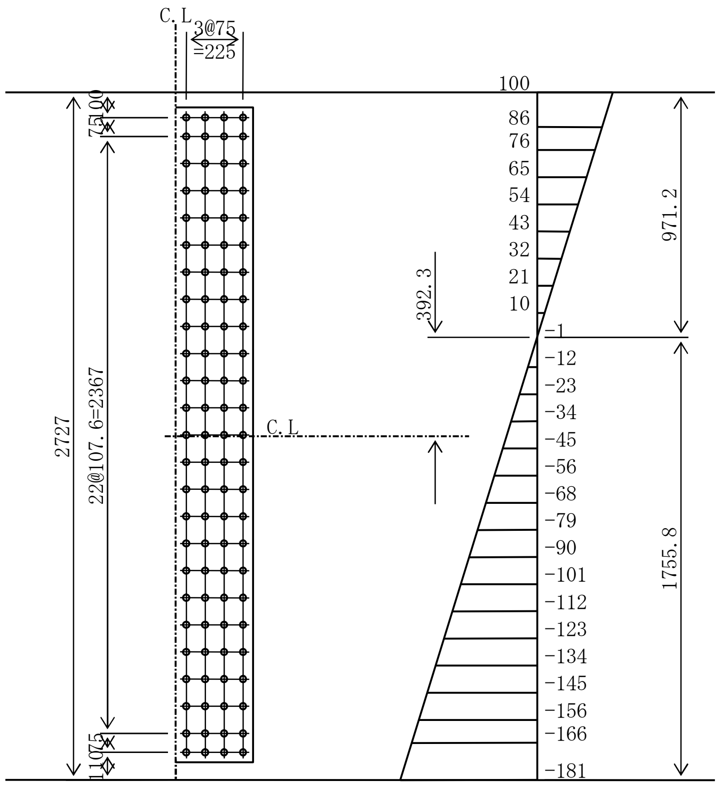
σL = -181 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 100 N/mm^2

σLn = 181 N/mm^2

τ = 44 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (166 + 181) / 2 = 357636 N

Required bolt number (Bolt number to be used)

N1 = 357636 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 44 * 38178 / 100 = 16898 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((357636 / 4)^2 + 16898^2)}$ = 90992 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3328503 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2953507 cm^4

Bending moment to be shared by the web

Mw = 181 ＊ $2953507 * 10^4$ / 1756 = $3041 * 10^6$ N･mm

Bending stress of splice plates

σsp = $3041 * 10^6$ / ($3328503 * 10^4$) ＊ 1686 = 154 N/mm^2 ＜ σa = 210 N/mm^2

(245) G3 J-18(Sec-18) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = 95 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

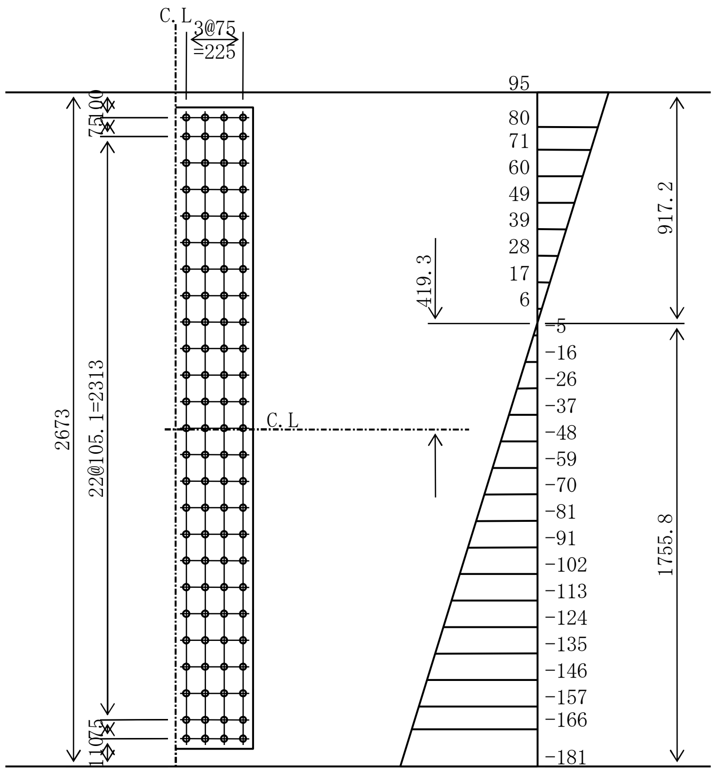
σL = -181 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 95 N/mm^2

σLn = 181 N/mm^2

τ = 44 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (166 + 181) / 2 = 358121 N

Required bolt number (Bolt number to be used)

N1 = 358121 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 44 * 37422 / 100 = 16347 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((358121 / 4)^2 + 16347^2)}$ = 91010 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3252488 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2886090 cm^4

Bending moment to be shared by the web

Mw = 181 ＊ $2886090*10^4$ / 1756 = $2976*10^6$ N･mm

Bending stress of splice plates

σsp = $2976*10^6$ / ($3252488*10^4$) ＊ 1686 = 154 N/mm^2 ＜ σa = 210 N/mm^2

(246) G3 J-18(Sec-18) LFLG

(a) Acting stress

$\sigma cmax$ = -182 N/mm^2 0.75 σca = 0.75 * 200 = 150 N/mm^2

$\therefore \sigma c$ = 182 N/mm^2

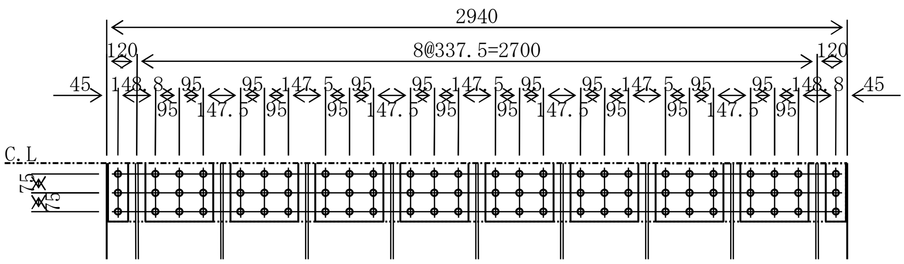
τmax = 33 N/mm^2

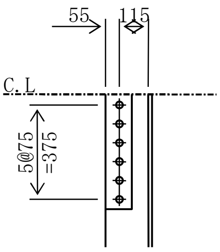
(b) Section area of main plate

1-LFLG	PL	2940 * 14	Ag	=	411.6 cm^2	(SM490Y)
7-RIB	PL	170 * 17	Agr	=	202.3 cm^2	(SM490Y)

ΣAg = Ag + Agr = 411.6 + 202.3 = 613.9 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 182 * 41160 = 7510959 N

・Rib Pcr = σc * Agr = 182 * 20230 = 3691611 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 411.6 / 2 = 205.8 cm^2

・Rib AgrR = Agr = 202.3 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 7510959 / 108000 = 69.5 pcs. (78 bolts will be used.)

・Rib nr = Pcr / (108000 * 1.00) = 3691611 / 108000 = 34.2 pcs. (7 @ 6 = 42 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,6 unites)

(g) Tensile force per one bolt

ρp = Pc / 78 = 7510959 / 78 = 96294 N

ρs = τ * Ag / 78 = 33 * 41160 / 78 = 17247 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(96294^2 + 17247^2)}$ = 97827 N < ρa = 108000 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
2-SPL PL	80 * 9	14.4	
8-SPL PL	270 * 9	194.4	
		208.8	
			> AgR = 205.8cm^2
1-SPL PL	2930 * 9	263.7	> AgR = 205.8cm^2
14-SPL PL	100 * 15	210.0	> AgrR = 202.3cm^2

(247) G3 J-19(Sec-19) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = 139 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

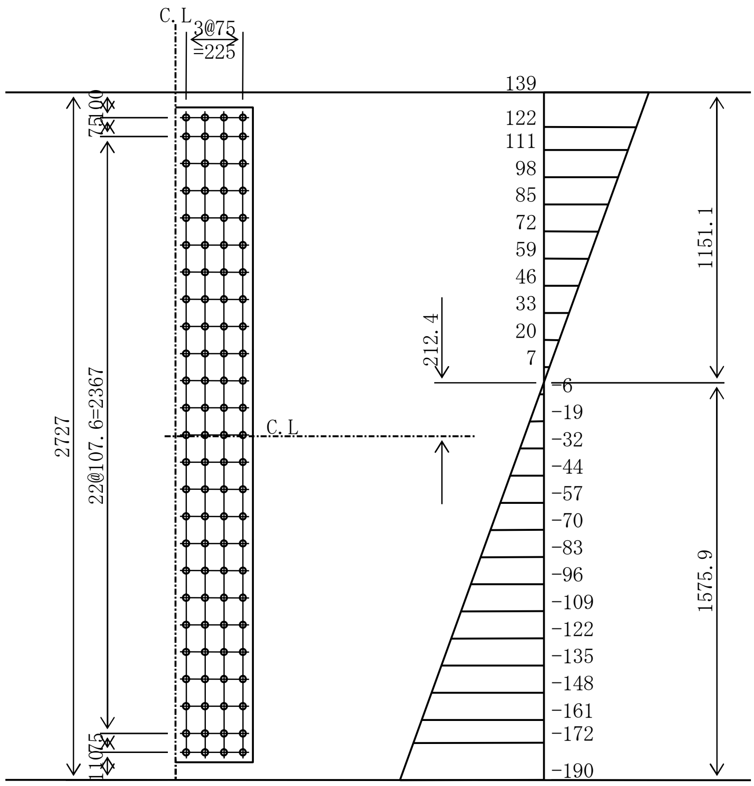
σL = -190 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 139 N/mm^2

σLn = 190 N/mm^2

τ = 51 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (172 + 190) / 2 = 374252 N

Required bolt number (Bolt number to be used)

N1 = 374252 / (108000 * 1.00) = 3.5 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 51 * 38178 / 100 = 19508 N < ρa = 108000 N

Combined stress

ρc25 = $\sqrt{}$((374252 / 4$)^2$ + 19508^2) = 95575 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 2828300 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2538116 cm^4

Bending moment to be shared by the web

Mw = 190 ＊ 2538116*10^4 / 1576 = 3062*10^6 N･mm

Bending stress of splice plates

σsp = 3062*10^6 / (2828300*10^4) ＊ 1506 = 163 N/mm^2 ＜ σa = 210 N/mm^2

(248) G3 J-19(Sec-19) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = 133 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

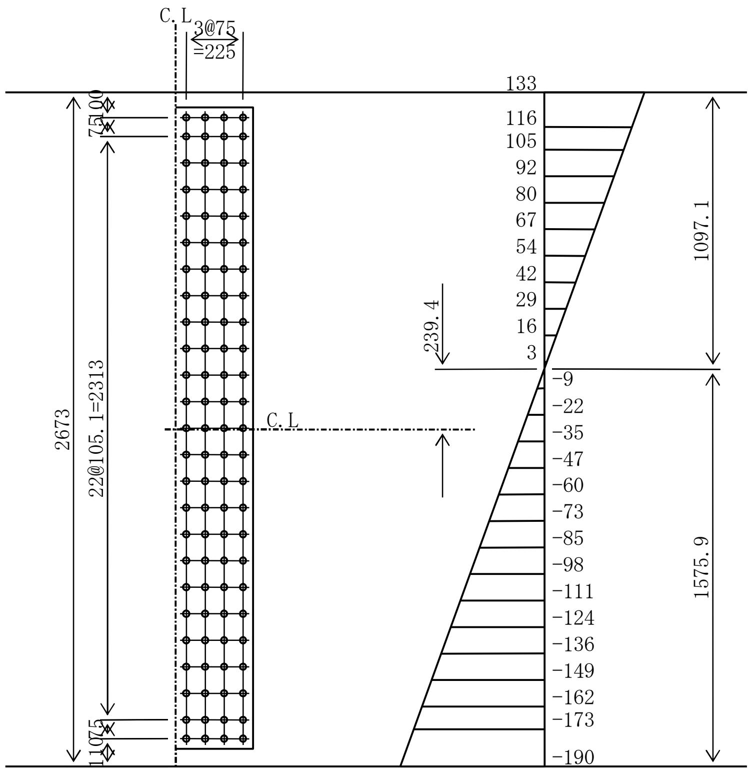
σL = -190 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 133 N/mm^2

σLn = 190 N/mm^2

τ = 50 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (173 + 190) / 2 = 374760 N

Required bolt number (Bolt number to be used)

N1 = 374760 / (108000 * 1.00) = 3.5 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 50 * 37422 / 100 = 18699 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{}$((374760 / 4)^2 + 18699^2) = 95538 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 * 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 2718213 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2442567 cm^4

Bending moment to be shared by the web

Mw = 190 * 2442567*10^4 / 1576 = 2951*10^6 N·mm

Bending stress of splice plates

σsp = 2951*10^6 / (2718213*10^4) * 1506 = 163 N/mm^2 ＜ σa = 210 N/mm^2

(249) G3 J-19(Sec-19) LFLG

(a) Acting stress

σcmax = -193 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma$c = 193 N/mm^2

τmax = 28 N/mm^2

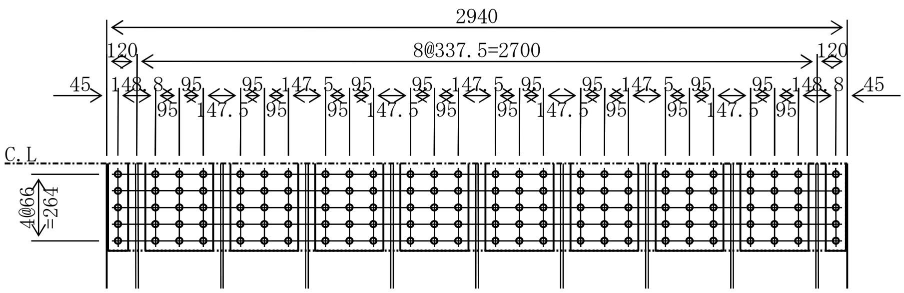
(b) Section area of main plate

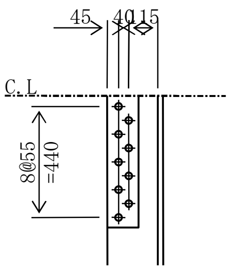
1-LFLG PL 2940 * 21   Ag = 617.4 cm^2 (SM490Y)

7-RIB PL 200 * 22   Agr = 308.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 617.4 + 308.0 = 925.4 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 193 * 61740 = 11912116 N

・Rib Pcr = σc * Agr = 193 * 30800 = 5942552 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 617.4 / 2 = 308.7 cm^2

・Rib AgrR = Agr = 308.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 11912116 / 108000 = 110.3 pcs. (130 bolts will be used.)

・Rib nr = Pcr / (108000 * 0.98) = 5942552 / 105840 = 56.1 pcs. (7 @ 9 = 63 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 5,9 unites)

(g) Tensile force per one bolt

ρp = Pc / 130 = 11912116 / 130 = 91632 N

ρs = τ * Ag / 130 = 28 * 61740 / 130 = 13188 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(91632^2 + 13188^2) = 92576 N < ρa = 108000 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
2-SPL PL	80 * 14	22.4	
8-SPL PL	270 * 14	302.4	
		324.8	
			> AgR = 308.7cm^2
1-SPL PL	2930 * 11	322.3	> AgR = 308.7cm^2
14-SPL PL	120 * 19	319.2	> AgrR = 308.0cm^2

(250) G3　J-20(Sec-21)　LWEB

(a) Section area of main plate (Web plate)

1-LWEB　PL　2727 ＊ 14　　A =　381.8 cm^2　　　(SM490Y)

(b) Design stress

σU =　 135 N/mm^2 ＜ σa ＊ 0.75 =　 210 ＊ 0.75 =　 158 N/mm^2

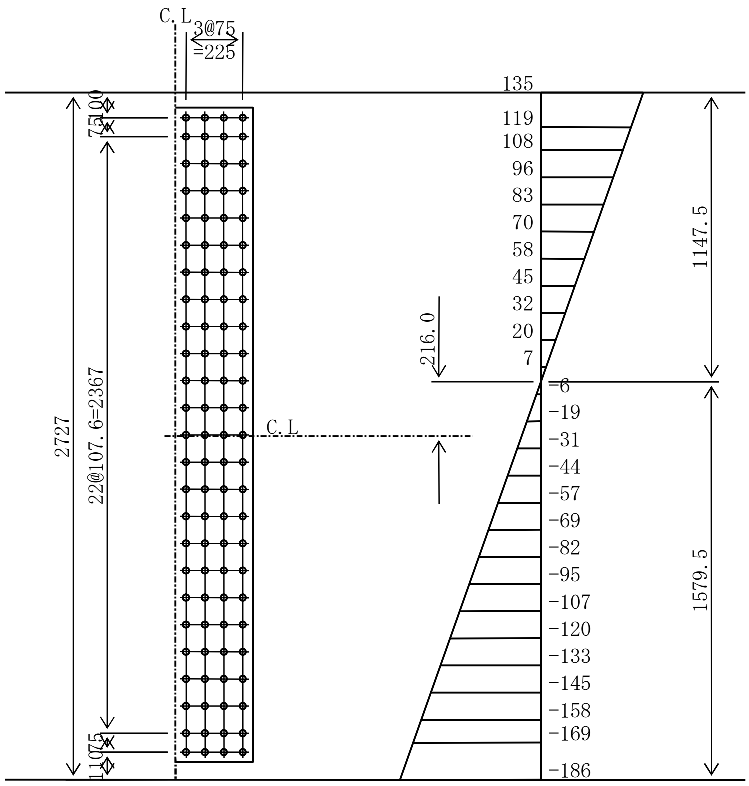
σL =　-186 N/mm^2 ＞ σa ＊ 0.75 =　 210 ＊ 0.75 =　 158 N/mm^2

σUn =　 135 N/mm^2

σLn =　 186 N/mm^2

τ　 =　　65 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width:　　b1 = 14.8 cm

Total force to be shared

P1 =　 148 ＊　14 ＊ (　169 +　186) / 2 =　366416 N

Required bolt number (Bolt number to be used)

N1 =　366416 / (108000 ＊ 1.00) = 3.4 pcs.　(4 bolts will be used.)

Check of shear force

ρs = τ ＊ A / 100 =　 65 ＊　 38178 / 100 =　 24892 N ＜ ρa =　108000 N

Combined stress

$\rho c25$ = $\sqrt{((366416 / 4)^2 + 24892^2)}$ =　 94926 N ＜ ρa =　108000 N

(High strength friction grip bolt, S10T, M22 will be used.：Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 2835432 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2544080 cm^4

Bending moment to be shared by the web

$Mw = 186 * 2544080*10^4 / 1580 = 2998*10^6$ N･mm

Bending stress of splice plates

$\sigma sp = 2998*10^6 / (2835432*10^4) * 1510 = 160$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(251) G3 J-20(Sec-21) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = 129 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

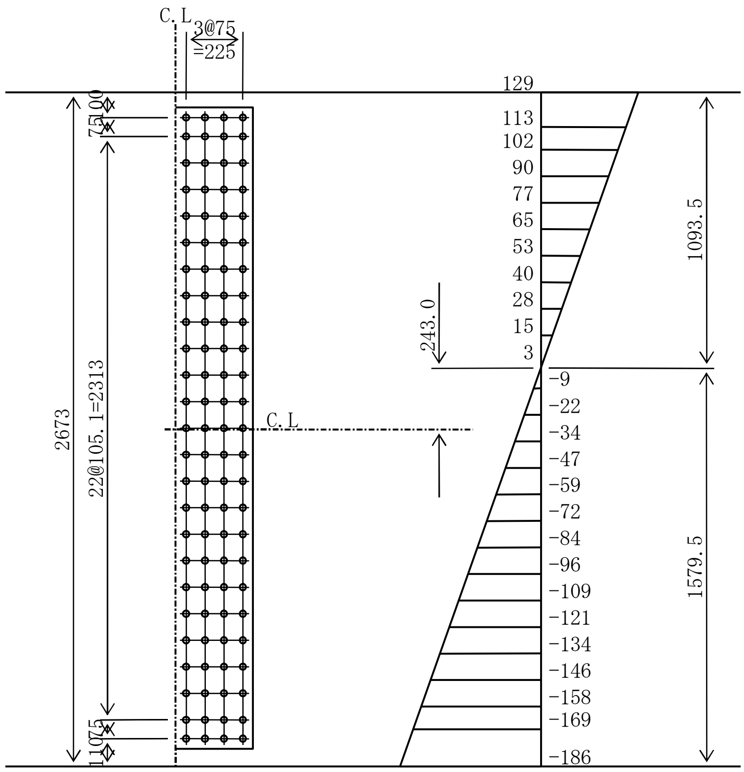
σL = -186 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 129 N/mm^2

σLn = 186 N/mm^2

τ = 63 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (169 + 186) / 2 = 366912 N

Required bolt number (Bolt number to be used)

N1 = 366912 / (108000 * 1.00) = 3.4 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 63 * 37422 / 100 = 23616 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((366912 / 4)^2 + 23616^2)}$ = 94719 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 2726095 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2449147 cm^4

Bending moment to be shared by the web

Mw = 186 ＊ 2449147*10^4 / 1580 = 2890*10^6 N·mm

Bending stress of splice plates

σsp = 2890*10^6 / (2726095*10^4) ＊ 1510 = 160 N/mm^2 ＜ σa = 210 N/mm^2

(252) G3 J-20(Sec-21) LFLG

(a) Acting stress

σcmax = -189 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 189 N/mm^2

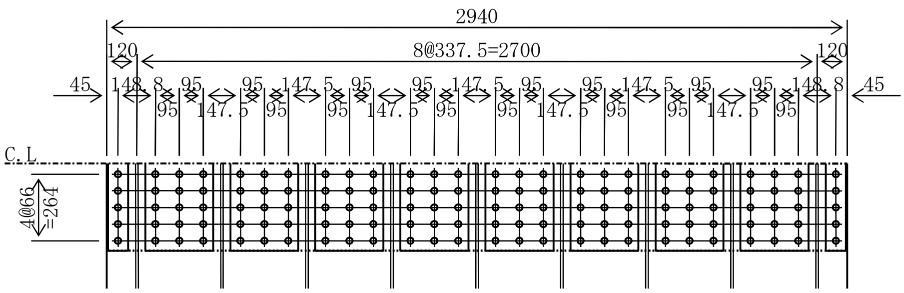
τmax = 37 N/mm^2

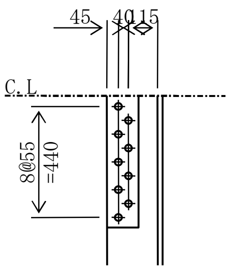
(b) Section area of main plate

1-LFLG	PL	2940 * 20	Ag =	588.0 cm^2	(SM490Y)
7-RIB	PL	200 * 22	Agr =	308.0 cm^2	(SM490Y)

ΣAg = Ag + Agr = 588.0 + 308.0 = 896.0 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 189 * 58800 = 11098735 N

・Rib Pcr = σc * Agr = 189 * 30800 = 5813623 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 588.0 / 2 = 294.0 cm^2

・Rib AgrR = Agr = 308.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 11098735 / 108000 = 102.8 pcs. (130 bolts will be used.)

・Rib nr = Pcr / (108000 * 0.98) = 5813623 / 105840 = 54.9 pcs. (7 @ 9 = 63 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 5,9 unites)

(g) Tensile force per one bolt

ρp = Pc / 130 = 11098735 / 130 = 85375 N

ρs = τ * Ag / 130 = 37 * 58800 / 130 = 16657 N

$\rho = \sqrt{}(\rho p^2 + \rho s^2) = \sqrt{}(85375^2 + 16657^2) = 86985$ N < ρa = 108000 N

(h) Check of splice plates

	(SM490Y)	$Ags(cm^2)$	
2-SPL PL	80 * 13	20.8	
8-SPL PL	270 * 13	280.8	
		301.6	
			> AgR = 294.0cm^2
1-SPL PL	2930 * 11	322.3	> AgR = 294.0cm^2
14-SPL PL	120 * 19	319.2	> AgrR = 308.0cm^2

(253) G3 J-21(Sec-22) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = 83 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

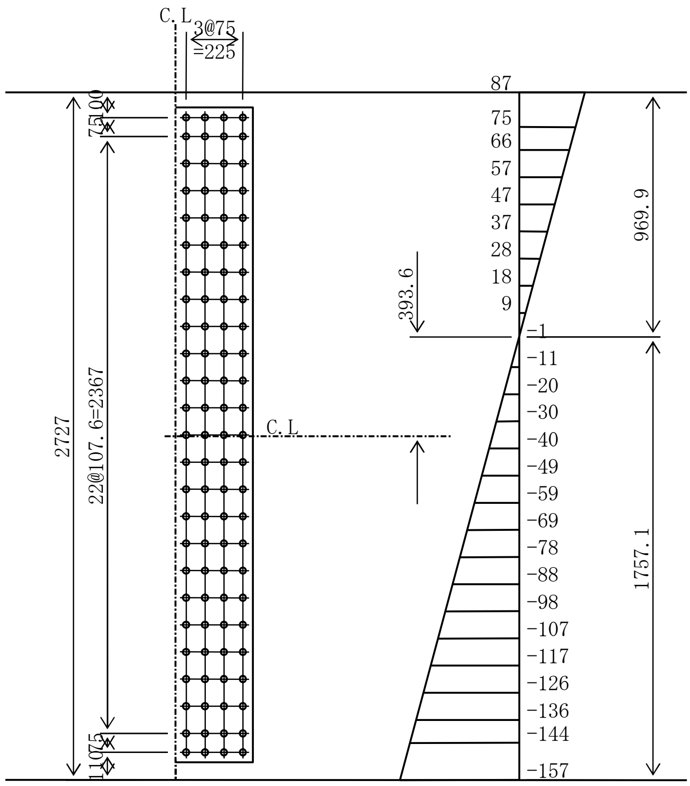
σL = -150 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 83 / 150 = 87 N/mm^2

σLn = 158 N/mm^2

τ = 62 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (144 + 157) / 2 = 311587 N

Required bolt number (Bolt number to be used)

N1 = 311587 / (108000 * 1.00) = 2.9 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 62 * 38178 / 100 = 23686 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((311587 / 4)^2 + 23686^2)}$ = 81418 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 * 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3333332 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2957502 cm^4

Bending moment to be shared by the web

Mw = 158 * 2957502*10^4 / 1757 = 2651*10^6 N·mm

Bending stress of splice plates

σsp = 2651*10^6 / (3333332*10^4) * 1687 = 134 N/mm^2 ＜ σa = 210 N/mm^2

(254) G3 J-21(Sec-22) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = 78 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

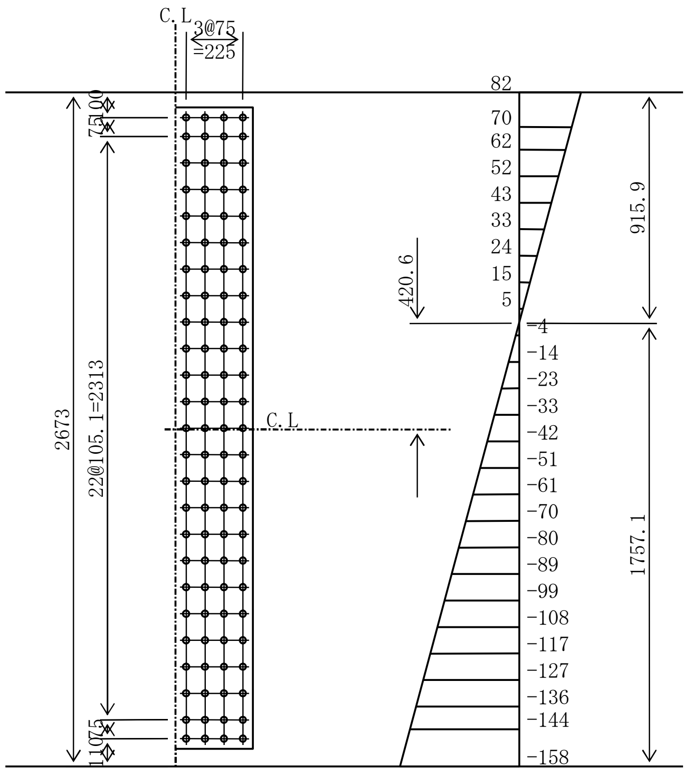
σL = -150 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 78 / 150 = 82 N/mm^2

σLn = 158 N/mm^2

τ = 60 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (144 + 158) / 2 = 311587 N

Required bolt number (Bolt number to be used)

N1 = 311587 / (108000 * 1.00) = 2.9 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 60 * 37422 / 100 = 22304 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((311587 / 4)^2 + 22304^2)}$ = 81027 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 * 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3257551 cm^4 > Iw

Moment of inertia of web plate Iw = 2890279 cm^4

Bending moment to be shared by the web

$Mw = 158 * 2890279*10^4 / 1757 = 2591*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 2591*10^6 / (3257551*10^4) * 1687 = 134$ N/mm^2 < $\sigma a = 210$ N/mm^2

(255) G3 J-21(Sec-22) LFLG

(a) Acting stress

σcmax = -151 N/mm^2 0.75σca = 0.75 * 182 = 136 N/mm^2

$\therefore \sigma$c = 151 N/mm^2

τmax = 53 N/mm^2

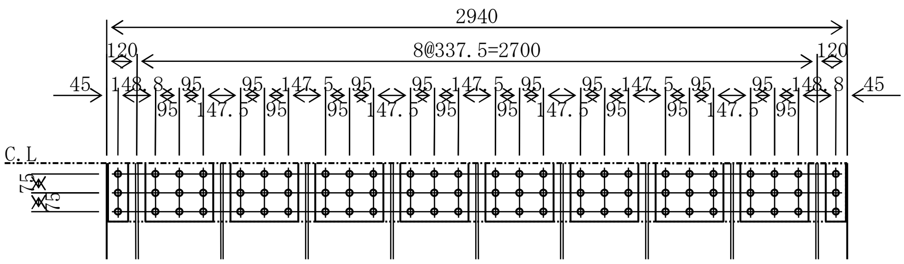
(b) Section area of main plate

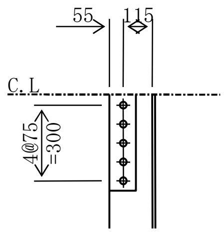
1-LFLG PL 2940 * 12   Ag = 352.8 cm^2 (SM490Y)

7-RIB PL 170 * 17   Agr = 202.3 cm^2 (SM490Y)

ΣAg = Ag + Agr = 352.8 + 202.3 = 555.1 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σc * Ag = 151 * 35280 = 5325128 N

・Rib Pcr = σc * Agr = 151 * 20230 = 3053496 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 352.8 / 2 = 176.4 cm^2

・Rib AgrR = Agr = 202.3 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5325128 / 108000 = 49.3 pcs. (78 bolts will be used.)

・Rib nr = Pcr / (108000 * 1.00) = 3053496 / 108000 = 28.3 pcs. (7 @ 5 = 35 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,5 unites)

(g) Tensile force per one bolt

ρp = Pc / 78 = 5325128 / 78 = 68271 N

ρs = τ * Ag / 78 = 53 * 35280 / 78 = 23814 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(68271^2 + 23814^2)}$ = 72305 N < ρa = 108000 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
2-SPL PL	80 * 9	14.4	
8-SPL PL	270 * 9	194.4	
		208.8	
			> AgR = 176.4cm^2
1-SPL PL	2930 * 9	263.7	> AgR = 176.4cm^2
14-SPL PL	100 * 15	210.0	> AgrR = 202.3cm^2

(256) G3 J-22(Sec-23) LWEB

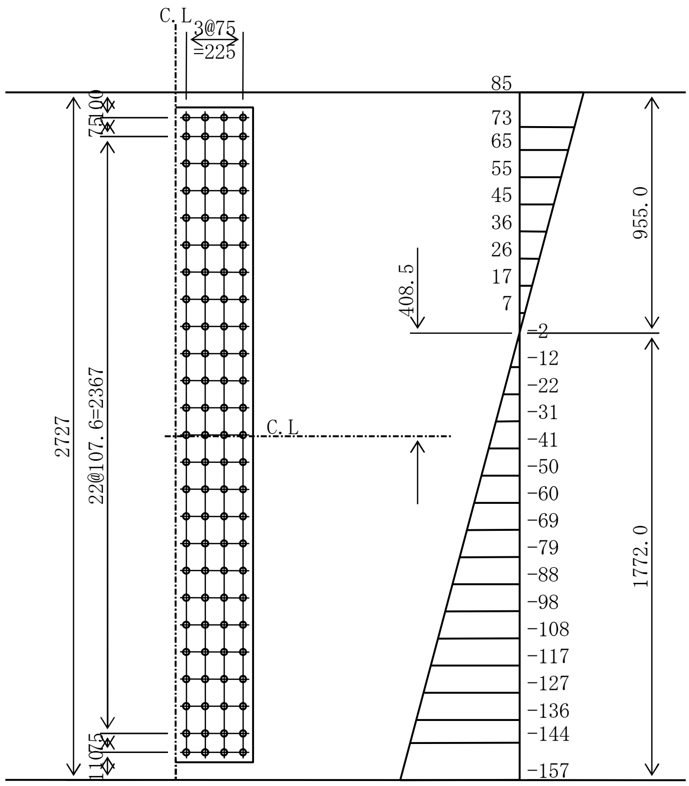
(a) Section area of main plate (Web plate)

1-LWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = 29 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = -53 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 158 * 29 / 53 = 85 N/mm^2
σLn = 158 N/mm^2
τ = 57 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (144 + 157) / 2 = 311701 N

Required bolt number (Bolt number to be used)

N1 = 311701 / (108000 * 1.00) = 2.9 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 57 * 38178 / 100 = 21699 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((311701 / 4)^2 + 21699^2)}$ = 80890 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3388329 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3002985 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ 3002985*10^4 / 1772 = 2669*10^6 N·mm

Bending stress of splice plates

σsp = 2669*10^6 / (3388329*10^4) ＊ 1702 = 134 N/mm^2 ＜ σa = 210 N/mm^2

(257) G3 J-22(Sec-23) RWEB

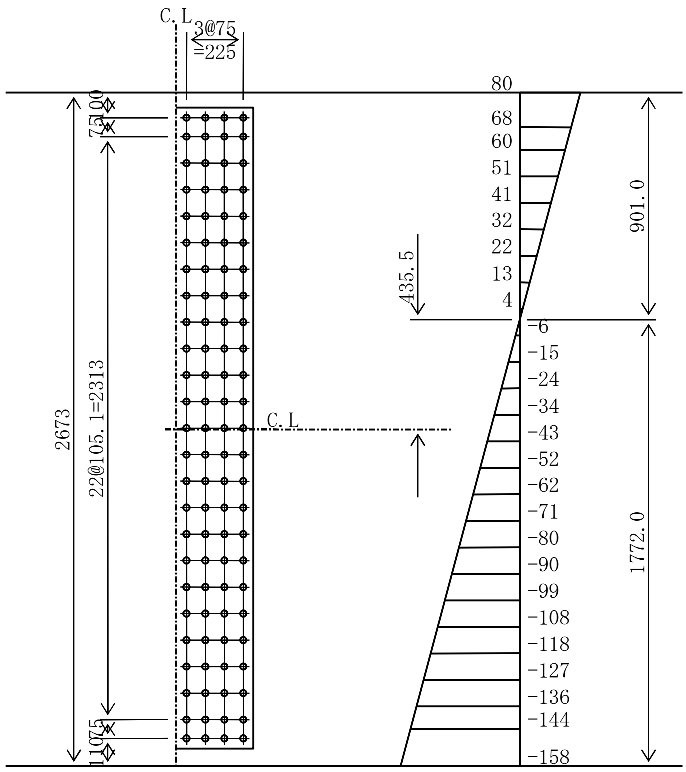
(a) Section area of main plate (Web plate)

1-RWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = 27 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = -53 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 158 * 27 / 53 = 80 N/mm^2
σLn = 158 N/mm^2
τ = 54 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (144 + 158) / 2 = 311701 N

Required bolt number (Bolt number to be used)

N1 = 311701 / (108000 * 1.00) = 2.9 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 54 * 37422 / 100 = 20081 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((311701 / 4)^2 + 20081^2)}$ = 80471 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3315060 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2937851 cm^4

Bending moment to be shared by the web

$Mw = 158 * 2937851*10^4 / 1772 = 2611*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 2611*10^6 / (3315060*10^4) * 1702 = 134$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(258) G3 J-22(Sec-23) LFLG

(a) Acting stress

σ cmax = -54 N/mm^2 0.75 σ ca = 0.75 * 156 = 117 N/mm^2

$\therefore \sigma$ c = 117 N/mm^2

τ max = 57 N/mm^2

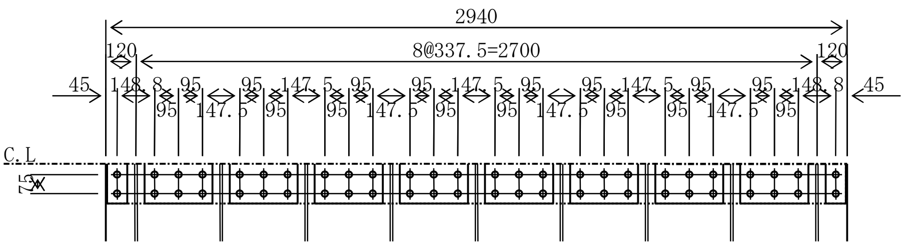
(b) Section area of main plate

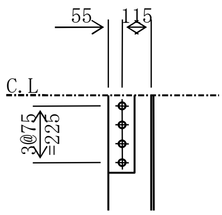
1-LFLG PL 2940 * 10 Ag = 294.0 cm^2 (SM490Y)

7-RIB PL 170 * 17 Agr = 202.3 cm^2 (SM490Y)

ΣAg = Ag + Agr = 294.0 + 202.3 = 496.3 cm^2

(c) Bolt arrangement





(d) Design axial force

・Main plate Pc = σ c * Ag = 117 * 29400 = 3438764 N

・Rib Pcr = σ c * Agr = 117 * 20230 = 2366197 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 294.0 / 2 = 147.0 cm^2

・Rib AgrR = Agr = 202.3 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 3438764 / 108000 = 31.8 pcs. (52 bolts will be used.)

・Rib nr = Pcr / (108000 * 1.00) = 2366197 / 108000 = 21.9 pcs. (7 @ 4 = 28 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(g) Tensile force per one bolt

ρ p = Pc / 52 = 3438764 / 52 = 66130 N

ρ s = τ * Ag / 52 = 57 * 29400 / 52 = 32377 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(66130^2 + 32377^2)}$ = 73630 N < ρ a = 108000 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
2-SPL PL	80 * 9	14.4	
8-SPL PL	270 * 9	194.4	
		208.8	> AgR = 147.0cm^2
1-SPL PL	2930 * 9	263.7	> AgR = 147.0cm^2
14-SPL PL	100 * 17	238.0	> AgrR = 202.3cm^2

(259) G3 J-23(Sec-23) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -61 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

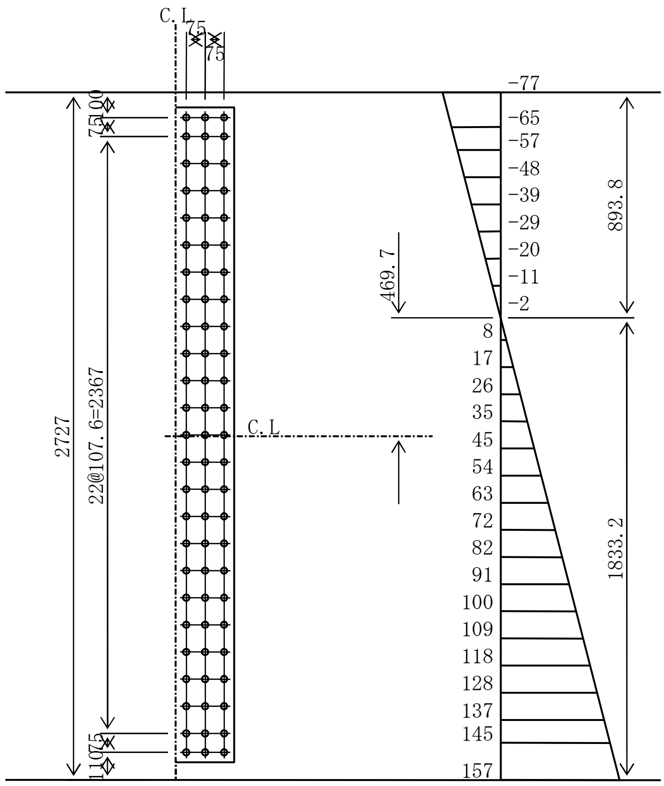
σL = 124 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 61 / 124 = 77 N/mm^2

σLn = 158 N/mm^2

τ = 48 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (145 + 157) / 2 = 312153 N

Required bolt number (Bolt number to be used)

N1 = 312153 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

ρs = τ * A / 75 = 48 * 38178 / 75 = 24629 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{(312153 / 3)^2 + 24629^2} = 106926$ N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3636600 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3208087 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ 3208087×10^4 / 1833 = 2756×10^6 N·mm

Bending stress of splice plates

σsp = 2756×10^6 / (3636600×10^4) ＊ 1763 = 134 N/mm^2 ＜ σa = 210 N/mm^2

(260) G3 J-23(Sec-23) RWEB

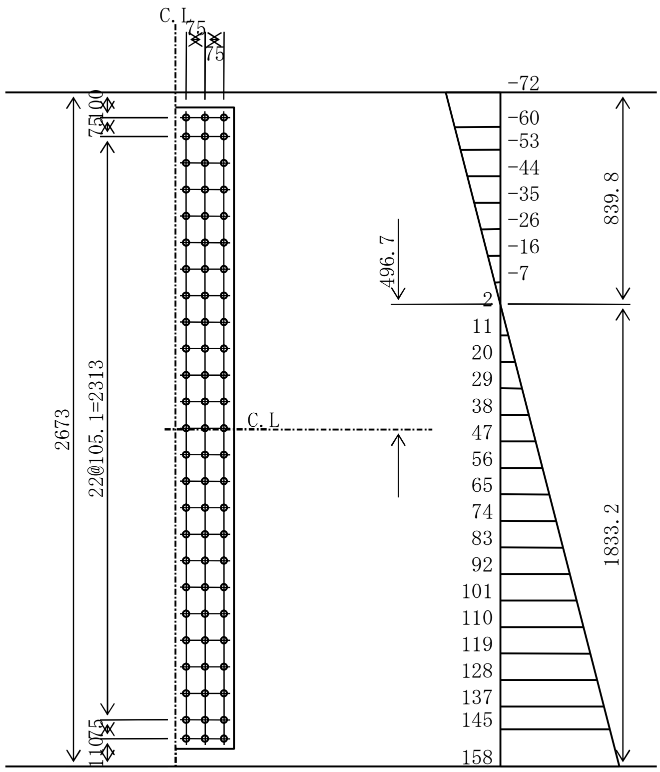
(a) Section area of main plate (Web plate)

1-RWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -57 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = 125 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 158 * 57 / 125 = 72 N/mm^2
σLn = 158 N/mm^2
τ = 46 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (145 + 158) / 2 = 312153 N

Required bolt number (Bolt number to be used)

N1 = 312153 / (108000 * 1.00) = 2.9 pcs. (3 bolts will be used.)

Check of shear force

ρs = τ * A / 75 = 46 * 37422 / 75 = 22760 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((312153 / 3)^2 + 22760^2)}$ = 106511 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(e) Check of splice plates

2-SPL PL 2543 * 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3573318 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3151276 cm^4

Bending moment to be shared by the web

Mw = 158 * 3151276*10^4 / 1833 = 2707*10^6 N·mm

Bending stress of splice plates

σsp = 2707*10^6 / (3573318*10^4) * 1763 = 134 N/mm^2 ＜ σa = 210 N/mm^2

(261) G3 J-23(Sec-23) LFLG

(a) Acting stress

σ tmax = 125 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

τ max = 45 N/mm^2

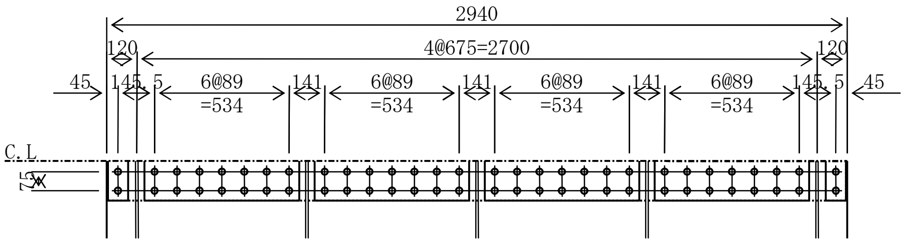
(b) Section area of main plate

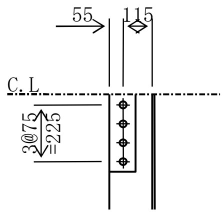
1-LFLG PL 2940 * 10 Ag = 294.0 cm^2 (SM490Y)

3-RIB PL 170 * 17 Agr = 86.7 cm^2 (SM490Y)

ΣAg = Ag + Agr = 294.0 + 86.7 = 380.7 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 10 A = 294.0

(294.0 - (30* 2.5)* 1.0) * 1.1 = 240.9 < 294.0 ∴An = 240.9 cm^2

3-RIB PL 170 * 17 Ar = 86.7

(86.7 - 3*(1* 2.7)* 1.7) * 1.1 = 80.2 < 86.7 ∴Anr = 80.2 cm^2

ΣAn = An + Anr = 240.9 + 80.2 = 321.1 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 125 * 380.7 / 321.1 = 148 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 148 * 24090 = 3575345 N

> 0.75 σ ta * An / 1.1 = 158 * 24090 / 1.1 = 3449250 N

・Rib Ptr = σ tn * Anr = 148 * 8022 = 1190639 N

> 0.75 σ ta * Anr/ 1.1 = 158 * 8022 / 1.1 = 1148648 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 240.9 / 2 = 120.5 cm^2

・Rib AnrR = Anr = 80.2 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 3575345 / 108000 = 33.1 pcs. (60 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 1190639 / 108000 = 11.0 pcs. (3 @ 4 = 12 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(h) Tensile force per one bolt

ρp = Pt / 60 = 3575345 / 60 = 59589 N

ρs = τ * Ag / 60 = 45 * 29400 / 60 = 22068 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(59589^2 + 22068^2)} = 63544$ N $< \rho a = 108000$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm²)	deduction of bolt holes		Ans(cm²)
2-SPL PL	80 * 9	(14.4 -	2*(1*2.5)* 0.9)*1.1= 10.9<	14.4	∴ 10.9
4-SPL PL	614 * 9	(221.0 -	4*(7*2.5)* 0.9)*1.1= 173.8<	221.0	∴173.8
		235.4			184.7 > AnR
1-SPL PL	2930 * 9	(263.7 -	(30*2.5)* 0.9)*1.1= 215.8<	263.7	∴215.8 > AnR
6-SPL PL	100 * 17	(102.0 -	6*(1*2.7)* 1.7)*1.1= 81.9<	102.0	∴ 81.9 >AnrR

(262) G3 J-24(Sec-24) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2727 * 14   A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -109 N/mm^2 ＜ σa * 0.75 = 210 * 0.75 = 158 N/mm^2

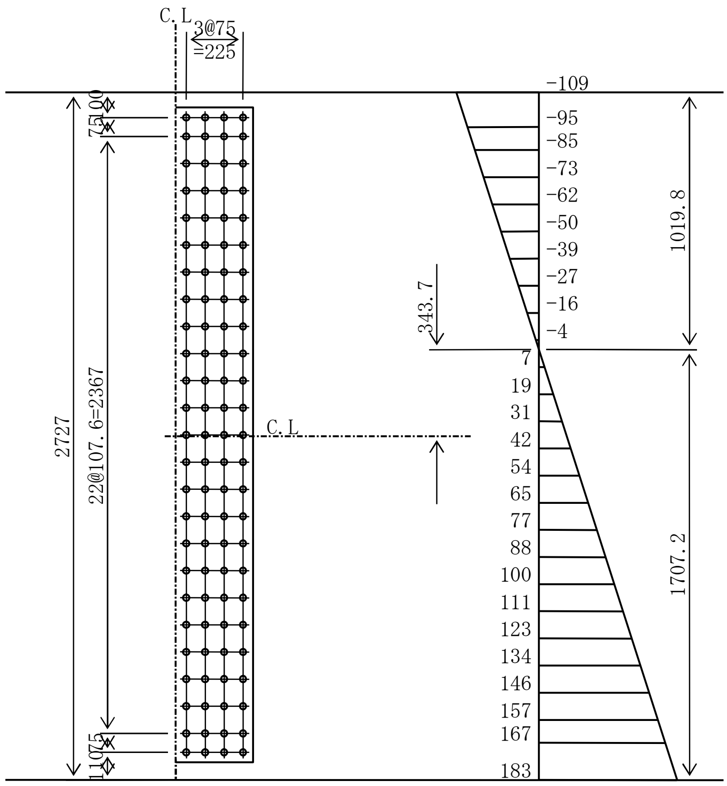
σL = 183 N/mm^2 ＞ σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 109 N/mm^2

σLn = 183 N/mm^2

τ = 39 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (167 + 183) / 2 = 361281 N

Required bolt number (Bolt number to be used)

N1 = 361281 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 39 * 38178 / 100 = 15031 N ＜ ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((361281 / 4)^2 + 15031^2)}$ = 91563 N ＜ ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.：Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 * 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3163401 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2816809 cm^4

Bending moment to be shared by the web

Mw = 183 * 2816809*10^4 / 1707 = 3017*10^6 N·mm

Bending stress of splice plates

σsp = 3017*10^6 / (3163401*10^4) * 1637 = 156 N/mm^2 ＜ σa = 210 N/mm^2

(263) G3 J-24(Sec-24) RWEB

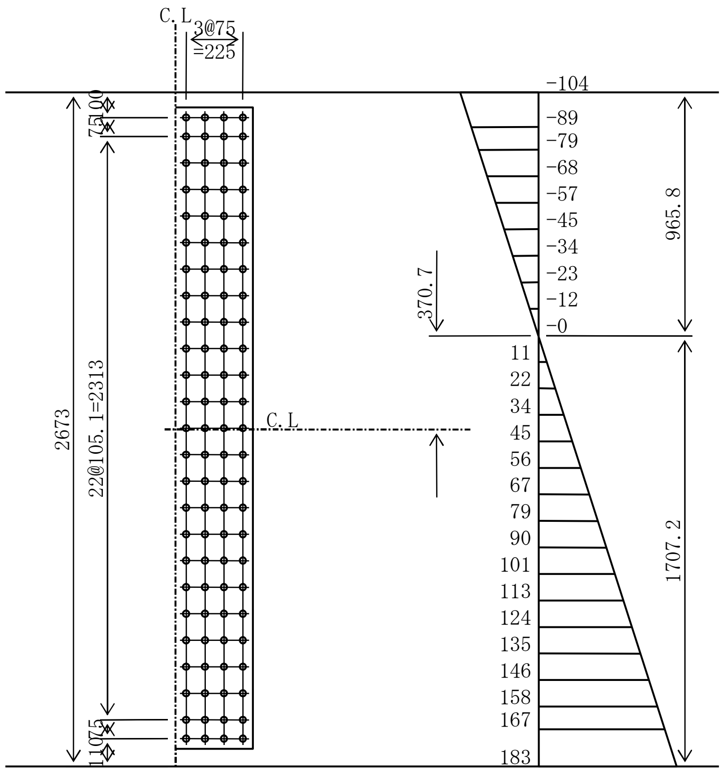
(a) Section area of main plate (Web plate)

1-RWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -104 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = 183 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 104 N/mm^2
σLn = 183 N/mm^2
τ = 37 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row
Sharing width: b1 = 14.8 cm
Total force to be shared
P1 = 148 * 14 * (167 + 183) / 2 = 361771 N
Required bolt number (Bolt number to be used)
N1 = 361771 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force
ρs = τ * A / 100 = 37 * 37422 / 100 = 13775 N < ρa = 108000 N
Combined stress
$\rho c25$ = $\sqrt{((361771 / 4)^2 + 13775^2)}$ = 91486 N < ρa = 108000 N
(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 * 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3078781 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2742258 cm^4

Bending moment to be shared by the web

Mw = 183 * 2742258*10^4 / 1707 = 2941*10^6 N·mm

Bending stress of splice plates

σsp = 2941*10^6 / (3078781*10^4) * 1637 = 156 N/mm^2 ＜ σa = 210 N/mm^2

(264) G3 J-24(Sec-24) LFLG

(a) Acting stress

σ tmax = 185 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

τ max = 25 N/mm^2

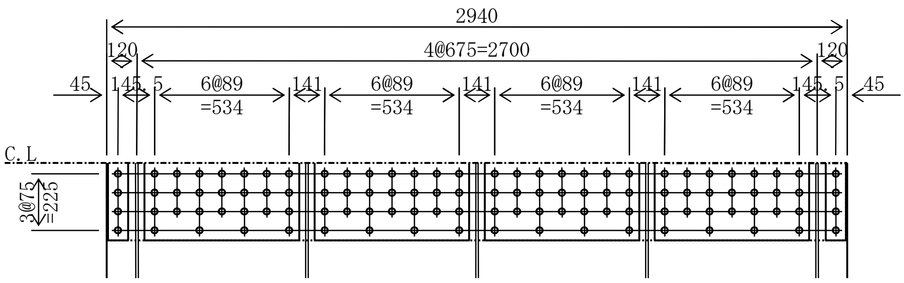
(b) Section area of main plate

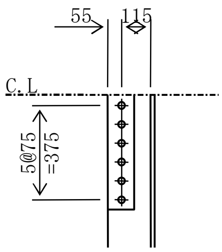
1-LFLG PL 2940 * 16 Ag = 470.4 cm^2 (SM490Y)

3-RIB PL 170 * 17 Agr = 86.7 cm^2 (SM490Y)

ΣAg = Ag + Agr = 470.4 + 86.7 = 557.1 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 16 A = 470.4

(470.4 - (18* 2.5)* 1.6) * 1.1 = 438.2 < 470.4 ∴An = 438.2 cm^2

3-RIB PL 170 * 17 Ar = 86.7

(86.7 - 3*(1* 2.7)* 1.7) * 1.1 = 80.2 < 86.7 ∴Anr = 80.2 cm^2

ΣAn = An + Anr = 438.2 + 80.2 = 518.5 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 185 * 557.1 / 518.5 = 199 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 199 * 43824 = 8703525 N

> 0.75 σ ta * An / 1.1 = 158 * 43824 / 1.1 = 6274800 N

・Rib Ptr = σ tn * Anr = 199 * 8022 = 1593243 N

> 0.75 σ ta * Anr/ 1.1 = 158 * 8022 / 1.1 = 1148648 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 438.2 / 2 = 219.1 cm^2

・Rib AnrR = Anr = 80.2 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 8703525 / 108000 = 80.6 pcs. (108 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 1593243 / 108000 = 14.8 pcs. (3 @ 6 = 18 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,6 unites)

(h) Tensile force per one bolt

ρp = Pt / 108 = 8703525 / 108 = 80588 N

ρs = τ * Ag / 108 = 25 * 47040 / 108 = 10954 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(80588^2 + 10954^2)}$ = 81329 N < ρa = 108000 N

(i) Check of splice plates

	(SM490Y)	Ags(cm²)	deduction of bolt holes		Ans(cm²)
2-SPL PL	80 * 11	(17.6 -	2*(1*2.5)* 1.1)*1.1= 13.3<	17.6	∴ 13.3
4-SPL PL	614 * 11	(270.2 -	4*(7*2.5)* 1.1)*1.1= 212.5<	270.2	∴212.5
		287.8			225.8 > AnR
1-SPL PL	2930 * 10	(293.0 -	(30*2.5)* 1.0)*1.1= 239.8<	293.0	∴239.8 > AnR
6-SPL PL	100 * 17	(102.0 -	6*(1*2.7)* 1.7)*1.1= 81.9<	102.0	∴ 81.9 >AnrR

(265) G3 J-25(Sec-25) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -141 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

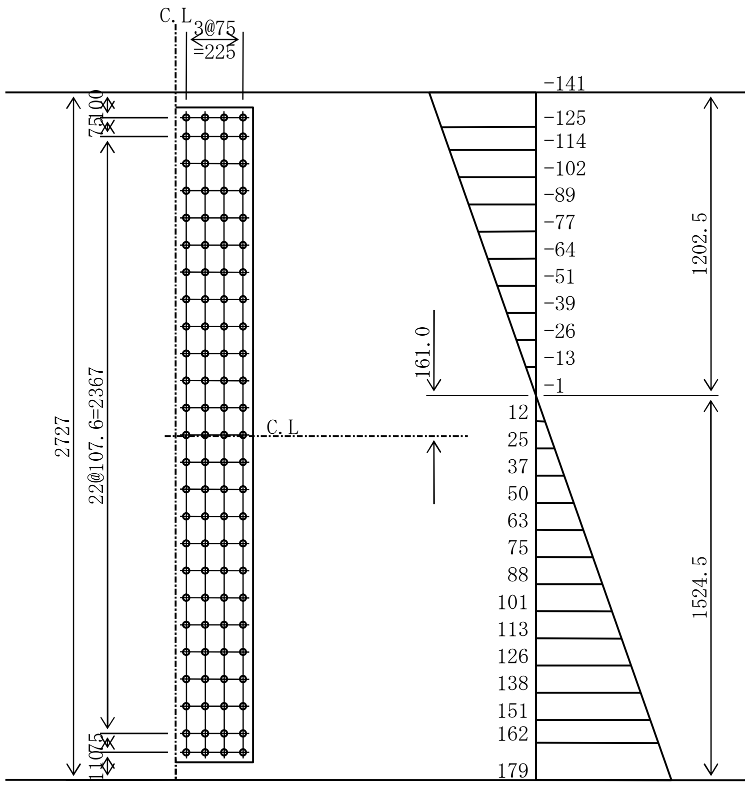
σL = 179 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 141 N/mm^2

σLn = 179 N/mm^2

τ = 29 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (162 + 179) / 2 = 352135 N

Required bolt number (Bolt number to be used)

N1 = 352135 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 29 * 38178 / 100 = 11222 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((352135 / 4)^2 + 11222^2)}$ = 88746 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 * 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 2741040 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2464888 cm^4

Bending moment to be shared by the web

Mw = 179 * 2464888*10^4 / 1524 = 2897*10^6 N·mm

Bending stress of splice plates

σsp = 2897*10^6 / (2741040*10^4) * 1454 = 154 N/mm^2 ＜ σa = 210 N/mm^2

(266) G3 J-25(Sec-25) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -135 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

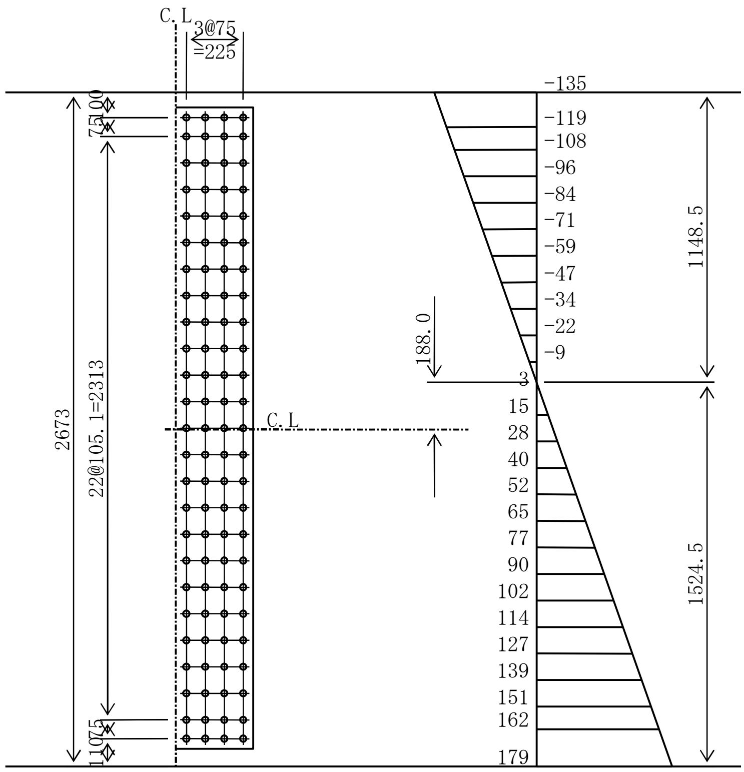
σL = 179 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 135 N/mm^2

σLn = 179 N/mm^2

τ = 27 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (162 + 179) / 2 = 352612 N

Required bolt number (Bolt number to be used)

N1 = 352612 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

$\rho s = \tau * A / 100$ = 27 * 37422 / 100 = 10261 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((352612 / 4)^2 + 10261^2)}$ = 88748 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 2620072 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2360410 cm^4

Bending moment to be shared by the web

Mw = 179 ＊ $2360410*10^4$ / 1524 = $2778*10^6$ N･mm

Bending stress of splice plates

σsp = $2778*10^6$ / ($2620072*10^4$) ＊ 1454 = 154 N/mm^2 ＜ σa = 210 N/mm^2

(267) G3 J-25(Sec-25) LFLG

(a) Acting stress

σtmax = 182 N/mm² 0.75σta = 0.75 * 210 = 158 N/mm²

τmax = 13 N/mm²

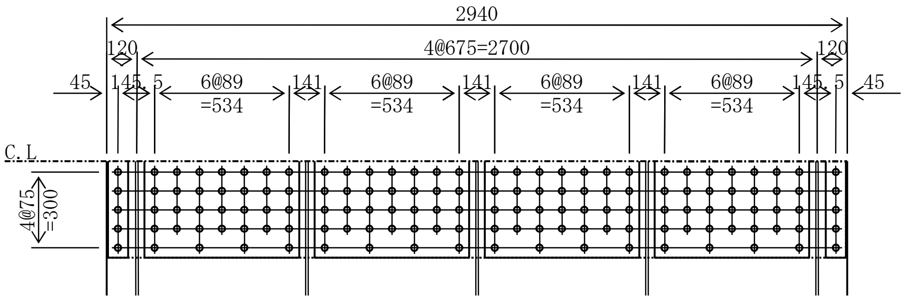
(b) Section area of main plate

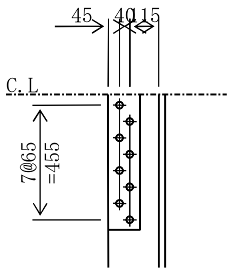
1-LFLG PL 2940 * 25 Ag = 735.0 cm² (SM490Y)

3-RIB PL 200 * 22 Agr = 132.0 cm² (SM490Y)

ΣAg = Ag + Agr = 735.0 + 132.0 = 867.0 cm²

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 25 A = 735.0

(735.0 - (18* 2.5)* 2.5) * 1.1 = 684.8 < 735.0 ∴An = 684.8 cm²

3-RIB PL 200 * 22 Ar = 132.0

(132.0 - 3*(1* 2.7+ 1*0.059)* 2.2) * 1.1 = 125.2 < 132.0 ∴Anr = 125.2 cm²

ΣAn = An + Anr = 684.8 + 125.2 = 809.9 cm²

σtn = σtmax * ΣAg / ΣAn = 182 * 867.0 / 809.9 = 195 N/mm²

< σta = 210 N/mm²

(e) Design axial force

・Main plate Pt = σtn * An = 195 * 68475 = 13369393 N

> 0.75σta * An / 1.1 = 158 * 68475 / 1.1 = 9804375 N

・Rib Ptr = σtn * Anr = 195 * 12517 = 2443820 N

> 0.75σta * Anr/ 1.1 = 158 * 12517 / 1.1 = 1792163 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 684.8 / 2 = 342.4 cm²

・Rib AnrR = Anr = 125.2 cm²

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 13369393 / 108000 = 123.8 pcs. (138 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 2443820 / 108000 = 22.6 pcs. (3 @ 8 = 24 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 5,8 unites)

(h) Tensile force per one bolt

ρp = Pt / 138 = 13369393 / 138 = 96880 N

ρs = τ * Ag / 138 = 13 * 73500 / 138 = 7087 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(96880^2 + 7087^2)} = 97139 \text{ N} < \rho a = 108000 \text{ N}$

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 17	(27.2 -	2*(1*2.5)* 1.7)*1.1= 20.6<	27.2	∴ 20.6
4-SPL PL	614 * 17	(417.5 -	4*(7*2.5)* 1.7)*1.1= 328.4<	417.5	∴328.4
		444.7			348.9 > AnR
1-SPL PL	2930 * 15	(439.5 -	(30*2.5)* 1.5)*1.1= 359.7<	439.5	∴359.7 > AnR
6-SPL PL	120 * 21	(151.2 -	6*(1*2.7+ 1*0.059)* 2.1)*1.1= 128.1<	151.2	∴128.1 >AnrR

(268) G3 J-26(Sec-26) LWEB

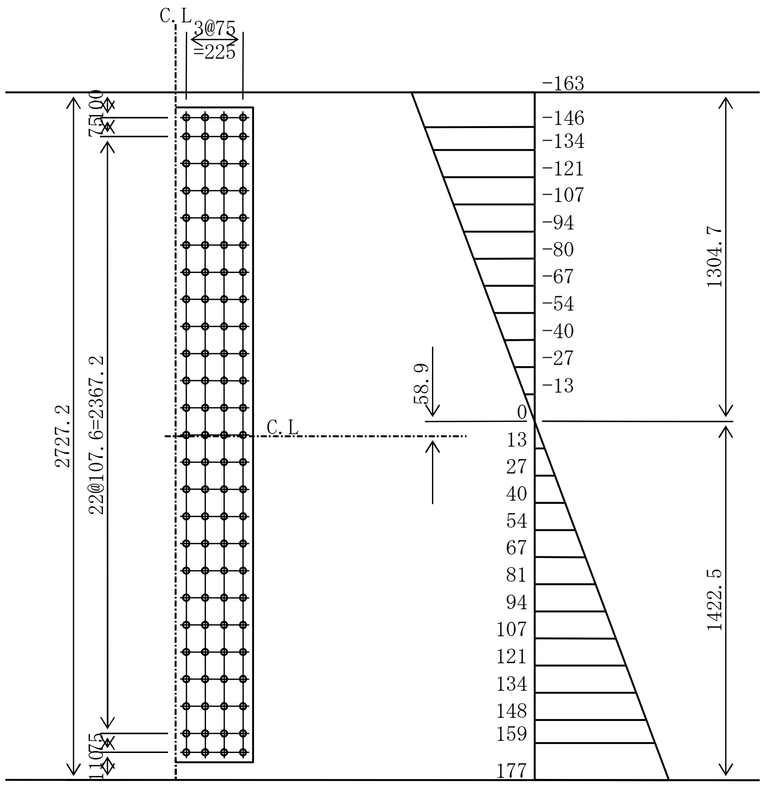
(a) Section area of main plate (Web plate)

1-LWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -163 N/mm^2 ＞ σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = 177 N/mm^2 ＞ σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 163 N/mm^2
σLn = 177 N/mm^2
τ = 22 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (159 + 177) / 2 = 347339 N

Required bolt number (Bolt number to be used)

N1 = 347339 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

$\rho s = \tau * A / 100$ = 22 * 38181 / 100 = 8546 N ＜ ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((347339 / 4)^2 + 8546^2)}$ = 87254 N ＜ ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.：Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9   As =   467.5 cm^2 (SM490Y)

Moment of inertia of splice plates   Is =   2641435 cm^4 ＞ Iw

Moment of inertia of web plate   Iw =   2379666 cm^4

Bending moment to be shared by the web

Mw =   177 ＊ 2379666*10^4 / 1423 =   2968*10^6 N·mm

Bending stress of splice plates

σsp =   2968*10^6 / (2641435*10^4) ＊ 1353 =   152 N/mm^2 ＜ σa =   210 N/mm^2

(269) G3 J-26(Sec-26) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -157 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

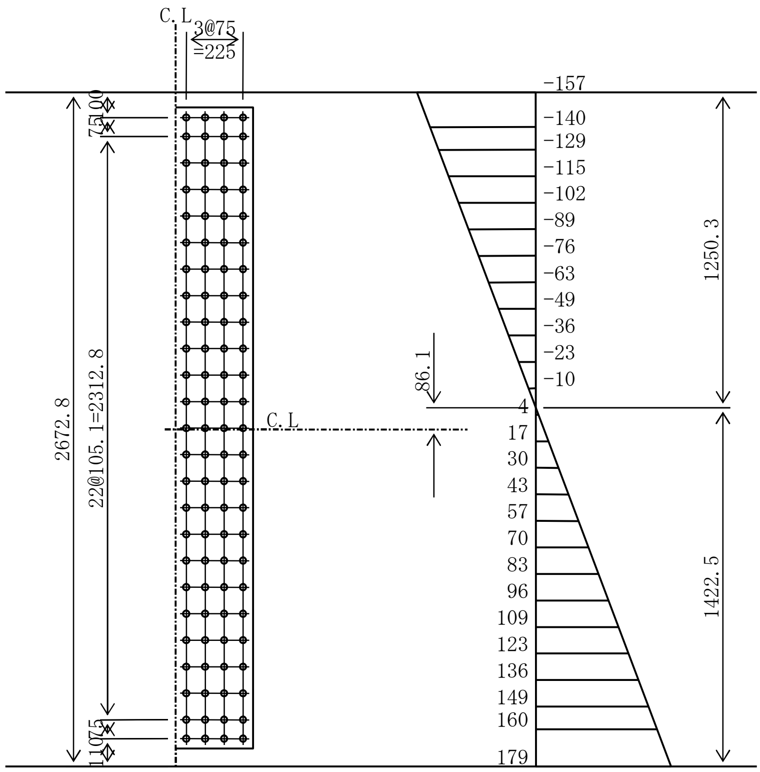
σL = 179 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 157 N/mm^2

σLn = 179 N/mm^2

τ = 21 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (160 + 179) / 2 = 350507 N

Required bolt number (Bolt number to be used)

N1 = 350507 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 21 * 37419 / 100 = 7861 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((350507 / 4)^2 + 7861^2)}$ = 87979 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 * 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 2496352 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2255429 cm^4

Bending moment to be shared by the web

Mw = 179 * 2255429*10^4 / 1423 = 2838*10^6 N·mm

Bending stress of splice plates

σsp = 2838*10^6 / (2496352*10^4) * 1353 = 154 N/mm^2 ＜ σa = 210 N/mm^2

(270) G3 J-26(Sec-26) LFLG

(a) Acting stress

σ tmax = 183 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

τ max = 8 N/mm^2

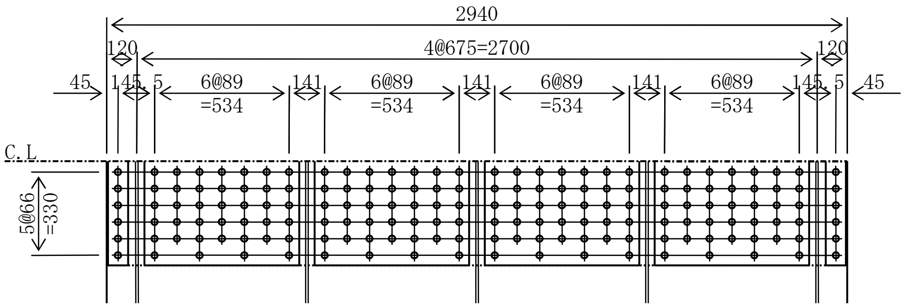
(b) Section area of main plate

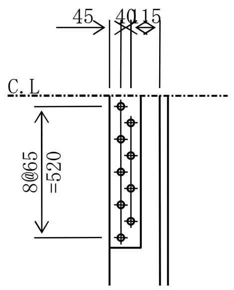
1-LFLG PL 2940 * 32 Ag = 940.8 cm^2 (SM490Y)

3-RIB PL 200 * 22 Agr = 132.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 940.8 + 132.0 = 1072.8 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 32 A = 940.8

(940.8 - (30* 2.5)* 3.2) * 1.1 = 770.9 < 940.8 ∴An = 770.9 cm^2

3-RIB PL 200 * 22 Ar = 132.0

(132.0 - 3*(1* 2.7+ 1*0.059)* 2.2) * 1.1 = 125.2 < 132.0 ∴Anr = 125.2 cm^2

ΣAn = An + Anr = 770.9 + 125.2 = 896.0 cm^2

σ tn = σ tmax * ΣAg / ΣAn * 177 / 195

= 183 * 1072.8 / 896.0 * 177 / 195 = 199 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 199 * 77088 * 168 / 150 = 17181181 N

> 0.75 σ ta * An / 1.1 = 158 * 77088 * 168 / 150 / 1.1 = 12362112 N

・Rib Ptr = σ tn * Anr = 199 * 12517 = 2490794 N

> 0.75 σ ta * Anr/ 1.1 = 158 * 12517 / 1.1 = 1792163 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 770.9 * 168 / 150 / 2 = 431.7 cm^2

・Rib AnrR = Anr = 125.2 cm^2

(g) Required bolt number

・Main plate $n = Pt / (108000 * 1.00) = 17181181 / 108000 = 159.1$ pcs. (168 bolts will be used.)

・Rib $nr = Ptr / (108000 * 0.98) = 2490794 / 105840 = 23.5$ pcs. (3 @ 9 = 27 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 6,9 unites)

(h) Tensile force per one bolt

$\rho p = Pt / 168 = 17181181 / 168 = 102269$ N

$\rho s = \tau * Ag / 168 = 8 * 94080 / 168 = 4645$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(102269^2 + 4645^2)} = 102374 \text{ N} < \rho a = 108000$ N

(i) Check of splice plates

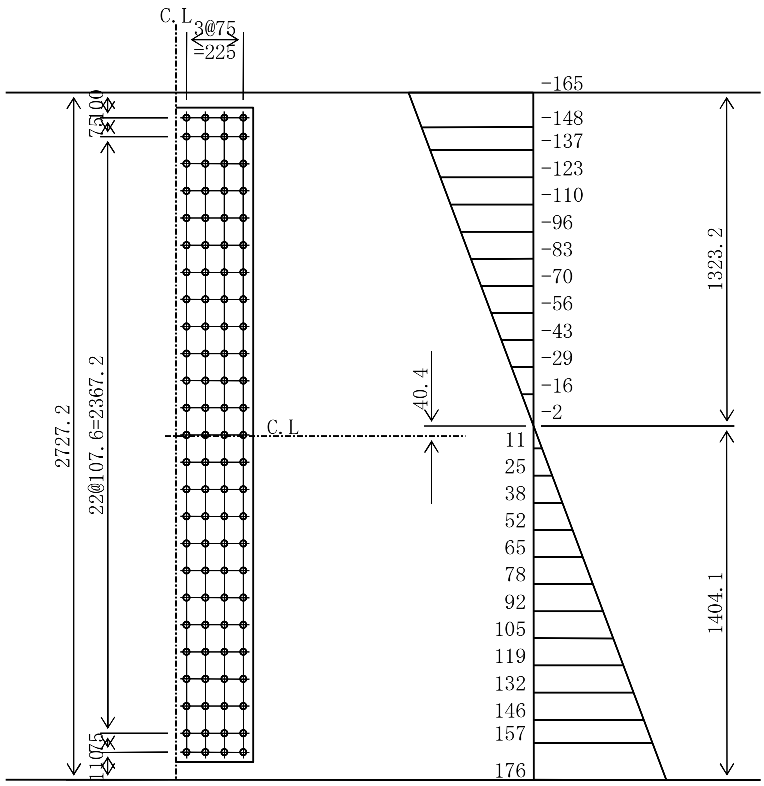
	(SM490Y)	$Ags(cm^2)$	deduction of bolt holes		$Ans(cm^2)$
2-SPL PL	80 * 22	(35.2 -	2*(1*2.5)* 2.2)*1.1= 26.6<	35.2	∴ 26.6
4-SPL PL	614 * 22	(540.3 -	4*(7*2.5)* 2.2)*1.1= 425.0<	540.3	∴425.0
		575.5			451.6 > AnR
1-SPL PL	2930 * 19	(556.7 -	(30*2.5)* 1.9)*1.1= 455.6<	556.7	∴455.6 > AnR
6-SPL PL	120 * 21	(151.2 -	6*(1*2.7+ 1*0.059)* 2.1)*1.1= 128.1<	151.2	∴128.1 >AnrR

(271) G3 J-27(Sec-27) LWEB

(a) Section area of main plate (Web plate)
1-LWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress
σU = -165 N/mm^2 ＞ σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = 176 N/mm^2 ＞ σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 165 N/mm^2
σLn = 176 N/mm^2
τ = 19 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress
Check of bolt at 25th row
Sharing width: b1 = 14.8 cm
Total force to be shared
P1 = 148 * 14 * (157 + 176) / 2 = 343546 N
Required bolt number (Bolt number to be used)
N1 = 343546 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force
ρs = τ * A / 100 = 19 * 38181 / 100 = 7145 N ＜ ρa = 108000 N
Combined stress
$\rho c25$ = $\sqrt{((343546 / 4)^2 + 7145^2)}$ = 86183 N ＜ ρa = 108000 N
(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 2633896 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2372810 cm^4

Bending moment to be shared by the web

Mw = 176 ＊ 2372810*10^4 / 1404 = 2967*10^6 N･mm

Bending stress of splice plates

σsp = 2967*10^6 / (2633896*10^4) ＊ 1334 = 150 N/mm^2 ＜ σa = 210 N/mm^2

(272) G3 J-27(Sec-27) RWEB

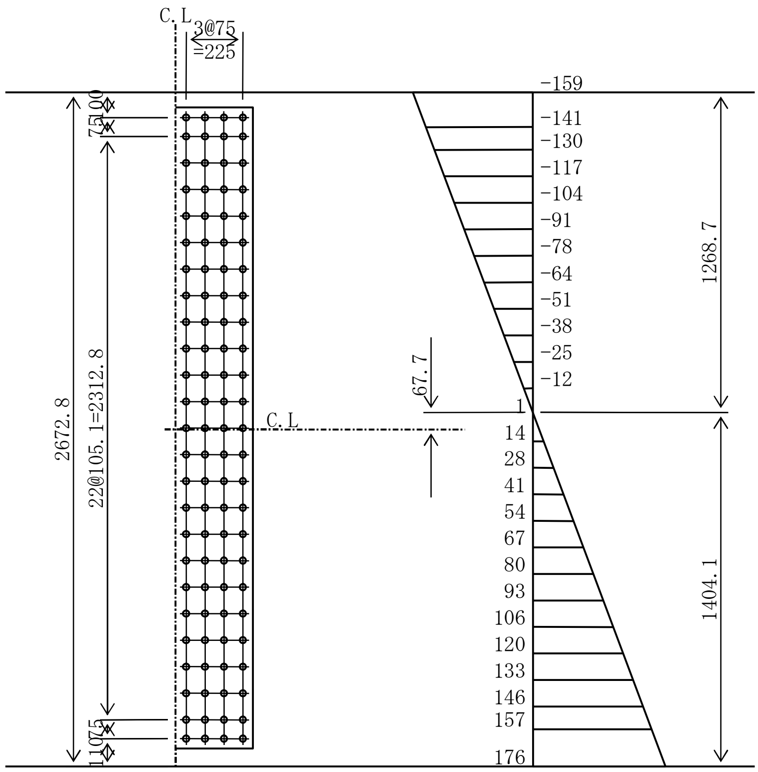
(a) Section area of main plate (Web plate)

1-RWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -159 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = 176 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 159 N/mm^2
σLn = 176 N/mm^2
τ = 18 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (157 + 176) / 2 = 343546 N

Required bolt number (Bolt number to be used)

N1 = 343546 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 18 * 37419 / 100 = 6595 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{}$((343546 / 4)^2 + 6595^2) = 86139 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 2484052 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2244676 cm^4

Bending moment to be shared by the web

$Mw = 176 * 2244676*10^4 / 1404 = 2807*10^6$ N・mm

Bending stress of splice plates

$\sigma sp = 2807*10^6 / (2484052*10^4) * 1334 = 151$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(273) G3 J-27(Sec-27) LFLG

(a) Acting stress

$\sigma tmax$ = 180 N/mm^2 0.75σta = 0.75 * 210 = 158 N/mm^2

τmax = 7 N/mm^2

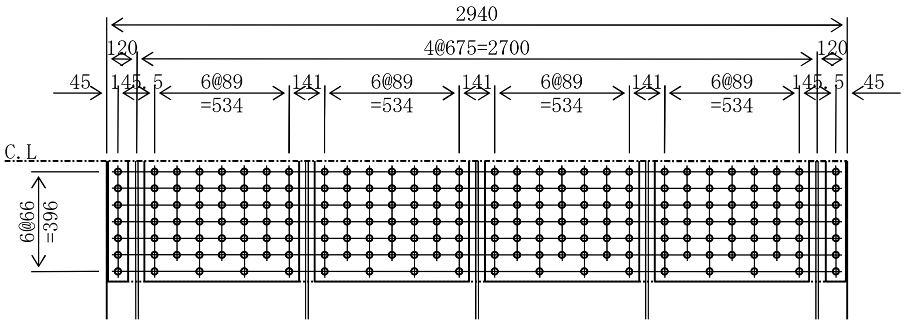
(b) Section area of main plate

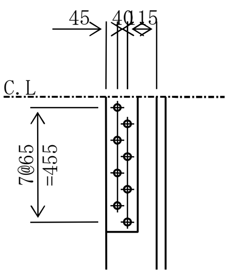
1-LFLG PL 2940 * 36 Ag = 1058.4 cm^2 (SM490Y)

3-RIB PL 200 * 22 Agr = 132.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 1058.4 + 132.0 = 1190.4 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 36 A = 1058.4

(1058.4 - (30* 2.5)* 3.6) * 1.1 = 867.2 < 1058.4 ∴An = 867.2 cm^2

3-RIB PL 200 * 22 Ar = 132.0

(132.0 - 3*(1* 2.7+ 1*0.059)* 2.2) * 1.1 = 125.2 < 132.0 ∴Anr = 125.2 cm^2

ΣAn = An + Anr = 867.2 + 125.2 = 992.4 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn * 204 / 222

= 180 * 1190.4 / 992.4 * 204 / 222 = 199 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 199 * 86724 * 198 / 180 = 18936806 N

> 0.75σta * An / 1.1 = 158 * 86724 * 198 / 180 / 1.1 = 13659030 N

・Rib Ptr = σtn * Anr = 199 * 12517 = 2484645 N

> 0.75σta * Anr/ 1.1 = 158 * 12517 / 1.1 = 1792163 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 867.2 * 198 / 180 / 2 = 477.0 cm^2

・Rib AnrR = Anr = 125.2 cm^2

(g) Required bolt number

・Main plate $n = Pt / (108000 * 1.00) = 18936806 / 108000 = 175.3$ pcs. (198 bolts will be used.)

・Rib $nr = Ptr / (108000 * 1.00) = 2484645 / 108000 = 23.0$ pcs. (3 @ 8 = 24 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 7,8 unites)

(h) Tensile force per one bolt

$\rho p = Pt / 198 = 18936806 / 198 = 95640$ N

$\rho s = \tau * Ag / 198 = 7 * 105840 / 198 = 3499$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(95640^2 + 3499^2)} = 95704 \text{ N} < \rho a = 108000 \text{ N}$

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
2-SPL PL	80 * 24	(38.4 -	2*(1*2.5)* 2.4)*1.1=	29.0<	38.4	∴ 29.0
4-SPL PL	614 * 24	(589.4 -	4*(7*2.5)* 2.4)*1.1=	463.6<	589.4	∴463.6
		627.8				492.6 > AnR
1-SPL PL	2930 * 20	(586.0 -	(30*2.5)* 2.0)*1.1=	479.6<	586.0	∴479.6 > AnR
6-SPL PL	120 * 21	(151.2 -	6*(1*2.7+ 1*0.059)* 2.1)*1.1=	128.1<	151.2	∴128.1 >AnrR

(274) G3 J-28(Sec-29) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -158 N/mm^2 ＞ σa * 0.75 = 210 * 0.75 = 158 N/mm^2

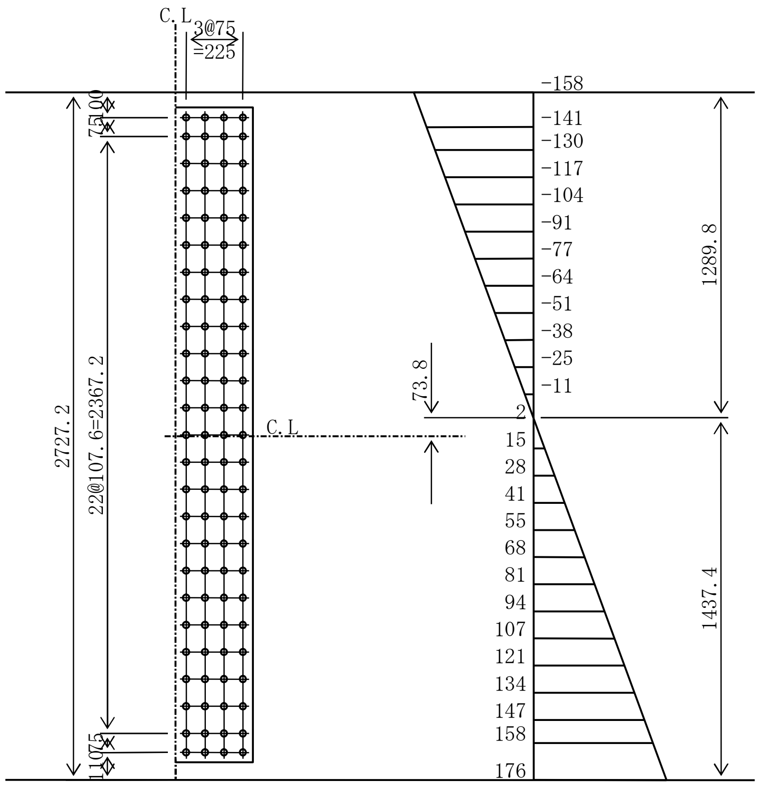
σL = 176 N/mm^2 ＞ σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 N/mm^2

σLn = 176 N/mm^2

τ = 16 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (158 + 176) / 2 = 345259 N

Required bolt number (Bolt number to be used)

N1 = 345259 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

$\rho s = \tau * A / 100$ = 16 * 38181 / 100 = 6066 N ＜ ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((345259 / 4)^2 + 6066^2)}$ = 86528 N ＜ ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 * 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 2649997 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2387227 cm^4

Bending moment to be shared by the web

Mw = 176 * 2387227*10^4 / 1437 = 2927*10^6 N・mm

Bending stress of splice plates

σsp = 2927*10^6 / (2649997*10^4) * 1367 = 151 N/mm^2 ＜ σa = 210 N/mm^2

(275) G3 J-28(Sec-29) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -151 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

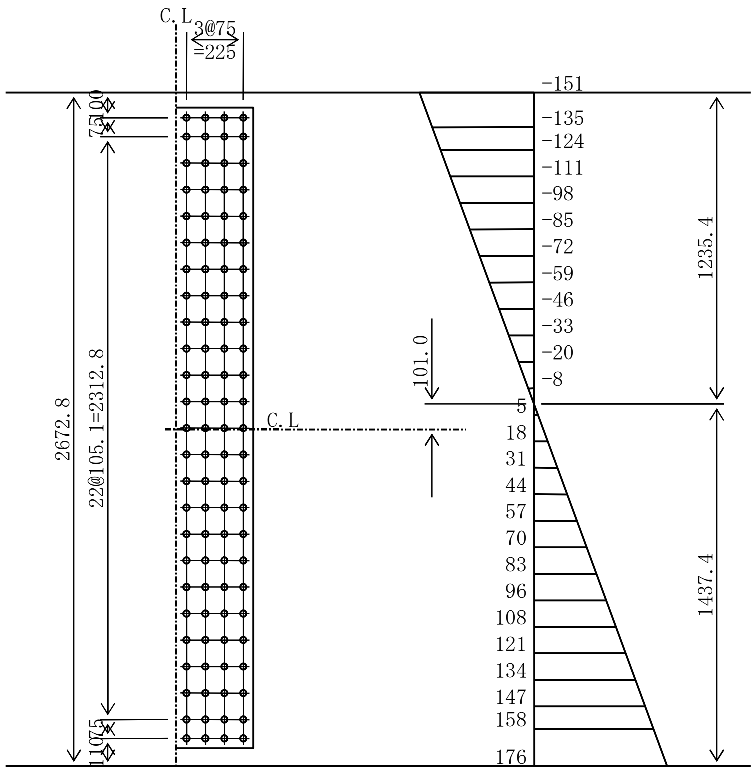
σL = 176 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 151 N/mm^2

σLn = 176 N/mm^2

τ = 15 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (158 + 176) / 2 = 345259 N

Required bolt number (Bolt number to be used)

N1 = 345259 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 15 * 37419 / 100 = 5604 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((345259 / 4)^2 + 5604^2)}$ = 86496 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 2508372 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2265811 cm^4

Bending moment to be shared by the web

Mw = 176 ＊ $2265811*10^4$ / 1437 = $2778*10^6$ N･mm

Bending stress of splice plates

σsp = $2778*10^6$ / ($2508372*10^4$) ＊ 1367 = 151 N/mm^2 ＜ σa = 210 N/mm^2

(276) G3 J-28(Sec-29) LFLG

(a) Acting stress

σ tmax = 181 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

τ max = 6 N/mm^2

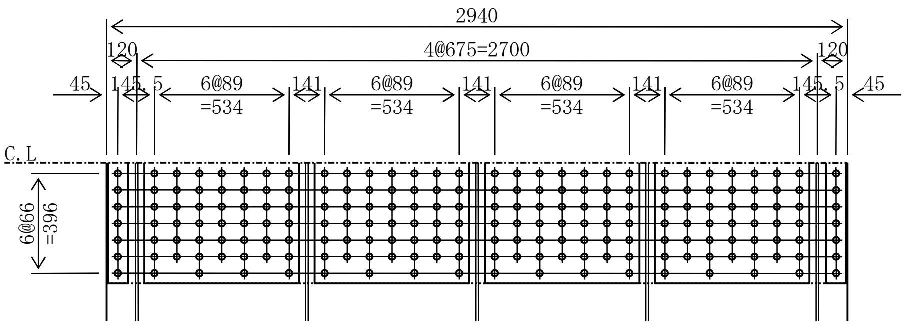
(b) Section area of main plate

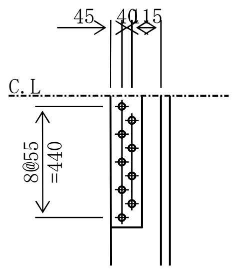
1-LFLG PL 2940 * 36 Ag = 1058.4 cm^2 (SM490Y)

3-RIB PL 200 * 22 Agr = 132.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 1058.4 + 132.0 = 1190.4 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 36 A = 1058.4

(1058.4 - (30* 2.5)* 3.6) * 1.1 = 867.2 < 1058.4 ∴An = 867.2 cm^2

3-RIB PL 200 * 22 Ar = 132.0

(132.0 - 3*(1* 2.7+ 1*0.809)* 2.2) * 1.1 = 119.7 < 132.0 ∴Anr = 119.7 cm^2

ΣAn = An + Anr = 867.2 + 119.7 = 987.0 cm^2

σ tn = σ tmax * ΣAg / ΣAn * 207 / 225

= 181 * 1190.4 / 987.0 * 207 / 225 = 200 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 200 * 86724 * 198 / 180 = 19122959 N

> 0.75 σ ta * An / 1.1 = 158 * 86724 * 198 / 180 / 1.1 = 13659030 N

・Rib Ptr = σ tn * Anr = 200 * 11972 = 2399920 N

> 0.75 σ ta * Anr/ 1.1 = 158 * 11972 / 1.1 = 1714200 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 867.2 * 198 / 180 / 2 = 477.0 cm^2

・Rib AnrR = Anr = 119.7 cm^2

(g) Required bolt number

・Main plate　n　= Pt　/ (108000 * 1.00) = 19122959 / 108000 = 177.1 pcs. (198 bolts will be used.)

・Rib　nr = Ptr / (108000 * 0.98) = 2399920 / 105840 = 22.7 pcs. (3 @ 9 = 27 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 7,9 unites)

(h) Tensile force per one bolt

ρp = Pt / 198 = 19122959 / 198 = 96581 N

ρs = τ * Ag / 198 = 6 * 105840 / 198 = 3024 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(96581^2 + 3024^2)}$ = 96628 N ＜ ρa = 108000 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 24	(38.4 -	2*(1*2.5)* 2.4)*1.1= 29.0＜	38.4	∴ 29.0
4-SPL PL	614 * 24	(589.4 -	4*(7*2.5)* 2.4)*1.1= 463.6＜	589.4	∴463.6
		627.8			492.6 ＞ AnR
1-SPL PL	2930 * 21	(615.3 -	(30*2.5)* 2.1)*1.1= 503.6＜	615.3	∴503.6 ＞ AnR
6-SPL PL	120 * 22	(158.4 -	6*(1*2.7+ 1*0.809)* 2.2)*1.1= 123.3＜	158.4	∴123.3 ＞AnrR

(277) G3 J-29(Sec-30) LWEB

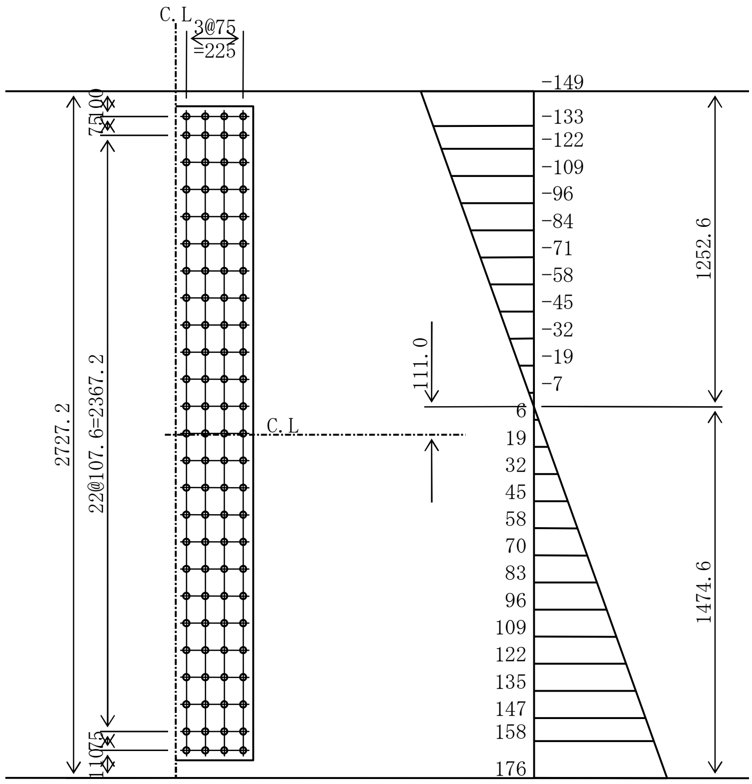
(a) Section area of main plate (Web plate)

1-LWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -149 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = 176 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 149 N/mm^2
σLn = 176 N/mm^2
τ = 23 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (158 + 176) / 2 = 345023 N

Required bolt number (Bolt number to be used)

N1 = 345023 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 23 * 38180 / 100 = 8944 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((345023 / 4)^2 + 8944^2)}$ = 86718 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 2680255 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2413354 cm^4

Bending moment to be shared by the web

Mw = 176 ＊ $2413354*10^4$ / 1475 = $2879*10^6$ N･mm

Bending stress of splice plates

σsp = $2879*10^6$ / ($2680255*10^4$) ＊ 1405 = 151 N/mm^2 ＜ σa = 210 N/mm^2

(278) G3 J-29(Sec-30) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -143 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

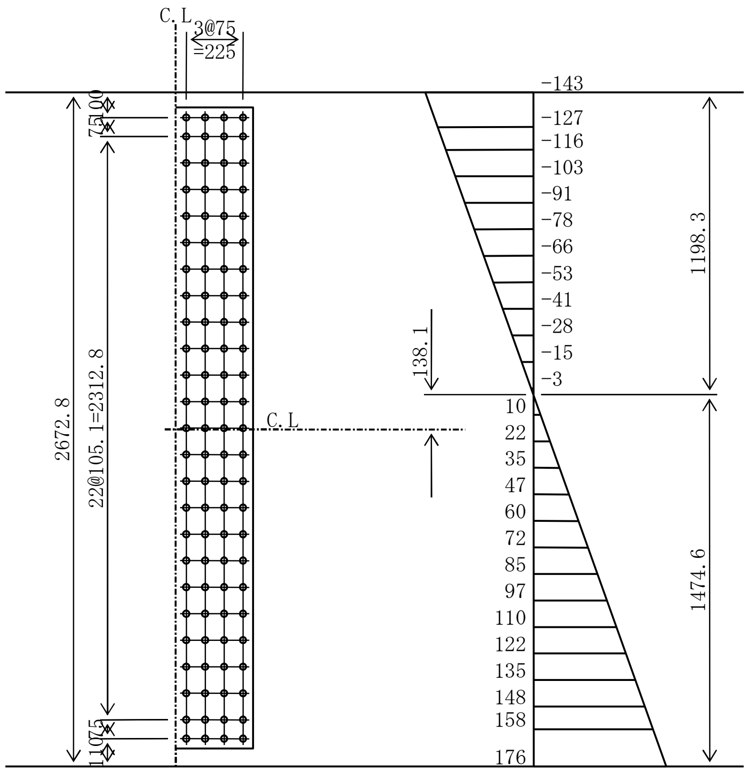
σL = 176 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 143 N/mm^2

σLn = 176 N/mm^2

τ = 22 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (158 + 176) / 2 = 345023 N

Required bolt number (Bolt number to be used)

N1 = 345023 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 22 * 37420 / 100 = 8106 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{}$((345023 / 4)^2 + 8106^2) = 86636 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 * 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 2547463 cm^4 > Iw

Moment of inertia of web plate Iw = 2299165 cm^4

Bending moment to be shared by the web

Mw = 176 * 2299165*10^4 / 1475 = 2742*10^6 N·mm

Bending stress of splice plates

σsp = 2742*10^6 / (2547463*10^4) * 1405 = 151 N/mm^2 < σa = 210 N/mm^2

(279) G3 J-29(Sec-30) LFLG

(a) Acting stress

σ tmax = 180 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

τ max = 9 N/mm^2

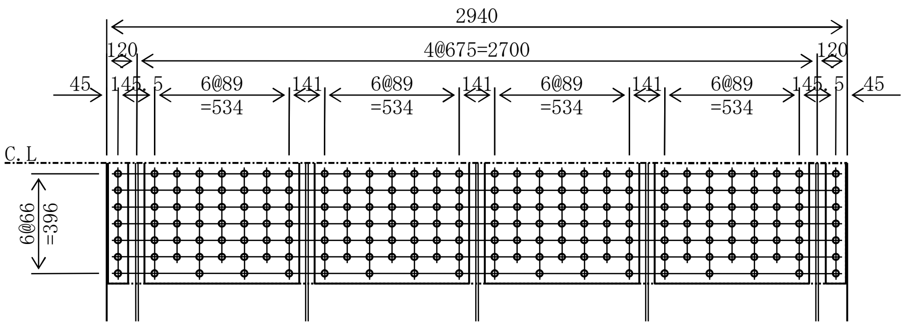
(b) Section area of main plate

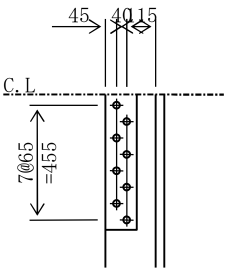
1-LFLG PL 2940 * 34 Ag = 999.6 cm^2 (SM490Y)

3-RIB PL 200 * 22 Agr = 132.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 999.6 + 132.0 = 1131.6 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 34 A = 999.6

(999.6 - (30* 2.5)* 3.4) * 1.1 = 819.1 ＜ 999.6 ∴An = 819.1 cm^2

3-RIB PL 200 * 22 Ar = 132.0

(132.0 - 3*(1* 2.7+ 1*0.059)* 2.2) * 1.1 = 125.2 ＜ 132.0 ∴Anr = 125.2 cm^2

ΣAn = An + Anr = 819.1 + 125.2 = 944.2 cm^2

σ tn = σ tmax * ΣAg / ΣAn * 204 / 222

= 180 * 1131.6 / 944.2 * 204 / 222 = 198 N/mm^2

＜ σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 198 * 81906 * 198 / 180 = 17853073 N

＞ 0.75 σ ta * An / 1.1 = 158 * 81906 * 198 / 180 / 1.1 = 12900195 N

・Rib Ptr = σ tn * Anr = 198 * 12517 = 2480243 N

＞ 0.75 σ ta * Anr/ 1.1 = 158 * 12517 / 1.1 = 1792163 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 819.1 * 198 / 180 / 2 = 450.5 cm^2

・Rib AnrR = Anr = 125.2 cm^2

(g) Required bolt number

・Main plate $n = Pt / (108000 * 1.00) = 17853073 / 108000 = 165.3$ pcs. (198 bolts will be used.)

・Rib $nr = Ptr / (108000 * 1.00) = 2480243 / 108000 = 23.0$ pcs. (3 @ 8 = 24 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 7,8 unites)

(h) Tensile force per one bolt

$\rho p = Pt / 198 = 17853073 / 198 = 90167$ N

$\rho s = \tau * Ag / 198 = 9 * 99960 / 198 = 4335$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(90167^2 + 4335^2)} = 90271 \text{ N} < \rho a = 108000 \text{ N}$

(i) Check of splice plates

	(SM490Y)	$Ags(cm^2)$	deduction of bolt holes		$Ans(cm^2)$
2-SPL PL	80 * 22	(35.2 -	2*(1*2.5)* 2.2)*1.1= 26.6<	35.2	∴ 26.6
4-SPL PL	614 * 22	(540.3 -	4*(7*2.5)* 2.2)*1.1= 425.0<	540.3	∴425.0
		575.5			451.6 > AnR
1-SPL PL	2930 * 19	(556.7 -	(30*2.5)* 1.9)*1.1= 455.6<	556.7	∴455.6 > AnR
6-SPL PL	120 * 21	(151.2 -	6*(1*2.7+ 1*0.059)* 2.1)*1.1= 128.1<	151.2	∴128.1 >AnrR

(280) G3 J-30(Sec-31) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -125 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

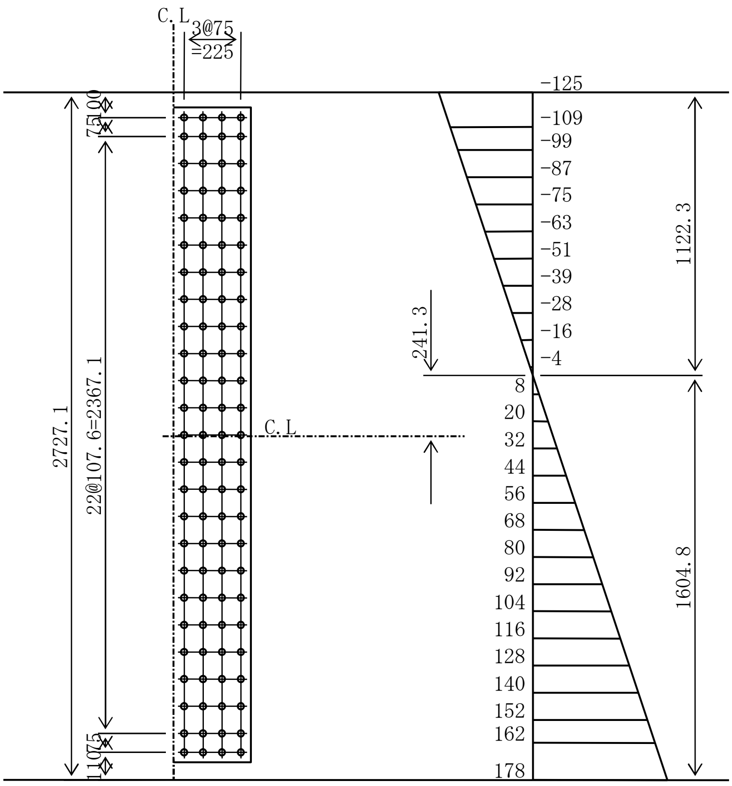
σL = 178 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 125 N/mm^2

σLn = 178 N/mm^2

τ = 36 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (162 + 178) / 2 = 350897 N

Required bolt number (Bolt number to be used)

N1 = 350897 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 36 * 38180 / 100 = 13627 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((350897 / 4)^2 + 13627^2)}$ = 88776 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 2888616 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2588494 cm^4

Bending moment to be shared by the web

$Mw = 178 * 2588494*10^4 / 1605 = 2873*10^6$ N･mm

Bending stress of splice plates

$\sigma sp = 2873*10^6 / (2888616*10^4) * 1535 = 153$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(281) G3 J-30(Sec-31) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -119 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

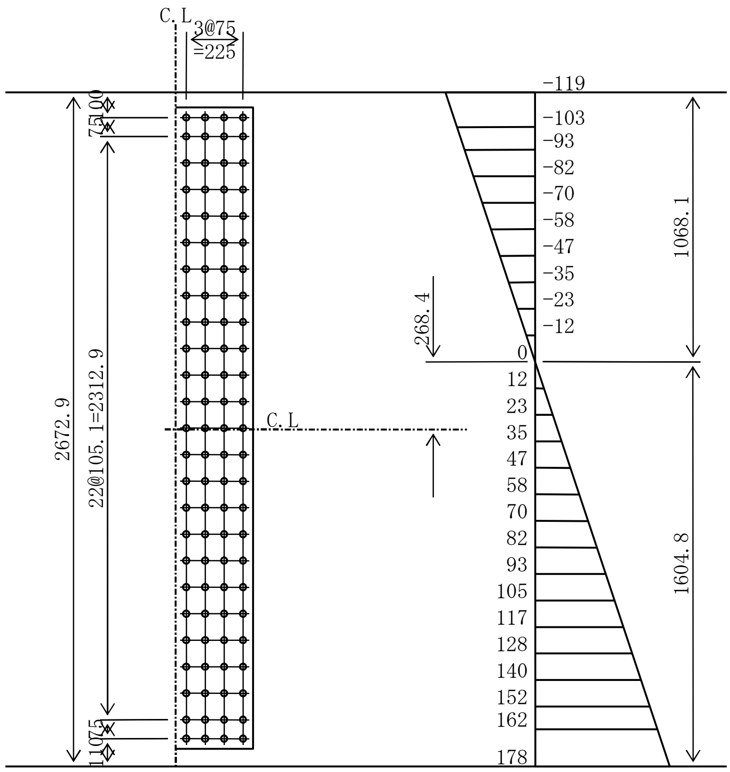
σL = 178 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 119 N/mm^2

σLn = 178 N/mm^2

τ = 32 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (162 + 178) / 2 = 350897 N

Required bolt number (Bolt number to be used)

N1 = 350897 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

$\rho s = \tau * A / 100$ = 32 * 37420 / 100 = 12015 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((350897 / 4)^2 + 12015^2)}$ = 88543 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 * 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 2784019 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 2497439 cm^4

Bending moment to be shared by the web

$Mw = 178 * 2497439*10^4 / 1605 = 2772*10^6$ N･mm

Bending stress of splice plates

$\sigma sp = 2772*10^6 / (2784019*10^4) * 1535 = 153$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(282) G3 J-30(Sec-31) LFLG

(a) Acting stress

σ tmax = 181 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

τ max = 16 N/mm^2

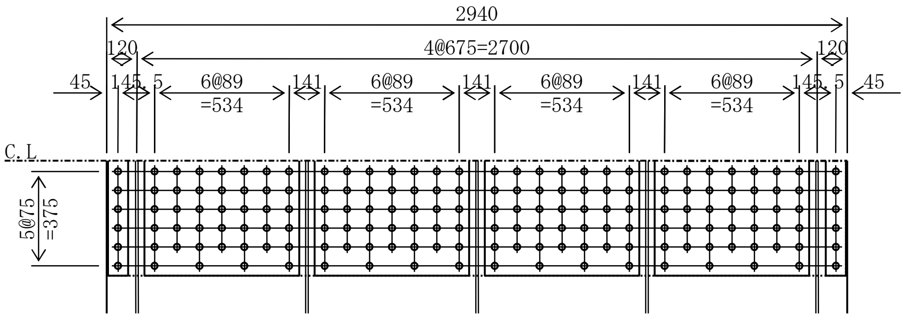
(b) Section area of main plate

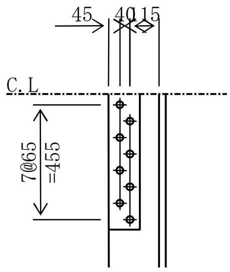
1-LFLG PL 2940 * 27 Ag = 793.8 cm^2 (SM490Y)

3-RIB PL 200 * 22 Agr = 132.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 793.8 + 132.0 = 925.8 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 27 A = 793.8

(793.8 - (30* 2.5)* 2.7) * 1.1 = 650.4 < 793.8 ∴An = 650.4 cm^2

3-RIB PL 200 * 22 Ar = 132.0

(132.0 - 3*(1* 2.7+ 1*0.059)* 2.2) * 1.1 = 125.2 < 132.0 ∴Anr = 125.2 cm^2

ΣAn = An + Anr = 650.4 + 125.2 = 775.6 cm^2

σ tn = σ tmax * ΣAg / ΣAn * 174 / 192

= 181 * 925.8 / 775.6 * 174 / 192 = 196 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 196 * 65043 * 168 / 150 = 14272016 N

> 0.75 σ ta * An / 1.1 = 158 * 65043 * 168 / 150 / 1.1 = 10430532 N

・Rib Ptr = σ tn * Anr = 196 * 12517 = 2452203 N

> 0.75 σ ta * Anr/ 1.1 = 158 * 12517 / 1.1 = 1792163 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 650.4 * 168 / 150 / 2 = 364.2 cm^2

・Rib AnrR = Anr = 125.2 cm^2

(g) Required bolt number

・Main plate $n = Pt / (108000 * 1.00) = 14272016 / 108000 = 132.1$ pcs. (168 bolts will be used.)

・Rib $nr = Ptr / (108000 * 1.00) = 2452203 / 108000 = 22.7$ pcs. (3 @ 8 = 24 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

$\rho a = 108000$ N (inorganic zinc primer is applied.) Nmax = 6,8 unites)

(h) Tensile force per one bolt

$\rho p = Pt / 168 = 14272016 / 168 = 84952$ N

$\rho s = \tau * Ag / 168 = 16 * 79380 / 168 = 7405$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(84952^2 + 7405^2)} = 85275 \text{ N} < \rho a = 108000$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes	Ans(cm^2)
2-SPL PL	80 * 18	(28.8 -	2*(1*2.5)* 1.8)*1.1= 21.8< 28.8	∴ 21.8
4-SPL PL	614 * 18	(442.1 -	4*(7*2.5)* 1.8)*1.1= 347.7< 442.1	∴347.7
		470.9		369.5 > AnR
1-SPL PL	2930 * 16	(468.8 -	(30*2.5)* 1.6)*1.1= 383.7< 468.8	∴383.7 > AnR
6-SPL PL	120 * 21	(151.2 -	6*(1*2.7+ 1*0.059)* 2.1)*1.1= 128.1< 151.2	∴128.1 >AnrR

(283) G3 J-31(Sec-32) LWEB

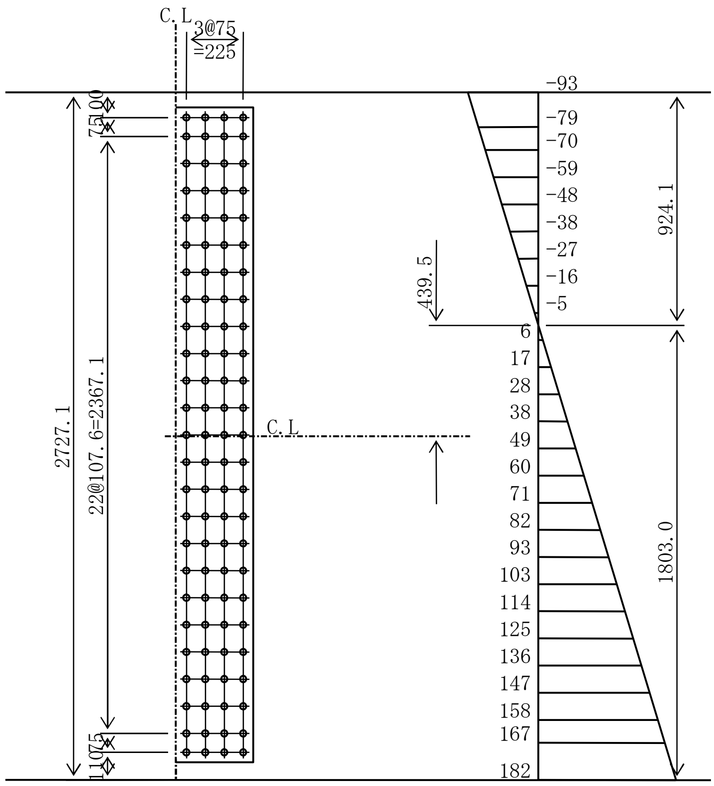
(a) Section area of main plate (Web plate)

1-LWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -93 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = 182 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 93 N/mm^2
σLn = 182 N/mm^2
τ = 49 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (167 + 182) / 2 = 360095 N

Required bolt number (Bolt number to be used)

N1 = 360095 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 49 * 38179 / 100 = 18522 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((360095 / 4)^2 + 18522^2)}$ = 91909 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 * 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3509869 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3103440 cm^4

Bending moment to be shared by the web

Mw = 182 * 3103440*10^4 / 1803 = 3130*10^6 N·mm

Bending stress of splice plates

σsp = 3130*10^6 / (3509869*10^4) * 1733 = 155 N/mm^2 ＜ σa = 210 N/mm^2

(284) G3 J-31(Sec-32) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2673 * 14 A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU = -88 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

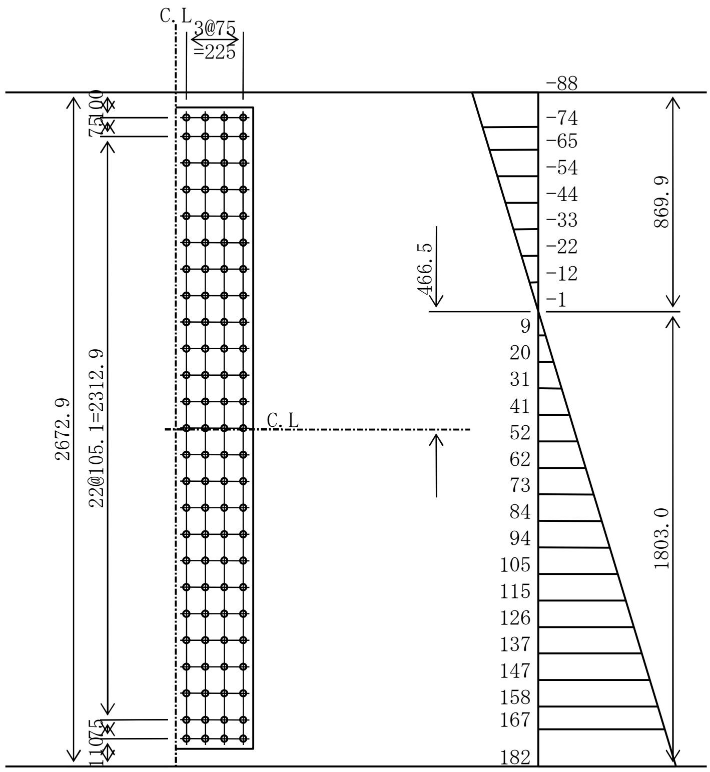
σL = 182 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 88 N/mm^2

σLn = 182 N/mm^2

τ = 43 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (167 + 182) / 2 = 360095 N

Required bolt number (Bolt number to be used)

N1 = 360095 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

$\rho s = \tau * A / 100$ = 43 * 37421 / 100 = 16128 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((360095 / 4)^2 + 16128^2)}$ = 91457 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 ＊ 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3441588 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3042446 cm^4

Bending moment to be shared by the web

Mw = 182 ＊ $3042446*10^4$ / 1803 = $3068*10^6$ N・mm

Bending stress of splice plates

σsp = $3068*10^6$ / ($3441588*10^4$) ＊ 1733 = 154 N/mm^2 ＜ σa = 210 N/mm^2

(285) G3 J-31(Sec-32) LFLG

(a) Acting stress

$\sigma tmax$ = 184 N/mm^2 0.75 σta = 0.75 * 210 = 158 N/mm^2

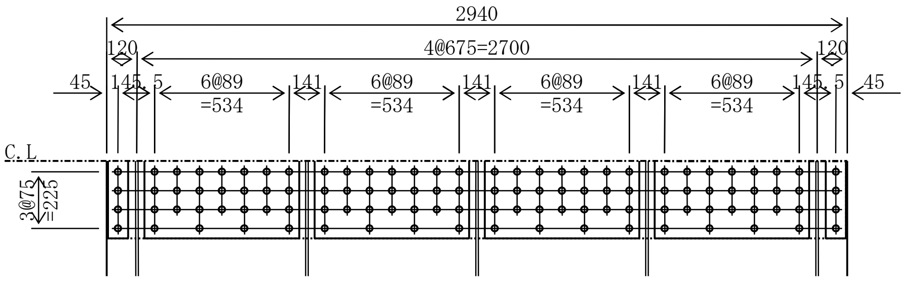
τmax = 30 N/mm^2

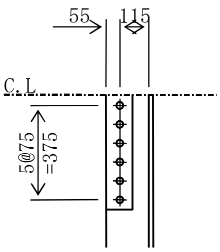
(b) Section area of main plate

1-LFLG	PL	2940 * 17	Ag =	499.8 cm^2	(SM490Y)
3-RIB	PL	170 * 17	Agr =	86.7 cm^2	(SM490Y)

ΣAg = Ag + Agr = 499.8 + 86.7 = 586.5 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 17 A = 499.8

(499.8 - (18* 2.5)* 1.7) * 1.1 = 465.6 < 499.8 ∴An = 465.6 cm^2

3-RIB PL 170 * 17 Ar = 86.7

(86.7 - 3*(1* 2.7)* 1.7) * 1.1 = 80.2 < 86.7 ∴Anr = 80.2 cm^2

ΣAn = An + Anr = 465.6 + 80.2 = 545.9 cm^2

$\sigma tn = \sigma tmax * \Sigma Ag / \Sigma An$ = 184 * 586.5 / 545.9 = 197 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 197 * 46563 = 9182114 N

> 0.75 σta * An / 1.1 = 158 * 46563 / 1.1 = 6666975 N

・Rib Ptr = σtn * Anr = 197 * 8022 = 1581979 N

> 0.75 σta * Anr/ 1.1 = 158 * 8022 / 1.1 = 1148648 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 465.6 / 2 = 232.8 cm^2

・Rib AnrR = Anr = 80.2 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 9182114 / 108000 = 85.0 pcs. (108 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 1581979 / 108000 = 14.6 pcs. (3 @ 6 = 18 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,6 unites)

(h) Tensile force per one bolt

$\rho p = Pt / 108 = 9182114 / 108 = 85020$ N

$\rho s = \tau * Ag / 108 = 30 * 49980 / 108 = 14047$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(85020^2 + 14047^2)} = 86172$ N $< \rho a = 108000$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 12	(19.2 -	2*(1*2.5)* 1.2)*1.1= 14.5<	19.2	∴ 14.5
4-SPL PL	614 * 12	(294.7 -	4*(7*2.5)* 1.2)*1.1= 231.8<	294.7	∴231.8
		313.9			246.3 > AnR
1-SPL PL	2930 * 10	(293.0 -	(30*2.5)* 1.0)*1.1= 239.8<	293.0	∴239.8 > AnR
6-SPL PL	100 * 17	(102.0 -	6*(1*2.7)* 1.7)*1.1= 81.9<	102.0	∴ 81.9 >AnrR

(286) G3 J-32(Sec-33) LWEB

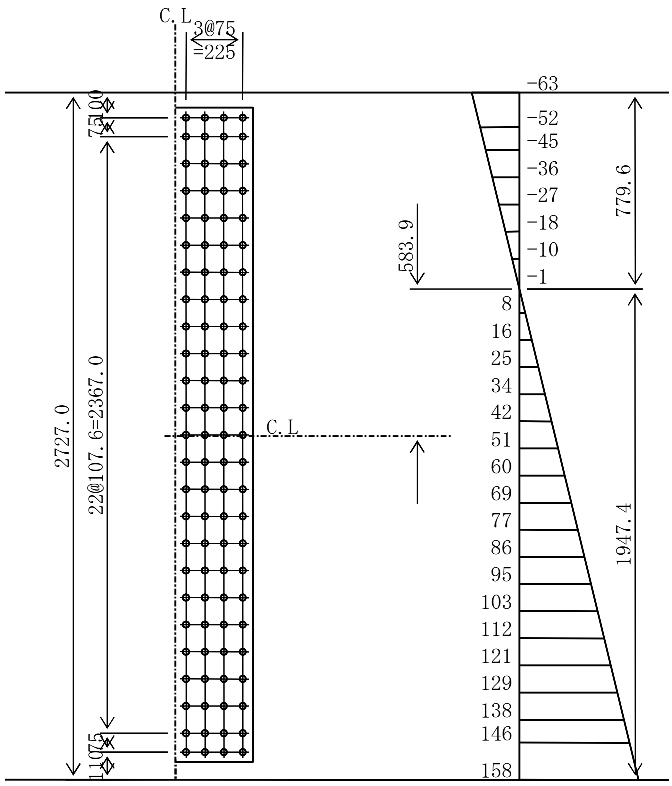
(a) Section area of main plate (Web plate)

1-LWEB PL 2727 * 14 A = 381.8 cm^2 (SM490Y)

(b) Design stress

σU = -47 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = 117 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 158 * 47 / 117 = 63 N/mm^2
σLn = 158 N/mm^2
τ = 55 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 = 148 * 14 * (146 + 158) / 2 = 312921 N

Required bolt number (Bolt number to be used)

N1 = 312921 / (108000 * 1.00) = 2.9 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 55 * 38178 / 100 = 21105 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((312921 / 4)^2 + 21105^2)}$ = 81027 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2597 ＊ 9 As = 467.5 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4194096 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3667763 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ 3667763*10^4 / 1947 = 2966*10^6 N･mm

Bending stress of splice plates

σsp = 2966*10^6 / (4194096*10^4) ＊ 1877 = 133 N/mm^2 ＜ σa = 210 N/mm^2

(287) G3 J-32(Sec-33) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 2673 * 14   A = 374.2 cm^2 (SM490Y)

(b) Design stress

σU =   -43 N/mm^2 < σa * 0.75 =   210 * 0.75 =   158 N/mm^2

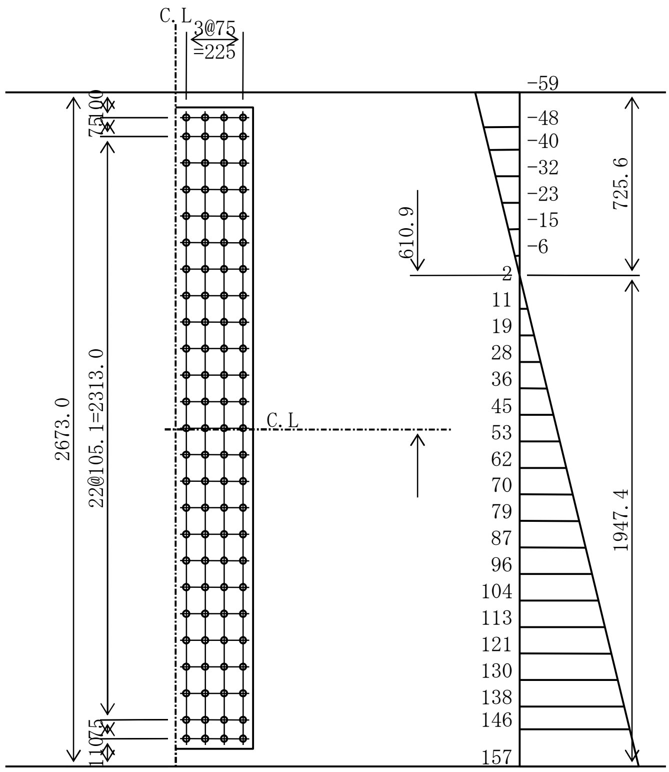
σL =   116 N/mm^2 < σa * 0.75 =   210 * 0.75 =   158 N/mm^2

σUn =   158 *   43 /   116 =   59 N/mm^2

σLn =   158 N/mm^2

τ =   49 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 14.8 cm

Total force to be shared

P1 =   148 * 14 * (146 + 157) / 2 = 312921 N

Required bolt number (Bolt number to be used)

N1 = 312921 / (108000 * 1.00) = 2.9 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 =   49 *   37422 / 100 =   18326 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((312921 / 4)^2 + 18326^2)}$ =   80348 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2543 * 9 As = 457.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4147438 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3624918 cm^4

Bending moment to be shared by the web

Mw = 158 * 3624918*10^4 / 1947 = 2932*10^6 N･mm

Bending stress of splice plates

σsp = 2932*10^6 / (4147438*10^4) * 1877 = 133 N/mm^2 ＜ σa = 210 N/mm^2

(288) G3 J-32(Sec-33) LFLG

(a) Acting stress

σ tmax = 117 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

τ max = 52 N/mm^2

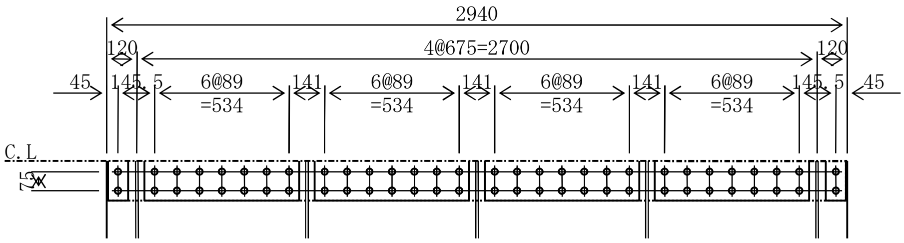
(b) Section area of main plate

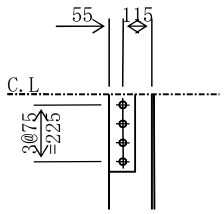
1-LFLG PL 2940 * 10   Ag = 294.0 cm^2 (SM490Y)

3-RIB PL 170 * 17   Agr = 86.7 cm^2 (SM490Y)

ΣAg = Ag + Agr = 294.0 + 86.7 = 380.7 cm^2

(c) Bolt arrangement





(d) Check of section of main plate

1- LFLG PL 2940 * 10   A = 294.0

(294.0 - (30* 2.5)* 1.0) * 1.1 = 240.9 < 294.0 ∴An = 240.9 cm^2

3-RIB PL 170 * 17   Ar = 86.7

(86.7 - 3*(1* 2.7)* 1.7) * 1.1 = 80.2 < 86.7 ∴Anr = 80.2 cm^2

ΣAn = An + Anr = 240.9 + 80.2 = 321.1 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 117 * 380.7 / 321.1 = 139 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 158 * 24090 / 1.1 = 3449250 N

> σ tn * An = 139 * 24090 = 3350782 N

・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 158 * 8022 / 1.1 = 1148648 N

> σ tn * Anr = 139 * 8022 = 1115856 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 240.9 / 2 = 120.5 cm^2

・Rib AnrR = Anr = 80.2 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 3449250 / 108000 = 31.9 pcs. (60 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 1148648 / 108000 = 10.6 pcs. (3 @ 4 = 12 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(h) Tensile force per one bolt

ρp = Pt / 60 = 3449250 / 60 = 57487 N

ρs = τ * Ag / 60 = 52 * 29400 / 60 = 25323 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(57487^2 + 25323^2)}$ = 62818 N < ρa = 108000 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 9	(14.4 -	2*(1*2.5)* 0.9)*1.1= 10.9<	14.4	∴ 10.9
4-SPL PL	614 * 9	(221.0 -	4*(7*2.5)* 0.9)*1.1= 173.8<	221.0	∴173.8
		235.4			184.7 > AnR
1-SPL PL	2930 * 9	(263.7 -	(30*2.5)* 0.9)*1.1= 215.8<	263.7	∴215.8 > AnR
6-SPL PL	100 * 17	(102.0 -	6*(1*2.7)* 1.7)*1.1= 81.9<	102.0	∴ 81.9 >AnrR

(289) G4 J-1(Sec-1) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2728 * 15 A = 409.3 cm^2 (SM490Y)

(b) Design stress

σU = -43 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

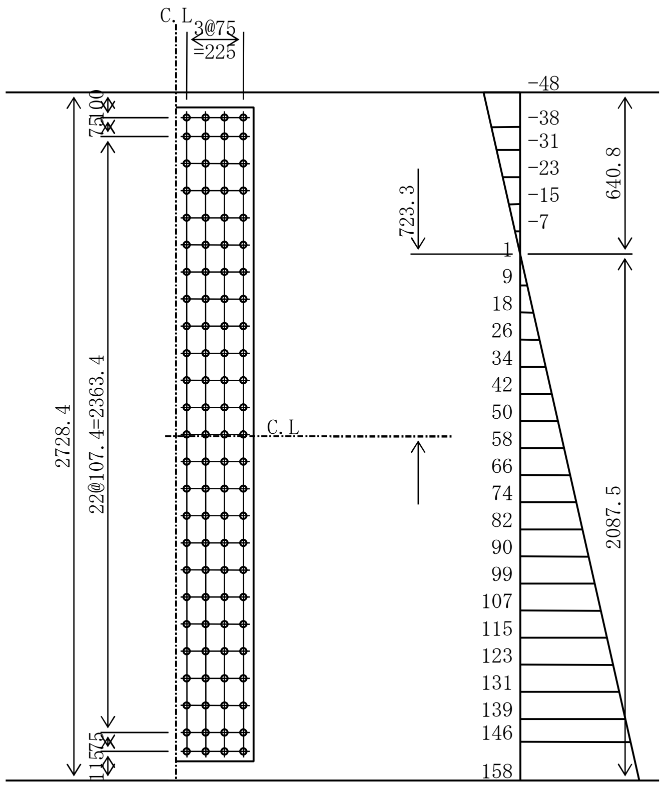
σL = 140 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 43 / 140 = 48 N/mm^2

σLn = 158 N/mm^2

τ = 48 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (146 + 158) / 2 = 347121 N

Required bolt number (Bolt number to be used)

N1 = 347121 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 48 * 40925 / 100 = 19744 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((347121 / 4)^2 + 19744^2)}$ = 88998 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2593 ＊ 9 As = 466.8 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 5008239 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4679981 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ 4679981*10^4 / 2088 = 3531*10^6 N･mm

Bending stress of splice plates

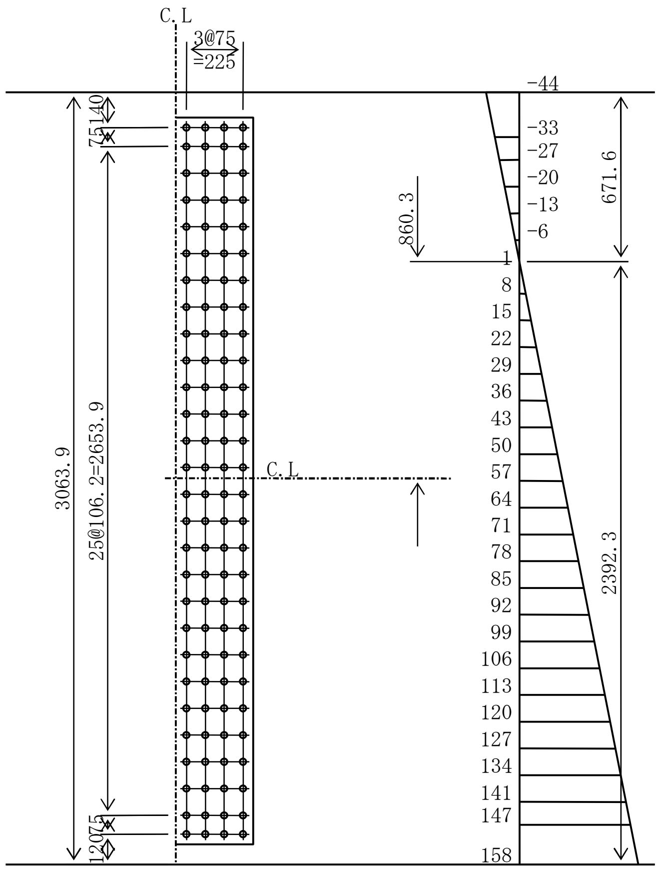
σsp = 3531*10^6 / (5008239*10^4) ＊ 2013 = 142 N/mm^2 ＜ σa = 210 N/mm^2

(290) G4 J-1(Sec-1) RWEB

(a) Section area of main plate (Web plate)
1-RWEB PL 3064 * 15 A = 459.6 cm^2 (SM490Y)

(b) Design stress
σU = -39 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = 140 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 158 * 39 / 140 = 44 N/mm^2
σLn = 158 N/mm^2
τ = 41 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress
Check of bolt at 28th row
Sharing width: b1 = 15.8 cm
Total force to be shared
P1 = 158 * 15 * (147 + 158) / 2 = 359845 N
Required bolt number (Bolt number to be used)
N1 = 359845 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force
ρs = τ * A / 112 = 41 * 45959 / 112 = 16702 N < ρa = 108000 N
Combined stress
$\rho c28$ = $\sqrt{((359845 / 4)^2 + 16702^2)}$ = 91499 N < ρa = 108000 N
(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2884 ＊ 9 As = 519.1 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 7529932 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 6997091 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ 6997091*10^4 / 2392 = 4607*10^6 N･mm

Bending stress of splice plates

σsp = 4607*10^6 / (7529932*10^4) ＊ 2312 = 141 N/mm^2 ＜ σa = 210 N/mm^2

(291) G4 J-1(Sec-1) LFLG

(a) Acting stress

σtmax = 141 N/mm^2 0.75σta = 0.75 * 210 = 158 N/mm^2

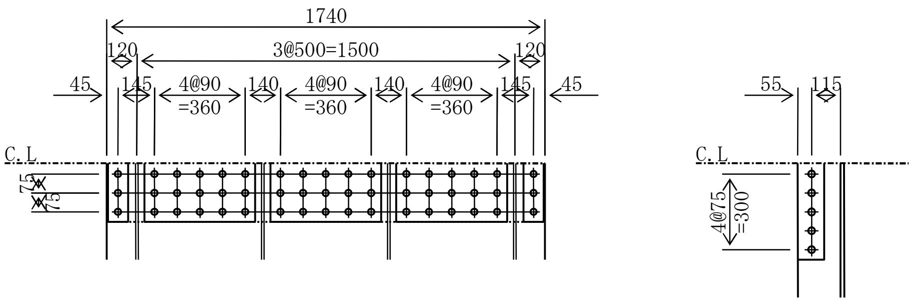
τmax = 31 N/mm^2

(b) Section area of main plate

1-LFLG	PL	1740 * 14	Ag =	243.6 cm^2	(SM490Y)
2-RIB	PL	170 * 17	Agr =	57.8 cm^2	(SM490Y)

ΣAg = Ag + Agr = 243.6 + 57.8 = 301.4 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 14 A = 243.6

(243.6 - (17* 2.5)* 1.4) * 1.1 = 202.5 < 243.6 ∴An = 202.5 cm^2

2-RIB PL 170 * 17 Ar = 57.8

(57.8 - 2*(1* 2.7)* 1.7) * 1.1 = 53.5 < 57.8 ∴Anr = 53.5 cm^2

ΣAn = An + Anr = 202.5 + 53.5 = 256.0 cm^2

σtn = σtmax * ΣAg / ΣAn = 141 * 301.4 / 256.0 = 166 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 166 * 20251 = 3356040 N

> 0.75σta * An / 1.1 = 158 * 20251 / 1.1 = 2899575 N

・Rib Ptr = σtn * Anr = 166 * 5348 = 886315 N

> 0.75σta * Anr/ 1.1 = 158 * 5348 / 1.1 = 765765 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 202.5 / 2 = 101.3 cm^2

・Rib AnrR = Anr = 53.5 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 3356040 / 108000 = 31.1 pcs. (51 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 886315 / 108000 = 8.2 pcs. (2 @ 5 = 10 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,5 unites)

(h) Tensile force per one bolt

ρp = Pt / 51 = 3356040 / 51 = 65805 N

ρs = τ * Ag / 51 = 31 * 24360 / 51 = 15024 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(65805^2 + 15024^2) = 67498 N < ρa = 108000 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
2-SPL PL	80 ＊ 9	(14.4 -	2*(1*2.5)＊ 0.9)*1.1=	10.9＜	14.4	∴ 10.9
3-SPL PL	440 ＊ 9	(118.8 -	3*(5*2.5)＊ 0.9)*1.1=	93.6＜	118.8	∴ 93.6
		133.2				104.4 ＞ AnR
1-SPL PL	1730 ＊ 9	(155.7 -	(17*2.5)＊ 0.9)*1.1=	129.2＜	155.7	∴129.2 ＞ AnR
4-SPL PL	100 ＊ 17	(68.0 -	4*(1*2.7)＊ 1.7)*1.1=	54.6＜	68.0	∴ 54.6 ＞AnrR

(292) G4 J-2(Sec-2) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2728 * 15 A = 409.3 cm^2 (SM490Y)

(b) Design stress

σU = -69 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

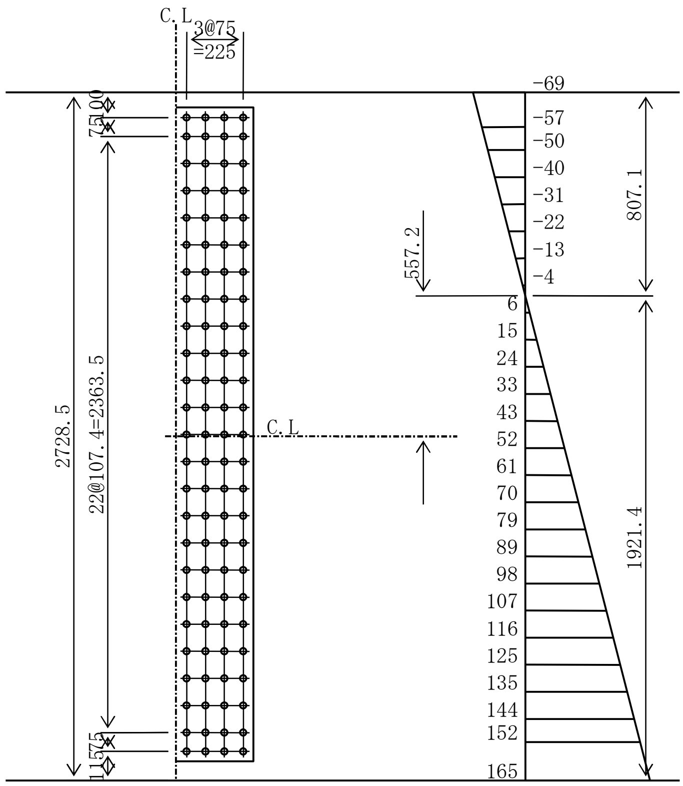
σL = 165 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 69 N/mm^2

σLn = 165 N/mm^2

τ = 37 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (152 + 165) / 2 = 361780 N

Required bolt number (Bolt number to be used)

N1 = 361780 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

$\rho s = \tau$ * A / 100 = 37 * 40927 / 100 = 15040 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((361780 / 4)^2 + 15040^2)}$ = 91687 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2593 ＊ 9 As = 466.8 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4027081 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3809602 cm^4

Bending moment to be shared by the web

Mw = 165 ＊ $3809602*10^4$ / 1921 = $3265*10^6$ N・mm

Bending stress of splice plates

σsp = $3265*10^6$ / ($4027081*10^4$) ＊ 1846 = 150 N/mm^2 ＜ σa = 210 N/mm^2

(293) G4 J-2(Sec-2) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 3064 * 15 A = 459.6 cm^2 (SM490Y)

(b) Design stress

σU = -65 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

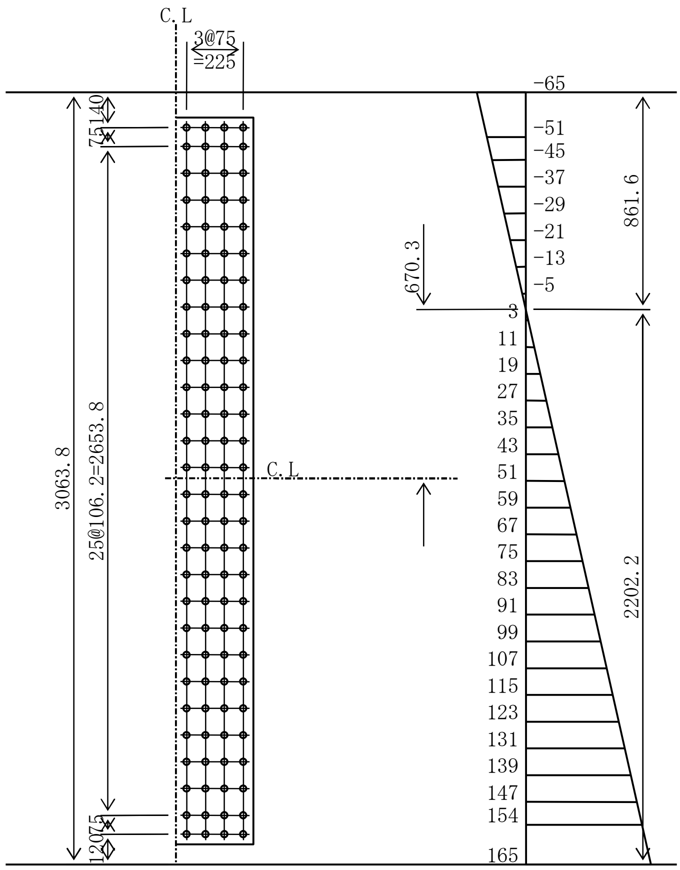
σL = 165 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 65 N/mm^2

σLn = 165 N/mm^2

τ = 31 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 15 * (154 + 165) / 2 = 376691 N

Required bolt number (Bolt number to be used)

N1 = 376691 / (108000 * 1.00) = 3.5 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 112 = 31 * 45957 / 112 = 12843 N < ρa = 108000 N

Combined stress

$\rho c28$ = $\sqrt{((376691 / 4)^2 + 12843^2)}$ = 95044 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2884 * 9 As = 519.1 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 5999732 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 5659787 cm^4

Bending moment to be shared by the web

Mw = 165 * 5659787*10^4 / 2202 = 4250*10^6 N・mm

Bending stress of splice plates

σsp = 4250*10^6 / (5999732*10^4) * 2122 = 150 N/mm^2 ＜ σa = 210 N/mm^2

(294) G4 J-2(Sec-2) LFLG

(a) Acting stress

σ tmax = 167 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

τ max = 15 N/mm^2

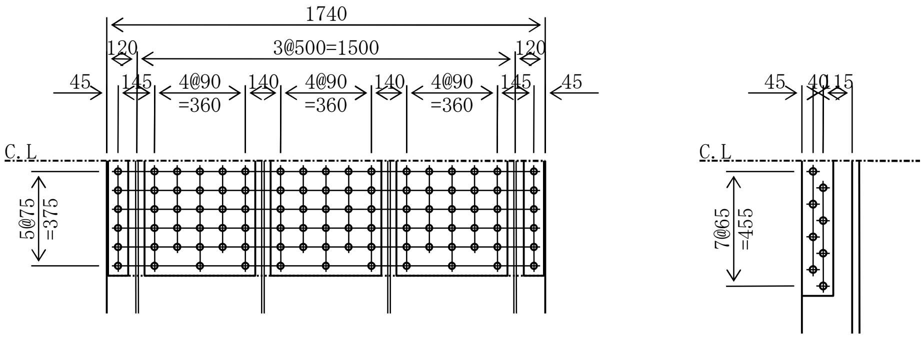
(b) Section area of main plate

1-LFLG PL 1740 * 28 Ag = 487.2 cm^2 (SM490Y)

2-RIB PL 200 * 22 Agr = 88.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 487.2 + 88.0 = 575.2 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 28 A = 487.2

(487.2 - (11* 2.5)* 2.8) * 1.1 = 451.2 < 487.2 ∴An = 451.2 cm^2

2-RIB PL 200 * 22 Ar = 88.0

(88.0 - 2*(1* 2.7+ 1*0.059)* 2.2) * 1.1 = 83.4 < 88.0 ∴Anr = 83.4 cm^2

ΣAn = An + Anr = 451.2 + 83.4 = 534.7 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 167 * 575.2 / 534.7 = 180 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 180 * 45122 = 8124189 N

> 0.75 σ ta * An / 1.1 = 158 * 45122 / 1.1 = 6460650 N

・Rib Ptr = σ tn * Anr = 180 * 8344 = 1502416 N

> 0.75 σ ta * Anr/ 1.1 = 158 * 8344 / 1.1 = 1194775 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 451.2 / 2 = 225.6 cm^2

・Rib AnrR = Anr = 83.4 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 8124189 / 108000 = 75.2 pcs. (96 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 1502416 / 108000 = 13.9 pcs. (2 @ 8 = 16 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 6,8 unites)

(h) Tensile force per one bolt

ρp = Pt / 96 = 8124189 / 96 = 84627 N

ρs = τ * Ag / 96 = 15 * 48720 / 96 = 7458 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(84627^2 + 7458^2) = 84955 N < ρa = 108000 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
2-SPL PL	80 * 20	(32.0 -	2*(1*2.5)* 2.0)*1.1=	24.2＜	32.0	∴ 24.2
3-SPL PL	440 * 20	(264.0 -	3*(5*2.5)* 2.0)*1.1=	207.9＜	264.0	∴207.9
		296.0				232.1 ＞ AnR
1-SPL PL	1730 * 16	(276.8 -	(17*2.5)* 1.6)*1.1=	229.7＜	276.8	∴229.7 ＞ AnR
4-SPL PL	120 * 21	(100.8 -	4*(1*2.7+ 1*0.059)* 2.1)*1.1=	85.4＜	100.8	∴ 85.4 ＞AnrR

(295) G4 J-3(Sec-3) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2729 * 15 A = 409.3 cm^2 (SM490Y)

(b) Design stress

σU = -83 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

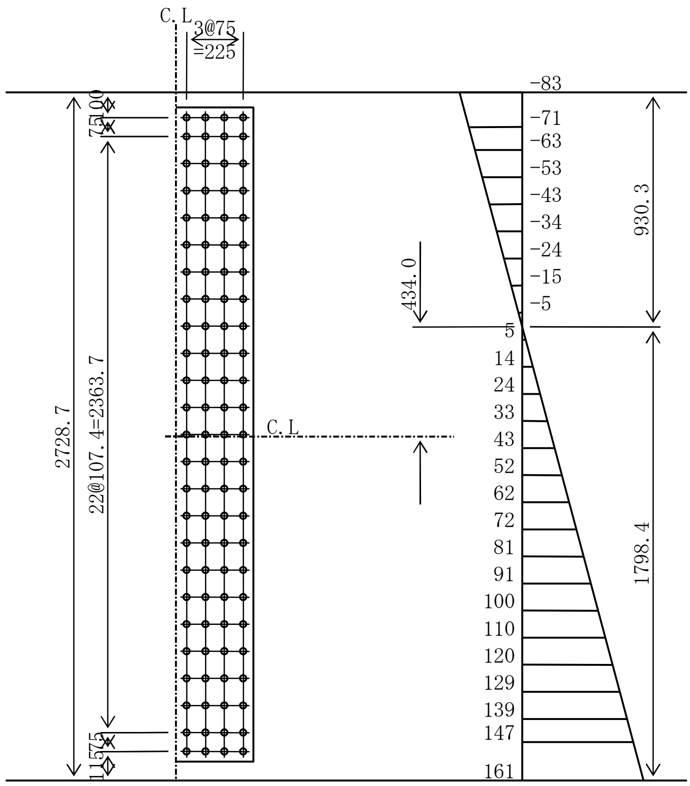
σL = 161 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 83 N/mm^2

σLn = 161 N/mm^2

τ = 23 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (147 + 161) / 2 = 351846 N

Required bolt number (Bolt number to be used)

N1 = 351846 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 23 * 40930 / 100 = 9253 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((351846 / 4)^2 + 9253^2)}$ = 88447 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2594 ＊ 9 As = 466.9 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3466542 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3310636 cm^4

Bending moment to be shared by the web

$Mw = 161 * 3310636*10^4 / 1798 = 2957*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 2957*10^6 / (3466542*10^4) * 1723 = 147$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(296) G4 J-3(Sec-3) RWEB

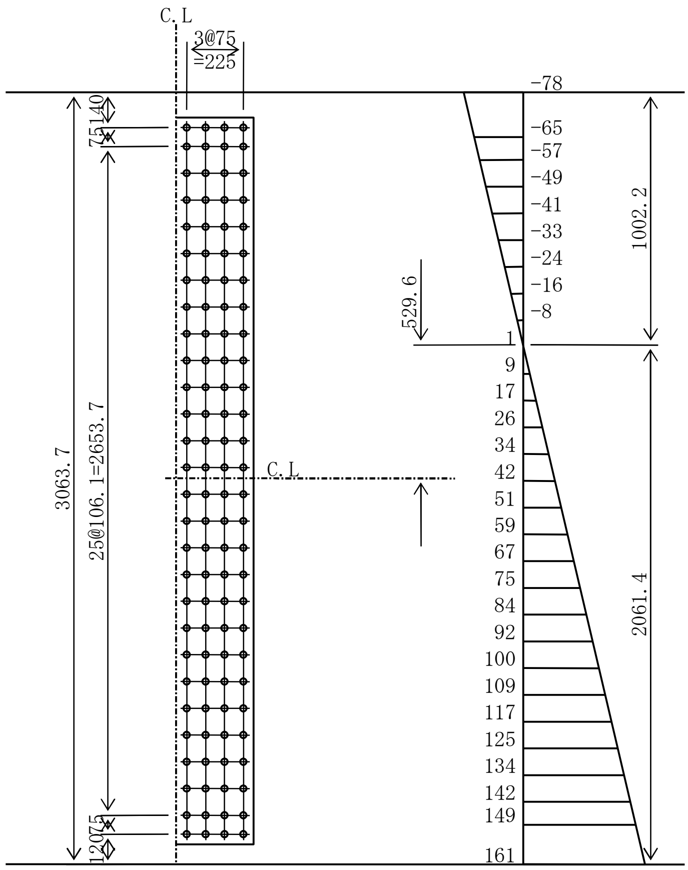
(a) Section area of main plate (Web plate)

1-RWEB PL 3064 * 15 A = 459.6 cm^2 (SM490Y)

(b) Design stress

σU = -78 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = 161 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 78 N/mm^2
σLn = 161 N/mm^2
τ = 19 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row
Sharing width: b1 = 15.8 cm
Total force to be shared
P1 = 158 * 15 * (149 + 161) / 2 = 366518 N
Required bolt number (Bolt number to be used)
N1 = 366518 / (108000 * 1.00) = 3.4 pcs. (4 bolts will be used.)

Check of shear force
$\rho s = \tau * A / 112$ = 19 * 45955 / 112 = 7957 N < ρa = 108000 N
Combined stress
$\rho c28 = \sqrt{((366518 / 4)^2 + 7957^2)}$ = 91974 N < ρa = 108000 N
(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2884 * 9 As = 519.1 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 5108213 cm^4 > Iw

Moment of inertia of web plate Iw = 4883390 cm^4

Bending moment to be shared by the web

$Mw = 161 * 4883390*10^4 / 2061 = 3821*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 3821*10^6 / (5108213*10^4) * 1981 = 148$ N/mm^2 < $\sigma a = 210$ N/mm^2

(297) G4 J-3(Sec-3) LFLG

(a) Acting stress

σ tmax = 165 N/mm^2 0.75σ ta = 0.75 * 210 = 158 N/mm^2

τ max = 7 N/mm^2

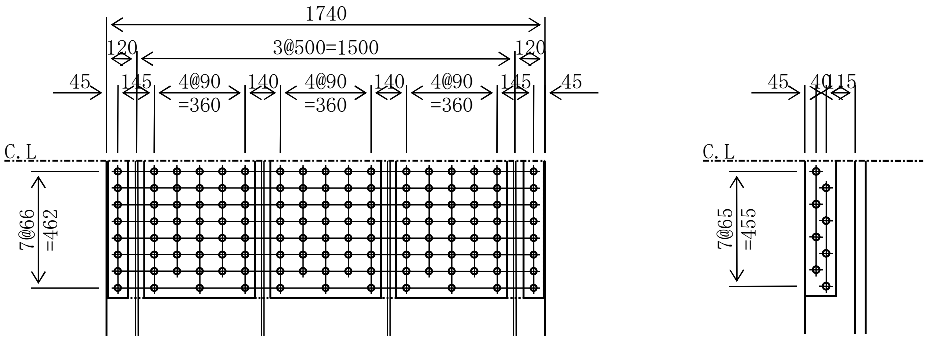
(b) Section area of main plate

1-LFLG PL 1740 * 41 Ag = 713.4 cm^2 (SM520-H)

2-RIB PL 200 * 22 Agr = 88.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 713.4 + 88.0 = 801.4 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 41 A = 713.4

(713.4 - (17* 2.5)* 4.1) * 1.1 = 593.1 < 713.4 ∴An = 593.1 cm^2

2-RIB PL 200 * 22 Ar = 88.0

(88.0 - 2*(1* 2.7+ 1*0.059)* 2.2) * 1.1 = 83.4 < 88.0 ∴Anr = 83.4 cm^2

ΣAn = An + Anr = 593.1 + 83.4 = 676.5 cm^2

σ tn = σ tmax * ΣAg / ΣAn * 135 / 146

= 165 * 801.4 / 676.5 * 135 / 146 = 180 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 180 * 59307 * 130 / 119 = 11677580 N

> 0.75σ ta * An / 1.1 = 158 * 59307 * 130 / 119 / 1.1 = 9276551 N

・Rib Ptr = σ tn * Anr = 180 * 8344 = 1504016 N

> 0.75σ ta * Anr/ 1.1 = 158 * 8344 / 1.1 = 1194775 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 593.1 * 130 / 119 / 2 = 323.9 cm^2

・Rib AnrR = Anr = 83.4 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 11677580 / 108000 = 108.1 pcs. (130 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 1504016 / 108000 = 13.9 pcs. (2 @ 8 = 16 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 8,8 unites)

(h) Tensile force per one bolt

ρp = Pt / 130 = 11677580 / 130 = 89828 N

ρs = τ * Ag / 130 = 7 * 71340 / 130 = 3616 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(89828^2 + 3616^2) = 89900 N < ρa = 108000 N

(i) Check of splice plates

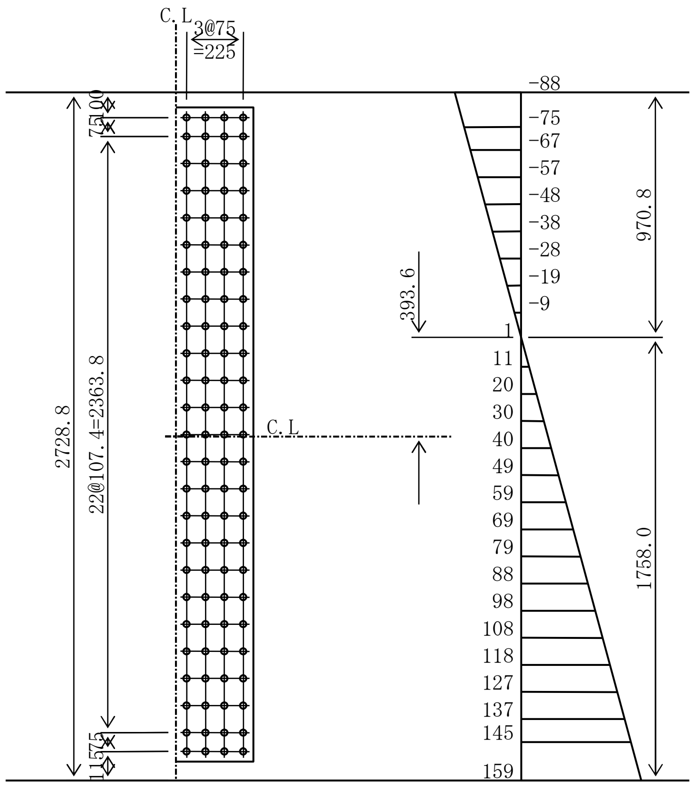
	(SM490Y)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
2-SPL PL	80 * 28	(44.8 -	2*(1*2.5)* 2.8)*1.1=	33.9<	44.8	∴ 33.9
3-SPL PL	440 * 28	(369.6 -	3*(5*2.5)* 2.8)*1.1=	291.1<	369.6	∴291.1
		414.4				324.9 > AnR
1-SPL PL	1730 * 23	(397.9 -	(17*2.5)* 2.3)*1.1=	330.2<	397.9	∴330.2 > AnR
4-SPL PL	120 * 21	(100.8 -	4*(1*2.7+ 1*0.059)* 2.1)*1.1=	85.4<	100.8	∴ 85.4 >AnrR

(298) G4 J-4(Sec-5) LWEB

(a) Section area of main plate (Web plate)
1-LWEB PL 2729 * 15 A = 409.3 cm^2 (SM490Y)

(b) Design stress
σU = -88 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = 159 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 88 N/mm^2
σLn = 159 N/mm^2
τ = 13 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress
Check of bolt at 25th row
Sharing width: b1 = 15.3 cm
Total force to be shared
P1 = 153 * 15 * (145 + 159) / 2 = 347900 N
Required bolt number (Bolt number to be used)
N1 = 347900 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force
ρs = τ * A / 100 = 13 * 40932 / 100 = 5403 N < ρa = 108000 N
Combined stress
$\rho c25$ = $\sqrt{((347900 / 4)^2 + 5403^2)}$ = 87143 N < ρa = 108000 N
(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2594 ＊ 9 As = 466.9 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3313653 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3174136 cm^4

Bending moment to be shared by the web

Mw = 159 ＊ 3174136*10^4 / 1758 = 2870*10^6 N·mm

Bending stress of splice plates

σsp = 2870*10^6 / (3313653*10^4) ＊ 1683 = 146 N/mm^2 ＜ σa = 210 N/mm^2

(299) G4 J-4(Sec-5) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 3064 * 15 A = 459.5 cm^2 (SM490Y)

(b) Design stress

σU = -83 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

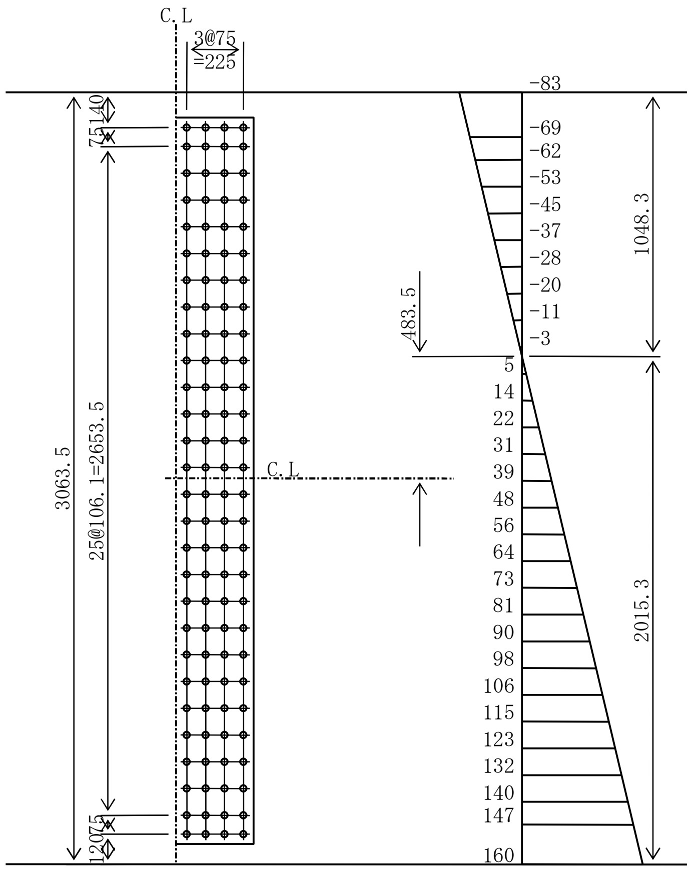
σL = 160 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 83 N/mm^2

σLn = 160 N/mm^2

τ = 11 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 15 * (147 + 160) / 2 = 362471 N

Required bolt number (Bolt number to be used)

N1 = 362471 / (108000 * 1.00) = 3.4 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 112 = 11 * 45953 / 112 = 4697 N < ρa = 108000 N

Combined stress

$\rho c28 = \sqrt{((362471 / 4)^2 + 4697^2)}$ = 90739 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2884 ＊ 9 As = 519.0 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4860501 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4668289 cm^4

Bending moment to be shared by the web

Mw = 160 ＊ 4668289*10^4 / 2015 = 3699*10^6 N·mm

Bending stress of splice plates

σsp = 3699*10^6 / (4860501*10^4) ＊ 1935 = 147 N/mm^2 ＜ σa = 210 N/mm^2

(300) G4 J-4(Sec-5) LFLG

(a) Acting stress

σtmax = 163 N/mm^2 0.75σta = 0.75 * 210 = 158 N/mm^2

τmax = 4 N/mm^2

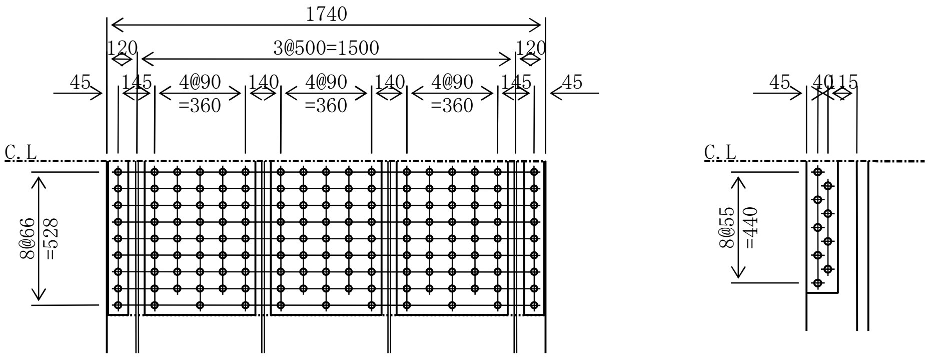
(b) Section area of main plate

1-LFLG PL 1740 * 45 Ag = 783.0 cm^2 (SM520-H)

2-RIB PL 200 * 22 Agr = 88.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 783.0 + 88.0 = 871.0 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 45 A = 783.0

(783.0 - (17* 2.5)* 4.5) * 1.1 = 650.9 < 783.0 ∴An = 650.9 cm^2

2-RIB PL 200 * 22 Ar = 88.0

(88.0 - 2*(1* 2.7+ 1*0.809)* 2.2) * 1.1 = 79.8 < 88.0 ∴Anr = 79.8 cm^2

ΣAn = An + Anr = 650.9 + 79.8 = 730.7 cm^2

σtn = σtmax * ΣAg / ΣAn * 154 / 165

= 163 * 871.0 / 730.7 * 154 / 165 = 182 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 182 * 65093 * 147 / 136 = 12782929 N

> 0.75σta * An / 1.1 = 158 * 65093 * 147 / 136 / 1.1 = 10073891 N

・Rib Ptr = σtn * Anr = 182 * 7981 = 1450118 N

> 0.75σta * Anr/ 1.1 = 158 * 7981 / 1.1 = 1142800 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 650.9 * 147 / 136 / 2 = 351.8 cm^2

・Rib AnrR = Anr = 79.8 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 0.98) = 12782929 / 105840 = 120.8 pcs. (147 bolts will be used.)

・Rib nr = Ptr / (108000 * 0.98) = 1450118 / 105840 = 13.7 pcs. (2 @ 9 = 18 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 9,9 unites)

(h) Tensile force per one bolt

ρp = Pt / 147 = 12782929 / 147 = 86959 N

ρs = τ * Ag / 147 = 4 * 78300 / 147 = 1908 N

ρ = √(ρp^2 + ρs^2) = √(86959^2 + 1908^2) = 86980 N < ρa = 105840 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
2-SPL PL	80 * 31	(49.6 -	2*(1*2.5)* 3.1)*1.1=	37.5＜	49.6	∴ 37.5
3-SPL PL	440 * 31	(409.2 -	3*(5*2.5)* 3.1)*1.1=	322.2＜	409.2	∴322.2
		458.8				359.8
						＞ AnR
1-SPL PL	1730 * 25	(432.5 -	(17*2.5)* 2.5)*1.1=	358.9＜	432.5	∴358.9
						＞ AnR
4-SPL PL	120 * 22	(105.6 -	4*(1*2.7+ 1*0.809)* 2.2)*1.1=	82.2＜	105.6	∴ 82.2
						＞AnrR

(301) G4 J-5(Sec-6) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2729 * 15 A = 409.3 cm^2 (SM490Y)

(b) Design stress

σU = -83 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

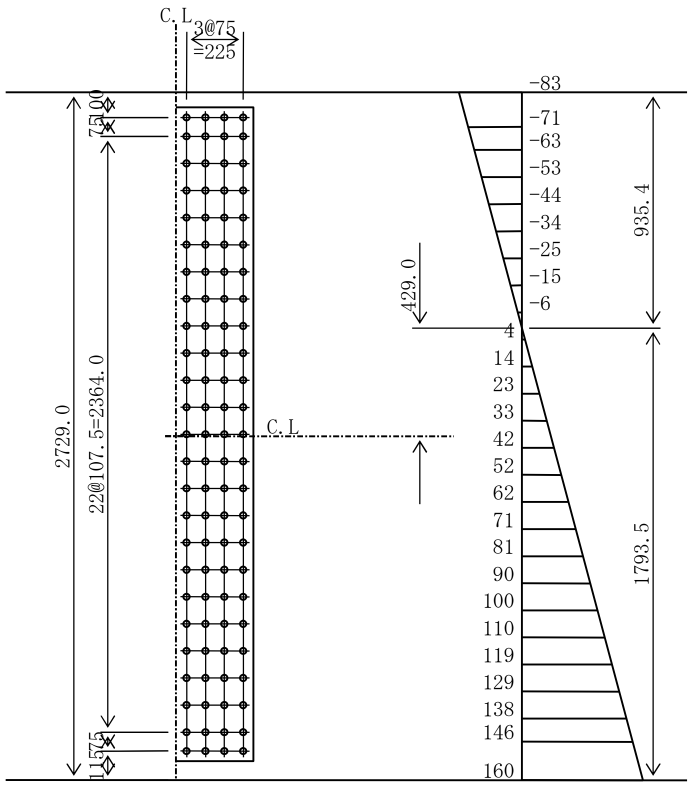
σL = 160 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 83 N/mm^2

σLn = 160 N/mm^2

τ = 22 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (146 + 160) / 2 = 350602 N

Required bolt number (Bolt number to be used)

N1 = 350602 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 22 * 40935 / 100 = 8855 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((350602 / 4)^2 + 8855^2)}$ = 88097 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2594 * 9 As = 466.9 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3447805 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3293944 cm^4

Bending moment to be shared by the web

$Mw = 160 * 3293944*10^4 / 1794 = 2940*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 2940*10^6 / (3447805*10^4) * 1719 = 147$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(302) G4 J-5(Sec-6) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 3063 * 15   A = 459.5 cm^2 (SM490Y)

(b) Design stress

σU = -79 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

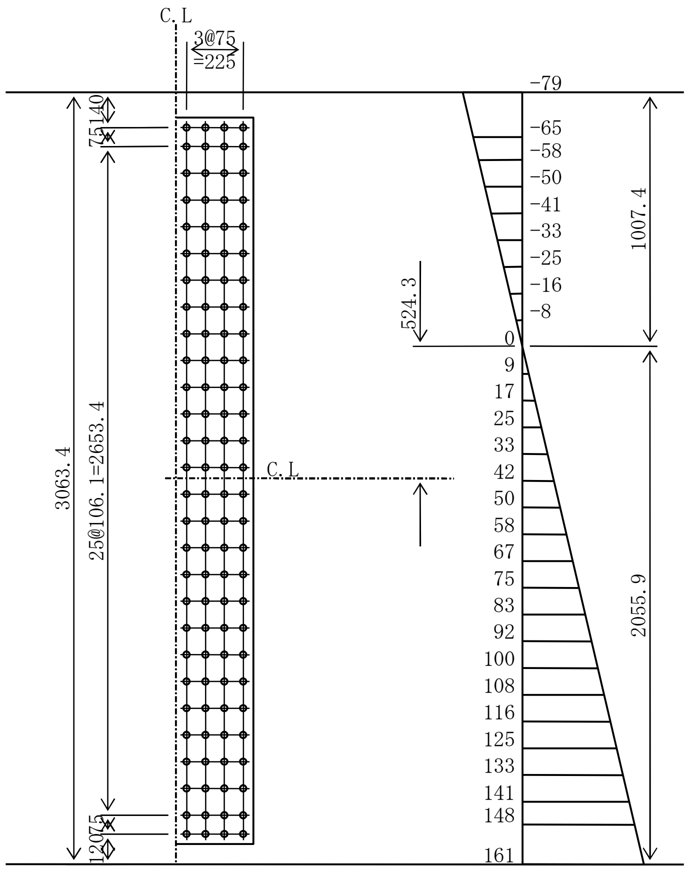
σL = 161 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 79 N/mm^2

σLn = 161 N/mm^2

τ = 18 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 15 * (148 + 161) / 2 = 365230 N

Required bolt number (Bolt number to be used)

N1 = 365230 / (108000 * 1.00) = 3.4 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 112 = 18 * 45951 / 112 =   7414 N < ρa = 108000 N

Combined stress

$\rho c28$ = $\sqrt{((365230 / 4)^2 + 7414^2)}$ = 91608 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2883 ＊ 9 As = 519.0 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 5077254 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4856426 cm^4

Bending moment to be shared by the web

Mw = 161 ＊ 4856426*10^4 / 2056 = 3797*10^6 N･mm

Bending stress of splice plates

σsp = 3797*10^6 / (5077254*10^4) ＊ 1976 = 148 N/mm^2 ＜ σa = 210 N/mm^2

(303) G4 J-5(Sec-6) LFLG

(a) Acting stress

$\sigma tmax$ = 164 N/mm^2 0.75 σta = 0.75 * 210 = 158 N/mm^2

τmax = 6 N/mm^2

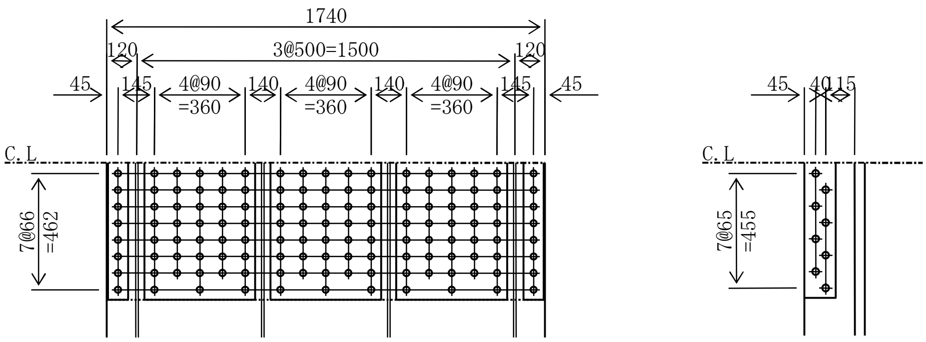
(b) Section area of main plate

1-LFLG PL 1740 * 40 Ag = 696.0 cm^2 (SM490Y)

2-RIB PL 200 * 22 Agr = 88.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 696.0 + 88.0 = 784.0 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 40 A = 696.0

(696.0 - (17* 2.5)* 4.0) * 1.1 = 578.6 < 696.0 ∴An = 578.6 cm^2

2-RIB PL 200 * 22 Ar = 88.0

(88.0 - 2*(1* 2.7+ 1*0.059)* 2.2) * 1.1 = 83.4 < 88.0 ∴Anr = 83.4 cm^2

ΣAn = An + Anr = 578.6 + 83.4 = 662.0 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn * 135 / 146

= 164 * 784.0 / 662.0 * 135 / 146 = 179 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 179 * 57860 * 130 / 119 = 11344482 N

> 0.75 σta * An / 1.1 = 158 * 57860 * 130 / 119 / 1.1 = 9050294 N

・Rib Ptr = σtn * Anr = 179 * 8344 = 1497643 N

> 0.75 σta * Anr/ 1.1 = 158 * 8344 / 1.1 = 1194775 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 578.6 * 130 / 119 / 2 = 316.0 cm^2

・Rib AnrR = Anr = 83.4 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 11344482 / 108000 = 105.0 pcs. (130 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 1497643 / 108000 = 13.9 pcs. (2 @ 8 = 16 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 8,8 unites)

(h) Tensile force per one bolt

ρp = Pt / 130 = 11344482 / 130 = 87265 N

ρs = τ * Ag / 130 = 6 * 69600 / 130 = 3256 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(87265^2 + 3256^2)}$ = 87326 N < ρa = 108000 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
2-SPL PL	80 * 28	(44.8 -	2*(1*2.5)* 2.8)*1.1=	33.9<	44.8	∴ 33.9
3-SPL PL	440 * 28	(369.6 -	3*(5*2.5)* 2.8)*1.1=	291.1<	369.6	∴291.1
		414.4				324.9 > AnR
1-SPL PL	1730 * 23	(397.9 -	(17*2.5)* 2.3)*1.1=	330.2<	397.9	∴330.2 > AnR
4-SPL PL	120 * 21	(100.8 -	4*(1*2.7+ 1*0.059)* 2.1)*1.1=	85.4<	100.8	∴ 85.4 >AnrR

(304) G4 J-6(Sec-7) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2729 * 15 A = 409.4 cm^2 (SM490Y)

(b) Design stress

σU = -69 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

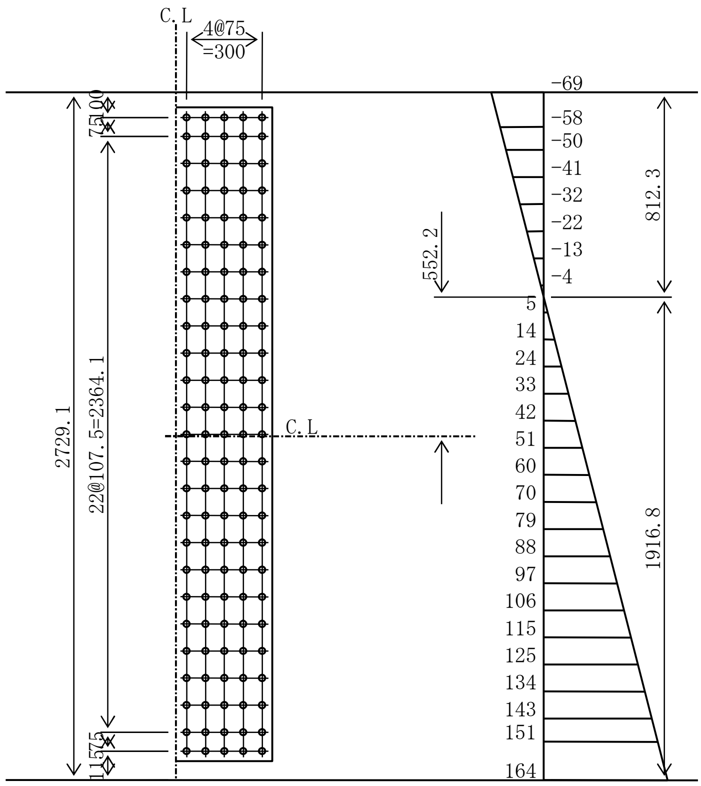
σL = 164 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 69 N/mm^2

σLn = 164 N/mm^2

τ = 34 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (151 + 164) / 2 = 360005 N

Required bolt number (Bolt number to be used)

N1 = 360005 / (108000 * 1.00) = 3.3 pcs. (5 bolts will be used.)

Check of shear force

ρs = τ * A / 125 = 34 * 40937 / 125 = 11265 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((360005 / 5)^2 + 11265^2)}$ = 72877 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 5 unites)

(e) Check of splice plates

2-SPL PL 2594 ＊ 9 As = 466.9 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4004049 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3789187 cm^4

Bending moment to be shared by the web

$Mw = 164 * 3789187*10^4 / 1917 = 3240*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 3240*10^6 / (4004049*10^4) * 1842 = 149$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(305) G4 J-6(Sec-7) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 3063 * 15 A = 459.5 cm^2 (SM490Y)

(b) Design stress

σU = -65 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

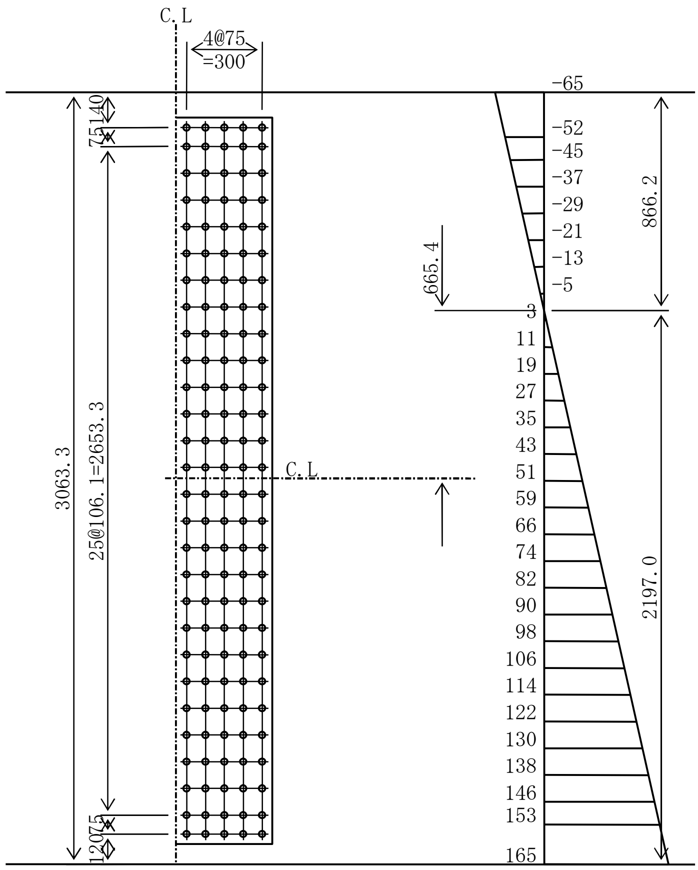
σL = 165 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 65 N/mm^2

σLn = 165 N/mm^2

τ = 29 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 15 * (153 + 165) / 2 = 374849 N

Required bolt number (Bolt number to be used)

N1 = 374849 / (108000 * 1.00) = 3.5 pcs. (5 bolts will be used.)

Check of shear force

ρs = τ * A / 140 = 29 * 45949 / 140 = 9587 N < ρa = 108000 N

Combined stress

ρc28 = $\sqrt{((374849 / 5)^2 + 9587^2)}$ = 75580 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 5 unites)

(e) Check of splice plates

2-SPL PL 2883 ＊ 9 As = 519.0 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 5962758 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 5627422 cm^4

Bending moment to be shared by the web

Mw = 165 ＊ 5627422*10^4 / 2197 = 4215*10^6 N･mm

Bending stress of splice plates

σsp = 4215*10^6 / (5962758*10^4) ＊ 2117 = 150 N/mm^2 ＜ σa = 210 N/mm^2

(306) G4 J-6(Sec-7) LFLG

(a) Acting stress

σ tmax = 166 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

τ max = 14 N/mm^2

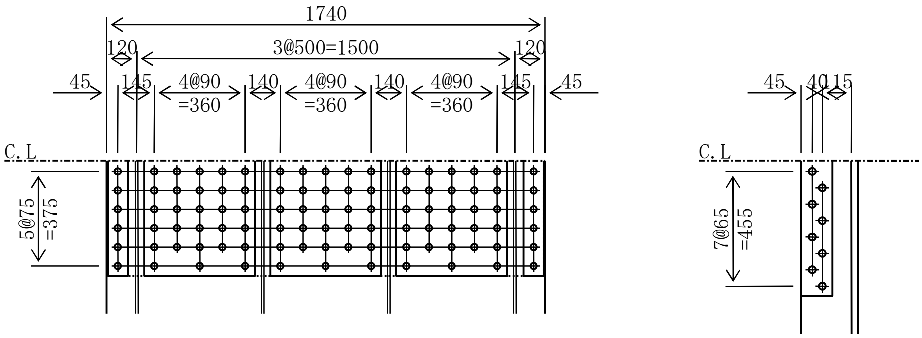
(b) Section area of main plate

1-LFLG PL 1740 * 26 Ag = 452.4 cm^2 (SM490Y)

2-RIB PL 200 * 22 Agr = 88.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 452.4 + 88.0 = 540.4 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 26 A = 452.4

(452.4 - (11* 2.5)* 2.6) * 1.1 = 419.0 < 452.4 ∴An = 419.0 cm^2

2-RIB PL 200 * 22 Ar = 88.0

(88.0 - 2*(1* 2.7+ 1*0.059)* 2.2) * 1.1 = 83.4 < 88.0 ∴Anr = 83.4 cm^2

ΣAn = An + Anr = 419.0 + 83.4 = 502.4 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 166 * 540.4 / 502.4 = 179 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 179 * 41899 = 7498366 N

> 0.75 σ ta * An / 1.1 = 158 * 41899 / 1.1 = 5999175 N

・Rib Ptr = σ tn * Anr = 179 * 8344 = 1493349 N

> 0.75 σ ta * Anr/ 1.1 = 158 * 8344 / 1.1 = 1194775 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 419.0 / 2 = 209.5 cm^2

・Rib AnrR = Anr = 83.4 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 7498366 / 108000 = 69.4 pcs. (96 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 1493349 / 108000 = 13.8 pcs. (2 @ 8 = 16 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 6,8 unites)

(h) Tensile force per one bolt

ρp = Pt / 96 = 7498366 / 96 = 78108 N

ρs = τ * Ag / 96 = 14 * 45240 / 96 = 6569 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(78108^2 + 6569^2) = 78384 N < ρa = 108000 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 19	(30.4 -	2*(1*2.5)* 1.9)*1.1= 23.0<	30.4	∴ 23.0
3-SPL PL	440 * 19	(250.8 -	3*(5*2.5)* 1.9)*1.1= 197.5<	250.8	∴197.5
		281.2			220.5 > AnR
1-SPL PL	1730 * 15	(259.5 -	(17*2.5)* 1.5)*1.1= 215.3<	259.5	∴215.3 > AnR
4-SPL PL	120 * 21	(100.8 -	4*(1*2.7+ 1*0.059)* 2.1)*1.1= 85.4<	100.8	∴ 85.4 >AnrR

(307) G4 J-7(Sec-8) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2729 * 15 A = 409.4 cm^2 (SM490Y)

(b) Design stress

σU = -42 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

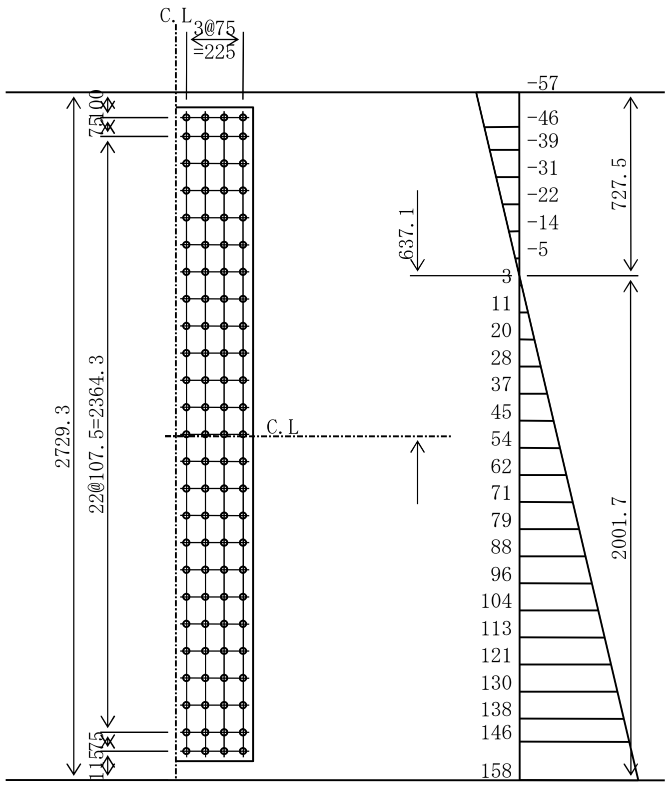
σL = 116 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 42 / 116 = 57 N/mm^2

σLn = 158 N/mm^2

τ = 45 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (146 + 158) / 2 = 346557 N

Required bolt number (Bolt number to be used)

N1 = 346557 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 45 * 40939 / 100 = 18355 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((346557 / 4)^2 + 18355^2)}$ = 88562 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2594 ＊ 9 As = 467.0 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4469905 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4202831 cm^4

Bending moment to be shared by the web

$Mw = 158 * 4202831*10^4 / 2002 = 3307*10^6$ N･mm

Bending stress of splice plates

$\sigma sp = 3307*10^6 / (4469905*10^4) * 1927 = 143$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(308) G4 J-7(Sec-8) RWEB

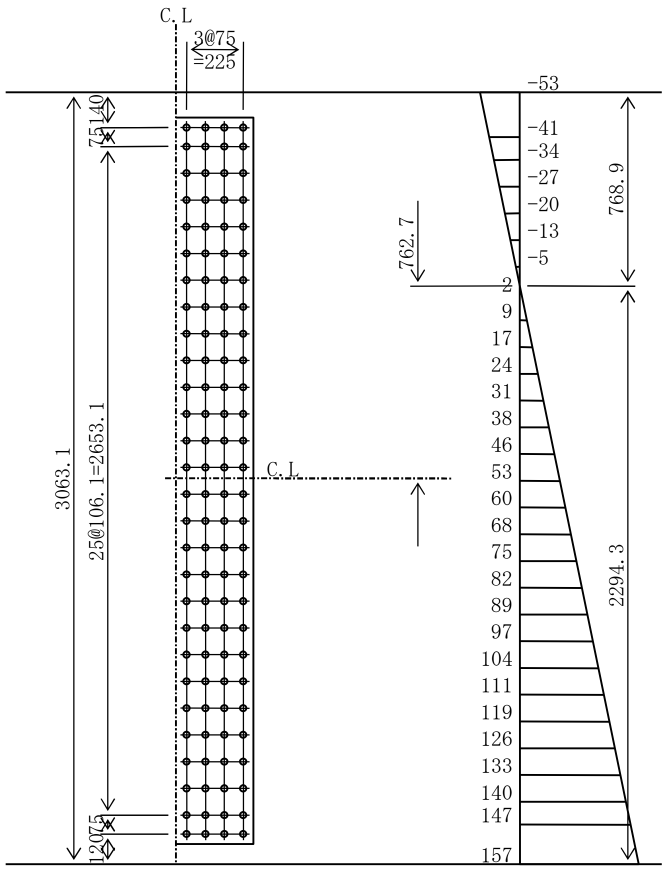
(a) Section area of main plate (Web plate)

1-RWEB PL 3063 * 15 A = 459.5 cm^2 (SM490Y)

(b) Design stress

σU = -39 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = 116 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 158 * 39 / 116 = 53 N/mm^2
σLn = 158 N/mm^2
τ = 39 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 15 * (147 + 157) / 2 = 359322 N

Required bolt number (Bolt number to be used)

N1 = 359322 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 112 = 39 * 45947 / 112 = 16051 N < ρa = 108000 N

Combined stress

ρc28 = $\sqrt{((359322 / 4)^2 + 16051^2)}$ = 91253 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2883 ＊ 9 As = 519.0 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 6693385 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 6265332 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ 6265332*10^4 / 2294 = 4301*10^6 N･mm

Bending stress of splice plates

σsp = 4301*10^6 / (6693385*10^4) ＊ 2214 = 142 N/mm^2 ＜ σa = 210 N/mm^2

(309) G4 J-7(Sec-8) LFLG

(a) Acting stress

σ tmax = 117 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

τ max = 33 N/mm^2

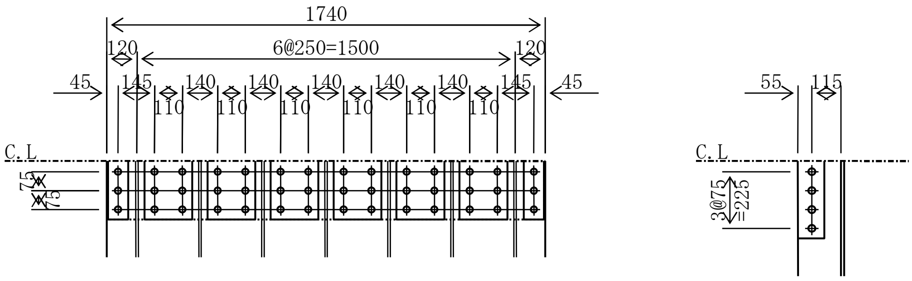
(b) Section area of main plate

1-LFLG PL 1740 * 13 Ag = 226.2 cm^2 (SM490Y)

5-RIB PL 170 * 17 Agr = 144.5 cm^2 (SM490Y)

ΣAg = Ag + Agr = 226.2 + 144.5 = 370.7 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 13 A = 226.2

(226.2 - (14* 2.5)* 1.3) * 1.1 = 198.8 < 226.2 ∴An = 198.8 cm^2

5-RIB PL 170 * 17 Ar = 144.5

(144.5 - 5*(1* 2.7)* 1.7) * 1.1 = 133.7 < 144.5 ∴Anr = 133.7 cm^2

ΣAn = An + Anr = 198.8 + 133.7 = 332.5 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 117 * 370.7 / 332.5 = 130 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 158 * 19877 / 1.1 = 2846025 N

> σ tn * An = 130 * 19877 = 2586693 N

・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 158 * 13371 / 1.1 = 1914413 N

> σ tn * Anr = 130 * 13371 = 1739969 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 198.8 / 2 = 99.4 cm^2

・Rib AnrR = Anr = 133.7 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 2846025 / 108000 = 26.4 pcs. (42 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 1914413 / 108000 = 17.7 pcs. (5 @ 4 = 20 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,4 unites)

(h) Tensile force per one bolt

ρ p = Pt / 42 = 2846025 / 42 = 67763 N

ρ s = τ * Ag / 42 = 33 * 22620 / 42 = 17717 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(67763^2 + 17717^2)}$ = 70040 N < ρ a = 108000 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 10	(16.0 -	2*(1*2.5)* 1.0)*1.1= 12.1<	16.0	∴ 12.1
6-SPL PL	190 * 10	(114.0 -	6*(2*2.5)* 1.0)*1.1= 92.4<	114.0	∴ 92.4
		130.0			104.5 > AnR
1-SPL PL	1730 * 9	(155.7 -	(14*2.5)* 0.9)*1.1= 136.6<	155.7	∴136.6 > AnR
10-SPL PL	100 * 17	(170.0 -	10*(1*2.7)* 1.7)*1.1= 136.5<	170.0	∴136.5 >AnrR

(310) G4 J-8(Sec-8) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2729 * 15 A = 409.4 cm^2 (SM490Y)

(b) Design stress

σU = 24 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

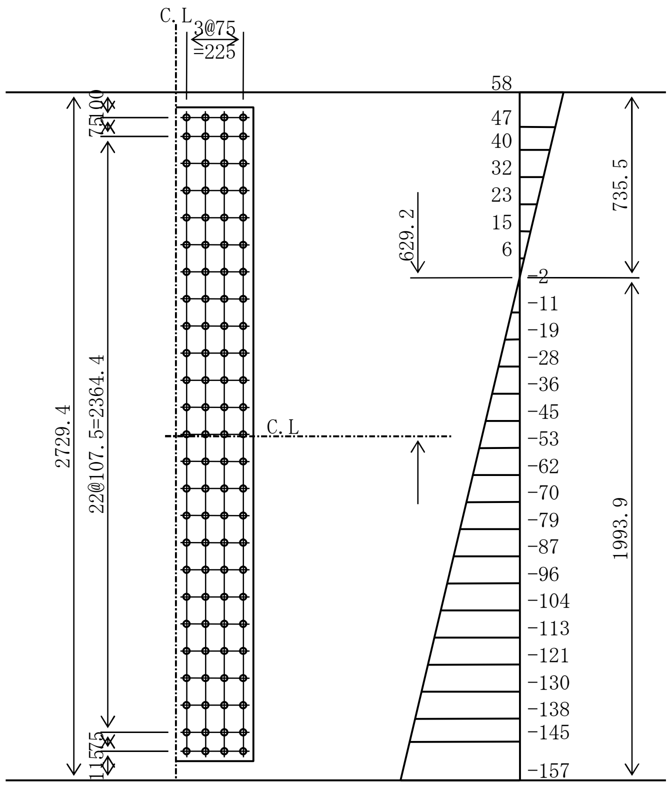
σL = -66 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 24 / 66 = 58 N/mm^2

σLn = 158 N/mm^2

τ = 57 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (145 + 157) / 2 = 346503 N

Required bolt number (Bolt number to be used)

N1 = 346503 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

$\rho s = \tau * A / 100$ = 57 * 40941 / 100 = 23325 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((346503 / 4)^2 + 23325^2)}$ = 89711 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2594 ＊ 9 As = 467.0 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4424088 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4162192 cm^4

Bending moment to be shared by the web

$Mw = 158 * 4162192*10^4 / 1994 = 3288*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 3288*10^6 / (4424088*10^4) * 1919 = 143$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(311) G4 J-8(Sec-8) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 3063 * 15 A = 459.5 cm^2 (SM490Y)

(b) Design stress

σU = 23 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

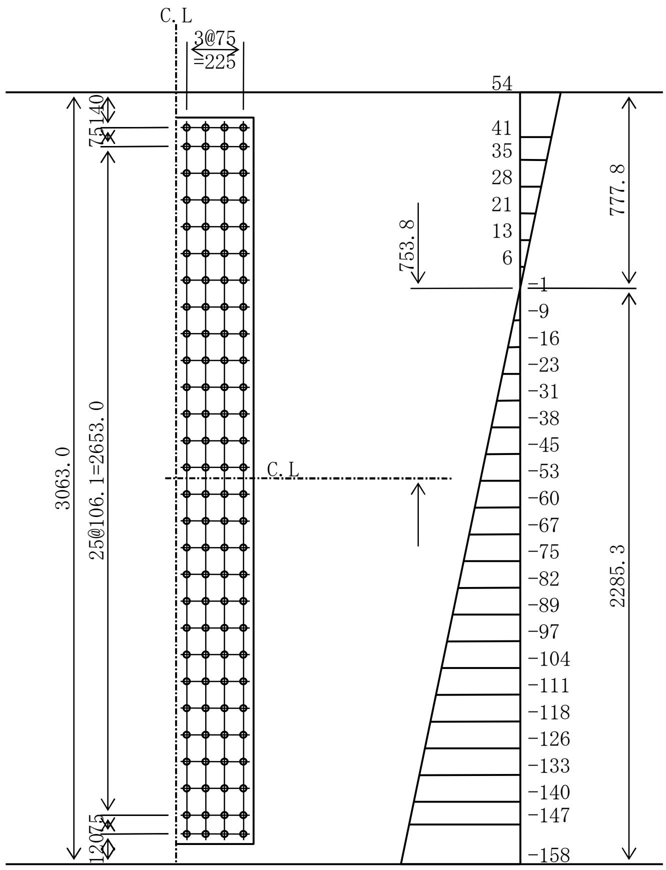
σL = -66 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 23 / 66 = 54 N/mm^2

σLn = 158 N/mm^2

τ = 50 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 15 * (147 + 158) / 2 = 359272 N

Required bolt number (Bolt number to be used)

N1 = 359272 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 112 = 50 * 45946 / 112 = 20339 N < ρa = 108000 N

Combined stress

$\rho c28$ = $\sqrt{((359272 / 4)^2 + 20339^2)}$ = 92092 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2883 * 9 As = 518.9 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 6621720 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 6202688 cm^4

Bending moment to be shared by the web

Mw = 158 * 6202688*10^4 / 2285 = 4275*10^6 N·mm

Bending stress of splice plates

σsp = 4275*10^6 / (6621720*10^4) * 2205 = 142 N/mm^2 ＜ σa = 210 N/mm^2

(312) G4 J-8(Sec-8) LFLG

(a) Acting stress

σ cmax = -67 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2

∴ σ c = 158 N/mm^2

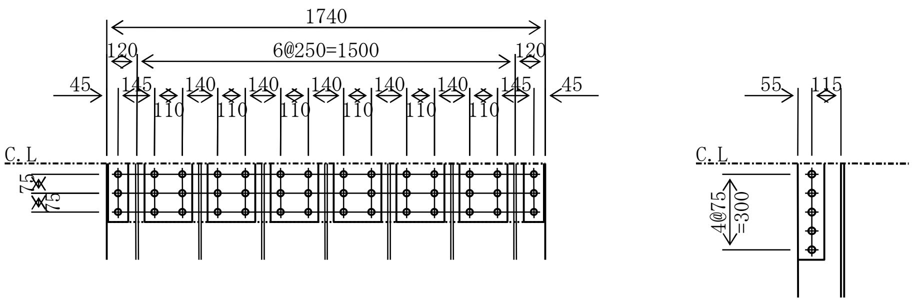
τ max = 41 N/mm^2

(b) Section area of main plate

1-LFLG	PL	1740 * 13	Ag = 226.2 cm^2	(SM490Y)
5-RIB	PL	170 * 17	Agr = 144.5 cm^2	(SM490Y)

ΣAg = Ag + Agr = 226.2 + 144.5 = 370.7 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 22620 = 3562650 N

・Rib Pcr = σc * Agr = 158 * 14450 = 2275875 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 226.2 / 2 = 113.1 cm^2

・Rib AgrR = Agr = 144.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 3562650 / 108000 = 33.0 pcs. (42 bolts will be used.)

・Rib nr = Pcr / (108000 * 1.00) = 2275875 / 108000 = 21.1 pcs. (5 @ 5 = 25 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,5 unites)

(g) Tensile force per one bolt

ρp = Pc / 42 = 3562650 / 42 = 84825 N

ρs = τ * Ag / 42 = 41 * 22620 / 42 = 21945 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(84825^2 + 21945^2)}$ = 87618 N < ρa = 108000 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
2-SPL PL	80 * 10	16.0	
6-SPL PL	190 * 10	114.0	
		130.0	> AgR = 113.1cm^2
1-SPL PL	1730 * 9	155.7	> AgR = 113.1cm^2
10-SPL PL	100 * 17	170.0	> AgrR = 144.5cm^2

(313) G4 J-9(Sec-9) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2729 * 17 A = 464.0 cm^2 (SM490Y)

(b) Design stress

σU = 76 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

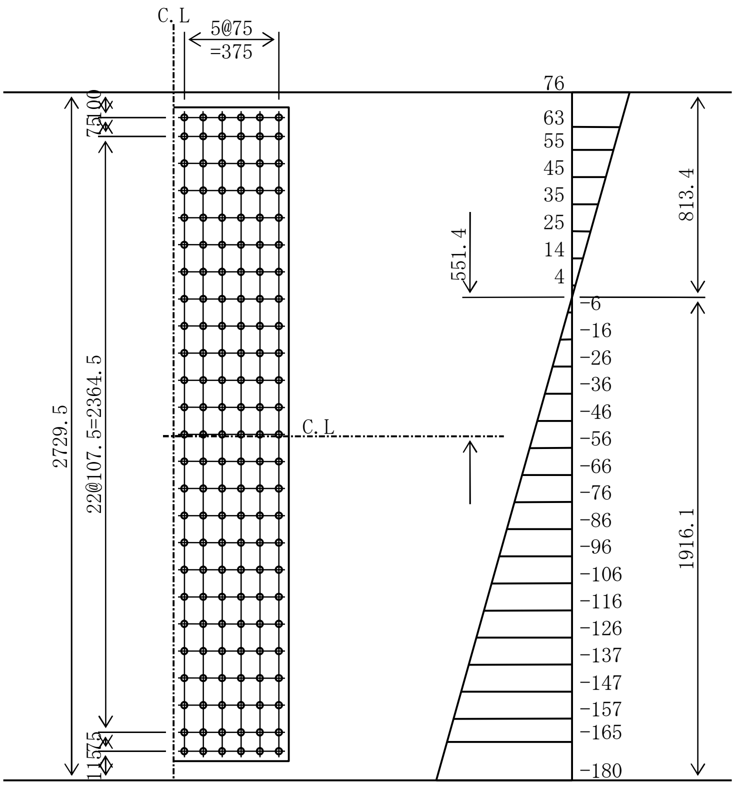
σL = -180 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 76 N/mm^2

σLn = 180 N/mm^2

τ = 59 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 17 * (165 + 180) / 2 = 446863 N

Required bolt number (Bolt number to be used)

N1 = 446863 / (108000 * 1.00) = 4.1 pcs. (6 bolts will be used.)

Check of shear force

ρs = τ * A / 150 = 59 * 46401 / 150 = 18250 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((446863 / 6)^2 + 18250^2)}$ = 76681 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 6 unites)

(e) Check of splice plates

2-SPL PL 2594 * 10 As = 518.9 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4445645 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4291457 cm^4

Bending moment to be shared by the web

Mw = 180 * 4291457*10^4 / 1916 = 4020*10^6 N·mm

Bending stress of splice plates

σsp = 4020*10^6 / (4445645*10^4) * 1841 = 167 N/mm^2 ＜ σa = 210 N/mm^2

(314) G4 J-9(Sec-9) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 3063 * 17   A = 520.7 cm^2 (SM490Y)

(b) Design stress

σU =   71 N/mm^2 < σa * 0.75 =   210 * 0.75 =   158 N/mm^2

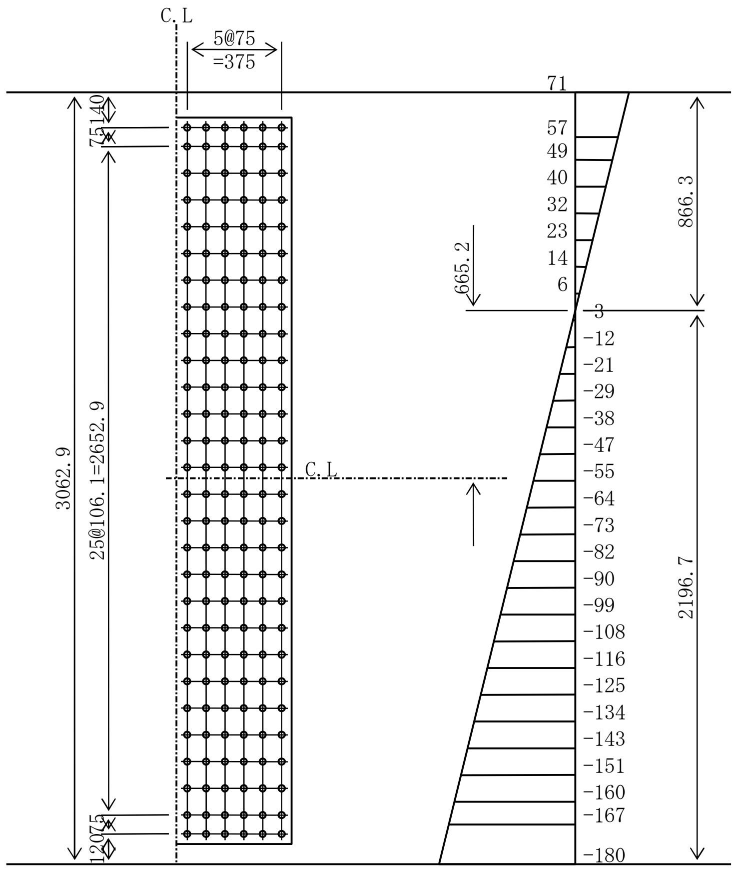
σL = -180 N/mm^2 > σa * 0.75 =   210 * 0.75 =   158 N/mm^2

σUn =   71 N/mm^2

σLn =   180 N/mm^2

τ =   51 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 =   158 * 17 * (167 + 180) / 2 = 465532 N

Required bolt number (Bolt number to be used)

N1 = 465532 / (108000 * 1.00) = 4.3 pcs. (6 bolts will be used.)

Check of shear force

ρs = τ * A / 168 =   51 *   52070 / 168 =   15785 N < ρa = 108000 N

Combined stress

$\rho c28$ = $\sqrt{((465532 / 6)^2 + 15785^2)}$ =   79178 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 6 unites)

(e) Check of splice plates

2-SPL PL 2883 * 10 As = 576.6 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 6622085 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 6374822 cm^4

Bending moment to be shared by the web

Mw = 180 ＊ 6374822*10^4 / 2197 = 5233*10^6 N·mm

Bending stress of splice plates

σsp = 5233*10^6 / (6622085*10^4) ＊ 2117 = 167 N/mm^2 ＜ σa = 210 N/mm^2

(315) G4 J-9(Sec-9) LFLG

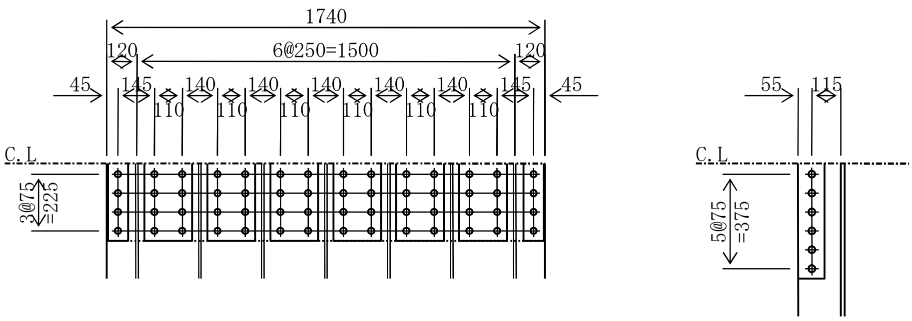
(a) Acting stress

$\sigma cmax$ = -181 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2
∴ σc = 181 N/mm^2
τmax = 41 N/mm^2

(b) Section area of main plate

1-LFLG PL 1740 * 15 Ag = 261.0 cm^2 (SM490Y)
5-RIB PL 170 * 17 Agr = 144.5 cm^2 (SM490Y)
ΣAg = Ag + Agr = 261.0 + 144.5 = 405.5 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 181 * 26100 = 4729529 N
・Rib Pcr = σc * Agr = 181 * 14450 = 2618456 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 261.0 / 2 = 130.5 cm^2
・Rib AgrR = Agr = 144.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 4729529 / 108000 = 43.8 pcs. (56 bolts will be used.)
・Rib nr = Pcr / (108000 * 1.00) = 2618456 / 108000 = 24.2 pcs. (5 @ 6 = 30 bolts will be used.)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,6 unites)

(g) Tensile force per one bolt

ρp = Pc / 56 = 4729529 / 56 = 84456 N
ρs = τ * Ag / 56 = 41 * 26100 / 56 = 18929 N
$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(84456^2 + 18929^2)}$ = 86551 N < ρa = 108000 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)
2-SPL PL	80 * 11	17.6
6-SPL PL	190 * 11	125.4
		143.0

> AgR = 130.5cm^2

1-SPL PL 1730 * 9 155.7 > AgR = 130.5cm^2

10-SPL PL 100 * 15 150.0 > AgrR = 144.5cm^2

(316) G4 J-10(Sec-11) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2730 * 17 A = 464.0 cm^2 (SM490Y)

(b) Design stress

σU = 80 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

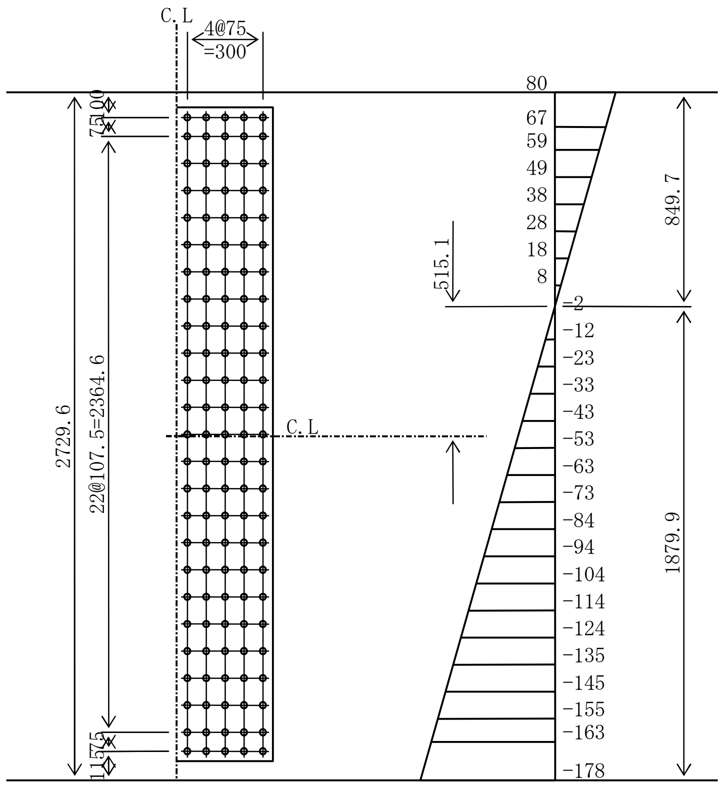
σL = -178 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 80 N/mm^2

σLn = 178 N/mm^2

τ = 47 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 17 * (163 + 178) / 2 = 442581 N

Required bolt number (Bolt number to be used)

N1 = 442581 / (108000 * 1.00) = 4.1 pcs. (5 bolts will be used.)

Check of shear force

ρs = τ * A / 125 = 47 * 46403 / 125 = 17632 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((442581 / 5)^2 + 17632^2)}$ = 90255 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 5 unites)

(e) Check of splice plates

2-SPL PL 2595 * 10 As = 518.9 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4248099 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4112294 cm^4

Bending moment to be shared by the web

$Mw = 178 * 4112294*10^4 / 1880 = 3892*10^6$ N·mm

Bending stress of splice plates

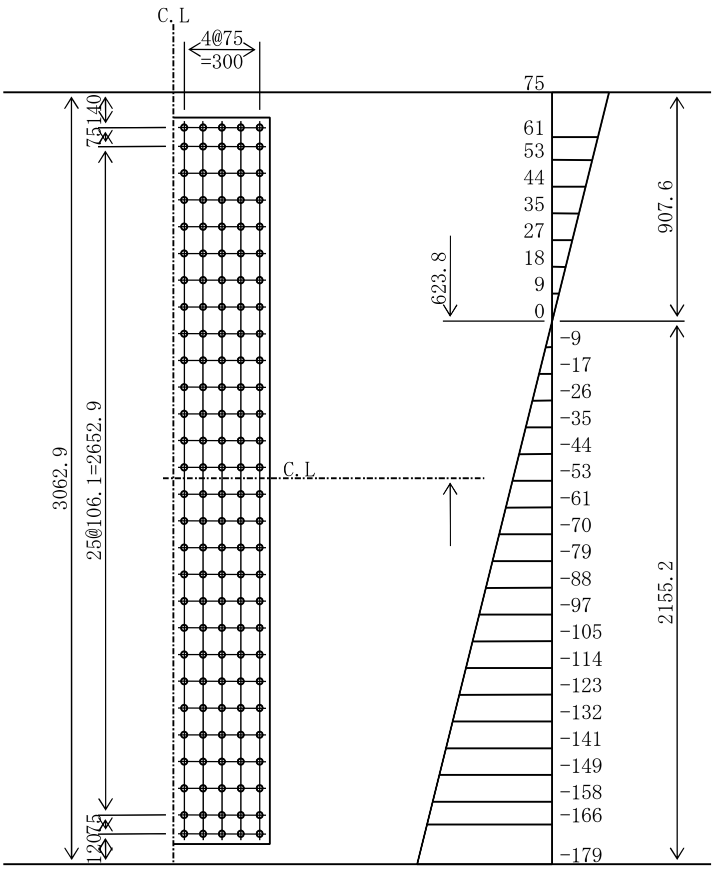
$\sigma sp = 3892*10^6 / (4248099*10^4) * 1805 = 165$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(317) G4 J-10(Sec-11) RWEB

(a) Section area of main plate (Web plate)
1-RWEB PL 3063 * 17   A = 520.7 cm^2 (SM490Y)

(b) Design stress
σU =   75 N/mm^2 < σa * 0.75 =   210 * 0.75 =   158 N/mm^2
σL = -179 N/mm^2 > σa * 0.75 =   210 * 0.75 =   158 N/mm^2
σUn =   75 N/mm^2
σLn =   179 N/mm^2
τ =   42 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress
Check of bolt at 28th row
Sharing width: b1 = 15.8 cm
Total force to be shared
P1 =   158 * 17 * (166 + 179) / 2 = 461136 N
Required bolt number (Bolt number to be used)
N1 = 461136 / (108000 * 1.00) = 4.3 pcs. (5 bolts will be used.)

Check of shear force
ρs = τ * A / 140 =   42 *   52069 / 140 =   15527 N < ρa = 108000 N
Combined stress
$\rho c28$ = $\sqrt{((461136 / 5)^2 + 15527^2)}$ =   93525 N < ρa = 108000 N
(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 5 unites)

(e) Check of splice plates

2-SPL PL 2883 * 10   As =   576.6 cm^2 (SM490Y)

Moment of inertia of splice plates   Is =   6309329 cm^4 ＞ Iw

Moment of inertia of web plate   Iw =   6096679 cm^4

Bending moment to be shared by the web

$Mw = 179 * 6096679*10^4 / 2155 = 5057*10^6$ N･mm

Bending stress of splice plates

$\sigma sp = 5057*10^6 / (6309329*10^4) * 2075 = 166$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(318) G4 J-10(Sec-11) LFLG

(a) Acting stress

σ cmax = -180 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma$c = 180 N/mm^2

τ max = 35 N/mm^2

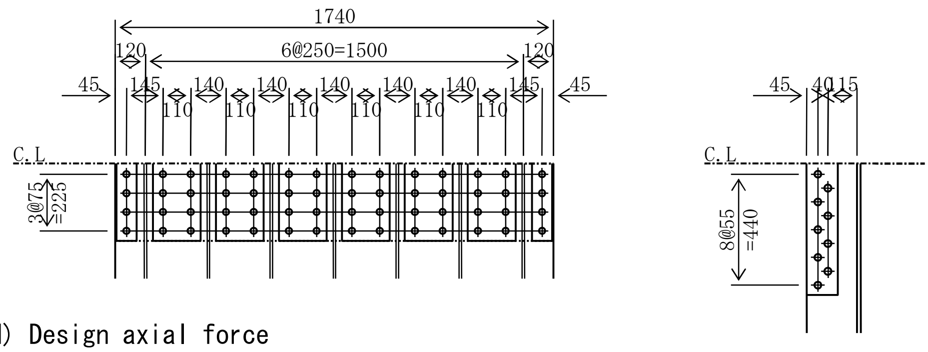
(b) Section area of main plate

1-LFLG PL 1740 * 15 Ag = 261.0 cm^2 (SM490Y)

5-RIB PL 200 * 22 Agr = 220.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 261.0 + 220.0 = 481.0 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 180 * 26100 = 4688656 N

・Rib Pcr = σc * Agr = 180 * 22000 = 3952124 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 261.0 / 2 = 130.5 cm^2

・Rib AgrR = Agr = 220.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 4688656 / 108000 = 43.4 pcs. (56 bolts will be used.)

・Rib nr = Pcr / (108000 * 0.98) = 3952124 / 105840 = 37.3 pcs. (5 @ 9 = 45 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4,9 unites)

(g) Tensile force per one bolt

ρp = Pc / 56 = 4688656 / 56 = 83726 N

ρs = τ * Ag / 56 = 35 * 26100 / 56 = 16432 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(83726^2 + 16432^2)}$ = 85323 N < ρa = 108000 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)
2-SPL PL	80 * 11	17.6
6-SPL PL	190 * 11	125.4
		143.0
		> AgR = 130.5cm^2
1-SPL PL	1730 * 9	155.7 > AgR = 130.5cm^2
10-SPL PL	120 * 19	228.0 > AgrR = 220.0cm^2

(319) G4 J-11(Sec-12) LWEB

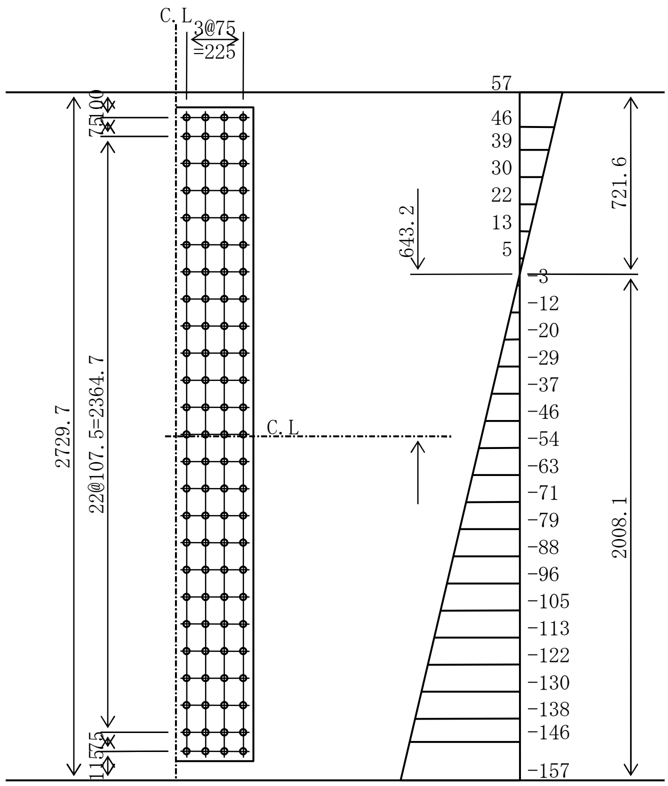
(a) Section area of main plate (Web plate)

1-LWEB PL 2730 * 15 A = 409.4 cm^2 (SM490Y)

(b) Design stress

σU = 44 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = -124 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 158 * 44 / 124 = 57 N/mm^2
σLn = 158 N/mm^2
τ = 43 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row
Sharing width: b1 = 15.3 cm
Total force to be shared
P1 = 153 * 15 * (146 + 157) / 2 = 346601 N
Required bolt number (Bolt number to be used)
N1 = 346601 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force
$\rho s = \tau * A / 100$ = 43 * 40945 / 100 = 17447 N < ρa = 108000 N
Combined stress
$\rho c25 = \sqrt{((346601 / 4)^2 + 17447^2)}$ = 88389 N < ρa = 108000 N
(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2595 ＊ 9 As = 467.0 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4507811 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4236491 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ 4236491*10^4 / 2008 = 3323*10^6 N･mm

Bending stress of splice plates

σsp = 3323*10^6 / (4507811*10^4) ＊ 1933 = 142 N/mm^2 ＜ σa = 210 N/mm^2

(320) G4 J-11(Sec-12) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 3063 * 15 A = 459.4 cm^2 (SM490Y)

(b) Design stress

σU = 41 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

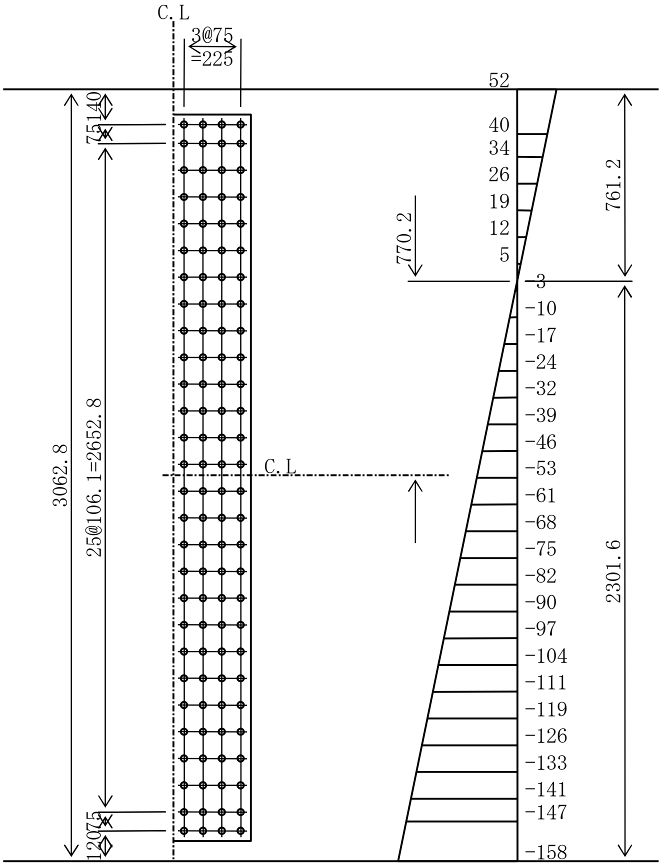
σL = -124 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 41 / 124 = 52 N/mm^2

σLn = 158 N/mm^2

τ = 38 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 15 * (147 + 158) / 2 = 359363 N

Required bolt number (Bolt number to be used)

N1 = 359363 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 112 = 38 * 45942 / 112 = 15713 N < ρa = 108000 N

Combined stress

$\rho c28$ = $\sqrt{((359363 / 4)^2 + 15713^2)}$ = 91204 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2883 ＊ 9 As = 518.9 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 6752510 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 6316940 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ $6316940*10^4$ / 2302 = $4323*10^6$ N·mm

Bending stress of splice plates

σsp = $4323*10^6$ / ($6752510*10^4$) ＊ 2222 = 142 N/mm^2 ＜ σa = 210 N/mm^2

(321) G4 J-11(Sec-12) LFLG

(a) Acting stress

σ cmax = -125 N/mm^2 0.75 σ ca = 0.75 * 190 = 143 N/mm^2

∴ σ c = 143 N/mm^2

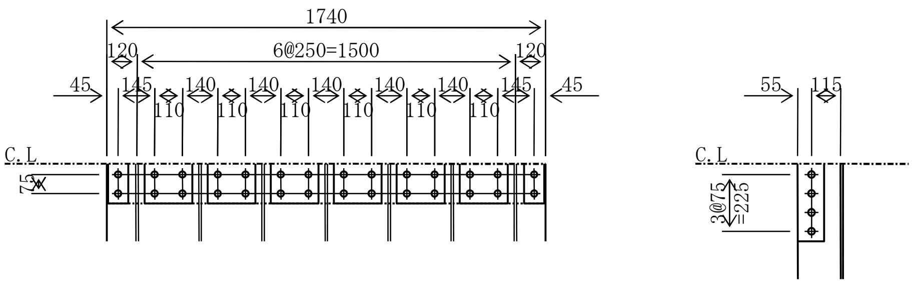
τ max = 39 N/mm^2

(b) Section area of main plate

1-LFLG	PL 1740 * 10	Ag =	174.0 cm^2	(SM490Y)
5-RIB	PL 170 * 17	Agr =	144.5 cm^2	(SM490Y)

ΣAg = Ag + Agr = 174.0 + 144.5 = 318.5 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σ c * Ag = 143 * 17400 = 2480583 N

・Rib Pcr = σ c * Agr = 143 * 14450 = 2060025 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 174.0 / 2 = 87.0 cm^2

・Rib AgrR = Agr = 144.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2480583 / 108000 = 23.0 pcs. (28 bolts will be used.)

・Rib nr = Pcr / (108000 * 1.00) = 2060025 / 108000 = 19.1 pcs. (5 @ 4 = 20 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(g) Tensile force per one bolt

ρ p = Pc / 28 = 2480583 / 28 = 88592 N

ρ s = τ * Ag / 28 = 39 * 17400 / 28 = 24115 N

ρ = $\sqrt{}$(ρ p^2 + ρ s^2) = $\sqrt{}$(88592^2 + 24115^2) = 91816 N < ρ a = 108000 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
2-SPL PL	80 * 9	14.4	
6-SPL PL	190 * 9	102.6	
		117.0	> AgR = 87.0cm^2
1-SPL PL	1730 * 9	155.7	> AgR = 87.0cm^2
10-SPL PL	100 * 15	150.0	> AgrR = 144.5cm^2

(322) G4 J-12(Sec-12) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2730 * 15 A = 409.5 cm^2 (SM490Y)

(b) Design stress

σU = 17 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

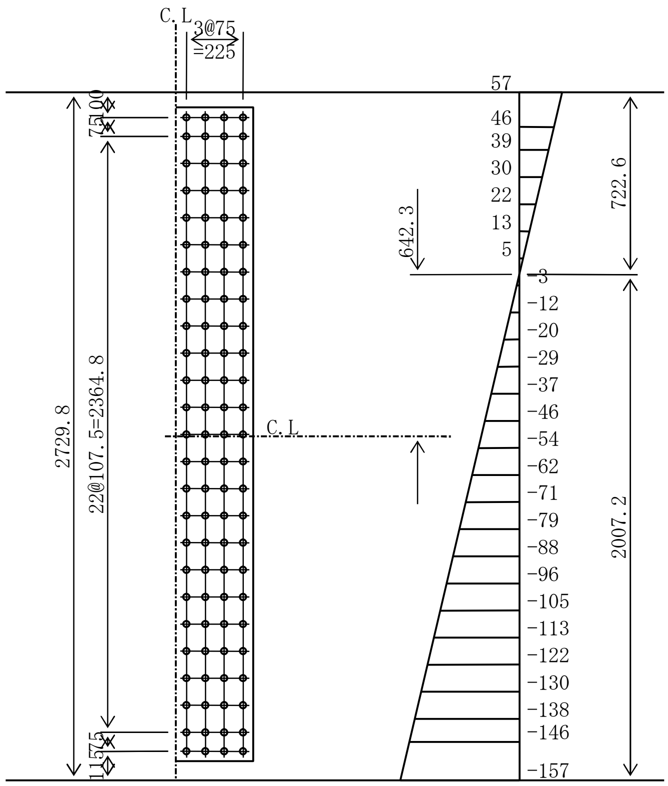
σL = -48 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 17 / 48 = 57 N/mm^2

σLn = 158 N/mm^2

τ = 30 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (146 + 157) / 2 = 346595 N

Required bolt number (Bolt number to be used)

N1 = 346595 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 30 * 40946 / 100 = 12404 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((346595 / 4)^2 + 12404^2)}$ = 87532 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2595 ＊ 9 As = 467.1 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4502664 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4231933 cm^4

Bending moment to be shared by the web

$Mw = 158 * 4231933*10^4 / 2007 = 3321*10^6$ N･mm

Bending stress of splice plates

$\sigma sp = 3321*10^6 / (4502664*10^4) * 1932 = 142$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(323) G4 J-12(Sec-12) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 3063 * 15 A = 459.4 cm^2 (SM490Y)

(b) Design stress

σU = 16 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

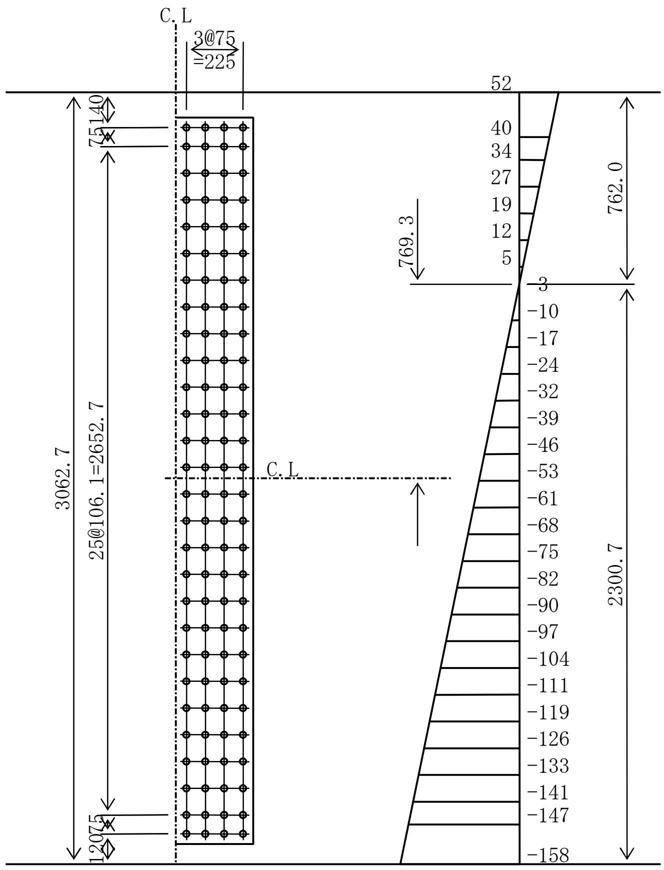
σL = -48 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 16 / 48 = 52 N/mm^2

σLn = 158 N/mm^2

τ = 28 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 15 * (147 + 158) / 2 = 359357 N

Required bolt number (Bolt number to be used)

N1 = 359357 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 112 = 28 * 45941 / 112 = 11301 N < ρa = 108000 N

Combined stress

ρc28 = $\sqrt{((359357 / 4)^2 + 11301^2)}$ = 90547 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2883 * 9 As = 518.9 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 6744547 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 6309964 cm^4

Bending moment to be shared by the web

Mw = 158 * 6309964*10^4 / 2301 = 4320*10^6 N·mm

Bending stress of splice plates

σsp = 4320*10^6 / (6744547*10^4) * 2221 = 142 N/mm^2 ＜ σa = 210 N/mm^2

(324) G4 J-12(Sec-12) LFLG

(a) Acting stress

$\sigma tmax$ = 18 N/mm^2 0.75σta = 0.75 ＊ 210 = 158 N/mm^2

$\sigma cmax$ = −48 N/mm^2 0.75σca = 0.75 ＊ 190 = 143 N/mm^2

$\therefore \sigma c$ = 143 N/mm^2

τmax = 29 N/mm^2

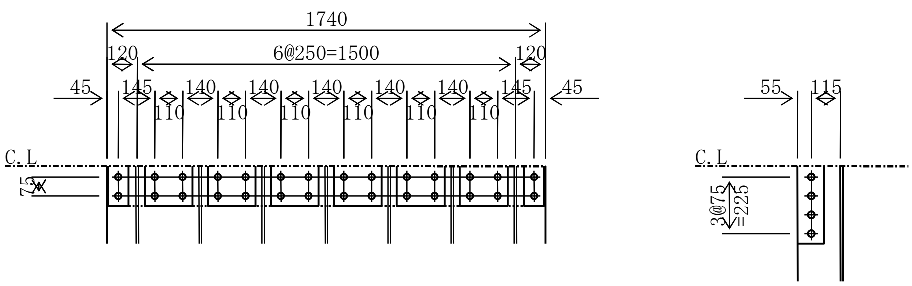
(b) Section area of main plate

1-LFLG PL 1740 ＊ 10 Ag = 174.0 cm^2 (SM490Y)

5-RIB PL 170 ＊ 17 Agr = 144.5 cm^2 (SM490Y)

ΣAg = Ag + Agr = 174.0 + 144.5 = 318.5 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 ＊ 10 A = 174.0

(174.0 − (14＊ 2.5)＊ 1.0) ＊ 1.1 = 152.9 ＜ 174.0 $\therefore$An = 152.9 cm^2

5-RIB PL 170 ＊ 17 Ar = 144.5

(144.5 − 5＊(1＊ 2.7)＊ 1.7) ＊ 1.1 = 133.7 ＜ 144.5 $\therefore$Anr = 133.7 cm^2

ΣAn = An + Anr = 152.9 + 133.7 = 286.6 cm^2

σtn = $\sigma tmax$ ＊ ΣAg / ΣAn = 18 ＊ 318.5 / 286.6 = 20 N/mm^2

＜ σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75σta ＊ An / 1.1 = 158 ＊ 15290 / 1.1 = 2189250 N

＞ σtn ＊ An = 20 ＊ 15290 = 303061 N

Pc = σc ＊ Ag = 143 ＊ 17400 = 2480583 N

・Rib Ptr = 0.75σta ＊ Anr / 1.1 = 158 ＊ 13371 / 1.1 = 1914413 N

＞ σtn ＊ Anr = 20 ＊ 13371 = 265015 N

Pcr = σc ＊ Agr = 143 ＊ 14450 = 2060025 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 152.9 / 2 = 76.5 cm^2

AgR = Ag / 2 = 174.0 / 2 = 87.0 cm^2

・Rib AnrR = Anr = 133.7 cm^2

AgrR = Agr = 144.5 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 ＊ 1.00) = 2480583 / 108000 = 23.0 pcs. (28 bolts will be used.)

・Rib nr = Pcr / (108000 ＊ 1.00) = 2060025 / 108000 = 19.1 pcs. (5 @ 4 = 20 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 28 = 2480583 / 28 = 88592$ N

$\rho s = \tau * Ag / 28 = 29 * 17400 / 28 = 18064$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(88592^2 + 18064^2)} = 90415$ N $< \rho a = 108000$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 9	(14.4 -	2*(1*2.5)* 0.9)*1.1= 10.9<	14.4	∴ 10.9
6-SPL PL	190 * 9	(102.6 -	6*(2*2.5)* 0.9)*1.1= 83.2<	102.6	∴ 83.2
		117.0			94.1
		> AgR			> AnR
1-SPL PL	1730 * 9	(155.7 -	(14*2.5)* 0.9)*1.1= 136.6<	155.7	∴136.6
		> AgR			> AnR
10-SPL PL	100 * 17	(170.0 -	10*(1*2.7)* 1.7)*1.1= 136.5<	170.0	∴136.5
		> AgrR			>AnrR

(325) G4 J-13(Sec-13) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2730 * 15 A = 409.5 cm^2 (SM490Y)

(b) Design stress

σU = -23 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

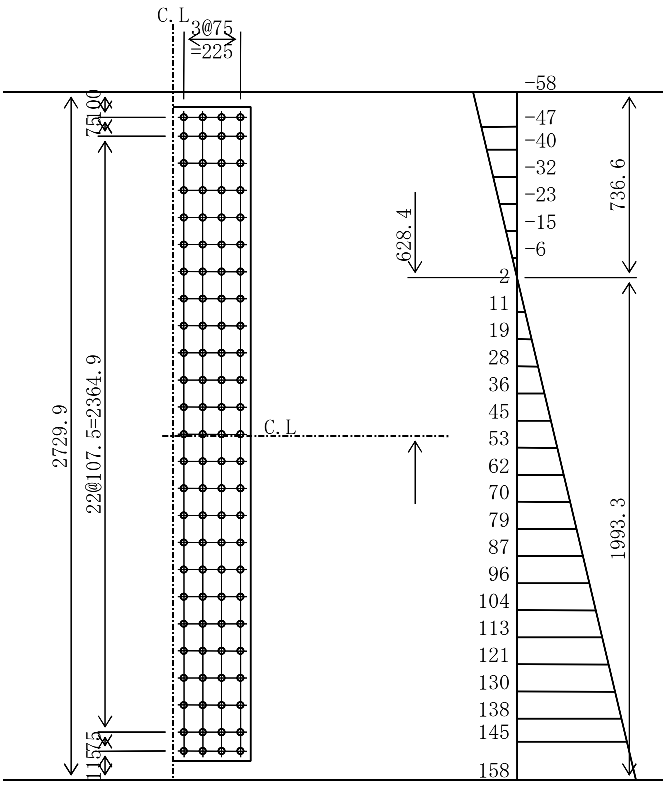
σL = 63 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 23 / 63 = 58 N/mm^2

σLn = 158 N/mm^2

τ = 19 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (145 + 158) / 2 = 346499 N

Required bolt number (Bolt number to be used)

N1 = 346499 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 19 * 40948 / 100 = 7710 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((346499 / 4)^2 + 7710^2)}$ = 86967 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2595 ＊ 9 　 As = 467.1 cm^2 (SM490Y)

Moment of inertia of splice plates 　 Is = 4421237 cm^4 ＞ Iw

Moment of inertia of web plate 　 Iw = 4159702 cm^4

Bending moment to be shared by the web

$Mw = 158 * 4159702*10^4 / 1993 = 3287*10^6$ N･mm

Bending stress of splice plates

$\sigma sp = 3287*10^6 / (4421237*10^4) * 1918 = 143$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(326) G4 J-13(Sec-13) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 3063 * 15   A = 459.4 cm^2 (SM490Y)

(b) Design stress

σU =   -22 N/mm^2 < σa * 0.75 =   210 * 0.75 =   158 N/mm^2

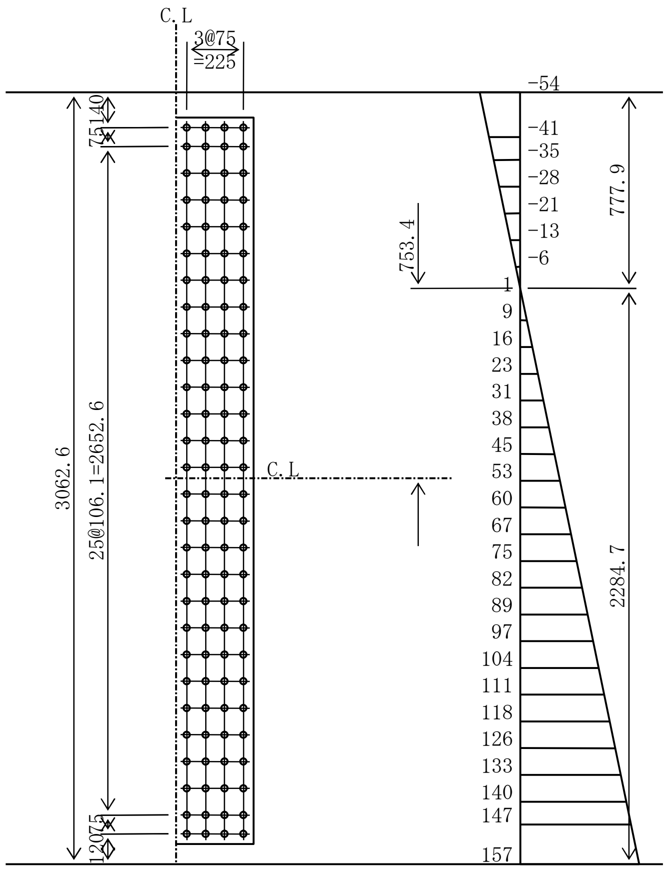
σL =   63 N/mm^2 < σa * 0.75 =   210 * 0.75 =   158 N/mm^2

σUn =   158 *   22 /   63 =   54 N/mm^2

σLn =   158 N/mm^2

τ =   18 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 =   158 * 15 * (147 + 157) / 2 = 359268 N

Required bolt number (Bolt number to be used)

N1 = 359268 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

$\rho s = \tau$ * A / 112 =   18 *   45939 / 112 =   7178 N < ρa = 108000 N

Combined stress

$\rho c28 = \sqrt{((359268 / 4)^2 + 7178^2)}$ =   90104 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2883 ＊ 9 As = 518.9 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 6617068 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 6198546 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ $6198546 * 10^4$ / 2285 = $4273 * 10^6$ N･mm

Bending stress of splice plates

σsp = $4273 * 10^6$ / ($6617068 * 10^4$) ＊ 2205 = 142 N/mm^2 ＜ σa = 210 N/mm^2

(327) G4 J-13(Sec-13) LFLG

(a) Acting stress

σ tmax = 64 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

σ cmax = -17 N/mm^2 0.75 σ ca = 0.75 * 190 = 143 N/mm^2

$\therefore$ σ c = 143 N/mm^2

τ max = 19 N/mm^2

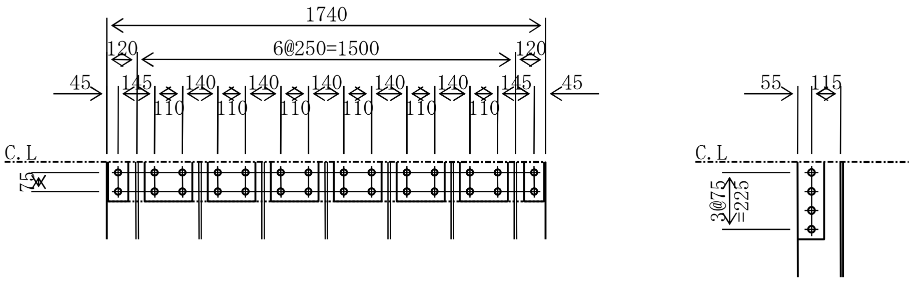
(b) Section area of main plate

1-LFLG PL 1740 * 10 Ag = 174.0 cm^2 (SM490Y)

5-RIB PL 170 * 17 Agr = 144.5 cm^2 (SM490Y)

ΣAg = Ag + Agr = 174.0 + 144.5 = 318.5 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 10 A = 174.0

(174.0 - (14* 2.5)* 1.0) * 1.1 = 152.9 < 174.0 $\therefore$An = 152.9 cm^2

5-RIB PL 170 * 17 Ar = 144.5

(144.5 - 5*(1* 2.7)* 1.7) * 1.1 = 133.7 < 144.5 $\therefore$Anr = 133.7 cm^2

ΣAn = An + Anr = 152.9 + 133.7 = 286.6 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 64 * 318.5 / 286.6 = 71 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 158 * 15290 / 1.1 = 2189250 N

> σ tn * An = 71 * 15290 = 1079847 N

Pc = σ c * Ag = 143 * 17400 = 2480583 N

・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 158 * 13371 / 1.1 = 1914413 N

> σ tn * Anr = 71 * 13371 = 944284 N

Pcr = σ c * Agr = 143 * 14450 = 2060025 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 152.9 / 2 = 76.5 cm^2

AgR = Ag / 2 = 174.0 / 2 = 87.0 cm^2

・Rib AnrR = Anr = 133.7 cm^2

AgrR = Agr = 144.5 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2480583 / 108000 = 23.0 pcs. (28 bolts will be used.)

・Rib nr = Pcr / (108000 * 1.00) = 2060025 / 108000 = 19.1 pcs. (5 @ 4 = 20 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 28 = 2480583 / 28 = 88592$ N

$\rho s = \tau * Ag / 28 = 19 * 17400 / 28 = 11967$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(88592^2 + 11967^2)} = 89397$ N $< \rho a = 108000$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm²)	deduction of bolt holes		Ans(cm²)
2-SPL PL	80 * 9	(14.4 -	2*(1*2.5)* 0.9)*1.1= 10.9<	14.4	∴ 10.9
6-SPL PL	190 * 9	(102.6 -	6*(2*2.5)* 0.9)*1.1= 83.2<	102.6	∴ 83.2
		117.0			94.1
		> AgR			> AnR
1-SPL PL	1730 * 9	(155.7 -	(14*2.5)* 0.9)*1.1= 136.6<	155.7	∴136.6
		> AgR			> AnR
10-SPL PL	100 * 17	(170.0 -	10*(1*2.7)* 1.7)*1.1= 136.5<	170.0	∴136.5
		> AgrR			>AnrR

(328) G4 J-14(Sec-14) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2730 * 15 A = 409.5 cm^2 (SM490Y)

(b) Design stress

σU = -28 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

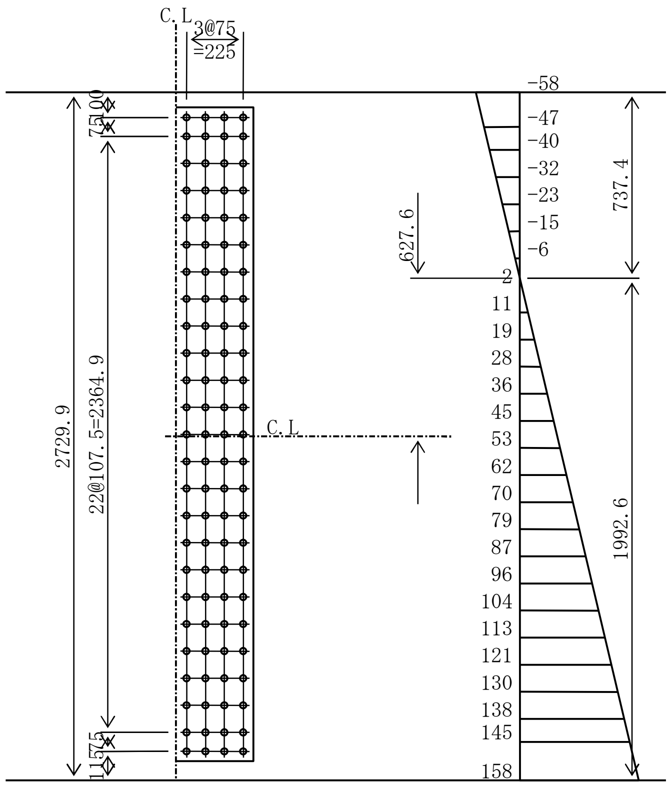
σL = 76 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 28 / 76 = 58 N/mm^2

σLn = 158 N/mm^2

τ = 12 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (145 + 158) / 2 = 346494 N

Required bolt number (Bolt number to be used)

N1 = 346494 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 12 * 40949 / 100 = 4978 N < ρa = 108000 N

Combined stress

ρc25 = $\sqrt{((346494 / 4)^2 + 4978^2)}$ = 86766 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2595 ＊ 9 As = 467.1 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4417017 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4155964 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ 4155964*10^4 / 1993 = 3285*10^6 N･mm

Bending stress of splice plates

σsp = 3285*10^6 / (4417017*10^4) ＊ 1918 = 143 N/mm^2 ＜ σa = 210 N/mm^2

(329) G4 J-14(Sec-14) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 3063 * 15   A = 459.4 cm^2 (SM490Y)

(b) Design stress

σU =   -26 N/mm^2 < σa * 0.75 =   210 * 0.75 =   158 N/mm^2

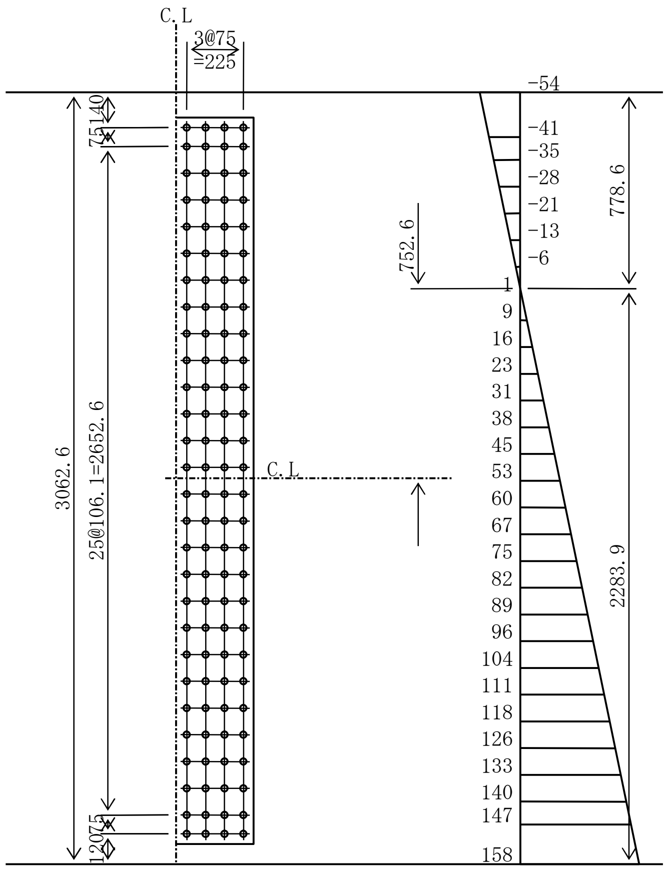
σL =   77 N/mm^2 < σa * 0.75 =   210 * 0.75 =   158 N/mm^2

σUn =   158 *   26 /   77 =   54 N/mm^2

σLn =   158 N/mm^2

τ =   11 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 =   158 * 15 * (147 + 158) / 2 = 359264 N

Required bolt number (Bolt number to be used)

N1 = 359264 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 112 =   11 *   45938 / 112 =   4638 N < ρa = 108000 N

Combined stress

$\rho c28$ = $\sqrt{((359264 / 4)^2 + 4638^2)}$ =   89936 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2883 ＊ 9 　 As = 518.9 cm^2 (SM490Y)

Moment of inertia of splice plates 　 Is = 6610464 cm^4 ＞ Iw

Moment of inertia of web plate 　 Iw = 6192764 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ $6192764 * 10^4$ / 2284 = $4271 * 10^6$ N･mm

Bending stress of splice plates

σsp = $4271 * 10^6$ / ($6610464 * 10^4$) ＊ 2204 = 142 N/mm^2 ＜ σa = 210 N/mm^2

(330) G4 J-14(Sec-14) LFLG

(a) Acting stress

σ tmax = 77 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

σ cmax = -11 N/mm^2 0.75 σ ca = 0.75 * 190 = 143 N/mm^2

$\therefore \sigma$ c = 143 N/mm^2

τ max = 12 N/mm^2

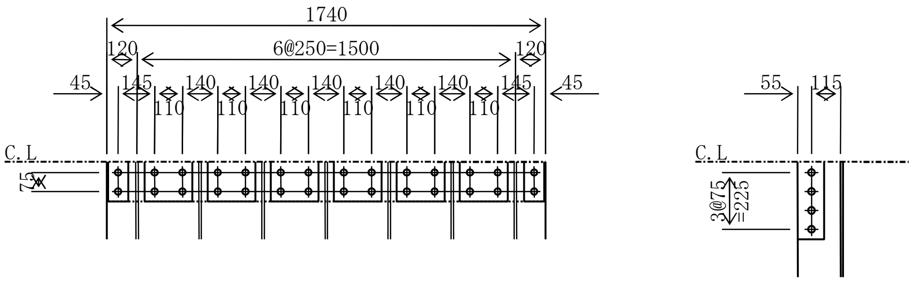
(b) Section area of main plate

1-LFLG PL 1740 * 10 Ag = 174.0 cm^2 (SM490Y)

5-RIB PL 170 * 17 Agr = 144.5 cm^2 (SM490Y)

ΣAg = Ag + Agr = 174.0 + 144.5 = 318.5 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 10 A = 174.0

(174.0 - (14* 2.5)* 1.0) * 1.1 = 152.9 < 174.0 $\therefore$An = 152.9 cm^2

5-RIB PL 170 * 17 Ar = 144.5

(144.5 - 5*(1* 2.7)* 1.7) * 1.1 = 133.7 < 144.5 $\therefore$Anr = 133.7 cm^2

ΣAn = An + Anr = 152.9 + 133.7 = 286.6 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 77 * 318.5 / 286.6 = 85 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 158 * 15290 / 1.1 = 2189250 N

> σ tn * An = 85 * 15290 = 1305019 N

Pc = σ c * Ag = 143 * 17400 = 2480583 N

・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 158 * 13371 / 1.1 = 1914413 N

> σ tn * Anr = 85 * 13371 = 1141188 N

Pcr = σ c * Agr = 143 * 14450 = 2060025 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 152.9 / 2 = 76.5 cm^2

AgR = Ag / 2 = 174.0 / 2 = 87.0 cm^2

・Rib AnrR = Anr = 133.7 cm^2

AgrR = Agr = 144.5 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2480583 / 108000 = 23.0 pcs. (28 bolts will be used.)

・Rib nr = Pcr / (108000 * 1.00) = 2060025 / 108000 = 19.1 pcs. (5 @ 4 = 20 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 28 = 2480583 / 28 = 88592$ N

$\rho s = \tau * Ag / 28 = 12 * 17400 / 28 = 7734$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(88592^2 + 7734^2)} = 88929$ N $< \rho a = 108000$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm²)	deduction of bolt holes		Ans(cm²)
2-SPL PL	80 * 9	(14.4 -	2*(1*2.5)* 0.9)*1.1= 10.9<	14.4	∴ 10.9
6-SPL PL	190 * 9	(102.6 -	6*(2*2.5)* 0.9)*1.1= 83.2<	102.6	∴ 83.2
		117.0 > AgR			94.1 > AnR
1-SPL PL	1730 * 9	(155.7 -	(14*2.5)* 0.9)*1.1= 136.6<	155.7	∴136.6
		> AgR			> AnR
10-SPL PL	100 * 17	(170.0 -	10*(1*2.7)* 1.7)*1.1= 136.5<	170.0	∴136.5
		> AgrR			>AnrR

(331) G4 J-15(Sec-15) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2730 * 15 A = 409.5 cm^2 (SM490Y)

(b) Design stress

σU = -23 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

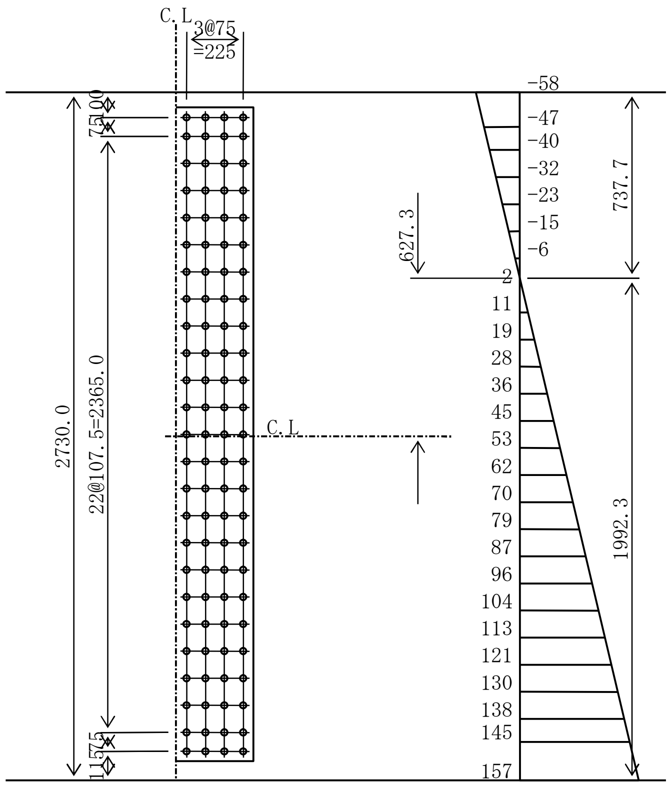
σL = 61 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 23 / 61 = 58 N/mm^2

σLn = 158 N/mm^2

τ = 19 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (145 + 157) / 2 = 346493 N

Required bolt number (Bolt number to be used)

N1 = 346493 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

$\rho s = \tau * A / 100$ = 19 * 40950 / 100 = 7768 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((346493 / 4)^2 + 7768^2)}$ = 86971 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2595 * 9 As = 467.1 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4415688 cm^4 > Iw

Moment of inertia of web plate Iw = 4154790 cm^4

Bending moment to be shared by the web

Mw = 158 * 4154790*10^4 / 1992 = 3285*10^6 N·mm

Bending stress of splice plates

σsp = 3285*10^6 / (4415688*10^4) * 1917 = 143 N/mm^2 < σa = 210 N/mm^2

(332) G4 J-15(Sec-15) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 3063 * 15 A = 459.4 cm^2 (SM490Y)

(b) Design stress

σU = -21 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

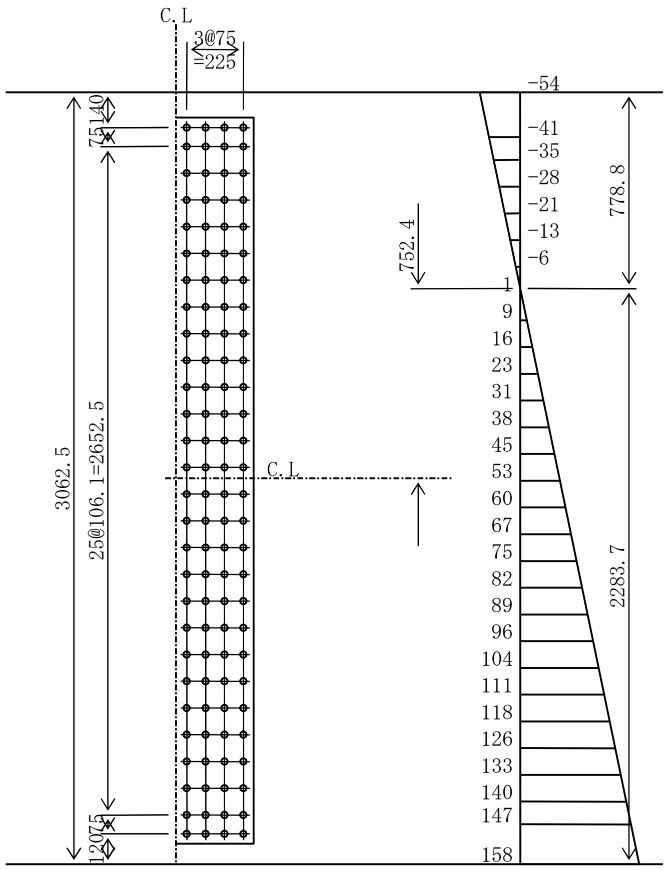
σL = 61 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 21 / 61 = 54 N/mm^2

σLn = 158 N/mm^2

τ = 17 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 15 * (147 + 158) / 2 = 359263 N

Required bolt number (Bolt number to be used)

N1 = 359263 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 112 = 17 * 45938 / 112 = 7093 N < ρa = 108000 N

Combined stress

$\rho c28$ = $\sqrt{((359263 / 4)^2 + 7093^2)}$ = 90095 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2883 ＊ 9 As = 518.9 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 6608548 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 6191079 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ 6191079*10^4 / 2284 = 4270*10^6 N･mm

Bending stress of splice plates

σsp = 4270*10^6 / (6608548*10^4) ＊ 2204 = 142 N/mm^2 ＜ σa = 210 N/mm^2

(333) G4 J-15(Sec-15) LFLG

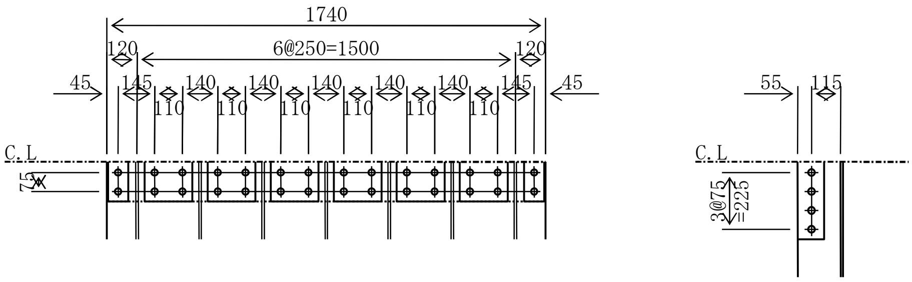
(a) Acting stress

σ tmax = 61 N/mm² 0.75 σ ta = 0.75 * 210 = 158 N/mm²
σ cmax = -34 N/mm² 0.75 σ ca = 0.75 * 190 = 143 N/mm²
∴ σ c = 143 N/mm²
τ max = 17 N/mm²

(b) Section area of main plate

1-LFLG PL 1740 * 10 Ag = 174.0 cm² (SM490Y)
5-RIB PL 170 * 17 Agr = 144.5 cm² (SM490Y)
Σ Ag = Ag + Agr = 174.0 + 144.5 = 318.5 cm²

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 10 A = 174.0
(174.0 - (14* 2.5)* 1.0) * 1.1 = 152.9 < 174.0 ∴An = 152.9 cm²
5-RIB PL 170 * 17 Ar = 144.5
(144.5 - 5*(1* 2.7)* 1.7) * 1.1 = 133.7 < 144.5 ∴Anr = 133.7 cm²
Σ An = An + Anr = 152.9 + 133.7 = 286.6 cm²
σ tn = σ tmax * Σ Ag / Σ An = 61 * 318.5 / 286.6 = 68 N/mm²
< σ ta = 210 N/mm²

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 158 * 15290 / 1.1 = 2189250 N
> σ tn * An = 68 * 15290 = 1040274 N
Pc = σ c * Ag = 143 * 17400 = 2480583 N
・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 158 * 13371 / 1.1 = 1914413 N
> σ tn * Anr = 68 * 13371 = 909678 N
Pcr = σ c * Agr = 143 * 14450 = 2060025 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 152.9 / 2 = 76.5 cm²
AgR = Ag / 2 = 174.0 / 2 = 87.0 cm²
・Rib AnrR = Anr = 133.7 cm²
AgrR = Agr = 144.5 cm²

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2480583 / 108000 = 23.0 pcs. (28 bolts will be used.)
・Rib nr = Pcr / (108000 * 1.00) = 2060025 / 108000 = 19.1 pcs. (5 @ 4 = 20 bolts will be used.)
(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 28 = 2480583 / 28 = 88592$ N

$\rho s = \tau * Ag / 28 = 17 * 17400 / 28 = 10677$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(88592^2 + 10677^2)} = 89233 \text{ N} < \rho a = 108000$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm²)	deduction of bolt holes			Ans(cm²)
2-SPL PL	80 * 9	(14.4 -	2*(1*2.5)* 0.9)*1.1=	10.9<	14.4	∴ 10.9
6-SPL PL	190 * 9	(102.6 -	6*(2*2.5)* 0.9)*1.1=	83.2<	102.6	∴ 83.2
		117.0				94.1
		> AgR				> AnR
1-SPL PL	1730 * 9	(155.7 -	(14*2.5)* 0.9)*1.1=	136.6<	155.7	∴136.6
		> AgR				> AnR
10-SPL PL	100 * 17	(170.0 -	10*(1*2.7)* 1.7)*1.1=	136.5<	170.0	∴136.5
		> AgrR				>AnrR

(334) G4 J-16(Sec-16) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2729 * 15 A = 409.3 cm^2 (SM490Y)

(b) Design stress

σU = 27 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

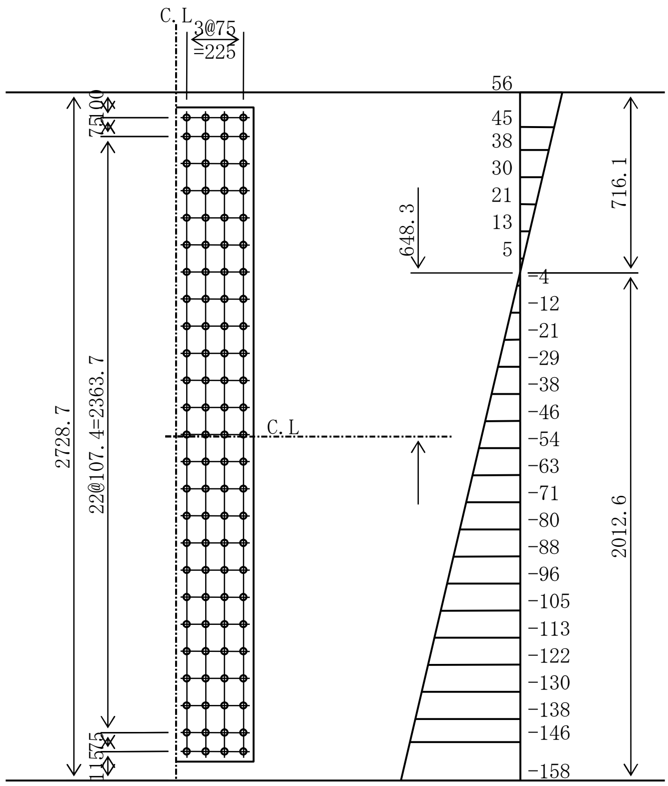
σL = -77 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 27 / 77 = 56 N/mm^2

σLn = 158 N/mm^2

τ = 29 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (146 + 158) / 2 = 346631 N

Required bolt number (Bolt number to be used)

N1 = 346631 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 29 * 40930 / 100 = 11824 N < ρa = 108000 N

Combined stress

ρc25 = $\sqrt{}$((346631 / 4$)^2$ + 11824^2) = 87461 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2594 ＊ 9 As = 466.9 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4533911 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4259559 cm^4

Bending moment to be shared by the web

$Mw = 158 * 4259559*10^4 / 2013 = 3333*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 3333*10^6 / (4533911*10^4) * 1938 = 142$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(335) G4 J-16(Sec-16) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 3064 * 15 A = 459.5 cm^2 (SM490Y)

(b) Design stress

σU = 25 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

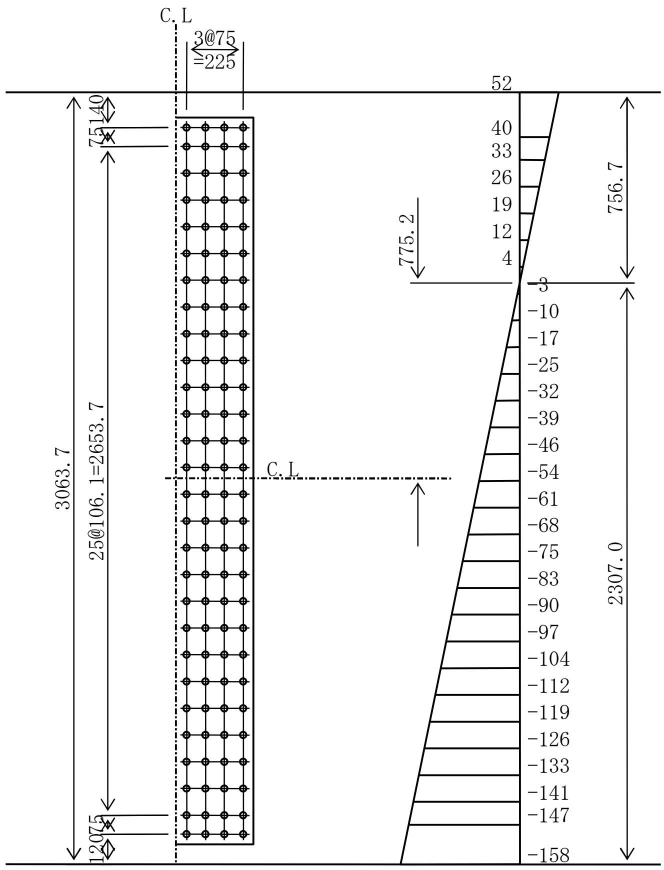
σL = -77 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 25 / 77 = 52 N/mm^2

σLn = 158 N/mm^2

τ = 26 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 15 * (147 + 158) / 2 = 359392 N

Required bolt number (Bolt number to be used)

N1 = 359392 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 112 = 26 * 45955 / 112 = 10635 N < ρa = 108000 N

Combined stress

$\rho c28$ = $\sqrt{((359392 / 4)^2 + 10635^2)}$ = 90475 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2884 * 9 As = 519.1 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 6796731 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 6355748 cm^4

Bending moment to be shared by the web

Mw = 158 * 6355748*10^4 / 2307 = 4339*10^6 N·mm

Bending stress of splice plates

σsp = 4339*10^6 / (6796731*10^4) * 2227 = 142 N/mm^2 ＜ σa = 210 N/mm^2

(336) G4 J-16(Sec-16) LFLG

(a) Acting stress

σ tmax = 19 N/mm^2 0.75 σ ta = 0.75 * 210 = 158 N/mm^2

σ cmax = -77 N/mm^2 0.75 σ ca = 0.75 * 190 = 143 N/mm^2

$\therefore$ σ c = 143 N/mm^2

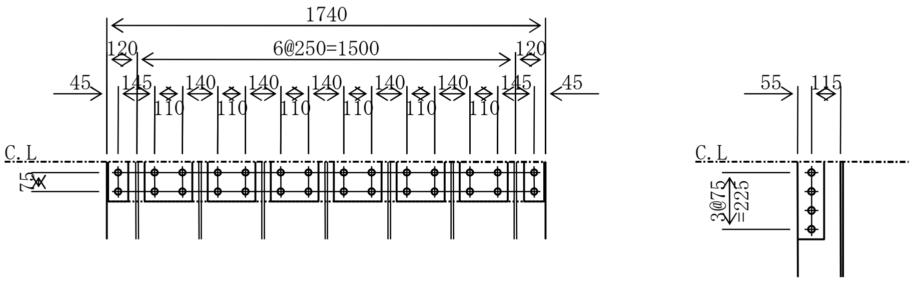
τ max = 26 N/mm^2

(b) Section area of main plate

1-LFLG	PL	1740 * 10	Ag =	174.0 cm^2	(SM490Y)
5-RIB	PL	170 * 17	Agr =	144.5 cm^2	(SM490Y)

ΣAg = Ag + Agr = 174.0 + 144.5 = 318.5 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 10 A = 174.0

(174.0 - (14* 2.5)* 1.0) * 1.1 = 152.9 < 174.0 $\therefore$An = 152.9 cm^2

5-RIB PL 170 * 17 Ar = 144.5

(144.5 - 5*(1* 2.7)* 1.7) * 1.1 = 133.7 < 144.5 $\therefore$Anr = 133.7 cm^2

ΣAn = An + Anr = 152.9 + 133.7 = 286.6 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 19 * 318.5 / 286.6 = 22 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = 0.75 σ ta * An / 1.1 = 158 * 15290 / 1.1 = 2189250 N

> σ tn * An = 22 * 15290 = 329398 N

Pc = σ c * Ag = 143 * 17400 = 2480583 N

・Rib Ptr = 0.75 σ ta * Anr / 1.1 = 158 * 13371 / 1.1 = 1914413 N

> σ tn * Anr = 22 * 13371 = 288046 N

Pcr = σ c * Agr = 143 * 14450 = 2060025 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 152.9 / 2 = 76.5 cm^2

AgR = Ag / 2 = 174.0 / 2 = 87.0 cm^2

・Rib AnrR = Anr = 133.7 cm^2

AgrR = Agr = 144.5 cm^2

(g) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 2480583 / 108000 = 23.0 pcs. (28 bolts will be used.)

・Rib nr = Pcr / (108000 * 1.00) = 2060025 / 108000 = 19.1 pcs. (5 @ 4 = 20 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(h) Tensile force per one bolt

$\rho p = Pc / 28 = 2480583 / 28 = 88592$ N

$\rho s = \tau * Ag / 28 = 26 * 17400 / 28 = 16414$ N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(88592^2 + 16414^2)} = 90100$ N $< \rho a = 108000$ N

(i) Check of splice plates

	(SM490Y)	Ags(cm²)	deduction of bolt holes			Ans(cm²)
2-SPL PL	80 * 9	(14.4 -	2*(1*2.5)* 0.9)*1.1=	10.9<	14.4	∴ 10.9
6-SPL PL	190 * 9	(102.6 -	6*(2*2.5)* 0.9)*1.1=	83.2<	102.6	∴ 83.2
		117.0				94.1
		> AgR				> AnR
1-SPL PL	1730 * 9	(155.7 -	(14*2.5)* 0.9)*1.1=	136.6<	155.7	∴136.6
		> AgR				> AnR
10-SPL PL	100 * 17	(170.0 -	10*(1*2.7)* 1.7)*1.1=	136.5<	170.0	∴136.5
		> AgrR				>AnrR

(337) G4 J-17(Sec-17) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2729 * 15 A = 409.3 cm^2 (SM490Y)

(b) Design stress

σU = 57 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

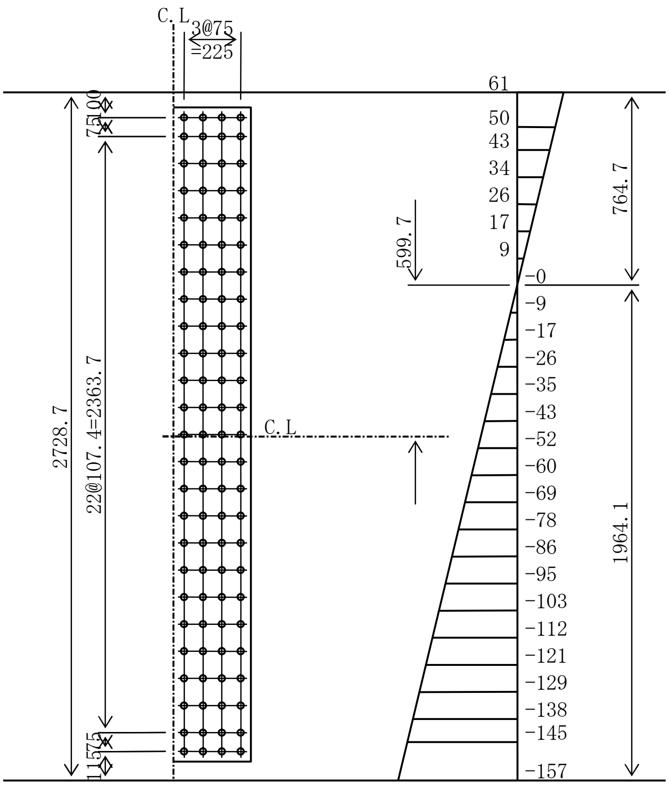
σL = -145 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 57 / 145 = 61 N/mm^2

σLn = 158 N/mm^2

τ = 41 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (145 + 157) / 2 = 346294 N

Required bolt number (Bolt number to be used)

N1 = 346294 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 41 * 40931 / 100 = 16720 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((346294 / 4)^2 + 16720^2)}$ = 88173 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2594 * 9 As = 466.9 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4254677 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4011780 cm^4

Bending moment to be shared by the web

Mw = 158 * 4011780*10^4 / 1964 = 3217*10^6 N·mm

Bending stress of splice plates

σsp = 3217*10^6 / (4254677*10^4) * 1889 = 143 N/mm^2 ＜ σa = 210 N/mm^2

(338) G4 J-17(Sec-17) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 3064 * 15 A = 459.5 cm^2 (SM490Y)

(b) Design stress

σU = 53 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

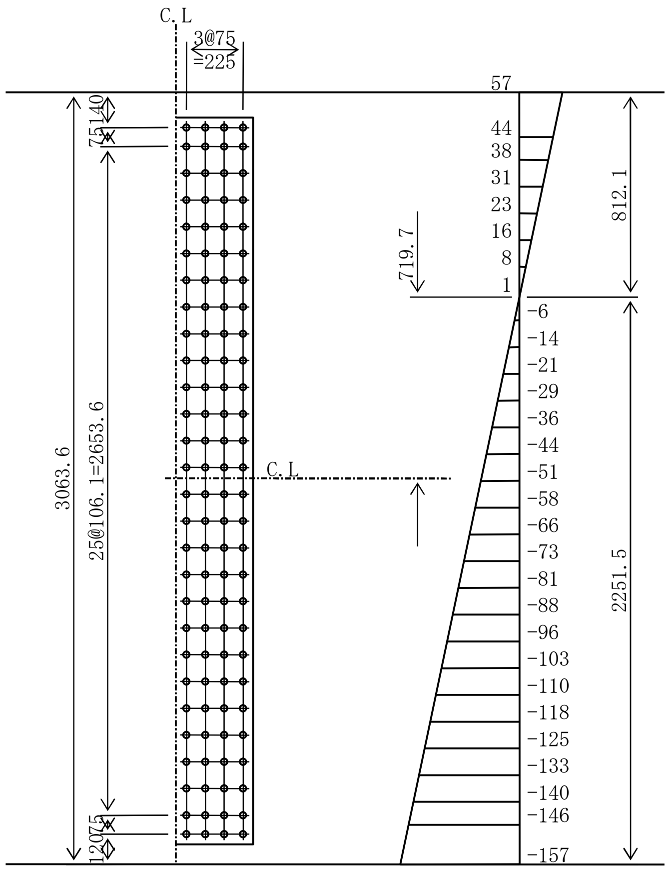
σL = -146 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 53 / 146 = 57 N/mm^2

σLn = 158 N/mm^2

τ = 37 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 15 * (146 + 157) / 2 = 359079 N

Required bolt number (Bolt number to be used)

N1 = 359079 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 112 = 37 * 45954 / 112 = 15245 N < ρa = 108000 N

Combined stress

$\rho c28$ = $\sqrt{((359079 / 4)^2 + 15245^2)}$ = 91055 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2884 ＊ 9 As = 519.0 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 6360359 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 5974496 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ 5974496*10^4 / 2251 = 4179*10^6 N･mm

Bending stress of splice plates

σsp = 4179*10^6 / (6360359*10^4) ＊ 2171 = 143 N/mm^2 ＜ σa = 210 N/mm^2

(339) G4 J-17(Sec-17) LFLG

(a) Acting stress

σ cmax = -146 N/mm^2 0.75 σ ca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma$ c = 158 N/mm^2

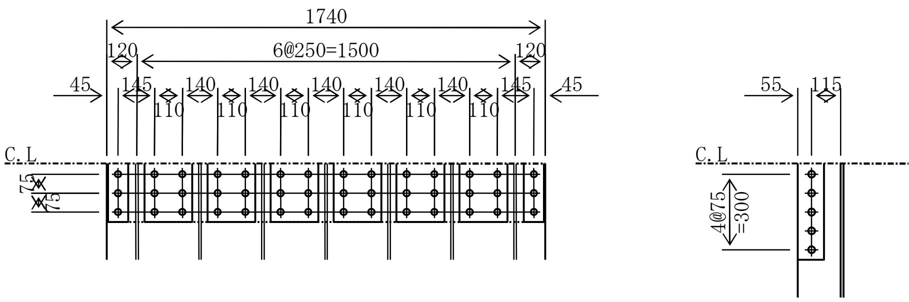
τ max = 32 N/mm^2

(b) Section area of main plate

1-LFLG	PL 1740 * 12	Ag =	208.8 cm^2	(SM490Y)
5-RIB	PL 170 * 17	Agr =	144.5 cm^2	(SM490Y)

ΣAg = Ag + Agr = 208.8 + 144.5 = 353.3 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σ c * Ag = 158 * 20880 = 3288600 N

・Rib Pcr = σ c * Agr = 158 * 14450 = 2275875 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 208.8 / 2 = 104.4 cm^2

・Rib AgrR = Agr = 144.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 3288600 / 108000 = 30.4 pcs. (42 bolts will be used.)

・Rib nr = Pcr / (108000 * 1.00) = 2275875 / 108000 = 21.1 pcs. (5 @ 5 = 25 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3,5 unites)

(g) Tensile force per one bolt

ρ p = Pc / 42 = 3288600 / 42 = 78300 N

ρ s = τ * Ag / 42 = 32 * 20880 / 42 = 15764 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(78300^2 + 15764^2)}$ = 79871 N < ρ a = 108000 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)
2-SPL PL	80 * 9	14.4
6-SPL PL	190 * 9	102.6
		117.0

> AgR = 104.4cm^2

1-SPL PL 1730 * 9 155.7 > AgR = 104.4cm^2

10-SPL PL 100 * 15 150.0 > AgrR = 144.5cm^2

(340) G4 J-18(Sec-18) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2729 * 15 A = 409.3 cm^2 (SM490Y)

(b) Design stress

σU = 101 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

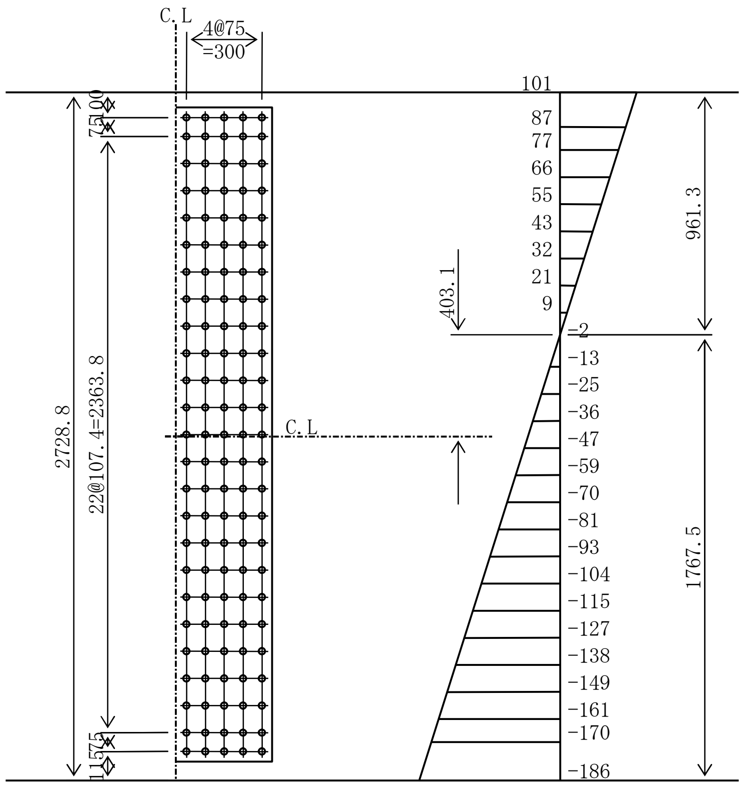
σL = -186 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 101 N/mm^2

σLn = 186 N/mm^2

τ = 50 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (170 + 186) / 2 = 407639 N

Required bolt number (Bolt number to be used)

N1 = 407639 / (108000 * 1.00) = 3.8 pcs. (5 bolts will be used.)

Check of shear force

ρs = τ * A / 125 = 50 * 40932 / 125 = 16431 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{}$((407639 / 5)^2 + 16431^2) = 83167 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 5 unites)

(e) Check of splice plates

2-SPL PL 2594 ＊ 9 As = 466.9 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3348408 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3205189 cm^4

Bending moment to be shared by the web

Mw = 186 ＊ 3205189*10^4 / 1768 = 3377*10^6 N·mm

Bending stress of splice plates

σsp = 3377*10^6 / (3348408*10^4) ＊ 1693 = 171 N/mm^2 ＜ σa = 210 N/mm^2

(341) G4 J-18(Sec-18) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 3064 * 15 A = 459.5 cm^2 (SM490Y)

(b) Design stress

σU = 96 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

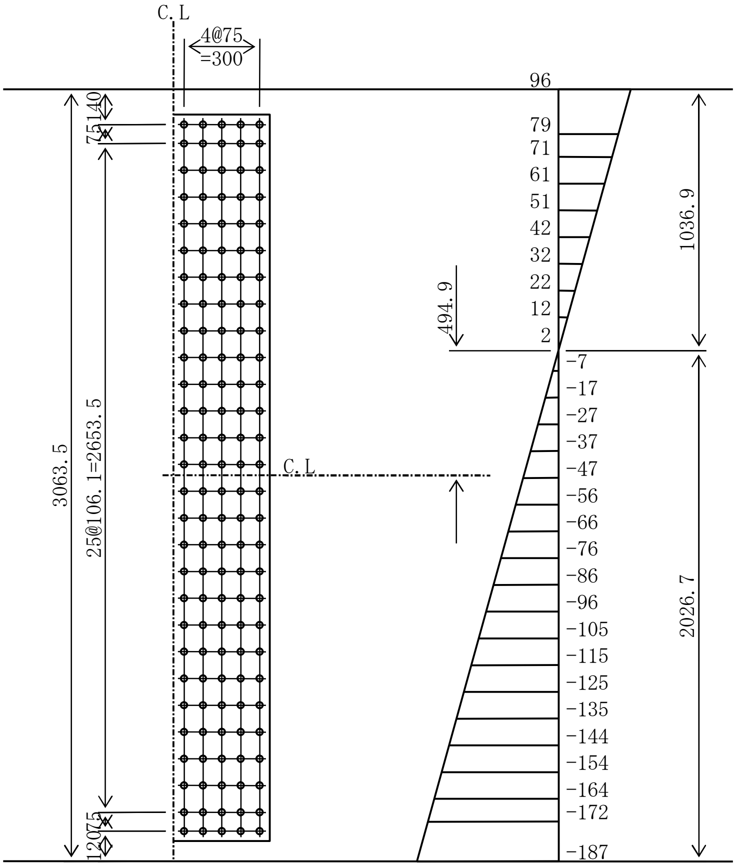
σL = -187 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 96 N/mm^2

σLn = 187 N/mm^2

τ = 45 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 15 * (172 + 187) / 2 = 424381 N

Required bolt number (Bolt number to be used)

N1 = 424381 / (108000 * 1.00) = 3.9 pcs. (5 bolts will be used.)

Check of shear force

ρs = τ * A / 140 = 45 * 45953 / 140 = 14826 N < ρa = 108000 N

Combined stress

$\rho c28$ = $\sqrt{((424381 / 5)^2 + 14826^2)}$ = 86161 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 5 unites)

(e) Check of splice plates

2-SPL PL 2884 ＊ 9 As = 519.0 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4919673 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4719632 cm^4

Bending moment to be shared by the web

Mw = 187 ＊ $4719632*10^4$ / 2027 = $4352*10^6$ N･mm

Bending stress of splice plates

σsp = $4352*10^6$ / ($4919673*10^4$) ＊ 1947 = 172 N/mm^2 ＜ σa = 210 N/mm^2

(342) G4 J-18(Sec-18) LFLG

(a) Acting stress

σcmax = -189 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2

$\therefore\sigma$c = 189 N/mm^2

τmax = 22 N/mm^2

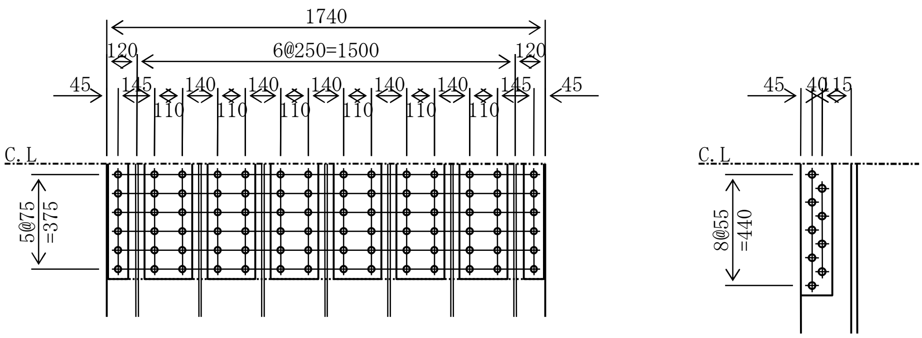
(b) Section area of main plate

1-LFLG PL 1740 * 24   Ag = 417.6 cm^2 (SM490Y)

5-RIB PL 200 * 22   Agr = 220.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 417.6 + 220.0 = 637.6 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 189 * 41760 = 7889257 N

・Rib Pcr = σc * Agr = 189 * 22000 = 4156218 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 417.6 / 2 = 208.8 cm^2

・Rib AgrR = Agr = 220.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 7889257 / 108000 = 73.0 pcs. (84 bolts will be used.)

・Rib nr = Pcr / (108000 * 0.98) = 4156218 / 105840 = 39.3 pcs. (5 @ 9 = 45 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 6,9 unites)

(g) Tensile force per one bolt

ρp = Pc / 84 = 7889257 / 84 = 93920 N

ρs = τ * Ag / 84 = 22 * 41760 / 84 = 11096 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(93920^2 + 11096^2) = 94573 N < ρa = 108000 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
2-SPL PL	80 * 17	27.2	
6-SPL PL	190 * 17	193.8	
		221.0	> AgR = 208.8cm^2
1-SPL PL	1730 * 13	224.9	> AgR = 208.8cm^2
10-SPL PL	120 * 19	228.0	> AgrR = 220.0cm^2

(343) G4 J-19(Sec-19) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2729 * 17 A = 463.9 cm^2 (SM490Y)

(b) Design stress

σU = 142 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

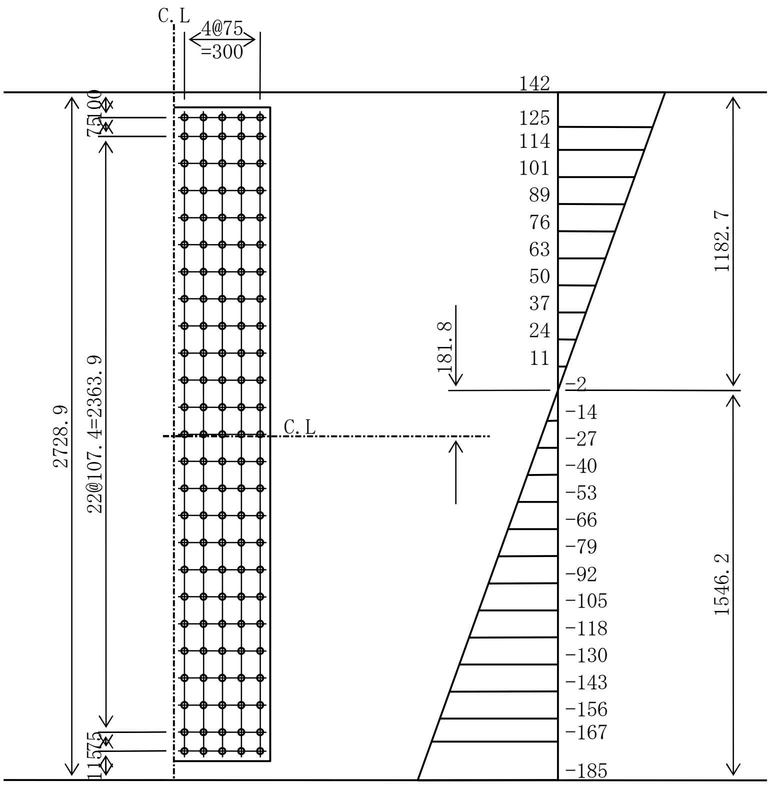
σL = -185 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 142 N/mm^2

σLn = 185 N/mm^2

τ = 51 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 17 * (167 + 185) / 2 = 456915 N

Required bolt number (Bolt number to be used)

N1 = 456915 / (108000 * 1.00) = 4.2 pcs. (5 bolts will be used.)

Check of shear force

ρs = τ * A / 125 = 51 * 46391 / 125 = 18833 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((456915 / 5)^2 + 18833^2)}$ = 93303 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 5 unites)

(e) Check of splice plates

2-SPL PL 2594 * 11 As = 570.6 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3372797 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3032075 cm^4

Bending moment to be shared by the web

Mw = 185 * 3032075*10^4 / 1546 = 3635*10^6 N·mm

Bending stress of splice plates

σsp = 3635*10^6 / (3372797*10^4) * 1471 = 159 N/mm^2 ＜ σa = 210 N/mm^2

(344) G4 J-19(Sec-19) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 3063 * 17 A = 520.8 cm^2 (SM490Y)

(b) Design stress

σU = 135 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

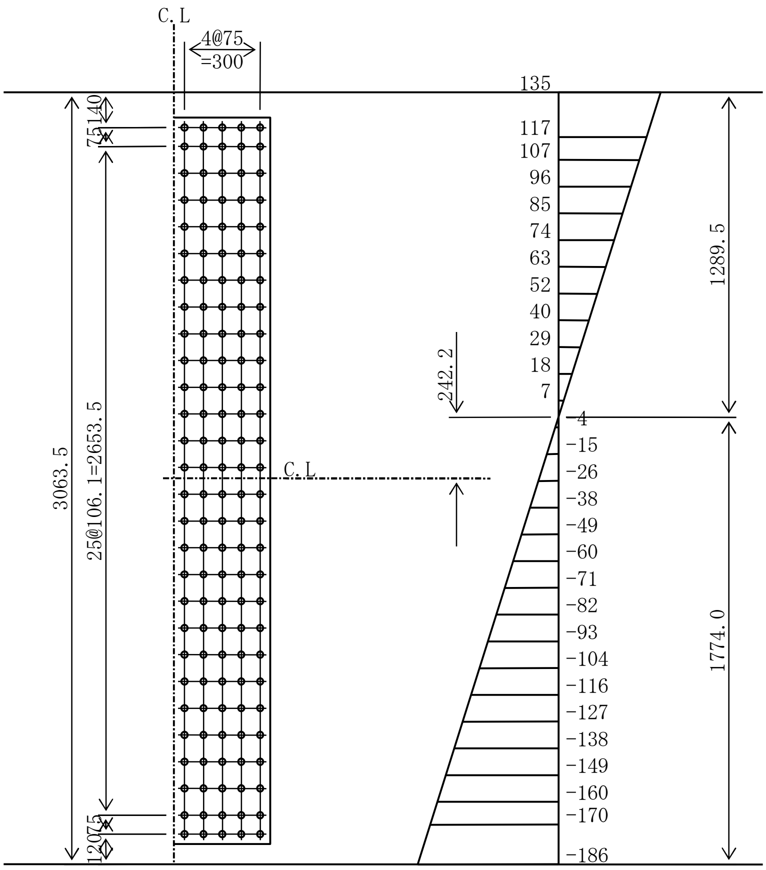
σL = -186 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 135 N/mm^2

σLn = 186 N/mm^2

τ = 47 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 17 * (170 + 186) / 2 = 476501 N

Required bolt number (Bolt number to be used)

N1 = 476501 / (108000 * 1.00) = 4.4 pcs. (5 bolts will be used.)

Check of shear force

ρs = τ * A / 140 = 47 * 52079 / 140 = 17350 N < ρa = 108000 N

Combined stress

$\rho c28 = \sqrt{((476501 / 5)^2 + 17350^2)}$ = 96867 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 5 unites)

(e) Check of splice plates

2-SPL PL 2883 * 11 As = 634.4 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4798969 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4378605 cm^4

Bending moment to be shared by the web

Mw = 186 * 4378605*10^4 / 1774 = 4597*10^6 N·mm

Bending stress of splice plates

σsp = 4597*10^6 / (4798969*10^4) * 1694 = 162 N/mm^2 ＜ σa = 210 N/mm^2

(345) G4 J-19(Sec-19) LFLG

(a) Acting stress

σcmax = -191 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2

$\therefore\sigma$c = 191 N/mm^2

τmax = 15 N/mm^2

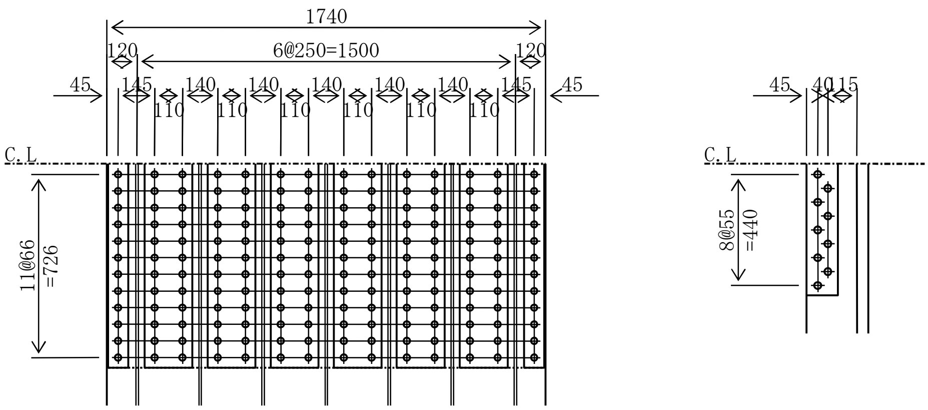
(b) Section area of main plate

1-LFLG PL 1740 * 45 Ag = 783.0 cm^2 (SM520-H)

5-RIB PL 200 * 22 Agr = 220.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 783.0 + 220.0 = 1003.0 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 191 * 78300 = 14950367 N

・Rib Pcr = σc * Agr = 191 * 22000 = 4200614 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 783.0 / 2 = 391.5 cm^2

・Rib AgrR = Agr = 220.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 0.92) = 14950367 / 99360 = 150.5 pcs. (168 bolts will be used.)

・Rib nr = Pcr / (108000 * 0.98) = 4200614 / 105840 = 39.7 pcs. (5 @ 9 = 45 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 12,9 unites)

(g) Tensile force per one bolt

ρp = Pc / 168 = 14950367 / 168 = 88990 N

ρs = τ * Ag / 168 = 15 * 78300 / 168 = 6786 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(88990^2 + 6786^2)}$ = 89249 N < ρa = 99360 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)
2-SPL PL	80 * 31	49.6
6-SPL PL	190 * 31	353.4
		403.0

> AgR = 391.5cm^2

1-SPL PL 1730 * 23 397.9 > AgR = 391.5cm^2

10-SPL PL　120 ＊ 19　　　228.0　＞ AgrR =　220.0cm^2

(346) G4 J-20(Sec-21) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2729 * 17 A = 463.9 cm^2 (SM490Y)

(b) Design stress

σU = 142 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

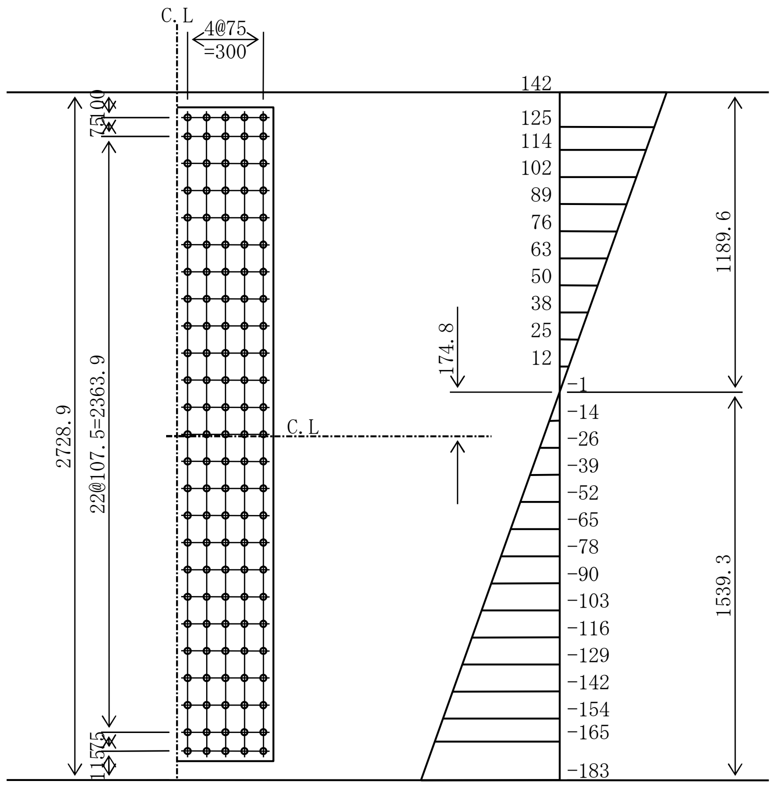
σL = -183 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 142 N/mm^2

σLn = 183 N/mm^2

τ = 61 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 17 * (165 + 183) / 2 = 451742 N

Required bolt number (Bolt number to be used)

N1 = 451742 / (108000 * 1.00) = 4.2 pcs. (5 bolts will be used.)

Check of shear force

$\rho s = \tau$ * A / 125 = 61 * 46391 / 125 = 22721 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((451742 / 5)^2 + 22721^2)}$ = 93162 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 5 unites)

(e) Check of splice plates

2-SPL PL 2594 * 11 As = 570.7 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3359441 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3020742 cm^4

Bending moment to be shared by the web

Mw = 183 * 3020742*10^4 / 1539 = 3598*10^6 N·mm

Bending stress of splice plates

σsp = 3598*10^6 / (3359441*10^4) * 1464 = 157 N/mm^2 ＜ σa = 210 N/mm^2

(347) G4 J-20(Sec-21) RWEB

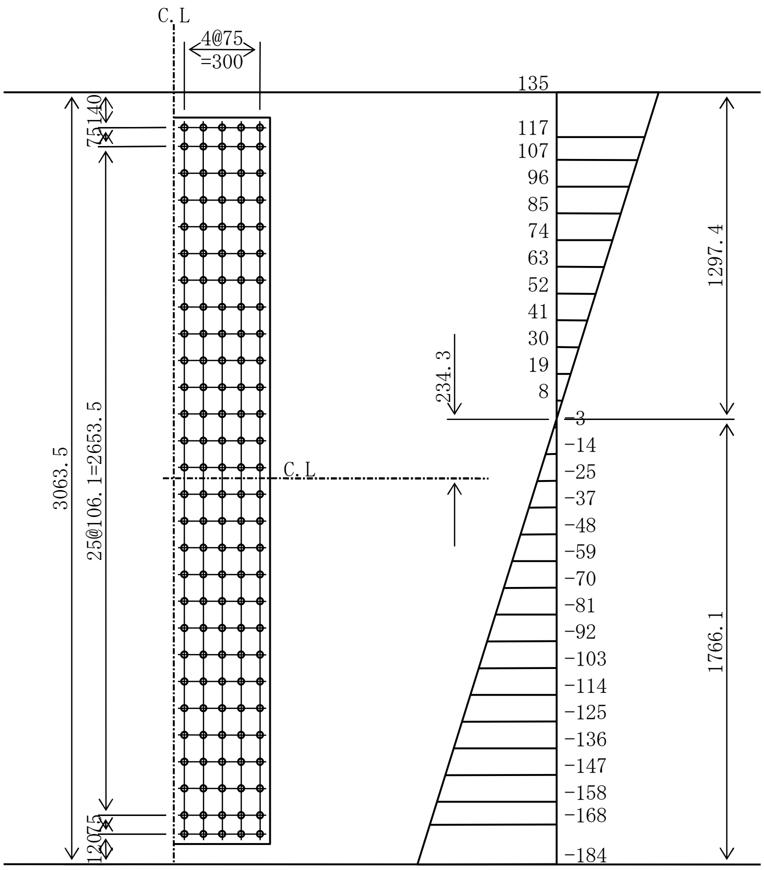
(a) Section area of main plate (Web plate)

1-RWEB PL 3063 * 17 A = 520.8 cm^2 (SM490Y)

(b) Design stress

σU = 135 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = -184 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 135 N/mm^2
σLn = 184 N/mm^2
τ = 57 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 17 * (168 + 184) / 2 = 471127 N

Required bolt number (Bolt number to be used)

N1 = 471127 / (108000 * 1.00) = 4.4 pcs. (5 bolts will be used.)

Check of shear force

$\rho s = \tau * A / 140 =$ 57 * 52079 / 140 = 21151 N < ρa = 108000 N

Combined stress

$\rho c28 = \sqrt{((471127 / 5)^2 + 21151^2)}$ = 96570 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 5 unites)

(e) Check of splice plates

2-SPL PL 2883 * 11 As = 634.4 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4773910 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4358845 cm^4

Bending moment to be shared by the web

$Mw = 184 * 4358845*10^4 / 1766 = 4546*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 4546*10^6 / (4773910*10^4) * 1686 = 161$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(348) G4 J-20(Sec-21) LFLG

(a) Acting stress

σ cmax = -188 N/mm^2 0.75 σ ca = 0.75 * 210 = 158 N/mm^2

$\therefore \sigma$ c = 188 N/mm^2

τ max = 18 N/mm^2

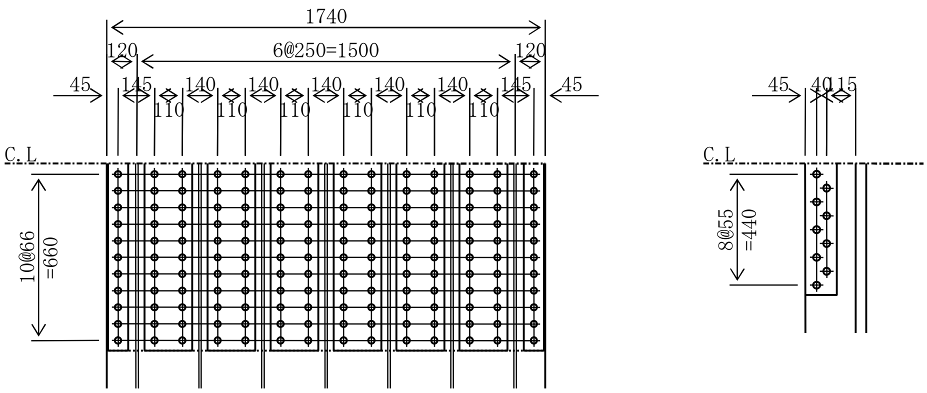
(b) Section area of main plate

1-LFLG PL 1740 * 42 Ag = 730.8 cm^2 (SM520-H)

5-RIB PL 200 * 22 Agr = 220.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 730.8 + 220.0 = 950.8 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σ c * Ag = 188 * 73080 = 13774557 N

・Rib Pcr = σ c * Agr = 188 * 22000 = 4146692 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 730.8 / 2 = 365.4 cm^2

・Rib AgrR = Agr = 220.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 0.94) = 13774557 / 101520 = 135.7 pcs. (154 bolts will be used.)

・Rib nr = Pcr / (108000 * 0.98) = 4146692 / 105840 = 39.2 pcs. (5 @ 9 = 45 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 11,9 unites)

(g) Tensile force per one bolt

ρ p = Pc / 154 = 13774557 / 154 = 89445 N

ρ s = τ * Ag / 154 = 18 * 73080 / 154 = 8756 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(89445^2 + 8756^2)}$ = 89873 N < ρ a = 101520 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)
2-SPL PL	80 * 29	46.4
6-SPL PL	190 * 29	330.6
		377.0

> AgR = 365.4cm^2

1-SPL PL 1730 * 22 380.6 > AgR = 365.4cm^2

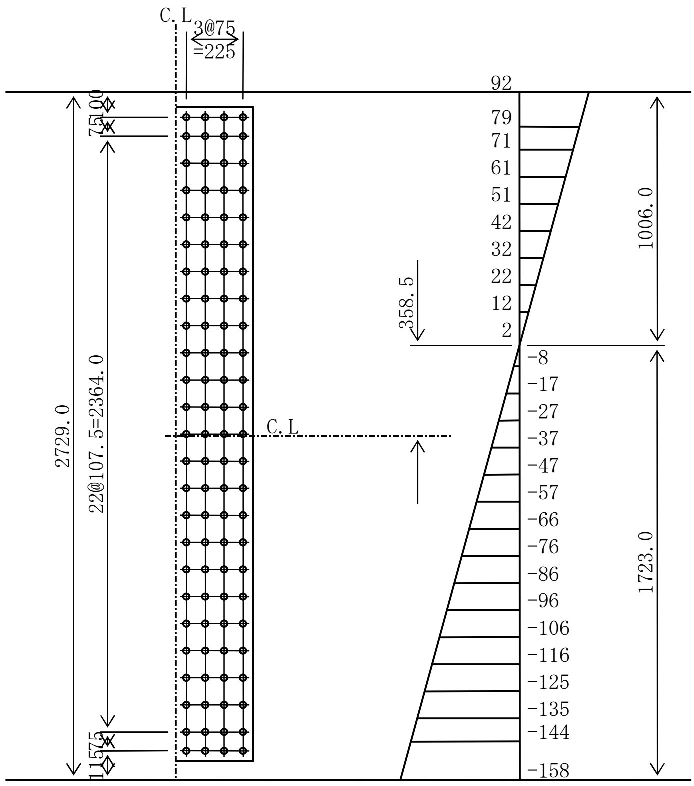
10-SPL PL 120 * 19 228.0 ＞ AgrR = 220.0cm^2

(349) G4 J-21(Sec-22) LWEB

(a) Section area of main plate (Web plate)
1-LWEB PL 2729 * 15 A = 409.3 cm^2 (SM490Y)

(b) Design stress
σU = 89 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = -153 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 158 * 89 / 153 = 92 N/mm^2
σLn = 158 N/mm^2
τ = 60 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress
Check of bolt at 25th row
Sharing width: b1 = 15.3 cm
Total force to be shared
P1 = 153 * 15 * (144 + 158) / 2 = 344337 N
Required bolt number (Bolt number to be used)
N1 = 344337 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force
ρs = τ * A / 100 = 60 * 40934 / 100 = 24496 N < ρa = 108000 N
Combined stress
$\rho c25$ = $\sqrt{((344337 / 4)^2 + 24496^2)}$ = 89502 N < ρa = 108000 N
(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2594 ＊ 9 A_s = 466.9 cm^2 (SM490Y)

Moment of inertia of splice plates I_s = 3193263 cm^4 ＞ I_w

Moment of inertia of web plate I_w = 3066452 cm^4

Bending moment to be shared by the web

M_w = 158 ＊ 3066452*10^4 / 1723 = 2803*10^6 N·mm

Bending stress of splice plates

σ_{sp} = 2803*10^6 / (3193263*10^4) ＊ 1648 = 145 N/mm^2 ＜ σ_a = 210 N/mm^2

(350) G4 J-21(Sec-22) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 3063 * 15 A = 459.5 cm^2 (SM490Y)

(b) Design stress

σU = 85 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

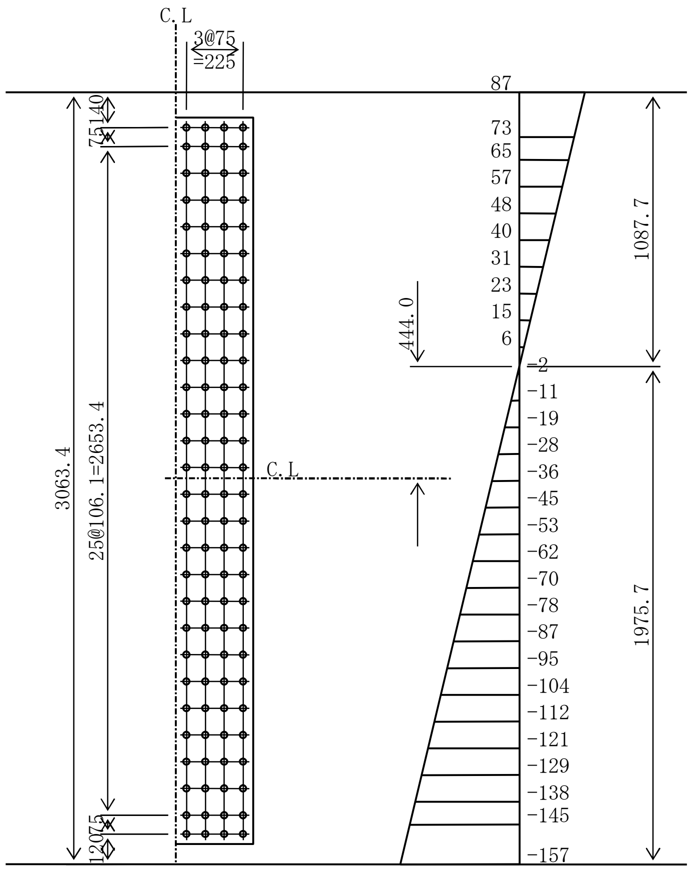
σL = -154 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 85 / 154 = 87 N/mm^2

σLn = 158 N/mm^2

τ = 59 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 15 * (145 + 157) / 2 = 357262 N

Required bolt number (Bolt number to be used)

N1 = 357262 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 112 = 59 * 45951 / 112 = 24125 N < ρa = 108000 N

Combined stress

$\rho c28$ = $\sqrt{((357262 / 4)^2 + 24125^2)}$ = 92516 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2883 ＊ 9 As = 519.0 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4665741 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4499466 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ 4499466*10^4 / 1976 = 3587*10^6 N·mm

Bending stress of splice plates

σsp = 3587*10^6 / (4665741*10^4) ＊ 1896 = 146 N/mm^2 ＜ σa = 210 N/mm^2

(351) G4 J-21(Sec-22) LFLG

(a) Acting stress

σ cmax = -155 N/mm^2 0.75 σ ca = 0.75 * 210 = 158 N/mm^2

∴ σ c = 158 N/mm^2

τ max = 30 N/mm^2

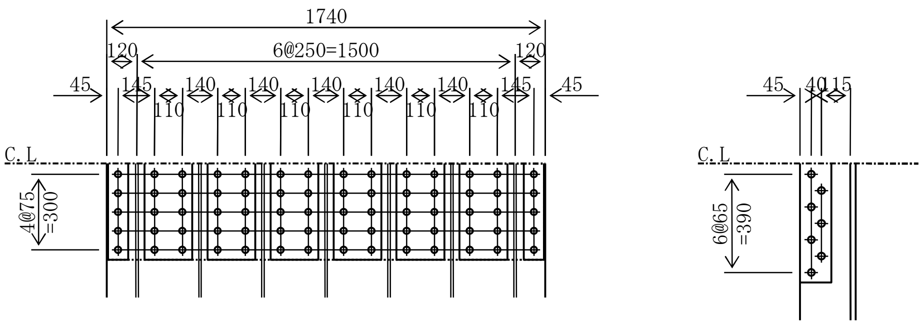
(b) Section area of main plate

1-LFLG PL 1740 * 21   Ag = 365.4 cm^2 (SM490Y)

5-RIB PL 200 * 22   Agr = 220.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 365.4 + 220.0 = 585.4 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σ c * Ag = 158 * 36540 = 5755050 N

・Rib Pcr = σ c * Agr = 158 * 22000 = 3465000 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 365.4 / 2 = 182.7 cm^2

・Rib AgrR = Agr = 220.0 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 5755050 / 108000 = 53.3 pcs. (70 bolts will be used.)

・Rib nr = Pcr / (108000 * 1.00) = 3465000 / 108000 = 32.1 pcs. (5 @ 7 = 35 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 5,7 unites)

(g) Tensile force per one bolt

ρ p = Pc / 70 = 5755050 / 70 = 82215 N

ρ s = τ * Ag / 70 = 30 * 36540 / 70 = 15429 N

$\rho = \sqrt{(\rho p^2 + \rho s^2)} = \sqrt{(82215^2 + 15429^2)}$ = 83650 N < ρ a = 108000 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)	
2-SPL PL	80 * 15	24.0	
6-SPL PL	190 * 15	171.0	
		195.0	> AgR = 182.7cm^2
1-SPL PL	1730 * 11	190.3	> AgR = 182.7cm^2
10-SPL PL	120 * 19	228.0	> AgrR = 220.0cm^2

(352) G4 J-22(Sec-23) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2730 * 15 A = 409.4 cm^2 (SM490Y)

(b) Design stress

σU = 31 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

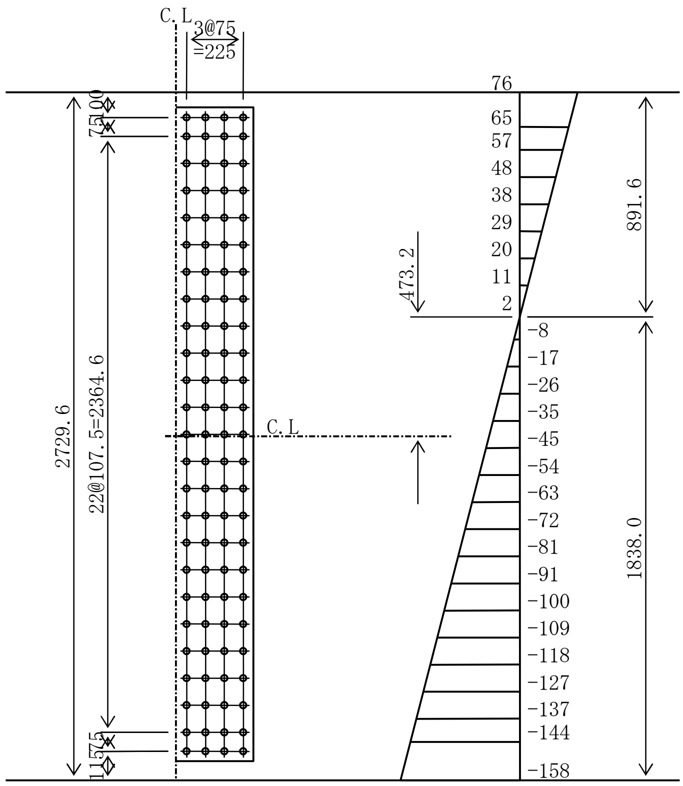
σL = -63 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 31 / 63 = 76 N/mm^2

σLn = 158 N/mm^2

τ = 57 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (144 + 158) / 2 = 345335 N

Required bolt number (Bolt number to be used)

N1 = 345335 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 57 * 40944 / 100 = 23165 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((345335 / 4)^2 + 23165^2)}$ = 89388 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2595 ＊ 9 As = 467.0 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3632930 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3459040 cm^4

Bending moment to be shared by the web

$Mw = 158 * 3459040*10^4 / 1838 = 2964*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 2964*10^6 / (3632930*10^4) * 1763 = 144$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(353) G4 J-22(Sec-23) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 3063 * 15   A = 459.4 cm^2 (SM490Y)

(b) Design stress

σU = 29 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

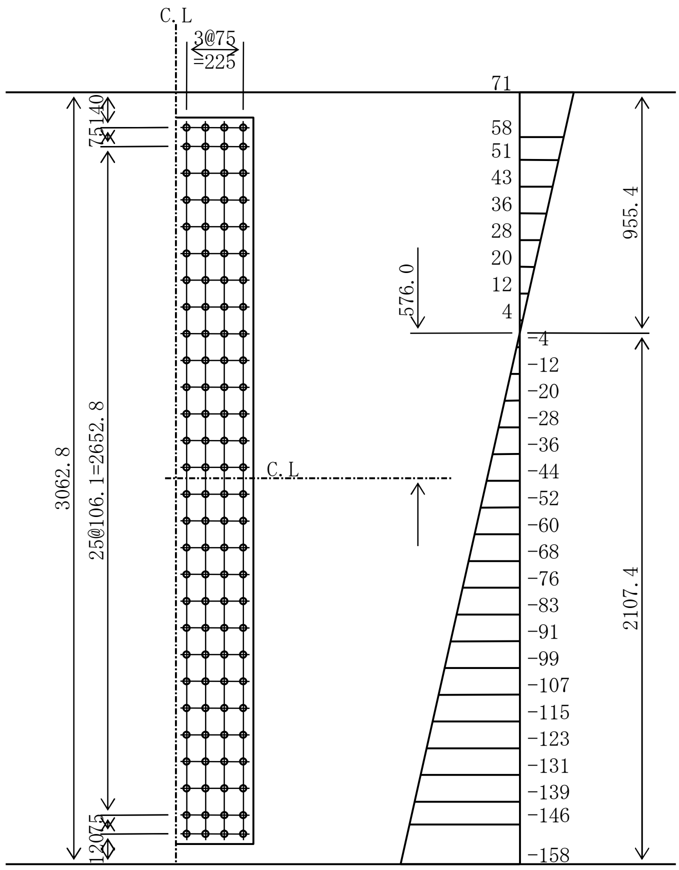
σL = -63 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 29 / 63 = 71 N/mm^2

σLn = 158 N/mm^2

τ = 57 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 15 * (146 + 158) / 2 = 358190 N

Required bolt number (Bolt number to be used)

N1 = 358190 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 112 = 57 * 45943 / 112 = 23209 N < ρa = 108000 N

Combined stress

$\rho c28$ = $\sqrt{((358190 / 4)^2 + 23209^2)}$ = 92506 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2883 ＊ 9 As = 518.9 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 5375868 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 5115958 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ $5115958*10^4$ / 2107 = $3823*10^6$ N･mm

Bending stress of splice plates

$\sigma sp = 3823*10^6 / (5375868*10^4) * 2027 = 144\ N/mm^2 < \sigma a = 210\ N/mm^2$

(354) G4 J-22(Sec-23) LFLG

(a) Acting stress

σcmax = -64 N/mm^2 0.75σca = 0.75 * 210 = 158 N/mm^2

∴ σc = 158 N/mm^2

τmax = 39 N/mm^2

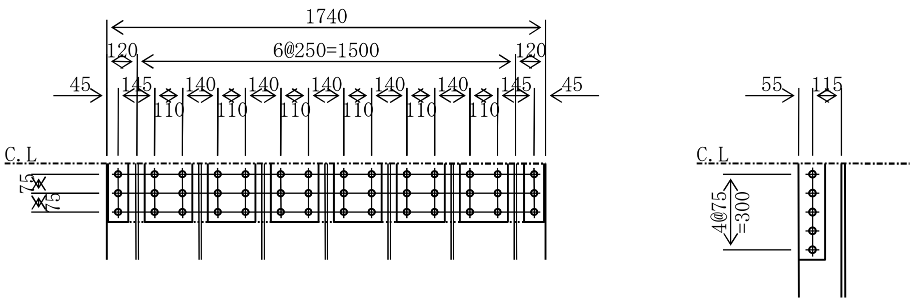
(b) Section area of main plate

1-LFLG PL 1740 * 14 Ag = 243.6 cm^2 (SM490Y)

5-RIB PL 170 * 17 Agr = 144.5 cm^2 (SM490Y)

ΣAg = Ag + Agr = 243.6 + 144.5 = 388.1 cm^2

(c) Bolt arrangement



(d) Design axial force

・Main plate Pc = σc * Ag = 158 * 24360 = 3836700 N

・Rib Pcr = σc * Agr = 158 * 14450 = 2275875 N

(e) Required section area of the splice plates

・Mother material(One side) AgR = Ag / 2 = 243.6 / 2 = 121.8 cm^2

・Rib AgrR = Agr = 144.5 cm^2

(f) Required bolt number

・Main plate n = Pc / (108000 * 1.00) = 3836700 / 108000 = 35.5 pcs. (42 bolts will be used.)

・Rib nr = Pcr / (108000 * 1.00) = 2275875 / 108000 = 21.1 pcs. (5 @ 5 = 25 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,5 unites)

(g) Tensile force per one bolt

ρp = Pc / 42 = 3836700 / 42 = 91350 N

ρs = τ * Ag / 42 = 39 * 24360 / 42 = 22556 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(91350^2 + 22556^2) = 94094 N < ρa = 108000 N

(h) Check of splice plates

	(SM490Y)	Ags(cm^2)
2-SPL PL	80 * 11	17.6
6-SPL PL	190 * 11	125.4
		143.0

> AgR = 121.8cm^2

1-SPL PL 1730 * 9 155.7 > AgR = 121.8cm^2

10-SPL PL 100 * 17 170.0 > AgrR = 144.5cm^2

(355) G4 J-23(Sec-23) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2730 * 15 A = 409.5 cm^2 (SM490Y)

(b) Design stress

σU = -63 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

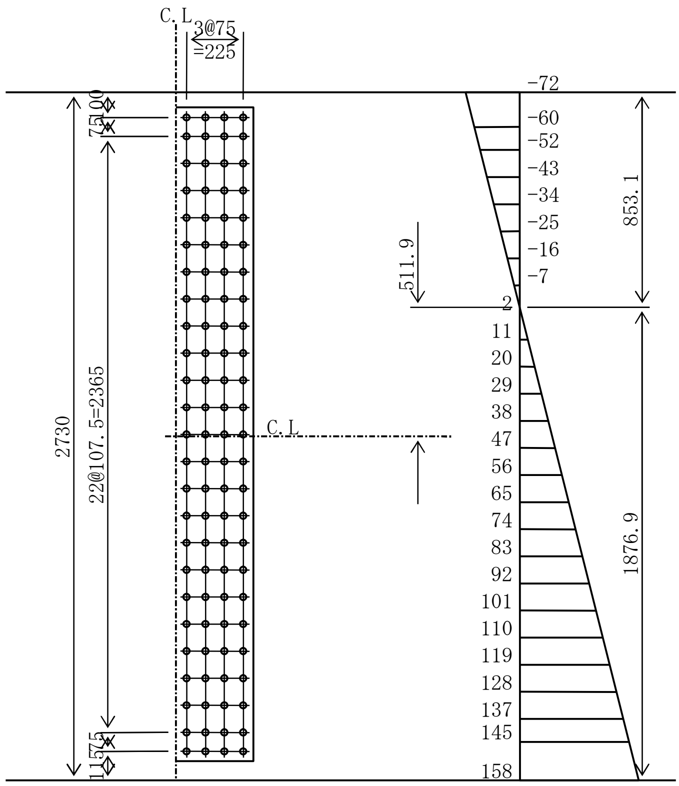
σL = 138 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 63 / 138 = 72 N/mm^2

σLn = 158 N/mm^2

τ = 46 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (145 + 158) / 2 = 345644 N

Required bolt number (Bolt number to be used)

N1 = 345644 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 46 * 40950 / 100 = 18665 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((345644 / 4)^2 + 18665^2)}$ = 88404 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2595 ＊ 9 As = 467.1 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3809442 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3616212 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ $3616212*10^4$ / 1877 = $3035*10^6$ N･mm

Bending stress of splice plates

σsp = $3035*10^6$ / ($3809442*10^4$) ＊ 1802 = 144 N/mm^2 ＜ σa = 210 N/mm^2

(356) G4 J-23(Sec-23) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 3062 * 15 A = 459.4 cm^2 (SM490Y)

(b) Design stress

σU = -59 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

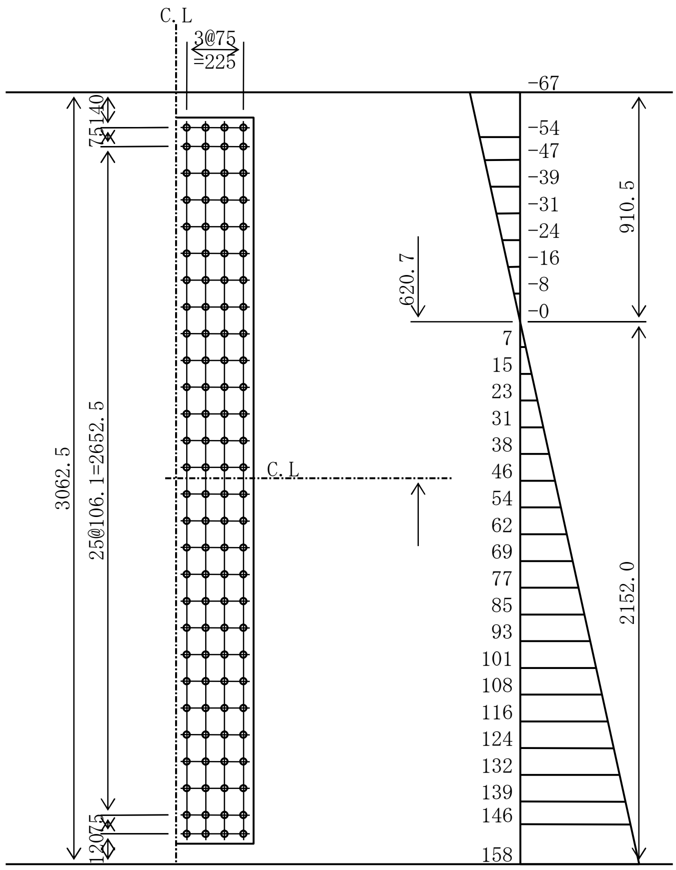
σL = 139 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 158 * 59 / 139 = 67 N/mm^2

σLn = 158 N/mm^2

τ = 47 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 15 * (146 + 158) / 2 = 358477 N

Required bolt number (Bolt number to be used)

N1 = 358477 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 112 = 47 * 45937 / 112 = 19112 N < ρa = 108000 N

Combined stress

$\rho c28$ = $\sqrt{((358477 / 4)^2 + 19112^2)}$ = 91635 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2882 ＊ 9 As = 518.8 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 5656636 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 5360383 cm^4

Bending moment to be shared by the web

Mw = 158 ＊ 5360383*10^4 / 2152 = 3923*10^6 N･mm

Bending stress of splice plates

σsp = 3923*10^6 / (5656636*10^4) ＊ 2072 = 144 N/mm^2 ＜ σa = 210 N/mm^2

(357) G4 J-23(Sec-23) LFLG

(a) Acting stress

σ tmax = 140 N/mm^2 0.75σ ta = 0.75 * 210 = 158 N/mm^2

τ max = 28 N/mm^2

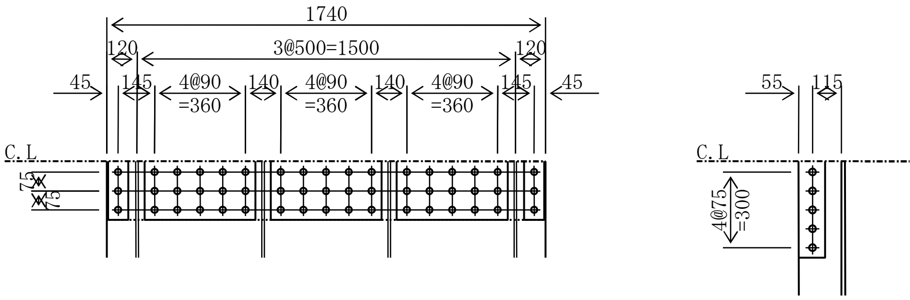
(b) Section area of main plate

1-LFLG PL 1740 * 14 Ag = 243.6 cm^2 (SM490Y)

2-RIB PL 170 * 17 Agr = 57.8 cm^2 (SM490Y)

ΣAg = Ag + Agr = 243.6 + 57.8 = 301.4 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 14 A = 243.6

(243.6 - (17* 2.5)* 1.4) * 1.1 = 202.5 < 243.6 ∴An = 202.5 cm^2

2-RIB PL 170 * 17 Ar = 57.8

(57.8 - 2*(1* 2.7)* 1.7) * 1.1 = 53.5 < 57.8 ∴Anr = 53.5 cm^2

ΣAn = An + Anr = 202.5 + 53.5 = 256.0 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 140 * 301.4 / 256.0 = 164 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 164 * 20251 = 3329193 N

> 0.75σ ta * An / 1.1 = 158 * 20251 / 1.1 = 2899575 N

・Rib Ptr = σ tn * Anr = 164 * 5348 = 879225 N

> 0.75σ ta * Anr/ 1.1 = 158 * 5348 / 1.1 = 765765 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 202.5 / 2 = 101.3 cm^2

・Rib AnrR = Anr = 53.5 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 3329193 / 108000 = 30.8 pcs. (51 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 879225 / 108000 = 8.1 pcs. (2 @ 5 = 10 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3,5 unites)

(h) Tensile force per one bolt

ρp = Pt / 51 = 3329193 / 51 = 65278 N

ρs = τ * Ag / 51 = 28 * 24360 / 51 = 13560 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(65278^2 + 13560^2) = 66672 N < ρa = 108000 N

(i) Check of splice plates

	(SM490Y)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
2-SPL PL	80 ＊ 9	(14.4 -	2*(1*2.5)＊ 0.9)*1.1=	10.9＜	14.4	∴ 10.9
3-SPL PL	440 ＊ 9	(118.8 -	3*(5*2.5)＊ 0.9)*1.1=	93.6＜	118.8	∴ 93.6
		133.2				104.4 ＞ AnR
1-SPL PL	1730 ＊ 9	(155.7 -	(17*2.5)＊ 0.9)*1.1=	129.2＜	155.7	∴129.2 ＞ AnR
4-SPL PL	100 ＊ 17	(68.0 -	4*(1*2.7)＊ 1.7)*1.1=	54.6＜	68.0	∴ 54.6 ＞AnrR

(358) G4 J-24(Sec-24) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2730 * 15 A = 409.5 cm^2 (SM490Y)

(b) Design stress

σU = -105 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

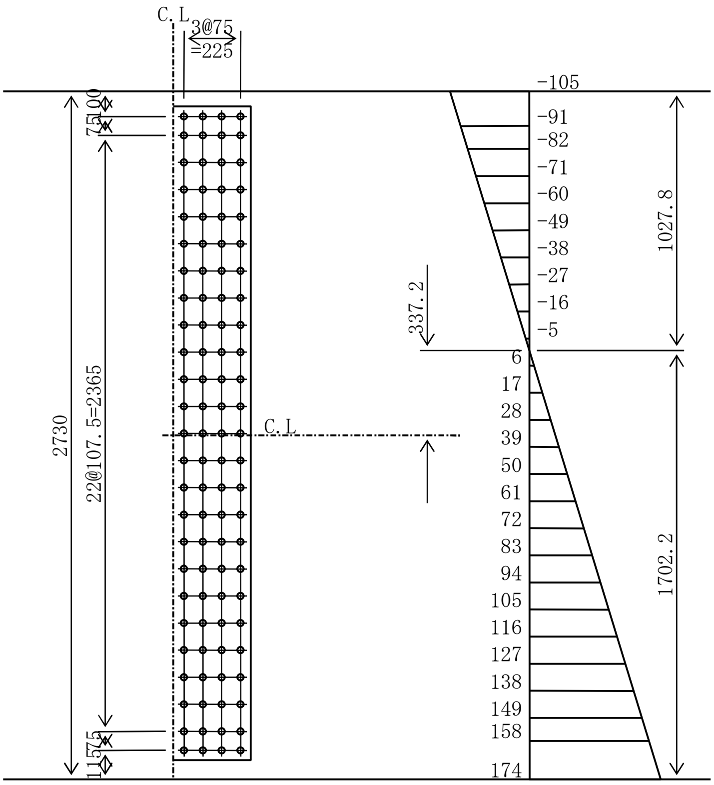
σL = 174 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 105 N/mm^2

σLn = 174 N/mm^2

τ = 32 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (158 + 174) / 2 = 379798 N

Required bolt number (Bolt number to be used)

N1 = 379798 / (108000 * 1.00) = 3.5 pcs. (4 bolts will be used.)

Check of shear force

$\rho s = \tau * A / 100$ = 32 * 40950 / 100 = 13156 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((379798 / 4)^2 + 13156^2)}$ = 95857 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2595 ＊ 9 As = 467.1 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3128920 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3008877 cm^4

Bending moment to be shared by the web

$Mw = 174 * 3008877*10^4 / 1702 = 3073*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 3073*10^6 / (3128920*10^4) * 1627 = 160$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(359) G4 J-24(Sec-24) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 3062 * 15 A = 459.4 cm^2 (SM490Y)

(b) Design stress

σU = -99 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

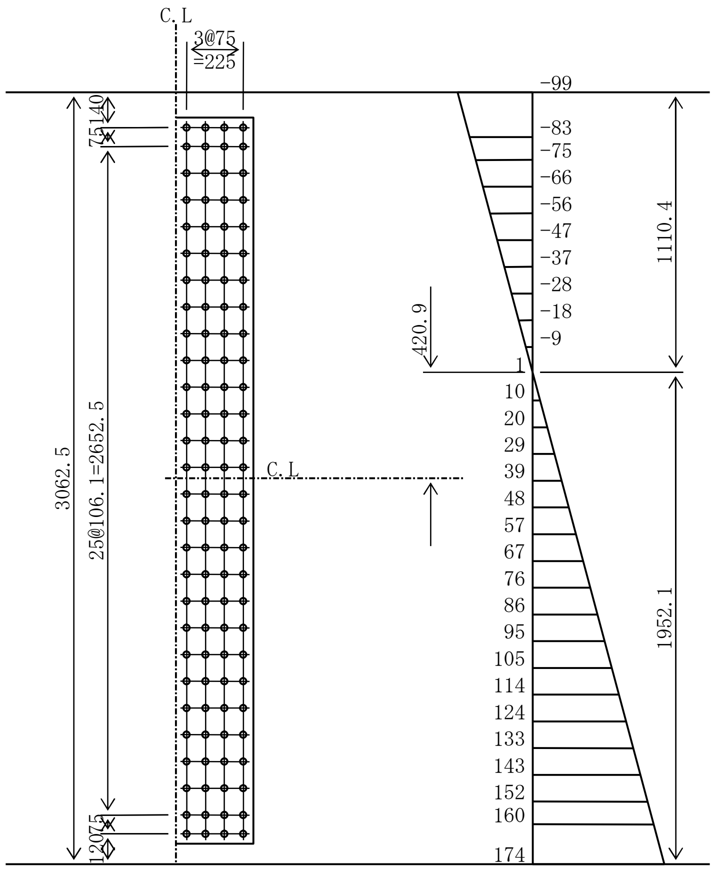
σL = 174 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 99 N/mm^2

σLn = 174 N/mm^2

τ = 33 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 15 * (160 + 174) / 2 = 395510 N

Required bolt number (Bolt number to be used)

N1 = 395510 / (108000 * 1.00) = 3.7 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 112 = 33 * 45937 / 112 = 13357 N < ρa = 108000 N

Combined stress

$\rho c28$ = $\sqrt{((395510 / 4)^2 + 13357^2)}$ = 99776 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2882 ＊ 9 As = 518.8 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4555782 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4404080 cm^4

Bending moment to be shared by the web

Mw = 174 ＊ 4404080*10^4 / 1952 = 3936*10^6 N·mm

Bending stress of splice plates

σsp = 3936*10^6 / (4555782*10^4) ＊ 1872 = 162 N/mm^2 ＜ σa = 210 N/mm^2

(360) G4 J-24(Sec-24) LFLG

(a) Acting stress

σ tmax = 177 N/mm^2 0.75σ ta = 0.75 * 210 = 158 N/mm^2

τ max = 12 N/mm^2

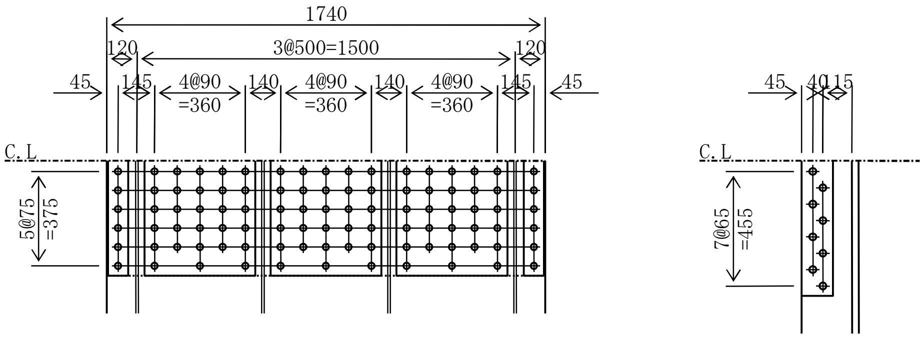
(b) Section area of main plate

1-LFLG PL 1740 * 27 Ag = 469.8 cm^2 (SM490Y)

2-RIB PL 200 * 22 Agr = 88.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 469.8 + 88.0 = 557.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 27 A = 469.8

(469.8 - (11* 2.5)* 2.7) * 1.1 = 435.1 < 469.8 ∴An = 435.1 cm^2

2-RIB PL 200 * 22 Ar = 88.0

(88.0 - 2*(1* 2.7+ 1*0.059)* 2.2) * 1.1 = 83.4 < 88.0 ∴Anr = 83.4 cm^2

ΣAn = An + Anr = 435.1 + 83.4 = 518.5 cm^2

σ tn = σ tmax * ΣAg / ΣAn = 177 * 557.8 / 518.5 = 190 N/mm^2

< σ ta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 190 * 43511 = 8271096 N

> 0.75σ ta * An / 1.1 = 158 * 43511 / 1.1 = 6229912 N

・Rib Ptr = σ tn * Anr = 190 * 8344 = 1586234 N

> 0.75σ ta * Anr/ 1.1 = 158 * 8344 / 1.1 = 1194775 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 435.1 / 2 = 217.6 cm^2

・Rib AnrR = Anr = 83.4 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 8271096 / 108000 = 76.6 pcs. (96 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 1586234 / 108000 = 14.7 pcs. (2 @ 8 = 16 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 6,8 unites)

(h) Tensile force per one bolt

ρp = Pt / 96 = 8271096 / 96 = 86157 N

ρs = τ * Ag / 96 = 12 * 46980 / 96 = 6065 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(86157^2 + 6065^2)}$ = 86370 N < ρa = 108000 N

(i) Check of splice plates

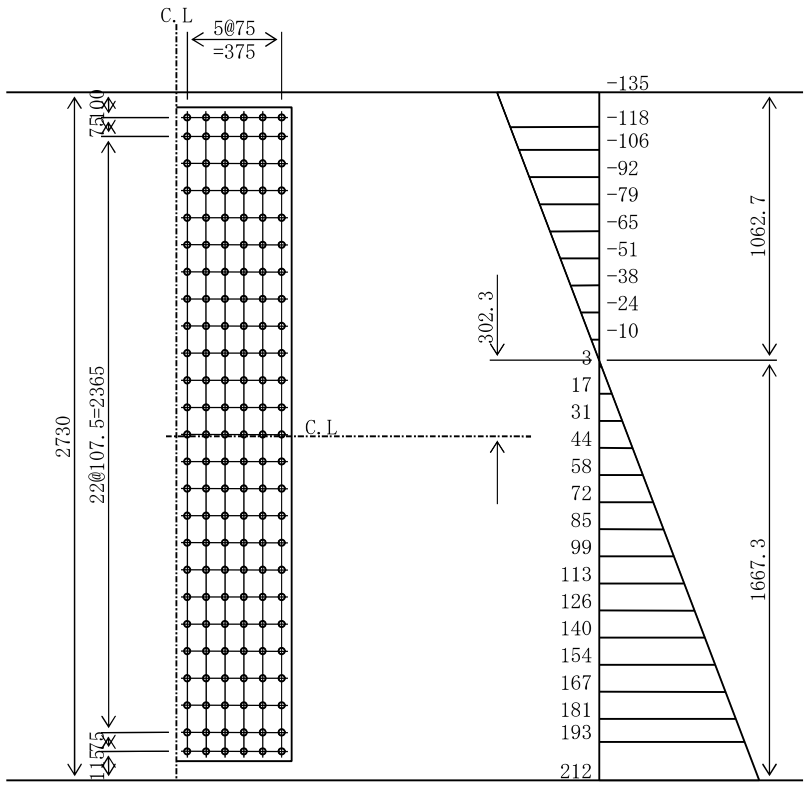
	(SM490Y)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 19	(30.4 -	2*(1*2.5)* 1.9)*1.1= 23.0<	30.4	∴ 23.0
3-SPL PL	440 * 19	(250.8 -	3*(5*2.5)* 1.9)*1.1= 197.5<	250.8	∴197.5
		281.2			220.5 > AnR
1-SPL PL	1730 * 16	(276.8 -	(17*2.5)* 1.6)*1.1= 229.7<	276.8	∴229.7 > AnR
4-SPL PL	120 * 21	(100.8 -	4*(1*2.7+ 1*0.059)* 2.1)*1.1= 85.4<	100.8	∴ 85.4 >AnrR

(361) G4 J-25(Sec-25) LWEB

(a) Section area of main plate (Web plate)
1-LWEB PL 2730 * 17 A = 464.1 cm^2 (SM570)

(b) Design stress
σU = -135 N/mm^2 < σa * 0.75 = 255 * 0.75 = 191 N/mm^2
σL = 212 N/mm^2 > σa * 0.75 = 255 * 0.75 = 191 N/mm^2
σUn = 135 N/mm^2
σLn = 212 N/mm^2
τ = 22 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress
Check of bolt at 25th row
Sharing width: b1 = 15.3 cm
Total force to be shared
P1 = 153 * 17 * (193 + 212) / 2 = 524381 N
Required bolt number (Bolt number to be used)
N1 = 524381 / (108000 * 1.00) = 4.9 pcs. (6 bolts will be used.)

Check of shear force
ρs = τ * A / 150 = 22 * 46410 / 150 = 6818 N < ρa = 108000 N
Combined stress
$\rho c25$ = $\sqrt{((524381 / 6)^2 + 6818^2)}$ = 87662 N < ρa = 108000 N
(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 6 unites)

(e) Check of splice plates

2-SPL PL 2595 * 10 As = 519.0 cm^2 (SM570)

Moment of inertia of splice plates Is = 3363585 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3306594 cm^4

Bending moment to be shared by the web

Mw = 212 * 3306594*10^4 / 1667 = 4204*10^6 N·mm

Bending stress of splice plates

σsp = 4204*10^6 / (3363585*10^4) * 1592 = 199 N/mm^2 ＜ σa = 255 N/mm^2

(362) G4 J-25(Sec-25) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 3062 * 17 A = 520.6 cm^2 (SM570)

(b) Design stress

σU = -128 N/mm^2 < σa * 0.75 = 255 * 0.75 = 191 N/mm^2

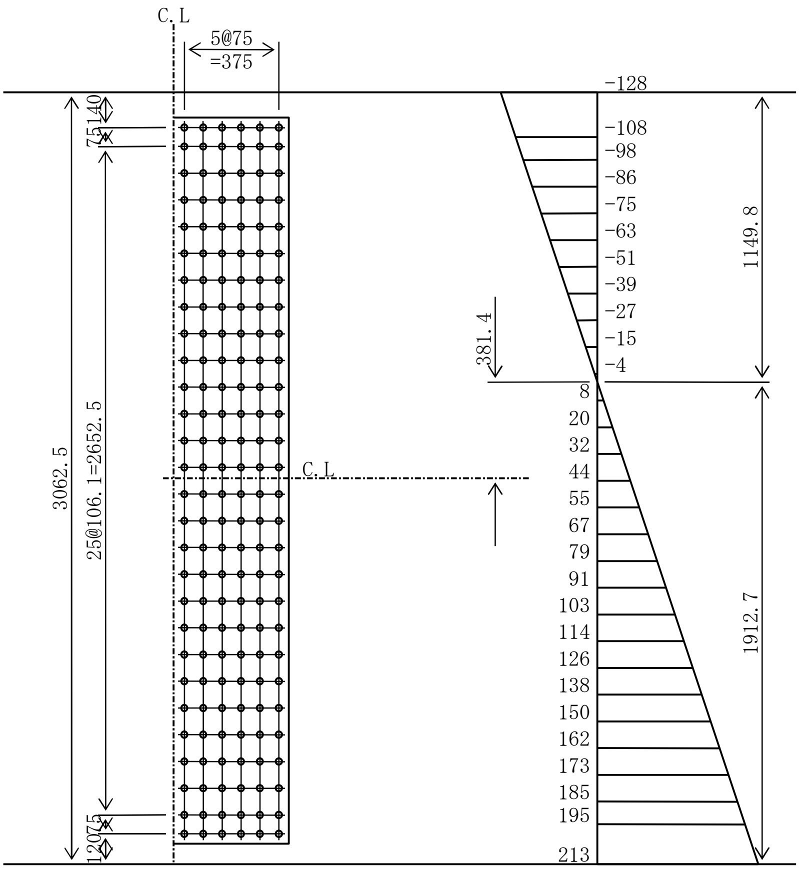
σL = 213 N/mm^2 > σa * 0.75 = 255 * 0.75 = 191 N/mm^2

σUn = 128 N/mm^2

σLn = 213 N/mm^2

τ = 22 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 17 * (195 + 213) / 2 = 546493 N

Required bolt number (Bolt number to be used)

N1 = 546493 / (108000 * 1.00) = 5.1 pcs. (6 bolts will be used.)

Check of shear force

ρs = τ * A / 168 = 22 * 52062 / 168 = 6965 N < ρa = 108000 N

Combined stress

$\rho c28 = \sqrt{((546493 / 6)^2 + 6965^2)}$ = 91348 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 6 unites)

(e) Check of splice plates

2-SPL PL 2882 * 10 As = 576.5 cm^2 (SM570)

Moment of inertia of splice plates Is = 4874937 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4826484 cm^4

Bending moment to be shared by the web

Mw = 213 ＊ 4826484*10^4 / 1913 = 5372*10^6 N·mm

Bending stress of splice plates

σsp = 5372*10^6 / (4874937*10^4) ＊ 1833 = 202 N/mm^2 ＜ σa = 255 N/mm^2

(363) G4 J-25(Sec-25) LFLG

(a) Acting stress

σ tmax = 216 N/mm^2 0.75 σ ta = 0.75 * 255 = 191 N/mm^2

τ max = 9 N/mm^2

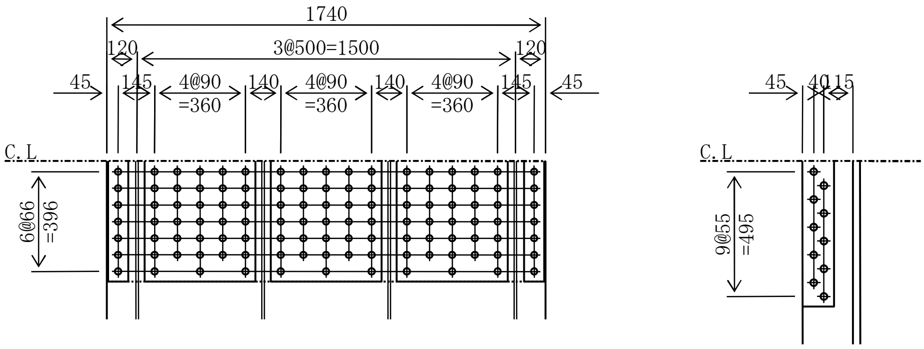
(b) Section area of main plate

1-LFLG PL 1740 * 29 Ag = 504.6 cm^2 (SM570)

2-RIB PL 200 * 22 Agr = 88.0 cm^2 (SM570)

ΣAg = Ag + Agr = 504.6 + 88.0 = 592.6 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 29 A = 504.6

(504.6 - (17* 2.5)* 2.9) * 1.1 = 419.5 < 504.6 ∴An = 419.5 cm^2

2-RIB PL 200 * 22 Ar = 88.0

(88.0 - 2*(1* 2.7+ 1*0.809)* 2.2) * 1.1 = 79.8 < 88.0 ∴Anr = 79.8 cm^2

ΣAn = An + Anr = 419.5 + 79.8 = 499.3 cm^2

σ tn = σ tmax * ΣAg / ΣAn * 122 / 133

= 216 * 592.6 / 499.3 * 122 / 133 = 235 N/mm^2

< σ ta = 255 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 235 * 41949 * 113 / 102 = 10919457 N

> 0.75 σ ta * An / 1.1 = 191 * 41949 * 113 / 102 / 1.1 = 8079853 N

・Rib Ptr = σ tn * Anr = 235 * 7981 = 1875378 N

> 0.75 σ ta * Anr/ 1.1 = 191 * 7981 / 1.1 = 1387686 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 419.5 * 113 / 102 / 2 = 232.4 cm^2

・Rib AnrR = Anr = 79.8 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 10919457 / 108000 = 101.1 pcs. (113 bolts will be used.)

・Rib nr = Ptr / (108000 * 0.96) = 1875378 / 103680 = 18.1 pcs. (2 @ 10 = 20 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 7,10 unites)

(h) Tensile force per one bolt

ρ p = Pt / 113 = 10919457 / 113 = 96632 N

ρ s = τ * Ag / 113 = 9 * 50460 / 113 = 4006 N

ρ = $\sqrt{}$ (ρ p^2 + ρ s^2) = $\sqrt{}$ (96632^2 + 4006^2) = 96715 N < ρ a = 108000 N

(i) Check of splice plates

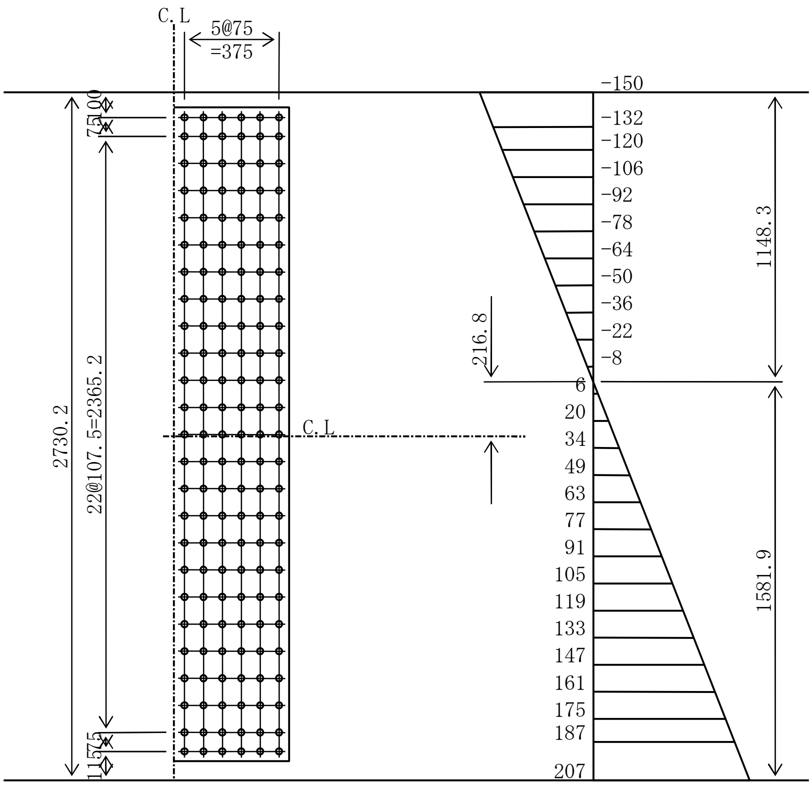
	(SM570)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
2-SPL PL	80 * 21	(33.6 -	2*(1*2.5)* 2.1)*1.1=	25.4<	33.6	∴ 25.4
3-SPL PL	440 * 21	(277.2 -	3*(5*2.5)* 2.1)*1.1=	218.3<	277.2	∴218.3
		310.8				243.7 > AnR
1-SPL PL	1730 * 17	(294.1 -	(17*2.5)* 1.7)*1.1=	244.0<	294.1	∴244.0 > AnR
4-SPL PL	120 * 22	(105.6 -	4*(1*2.7+ 1*0.809)* 2.2)*1.1=	82.2<	105.6	∴ 82.2 >AnrR

(364) G4 J-26(Sec-26) LWEB

(a) Section area of main plate (Web plate)
1-LWEB PL 2730 * 17 A = 464.1 cm^2 (SM570)

(b) Design stress
σU = -150 N/mm^2 < σa * 0.75 = 255 * 0.75 = 191 N/mm^2
σL = 207 N/mm^2 > σa * 0.75 = 255 * 0.75 = 191 N/mm^2
σUn = 150 N/mm^2
σLn = 207 N/mm^2
τ = 17 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress
Check of bolt at 25th row
Sharing width: b1 = 15.3 cm
Total force to be shared
P1 = 153 * 17 * (187 + 207) / 2 = 511358 N
Required bolt number (Bolt number to be used)
N1 = 511358 / (108000 * 1.00) = 4.7 pcs. (6 bolts will be used.)

Check of shear force
ρs = τ * A / 150 = 17 * 46414 / 150 = 5217 N < ρa = 108000 N
Combined stress
$\rho c25$ = $\sqrt{((511358 / 6)^2 + 5217^2)}$ = 85386 N < ρa = 108000 N
(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 6 unites)

(e) Check of splice plates

2-SPL PL 2595 * 11 As = 570.9 cm^2 (SM570)

Moment of inertia of splice plates Is = 3454577 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3101208 cm^4

Bending moment to be shared by the web

Mw = 207 ＊ 3101208*10^4 / 1582 = 4063*10^6 N･mm

Bending stress of splice plates

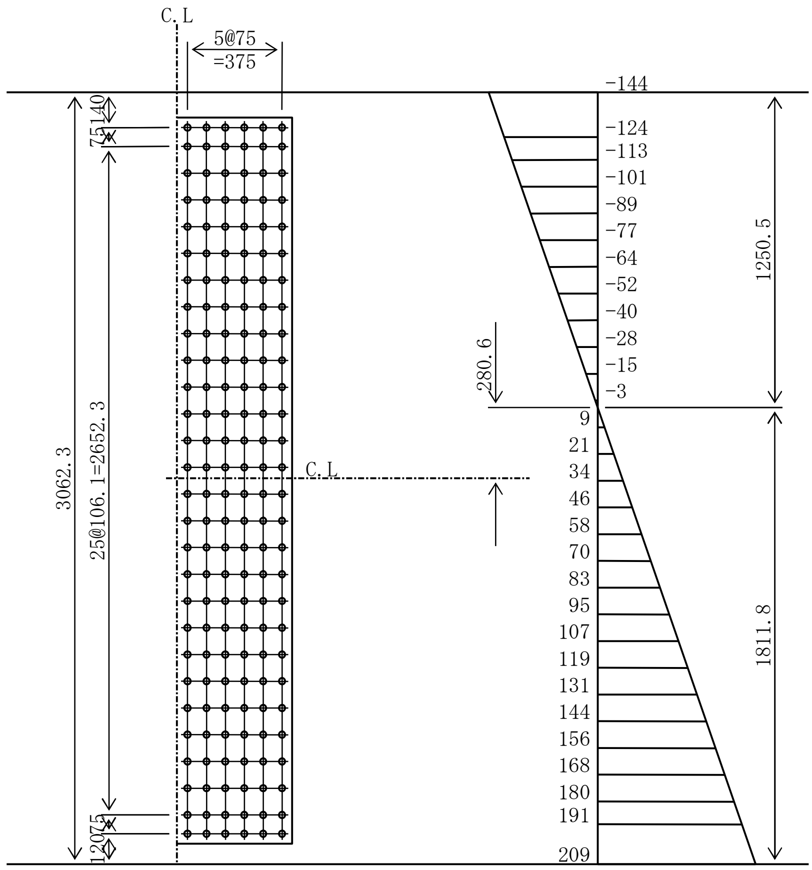
σsp = 4063*10^6 / (3454577*10^4) ＊ 1507 = 177 N/mm^2 ＜ σa = 255 N/mm^2

(365) G4 J-26(Sec-26) RWEB

(a) Section area of main plate (Web plate)
1-RWEB PL 3062 * 17   A = 520.6 cm^2 (SM570)

(b) Design stress
σU = -144 N/mm^2 < σa * 0.75 =   255 * 0.75 =   191 N/mm^2
σL =   209 N/mm^2 > σa * 0.75 =   255 * 0.75 =   191 N/mm^2
σUn =   144 N/mm^2
σLn =   209 N/mm^2
τ =   17 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress
Check of bolt at 28th row
Sharing width: b1 = 15.8 cm
Total force to be shared
P1 = 158 * 17 * (191 + 209) / 2 = 535459 N
Required bolt number (Bolt number to be used)
N1 = 535459 / (108000 * 1.00) = 5.0 pcs. (6 bolts will be used.)

Check of shear force
ρs = τ * A / 168 =   17 *   52059 / 168 =   5341 N < ρa = 108000 N
Combined stress
$\rho c28$ = $\sqrt{((535459 / 6)^2 + 5341^2)}$ =   89403 N < ρa = 108000 N
(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 6 unites)

(e) Check of splice plates

2-SPL PL 2882 * 11 As = 634.1 cm^2 (SM570)

Moment of inertia of splice plates Is = 4925684 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4478379 cm^4

Bending moment to be shared by the web

Mw = 209 ＊ 4478379*10^4 / 1812 = 5168*10^6 N･mm

Bending stress of splice plates

σsp = 5168*10^6 / (4925684*10^4) ＊ 1732 = 182 N/mm^2 ＜ σa = 255 N/mm^2

(366) G4 J-26(Sec-26) LFLG

(a) Acting stress

σtmax = 213 N/mm^2 0.75σta = 0.75 * 255 = 191 N/mm^2

τmax = 6 N/mm^2

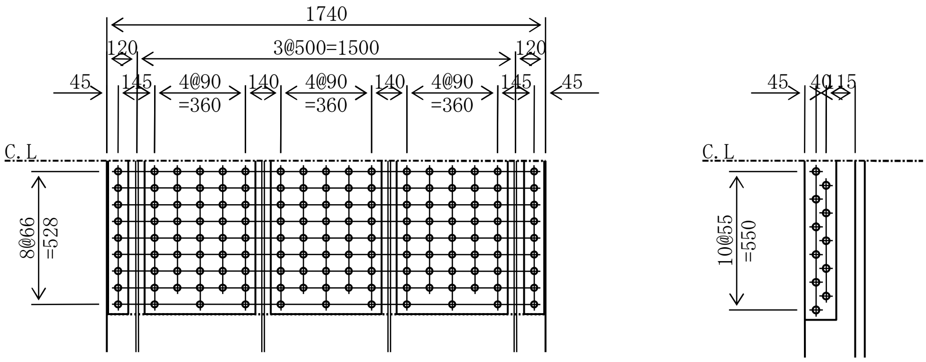
(b) Section area of main plate

1-LFLG PL 1740 * 38 Ag = 661.2 cm^2 (SM570)

2-RIB PL 200 * 22 Agr = 88.0 cm^2 (SM570)

ΣAg = Ag + Agr = 661.2 + 88.0 = 749.2 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 38 A = 661.2

(661.2 - (17* 2.5)* 3.8) * 1.1 = 549.7 < 661.2 ∴An = 549.7 cm^2

2-RIB PL 200 * 22 Ar = 88.0

(88.0 - 2*(1* 2.7+ 1*0.809)* 2.2) * 1.1 = 79.8 < 88.0 ∴Anr = 79.8 cm^2

ΣAn = An + Anr = 549.7 + 79.8 = 629.5 cm^2

σtn = σtmax * ΣAg / ΣAn * 158 / 169

= 213 * 749.2 / 629.5 * 158 / 169 = 237 N/mm^2

< σta = 255 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 237 * 54967 * 147 / 136 = 14106565 N

> 0.75σta * An / 1.1 = 191 * 54967 * 147 / 136 / 1.1 = 10329736 N

・Rib Ptr = σtn * Anr = 237 * 7981 = 1895061 N

> 0.75σta * Anr/ 1.1 = 191 * 7981 / 1.1 = 1387686 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 549.7 * 147 / 136 / 2 = 297.1 cm^2

・Rib AnrR = Anr = 79.8 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 0.98) = 14106565 / 105840 = 133.3 pcs. (147 bolts will be used.)

・Rib nr = Ptr / (108000 * 0.94) = 1895061 / 101520 = 18.7 pcs. (2 @ 11 = 22 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 9,11 unites)

(h) Tensile force per one bolt

ρp = Pt / 147 = 14106565 / 147 = 95963 N

ρs = τ * Ag / 147 = 6 * 66120 / 147 = 2523 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(95963^2 + 2523^2) = 95996 N < ρa = 105840 N

(i) Check of splice plates

	(SM570)	Ags(cm²)	deduction of bolt holes			Ans(cm²)
2-SPL PL	80 * 26	(41.6 -	2*(1*2.5)* 2.6)*1.1=	31.5<	41.6	∴ 31.5
3-SPL PL	440 * 26	(343.2 -	3*(5*2.5)* 2.6)*1.1=	270.3<	343.2	∴270.3
		384.8				301.7 > AnR
1-SPL PL	1730 * 21	(363.3 -	(17*2.5)* 2.1)*1.1=	301.5<	363.3	∴301.5 > AnR
4-SPL PL	120 * 22	(105.6 -	4*(1*2.7+ 1*0.809)* 2.2)*1.1=	82.2<	105.6	∴ 82.2 >AnrR

(367) G4 J-27(Sec-27) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2730 * 17 A = 464.1 cm^2 (SM570)

(b) Design stress

σU = -159 N/mm^2 < σa * 0.75 = 255 * 0.75 = 191 N/mm^2

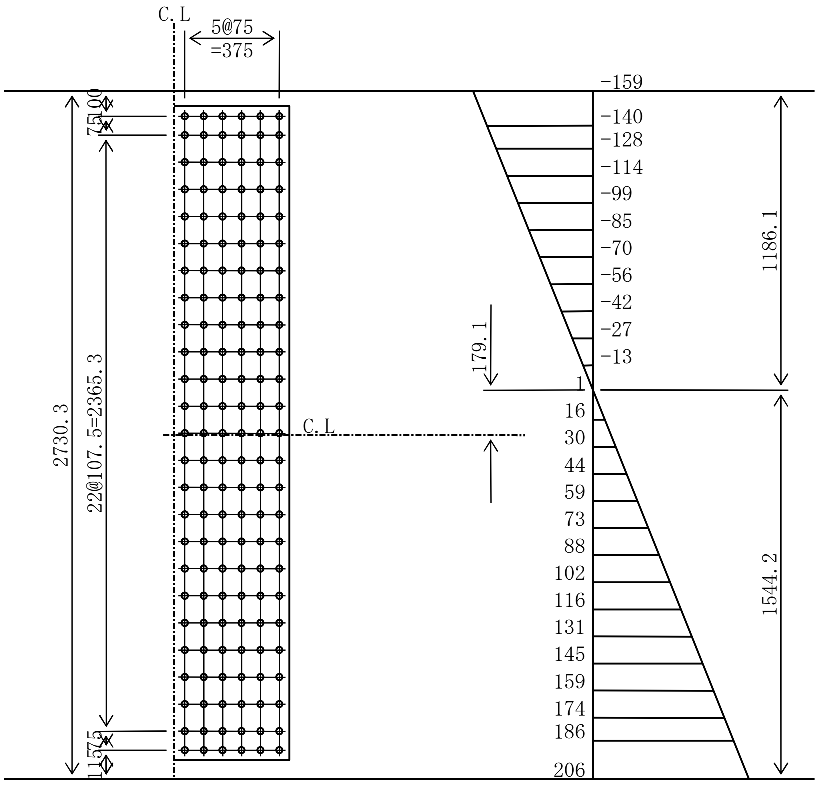
σL = 206 N/mm^2 > σa * 0.75 = 255 * 0.75 = 191 N/mm^2

σUn = 159 N/mm^2

σLn = 206 N/mm^2

τ = 15 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 17 * (186 + 206) / 2 = 508656 N

Required bolt number (Bolt number to be used)

N1 = 508656 / (108000 * 1.00) = 4.7 pcs. (6 bolts will be used.)

Check of shear force

ρs = τ * A / 150 = 15 * 46415 / 150 = 4641 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((508656 / 6)^2 + 4641^2)}$ = 84903 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 6 unites)

(e) Check of splice plates

2-SPL PL 2595 * 11 As = 571.0 cm^2 (SM570)

Moment of inertia of splice plates Is = 3372810 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3032122 cm^4

Bending moment to be shared by the web

Mw = 206 * 3032122*10^4 / 1544 = 4053*10^6 N·mm

Bending stress of splice plates

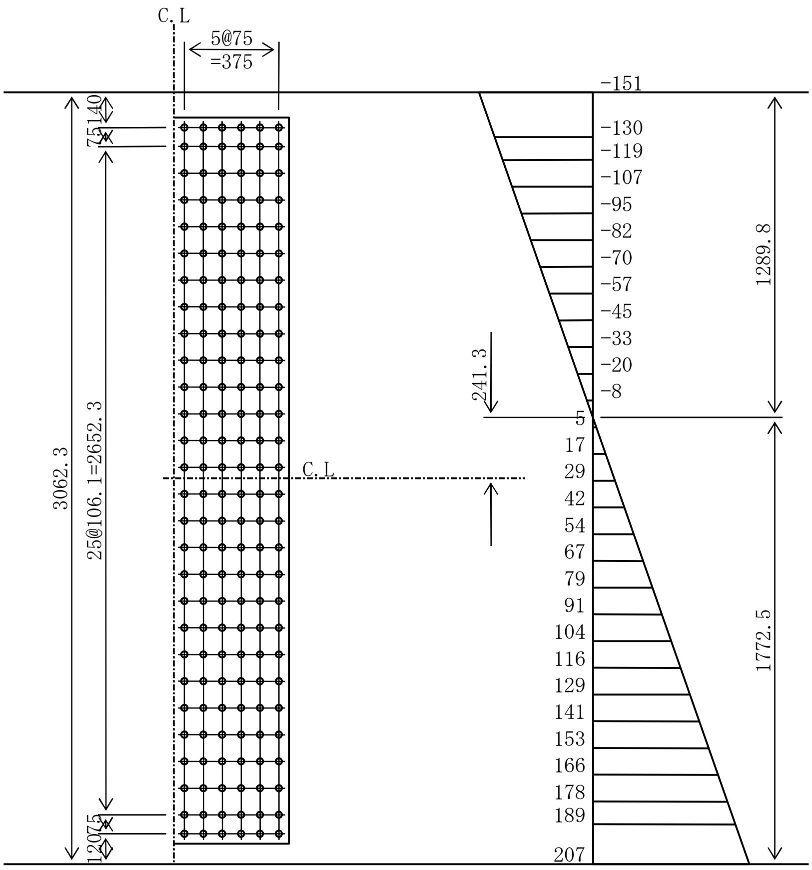
σsp = 4053*10^6 / (3372810*10^4) * 1469 = 177 N/mm^2 ＜ σa = 255 N/mm^2

(368) G4 J-27(Sec-27) RWEB

(a) Section area of main plate (Web plate)
1-RWEB PL 3062 * 17 A = 520.6 cm^2 (SM570)

(b) Design stress
σU = -151 N/mm^2 < σa * 0.75 = 255 * 0.75 = 191 N/mm^2
σL = 207 N/mm^2 > σa * 0.75 = 255 * 0.75 = 191 N/mm^2
σUn = 151 N/mm^2
σLn = 207 N/mm^2
τ = 15 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress
Check of bolt at 28th row
Sharing width: b1 = 15.8 cm
Total force to be shared
P1 = 158 * 17 * (189 + 207) / 2 = 530078 N
Required bolt number (Bolt number to be used)
N1 = 530078 / (108000 * 1.00) = 4.9 pcs. (6 bolts will be used.)

Check of shear force
ρs = τ * A / 168 = 15 * 52058 / 168 = 4700 N < ρa = 108000 N
Combined stress
$\rho c28$ = $\sqrt{((530078 / 6)^2 + 4700^2)}$ = 88471 N < ρa = 108000 N
(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 6 unites)

(e) Check of splice plates

2-SPL PL 2882 * 11 As = 634.1 cm^2 (SM570)

Moment of inertia of splice plates Is = 4790362 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4371360 cm^4

Bending moment to be shared by the web

$Mw = 207 * 4371360*10^4 / 1772 = 5110*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 5110*10^6 / (4790362*10^4) * 1692 = 181$ N/mm^2 ＜ $\sigma a = 255$ N/mm^2

(369) G4 J-27(Sec-27) LFLG

(a) Acting stress

$\sigma tmax$ = 212 N/mm^2 0.75σta = 0.75 * 255 = 191 N/mm^2

τmax = 5 N/mm^2

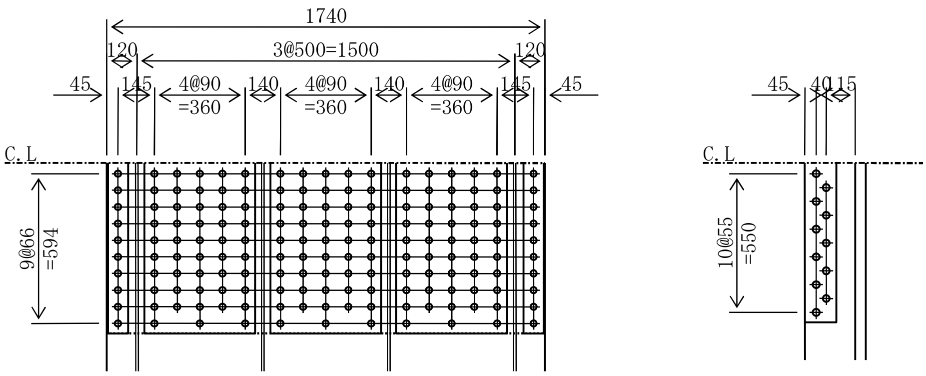
(b) Section area of main plate

1-LFLG PL 1740 * 42 Ag = 730.8 cm^2 (SM570-H)

2-RIB PL 200 * 22 Agr = 88.0 cm^2 (SM570)

ΣAg = Ag + Agr = 730.8 + 88.0 = 818.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 42 A = 730.8

(730.8 - (17* 2.5)* 4.2) * 1.1 = 607.5 < 730.8 ∴An = 607.5 cm^2

2-RIB PL 200 * 22 Ar = 88.0

(88.0 - 2*(1* 2.7+ 1*0.809)* 2.2) * 1.1 = 79.8 < 88.0 ∴Anr = 79.8 cm^2

ΣAn = An + Anr = 607.5 + 79.8 = 687.3 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn * 175 / 186

= 212 * 818.8 / 687.3 * 175 / 186 = 238 N/mm^2

< σta = 255 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 238 * 60753 * 164 / 153 = 15473863 N

> 0.75σta * An / 1.1 = 191 * 60753 * 164 / 153 / 1.1 = 11322150 N

・Rib Ptr = σtn * Anr = 238 * 7981 = 1896536 N

> 0.75σta * Anr/ 1.1 = 191 * 7981 / 1.1 = 1387686 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 607.5 * 164 / 153 / 2 = 325.6 cm^2

・Rib AnrR = Anr = 79.8 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 0.96) = 15473863 / 103680 = 149.2 pcs. (164 bolts will be used.)

・Rib nr = Ptr / (108000 * 0.94) = 1896536 / 101520 = 18.7 pcs. (2 @ 11 = 22 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 10,11 unites)

(h) Tensile force per one bolt

ρp = Pt / 164 = 15473863 / 164 = 94353 N

ρs = τ * Ag / 164 = 5 * 73080 / 164 = 2230 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(94353^2 + 2230^2) = 94379 N < ρa = 103680 N

(i) Check of splice plates

	(SM570)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 * 29	(46.4 -	2*(1*2.5)* 2.9)*1.1= 35.1<	46.4	∴ 35.1
3-SPL PL	440 * 29	(382.8 -	3*(5*2.5)* 2.9)*1.1= 301.5<	382.8	∴301.5
		429.2			336.5 > AnR
1-SPL PL	1730 * 23	(397.9 -	(17*2.5)* 2.3)*1.1= 330.2<	397.9	∴330.2 > AnR
4-SPL PL	120 * 22	(105.6 -	4*(1*2.7+ 1*0.809)* 2.2)*1.1= 82.2<	105.6	∴ 82.2 >AnrR

(370) G4 J-28(Sec-29) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2730 * 17 A = 464.1 cm^2 (SM570)

(b) Design stress

σU = -157 N/mm^2 < σa * 0.75 = 255 * 0.75 = 191 N/mm^2

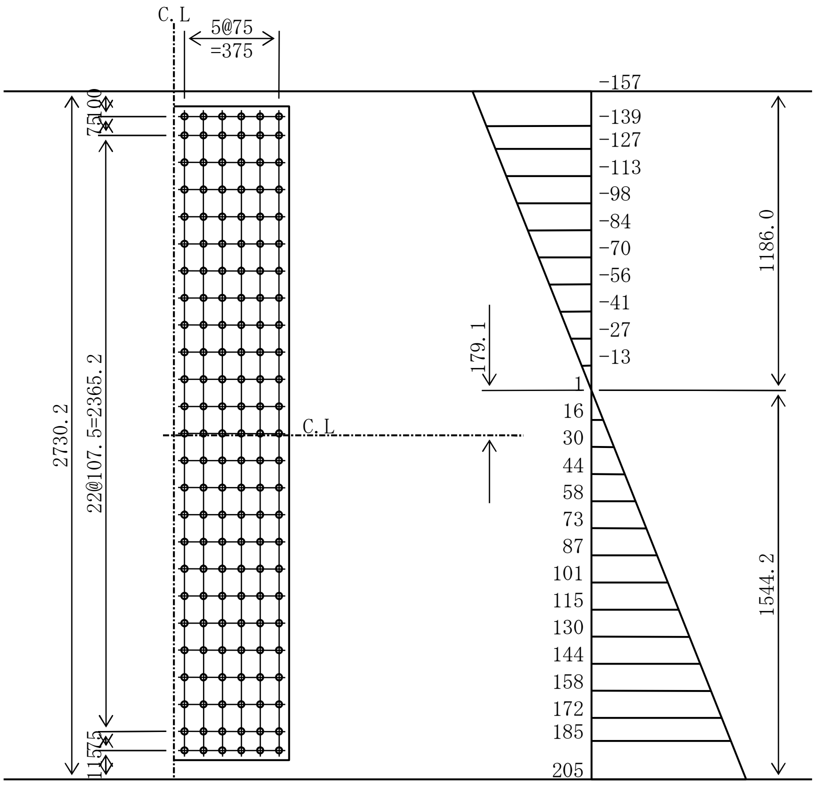
σL = 205 N/mm^2 > σa * 0.75 = 255 * 0.75 = 191 N/mm^2

σUn = 157 N/mm^2

σLn = 205 N/mm^2

τ = 16 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 17 * (185 + 205) / 2 = 504570 N

Required bolt number (Bolt number to be used)

N1 = 504570 / (108000 * 1.00) = 4.7 pcs. (6 bolts will be used.)

Check of shear force

ρs = τ * A / 150 = 16 * 46414 / 150 = 4846 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((504570 / 6)^2 + 4846^2)}$ = 84234 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 6 unites)

(e) Check of splice plates

2-SPL PL 2595 * 11 As = 570.9 cm^2 (SM570)

Moment of inertia of splice plates Is = 3372671 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3032003 cm^4

Bending moment to be shared by the web

M_w = 205 * 3032003*10^4 / 1544 = 4020*10^6 N·mm

Bending stress of splice plates

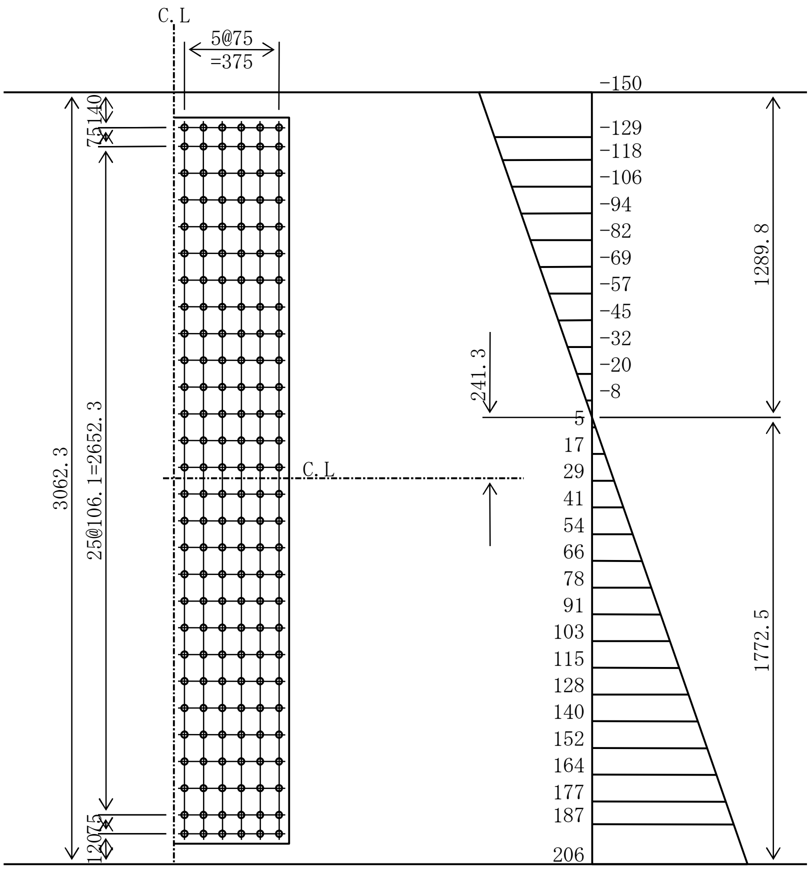
σ_{sp} = 4020*10^6 / (3372671*10^4) * 1469 = 175 N/mm^2 ＜ σ_a = 255 N/mm^2

(371) G4 J-28(Sec-29) RWEB

(a) Section area of main plate (Web plate)
1-RWEB PL 3062 * 17 A = 520.6 cm^2 (SM570)

(b) Design stress
σU = -150 N/mm^2 < σa * 0.75 = 255 * 0.75 = 191 N/mm^2
σL = 206 N/mm^2 > σa * 0.75 = 255 * 0.75 = 191 N/mm^2
σUn = 150 N/mm^2
σLn = 206 N/mm^2
τ = 16 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress
Check of bolt at 28th row
Sharing width: b1 = 15.8 cm
Total force to be shared
P1 = 158 * 17 * (187 + 206) / 2 = 525821 N
Required bolt number (Bolt number to be used)
N1 = 525821 / (108000 * 1.00) = 4.9 pcs. (6 bolts will be used.)

Check of shear force
ρs = τ * A / 168 = 16 * 52059 / 168 = 4909 N < ρa = 108000 N
Combined stress
$\rho c28$ = $\sqrt{((525821 / 6)^2 + 4909^2)}$ = 87774 N < ρa = 108000 N
(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 6 unites)

(e) Check of splice plates

2-SPL PL 2882 * 11 As = 634.1 cm^2 (SM570)

Moment of inertia of splice plates Is = 4790503 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4371488 cm^4

Bending moment to be shared by the web

Mw = 206 * 4371488*10^4 / 1772 = 5069*10^6 N·mm

Bending stress of splice plates

σsp = 5069*10^6 / (4790503*10^4) * 1692 = 179 N/mm^2 ＜ σa = 255 N/mm^2

(372) G4 J-28(Sec-29) LFLG

(a) Acting stress

σtmax = 210 N/mm^2 0.75σta = 0.75 * 255 = 191 N/mm^2

τmax = 5 N/mm^2

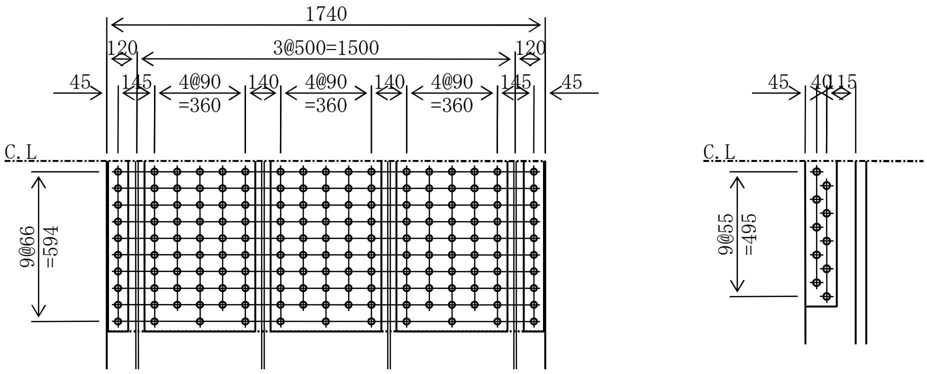
(b) Section area of main plate

1-LFLG PL 1740 * 42 Ag = 730.8 cm^2 (SM570-H)

2-RIB PL 200 * 22 Agr = 88.0 cm^2 (SM570)

ΣAg = Ag + Agr = 730.8 + 88.0 = 818.8 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 42 A = 730.8

(730.8 - (17* 2.5)* 4.2) * 1.1 = 607.5 < 730.8 ∴An = 607.5 cm^2

2-RIB PL 200 * 22 Ar = 88.0

(88.0 - 2*(1* 2.7+ 1*0.809)* 2.2) * 1.1 = 79.8 < 88.0 ∴Anr = 79.8 cm^2

ΣAn = An + Anr = 607.5 + 79.8 = 687.3 cm^2

σtn = σtmax * ΣAg / ΣAn * 173 / 184

= 210 * 818.8 / 687.3 * 173 / 184 = 236 N/mm^2

< σta = 255 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 236 * 60753 * 164 / 153 = 15339151 N

> 0.75σta * An / 1.1 = 191 * 60753 * 164 / 153 / 1.1 = 11322150 N

・Rib Ptr = σtn * Anr = 236 * 7981 = 1880025 N

> 0.75σta * Anr/ 1.1 = 191 * 7981 / 1.1 = 1387686 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 607.5 * 164 / 153 / 2 = 325.6 cm^2

・Rib AnrR = Anr = 79.8 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 0.96) = 15339151 / 103680 = 147.9 pcs. (164 bolts will be used.)

・Rib nr = Ptr / (108000 * 0.96) = 1880025 / 103680 = 18.1 pcs. (2 @ 10 = 20 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 10,10 unites)

(h) Tensile force per one bolt

ρp = Pt / 164 = 15339151 / 164 = 93531 N

ρs = τ * Ag / 164 = 5 * 73080 / 164 = 2310 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(93531^2 + 2310^2) = 93560 N < ρa = 103680 N

(i) Check of splice plates

	(SM570)	Ags(cm²)	deduction of bolt holes		Ans(cm²)
2-SPL PL	80 * 29	(46.4 -	2*(1*2.5)* 2.9)*1.1= 35.1<	46.4	∴ 35.1
3-SPL PL	440 * 29	(382.8 -	3*(5*2.5)* 2.9)*1.1= 301.5<	382.8	∴301.5
		429.2			336.5 > AnR
1-SPL PL	1730 * 23	(397.9 -	(17*2.5)* 2.3)*1.1= 330.2<	397.9	∴330.2 > AnR
4-SPL PL	120 * 22	(105.6 -	4*(1*2.7+ 1*0.809)* 2.2)*1.1= 82.2<	105.6	∴ 82.2 >AnrR

(373) G4 J-29(Sec-30) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2730 * 17 A = 464.1 cm^2 (SM570)

(b) Design stress

σU = -149 N/mm^2 < σa * 0.75 = 255 * 0.75 = 191 N/mm^2

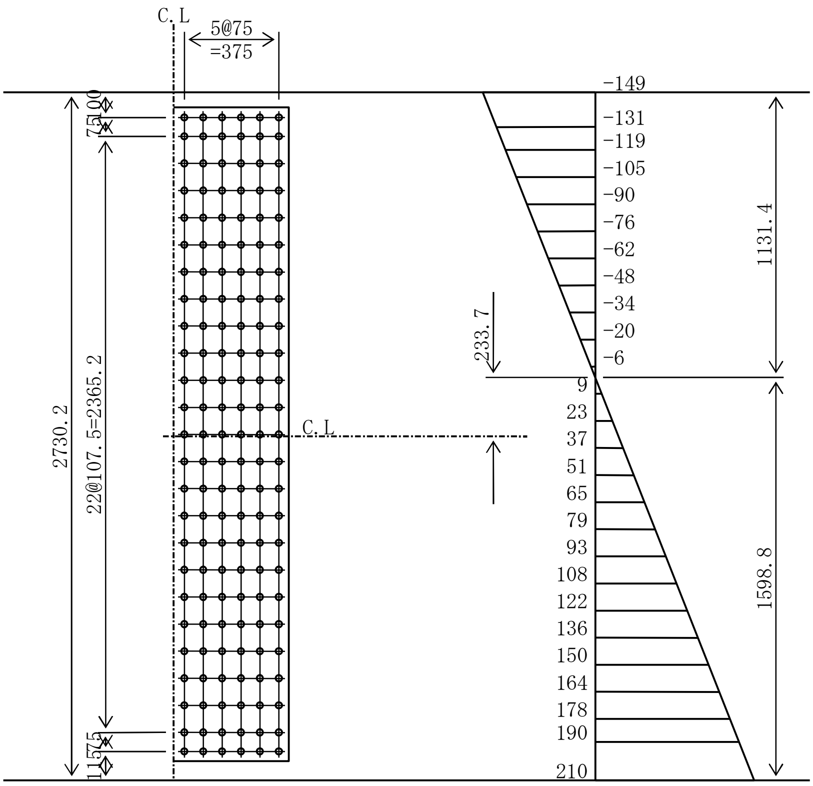
σL = 210 N/mm^2 > σa * 0.75 = 255 * 0.75 = 191 N/mm^2

σUn = 149 N/mm^2

σLn = 210 N/mm^2

τ = 21 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 17 * (190 + 210) / 2 = 519294 N

Required bolt number (Bolt number to be used)

N1 = 519294 / (108000 * 1.00) = 4.8 pcs. (6 bolts will be used.)

Check of shear force

ρs = τ * A / 150 = 21 * 46413 / 150 = 6586 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((519294 / 6)^2 + 6586^2)}$ = 86799 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 6 unites)

(e) Check of splice plates

2-SPL PL 2595 * 10 As = 519.0 cm^2 (SM570)

Moment of inertia of splice plates Is = 3178564 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3136393 cm^4

Bending moment to be shared by the web

Mw = 210 ＊ 3136393*10^4 / 1599 = 4126*10^6 N·mm

Bending stress of splice plates

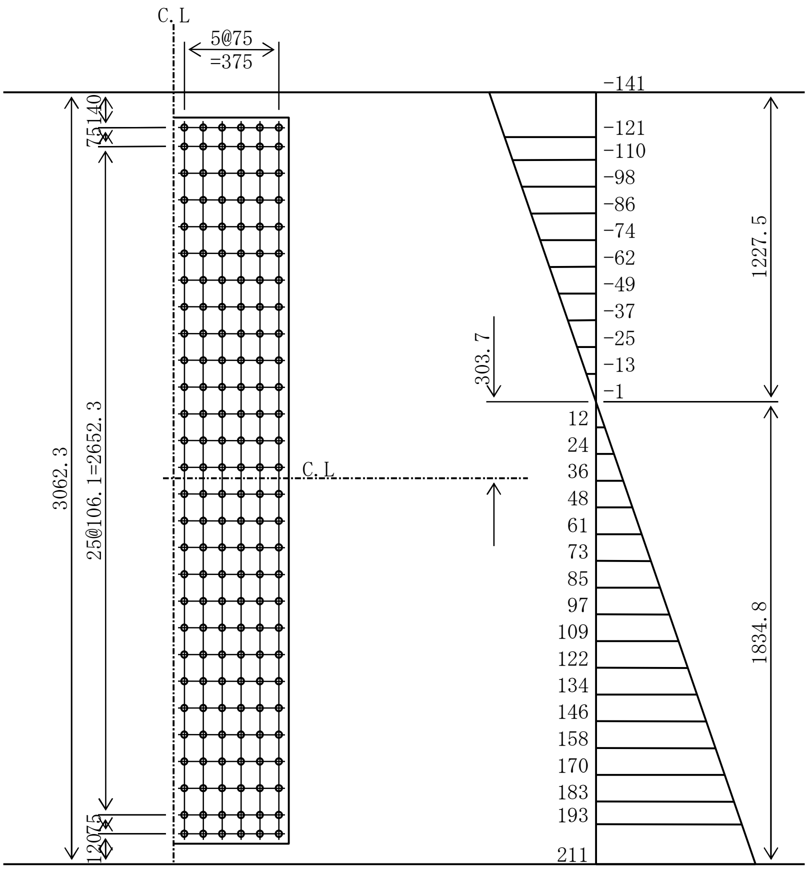
σsp = 4126*10^6 / (3178564*10^4) ＊ 1524 = 198 N/mm^2 ＜ σa = 255 N/mm^2

(374) G4 J-29(Sec-30) RWEB

(a) Section area of main plate (Web plate)
1-RWEB PL 3062 * 17 A = 520.6 cm^2 (SM570)

(b) Design stress
σU = -141 N/mm^2 < σa * 0.75 = 255 * 0.75 = 191 N/mm^2
σL = 211 N/mm^2 > σa * 0.75 = 255 * 0.75 = 191 N/mm^2
σUn = 141 N/mm^2
σLn = 211 N/mm^2
τ = 22 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress
Check of bolt at 28th row
Sharing width: b1 = 15.8 cm
Total force to be shared
P1 = 158 * 17 * (193 + 211) / 2 = 540990 N
Required bolt number (Bolt number to be used)
N1 = 540990 / (108000 * 1.00) = 5.0 pcs. (6 bolts will be used.)

Check of shear force
ρs = τ * A / 168 = 22 * 52060 / 168 = 6686 N < ρa = 108000 N
Combined stress
$\rho c28$ = $\sqrt{((540990 / 6)^2 + 6686^2)}$ = 90412 N < ρa = 108000 N
(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 6 unites)

(e) Check of splice plates

2-SPL PL 2882 * 10 As = 576.5 cm^2 (SM570)

Moment of inertia of splice plates Is = 4558221 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4548529 cm^4

Bending moment to be shared by the web

Mw = 211 ＊ 4548529*10^4 / 1835 = 5233*10^6 N·mm

Bending stress of splice plates

σsp = 5233*10^6 / (4558221*10^4) ＊ 1755 = 201 N/mm^2 ＜ σa = 255 N/mm^2

(375) G4 J-29(Sec-30) LFLG

(a) Acting stress

σ tmax = 215 N/mm^2 0.75 σ ta = 0.75 * 255 = 191 N/mm^2

τ max = 8 N/mm^2

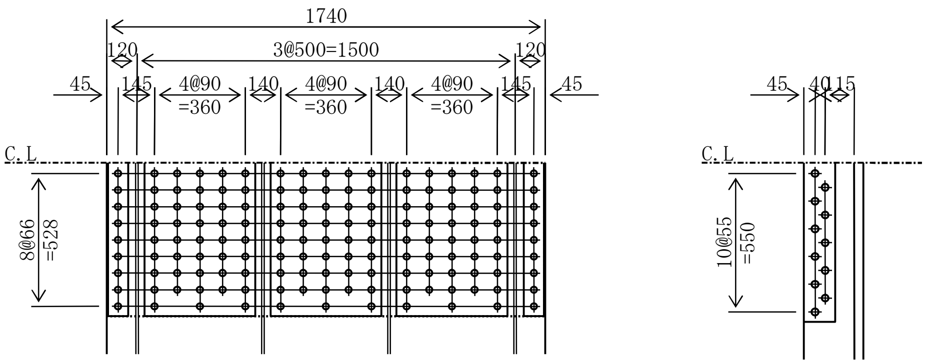
(b) Section area of main plate

1-LFLG PL 1740 * 36 Ag = 626.4 cm^2 (SM570)

2-RIB PL 200 * 22 Agr = 88.0 cm^2 (SM570)

ΣAg = Ag + Agr = 626.4 + 88.0 = 714.4 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 36 A = 626.4

(626.4 - (17* 2.5)* 3.6) * 1.1 = 520.7 < 626.4 ∴An = 520.7 cm^2

2-RIB PL 200 * 22 Ar = 88.0

(88.0 - 2*(1* 2.7+ 1*0.809)* 2.2) * 1.1 = 79.8 < 88.0 ∴Anr = 79.8 cm^2

ΣAn = An + Anr = 520.7 + 79.8 = 600.6 cm^2

σ tn = σ tmax * ΣAg / ΣAn * 158 / 169

= 215 * 714.4 / 600.6 * 158 / 169 = 239 N/mm^2

< σ ta = 255 N/mm^2

(e) Design axial force

・Main plate Pt = σ tn * An = 239 * 52074 * 147 / 136 = 13463147 N

> 0.75 σ ta * An / 1.1 = 191 * 52074 * 147 / 136 / 1.1 = 9786066 N

・Rib Ptr = σ tn * Anr = 239 * 7981 = 1909105 N

> 0.75 σ ta * Anr/ 1.1 = 191 * 7981 / 1.1 = 1387686 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 520.7 * 147 / 136 / 2 = 281.4 cm^2

・Rib AnrR = Anr = 79.8 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 0.98) = 13463147 / 105840 = 127.2 pcs. (147 bolts will be used.)

・Rib nr = Ptr / (108000 * 0.94) = 1909105 / 101520 = 18.8 pcs. (2 @ 11 = 22 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 9,11 unites)

(h) Tensile force per one bolt

ρ p = Pt / 147 = 13463147 / 147 = 91586 N

ρ s = τ * Ag / 147 = 8 * 62640 / 147 = 3349 N

ρ = $\sqrt{}$(ρ p^2 + ρ s^2) = $\sqrt{}$(91586^2 + 3349^2) = 91647 N < ρ a = 105840 N

(i) Check of splice plates

	(SM570)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	80 ＊ 25	(40.0 -	2*(1*2.5)＊ 2.5)*1.1=	30.3＜ 40.0	∴ 30.3
3-SPL PL	440 ＊ 25	(330.0 -	3*(5*2.5)＊ 2.5)*1.1=	259.9＜ 330.0	∴259.9
		370.0			290.1 ＞ AnR
1-SPL PL	1730 ＊ 20	(346.0 -	(17*2.5)＊ 2.0)*1.1=	287.1＜ 346.0	∴287.1 ＞ AnR
4-SPL PL	120 ＊ 22	(105.6 -	4*(1*2.7+ 1*0.809)＊ 2.2)*1.1=	82.2＜ 105.6	∴ 82.2 ＞AnrR

(376) G4 J-30(Sec-31) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2730 * 17 A = 464.1 cm^2 (SM570)

(b) Design stress

σU = -130 N/mm^2 < σa * 0.75 = 255 * 0.75 = 191 N/mm^2

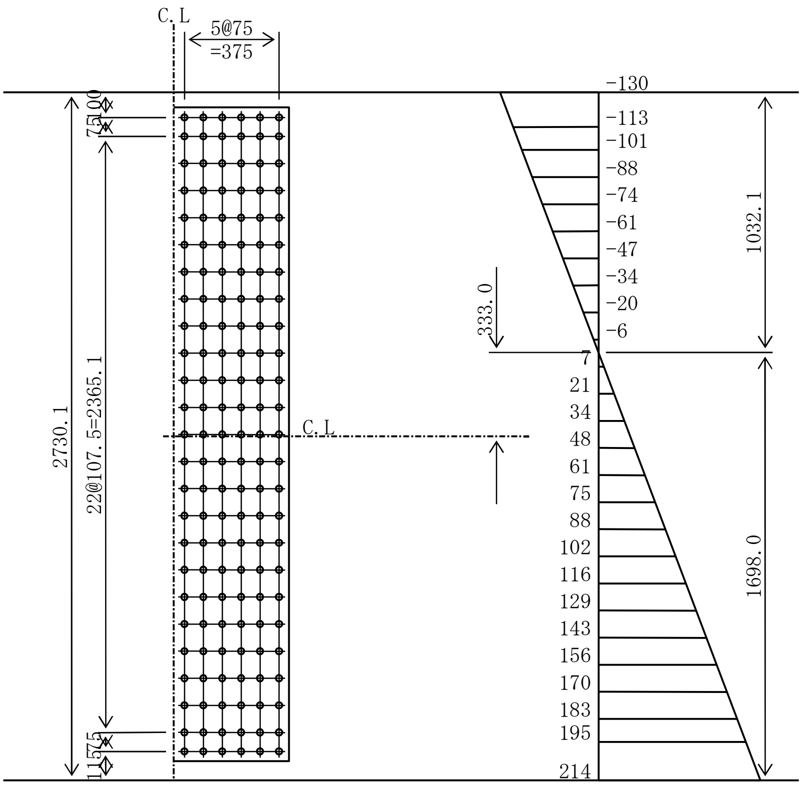
σL = 214 N/mm^2 > σa * 0.75 = 255 * 0.75 = 191 N/mm^2

σUn = 130 N/mm^2

σLn = 214 N/mm^2

τ = 27 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 17 * (195 + 214) / 2 = 529976 N

Required bolt number (Bolt number to be used)

N1 = 529976 / (108000 * 1.00) = 4.9 pcs. (6 bolts will be used.)

Check of shear force

$\rho s = \tau$ * A / 150 = 27 * 46412 / 150 = 8344 N < ρa = 108000 N

Combined stress

$\rho c25 = \sqrt{((529976 / 6)^2 + 8344^2)}$ = 88723 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 6 unites)

(e) Check of splice plates

2-SPL PL 2595 * 10 As = 519.0 cm^2 (SM570)

Moment of inertia of splice plates Is = 3462713 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3397389 cm^4

Bending moment to be shared by the web

Mw = 214 ＊ 3397389*10^4 / 1698 = 4282*10^6 N･mm

Bending stress of splice plates

σsp = 4282*10^6 / (3462713*10^4) ＊ 1623 = 201 N/mm^2 ＜ σa = 255 N/mm^2

(377) G4 J-30(Sec-31) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 3062 * 17 A = 520.6 cm^2 (SM570)

(b) Design stress

σU = -123 N/mm^2 < σa * 0.75 = 255 * 0.75 = 191 N/mm^2

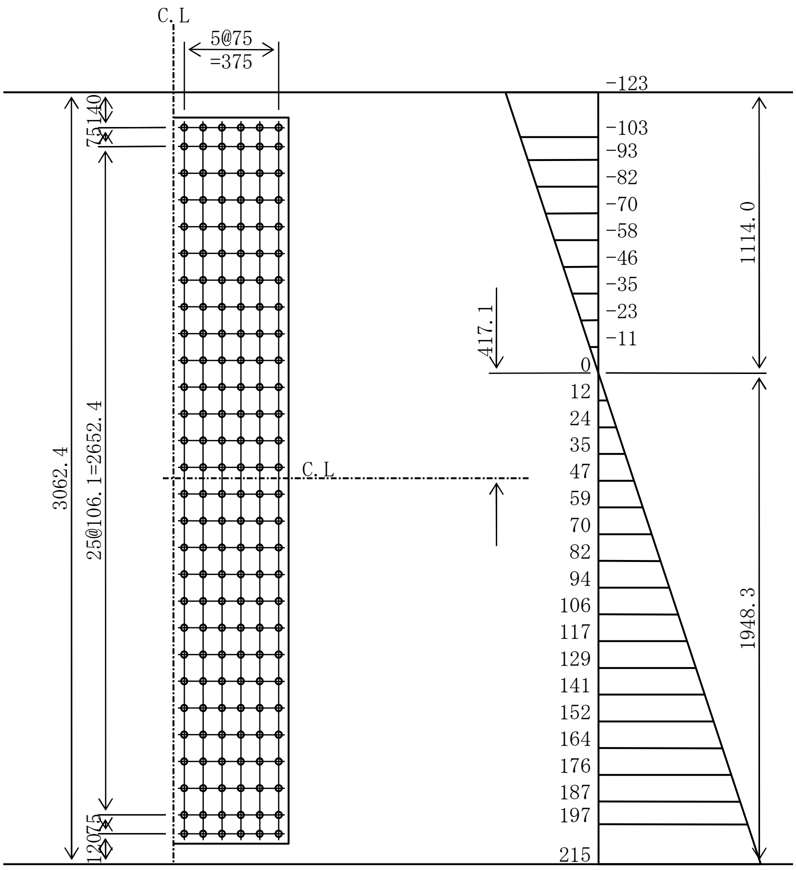
σL = 215 N/mm^2 > σa * 0.75 = 255 * 0.75 = 191 N/mm^2

σUn = 123 N/mm^2

σLn = 215 N/mm^2

τ = 27 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 17 * (197 + 215) / 2 = 551827 N

Required bolt number (Bolt number to be used)

N1 = 551827 / (108000 * 1.00) = 5.1 pcs. (6 bolts will be used.)

Check of shear force

ρs = τ * A / 168 = 27 * 52061 / 168 = 8495 N < ρa = 108000 N

Combined stress

$\rho c28$ = $\sqrt{((551827 / 6)^2 + 8495^2)}$ = 92363 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 6 unites)

(e) Check of splice plates

2-SPL PL 2882 * 10 As = 576.5 cm^2 (SM570)

Moment of inertia of splice plates Is = 5043061 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4974572 cm^4

Bending moment to be shared by the web

Mw = 215 ＊ 4974572*10^4 / 1948 = 5484*10^6 N･mm

Bending stress of splice plates

σsp = 5484*10^6 / (5043061*10^4) ＊ 1868 = 203 N/mm^2 ＜ σa = 255 N/mm^2

(378) G4 J-30(Sec-31) LFLG

(a) Acting stress

$\sigma tmax$ = 217 N/mm^2 0.75σta = 0.75 * 255 = 191 N/mm^2

τmax = 13 N/mm^2

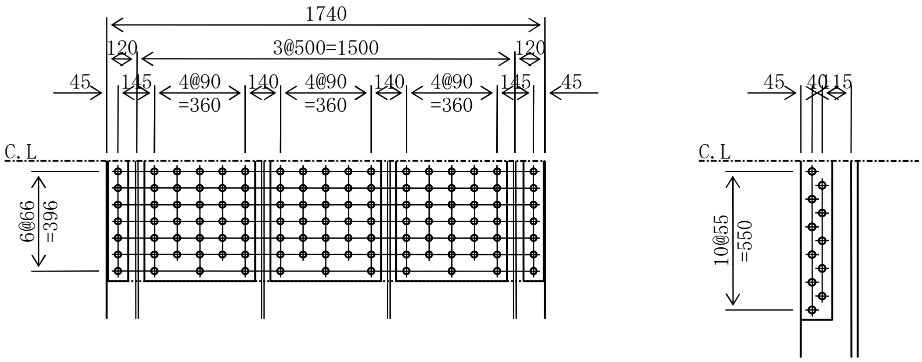
(b) Section area of main plate

1-LFLG PL 1740 * 26   Ag = 452.4 cm^2 (SM570)

2-RIB PL 200 * 22   Agr = 88.0 cm^2 (SM570)

ΣAg = Ag + Agr = 452.4 + 88.0 = 540.4 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 26   A = 452.4

(452.4 - (17* 2.5)* 2.6) * 1.1 = 376.1 < 452.4 ∴An = 376.1 cm^2

2-RIB PL 200 * 22   Ar = 88.0

(88.0 - 2*(1* 2.7+ 1*0.809)* 2.2) * 1.1 = 79.8 < 88.0 ∴Anr = 79.8 cm^2

ΣAn = An + Anr = 376.1 + 79.8 = 455.9 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn * 124 / 135

= 217 * 540.4 / 455.9 * 124 / 135 = 237 N/mm^2

< σta = 255 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 237 * 37609 * 113 / 102 = 9858005 N

> 0.75σta * An / 1.1 = 191 * 37609 * 113 / 102 / 1.1 = 7244006 N

・Rib Ptr = σtn * Anr = 237 * 7981 = 1888432 N

> 0.75σta * Anr/ 1.1 = 191 * 7981 / 1.1 = 1387686 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 376.1 * 113 / 102 / 2 = 208.3 cm^2

・Rib AnrR = Anr = 79.8 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 9858005 / 108000 = 91.3 pcs. (113 bolts will be used.)

・Rib nr = Ptr / (108000 * 0.94) = 1888432 / 101520 = 18.6 pcs. (2 @ 11 = 22 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 7,11 unites)

(h) Tensile force per one bolt

ρp = Pt / 113 = 9858005 / 113 = 87239 N

ρs = τ * Ag / 113 = 13 * 45240 / 113 = 5158 N

ρ = $\sqrt{(\rho p^2 + \rho s^2)}$ = $\sqrt{(87239^2 + 5158^2)}$ = 87391 N < ρa = 108000 N

(i) Check of splice plates

	(SM570)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
2-SPL PL	80 * 18	(28.8 -	2*(1*2.5)* 1.8)*1.1=	21.8＜	28.8	∴ 21.8
3-SPL PL	440 * 18	(237.6 -	3*(5*2.5)* 1.8)*1.1=	187.1＜	237.6	∴187.1
		266.4				208.9 ＞ AnR
1-SPL PL	1730 * 15	(259.5 -	(17*2.5)* 1.5)*1.1=	215.3＜	259.5	∴215.3 ＞ AnR
4-SPL PL	120 * 22	(105.6 -	4*(1*2.7+ 1*0.809)* 2.2)*1.1=	82.2＜	105.6	∴ 82.2 ＞AnrR

(379) G4 J-31(Sec-32) LWEB

(a) Section area of main plate (Web plate)

1-LWEB PL 2730 * 15 A = 409.5 cm^2 (SM490Y)

(b) Design stress

σU = -99 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

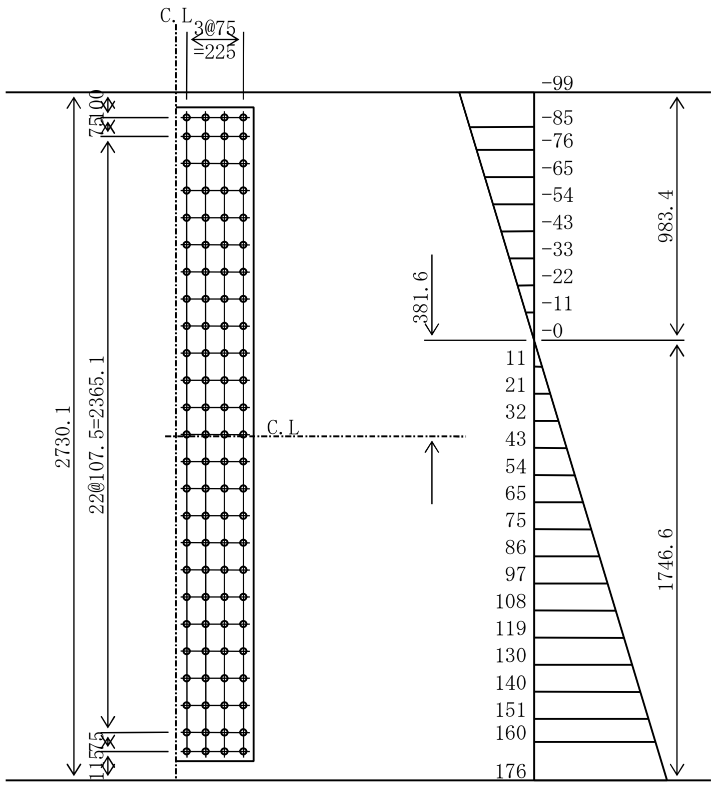
σL = 176 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 99 N/mm^2

σLn = 176 N/mm^2

τ = 34 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 25th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 15 * (160 + 176) / 2 = 384401 N

Required bolt number (Bolt number to be used)

N1 = 384401 / (108000 * 1.00) = 3.6 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 100 = 34 * 40951 / 100 = 14027 N < ρa = 108000 N

Combined stress

$\rho c25$ = $\sqrt{((384401 / 4)^2 + 14027^2)}$ = 97118 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2595 ＊ 9 As = 467.1 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3275194 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3139853 cm^4

Bending moment to be shared by the web

$Mw = 176 * 3139853*10^4 / 1747 = 3159*10^6$ N･mm

Bending stress of splice plates

$\sigma sp = 3159*10^6 / (3275194*10^4) * 1672 = 161$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(380) G4 J-31(Sec-32) RWEB

(a) Section area of main plate (Web plate)

1-RWEB PL 3062 * 15 A = 459.4 cm^2 (SM490Y)

(b) Design stress

σU = -93 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2

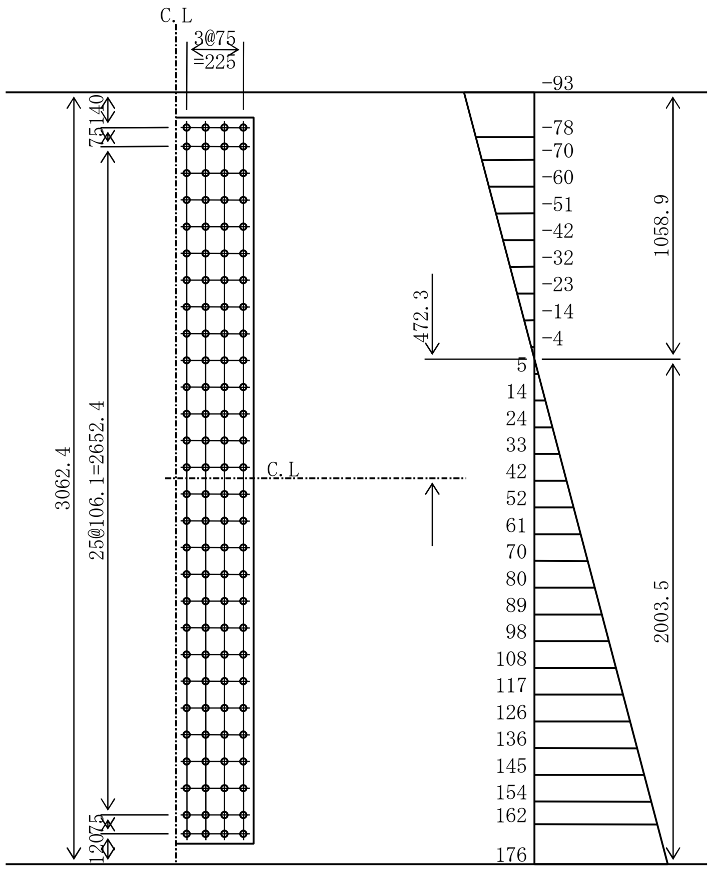
σL = 176 N/mm^2 > σa * 0.75 = 210 * 0.75 = 158 N/mm^2

σUn = 93 N/mm^2

σLn = 176 N/mm^2

τ = 35 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 15 * (162 + 176) / 2 = 399929 N

Required bolt number (Bolt number to be used)

N1 = 399929 / (108000 * 1.00) = 3.7 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 112 = 35 * 45936 / 112 = 14221 N < ρa = 108000 N

Combined stress

ρc28 = $\sqrt{((399929 / 4)^2 + 14221^2)}$ = 100989 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2882 ＊ 9 As = 518.8 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 4799202 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 4614858 cm^4

Bending moment to be shared by the web

Mw = 176 ＊ $4614858*10^4$ / 2004 = $4059*10^6$ N･mm

Bending stress of splice plates

σsp = $4059*10^6$ / ($4799202*10^4$) ＊ 1924 = 163 N/mm^2 ＜ σa = 210 N/mm^2

(381) G4 J-31(Sec-32) LFLG

(a) Acting stress

$\sigma tmax$ = 178 N/mm^2 0.75σta = 0.75 * 210 = 158 N/mm^2

τmax = 16 N/mm^2

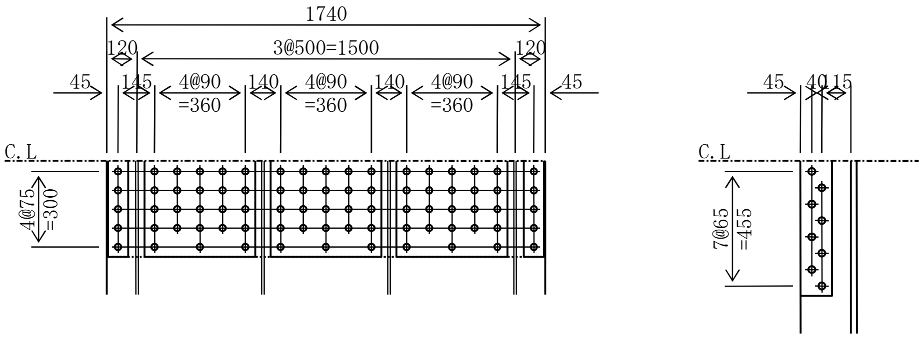
(b) Section area of main plate

1-LFLG PL 1740 * 23 Ag = 400.2 cm^2 (SM490Y)

2-RIB PL 200 * 22 Agr = 88.0 cm^2 (SM490Y)

ΣAg = Ag + Agr = 400.2 + 88.0 = 488.2 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 23 A = 400.2

(400.2 - (11* 2.5)* 2.3) * 1.1 = 370.6 < 400.2 ∴An = 370.6 cm^2

2-RIB PL 200 * 22 Ar = 88.0

(88.0 - 2*(1* 2.7+ 1*0.059)* 2.2) * 1.1 = 83.4 < 88.0 ∴Anr = 83.4 cm^2

ΣAn = An + Anr = 370.6 + 83.4 = 454.1 cm^2

σtn = $\sigma tmax$ * ΣAg / ΣAn = 178 * 488.2 / 454.1 = 191 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 191 * 37065 = 7094227 N

> 0.75σta * An / 1.1 = 158 * 37065 / 1.1 = 5306963 N

・Rib Ptr = σtn * Anr = 191 * 8344 = 1597149 N

> 0.75σta * Anr/ 1.1 = 158 * 8344 / 1.1 = 1194775 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 370.6 / 2 = 185.3 cm^2

・Rib AnrR = Anr = 83.4 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 7094227 / 108000 = 65.7 pcs. (79 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 1597149 / 108000 = 14.8 pcs. (2 @ 8 = 16 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 5,8 unites)

(h) Tensile force per one bolt

ρp = Pt / 79 = 7094227 / 79 = 89800 N

ρs = τ * Ag / 79 = 16 * 40020 / 79 = 8120 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(89800^2 + 8120^2) = 90167 N < ρa = 108000 N

(i) Check of splice plates

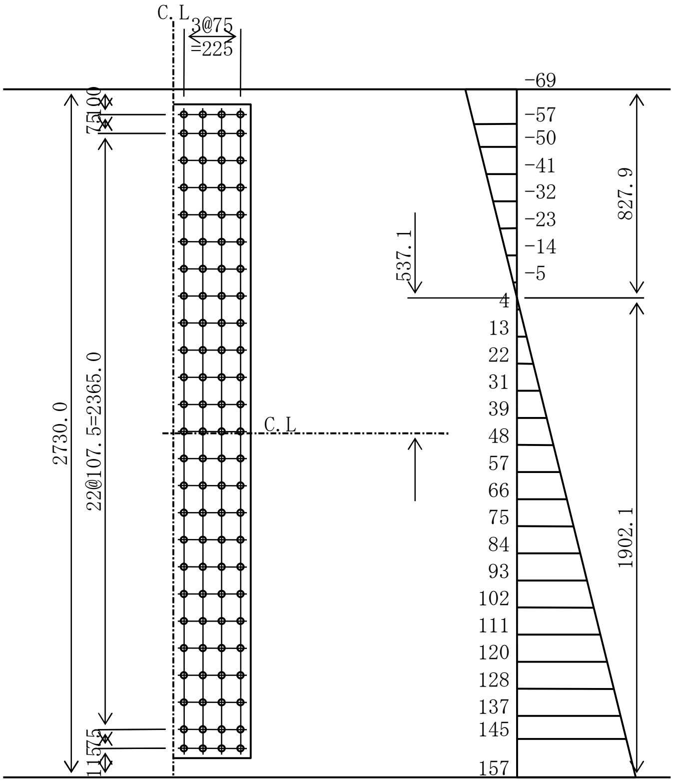
	(SM490Y)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
2-SPL PL	80 ＊ 16	(25.6 -	2*(1*2.5)＊ 1.6)*1.1=	19.4＜	25.6	∴ 19.4
3-SPL PL	440 ＊ 16	(211.2 -	3*(5*2.5)＊ 1.6)*1.1=	166.3＜	211.2	∴166.3
		236.8				185.7
						＞ AnR
1-SPL PL	1730 ＊ 13	(224.9 -	(17*2.5)＊ 1.3)*1.1=	186.6＜	224.9	∴186.6
						＞ AnR
4-SPL PL	120 ＊ 21	(100.8 -	4*(1*2.7+ 1*0.059)＊ 2.1)*1.1=	85.4＜	100.8	∴ 85.4
						＞AnrR

(382) G4 J-32(Sec-33) LWEB

(a) Section area of main plate (Web plate)
1-LWEB PL 2730 * 15 A = 409.5 cm^2 (SM490Y)

(b) Design stress
σU = -56 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = 128 N/mm^2 < σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 158 * 56 / 128 = 69 N/mm^2
σLn = 158 N/mm^2
τ = 46 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress
Check of bolt at 25th row
Sharing width: b1 = 15.3 cm
Total force to be shared
P1 = 153 * 15 * (145 + 157) / 2 = 345839 N
Required bolt number (Bolt number to be used)
N1 = 345839 / (108000 * 1.00) = 3.2 pcs. (4 bolts will be used.)

Check of shear force
ρs = τ * A / 100 = 46 * 40950 / 100 = 18966 N < ρa = 108000 N
Combined stress
$\rho c25$ = $\sqrt{((345839/4)^2 + 18966^2)}$ = 88515 N < ρa = 108000 N
(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2595 ＊ 9 As = 467.1 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 3931464 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 3724739 cm^4

Bending moment to be shared by the web

$Mw = 158 * 3724739*10^4 / 1902 = 3084*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 3084*10^6 / (3931464*10^4) * 1827 = 143$ N/mm^2 ＜ $\sigma a = 210$ N/mm^2

(383) G4 J-32(Sec-33) RWEB

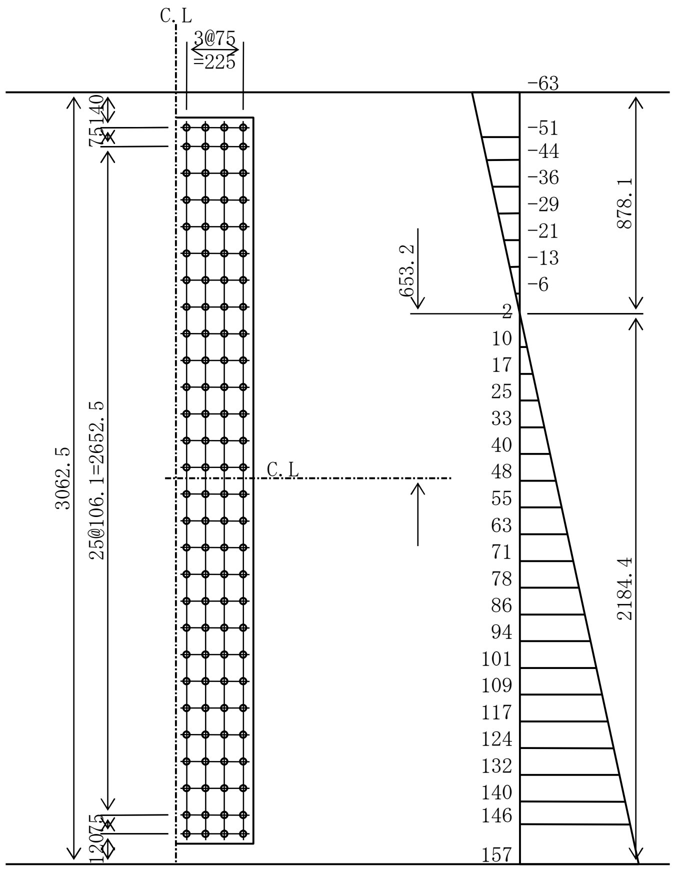
(a) Section area of main plate (Web plate)

1-RWEB PL 3062 * 15 A = 459.4 cm^2 (SM490Y)

(b) Design stress

σU = -51 N/mm^2 ＜ σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σL = 128 N/mm^2 ＜ σa * 0.75 = 210 * 0.75 = 158 N/mm^2
σUn = 158 * 51 / 128 = 63 N/mm^2
σLn = 158 N/mm^2
τ = 47 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 28th row

Sharing width: b1 = 15.8 cm

Total force to be shared

P1 = 158 * 15 * (146 + 157) / 2 = 358679 N

Required bolt number (Bolt number to be used)

N1 = 358679 / (108000 * 1.00) = 3.3 pcs. (4 bolts will be used.)

Check of shear force

ρs = τ * A / 112 = 47 * 45937 / 112 = 19368 N ＜ ρa = 108000 N

Combined stress

ρc28 = $\sqrt{((358679 / 4)^2 + 19368^2)}$ = 91738 N ＜ ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 4 unites)

(e) Check of splice plates

2-SPL PL 2882 * 9 As = 518.8 cm^2 (SM490Y)

Moment of inertia of splice plates Is = 5874254 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 5550076 cm^4

Bending moment to be shared by the web

Mw = 158 * 5550076*10^4 / 2184 = 4002*10^6 N·mm

Bending stress of splice plates

σsp = 4002*10^6 / (5874254*10^4) * 2104 = 143 N/mm^2 ＜ σa = 210 N/mm^2

(384) G4 J-32(Sec-33) LFLG

(a) Acting stress

σtmax = 129 N/mm^2 0.75σta = 0.75 * 210 = 158 N/mm^2

τmax = 33 N/mm^2

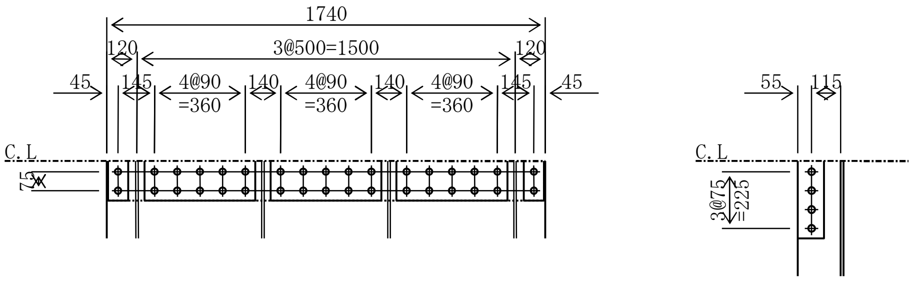
(b) Section area of main plate

1-LFLG PL 1740 * 12 Ag = 208.8 cm^2 (SM490Y)

2-RIB PL 170 * 17 Agr = 57.8 cm^2 (SM490Y)

ΣAg = Ag + Agr = 208.8 + 57.8 = 266.6 cm^2

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 1740 * 12 A = 208.8

(208.8 - (17* 2.5)* 1.2) * 1.1 = 173.6 < 208.8 ∴An = 173.6 cm^2

2-RIB PL 170 * 17 Ar = 57.8

(57.8 - 2*(1* 2.7)* 1.7) * 1.1 = 53.5 < 57.8 ∴Anr = 53.5 cm^2

ΣAn = An + Anr = 173.6 + 53.5 = 227.1 cm^2

σtn = σtmax * ΣAg / ΣAn = 129 * 266.6 / 227.1 = 152 N/mm^2

< σta = 210 N/mm^2

(e) Design axial force

・Main plate Pt = σtn * An = 152 * 17358 = 2630514 N

> 0.75σta * An / 1.1 = 158 * 17358 / 1.1 = 2485350 N

・Rib Ptr = σtn * Anr = 152 * 5348 = 810492 N

> 0.75σta * Anr/ 1.1 = 158 * 5348 / 1.1 = 765765 N

(f) Required section area of the splice plates

・Mother material(One side) AnR = An / 2 = 173.6 / 2 = 86.8 cm^2

・Rib AnrR = Anr = 53.5 cm^2

(g) Required bolt number

・Main plate n = Pt / (108000 * 1.00) = 2630514 / 108000 = 24.4 pcs. (34 bolts will be used.)

・Rib nr = Ptr / (108000 * 1.00) = 810492 / 108000 = 7.5 pcs. (2 @ 4 = 8 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 2,4 unites)

(h) Tensile force per one bolt

ρp = Pt / 34 = 2630514 / 34 = 77368 N

ρs = τ * Ag / 34 = 33 * 20880 / 34 = 20490 N

ρ = $\sqrt{}$(ρp^2 + ρs^2) = $\sqrt{}$(77368^2 + 20490^2) = 80035 N < ρa = 108000 N

(i) Check of splice plates

	(SM490Y)	Ags(cm²)	deduction of bolt holes			Ans(cm²)
2-SPL PL	80 * 9	(14.4 -	2*(1*2.5)* 0.9)*1.1=	10.9<	14.4	∴ 10.9
3-SPL PL	440 * 9	(118.8 -	3*(5*2.5)* 0.9)*1.1=	93.6<	118.8	∴ 93.6
		133.2				104.4 > AnR
1-SPL PL	1730 * 9	(155.7 -	(17*2.5)* 0.9)*1.1=	129.2<	155.7	∴129.2 > AnR
4-SPL PL	100 * 17	(68.0 -	4*(1*2.7)* 1.7)*1.1=	54.6<	68.0	∴ 54.6 >AnrR

４．８．Calculation of Weld

Welding of the main girder flange and web plate is determined in consideration of the synthesized stress of the weld.
However, if bending stress degree is less than about 45% of the allowable stress, it is determined in shear only.

１）Combined stress of the formula

$(\sigma/\sigma a)^2 + (\tau/\tau a)^2 \leqq 1.2$ ········ (1)

In which, σ : web board, lower edge stress intensity

τ : shear stress of the weld

$(\tau = \tau w \times tw / A)$ ········ (2)

τw : shear stress of the web plate

tw : web thickness

A : throat thickness

σa : welding part of the allowable stress

τa : allowable shear stress of the weld

２）Required throat thickness

Required throat thickness, equation (1) and (2), is calculated by the following equation.

$(\sigma/\sigma a)^2 < 0.2$ $\quad$ $Areq = (\tau w \times tw)/\tau a$

$(\sigma/\sigma a)^2 \geqq 0.2$ $\quad$ $Areq = (\tau w \times tw)/(\tau a \times \sqrt{(1.2-(\sigma/\sigma a)^2)})$

３）weld size

And a fillet weld maximum Smax = 12mm, corner to Shosa soil thickness of meat necessary.

Total of throat thickness $\Sigma A = S/\sqrt{2} \times 2$

Fillet welding is not possible places, it is with the following partial penetration welding.

Groove angle $\theta = 45°$, 2mm leaving

Groove depth D = (thickness-2mm leaving)/2

Groove excess prime $S' = D \times (1/\cos\theta - 1)$

Welding of the throat $A = (D+S') \times \sin\alpha - 3$

$\alpha = \tan^{-1}(b/S')$

Groove height b $b = D \times \tan\theta$

Total of throat $\Sigma A = A \times 2$

※List symbol

S : fillet size = Max(St,SA) (mm)

Areq : need of throat (mm)

St : the lowest was calculated from the thickness fillet size
$= \sqrt{(2 \times \text{thickness})} \geqq 6$ (mm)

SA : calculated from the throat of the need to fillet weld size
$= Areq \times \sqrt{2}/2 \geqq 6$ (mm)

ΣA : throat of the total (mm)

D : groove depth (mm)

θ : groove angle (°)

S' : groove extra prime (mm)

		G1	G1	G1	G1	G1	G1	G1	G1	G1
		Sec-1	Sec-2	Sec-3	Sec-4	Sec-5	Sec-6	Sec-7	Sec-7	Sec-8
THK	UFlg	16	16	16	16	16	16	16	16	16
	Web	15	15	15	15	15	15	15	15	15
	LFlg	10	18	27	30	30	26	17	17	10
UFlg	Pnt	S1_L	R	R	R	D4_R	L	L	L	R
	Case	max	max	max	max	max	max	max	max	min
	σu	0	84	100	105	104	99	81	45	27
	σua	210	210	210	210	210	210	210	210	210
	τw	45	25	15	8	9	15	24	30	42
	τa	120	120	120	120	120	120	120	120	120
LFlg	Pnt	R	R	R	R	L	L	L	L	L
	Case	max	max	max	max	max	max	max	max	max
	σL	121	170	166	165	165	167	168	84	95
	σLa	210	210	210	210	210	210	210	210	210
	τw	23	19	13	7	7	12	17	24	22
	τa	120	120	120	120	120	120	120	120	120
UFlg	Type	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet
	S	6	6	6	6	6	6	6	6	6
	Areq	5.59	3.17	1.93	1.01	1.09	1.91	3.03	3.75	5.24
	St	6	6	6	6	6	6	6	6	6
	SA	6	6	6	6	6	6	6	6	6
	ΣA	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49
		OK	OK	OK	OK	OK	OK	OK	OK	OK
LFlg	Type	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet
	S	6	6	8	8	8	8	6	6	6
	Areq	3.02	3.19	2.11	1.10	1.10	2.02	2.83	2.95	2.78
	St	6	6	8	8	8	8	6	6	6
	SA	6	6	6	6	6	6	6	6	6
	ΣA	8.49	8.49	11.31	11.31	11.31	11.31	8.49	8.49	8.49
		OK	OK	OK	OK	OK	OK	OK	OK	OK

		G1	G1	G1	G1	G1	G1	G1	G1	G1
		Sec-9	Sec-10	Sec-11	Sec-12	Sec-13	Sec-14	Sec-15	Sec-16	Sec-17
THK	UFlg	16	16	16	16	16	16	16	16	16
	Web	17	17	17	15	15	15	15	15	15
	LFlg	10	15	12	10	10	10	10	10	12
UFlg	Pnt	R	P6_R	L	L	C9_L	C10_L	C11_R	R	R
	Case	min	min	min	min	min	max	max	min	min
	σu	84	107	88	47	17	27	28	33	66
	σua	210	210	210	210	210	210	210	210	210
	τw	41	43	34	30	22	14	15	21	32
	τa	120	120	120	120	120	120	120	120	120
LFlg	Pnt	R	P6_R	L	L	R	R	L	R	R
	Case	min	min	min	min	max	max	max	min	min
	σL	171	185	173	103	54	65	65	72	137
	σLa	210	210	210	210	210	210	210	210	210
	τw	27	33	23	20	10	7	7	15	23
	τa	120	120	120	120	120	120	120	120	120
UFlg	Type	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet
	S	6	6	6	6	6	6	6	6	6
	Areq	5.87	6.31	4.77	3.74	2.81	1.77	1.86	2.68	4.06
	St	6	6	6	6	6	6	6	6	6
	SA	6	6	6	6	6	6	6	6	6
	ΣA	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49
		OK	OK	OK	OK	OK	OK	OK	OK	OK
LFlg	Type	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet
	S	6	6	6	6	6	6	6	6	6
	Areq	5.24	7.14	4.50	2.58	1.20	0.87	0.87	1.84	3.28
	St	6	6	6	6	6	6	6	6	6
	SA	6	6	6	6	6	6	6	6	6
	ΣA	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49
		OK	OK	OK	OK	OK	OK	OK	OK	OK

		G1	G1	G1	G1	G1	G1	G1	G1	G1
		Sec-18	Sec-19	Sec-20	Sec-21	Sec-22	Sec-23	Sec-23	Sec-24	Sec-25
THK	UFlg	16	16	16	16	16	16	16	16	16
	Web	15	17	17	17	15	15	15	15	17
	LFlg	21	41	52	38	19	15	15	29	32
UFlg	Pnt	R	R	P7_L	L	L	D19_R	R	R	R
	Case	min	min	min	min	min	max	max	max	max
	σu	111	156	179	150	89	53	68	111	141
	σua	210	210	210	210	210	210	210	210	255
	τw	41	42	53	52	56	43	42	30	19
	τa	120	120	120	120	120	120	120	120	145
LFlg	Pnt	R	R	P7_L	L	L	D19_R	R	R	R
	Case	min	min	min	min	min	max	max	max	max
	σL	187	186	187	185	150	103	146	177	211
	σLa	210	210	210	210	210	210	210	210	255
	τw	34	39	52	47	45	32	29	25	16
	τa	120	120	120	120	120	120	120	120	145
UFlg	Type	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet
	S	6	6	8	7	6	6	6	6	6
	Areq	5.30	7.34	11.01	8.80	6.95	5.35	5.20	3.95	2.36
	St	6	6	6	6	6	6	6	6	6
	SA	6	6	8	7	6	6	6	6	6
	ΣA	8.49	8.49	11.31	9.90	8.49	8.49	8.49	8.49	8.49
		OK	OK	OK	OK	OK	OK	OK	OK	OK
LFlg	Type	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet
	S	7	10	11	9	7	6	6	8	8
	Areq	6.57	8.48	11.50	10.24	6.83	4.06	4.22	4.47	2.60
	St	7	10	11	9	7	6	6	8	8
	SA	6	6	9	8	6	6	6	6	6
	ΣA	9.90	14.14	15.56	12.73	9.90	8.49	8.49	11.31	11.31
		OK	OK	OK	OK	OK	OK	OK	OK	OK

		G1	G1	G1	G1	G1	G1	G1	G1	G2
		Sec-26	Sec-27	Sec-28	Sec-29	Sec-30	Sec-31	Sec-32	Sec-33	Sec-1
THK	UFlg	16	16	16	16	16	16	16	16	16
	Web	17	17	17	17	17	17	15	15	14
	LFlg	41	44	44	44	38	27	24	12	10
UFlg	Pnt	R	R	D23_L	L	L	L	L	L	R
	Case	max	max	max	max	max	max	max	max	max
	σu	155	162	163	160	151	132	101	58	47
	σua	255	255	255	255	255	255	210	210	210
	τw	16	10	8	11	16	22	31	44	38
	τa	145	145	145	145	145	145	120	120	120
LFlg	Pnt	R	R	D23_L	L	L	L	L	L	R
	Case	max	max	max	max	max	max	max	max	max
	σL	207	207	208	204	209	215	177	133	97
	σLa	255	255	255	255	255	255	210	210	210
	τw	14	9	7	11	14	18	25	29	29
	τa	145	145	145	145	145	145	120	120	120
UFlg	Type	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet
	S	6	6	6	6	6	6	6	6	6
	Areq	2.03	1.33	1.02	1.50	2.02	2.68	3.95	5.44	4.38
	St	6	6	6	6	6	6	6	6	6
	SA	6	6	6	6	6	6	6	6	6
	ΣA	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49
		OK	OK	OK	OK	OK	OK	OK	OK	OK
LFlg	Type	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet
	S	10	10	10	10	9	8	7	6	6
	Areq	2.29	1.49	1.16	1.65	2.25	3.01	4.47	4.04	3.44
	St	10	10	10	10	9	8	7	6	6
	SA	6	6	6	6	6	6	6	6	6
	ΣA	14.14	14.14	14.14	14.14	12.73	11.31	9.90	8.49	8.49
		OK	OK	OK	OK	OK	OK	OK	OK	OK

		G2	G2	G2	G2	G2	G2	G2	G2	G2
		Sec-2	Sec-3	Sec-4	Sec-5	Sec-6	Sec-7	Sec-7	Sec-8	Sec-9
THK	UFlg	16	16	16	16	16	16	16	16	16
	Web	14	14	14	14	14	14	14	14	14
	LFlg	10	16	16	16	16	10	10	10	12
UFlg	Pnt	R	R	C3_R	L	L	L	L	R	R
	Case	max	max	max	max	max	max	max	min	min
	σu	81	96	102	103	96	80	48	31	82
	σua	210	210	210	210	210	210	210	210	210
	τw	25	17	14	8	16	25	37	44	49
	τa	120	120	120	120	120	120	120	120	120
LFlg	Pnt	R	R	R	L	L	L	C6_R	L	R
	Case	max	max	max	max	max	max	max	max	min
	σL	166	161	172	172	160	165	102	82	141
	σLa	210	210	210	210	210	210	210	210	210
	τw	20	14	7	7	14	19	24	30	40
	τa	120	120	120	120	120	120	120	120	120
UFlg	Type	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet
	S	6	6	6	6	6	6	6	6	6
	Areq	2.94	1.94	1.64	0.94	1.86	2.96	4.30	5.09	5.67
	St	6	6	6	6	6	6	6	6	6
	SA	6	6	6	6	6	6	6	6	6
	ΣA	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49
		OK	OK	OK	OK	OK	OK	OK	OK	OK
LFlg	Type	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet
	S	6	6	6	6	6	6	6	6	6
	Areq	3.07	2.16	1.11	1.11	2.02	2.95	2.82	3.55	5.42
	St	6	6	6	6	6	6	6	6	6
	SA	6	6	6	6	6	6	6	6	6
	ΣA	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49
		OK	OK	OK	OK	OK	OK	OK	OK	OK

		G2	G2	G2	G2	G2	G2	G2	G2	G2
		Sec-10	Sec-11	Sec-12	Sec-13	Sec-14	Sec-15	Sec-16	Sec-17	Sec-18
THK	UFlg	16	16	16	16	16	16	16	16	16
	Web	14	14	14	14	14	14	14	14	14
	LFlg	14	12	10	10	10	10	10	10	14
UFlg	Pnt	P6_R	L	L	L	C10_R	C11_L	R	R	R
	Case	min	min	min	min	max	max	min	min	min
	σu	106	88	52	22	31	32	37	68	108
	σua	210	210	210	210	210	210	210	210	210
	τw	51	38	32	26	16	15	25	33	39
	τa	120	120	120	120	120	120	120	120	120
LFlg	Pnt	P6_R	L	L	R	R	L	R	R	R
	Case	min	min	min	max	max	max	min	min	min
	σL	171	152	95	51	60	60	67	123	176
	σLa	210	210	210	210	210	210	210	210	210
	τw	43	32	26	14	9	9	20	27	34
	τa	120	120	120	120	120	120	120	120	120
UFlg	Type	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet
	S	6	6	6	6	6	6	6	6	6
	Areq	6.09	4.45	3.78	3.02	1.83	1.73	2.91	3.87	4.73
	St	6	6	6	6	6	6	6	6	6
	SA	6	6	6	6	6	6	6	6	6
	ΣA	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49
		OK	OK	OK	OK	OK	OK	OK	OK	OK
LFlg	Type	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet
	S	6	6	6	6	6	6	6	6	6
	Areq	6.90	4.50	3.05	1.64	0.99	0.99	2.34	3.39	5.54
	St	6	6	6	6	6	6	6	6	6
	SA	6	6	6	6	6	6	6	6	6
	ΣA	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49
		OK	OK	OK	OK	OK	OK	OK	OK	OK

		G2	G2	G2	G2	G2	G2	G2	G2	G2
		Sec-19	Sec-20	Sec-21	Sec-22	Sec-23	Sec-23	Sec-24	Sec-25	Sec-26
THK	UFlg	16	16	16	16	16	16	16	16	16
	Web	14	14	14	14	14	14	14	14	14
	LFlg	20	27	19	11	11	11	17	26	35
UFlg	Pnt	R	P7_L	L	L	L	R	R	R	R
	Case	min	min	min	min	min	max	max	max	max
	σu	148	169	142	84	27	62	111	146	163
	σua	210	210	210	210	210	210	210	210	210
	τw	46	60	59	57	52	44	37	28	21
	τa	120	120	120	120	120	120	120	120	120
LFlg	Pnt	R	P7_L	L	L	D19_L	R	R	R	R
	Case	min	min	min	min	max	max	max	max	max
	σL	191	187	187	150	97	122	181	181	175
	σLa	210	210	210	210	210	210	210	210	210
	τw	43	59	55	47	31	34	32	27	19
	τa	120	120	120	120	120	120	120	120	120
UFlg	Type	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet
	S	6	7	6	6	6	6	6	6	6
	Areq	6.38	9.45	7.96	6.66	6.04	5.12	4.51	3.91	3.10
	St	6	6	6	6	6	6	6	6	6
	SA	6	7	6	6	6	6	6	6	6
	ΣA	8.49	9.90	8.49	8.49	8.49	8.49	8.49	8.49	8.49
		OK	OK	OK	OK	OK	OK	OK	OK	OK
LFlg	Type	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet
	S	7	8	8	6	6	6	6	8	9
	Areq	8.25	10.82	10.02	6.57	3.69	4.21	5.42	4.62	3.07
	St	7	8	7	6	6	6	6	8	9
	SA	6	8	8	6	6	6	6	6	6
	ΣA	9.90	11.31	11.31	8.49	8.49	8.49	8.49	11.31	12.73
		OK	OK	OK	OK	OK	OK	OK	OK	OK

		G2	G2	G2	G2	G2	G2	G2	G3	G3
		Sec-27	Sec-28	Sec-29	Sec-30	Sec-31	Sec-32	Sec-33	Sec-1	Sec-2
THK	UFlg	16	16	16	16	16	16	16	16	16
	Web	14	14	14	14	14	14	14	14	14
	LFlg	38	38	38	35	28	18	10	10	13
UFlg	Pnt	R	L	L	L	L	L	S2_R	S1_L	R
	Case	max	max	max	max	max	max	max	max	max
	σu	170	170	162	153	127	92	0	0	68
	σua	210	210	210	210	210	210	210	210	210
	τw	13	13	11	18	30	46	62	53	29
	τa	120	120	120	120	120	120	120	120	120
LFlg	Pnt	R	D23_L	L	L	L	L	L	R	R
	Case	max	max	max	max	max	max	max	max	max
	σL	174	174	174	176	178	180	120	110	168
	σLa	210	210	210	210	210	210	210	210	210
	τw	13	10	11	18	28	38	39	30	24
	τa	120	120	120	120	120	120	120	120	120
UFlg	Type	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet
	S	6	6	6	6	6	6	6	6	6
	Areq	2.04	2.04	1.68	2.56	3.82	5.32	7.21	6.19	3.39
	St	6	6	6	6	6	6	6	6	6
	SA	6	6	6	6	6	6	6	6	6
	ΣA	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49
		OK	OK	OK	OK	OK	OK	OK	OK	OK
LFlg	Type	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet
	S	9	9	9	9	8	6	6	6	6
	Areq	2.09	1.69	1.80	2.90	4.68	6.56	4.92	3.69	3.82
	St	9	9	9	9	8	6	6	6	6
	SA	6	6	6	6	6	6	6	6	6
	ΣA	12.73	12.73	12.73	12.73	11.31	8.49	8.49	8.49	8.49
		OK	OK	OK	OK	OK	OK	OK	OK	OK

		G3	G3	G3	G3	G3	G3	G3	G3	G3
		Sec-3	Sec-4	Sec-5	Sec-6	Sec-7	Sec-7	Sec-8	Sec-9	Sec-10
THK	UFlg	16	16	16	16	16	16	16	16	16
	Web	14	14	14	14	14	14	14	14	14
	LFlg	18	20	20	18	12	12	10	12	14
UFlg	Pnt	R	C3_R	C4_L	L	L	C6_L	R	R	P6_R
	Case	max	max	max	max	max	max	min	min	min
	σu	82	85	84	82	70	39	24	68	88
	σua	210	210	210	210	210	210	210	210	210
	τw	17	13	15	18	29	39	49	53	56
	τa	120	120	120	120	120	120	120	120	120
LFlg	Pnt	R	R	L	L	L	C6_L	L	R	P6_R
	Case	max	max	max	max	max	max	max	min	min
	σL	173	172	172	171	170	88	89	148	164
	σLa	210	210	210	210	210	210	210	210	210
	τw	16	8	8	16	23	31	30	41	46
	τa	120	120	120	120	120	120	120	120	120
UFlg	Type	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet
	S	6	6	6	6	6	6	6	6	6
	Areq	2.01	1.53	1.72	2.07	3.34	4.52	5.69	6.22	6.51
	St	6	6	6	6	6	6	6	6	6
	SA	6	6	6	6	6	6	6	6	6
	ΣA	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49
		OK	OK	OK	OK	OK	OK	OK	OK	OK
LFlg	Type	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet
	S	6	7	7	6	6	6	6	6	6
	Areq	2.52	1.22	1.22	2.48	3.57	3.59	3.56	5.74	7.05
	St	6	7	7	6	6	6	6	6	6
	SA	6	6	6	6	6	6	6	6	6
	ΣA	8.49	9.90	9.90	8.49	8.49	8.49	8.49	8.49	8.49
		OK	OK	OK	OK	OK	OK	OK	OK	OK

		G3	G3	G3	G3	G3	G3	G3	G3	G3
		Sec-11	Sec-12	Sec-13	Sec-14	Sec-15	Sec-16	Sec-17	Sec-18	Sec-19
THK	UFlg	16	16	16	16	16	16	16	16	16
	Web	14	14	14	14	14	14	14	14	14
	LFlg	12	10	10	10	10	10	10	14	21
UFlg	Pnt	L	L	L	L	R	R	R	R	R
	Case	min	min	min	max	max	min	min	min	min
	σu	78	43	19	25	22	32	61	100	139
	σua	210	210	210	210	210	210	210	210	210
	τw	40	37	28	19	19	26	34	41	47
	τa	120	120	120	120	120	120	120	120	120
LFlg	Pnt	L	L	R	R	L	R	R	R	R
	Case	min	min	max	max	max	min	min	min	min
	σL	160	102	55	66	66	69	128	181	190
	σLa	210	210	210	210	210	210	210	210	210
	τw	33	28	16	9	9	20	27	34	43
	τa	120	120	120	120	120	120	120	120	120
UFlg	Type	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet
	S	6	6	6	6	6	6	6	6	6
	Areq	4.69	4.31	3.28	2.19	2.16	3.02	3.93	4.85	6.25
	St	6	6	6	6	6	6	6	6	6
	SA	6	6	6	6	6	6	6	6	6
	ΣA	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49
		OK	OK	OK	OK	OK	OK	OK	OK	OK
LFlg	Type	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet
	S	6	6	6	6	6	6	6	6	7
	Areq	4.87	3.34	1.81	1.06	1.06	2.37	3.39	5.87	8.22
	St	6	6	6	6	6	6	6	6	7
	SA	6	6	6	6	6	6	6	6	6
	ΣA	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49	9.90
		OK	OK	OK	OK	OK	OK	OK	OK	OK

		G3	G3	G3	G3	G3	G3	G3	G3	G3
		Sec-20	Sec-21	Sec-22	Sec-23	Sec-23	Sec-24	Sec-25	Sec-26	Sec-27
THK	UFlg	16	16	16	16	16	16	16	16	16
	Web	14	14	14	14	14	14	14	14	14
	LFlg	28	20	12	10	10	16	25	32	36
UFlg	Pnt	P7_L	L	L	L	R	R	R	R	R
	Case	min	min	min	min	max	max	max	max	max
	σu	159	135	83	29	61	109	141	163	165
	σua	210	210	210	210	210	210	210	210	210
	τw	61	59	57	52	45	36	27	20	18
	τa	120	120	120	120	120	120	120	120	120
LFlg	Pnt	P7_L	L	L	D19_R	R	R	R	R	R
	Case	min	min	min	max	max	max	max	max	max
	σL	186	186	150	84	124	183	179	179	176
	σLa	210	210	210	210	210	210	210	210	210
	τw	59	55	47	37	34	30	25	18	17
	τa	120	120	120	120	120	120	120	120	120
UFlg	Type	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet
	S	7	6	6	6	6	6	6	6	6
	Areq	9.02	7.83	6.67	6.11	5.23	4.37	3.60	3.06	2.69
	St	6	6	6	6	6	6	6	6	6
	SA	7	6	6	6	6	6	6	6	6
	ΣA	9.90	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49
		OK	OK	OK	OK	OK	OK	OK	OK	OK
LFlg	Type	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet
	S	8	8	6	6	6	6	8	8	9
	Areq	10.75	9.95	6.58	4.29	4.25	5.30	4.25	3.13	2.87
	St	8	7	6	6	6	6	8	8	9
	SA	8	8	6	6	6	6	6	6	6
	ΣA	11.31	11.31	8.49	8.49	8.49	8.49	11.31	11.31	12.73
		OK	OK	OK	OK	OK	OK	OK	OK	OK

		G3	G3	G3	G3	G3	G3	G4	G4	G4
		Sec-28	Sec-29	Sec-30	Sec-31	Sec-32	Sec-33	Sec-1	Sec-2	Sec-3
THK	UFlg	16	16	16	16	16	16	16	16	16
	Web	14	14	14	14	14	14	15	15	15
	LFlg	36	36	34	27	17	10	14	28	41
UFlg	Pnt	L	C21_L	L	L	L	S2_R	S1_L	R	D3_R
	Case	max	max	max	max	max	max	min	max	max
	σu	165	158	149	125	93	0	0	69	82
	σua	210	210	210	210	210	210	210	210	210
	τw	18	17	22	34	46	60	60	35	23
	τa	120	120	120	120	120	120	120	120	120
LFlg	Pnt	D23_L	C21_L	L	L	L	L	R	R	R
	Case	max	max	max	max	max	max	max	max	max
	σL	177	176	176	178	182	117	140	165	161
	σLa	210	210	210	210	210	210	210	210	210
	τw	15	17	22	31	38	38	31	29	19
	τa	120	120	120	120	120	120	120	120	120
UFlg	Type	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet
	S	6	6	6	6	6	6	6	6	6
	Areq	2.69	2.50	3.10	4.26	5.35	6.99	7.52	4.43	2.92
	St	6	6	6	6	6	6	6	6	6
	SA	6	6	6	6	6	6	6	6	6
	ΣA	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49
		OK	OK	OK	OK	OK	OK	OK	OK	OK
LFlg	Type	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet
	S	9	9	9	8	6	6	6	8	10
	Areq	2.48	2.79	3.57	5.29	6.69	4.76	4.48	4.77	3.07
	St	9	9	9	8	6	6	6	8	10
	SA	6	6	6	6	6	6	6	6	6
	ΣA	12.73	12.73	12.73	11.31	8.49	8.49	8.49	11.31	14.14
		OK	OK	OK	OK	OK	OK	OK	OK	OK

		G4	G4	G4	G4	G4	G4	G4	G4	G4
		Sec-4	Sec-5	Sec-6	Sec-7	Sec-7	Sec-8	Sec-9	Sec-10	Sec-11
THK	UFlg	16	16	16	16	16	16	16	16	16
	Web	15	15	15	15	15	15	17	17	17
	LFlg	45	45	40	26	26	13	15	25	15
UFlg	Pnt	R	C4_R	D5_L	L	C6_L	R	R	P6_R	L
	Case	max	max	max	max	max	min	min	min	min
	σu	88	88	83	69	41	24	76	97	80
	σua	210	210	210	210	210	210	210	210	210
	τw	13	18	23	33	40	54	56	57	45
	τa	120	120	120	120	120	120	120	120	120
LFlg	Pnt	R	L	L	L	C6_R	L	R	P6_R	L
	Case	max	max	max	max	max	max	min	min	min
	σL	160	160	160	164	97	116	180	179	178
	σLa	210	210	210	210	210	210	210	210	210
	τw	9	9	18	26	25	30	38	46	33
	τa	120	120	120	120	120	120	120	120	120
UFlg	Type	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet
	S	6	6	6	6	6	6	6	6	6
	Areq	1.58	2.30	2.85	4.11	5.06	6.79	7.89	8.15	6.32
	St	6	6	6	6	6	6	6	6	6
	SA	6	6	6	6	6	6	6	6	6
	ΣA	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49
		OK	OK	OK	OK	OK	OK	OK	OK	OK
LFlg	Type	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet
	S	10	10	9	8	8	6	6	8	6
	Areq	1.49	1.49	2.80	4.23	3.19	3.97	7.88	9.41	6.68
	St	10	10	9	8	8	6	6	8	6
	SA	6	6	6	6	6	6	6	7	6
	ΣA	14.14	14.14	12.73	11.31	11.31	8.49	8.49	11.31	8.49
		OK	OK	OK	OK	OK	OK	OK	OK	OK

		G4	G4	G4	G4	G4	G4	G4	G4	G4
		Sec-12	Sec-13	Sec-14	Sec-15	Sec-16	Sec-17	Sec-18	Sec-19	Sec-20
THK	UFlg	16	16	16	16	16	16	16	16	16
	Web	15	15	15	15	15	15	15	17	17
	LFlg	10	10	10	10	10	12	24	45	57
UFlg	Pnt	L	L	L	C11_R	R	R	R	R	P7_L
	Case	min	min	max	max	min	min	min	min	min
	σu	44	17	23	26	27	57	101	142	169
	σua	210	210	210	210	210	210	210	210	210
	τw	41	29	18	17	28	39	47	46	57
	τa	120	120	120	120	120	120	120	120	120
LFlg	Pnt	L	R	R	L	R	R	R	R	P7_L
	Case	min	max	max	max	min	min	min	min	min
	σL	124	63	76	76	77	145	186	185	185
	σLa	210	210	210	210	210	210	210	210	210
	τw	27	13	9	9	18	27	38	42	55
	τa	120	120	120	120	120	120	120	120	120
UFlg	Type	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet
	S	6	6	6	6	6	6	6	6	8
	Areq	5.08	3.62	2.26	2.16	3.45	4.84	5.95	7.53	10.76
	St	6	6	6	6	6	6	6	6	6
	SA	6	6	6	6	6	6	6	6	8
	ΣA	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49	11.31
		OK	OK	OK	OK	OK	OK	OK	OK	OK
LFlg	Type	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet
	S	6	6	6	6	6	6	7	10	11
	Areq	3.67	1.66	1.07	1.07	2.30	3.94	7.44	9.20	11.87
	St	6	6	6	6	6	6	7	10	11
	SA	6	6	6	6	6	6	6	7	9
	ΣA	8.49	8.49	8.49	8.49	8.49	8.49	9.90	14.14	15.56
		OK	OK	OK	OK	OK	OK	OK	OK	OK

		G4	G4	G4	G4	G4	G4	G4	G4	G4
		Sec-21	Sec-22	Sec-23	Sec-23	Sec-24	Sec-25	Sec-26	Sec-27	Sec-28
THK	UFlg	16	16	16	16	16	16	16	16	16
	Web	17	15	15	15	15	17	17	17	17
	LFlg	42	21	14	14	27	29	38	42	42
UFlg	Pnt	L	L	L	R	R	R	R	R	D23_L
	Case	min	min	min	max	max	max	max	max	max
	σu	142	89	31	63	105	135	150	159	159
	σua	210	210	210	210	210	255	255	255	255
	τw	55	55	52	42	29	20	15	14	11
	τa	120	120	120	120	120	145	145	145	145
LFlg	Pnt	L	L	D19_R	R	R	R	R	R	D23_L
	Case	min	min	max	max	max	max	max	max	max
	σL	183	153	95	138	174	213	209	207	208
	σLa	210	210	210	210	210	255	255	255	255
	τw	50	44	32	29	24	16	13	13	10
	τa	120	120	120	120	120	145	145	145	145
UFlg	Type	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet
	S	7	6	6	6	6	6	6	6	6
	Areq	9.04	6.82	6.54	5.26	3.75	2.43	1.93	1.80	1.43
	St	6	6	6	6	6	6	6	6	6
	SA	7	6	6	6	6	6	6	6	6
	ΣA	9.90	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49
		OK	OK	OK	OK	OK	OK	OK	OK	OK
LFlg	Type	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet	Fillet
	S	10	7	6	6	8	8	9	10	10
	Areq	10.69	6.79	3.99	4.08	4.12	2.68	2.16	2.07	1.68
	St	10	7	6	6	8	8	9	10	10
	SA	8	6	6	6	6	6	6	6	6
	ΣA	14.14	9.90	8.49	8.49	11.31	11.31	12.73	14.14	14.14
		OK	OK	OK	OK	OK	OK	OK	OK	OK

		G4	G4	G4	G4	G4
		Sec-29	Sec-30	Sec-31	Sec-32	Sec-33
THK	UFlg	16	16	16	16	16
	Web	17	17	17	15	15
	LFlg	42	36	26	23	12
UFlg	Pnt	L	L	L	L	L
	Case	max	max	max	max	max
	σu	157	149	130	99	56
	σua	255	255	255	210	210
	τw	14	20	25	32	43
	τa	145	145	145	120	120
LFlg	Pnt	L	L	L	L	L
	Case	max	max	max	max	max
	σL	206	211	215	176	128
	σLa	255	255	255	210	210
	τw	13	18	21	26	29
	τa	145	145	145	120	120
UFlg	Type	Fillet	Fillet	Fillet	Fillet	Fillet
	S	6	6	6	6	6
	Areq	1.87	2.47	3.00	4.01	5.37
	St	6	6	6	6	6
	SA	6	6	6	6	6
	ΣA	8.49	8.49	8.49	8.49	8.49
		OK	OK	OK	OK	OK
LFlg	Type	Fillet	Fillet	Fillet	Fillet	Fillet
	S	10	9	8	7	6
	Areq	2.13	2.87	3.44	4.53	3.92
	St	10	9	8	7	6
	SA	6	6	6	6	6
	ΣA	14.14	12.73	11.31	9.90	8.49
		OK	OK	OK	OK	OK

４．９．Calculation of rib

Explanation of calculation formula

Required section area of longitudinal rib

$AL\cdot req = b * t / (10*n)$

Required stiffness of longitudinal rib

$IL\cdot req = b * t^3 / 11 * \gamma L\cdot req$

Required stiffness ratio of longitudinal rib and required stiffness of transverse rib

$\alpha \leqq \alpha 0$ and stiffness ratio of transverse rib satisfies $Ic\cdot req$

$\gamma L\cdot req = 4\alpha^2 n*(t0/t)^2 *(1+n*\delta L) - (\alpha^2+1)^2/n \quad (t \geqq t0)$

$= 4\alpha^2 n*(1+n*\delta L) - (\alpha^2+1)^2/n \quad (t < t0)$ ····· (4.2.5)

Where required stiffness ratio of transverse rib is as follows

$Ic\cdot req = (b*t^3/11)*\{ (1+ n*\gamma L\cdot req)/(4*\alpha^3) \}$ ····················· (4.2.6)

2) Except case 1)

$\gamma L\cdot req = [\{2n^2*(t0/t)^2*(1+n*\delta L) - 1\}^2 -1] / n \quad (t \geqq t0)$

$= [\{2n^2*(1+n*\delta L) - 1\}^2 -1] / n \quad (t < t0)$ ······ (4.2.7)

Explanation of codes

t : Thickness of stiffener　　b : Total width of stiffener

a : Interval of transverse ribs　　n : Number of panel to be separated by longitudinal

α : Aspect ratio of stiffener　　$\alpha = a / b$

$\alpha 0$: Limit size ratio in length and width　　$\alpha 0 = \sqrt[4]{(1+n*\gamma L)}$

δL : Section area ratio of one(1) longitudinal rib　　$\delta L = AL / (b*t)$

γL : Stiffness ratio of longitudinal rib　　$\gamma L = IL / (b*t^3/11)$

t0 : Thickness specified in the Table 4.2.6 in ‘Spec. for Highway Bridges Ⅱ’ t0 = b / (k*f*n)

t0 : Thickness specified in the Table 3.2.6 in ‘Spec. for Highway Bridges Ⅱ’ t0 = b / (k*f*n)

Provided, SM400:k=28 SM490:k=24 SM490Y:k=22 SM570:k=22

f : Modification factor by stress grade(is =1) 「in the Table 4.2.4 in ‘Spec. for Highway Bridges Ⅱ’」

AL : Section area of one(1) longitudinal rib

IL : Moment of inertia of one(1) longitudinal rib

Ic : Moment of inertia of one(1) transverse rib

(1) Calculation of longitudinal ribs

1) Main Girder G1 Name of stiffener : LFLG

(a) Dimension of sections

node No.	section No.	node length (mm)	Trans- verse rib nos.	Trans- verse interval (mm)	Longi- tudinal rib nos.	Longi- tudinal height (mm)	Longi- tudinal thickness (mm)	stiffener grade	width b (mm)	thickness t (mm)	thickness t0 (mm)
13	9	4768	1	2384	5	170	17	SM490Y	1500	10	11.4
14	9	4768	1	2384	5	170	17	SM490Y	1500	10	11.4
14	10	4768	1	2384	5	170	17	SM490Y	1500	10	11.4
15	10	4667	1	2334	5	170	17	SM490Y	1500	10	11.4
16	10	4667	1	2334	5	170	17	SM490Y	1500	10	11.4
16	11	4667	1	2334	5	200	22	SM490Y	1500	15	11.4
17	11	4743	1	2371	5	200	22	SM490Y	1500	15	11.4
17	12	4743	1	2371	5	170	17	SM490Y	1500	12	11.4
18	12	4743	1	2371	5	170	17	SM490Y	1500	12	11.4
19	12	4818	1	2409	5	170	17	SM490Y	1500	12	11.4
19	13	4818	1	2409	5	170	17	SM490Y	1500	10	11.4
20	13	4818	1	2409	5	170	17	SM490Y	1500	10	11.4
20	14	4818	1	2409	5	170	17	SM490Y	1500	10	11.4
21	14	4818	1	2409	5	170	17	SM490Y	1500	10	11.4
22	14	4818	1	2409	5	170	17	SM490Y	1500	10	11.4
22	15	4818	1	2409	5	170	17	SM490Y	1500	10	11.4
23	15	4818	1	2409	5	170	17	SM490Y	1500	10	11.4
24	15	4818	1	2409	5	170	17	SM490Y	1500	10	11.4
24	16	4818	1	2409	5	170	17	SM490Y	1500	10	11.4
25	16	4818	1	2409	5	170	17	SM490Y	1500	10	11.4
25	17	4818	1	2409	5	170	17	SM490Y	1500	10	11.4
26	17	4818	1	2409	5	170	17	SM490Y	1500	10	11.4
27	17	4818	1	2409	5	170	17	SM490Y	1500	10	11.4
27	18	4818	1	2409	5	170	17	SM490Y	1500	12	11.4
28	18	4818	1	2409	5	170	17	SM490Y	1500	12	11.4
29	18	4818	1	2409	5	170	17	SM490Y	1500	12	11.4
29	19	4818	1	2409	5	200	22	SM490Y	1500	21	11.4
30	19	4818	1	2409	5	200	22	SM490Y	1500	21	11.4
30	20	4818	1	2409	5	200	22	SM520-H	1500	41	11.4
31	20	4743	1	2371	5	200	22	SM520-H	1500	41	11.4
32	20	4743	1	2371	5	200	22	SM520-H	1500	41	11.4
32	21	4743	1	2371	5	200	22	SM520-H	1500	52	11.4
33	21	4467	1	2233	5	200	22	SM520-H	1500	52	11.4

node No.	section No.	node length (mm)	Trans-verse rib nos.	Trans-verse interval (mm)	Longi-tudinal rib nos.	Longi-tudinal height (mm)	Longi-tudinal thickness (mm)	stiffener grade	width b (mm)	thickness t (mm)	thickness t0 (mm)
33	22	4467	1	2233	5	200	22	SM490Y	1500	38	11.4
34	22	4467	1	2233	5	200	22	SM490Y	1500	38	11.4
35	22	4718	1	2359	5	200	22	SM490Y	1500	38	11.4
35	23	4718	1	2359	5	200	22	SM490Y	1500	19	11.4
36	23	4718	1	2359	5	200	22	SM490Y	1500	19	11.4
36	24	4718	1	2359	5	170	17	SM490Y	1500	15	11.4
37	24	4718	1	2359	5	170	17	SM490Y	1500	15	11.4

（b）Calculation of required stiffness

node No.	section No.	δL	γL	α	α0	γL·req	AL·req (cm^2)	AL	IL·req (cm^4)	IL	Ic·req (cm^4)	Ic
13	9	0.193	204.2	1.589	5.917	128.62	2.5	28.9	1754	2784	656	33018
14	9	0.193	204.2	1.589	5.917	128.62	2.5	28.9	1754	2784	656	33018
14	10	0.193	204.2	1.589	5.917	128.62	2.5	28.9	1754	2784	656	33018
15	10	0.193	204.2	1.556	5.917	123.30	2.5	28.9	1681	2784	671	33018
16	10	0.193	204.2	1.556	5.917	123.30	2.5	28.9	1681	2784	671	33018
16	11	0.196	127.5	1.556	5.261	70.51	3.8	44.0	3245	5867	1296	31709
17	11	0.196	127.5	1.581	5.261	72.78	3.8	44.0	3349	5867	1274	31709
17	12	0.161	118.1	1.581	5.162	103.57	3.0	28.9	2440	2784	928	33018
18	12	0.161	118.1	1.581	5.162	103.57	3.0	28.9	2440	2784	928	33018
19	12	0.161	118.1	1.606	5.162	106.85	3.0	28.9	2518	2784	913	33018
19	13	0.193	204.2	1.606	5.917	131.32	2.5	28.9	1791	2784	649	33018
20	13	0.193	204.2	1.606	5.917	131.32	2.5	28.9	1791	2784	649	33018
20	14	0.193	204.2	1.606	5.917	131.32	2.5	28.9	1791	2784	649	33018
21	14	0.193	204.2	1.606	5.917	131.32	2.5	28.9	1791	2784	649	33018
22	14	0.193	204.2	1.606	5.917	131.32	2.5	28.9	1791	2784	649	33018
22	15	0.193	204.2	1.606	5.917	131.32	2.5	28.9	1791	2784	649	33018
23	15	0.193	204.2	1.606	5.917	131.32	2.5	28.9	1791	2784	649	33018
24	15	0.193	204.2	1.606	5.917	131.32	2.5	28.9	1791	2784	649	33018
24	16	0.193	204.2	1.606	5.917	131.32	2.5	28.9	1791	2784	649	33018
25	16	0.193	204.2	1.606	5.917	131.32	2.5	28.9	1791	2784	649	33018
25	17	0.193	204.2	1.606	5.917	131.32	2.5	28.9	1791	2784	649	33018
26	17	0.193	204.2	1.606	5.917	131.32	2.5	28.9	1791	2784	649	33018
27	17	0.193	204.2	1.606	5.917	131.32	2.5	28.9	1791	2784	649	33018
27	18	0.161	118.1	1.606	5.162	106.85	3.0	28.9	2518	2784	913	33018
28	18	0.161	118.1	1.606	5.162	106.85	3.0	28.9	2518	2784	913	33018
29	18	0.161	118.1	1.606	5.162	106.85	3.0	28.9	2518	2784	913	33018
29	19	0.140	46.5	1.606	4.090	31.18	5.3	44.0	3938	5867	1434	31709
30	19	0.140	46.5	1.606	4.090	31.18	5.3	44.0	3938	5867	1434	31709

node No.	section No.	δL	γL	α	α0	γL·req	AL·req	AL (cm^2)	IL·req	IL (cm^4)	Ic·req	Ic (cm^4)
30	20	0.072	6.2	1.606	2.490	4.66	10.3	44.0	4381	5867	1643	31709
31	20	0.072	6.2	1.581	2.490	4.55	10.3	44.0	4272	5867	1681	31709
32	20	0.072	6.2	1.581	2.490	4.55	10.3	44.0	4272	5867	1681	31709
32	21	0.056	3.1	1.581	2.098	1.79	13.0	44.0	3438	5867	1427	31709
33	21	0.056	3.1	1.489	2.098	1.68	13.0	44.0	3214	5867	1606	31709
33	22	0.077	7.8	1.489	2.633	5.24	9.5	44.0	3919	5867	1837	31709
34	22	0.077	7.8	1.489	2.633	5.24	9.5	44.0	3919	5867	1837	31709
35	22	0.077	7.8	1.573	2.633	5.76	9.5	44.0	4306	5867	1709	31709
35	23	0.154	62.7	1.573	4.407	38.88	4.7	44.0	3637	5867	1409	31709
36	23	0.154	62.7	1.573	4.407	38.88	4.7	44.0	3637	5867	1409	31709
36	24	0.128	60.5	1.573	4.368	58.30	3.8	28.9	2683	2784	1038	33018
37	24	0.128	60.5	1.573	4.368	58.30	3.8	28.9	2683	2784	1038	33018

２）Main Girder G2　Name of stiffener：LFLG

（a）Dimension of sections

node No.	section No.	node length (mm)	Trans-verse rib nos.	Trans-verse interval (mm)	Longi-tudinal rib nos.	Longi-tudinal height (mm)	Longi-tudinal thickness (mm)	stiffener grade	width b (mm)	thickness t (mm)	thickness t0 (mm)
13	9	4757	1	2379	7	170	17	SM490Y	2700	10	15.3
14	9	4757	1	2379	7	170	17	SM490Y	2700	10	15.3
14	10	4757	1	2379	7	170	17	SM490Y	2700	12	15.3
15	10	4657	1	2329	7	170	17	SM490Y	2700	12	15.3
16	10	4657	1	2329	7	170	17	SM490Y	2700	12	15.3
16	11	4657	1	2329	7	170	17	SM490Y	2700	14	15.3
17	11	4732	1	2366	7	170	17	SM490Y	2700	14	15.3
17	12	4732	1	2366	7	170	17	SM490Y	2700	12	15.3
18	12	4732	1	2366	7	170	17	SM490Y	2700	12	15.3
19	12	4807	1	2404	7	170	17	SM490Y	2700	12	15.3
19	13	4807	1	2404	7	170	17	SM490Y	2700	10	15.3
20	13	4807	1	2404	7	170	17	SM490Y	2700	10	15.3
20	14	4807	1	2404	7	170	17	SM490Y	2700	10	15.3
21	14	4807	1	2404	7	170	17	SM490Y	2700	10	15.3
22	14	4807	1	2404	7	170	17	SM490Y	2700	10	15.3
22	15	4807	1	2404	7	170	17	SM490Y	2700	10	15.3
23	15	4807	1	2404	7	170	17	SM490Y	2700	10	15.3
24	15	4807	1	2404	7	170	17	SM490Y	2700	10	15.3
24	16	4807	1	2404	7	170	17	SM490Y	2700	10	15.3
25	16	4807	1	2404	7	170	17	SM490Y	2700	10	15.3

node No.	section No.	node length (mm)	Trans-verse rib nos.	Trans-verse interval (mm)	Longi-tudinal rib nos.	Longi-tudinal height (mm)	Longi-tudinal thickness (mm)	stiffener grade	width b (mm)	thickness t (mm)	thickness t0 (mm)
25	17	4807	1	2404	7	170	17	SM490Y	2700	10	15.3
26	17	4807	1	2404	7	170	17	SM490Y	2700	10	15.3
27	17	4807	1	2404	7	170	17	SM490Y	2700	10	15.3
27	18	4807	1	2404	7	170	17	SM490Y	2700	10	15.3
28	18	4807	1	2404	7	170	17	SM490Y	2700	10	15.3
29	18	4807	1	2404	7	170	17	SM490Y	2700	10	15.3
29	19	4807	1	2404	7	170	17	SM490Y	2700	14	15.3
30	19	4807	1	2404	7	170	17	SM490Y	2700	14	15.3
30	20	4807	1	2404	7	200	22	SM490Y	2700	20	15.3
31	20	4732	1	2366	7	200	22	SM490Y	2700	20	15.3
32	20	4732	1	2366	7	200	22	SM490Y	2700	20	15.3
32	21	4732	1	2366	7	200	22	SM490Y	2700	27	15.3
33	21	4457	1	2228	7	200	22	SM490Y	2700	27	15.3
33	22	4457	1	2228	7	200	22	SM490Y	2700	19	15.3
34	22	4457	1	2228	7	200	22	SM490Y	2700	19	15.3
35	22	4707	1	2354	7	200	22	SM490Y	2700	19	15.3
35	23	4707	1	2354	7	170	17	SM490Y	2700	11	15.3
36	23	4707	1	2354	7	170	17	SM490Y	2700	11	15.3
36	24	4707	1	2354	7	170	17	SM490Y	2700	11	15.3
37	24	4707	1	2354	7	170	17	SM490Y	2700	11	15.3

(b) Calculation of required stiffness

node No.	section No.	δL	γL	α	α0	γL·req	AL·req (cm^2)	AL	IL·req (cm^4)	IL	Ic·req (cm^4)	Ic
13	9	0.107	113.4	0.881	5.490	45.71	3.4	28.9	1122	2784	3291	33018
14	9	0.107	113.4	0.881	5.490	45.71	3.4	28.9	1122	2784	3291	33018
14	10	0.089	65.6	0.881	4.789	42.16	4.1	28.9	1788	2784	5247	33018
15	10	0.089	65.6	0.862	4.789	40.40	4.1	28.9	1714	2784	5360	33018
16	10	0.089	65.6	0.862	4.789	40.40	4.1	28.9	1714	2784	5360	33018
16	11	0.076	41.3	0.862	4.268	37.98	4.7	28.9	2558	2784	8002	33018
17	11	0.076	41.3	0.876	4.268	39.21	4.7	28.9	2641	2784	7874	33018
17	12	0.089	65.6	0.876	4.789	41.72	4.1	28.9	1770	2784	5274	33018
18	12	0.089	65.6	0.876	4.789	41.72	4.1	28.9	1770	2784	5274	33018
19	12	0.089	65.6	0.890	4.789	43.05	4.1	28.9	1826	2784	5192	33018
19	13	0.107	113.4	0.890	5.490	46.67	3.4	28.9	1146	2784	3256	33018
20	13	0.107	113.4	0.890	5.490	46.67	3.4	28.9	1146	2784	3256	33018
20	14	0.107	113.4	0.890	5.490	46.67	3.4	28.9	1146	2784	3256	33018
21	14	0.107	113.4	0.890	5.490	46.67	3.4	28.9	1146	2784	3256	33018
22	14	0.107	113.4	0.890	5.490	46.67	3.4	28.9	1146	2784	3256	33018

node No.	section No.	δL	γL	α	α0	γL·req	AL·req (cm²)	AL (cm²)	IL·req (cm⁴)	IL (cm⁴)	Ic·req (cm⁴)	Ic (cm⁴)
22	15	0.107	113.4	0.890	5.490	46.67	3.4	28.9	1146	2784	3256	33018
23	15	0.107	113.4	0.890	5.490	46.67	3.4	28.9	1146	2784	3256	33018
24	15	0.107	113.4	0.890	5.490	46.67	3.4	28.9	1146	2784	3256	33018
24	16	0.107	113.4	0.890	5.490	46.67	3.4	28.9	1146	2784	3256	33018
25	16	0.107	113.4	0.890	5.490	46.67	3.4	28.9	1146	2784	3256	33018
25	17	0.107	113.4	0.890	5.490	46.67	3.4	28.9	1146	2784	3256	33018
26	17	0.107	113.4	0.890	5.490	46.67	3.4	28.9	1146	2784	3256	33018
27	17	0.107	113.4	0.890	5.490	46.67	3.4	28.9	1146	2784	3256	33018
27	18	0.107	113.4	0.890	5.490	46.67	3.4	28.9	1146	2784	3256	33018
28	18	0.107	113.4	0.890	5.490	46.67	3.4	28.9	1146	2784	3256	33018
29	18	0.107	113.4	0.890	5.490	46.67	3.4	28.9	1146	2784	3256	33018
29	19	0.076	41.3	0.890	4.268	40.47	4.7	28.9	2726	2784	7751	33018
30	19	0.076	41.3	0.890	4.268	40.47	4.7	28.9	2726	2784	7751	33018
30	20	0.081	29.9	0.890	3.936	24.25	6.8	44.0	4761	5867	13566	31709
31	20	0.081	29.9	0.876	3.936	23.49	6.8	44.0	4613	5867	13782	31709
32	20	0.081	29.9	0.876	3.936	23.49	6.8	44.0	4613	5867	13782	31709
32	21	0.060	12.1	0.876	3.148	11.37	9.1	44.0	5495	5867	16509	31709
33	21	0.060	12.1	0.825	3.148	10.08	9.1	44.0	4871	5867	17542	31709
33	22	0.086	34.8	0.825	4.090	23.61	6.4	44.0	3975	5867	14214	31709
34	22	0.086	34.8	0.825	4.090	23.61	6.4	44.0	3975	5867	14214	31709
35	22	0.086	34.8	0.872	4.090	26.34	6.4	44.0	4434	5867	13455	31709
35	23	0.097	85.2	0.872	5.112	42.85	3.7	28.9	1400	2784	4240	33018
36	23	0.097	85.2	0.872	5.112	42.86	3.7	28.9	1400	2784	4240	33018
36	24	0.097	85.2	0.872	5.112	42.86	3.7	28.9	1400	2784	4240	33018
37	24	0.097	85.2	0.872	5.112	42.86	3.7	28.9	1400	2784	4240	33018

３）Main Girder G3　Name of stiffener：LFLG

（a）Dimension of sections

node No.	section No.	node length (mm)	Trans-verse rib nos.	Trans-verse interval (mm)	Longi-tudinal rib nos.	Longi-tudinal height (mm)	Longi-tudinal thickness (mm)	stiffener grade	width b (mm)	thickness t (mm)	thickness t0 (mm)
13	9	4743	1	2372	7	170	17	SM490Y	2700	10	15.3
14	9	4743	1	2372	7	170	17	SM490Y	2700	10	15.3
14	10	4743	1	2372	7	170	17	SM490Y	2700	12	15.3
15	10	4643	1	2322	7	170	17	SM490Y	2700	12	15.3
16	10	4643	1	2322	7	170	17	SM490Y	2700	12	15.3
16	11	4643	1	2322	7	200	22	SM490Y	2700	14	15.3
17	11	4718	1	2359	7	200	22	SM490Y	2700	14	15.3

node No.	section No.	node length (mm)	Trans-verse rib nos.	Trans-verse interval (mm)	Longi-tudinal rib nos.	Longi-tudinal height (mm)	Longi-tudinal thickness (mm)	stiffener grade	width b (mm)	thickness t (mm)	thickness t0 (mm)
17	12	4718	1	2359	7	170	17	SM490Y	2700	12	15.3
18	12	4718	1	2359	7	170	17	SM490Y	2700	12	15.3
19	12	4793	1	2396	7	170	17	SM490Y	2700	12	15.3
19	13	4793	1	2396	7	170	17	SM490Y	2700	10	15.3
20	13	4793	1	2396	7	170	17	SM490Y	2700	10	15.3
20	14	4793	1	2396	7	170	17	SM490Y	2700	10	15.3
21	14	4793	1	2396	7	170	17	SM490Y	2700	10	15.3
22	14	4793	1	2396	7	170	17	SM490Y	2700	10	15.3
22	15	4793	1	2396	7	170	17	SM490Y	2700	10	15.3
23	15	4793	1	2396	7	170	17	SM490Y	2700	10	15.3
24	15	4793	1	2396	7	170	17	SM490Y	2700	10	15.3
24	16	4793	1	2396	7	170	17	SM490Y	2700	10	15.3
25	16	4793	1	2396	7	170	17	SM490Y	2700	10	15.3
25	17	4793	1	2396	7	170	17	SM490Y	2700	10	15.3
26	17	4793	1	2396	7	170	17	SM490Y	2700	10	15.3
27	17	4793	1	2396	7	170	17	SM490Y	2700	10	15.3
27	18	4793	1	2396	7	170	17	SM490Y	2700	10	15.3
28	18	4793	1	2396	7	170	17	SM490Y	2700	10	15.3
29	18	4793	1	2396	7	170	17	SM490Y	2700	10	15.3
29	19	4793	1	2396	7	170	17	SM490Y	2700	14	15.3
30	19	4793	1	2396	7	170	17	SM490Y	2700	14	15.3
30	20	4793	1	2396	7	200	22	SM490Y	2700	21	15.3
31	20	4718	1	2359	7	200	22	SM490Y	2700	21	15.3
32	20	4718	1	2359	7	200	22	SM490Y	2700	21	15.3
32	21	4718	1	2359	7	200	22	SM490Y	2700	28	15.3
33	21	4443	1	2222	7	200	22	SM490Y	2700	28	15.3
33	22	4443	1	2222	7	200	22	SM490Y	2700	20	15.3
34	22	4443	1	2222	7	200	22	SM490Y	2700	20	15.3
35	22	4693	1	2347	7	200	22	SM490Y	2700	20	15.3
35	23	4693	1	2347	7	170	17	SM490Y	2700	12	15.3
36	23	4693	1	2347	7	170	17	SM490Y	2700	12	15.3
36	24	4693	1	2347	7	170	17	SM490Y	2700	10	15.3
37	24	4693	1	2347	7	170	17	SM490Y	2700	10	15.3

(b) Calculation of required stiffness

node No.	section No.	δL	γL	α	$\alpha 0$	γL·req	AL·req (cm^2)	AL (cm^2)	IL·req (cm^4)	IL (cm^4)	Ic·req (cm^4)	Ic (cm^4)
13	9	0.107	113.4	0.878	5.490	45.43	3.4	28.9	1115	2784	3301	33018
14	9	0.107	113.4	0.878	5.490	45.43	3.4	28.9	1115	2784	3301	33018

node No.	section No.	δL	γL	α	α0	γL·req	AL·req	AL	IL·req	IL	Ic·req	Ic
							(cm^2)		(cm^4)		(cm^4)	
14	10	0.089	65.6	0.878	4.789	41.91	4.1	28.9	1778	2784	5262	33018
15	10	0.089	65.6	0.860	4.789	40.16	4.1	28.9	1703	2784	5376	33018
16	10	0.089	65.6	0.860	4.789	40.16	4.1	28.9	1703	2784	5376	33018
16	11	0.116	87.1	0.860	5.140	45.31	4.7	44.0	3052	5867	9628	31709
17	11	0.116	87.1	0.874	5.140	46.79	4.7	44.0	3151	5867	9475	31709
17	12	0.089	65.6	0.874	4.789	41.47	4.1	28.9	1759	2784	5290	33018
18	12	0.089	65.6	0.874	4.789	41.47	4.1	28.9	1759	2784	5290	33018
19	12	0.089	65.6	0.888	4.789	42.80	4.1	28.9	1815	2784	5208	33018
19	13	0.107	113.4	0.888	5.490	46.39	3.4	28.9	1139	2784	3266	33018
20	13	0.107	113.4	0.888	5.490	46.39	3.4	28.9	1139	2784	3266	33018
20	14	0.107	113.4	0.888	5.490	46.39	3.4	28.9	1139	2784	3266	33018
21	14	0.107	113.4	0.888	5.490	46.39	3.4	28.9	1139	2784	3266	33018
22	14	0.107	113.4	0.888	5.490	46.39	3.4	28.9	1139	2784	3266	33018
22	15	0.107	113.4	0.888	5.490	46.39	3.4	28.9	1139	2784	3266	33018
23	15	0.107	113.4	0.888	5.490	46.39	3.4	28.9	1139	2784	3266	33018
24	15	0.107	113.4	0.888	5.490	46.39	3.4	28.9	1139	2784	3266	33018
24	16	0.107	113.4	0.888	5.490	46.39	3.4	28.9	1139	2784	3266	33018
25	16	0.107	113.4	0.888	5.490	46.39	3.4	28.9	1139	2784	3266	33018
25	17	0.107	113.4	0.888	5.490	46.39	3.4	28.9	1139	2784	3266	33018
26	17	0.107	113.4	0.888	5.490	46.39	3.4	28.9	1139	2784	3266	33018
27	17	0.107	113.4	0.888	5.490	46.39	3.4	28.9	1139	2784	3266	33018
27	18	0.107	113.4	0.888	5.490	46.39	3.4	28.9	1139	2784	3266	33018
28	18	0.107	113.4	0.888	5.490	46.39	3.4	28.9	1139	2784	3266	33018
29	18	0.107	113.4	0.888	5.490	46.39	3.4	28.9	1139	2784	3266	33018
29	19	0.076	41.3	0.888	4.268	40.23	4.7	28.9	2709	2784	7774	33018
30	19	0.076	41.3	0.888	4.268	40.23	4.7	28.9	2709	2784	7774	33018
30	20	0.078	25.8	0.888	3.795	21.40	7.1	44.0	4866	5867	13999	31709
31	20	0.078	25.8	0.874	3.795	20.74	7.1	44.0	4715	5867	14223	31709
32	20	0.078	25.8	0.874	3.795	20.74	7.1	44.0	4715	5867	14223	31709
32	21	0.058	10.9	0.874	3.064	10.36	9.4	44.0	5581	5867	16939	31709
33	21	0.058	10.9	0.823	3.064	9.18	9.4	44.0	4947	5867	17999	31709
33	22	0.081	29.9	0.823	3.936	20.71	6.8	44.0	4066	5867	14684	31709
34	22	0.081	29.9	0.823	3.936	20.71	6.8	44.0	4066	5867	14684	31709
35	22	0.081	29.9	0.869	3.936	23.10	6.8	44.0	4537	5867	13898	31709
35	23	0.089	65.6	0.869	4.789	41.03	4.1	28.9	1740	2784	5319	33018
36	23	0.089	65.6	0.869	4.789	41.03	4.1	28.9	1740	2784	5319	33018
36	24	0.107	113.4	0.869	5.490	44.48	3.4	28.9	1092	2784	3336	33018
37	24	0.107	113.4	0.869	5.490	44.48	3.4	28.9	1092	2784	3336	33018

４）Main Girder G4　 Name of stiffener：LFLG

（ａ）Dimension of sections

node No.	section No.	node length (mm)	Trans-verse rib nos.	Trans-verse interval (mm)	Longi-tudinal rib nos.	Longi-tudinal height (mm)	Longi-tudinal thickness (mm)	stiffener grade	width b (mm)	thickness t (mm)	thickness t0 (mm)
1	1	4694	1	2347	2	170	17	SM490Y	1500	14	22.7
13	9	4721	1	2361	5	170	17	SM490Y	1500	13	11.4
14	9	4721	1	2361	5	170	17	SM490Y	1500	13	11.4
14	10	4721	1	2361	5	170	17	SM490Y	1500	15	11.4
15	10	4622	1	2311	5	170	17	SM490Y	1500	15	11.4
16	10	4591	1	2296	5	170	17	SM490Y	1500	15	11.4
16	11	4591	1	2296	5	200	22	SM490Y	1500	25	11.4
17	11	4727	1	2363	5	200	22	SM490Y	1500	25	11.4
17	12	4727	1	2363	5	200	22	SM490Y	1500	15	11.4
18	12	4696	1	2348	5	200	22	SM490Y	1500	15	11.4
19	12	4771	1	2385	5	200	22	SM490Y	1500	15	11.4
19	13	4771	1	2385	5	170	17	SM490Y	1500	10	11.4
20	13	4771	1	2385	5	170	17	SM490Y	1500	10	11.4
20	14	4771	1	2385	5	170	17	SM490Y	1500	10	11.4
21	14	4771	1	2385	5	170	17	SM490Y	1500	10	11.4
22	14	4771	1	2385	5	170	17	SM490Y	1500	10	11.4
22	15	4771	1	2385	5	170	17	SM490Y	1500	10	11.4
23	15	4771	1	2385	5	170	17	SM490Y	1500	10	11.4
24	15	4771	1	2385	5	170	17	SM490Y	1500	10	11.4
24	16	4771	1	2385	5	170	17	SM490Y	1500	10	11.4
25	16	4772	1	2386	5	170	17	SM490Y	1500	10	11.4
25	17	4772	1	2386	5	170	17	SM490Y	1500	10	11.4
26	17	4887	1	2443	5	170	17	SM490Y	1500	10	11.4
27	17	4787	1	2394	5	170	17	SM490Y	1500	10	11.4
27	18	4787	1	2394	5	170	17	SM490Y	1500	12	11.4
28	18	4788	1	2394	5	170	17	SM490Y	1500	12	11.4
29	18	4789	1	2395	5	170	17	SM490Y	1500	12	11.4
29	19	4789	1	2395	5	200	22	SM490Y	1500	24	11.4
30	19	4790	1	2395	5	200	22	SM490Y	1500	24	11.4
30	20	4790	1	2395	5	200	22	SM520-H	1500	45	11.4
31	20	4716	1	2358	5	200	22	SM520-H	1500	45	11.4
32	20	4608	1	2304	5	200	22	SM520-H	1500	45	11.4
32	21	4608	1	2304	5	200	22	SM520-H	1500	57	11.4
33	21	4552	1	2276	5	200	22	SM520-H	1500	57	11.4

node No.	section No.	node length (mm)	Trans-verse rib nos.	Trans-verse interval (mm)	Longi-tudinal rib nos.	Longi-tudinal height (mm)	Longi-tudinal thickness (mm)	stiffener grade	width b (mm)	thickness t (mm)	thickness t0 (mm)
33	22	4552	1	2276	5	200	22	SM520-H	1500	42	11.4
34	22	4444	1	2222	5	200	22	SM520-H	1500	42	11.4
35	22	4694	1	2347	5	200	22	SM520-H	1500	42	11.4
35	23	4694	1	2347	5	200	22	SM490Y	1500	21	11.4
36	23	4577	1	2289	5	200	22	SM490Y	1500	21	11.4
36	24	4577	1	2289	5	170	17	SM490Y	1500	14	11.4
37	24	4682	1	2341	5	170	17	SM490Y	1500	14	11.4

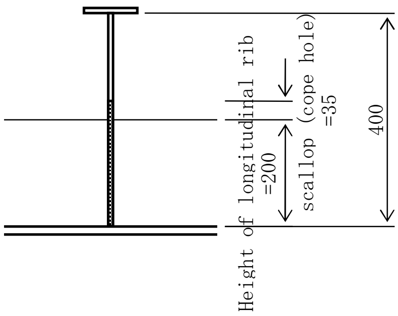
(b) Calculation of required stiffness

node No.	section No.	δL	γL	α	α0	γL·req	AL·req (cm^2)	AL (cm^2)	IL·req (cm^4)	IL (cm^4)	Ic·req (cm^4)	Ic (cm^4)
1	1	0.138	74.4	1.565	3.870	37.55	7.0	28.9	1405	2784	277	33018
13	9	0.148	92.9	1.574	4.861	83.78	3.3	28.9	2510	2784	968	33018
14	9	0.148	92.9	1.574	4.861	83.78	3.3	28.9	2510	2784	968	33018
14	10	0.128	60.5	1.574	4.368	58.38	3.8	28.9	2687	2784	1037	33018
15	10	0.128	60.5	1.541	4.368	55.99	3.8	28.9	2577	2784	1060	33018
16	10	0.128	60.5	1.530	4.368	55.26	3.8	28.9	2543	2784	1068	33018
16	11	0.117	27.5	1.530	3.591	17.93	6.3	44.0	3820	5867	1613	31709
17	11	0.117	27.5	1.576	3.591	18.95	6.3	44.0	4038	5867	1562	31709
17	12	0.196	127.5	1.576	5.261	72.29	3.8	44.0	3327	5867	1279	31709
18	12	0.196	127.5	1.565	5.261	71.37	3.8	44.0	3285	5867	1287	31709
19	12	0.196	127.5	1.590	5.261	73.62	3.8	44.0	3388	5867	1267	31709
19	13	0.193	204.2	1.590	5.917	128.77	2.5	28.9	1756	2784	656	33018
20	13	0.193	204.2	1.590	5.917	128.77	2.5	28.9	1756	2784	656	33018
20	14	0.193	204.2	1.590	5.917	128.77	2.5	28.9	1756	2784	656	33018
21	14	0.193	204.2	1.590	5.917	128.77	2.5	28.9	1756	2784	656	33018
22	14	0.193	204.2	1.590	5.917	128.77	2.5	28.9	1756	2784	656	33018
22	15	0.193	204.2	1.590	5.917	128.77	2.5	28.9	1756	2784	656	33018
23	15	0.193	204.2	1.590	5.917	128.77	2.5	28.9	1756	2784	656	33018
24	15	0.193	204.2	1.590	5.917	128.77	2.5	28.9	1756	2784	656	33018
24	16	0.193	204.2	1.590	5.917	128.77	2.5	28.9	1756	2784	656	33018
25	16	0.193	204.2	1.591	5.917	128.86	2.5	28.9	1757	2784	656	33018
25	17	0.193	204.2	1.591	5.917	128.86	2.5	28.9	1757	2784	656	33018
26	17	0.193	204.2	1.629	5.917	135.07	2.5	28.9	1842	2784	640	33018
27	17	0.193	204.2	1.596	5.917	129.67	2.5	28.9	1768	2784	654	33018
27	18	0.161	118.1	1.596	5.162	105.51	3.0	28.9	2486	2784	919	33018
28	18	0.161	118.1	1.596	5.162	105.54	3.0	28.9	2487	2784	919	33018
29	18	0.161	118.1	1.596	5.162	105.59	3.0	28.9	2488	2784	919	33018

node No.	section No.	δL	γL	α	α0	γL·req	AL·req	AL (cm²)	IL·req	IL (cm⁴)	Ic·req	Ic (cm⁴)
29	19	0.122	31.1	1.596	3.702	21.67	6.0	44.0	4085	5867	1518	31709
30	19	0.122	31.1	1.597	3.702	21.68	6.0	44.0	4086	5867	1517	31709
30	20	0.065	4.7	1.597	2.327	3.33	11.3	44.0	4135	5867	1600	31709
31	20	0.065	4.7	1.572	2.327	3.25	11.3	44.0	4042	5867	1641	31709
32	20	0.065	4.7	1.536	2.327	3.14	11.3	44.0	3905	5867	1702	31709
32	21	0.051	2.3	1.536	1.966	1.06	14.3	44.0	2688	5867	1287	31709
33	21	0.051	2.3	1.517	1.966	1.06	14.3	44.0	2668	5867	1327	31709
33	22	0.070	5.8	1.517	2.447	3.92	10.5	44.0	3962	5867	1774	31709
34	22	0.070	5.8	1.481	2.447	3.77	10.5	44.0	3808	5867	1836	31709
35	22	0.070	5.8	1.565	2.447	4.12	10.5	44.0	4164	5867	1697	31709
35	23	0.140	46.5	1.565	4.090	29.64	5.3	44.0	3743	5867	1474	31709
36	23	0.140	46.5	1.526	4.090	28.22	5.3	44.0	3564	5867	1514	31709
36	24	0.138	74.4	1.526	4.599	65.36	3.5	28.9	2445	2784	1035	33018
37	24	0.138	74.4	1.561	4.599	68.36	3.5	28.9	2558	2784	1012	33018

（２） Calculation of transverse ribs

Section of transverse rib



				Ag(cm²)	I(cm⁴)
1-WEB	PL	400* 9 (SM400)	=	36.00	19200
1-FLG	PL	100*10 (SM400)	=	10.00	16403
			ΣAg =	46.00 cm^2	35603 cm^4

$Ic = 35603 - 0.9 * (20.0 + 3.5)^3 / 3 = 31709\ cm^4 \geqq Ic\cdot req = 17999\ cm^4$

４．１０． Calculation of stiffener

（１）Description of the formula

Check of spacing of vertical stiffeners

It will be confirmed that K1 and K2 shall satisfy the below formula.

$K1 = a/b \leqq 1.5$

1) In case no horizontal stiffeners are used

$K2 = [b/(100*t)]^4 * [(\sigma/345)^2 + \{\tau/(77+58*(b/a)^2)\}^2] \leqq 1$: $(a/b > 1)$

$K2 = [b/(100*t)]^4 * [(\sigma/345)^2 + \{\tau/(58+77*(b/a)^2)\}^2] \leqq 1$: $(a/b \leqq 1)$

2) In case one rung of stiffener is used

$K2 = [b/(100*t)]^4 * [(\sigma/900)^2 + \{\tau/(120+58*(b/a)^2)\}^2] \leqq 1$: $(a/b > 0.80)$

$K2 = [b/(100*t)]^4 * [(\sigma/900)^2 + \{\tau/(90+77*(b/a)^2)\}^2] \leqq 1$: $(a/b \leqq 0.80)$

2) In case two rungs of stiffener are used

$K2 = [b/(100*t)]^4 * [(\sigma/3000)^2 + \{\tau/(187+58*(b/a)^2)\}^2] \leqq 1$: $(a/b > 0.64)$

$K2 = [b/(100*t)]^4 * [(\sigma/3000)^2 + \{\tau/(140+77*(b/a)^2)\}^2] \leqq 1$: $(a/b \leqq 0.64)$

Required stiffness of vertical stiffener

$Iv\cdot req = b * t^3 / 11 * \gamma v\cdot req$ $\quad\quad$ $\gamma v\cdot req = 8.0 * (b/a)^2$

Minimum width : b/30 + 50 (mm)

Minimum thickness : 1/13 of width of the stiffener

Required stiffness of horizontal stiffener

$Ih\cdot req = b * t^3 / 11 * \gamma h\cdot req$ $\quad\quad$ $\gamma h\cdot req = 30 * (a/b)$

Definition of the symbol

a : Spacing between vertical stiffeners

b : Width of web

t : Thickness of web

σ : Edge compressive stress of web

τ : Shear stress of web

（２）Section of stiffeners

＊Section of vertical stiffeners

Section code：VStfNo = 1
1-PL 190 * 15
$Iv = 1.5 * 19.0^3 / 3 = 3429\ cm^4 \geqq 3392\ cm^4$

Section code：VStfNo = 2
1-PL 240 * 19
$Iv = 1.9 * 24.0^3 / 3 = 8755\ cm^4 \geqq 8337\ cm^4$

＊Section of horizontal stiffeners

Section code：HStfNo = 1
1-PL 140 * 11
$Ih = 1.1 * 14.0^3 / 3 = 1006\ cm^4 \geqq 955\ cm^4$

Section code：HStfNo = 2
1-PL 160 * 17
$Ih = 1.7 * 16.0^3 / 3 = 2321\ cm^4 \geqq 2251\ cm^4$

（３）Check of spacing and calculation of required stiffness

１）Main girder G1　　Web name：LWEB

（ａ）Check of section and web thickness

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm²)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
1	1	4675	3	1170	1	0	48	SM490Y	3062	15	14.7
1	1	4675	3	1168	1	-31	41	SM490Y	3062	15	14.7
2	1	4671	3	1168	1	-31	41	SM490Y	3062	15	14.7
2	1	4671	3	1168	1	-46	37	SM490Y	3062	15	14.7
2	2	4671	3	1168	1	-44	36	SM490Y	3062	15	14.7
2	2	4671	3	1168	1	-52	33	SM490Y	3062	15	14.7
3	2	4771	3	1193	1	-52	36	SM490Y	3062	15	14.7
3	2	4771	3	1193	1	-73	30	SM490Y	3062	15	14.7
4	2	4771	3	1193	1	-73	30	SM490Y	3062	15	14.7
4	2	4771	3	1193	1	-79	28	SM490Y	3062	15	14.7
4	3	4771	3	1193	1	-75	27	SM490Y	3062	15	14.7
4	3	4771	3	1193	1	-83	24	SM490Y	3062	15	14.7
5	3	4771	3	1193	1	-83	24	SM490Y	3062	15	14.7
5	3	4771	3	1193	1	-93	18	SM490Y	3062	15	14.7
6	3	4771	3	1193	1	-93	17	SM490Y	3062	15	14.7
6	3	4771	3	1193	1	-94	17	SM490Y	3062	15	14.7
6	4	4771	3	1193	1	-93	16	SM490Y	3062	15	14.7
6	4	4771	3	1193	1	-97	12	SM490Y	3062	15	14.7
7	4	4771	3	1193	1	-97	13	SM490Y	3062	15	14.7
7	4	4771	3	1193	1	-99	9	SM490Y	3062	15	14.7
7	4	4771	3	1193	1	-99	9	SM490Y	3062	15	14.7
7	5	4771	3	1193	1	-99	9	SM490Y	3062	15	14.7
7	5	4771	3	1193	1	-99	9	SM490Y	3062	15	14.7
8	5	4771	3	1193	1	-99	9	SM490Y	3062	15	14.7
8	5	4771	3	1193	1	-95	15	SM490Y	3062	15	14.7
9	5	4771	3	1193	1	-95	13	SM490Y	3062	15	14.7
9	5	4771	3	1193	1	-92	17	SM490Y	3062	15	14.7
9	6	4771	3	1193	1	-93	17	SM490Y	3062	15	14.7
9	6	4771	3	1193	1	-90	19	SM490Y	3062	15	14.7
10	6	4771	3	1193	1	-90	19	SM490Y	3062	15	14.7
10	6	4771	3	1193	1	-78	25	SM490Y	3062	15	14.7
11	6	4771	3	1193	1	-78	24	SM490Y	3062	15	14.7
11	6	4771	3	1193	1	-72	26	SM490Y	3062	15	14.7
11	7	4771	3	1193	1	-76	27	SM490Y	3062	15	14.7
11	7	4771	3	1193	1	-65	30	SM490Y	3062	15	14.7
12	7	4771	3	1193	1	-65	30	SM490Y	3062	15	14.7
12	7	4771	3	1193	1	-43	37	SM490Y	3062	15	14.7

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm^2)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
13	8	4771	3	1193	1	-42	33	SM490Y	3062	15	14.7
13	8	4771	3	1193	1	-39	34	SM490Y	3062	15	14.7
13	9	4771	3	1193	1	-41	34	SM490Y	3062	15	14.7
13	9	4771	3	1193	1	-20	40	SM490Y	3062	15	14.7
14	9	4771	3	1193	1	-20	40	SM490Y	3062	15	14.7
14	9	4771	3	1193	1	-63	45	SM490Y	3062	15	14.7
14	10	4771	3	1193	1	-59	40	SM490Y	3062	17	14.7
14	10	4771	3	1193	1	-68	41	SM490Y	3062	17	14.7
15	10	4671	3	1168	1	-68	40	SM490Y	3062	17	14.7
15	10	4671	3	1168	1	-140	45	SM490Y	3062	17	14.7
16	10	4671	3	1168	1	-140	45	SM490Y	3062	17	14.7
16	10	4671	3	1168	1	-172	47	SM490Y	3062	17	14.7
16	11	4671	3	1168	1	-139	46	SM490Y	3062	17	14.7
16	11	4671	3	1168	1	-186	49	SM490Y	3062	17	14.7
17	11	4746	3	1187	1	-186	41	SM490Y	3062	17	14.7
17	11	4746	3	1187	1	-148	38	SM490Y	3062	17	14.7
17	12	4746	3	1187	1	-174	38	SM490Y	3062	17	14.7
17	12	4746	3	1187	1	-150	36	SM490Y	3062	17	14.7
18	12	4746	3	1187	1	-150	36	SM490Y	3062	17	14.7
18	12	4746	3	1187	1	-98	30	SM490Y	3062	17	14.7
19	12	4822	3	1205	1	-98	30	SM490Y	3062	17	14.7
19	12	4822	3	1205	1	-92	29	SM490Y	3062	17	14.7
19	13	4822	3	1205	1	-103	33	SM490Y	3062	15	14.7
19	13	4822	3	1205	1	-68	27	SM490Y	3062	15	14.7
20	13	4822	3	1205	1	-68	27	SM490Y	3062	15	14.7
20	13	4822	3	1205	1	-42	22	SM490Y	3062	15	14.7
20	14	4822	3	1205	1	-42	22	SM490Y	3062	15	14.7
20	14	4822	3	1205	1	-40	21	SM490Y	3062	15	14.7
21	14	4822	3	1205	1	-40	24	SM490Y	3062	15	14.7
21	14	4822	3	1205	1	-22	18	SM490Y	3062	15	14.7
22	14	4822	3	1205	1	-22	18	SM490Y	3062	15	14.7
22	14	4822	3	1205	1	-23	14	SM490Y	3062	15	14.7
22	15	4822	3	1205	1	-23	14	SM490Y	3062	15	14.7
22	15	4822	3	1205	1	-25	12	SM490Y	3062	15	14.7
23	15	4822	3	1205	1	-25	16	SM490Y	3062	15	14.7
23	15	4822	3	1205	1	-28	10	SM490Y	3062	15	14.7
24	15	4822	3	1205	1	-28	10	SM490Y	3062	15	14.7
24	15	4822	3	1205	1	-28	10	SM490Y	3062	15	14.7
24	15	4822	3	1205	1	-28	10	SM490Y	3062	15	14.7
24	16	4822	3	1205	1	-28	10	SM490Y	3062	15	14.7
24	16	4822	3	1205	1	-26	16	SM490Y	3062	15	14.7

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm²)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
25	16	4822	3	1205	1	-26	11	SM490Y	3062	15	14.7
25	16	4822	3	1205	1	-34	17	SM490Y	3062	15	14.7
25	17	4822	3	1205	1	-34	17	SM490Y	3062	15	14.7
25	17	4822	3	1205	1	-36	17	SM490Y	3062	15	14.7
26	17	4822	3	1205	1	-36	17	SM490Y	3062	15	14.7
26	17	4822	3	1205	1	-61	24	SM490Y	3062	15	14.7
27	17	4822	3	1205	1	-61	22	SM490Y	3062	15	14.7
27	17	4822	3	1205	1	-72	24	SM490Y	3062	15	14.7
27	18	4822	3	1205	1	-68	24	SM490Y	3062	15	14.7
27	18	4822	3	1205	1	-90	27	SM490Y	3062	15	14.7
28	18	4822	3	1205	1	-90	27	SM490Y	3062	15	14.7
28	18	4822	3	1205	1	-131	34	SM490Y	3062	15	14.7
29	18	4822	3	1205	1	-131	35	SM490Y	3062	15	14.7
29	18	4822	3	1205	1	-137	36	SM490Y	3062	15	14.7
29	19	4822	3	1205	1	-100	35	SM490Y	3062	15	14.7
29	19	4822	3	1205	1	-143	40	SM490Y	3062	15	14.7
30	19	4822	3	1205	1	-143	40	SM490Y	3062	15	14.7
30	19	4822	3	1205	1	-187	45	SM490Y	3062	15	14.7
30	20	4822	3	1205	1	-127	39	SM490Y	3062	17	14.7
30	20	4822	3	1205	1	-131	40	SM490Y	3062	17	14.7
31	20	4746	3	1187	1	-131	41	SM490Y	3062	17	14.7
31	20	4746	3	1187	1	-172	46	SM490Y	3062	17	14.7
32	20	4746	3	757	1	-172	46	SM490Y	3062	17	14.7
32	20	4746	3	1617	1	-186	48	SM490Y	3062	17	14.7
32	21	4746	3	1617	1	-159	48	SM490Y	3062	17	14.7
32	21	4746	3	1187	1	-187	51	SM490Y	3062	17	14.7
33	21	4470	3	1118	1	-187	62	SM490Y	3062	17	14.7
33	21	4470	3	1478	1	-152	59	SM490Y	3062	17	14.7
33	22	4470	3	1478	1	-185	60	SM490Y	3062	17	14.7
33	22	4470	3	758	1	-165	58	SM490Y	3062	17	14.7
34	22	4470	3	1118	1	-165	58	SM490Y	3062	17	14.7
34	22	4470	3	1118	1	-109	54	SM490Y	3062	17	14.7
35	22	4721	3	1180	1	-109	54	SM490Y	3062	17	14.7
35	22	4721	3	1180	1	-102	53	SM490Y	3062	17	14.7
35	23	4721	3	1180	1	-150	62	SM490Y	3062	15	14.7
35	23	4721	3	1180	1	-86	57	SM490Y	3062	15	14.7
36	23	4721	3	1180	1	-86	57	SM490Y	3062	15	14.7
36	23	4721	3	1180	1	-45	54	SM490Y	3062	15	14.7
36	24	4721	3	1180	1	-53	55	SM490Y	3062	15	14.7
36	24	4721	3	1180	1	-26	53	SM490Y	3062	15	14.7
37	24	4721	3	1180	1	-26	53	SM490Y	3062	15	14.7
37	24	4721	3	1180	1	-49	47	SM490Y	3062	15	14.7

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm²)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
38	25	4721	3	1180	1	-51	48	SM490Y	3062	15	14.7
38	25	4721	3	1180	1	-63	46	SM490Y	3062	15	14.7
38	26	4721	3	1180	1	-59	44	SM490Y	3062	15	14.7
38	26	4721	3	1180	1	-77	41	SM490Y	3062	15	14.7
39	26	4721	3	1180	1	-77	40	SM490Y	3062	15	14.7
39	26	4721	3	1180	1	-102	35	SM490Y	3062	15	14.7
40	26	4721	3	1180	1	-102	34	SM490Y	3062	15	14.7
40	26	4721	3	1180	1	-104	34	SM490Y	3062	15	14.7
40	27	4721	3	1180	1	-102	30	SM570	3062	17	16.3
40	27	4721	3	1180	1	-119	26	SM570	3062	17	16.3
41	27	4721	3	1180	1	-119	26	SM570	3062	17	16.3
41	27	4721	3	1250	1	-133	22	SM570	3062	17	16.3
41	28	4721	3	1250	1	-130	21	SM570	3062	17	16.3
41	28	4721	3	1250	1	-132	21	SM570	3062	17	16.3
42	28	4809	3	1180	1	-132	20	SM570	3062	17	16.3
42	28	4809	3	1224	1	-143	16	SM570	3063	17	16.3
43	28	4588	3	1147	1	-143	21	SM570	3063	17	16.3
43	28	4588	3	1407	1	-149	18	SM570	3063	17	16.3
43	29	4588	3	1407	1	-148	18	SM570	3063	17	16.3
43	29	4588	3	887	1	-151	16	SM570	3062	17	16.3
44	29	4641	3	1147	1	-151	15	SM570	3062	17	16.3
44	29	4641	3	1173	1	-155	10	SM570	3062	17	16.3
45	29	4705	3	806	1	-154	13	SM570	3062	17	16.3
45	29	4705	3	1546	1	-155	11	SM570	3062	17	16.3
45	30	4705	3	1546	1	-155	11	SM570	3062	17	16.3
45	30	4705	3	1176	1	-155	9	SM570	3062	17	16.3
45	30	4705	3	1176	1	-155	9	SM570	3062	17	16.3
46	30	4705	3	1176	1	-155	9	SM570	3062	17	16.3
46	30	4705	3	1416	1	-153	13	SM570	3062	17	16.3
46	31	4705	3	1416	1	-153	13	SM570	3062	17	16.3
46	31	4705	3	1416	1	-152	14	SM570	3062	17	16.3
47	31	4706	3	1176	1	-152	12	SM570	3062	17	16.3
47	31	4706	3	1177	1	-145	16	SM570	3062	17	16.3
48	31	4706	3	1037	1	-145	16	SM570	3062	17	16.3
48	31	4706	3	1317	1	-141	18	SM570	3062	17	16.3
48	32	4706	3	1317	1	-144	18	SM570	3062	17	16.3
48	32	4706	3	1177	1	-136	21	SM570	3062	17	16.3
49	32	4707	3	1177	1	-136	19	SM570	3062	17	16.3
49	32	4707	3	1177	1	-123	24	SM570	3062	17	16.3
50	32	4708	3	1177	1	-123	24	SM570	3062	17	16.3
50	32	4708	3	1177	1	-121	24	SM570	3062	17	16.3
50	33	4708	3	1177	1	-125	25	SM570	3062	17	16.3
50	33	4708	3	1177	1	-109	29	SM570	3062	17	16.3

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm²)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
51	33	4708	3	1177	1	-109	26	SM570	3062	17	16.3
51	33	4708	3	1177	1	-93	30	SM570	3062	17	16.3
51	34	4708	3	1177	1	-95	34	SM490Y	3062	15	14.7
51	34	4708	3	1177	1	-92	35	SM490Y	3062	15	14.7
52	34	4795	3	1192	1	-92	35	SM490Y	3062	15	14.7
52	34	4795	3	1206	1	-68	41	SM490Y	3062	15	14.7
53	34	4848	3	1193	1	-68	42	SM490Y	3062	15	14.7
53	34	4848	3	1232	1	-49	46	SM490Y	3062	15	14.7
53	35	4848	3	1232	1	-53	48	SM490Y	3062	15	14.7
53	35	4848	3	1232	1	-40	50	SM490Y	3062	15	14.7
54	35	4650	3	1163	1	-40	51	SM490Y	3062	15	14.7
54	35	4650	3	1163	1	0	58	SM490Y	3062	15	14.7

(b)Check of spacing and required stiffness

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm⁴)	Iv	VStf No	γh·req	Ih·req (cm⁴)	Ih	HStf No
1	1	0.38	0.11	54.83	5152	8755	2	11.46	1077	2321	2
1	1	0.38	0.10	55.03	5171	8755	2	11.44	1075	2321	2
2	1	0.38	0.10	55.03	5171	8755	2	11.44	1075	2321	2
2	1	0.38	0.11	55.03	5171	8755	2	11.44	1075	2321	2
2	2	0.38	0.10	55.03	5171	8755	2	11.44	1075	2321	2
2	2	0.38	0.11	55.03	5171	8755	2	11.44	1075	2321	2
3	2	0.39	0.12	52.74	4955	8755	2	11.68	1098	2321	2
3	2	0.39	0.16	52.74	4955	8755	2	11.68	1098	2321	2
4	2	0.39	0.16	52.74	4955	8755	2	11.68	1098	2321	2
4	2	0.39	0.17	52.74	4955	8755	2	11.68	1098	2321	2
4	3	0.39	0.16	52.74	4955	8755	2	11.68	1098	2321	2
4	3	0.39	0.18	52.74	4955	8755	2	11.68	1098	2321	2
5	3	0.39	0.18	52.74	4955	8755	2	11.68	1098	2321	2
5	3	0.39	0.20	52.74	4955	8755	2	11.68	1098	2321	2
6	3	0.39	0.20	52.74	4955	8755	2	11.68	1098	2321	2
6	3	0.39	0.20	52.74	4955	8755	2	11.68	1098	2321	2
6	4	0.39	0.20	52.74	4955	8755	2	11.68	1098	2321	2
6	4	0.39	0.21	52.74	4955	8755	2	11.68	1098	2321	2
7	4	0.39	0.21	52.74	4955	8755	2	11.68	1098	2321	2
7	4	0.39	0.21	52.74	4955	8755	2	11.68	1098	2321	2
7	4	0.39	0.21	52.74	4955	8755	2	11.68	1098	2321	2
7	5	0.39	0.21	52.74	4955	8755	2	11.68	1098	2321	2
7	5	0.39	0.21	52.74	4955	8755	2	11.68	1098	2321	2
8	5	0.39	0.21	52.74	4955	8755	2	11.68	1098	2321	2
8	5	0.39	0.21	52.74	4955	8755	2	11.68	1098	2321	2

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm⁴)	Iv	VStf No	γh·req	Ih·req (cm⁴)	Ih	HStf No
9	5	0.39	0.20	52.74	4955	8755	2	11.68	1098	2321	2
9	5	0.39	0.19	52.74	4955	8755	2	11.68	1098	2321	2
9	6	0.39	0.20	52.74	4955	8755	2	11.68	1098	2321	2
9	6	0.39	0.19	52.74	4955	8755	2	11.68	1098	2321	2
10	6	0.39	0.19	52.74	4955	8755	2	11.68	1098	2321	2
10	6	0.39	0.16	52.74	4955	8755	2	11.68	1098	2321	2
11	6	0.39	0.16	52.74	4955	8755	2	11.68	1098	2321	2
11	6	0.39	0.14	52.74	4955	8755	2	11.68	1098	2321	2
11	7	0.39	0.16	52.74	4955	8755	2	11.68	1098	2321	2
11	7	0.39	0.13	52.74	4955	8755	2	11.68	1098	2321	2
12	7	0.39	0.14	52.74	4955	8755	2	11.68	1098	2321	2
12	7	0.39	0.11	52.74	4955	8755	2	11.68	1098	2321	2
13	8	0.39	0.09	52.74	4955	8755	2	11.68	1098	2321	2
13	8	0.39	0.09	52.74	4955	8755	2	11.68	1098	2321	2
13	9	0.39	0.09	52.74	4955	8755	2	11.68	1098	2321	2
13	9	0.39	0.09	52.74	4955	8755	2	11.68	1098	2321	2
14	9	0.39	0.09	52.74	4955	8755	2	11.68	1098	2321	2
14	9	0.39	0.18	52.74	4955	8755	2	11.68	1098	2321	2
14	10	0.39	0.09	52.74	7213	8755	2	11.68	1598	2321	2
14	10	0.39	0.11	52.74	7213	8755	2	11.68	1598	2321	2
15	10	0.38	0.10	55.03	7527	8755	2	11.44	1565	2321	2
15	10	0.38	0.31	55.03	7527	8755	2	11.44	1565	2321	2
16	10	0.38	0.31	55.03	7527	8755	2	11.44	1565	2321	2
16	10	0.38	0.44	55.03	7527	8755	2	11.44	1565	2321	2
16	11	0.38	0.31	55.03	7527	8755	2	11.44	1565	2321	2
16	11	0.38	0.51	55.03	7527	8755	2	11.44	1565	2321	2
17	11	0.39	0.50	53.29	7289	8755	2	11.62	1590	2321	2
17	11	0.39	0.33	53.29	7289	8755	2	11.62	1590	2321	2
17	12	0.39	0.43	53.29	7289	8755	2	11.62	1590	2321	2
17	12	0.39	0.33	53.29	7289	8755	2	11.62	1590	2321	2
18	12	0.39	0.33	53.29	7289	8755	2	11.62	1590	2321	2
18	12	0.39	0.15	53.29	7289	8755	2	11.62	1590	2321	2
19	12	0.39	0.15	51.64	7063	8755	2	11.81	1615	2321	2
19	12	0.39	0.14	51.64	7063	8755	2	11.81	1615	2321	2
19	13	0.39	0.28	51.64	4852	8755	2	11.81	1110	2321	2
19	13	0.39	0.14	51.64	4852	8755	2	11.81	1110	2321	2
20	13	0.39	0.14	51.64	4852	8755	2	11.81	1110	2321	2
20	13	0.39	0.06	51.64	4852	8755	2	11.81	1110	2321	2
20	14	0.39	0.06	51.64	4852	8755	2	11.81	1110	2321	2
20	14	0.39	0.06	51.64	4852	8755	2	11.81	1110	2321	2
21	14	0.39	0.06	51.64	4852	8755	2	11.81	1110	2321	2
21	14	0.39	0.03	51.64	4852	8755	2	11.81	1110	2321	2

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm^4)	Iv	VStf No	γh·req	Ih·req (cm^4)	Ih	HStf No
22	14	0.39	0.03	51.64	4852	8755	2	11.81	1110	2321	2
22	14	0.39	0.02	51.64	4852	8755	2	11.81	1110	2321	2
22	15	0.39	0.02	51.64	4852	8755	2	11.81	1110	2321	2
22	15	0.39	0.02	51.64	4852	8755	2	11.81	1110	2321	2
23	15	0.39	0.03	51.64	4852	8755	2	11.81	1110	2321	2
23	15	0.39	0.02	51.64	4852	8755	2	11.81	1110	2321	2
24	15	0.39	0.02	51.64	4852	8755	2	11.81	1110	2321	2
24	15	0.39	0.02	51.64	4852	8755	2	11.81	1110	2321	2
24	15	0.39	0.02	51.64	4852	8755	2	11.81	1110	2321	2
24	16	0.39	0.02	51.64	4852	8755	2	11.81	1110	2321	2
24	16	0.39	0.03	51.64	4852	8755	2	11.81	1110	2321	2
25	16	0.39	0.02	51.64	4852	8755	2	11.81	1110	2321	2
25	16	0.39	0.04	51.64	4852	8755	2	11.81	1110	2321	2
25	17	0.39	0.04	51.64	4852	8755	2	11.81	1110	2321	2
25	17	0.39	0.04	51.64	4852	8755	2	11.81	1110	2321	2
26	17	0.39	0.04	51.64	4852	8755	2	11.81	1110	2321	2
26	17	0.39	0.11	51.64	4852	8755	2	11.81	1110	2321	2
27	17	0.39	0.10	51.64	4852	8755	2	11.81	1110	2321	2
27	17	0.39	0.14	51.64	4852	8755	2	11.81	1110	2321	2
27	18	0.39	0.13	51.64	4852	8755	2	11.81	1110	2321	2
27	18	0.39	0.21	51.64	4852	8755	2	11.81	1110	2321	2
28	18	0.39	0.21	51.64	4852	8755	2	11.81	1110	2321	2
28	18	0.39	0.43	51.64	4852	8755	2	11.81	1110	2321	2
29	18	0.39	0.43	51.64	4852	8755	2	11.81	1110	2321	2
29	18	0.39	0.47	51.64	4852	8755	2	11.81	1110	2321	2
29	19	0.39	0.28	51.64	4852	8755	2	11.81	1110	2321	2
29	19	0.39	0.52	51.64	4852	8755	2	11.81	1110	2321	2
30	19	0.39	0.52	51.64	4852	8755	2	11.81	1110	2321	2
30	19	0.39	0.85	51.64	4852	8755	2	11.81	1110	2321	2
30	20	0.39	0.26	51.64	7063	8755	2	11.81	1615	2321	2
30	20	0.39	0.27	51.64	7063	8755	2	11.81	1615	2321	2
31	20	0.39	0.27	53.29	7289	8755	2	11.62	1590	2321	2
31	20	0.39	0.44	53.29	7289	8755	2	11.62	1590	2321	2
32	20	0.25	0.40	131.07	17928	8755	2	7.41	1014	2321	2
[Iv < Iv・req → Vertical stiffener interval uses Maximum Spacing]											
32	20	0.53	0.63	28.71	3927	8755	2	15.84	2166	2321	2
32	21	0.53	0.51	28.71	3927	8755	2	15.84	2166	2321	2
32	21	0.39	0.53	53.29	7289	8755	2	11.62	1590	2321	2
33	21	0.36	0.55	60.08	8218	8755	2	10.95	1497	2321	2
33	21	0.48	0.50	34.37	4701	8755	2	14.47	1980	2321	2
33	22	0.48	0.66	34.37	4701	8755	2	14.47	1980	2321	2
33	22	0.25	0.38	130.76	17886	8755	2	7.42	1015	2321	2
[Iv < Iv・req → Vertical stiffener interval uses Maximum Spacing]											
34	22	0.36	0.44	60.08	8218	8755	2	10.95	1497	2321	2
34	22	0.36	0.22	60.08	8218	8755	2	10.95	1497	2321	2

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm^4)	Iv	VStf No	γh·req	Ih·req (cm^4)	Ih	HStf No
35	22	0.39	0.24	53.86	7367	8755	2	11.56	1581	2321	2
35	22	0.39	0.22	53.86	7367	8755	2	11.56	1581	2321	2
35	23	0.39	0.66	53.86	5061	8755	2	11.56	1086	2321	2
35	23	0.39	0.31	53.86	5061	8755	2	11.56	1086	2321	2
36	23	0.39	0.31	53.86	5061	8755	2	11.56	1086	2321	2
36	23	0.39	0.18	53.86	5061	8755	2	11.56	1086	2321	2
36	24	0.39	0.20	53.86	5061	8755	2	11.56	1086	2321	2
36	24	0.39	0.15	53.86	5061	8755	2	11.56	1086	2321	2
37	24	0.39	0.15	53.86	5061	8755	2	11.56	1086	2321	2
37	24	0.39	0.16	53.86	5061	8755	2	11.56	1086	2321	2
38	25	0.39	0.16	53.86	5061	8755	2	11.56	1086	2321	2
38	25	0.39	0.19	53.86	5061	8755	2	11.56	1086	2321	2
38	26	0.39	0.16	53.86	5061	8755	2	11.56	1086	2321	2
38	26	0.39	0.21	53.86	5061	8755	2	11.56	1086	2321	2
39	26	0.39	0.20	53.86	5061	8755	2	11.56	1086	2321	2
39	26	0.39	0.28	53.86	5061	8755	2	11.56	1086	2321	2
40	26	0.39	0.28	53.86	5061	8755	2	11.56	1086	2321	2
40	26	0.39	0.29	53.86	5061	8755	2	11.56	1086	2321	2
40	27	0.39	0.16	53.86	7367	8755	2	11.56	1581	2321	2
40	27	0.39	0.20	53.86	7367	8755	2	11.56	1581	2321	2
41	27	0.39	0.20	53.86	7367	8755	2	11.56	1581	2321	2
41	27	0.41	0.25	48.00	6565	8755	2	12.25	1675	2321	2
41	28	0.41	0.23	48.00	6565	8755	2	12.25	1675	2321	2
41	28	0.41	0.24	48.00	6565	8755	2	12.25	1675	2321	2
42	28	0.39	0.24	53.86	7367	8755	2	11.56	1581	2321	2
42	28	0.40	0.28	50.07	6849	8755	2	11.99	1640	2321	2
43	28	0.37	0.28	57.03	7800	8755	2	11.24	1537	2321	2
43	28	0.46	0.31	37.90	5184	8755	2	13.78	1885	2321	2
43	29	0.46	0.30	37.90	5184	8755	2	13.78	1885	2321	2
43	29	0.29	0.30	95.34	13041	8755	2	8.69	1189	2321	2
		[Iv < Iv・req → Vertical stiffener interval uses Maximum Spacing]									
44	29	0.37	0.30	57.02	7799	8755	2	11.24	1537	2321	2
44	29	0.38	0.31	54.51	7455	8755	2	11.49	1572	2321	2
45	29	0.26	0.31	115.43	15788	8755	2	7.90	1080	2321	2
		[Iv < Iv・req → Vertical stiffener interval uses Maximum Spacing]									
45	29	0.50	0.32	31.38	4292	8755	2	15.15	2072	2321	2
45	30	0.50	0.32	31.38	4292	8755	2	15.15	2072	2321	2
45	30	0.38	0.32	54.23	7417	8755	2	11.52	1576	2321	2
45	30	0.38	0.31	54.23	7417	8755	2	11.52	1576	2321	2
46	30	0.38	0.31	54.22	7416	8755	2	11.52	1576	2321	2
46	30	0.46	0.31	37.40	5115	8755	2	13.88	1898	2321	2
46	31	0.46	0.31	37.40	5115	8755	2	13.88	1898	2321	2
46	31	0.46	0.31	37.40	5115	8755	2	13.88	1898	2321	2
47	31	0.38	0.30	54.21	7415	8755	2	11.52	1576	2321	2
47	31	0.38	0.28	54.20	7414	8755	2	11.53	1576	2321	2

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm^4)	Iv	VStf No	γh·req	Ih·req (cm^4)	Ih	HStf No
48	31	0.34	0.28	69.83	9552	8755	2	10.15	1389	2321	2
			[Iv ＜ Iv・req → Vertical stiffener interval uses Maximum Spacing]								
48	31	0.43	0.27	43.29	5921	8755	2	12.90	1764	2321	2
48	32	0.43	0.28	43.29	5921	8755	2	12.90	1764	2321	2
48	32	0.38	0.25	54.19	7412	8755	2	11.53	1577	2321	2
49	32	0.38	0.25	54.18	7411	8755	2	11.53	1577	2321	2
49	32	0.38	0.21	54.17	7410	8755	2	11.53	1577	2321	2
50	32	0.38	0.21	54.17	7410	8755	2	11.53	1577	2321	2
50	32	0.38	0.21	54.17	7410	8755	2	11.53	1577	2321	2
50	33	0.38	0.22	54.17	7410	8755	2	11.53	1577	2321	2
50	33	0.38	0.18	54.17	7409	8755	2	11.53	1577	2321	2
51	33	0.38	0.17	54.16	7407	8755	2	11.53	1577	2321	2
51	33	0.38	0.14	54.15	7406	8755	2	11.53	1577	2321	2
51	34	0.38	0.25	54.15	5088	8755	2	11.53	1083	2321	2
51	34	0.38	0.24	54.15	5088	8755	2	11.53	1083	2321	2
52	34	0.39	0.24	52.83	4964	8755	2	11.67	1097	2321	2
52	34	0.39	0.18	51.60	4848	8755	2	11.81	1110	2321	2
53	34	0.39	0.19	52.73	4955	8755	2	11.68	1098	2321	2
53	34	0.40	0.17	49.47	4649	8755	2	12.06	1134	2321	2
53	35	0.40	0.18	49.47	4649	8755	2	12.06	1134	2321	2
53	35	0.40	0.17	49.47	4649	8755	2	12.06	1134	2321	2
54	35	0.38	0.15	55.52	5217	8755	2	11.39	1070	2321	2
54	35	0.38	0.15	55.52	5217	8755	2	11.39	1070	2321	2

２）Main girder G1　 Web name：RWEB

（a）Check of section and web thickness

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm^2)	Stress τ (N/mm^2)	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
1	1	4667	3	1167	1	0	47	SM490Y	2730	15	13.1
1	1	4667	3	1166	1	-34	40	SM490Y	2730	15	13.1
2	1	4664	3	1166	1	-34	40	SM490Y	2730	15	13.1
2	1	4664	3	1166	1	-50	36	SM490Y	2730	15	13.1
2	2	4664	3	1166	1	-47	35	SM490Y	2730	15	13.1
2	2	4664	3	1166	1	-55	33	SM490Y	2730	15	13.1
3	2	4764	3	1191	1	-55	36	SM490Y	2730	15	13.1
3	2	4764	3	1191	1	-78	30	SM490Y	2730	15	13.1
4	2	4764	3	1191	1	-78	29	SM490Y	2730	15	13.1
4	2	4764	3	1191	1	-84	27	SM490Y	2730	15	13.1
4	3	4764	3	1191	1	-80	27	SM490Y	2730	15	13.1
4	3	4764	3	1191	1	-88	23	SM490Y	2730	15	13.1
5	3	4764	3	1191	1	-88	23	SM490Y	2730	15	13.1
5	3	4764	3	1191	1	-99	17	SM490Y	2730	15	13.1

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm^2)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
6	3	4764	3	1191	1	-99	17	SM490Y	2730	15	13.1
6	3	4764	3	1191	1	-100	16	SM490Y	2730	15	13.1
6	4	4764	3	1191	1	-99	16	SM490Y	2730	15	13.1
6	4	4764	3	1191	1	-103	12	SM490Y	2730	15	13.1
7	4	4764	3	1191	1	-103	13	SM490Y	2730	15	13.1
7	4	4764	3	1191	1	-105	9	SM490Y	2730	15	13.1
7	4	4764	3	1191	1	-105	9	SM490Y	2730	15	13.1
7	5	4764	3	1191	1	-105	9	SM490Y	2730	15	13.1
7	5	4764	3	1191	1	-104	9	SM490Y	2730	15	13.1
8	5	4764	3	1191	1	-104	9	SM490Y	2730	15	13.1
8	5	4764	3	1191	1	-101	15	SM490Y	2730	15	13.1
9	5	4764	3	1191	1	-101	13	SM490Y	2730	15	13.1
9	5	4764	3	1191	1	-97	16	SM490Y	2730	15	13.1
9	6	4764	3	1191	1	-99	17	SM490Y	2730	15	13.1
9	6	4764	3	1191	1	-95	19	SM490Y	2730	15	13.1
10	6	4764	3	1191	1	-95	19	SM490Y	2730	15	13.1
10	6	4764	3	1191	1	-83	25	SM490Y	2730	15	13.1
11	6	4764	3	1191	1	-83	24	SM490Y	2730	15	13.1
11	6	4764	3	1191	1	-77	26	SM490Y	2730	15	13.1
11	7	4764	3	1191	1	-81	26	SM490Y	2730	15	13.1
11	7	4764	3	1191	1	-69	30	SM490Y	2730	15	13.1
12	7	4764	3	1191	1	-69	30	SM490Y	2730	15	13.1
12	7	4764	3	1191	1	-46	36	SM490Y	2730	15	13.1
13	8	4764	3	1191	1	-45	33	SM490Y	2730	15	13.1
13	8	4764	3	1191	1	-42	33	SM490Y	2730	15	13.1
13	9	4764	3	1191	1	-44	34	SM490Y	2730	15	13.1
13	9	4764	3	1191	1	-22	39	SM490Y	2730	15	13.1
14	9	4764	3	1191	1	-22	39	SM490Y	2730	15	13.1
14	9	4764	3	1191	1	-63	45	SM490Y	2730	15	13.1
14	10	4764	3	1191	1	-59	39	SM490Y	2730	17	13.1
14	10	4764	3	1191	1	-67	40	SM490Y	2730	17	13.1
15	10	4664	3	1166	1	-67	39	SM490Y	2730	17	13.1
15	10	4664	3	1166	1	-140	44	SM490Y	2730	17	13.1
16	10	4664	3	1166	1	-140	44	SM490Y	2730	17	13.1
16	10	4664	3	1166	1	-171	46	SM490Y	2730	17	13.1
16	11	4664	3	1166	1	-138	45	SM490Y	2730	17	13.1
16	11	4664	3	1166	1	-185	48	SM490Y	2730	17	13.1
17	11	4739	3	1185	1	-185	40	SM490Y	2730	17	13.1
17	11	4739	3	1185	1	-148	37	SM490Y	2730	17	13.1
17	12	4739	3	1185	1	-173	37	SM490Y	2730	17	13.1
17	12	4739	3	1185	1	-150	35	SM490Y	2730	17	13.1
18	12	4739	3	1185	1	-150	35	SM490Y	2730	17	13.1
18	12	4739	3	1185	1	-97	30	SM490Y	2730	17	13.1

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm²)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
19	12	4814	3	1204	1	-97	29	SM490Y	2730	17	13.1
19	12	4814	3	1204	1	-92	29	SM490Y	2730	17	13.1
19	13	4814	3	1204	1	-103	33	SM490Y	2730	15	13.1
19	13	4814	3	1204	1	-68	27	SM490Y	2730	15	13.1
20	13	4814	3	1204	1	-68	27	SM490Y	2730	15	13.1
20	13	4814	3	1204	1	-42	22	SM490Y	2730	15	13.1
20	14	4814	3	1204	1	-42	22	SM490Y	2730	15	13.1
20	14	4814	3	1204	1	-40	21	SM490Y	2730	15	13.1
21	14	4814	3	1204	1	-40	24	SM490Y	2730	15	13.1
21	14	4814	3	1204	1	-22	17	SM490Y	2730	15	13.1
22	14	4814	3	1204	1	-22	17	SM490Y	2730	15	13.1
22	14	4814	3	1204	1	-25	14	SM490Y	2730	15	13.1
22	15	4814	3	1204	1	-25	14	SM490Y	2730	15	13.1
22	15	4814	3	1204	1	-27	12	SM490Y	2730	15	13.1
23	15	4814	3	1204	1	-27	15	SM490Y	2730	15	13.1
23	15	4814	3	1204	1	-30	9	SM490Y	2730	15	13.1
24	15	4814	3	1204	1	-30	10	SM490Y	2730	15	13.1
24	15	4814	3	1204	1	-30	10	SM490Y	2730	15	13.1
24	15	4814	3	1204	1	-30	10	SM490Y	2730	15	13.1
24	16	4814	3	1204	1	-30	10	SM490Y	2730	15	13.1
24	16	4814	3	1204	1	-28	16	SM490Y	2730	15	13.1
25	16	4814	3	1204	1	-28	11	SM490Y	2730	15	13.1
25	16	4814	3	1204	1	-34	16	SM490Y	2730	15	13.1
25	17	4814	3	1204	1	-34	16	SM490Y	2730	15	13.1
25	17	4814	3	1204	1	-36	17	SM490Y	2730	15	13.1
26	17	4814	3	1204	1	-36	17	SM490Y	2730	15	13.1
26	17	4814	3	1204	1	-61	23	SM490Y	2730	15	13.1
27	17	4814	3	1204	1	-61	21	SM490Y	2730	15	13.1
27	17	4814	3	1204	1	-72	23	SM490Y	2730	15	13.1
27	18	4814	3	1204	1	-68	23	SM490Y	2730	15	13.1
27	18	4814	3	1204	1	-89	27	SM490Y	2730	15	13.1
28	18	4814	3	1204	1	-89	27	SM490Y	2730	15	13.1
28	18	4814	3	1204	1	-131	33	SM490Y	2730	15	13.1
29	18	4814	3	1204	1	-131	35	SM490Y	2730	15	13.1
29	18	4814	3	1204	1	-137	35	SM490Y	2730	15	13.1
29	19	4814	3	1204	1	-100	34	SM490Y	2730	15	13.1
29	19	4814	3	1204	1	-142	39	SM490Y	2730	15	13.1
30	19	4814	3	1204	1	-142	40	SM490Y	2730	15	13.1
30	19	4814	3	1204	1	-187	45	SM490Y	2730	15	13.1
30	20	4814	3	1204	1	-126	39	SM490Y	2730	17	13.1
30	20	4814	3	1204	1	-131	39	SM490Y	2730	17	13.1
31	20	4739	3	1185	1	-131	40	SM490Y	2730	17	13.1
31	20	4739	3	1185	1	-171	45	SM490Y	2730	17	13.1

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm²)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
32	20	4739	3	755	1	-171	46	SM490Y	2730	17	13.1
32	20	4739	3	1615	1	-185	47	SM490Y	2730	17	13.1
32	21	4739	3	1615	1	-159	47	SM490Y	2730	17	13.1
32	21	4739	3	1185	1	-186	51	SM490Y	2730	17	13.1
33	21	4463	3	1116	1	-186	61	SM490Y	2730	17	13.1
33	21	4463	3	1476	1	-151	58	SM490Y	2730	17	13.1
33	22	4463	3	1476	1	-185	59	SM490Y	2730	17	13.1
33	22	4463	3	756	1	-165	57	SM490Y	2730	17	13.1
34	22	4463	3	1116	1	-165	57	SM490Y	2730	17	13.1
34	22	4463	3	1116	1	-108	53	SM490Y	2730	17	13.1
35	22	4714	3	1179	1	-108	53	SM490Y	2730	17	13.1
35	22	4714	3	1179	1	-102	53	SM490Y	2730	17	13.1
35	23	4714	3	1179	1	-150	61	SM490Y	2730	15	13.1
35	23	4714	3	1179	1	-86	56	SM490Y	2730	15	13.1
36	23	4714	3	1179	1	-86	56	SM490Y	2730	15	13.1
36	23	4714	3	1179	1	-45	53	SM490Y	2730	15	13.1
36	24	4714	3	1179	1	-53	54	SM490Y	2730	15	13.1
36	24	4714	3	1179	1	-26	52	SM490Y	2730	15	13.1
37	24	4714	3	1179	1	-26	52	SM490Y	2730	15	13.1
37	24	4714	3	1179	1	-53	47	SM490Y	2730	15	13.1
38	25	4714	3	1179	1	-54	47	SM490Y	2730	15	13.1
38	25	4714	3	1179	1	-68	45	SM490Y	2730	15	13.1
38	26	4714	3	1179	1	-62	44	SM490Y	2730	15	13.1
38	26	4714	3	1179	1	-82	41	SM490Y	2730	15	13.1
39	26	4714	3	1179	1	-82	40	SM490Y	2730	15	13.1
39	26	4714	3	1179	1	-108	34	SM490Y	2730	15	13.1
40	26	4714	3	1179	1	-108	34	SM490Y	2730	15	13.1
40	26	4714	3	1179	1	-111	33	SM490Y	2730	15	13.1
40	27	4714	3	1179	1	-108	29	SM570	2730	17	14.5
40	27	4714	3	1179	1	-126	26	SM570	2730	17	14.5
41	27	4714	3	1179	1	-126	26	SM570	2730	17	14.5
41	27	4714	3	1249	1	-141	21	SM570	2730	17	14.5
41	28	4714	3	1249	1	-136	21	SM570	2730	17	14.5
41	28	4714	3	1249	1	-139	20	SM570	2730	17	14.5
42	28	4766	3	1179	1	-138	20	SM570	2730	17	14.5
42	28	4766	3	1205	1	-149	16	SM570	2730	17	14.5
43	28	4636	3	1159	1	-149	21	SM570	2730	17	14.5
43	28	4636	3	1419	1	-155	17	SM570	2730	17	14.5
43	29	4636	3	1419	1	-154	17	SM570	2730	17	14.5
43	29	4636	3	899	1	-157	16	SM570	2730	17	14.5
44	29	4667	3	1159	1	-157	15	SM570	2730	17	14.5
44	29	4667	3	1174	1	-161	10	SM570	2730	17	14.5

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm²)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
45	29	4705	3	806	1	-162	13	SM570	2730	17	14.5
45	29	4705	3	1546	1	-162	11	SM570	2730	17	14.5
45	30	4705	3	1546	1	-162	11	SM570	2730	17	14.5
45	30	4705	3	1176	1	-163	9	SM570	2730	17	14.5
45	30	4705	3	1176	1	-163	8	SM570	2730	17	14.5
46	30	4705	3	1176	1	-163	8	SM570	2730	17	14.5
46	30	4705	3	1416	1	-160	13	SM570	2730	17	14.5
46	31	4705	3	1416	1	-160	13	SM570	2730	17	14.5
46	31	4705	3	1416	1	-159	14	SM570	2730	17	14.5
47	31	4706	3	1176	1	-159	12	SM570	2730	17	14.5
47	31	4706	3	1177	1	-152	16	SM570	2730	17	14.5
48	31	4706	3	1037	1	-152	16	SM570	2730	17	14.5
48	31	4706	3	1317	1	-149	18	SM570	2730	17	14.5
48	32	4706	3	1317	1	-151	18	SM570	2730	17	14.5
48	32	4706	3	1177	1	-143	21	SM570	2730	17	14.5
49	32	4707	3	1177	1	-143	19	SM570	2730	17	14.5
49	32	4707	3	1177	1	-129	23	SM570	2730	17	14.5
50	32	4708	3	1177	1	-129	23	SM570	2730	17	14.5
50	32	4708	3	1177	1	-127	24	SM570	2730	17	14.5
50	33	4708	3	1177	1	-132	24	SM570	2730	17	14.5
50	33	4708	3	1177	1	-115	29	SM570	2730	17	14.5
51	33	4708	3	1177	1	-115	26	SM570	2730	17	14.5
51	33	4708	3	1177	1	-98	30	SM570	2730	17	14.5
51	34	4708	3	1177	1	-101	34	SM490Y	2730	15	13.1
51	34	4708	3	1177	1	-98	34	SM490Y	2730	15	13.1
52	34	4760	3	1186	1	-99	35	SM490Y	2730	15	13.1
52	34	4760	3	1194	1	-73	41	SM490Y	2730	15	13.1
53	34	4770	3	1181	1	-73	42	SM490Y	2730	15	13.1
53	34	4770	3	1204	1	-53	45	SM490Y	2730	15	13.1
53	35	4770	3	1204	1	-58	47	SM490Y	2730	15	13.1
53	35	4770	3	1204	1	-43	49	SM490Y	2730	15	13.1
54	35	4650	3	1163	1	-43	50	SM490Y	2730	15	13.1
54	35	4650	3	1163	1	0	57	SM490Y	2730	15	13.1

(b)Check of spacing and required stiffness

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm⁴)	Iv	VStf No	γh·req	Ih·req (cm⁴)	Ih	HStf No
1	1	0.43	0.09	43.76	3665	8755	2	12.83	1074	2321	2
1	1	0.43	0.08	43.85	3673	8755	2	12.81	1073	2321	2
2	1	0.43	0.08	43.85	3673	8755	2	12.81	1073	2321	2
2	1	0.43	0.09	43.85	3673	8755	2	12.81	1073	2321	2
2	2	0.43	0.08	43.85	3673	8755	2	12.81	1073	2321	2
2	2	0.43	0.09	43.85	3673	8755	2	12.81	1073	2321	2

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm^4)	Iv	VStf No	γh·req	Ih·req (cm^4)	Ih	HStf No
3	2	0.44	0.10	42.03	3520	8755	2	13.09	1096	2321	2
3	2	0.44	0.12	42.03	3520	8755	2	13.09	1096	2321	2
4	2	0.44	0.12	42.03	3520	8755	2	13.09	1096	2321	2
4	2	0.44	0.13	42.03	3520	8755	2	13.09	1096	2321	2
4	3	0.44	0.12	42.03	3520	8755	2	13.09	1096	2321	2
4	3	0.44	0.13	42.03	3520	8755	2	13.09	1096	2321	2
5	3	0.44	0.13	42.03	3520	8755	2	13.09	1096	2321	2
5	3	0.44	0.15	42.03	3520	8755	2	13.09	1096	2321	2
6	3	0.44	0.15	42.03	3520	8755	2	13.09	1096	2321	2
6	3	0.44	0.15	42.03	3520	8755	2	13.09	1096	2321	2
6	4	0.44	0.14	42.03	3520	8755	2	13.09	1096	2321	2
6	4	0.44	0.15	42.03	3520	8755	2	13.09	1096	2321	2
7	4	0.44	0.15	42.03	3520	8755	2	13.09	1096	2321	2
7	4	0.44	0.15	42.03	3520	8755	2	13.09	1096	2321	2
7	4	0.44	0.15	42.03	3520	8755	2	13.09	1096	2321	2
7	5	0.44	0.15	42.03	3520	8755	2	13.09	1096	2321	2
7	5	0.44	0.15	42.03	3520	8755	2	13.09	1096	2321	2
8	5	0.44	0.15	42.03	3520	8755	2	13.09	1096	2321	2
8	5	0.44	0.15	42.03	3520	8755	2	13.09	1096	2321	2
9	5	0.44	0.15	42.03	3520	8755	2	13.09	1096	2321	2
9	5	0.44	0.14	42.03	3520	8755	2	13.09	1096	2321	2
9	6	0.44	0.14	42.03	3520	8755	2	13.09	1096	2321	2
9	6	0.44	0.14	42.03	3520	8755	2	13.09	1096	2321	2
10	6	0.44	0.14	42.03	3520	8755	2	13.09	1096	2321	2
10	6	0.44	0.12	42.03	3520	8755	2	13.09	1096	2321	2
11	6	0.44	0.12	42.03	3520	8755	2	13.09	1096	2321	2
11	6	0.44	0.11	42.03	3520	8755	2	13.09	1096	2321	2
11	7	0.44	0.12	42.03	3520	8755	2	13.09	1096	2321	2
11	7	0.44	0.10	42.03	3520	8755	2	13.09	1096	2321	2
12	7	0.44	0.11	42.03	3520	8755	2	13.09	1096	2321	2
12	7	0.44	0.09	42.03	3520	8755	2	13.09	1096	2321	2
13	8	0.44	0.07	42.03	3520	8755	2	13.09	1096	2321	2
13	8	0.44	0.07	42.03	3520	8755	2	13.09	1096	2321	2
13	9	0.44	0.08	42.03	3520	8755	2	13.09	1096	2321	2
13	9	0.44	0.07	42.03	3520	8755	2	13.09	1096	2321	2
14	9	0.44	0.07	42.03	3520	8755	2	13.09	1096	2321	2
14	9	0.44	0.14	42.03	3520	8755	2	13.09	1096	2321	2
14	10	0.44	0.07	42.03	5124	8755	2	13.09	1596	2321	2
14	10	0.44	0.08	42.03	5124	8755	2	13.09	1596	2321	2
15	10	0.43	0.08	43.85	5347	8755	2	12.81	1562	2321	2
15	10	0.43	0.21	43.85	5347	8755	2	12.81	1562	2321	2
16	10	0.43	0.21	43.85	5347	8755	2	12.81	1562	2321	2
16	10	0.43	0.29	43.85	5347	8755	2	12.81	1562	2321	2
16	11	0.43	0.21	43.85	5347	8755	2	12.81	1562	2321	2
16	11	0.43	0.34	43.85	5347	8755	2	12.81	1562	2321	2

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm⁴)	Iv	VStf No	γh·req	Ih·req (cm⁴)	Ih	HStf No
17	11	0.43	0.32	42.47	5179	8755	2	13.02	1588	2321	2
17	11	0.43	0.22	42.47	5179	8755	2	13.02	1588	2321	2
17	12	0.43	0.28	42.47	5179	8755	2	13.02	1588	2321	2
17	12	0.43	0.22	42.47	5179	8755	2	13.02	1588	2321	2
18	12	0.43	0.22	42.47	5179	8755	2	13.02	1588	2321	2
18	12	0.43	0.10	42.47	5179	8755	2	13.02	1588	2321	2
19	12	0.44	0.10	41.16	5018	8755	2	13.23	1613	2321	2
19	12	0.44	0.09	41.16	5018	8755	2	13.23	1613	2321	2
19	13	0.44	0.19	41.16	3447	8755	2	13.23	1108	2321	2
19	13	0.44	0.10	41.16	3447	8755	2	13.23	1108	2321	2
20	13	0.44	0.10	41.16	3447	8755	2	13.23	1108	2321	2
20	13	0.44	0.05	41.16	3447	8755	2	13.23	1108	2321	2
20	14	0.44	0.05	41.16	3447	8755	2	13.23	1108	2321	2
20	14	0.44	0.04	41.16	3447	8755	2	13.23	1108	2321	2
21	14	0.44	0.05	41.16	3447	8755	2	13.23	1108	2321	2
21	14	0.44	0.02	41.16	3447	8755	2	13.23	1108	2321	2
22	14	0.44	0.02	41.16	3447	8755	2	13.23	1108	2321	2
22	14	0.44	0.02	41.16	3447	8755	2	13.23	1108	2321	2
22	15	0.44	0.02	41.16	3447	8755	2	13.23	1108	2321	2
22	15	0.44	0.02	41.16	3447	8755	2	13.23	1108	2321	2
23	15	0.44	0.02	41.16	3447	8755	2	13.23	1108	2321	2
23	15	0.44	0.02	41.16	3447	8755	2	13.23	1108	2321	2
24	15	0.44	0.02	41.16	3447	8755	2	13.23	1108	2321	2
24	15	0.44	0.02	41.16	3447	8755	2	13.23	1108	2321	2
24	15	0.44	0.02	41.16	3447	8755	2	13.23	1108	2321	2
24	16	0.44	0.02	41.16	3447	8755	2	13.23	1108	2321	2
24	16	0.44	0.02	41.16	3447	8755	2	13.23	1108	2321	2
25	16	0.44	0.02	41.16	3447	8755	2	13.23	1108	2321	2
25	16	0.44	0.03	41.16	3447	8755	2	13.23	1108	2321	2
25	17	0.44	0.03	41.16	3447	8755	2	13.23	1108	2321	2
25	17	0.44	0.03	41.16	3447	8755	2	13.23	1108	2321	2
26	17	0.44	0.03	41.16	3447	8755	2	13.23	1108	2321	2
26	17	0.44	0.08	41.16	3447	8755	2	13.23	1108	2321	2
27	17	0.44	0.07	41.16	3447	8755	2	13.23	1108	2321	2
27	17	0.44	0.10	41.16	3447	8755	2	13.23	1108	2321	2
27	18	0.44	0.09	41.16	3447	8755	2	13.23	1108	2321	2
27	18	0.44	0.14	41.16	3447	8755	2	13.23	1108	2321	2
28	18	0.44	0.14	41.16	3447	8755	2	13.23	1108	2321	2
28	18	0.44	0.28	41.16	3447	8755	2	13.23	1108	2321	2
29	18	0.44	0.29	41.16	3447	8755	2	13.23	1108	2321	2
29	18	0.44	0.31	41.16	3447	8755	2	13.23	1108	2321	2
29	19	0.44	0.19	41.16	3447	8755	2	13.23	1108	2321	2
29	19	0.44	0.35	41.16	3447	8755	2	13.23	1108	2321	2

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm^4)	Iv	VStf No	γh·req	Ih·req (cm^4)	Ih	HStf No
30	19	0.44	0.35	41.16	3447	8755	2	13.23	1108	2321	2
30	19	0.44	0.57	41.16	3447	8755	2	13.23	1108	2321	2
30	20	0.44	0.17	41.16	5018	8755	2	13.23	1613	2321	2
30	20	0.44	0.18	41.16	5018	8755	2	13.23	1613	2321	2
31	20	0.43	0.18	42.47	5179	8755	2	13.02	1588	2321	2
31	20	0.43	0.30	42.47	5179	8755	2	13.02	1588	2321	2
32	20	0.28	0.25	104.65	12761	8755	2	8.29	1011	2321	2
		[Iv < Iv・req → Vertical stiffener interval uses Maximum Spacing]									
32	20	0.59	0.44	22.87	2788	8755	2	17.75	2164	2321	2
32	21	0.59	0.36	22.87	2788	8755	2	17.75	2164	2321	2
32	21	0.43	0.35	42.47	5179	8755	2	13.02	1588	2321	2
33	21	0.41	0.37	47.89	5839	8755	2	12.26	1495	2321	2
33	21	0.54	0.37	27.38	3338	8755	2	16.22	1977	2321	2
33	22	0.54	0.46	27.38	3338	8755	2	16.22	1977	2321	2
33	22	0.28	0.24	104.38	12727	8755	2	8.31	1013	2321	2
		[Iv < Iv・req → Vertical stiffener interval uses Maximum Spacing]									
34	22	0.41	0.30	47.89	5839	8755	2	12.26	1495	2321	2
34	22	0.41	0.16	47.89	5839	8755	2	12.26	1495	2321	2
35	22	0.43	0.17	42.93	5234	8755	2	12.95	1579	2321	2
35	22	0.43	0.16	42.93	5234	8755	2	12.95	1579	2321	2
35	23	0.43	0.47	42.93	3596	8755	2	12.95	1085	2321	2
35	23	0.43	0.24	42.93	3596	8755	2	12.95	1085	2321	2
36	23	0.43	0.24	42.93	3596	8755	2	12.95	1085	2321	2
36	23	0.43	0.15	42.93	3596	8755	2	12.95	1085	2321	2
36	24	0.43	0.16	42.93	3596	8755	2	12.95	1085	2321	2
36	24	0.43	0.13	42.93	3596	8755	2	12.95	1085	2321	2
37	24	0.43	0.13	42.93	3596	8755	2	12.95	1085	2321	2
37	24	0.43	0.13	42.93	3596	8755	2	12.95	1085	2321	2
38	25	0.43	0.14	42.93	3596	8755	2	12.95	1085	2321	2
38	25	0.43	0.15	42.93	3596	8755	2	12.95	1085	2321	2
38	26	0.43	0.13	42.93	3596	8755	2	12.95	1085	2321	2
38	26	0.43	0.16	42.93	3596	8755	2	12.95	1085	2321	2
39	26	0.43	0.16	42.93	3596	8755	2	12.95	1085	2321	2
39	26	0.43	0.21	42.93	3596	8755	2	12.95	1085	2321	2
40	26	0.43	0.21	42.93	3596	8755	2	12.95	1085	2321	2
40	26	0.43	0.21	42.93	3596	8755	2	12.95	1085	2321	2
40	27	0.43	0.12	42.93	5234	8755	2	12.95	1579	2321	2
40	27	0.43	0.15	42.93	5234	8755	2	12.95	1579	2321	2
41	27	0.43	0.15	42.93	5234	8755	2	12.95	1579	2321	2
41	27	0.46	0.18	38.25	4664	8755	2	13.72	1673	2321	2
41	28	0.46	0.17	38.25	4664	8755	2	13.72	1673	2321	2
41	28	0.46	0.17	38.25	4664	8755	2	13.72	1673	2321	2
42	28	0.43	0.17	42.93	5234	8755	2	12.95	1579	2321	2
42	28	0.44	0.19	41.09	5010	8755	2	13.24	1614	2321	2

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm^4)	Iv	VStf No	γh·req	Ih·req (cm^4)	Ih	HStf No
43	28	0.42	0.19	44.39	5412	8755	2	12.74	1553	2321	2
43	28	0.52	0.21	29.61	3611	8755	2	15.59	1901	2321	2
43	29	0.52	0.21	29.61	3611	8755	2	15.59	1901	2321	2
43	29	0.33	0.20	73.79	8998	8755	2	9.88	1204	2321	2
		[Iv ＜ Iv・req → Vertical stiffener interval uses Maximum Spacing]									
44	29	0.42	0.21	44.40	5413	8755	2	12.73	1553	2321	2
44	29	0.43	0.21	43.23	5272	8755	2	12.90	1574	2321	2
45	29	0.30	0.22	91.74	11187	8755	2	8.86	1080	2321	2
		[Iv ＜ Iv・req → Vertical stiffener interval uses Maximum Spacing]									
45	29	0.57	0.22	24.94	3041	8755	2	16.99	2072	2321	2
45	30	0.57	0.22	24.94	3041	8755	2	16.99	2072	2321	2
45	30	0.43	0.22	43.10	5256	8755	2	12.92	1576	2321	2
45	30	0.43	0.22	43.10	5256	8755	2	12.92	1576	2321	2
46	30	0.43	0.22	43.10	5255	8755	2	12.93	1576	2321	2
46	30	0.52	0.22	29.72	3624	8755	2	15.56	1898	2321	2
46	31	0.52	0.22	29.72	3624	8755	2	15.56	1898	2321	2
46	31	0.52	0.22	29.72	3624	8755	2	15.56	1898	2321	2
47	31	0.43	0.21	43.09	5254	8755	2	12.93	1576	2321	2
47	31	0.43	0.20	43.08	5253	8755	2	12.93	1576	2321	2
48	31	0.38	0.20	55.50	6768	8755	2	11.39	1389	2321	2
48	31	0.48	0.19	34.41	4195	8755	2	14.47	1764	2321	2
48	32	0.48	0.20	34.41	4195	8755	2	14.47	1764	2321	2
48	32	0.43	0.18	43.07	5252	8755	2	12.93	1577	2321	2
49	32	0.43	0.18	43.07	5251	8755	2	12.93	1577	2321	2
49	32	0.43	0.15	43.06	5251	8755	2	12.93	1577	2321	2
50	32	0.43	0.15	43.06	5251	8755	2	12.93	1577	2321	2
50	32	0.43	0.15	43.06	5251	8755	2	12.93	1577	2321	2
50	33	0.43	0.16	43.06	5251	8755	2	12.93	1577	2321	2
50	33	0.43	0.13	43.05	5250	8755	2	12.93	1577	2321	2
51	33	0.43	0.13	43.04	5249	8755	2	12.93	1577	2321	2
51	33	0.43	0.10	43.04	5248	8755	2	12.93	1577	2321	2
51	34	0.43	0.19	43.04	3605	8755	2	12.93	1083	2321	2
51	34	0.43	0.18	43.04	3605	8755	2	12.93	1083	2321	2
52	34	0.43	0.19	42.41	3552	8755	2	13.03	1091	2321	2
52	34	0.44	0.15	41.83	3504	8755	2	13.12	1099	2321	2
53	34	0.43	0.15	42.74	3580	8755	2	12.98	1087	2321	2
53	34	0.44	0.13	41.15	3446	8755	2	13.23	1108	2321	2
53	35	0.44	0.15	41.15	3446	8755	2	13.23	1108	2321	2
53	35	0.44	0.14	41.14	3446	8755	2	13.23	1108	2321	2
54	35	0.43	0.13	44.12	3695	8755	2	12.77	1070	2321	2
54	35	0.43	0.13	44.12	3695	8755	2	12.77	1070	2321	2

３）Main girder G2　　Web name：LWEB

（a）Check of section and web thickness

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm^2)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
1	1	4662	3	1166	1	0	44	SM490Y	2673	14	12.8
1	1	4662	3	1165	1	-29	40	SM490Y	2673	14	12.8
2	1	4660	3	1165	1	-29	40	SM490Y	2673	14	12.8
2	1	4660	3	1165	1	-44	38	SM490Y	2673	14	12.8
2	2	4660	3	1165	1	-44	38	SM490Y	2673	14	12.8
2	2	4660	3	1165	1	-53	37	SM490Y	2673	14	12.8
3	2	4760	3	1190	1	-53	31	SM490Y	2673	14	12.8
3	2	4760	3	1190	1	-70	27	SM490Y	2673	14	12.8
4	2	4760	3	1190	1	-70	27	SM490Y	2673	14	12.8
4	2	4760	3	1190	1	-76	26	SM490Y	2673	14	12.8
4	3	4760	3	1190	1	-73	25	SM490Y	2673	14	12.8
4	3	4760	3	1190	1	-80	23	SM490Y	2673	14	12.8
5	3	4760	3	1190	1	-80	22	SM490Y	2673	14	12.8
5	3	4760	3	1190	1	-90	17	SM490Y	2673	14	12.8
6	3	4760	3	1190	1	-90	17	SM490Y	2673	14	12.8
6	3	4760	3	1190	1	-91	17	SM490Y	2673	14	12.8
6	4	4760	3	1190	1	-91	17	SM490Y	2673	14	12.8
6	4	4760	3	1190	1	-96	14	SM490Y	2673	14	12.8
7	4	4760	3	1190	1	-96	10	SM490Y	2673	14	12.8
7	4	4760	3	1190	1	-97	8	SM490Y	2673	14	12.8
7	4	4760	3	1190	1	-97	8	SM490Y	2673	14	12.8
7	5	4760	3	1190	1	-97	8	SM490Y	2673	14	12.8
7	5	4760	3	1190	1	-97	8	SM490Y	2673	14	12.8
8	5	4760	3	1190	1	-97	8	SM490Y	2673	14	12.8
8	5	4760	3	1190	1	-95	13	SM490Y	2673	14	12.8
9	5	4760	3	1190	1	-95	14	SM490Y	2673	14	12.8
9	5	4760	3	1190	1	-91	16	SM490Y	2673	14	12.8
9	6	4760	3	1190	1	-91	16	SM490Y	2673	14	12.8
9	6	4760	3	1190	1	-87	17	SM490Y	2673	14	12.8
10	6	4760	3	1190	1	-87	18	SM490Y	2673	14	12.8
10	6	4760	3	1190	1	-77	22	SM490Y	2673	14	12.8
11	6	4760	3	1190	1	-77	24	SM490Y	2673	14	12.8
11	6	4760	3	1190	1	-72	25	SM490Y	2673	14	12.8
11	7	4760	3	1190	1	-75	26	SM490Y	2673	14	12.8
11	7	4760	3	1190	1	-65	28	SM490Y	2673	14	12.8
12	7	4760	3	1190	1	-65	28	SM490Y	2673	14	12.8
12	7	4760	3	1190	1	-47	32	SM490Y	2673	14	12.8
13	8	4760	3	1190	1	-46	38	SM490Y	2673	14	12.8
13	8	4760	3	1190	1	-43	38	SM490Y	2673	14	12.8
13	9	4760	3	1190	1	-43	38	SM490Y	2673	14	12.8
13	9	4760	3	1190	1	-20	41	SM490Y	2673	14	12.8

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm²)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
14	9	4760	3	1190	1	-20	41	SM490Y	2673	14	12.8
14	9	4760	3	1190	1	-57	45	SM490Y	2673	14	12.8
14	10	4760	3	1190	1	-52	44	SM490Y	2673	14	12.8
14	10	4760	3	1190	1	-59	45	SM490Y	2673	14	12.8
15	10	4660	3	1165	1	-59	45	SM490Y	2673	14	12.8
15	10	4660	3	1165	1	-117	48	SM490Y	2673	14	12.8
16	10	4660	3	1165	1	-117	48	SM490Y	2673	14	12.8
16	10	4660	3	1165	1	-141	50	SM490Y	2673	14	12.8
16	11	4660	3	1165	1	-131	49	SM490Y	2673	14	12.8
16	11	4660	3	1165	1	-171	52	SM490Y	2673	14	12.8
17	11	4735	3	1184	1	-171	41	SM490Y	2673	14	12.8
17	11	4735	3	1184	1	-141	39	SM490Y	2673	14	12.8
17	12	4735	3	1184	1	-152	39	SM490Y	2673	14	12.8
17	12	4735	3	1184	1	-134	37	SM490Y	2673	14	12.8
18	12	4735	3	1184	1	-134	37	SM490Y	2673	14	12.8
18	12	4735	3	1184	1	-93	34	SM490Y	2673	14	12.8
19	12	4810	3	1203	1	-93	33	SM490Y	2673	14	12.8
19	12	4810	3	1203	1	-88	33	SM490Y	2673	14	12.8
19	13	4810	3	1203	1	-95	33	SM490Y	2673	14	12.8
19	13	4810	3	1203	1	-64	29	SM490Y	2673	14	12.8
20	13	4810	3	1203	1	-64	29	SM490Y	2673	14	12.8
20	13	4810	3	1203	1	-40	26	SM490Y	2673	14	12.8
20	14	4810	3	1203	1	-40	26	SM490Y	2673	14	12.8
20	14	4810	3	1203	1	-37	26	SM490Y	2673	14	12.8
21	14	4810	3	1203	1	-37	23	SM490Y	2673	14	12.8
21	14	4810	3	1203	1	-22	19	SM490Y	2673	14	12.8
22	14	4810	3	1203	1	-22	19	SM490Y	2673	14	12.8
22	14	4810	3	1203	1	-26	17	SM490Y	2673	14	12.8
22	15	4810	3	1203	1	-26	17	SM490Y	2673	14	12.8
22	15	4810	3	1203	1	-29	16	SM490Y	2673	14	12.8
23	15	4810	3	1203	1	-29	13	SM490Y	2673	14	12.8
23	15	4810	3	1203	1	-31	10	SM490Y	2673	14	12.8
24	15	4810	3	1203	1	-31	10	SM490Y	2673	14	12.8
24	15	4810	3	1203	1	-31	10	SM490Y	2673	14	12.8
24	16	4810	3	1203	1	-31	10	SM490Y	2673	14	12.8
24	16	4810	3	1203	1	-31	11	SM490Y	2673	14	12.8
24	16	4810	3	1203	1	-30	14	SM490Y	2673	14	12.8
25	16	4810	3	1203	1	-30	15	SM490Y	2673	14	12.8
25	16	4810	3	1203	1	-33	18	SM490Y	2673	14	12.8
25	17	4810	3	1203	1	-33	18	SM490Y	2673	14	12.8
25	17	4810	3	1203	1	-35	18	SM490Y	2673	14	12.8
26	17	4810	3	1203	1	-35	18	SM490Y	2673	14	12.8
26	17	4810	3	1203	1	-57	23	SM490Y	2673	14	12.8

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm²)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
27	17	4810	3	1203	1	-57	24	SM490Y	2673	14	12.8
27	17	4810	3	1203	1	-67	26	SM490Y	2673	14	12.8
27	18	4810	3	1203	1	-67	26	SM490Y	2673	14	12.8
27	18	4810	3	1203	1	-85	28	SM490Y	2673	14	12.8
28	18	4810	3	1203	1	-85	28	SM490Y	2673	14	12.8
28	18	4810	3	1203	1	-118	32	SM490Y	2673	14	12.8
29	18	4810	3	1203	1	-118	33	SM490Y	2673	14	12.8
29	18	4810	3	1203	1	-123	34	SM490Y	2673	14	12.8
29	19	4810	3	1203	1	-105	33	SM490Y	2673	14	12.8
29	19	4810	3	1203	1	-139	36	SM490Y	2673	14	12.8
30	19	4810	3	1203	1	-139	37	SM490Y	2673	14	12.8
30	19	4810	3	1203	1	-175	40	SM490Y	2673	14	12.8
30	20	4810	3	1203	1	-133	40	SM490Y	2673	14	12.8
30	20	4810	3	1203	1	-138	40	SM490Y	2673	14	12.8
31	20	4735	3	1184	1	-138	42	SM490Y	2673	14	12.8
31	20	4735	3	1184	1	-177	45	SM490Y	2673	14	12.8
32	20	4735	3	1134	1	-177	46	SM490Y	2673	14	12.8
32	20	4735	3	1234	1	-191	47	SM490Y	2673	14	12.8
32	21	4735	3	1234	1	-160	47	SM490Y	2673	14	12.8
32	21	4735	3	1184	1	-187	50	SM490Y	2673	14	12.8
33	21	4460	3	1115	1	-187	63	SM490Y	2673	14	12.8
33	21	4460	3	1165	1	-152	60	SM490Y	2673	14	12.8
33	22	4460	3	1165	1	-187	61	SM490Y	2673	14	12.8
33	22	4460	3	1065	1	-167	59	SM490Y	2673	14	12.8
34	22	4460	3	1115	1	-167	60	SM490Y	2673	14	12.8
34	22	4460	3	1115	1	-111	57	SM490Y	2673	14	12.8
35	22	4710	3	1178	1	-111	57	SM490Y	2673	14	12.8
35	22	4710	3	1178	1	-105	57	SM490Y	2673	14	12.8
35	23	4710	3	1178	1	-150	58	SM490Y	2673	14	12.8
35	23	4710	3	1178	1	-88	55	SM490Y	2673	14	12.8
36	23	4710	3	1178	1	-88	55	SM490Y	2673	14	12.8
36	23	4710	3	1178	1	-48	53	SM490Y	2673	14	12.8
36	24	4710	3	1178	1	-48	53	SM490Y	2673	14	12.8
36	24	4710	3	1178	1	-25	52	SM490Y	2673	14	12.8
37	24	4710	3	1178	1	-25	50	SM490Y	2673	14	12.8
37	24	4710	3	1178	1	-45	46	SM490Y	2673	14	12.8
38	25	4710	3	1178	1	-46	46	SM490Y	2673	14	12.8
38	25	4710	3	1178	1	-58	45	SM490Y	2673	14	12.8
38	26	4710	3	1178	1	-56	43	SM490Y	2673	14	12.8
38	26	4710	3	1178	1	-74	41	SM490Y	2673	14	12.8
39	26	4710	3	1178	1	-74	43	SM490Y	2673	14	12.8
39	26	4710	3	1178	1	-102	39	SM490Y	2673	14	12.8

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm²)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
40	26	4710	3	1178	1	-102	38	SM490Y	2673	14	12.8
40	26	4710	3	1178	1	-105	38	SM490Y	2673	14	12.8
40	27	4710	3	1178	1	-101	37	SM490Y	2673	14	12.8
40	27	4710	3	1178	1	-122	34	SM490Y	2673	14	12.8
41	27	4710	3	1178	1	-122	32	SM490Y	2673	14	12.8
41	27	4710	3	1178	1	-140	29	SM490Y	2673	14	12.8
41	28	4710	3	1178	1	-136	29	SM490Y	2673	14	12.8
41	28	4710	3	1178	1	-139	28	SM490Y	2673	14	12.8
42	28	4743	3	1178	1	-140	28	SM490Y	2673	14	12.8
42	28	4743	3	1194	1	-152	25	SM490Y	2673	14	12.8
43	28	4661	3	1165	1	-152	23	SM490Y	2673	14	12.8
43	28	4661	3	1225	1	-158	21	SM490Y	2673	14	12.8
43	29	4661	3	1225	1	-157	21	SM490Y	2673	14	12.8
43	29	4661	3	1105	1	-159	20	SM490Y	2673	14	12.8
44	29	4681	3	1165	1	-159	19	SM490Y	2673	14	12.8
44	29	4681	3	1175	1	-164	15	SM490Y	2673	14	12.8
45	29	4705	3	1076	1	-163	14	SM490Y	2673	14	12.8
45	29	4705	3	1276	1	-163	13	SM490Y	2673	14	12.8
45	30	4705	3	1276	1	-163	13	SM490Y	2673	14	12.8
45	30	4705	3	1176	1	-157	10	SM490Y	2673	14	12.8
46	30	4705	3	1176	1	-157	10	SM490Y	2673	14	12.8
46	30	4705	3	1176	1	-157	9	SM490Y	2673	14	12.8
46	30	4705	3	1226	1	-155	11	SM490Y	2673	14	12.8
46	31	4705	3	1226	1	-155	11	SM490Y	2673	14	12.8
46	31	4705	3	1226	1	-154	12	SM490Y	2673	14	12.8
47	31	4706	3	1176	1	-154	13	SM490Y	2673	14	12.8
47	31	4706	3	1177	1	-148	16	SM490Y	2673	14	12.8
48	31	4706	3	1177	1	-148	16	SM490Y	2673	14	12.8
48	31	4706	3	1177	1	-145	18	SM490Y	2673	14	12.8
48	32	4706	3	1177	1	-146	18	SM490Y	2673	14	12.8
48	32	4706	3	1177	1	-140	20	SM490Y	2673	14	12.8
49	32	4707	3	1177	1	-135	24	SM490Y	2673	14	12.8
49	32	4707	3	1177	1	-121	28	SM490Y	2673	14	12.8
50	32	4708	3	1177	1	-121	28	SM490Y	2673	14	12.8
50	32	4708	3	1177	1	-119	28	SM490Y	2673	14	12.8
50	33	4708	3	1177	1	-121	28	SM490Y	2673	14	12.8
50	33	4708	3	1177	1	-106	32	SM490Y	2673	14	12.8
51	33	4708	3	1177	1	-106	38	SM490Y	2673	14	12.8
51	33	4708	3	1177	1	-84	41	SM490Y	2673	14	12.8
51	34	4708	3	1177	1	-87	42	SM490Y	2673	14	12.8
51	34	4708	3	1177	1	-84	43	SM490Y	2673	14	12.8
52	34	4740	3	1183	1	-83	43	SM490Y	2673	14	12.8
52	34	4740	3	1188	1	-57	48	SM490Y	2673	14	12.8

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm²)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
53	34	4727	3	1175	1	-57	46	SM490Y	2673	14	12.8
53	34	4727	3	1189	1	-41	48	SM490Y	2673	14	12.8
53	35	4727	3	1189	1	-43	50	SM490Y	2673	14	12.8
53	35	4727	3	1189	1	-33	52	SM490Y	2673	14	12.8
54	35	4650	3	1163	1	-33	53	SM490Y	2673	14	12.8
54	35	4650	3	1163	1	0	58	SM490Y	2673	14	12.8

(b)Check of spacing and required stiffness

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm^4)	Iv	VStf No	γh·req	Ih·req (cm^4)	Ih	HStf No
1	1	0.44	0.11	42.04	2803	3429	1	13.09	873	1006	1
1	1	0.44	0.10	42.11	2808	3429	1	13.08	872	1006	1
2	1	0.44	0.10	42.11	2808	3429	1	13.08	872	1006	1
2	1	0.44	0.11	42.11	2808	3429	1	13.08	872	1006	1
2	2	0.44	0.11	42.11	2808	3429	1	13.08	872	1006	1
2	2	0.44	0.12	42.11	2808	3429	1	13.08	872	1006	1
3	2	0.45	0.10	40.36	2691	3429	1	13.36	891	1006	1
3	2	0.45	0.12	40.36	2691	3429	1	13.36	891	1006	1
4	2	0.45	0.12	40.36	2691	3429	1	13.36	891	1006	1
4	2	0.45	0.13	40.36	2691	3429	1	13.36	891	1006	1
4	3	0.45	0.12	40.36	2691	3429	1	13.36	891	1006	1
4	3	0.45	0.14	40.36	2691	3429	1	13.36	891	1006	1
5	3	0.45	0.13	40.36	2691	3429	1	13.36	891	1006	1
5	3	0.45	0.15	40.36	2691	3429	1	13.36	891	1006	1
6	3	0.45	0.15	40.36	2691	3429	1	13.36	891	1006	1
6	3	0.45	0.15	40.36	2691	3429	1	13.36	891	1006	1
6	4	0.45	0.15	40.36	2691	3429	1	13.36	891	1006	1
6	4	0.45	0.16	40.36	2691	3429	1	13.36	891	1006	1
7	4	0.45	0.16	40.36	2691	3429	1	13.36	891	1006	1
7	4	0.45	0.16	40.36	2691	3429	1	13.36	891	1006	1
7	4	0.45	0.16	40.36	2691	3429	1	13.36	891	1006	1
7	5	0.45	0.16	40.36	2691	3429	1	13.36	891	1006	1
7	5	0.45	0.16	40.36	2691	3429	1	13.36	891	1006	1
8	5	0.45	0.16	40.36	2691	3429	1	13.36	891	1006	1
8	5	0.45	0.16	40.36	2691	3429	1	13.36	891	1006	1
9	5	0.45	0.16	40.36	2691	3429	1	13.36	891	1006	1
9	5	0.45	0.15	40.36	2691	3429	1	13.36	891	1006	1
9	6	0.45	0.15	40.36	2691	3429	1	13.36	891	1006	1
9	6	0.45	0.14	40.36	2691	3429	1	13.36	891	1006	1
10	6	0.45	0.14	40.36	2691	3429	1	13.36	891	1006	1
10	6	0.45	0.13	40.36	2691	3429	1	13.36	891	1006	1

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm⁴)	Iv	VStf No	γh·req	Ih·req (cm⁴)	Ih	HStf No
11	6	0.45	0.13	40.36	2691	3429	1	13.36	891	1006	1
11	6	0.45	0.12	40.36	2691	3429	1	13.36	891	1006	1
11	7	0.45	0.13	40.36	2691	3429	1	13.36	891	1006	1
11	7	0.45	0.11	40.36	2691	3429	1	13.36	891	1006	1
12	7	0.45	0.12	40.36	2691	3429	1	13.36	891	1006	1
12	7	0.45	0.10	40.36	2691	3429	1	13.36	891	1006	1
13	8	0.45	0.12	40.36	2691	3429	1	13.36	891	1006	1
13	8	0.45	0.11	40.36	2691	3429	1	13.36	891	1006	1
13	9	0.45	0.11	40.36	2691	3429	1	13.36	891	1006	1
13	9	0.45	0.10	40.36	2691	3429	1	13.36	891	1006	1
14	9	0.45	0.10	40.36	2691	3429	1	13.36	891	1006	1
14	9	0.45	0.17	40.36	2691	3429	1	13.36	891	1006	1
14	10	0.45	0.16	40.36	2691	3429	1	13.36	891	1006	1
14	10	0.45	0.17	40.36	2691	3429	1	13.36	891	1006	1
15	10	0.44	0.17	42.11	2808	3429	1	13.08	872	1006	1
15	10	0.44	0.35	42.11	2808	3429	1	13.08	872	1006	1
16	10	0.44	0.35	42.11	2808	3429	1	13.08	872	1006	1
16	10	0.44	0.46	42.11	2808	3429	1	13.08	872	1006	1
16	11	0.44	0.41	42.11	2808	3429	1	13.08	872	1006	1
16	11	0.44	0.63	42.11	2808	3429	1	13.08	872	1006	1
17	11	0.44	0.58	40.79	2720	3429	1	13.29	886	1006	1
17	11	0.44	0.41	40.79	2720	3429	1	13.29	886	1006	1
17	12	0.44	0.47	40.79	2720	3429	1	13.29	886	1006	1
17	12	0.44	0.37	40.79	2720	3429	1	13.29	886	1006	1
18	12	0.44	0.37	40.79	2720	3429	1	13.29	886	1006	1
18	12	0.44	0.21	40.79	2720	3429	1	13.29	886	1006	1
19	12	0.45	0.21	39.52	2635	3429	1	13.50	900	1006	1
19	12	0.45	0.19	39.52	2635	3429	1	13.50	900	1006	1
19	13	0.45	0.21	39.52	2635	3429	1	13.50	900	1006	1
19	13	0.45	0.12	39.52	2635	3429	1	13.50	900	1006	1
20	13	0.45	0.12	39.52	2635	3429	1	13.50	900	1006	1
20	13	0.45	0.07	39.52	2635	3429	1	13.50	900	1006	1
20	14	0.45	0.07	39.52	2635	3429	1	13.50	900	1006	1
20	14	0.45	0.06	39.52	2635	3429	1	13.50	900	1006	1
21	14	0.45	0.06	39.52	2635	3429	1	13.50	900	1006	1
21	14	0.45	0.03	39.52	2635	3429	1	13.50	900	1006	1
22	14	0.45	0.03	39.52	2635	3429	1	13.50	900	1006	1
22	14	0.45	0.03	39.52	2635	3429	1	13.50	900	1006	1
22	15	0.45	0.03	39.52	2635	3429	1	13.50	900	1006	1
22	15	0.45	0.03	39.52	2635	3429	1	13.50	900	1006	1
23	15	0.45	0.02	39.52	2635	3429	1	13.50	900	1006	1
23	15	0.45	0.02	39.52	2635	3429	1	13.50	900	1006	1

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm^4)	Iv	VStf No	γh·req	Ih·req (cm^4)	Ih	HStf No
24	15	0.45	0.02	39.52	2635	3429	1	13.50	900	1006	1
24	15	0.45	0.02	39.52	2635	3429	1	13.50	900	1006	1
24	16	0.45	0.02	39.52	2635	3429	1	13.50	900	1006	1
24	16	0.45	0.02	39.52	2635	3429	1	13.50	900	1006	1
24	16	0.45	0.03	39.52	2635	3429	1	13.50	900	1006	1
25	16	0.45	0.03	39.52	2635	3429	1	13.50	900	1006	1
25	16	0.45	0.04	39.52	2635	3429	1	13.50	900	1006	1
25	17	0.45	0.04	39.52	2635	3429	1	13.50	900	1006	1
25	17	0.45	0.04	39.52	2635	3429	1	13.50	900	1006	1
26	17	0.45	0.04	39.52	2635	3429	1	13.50	900	1006	1
26	17	0.45	0.08	39.52	2635	3429	1	13.50	900	1006	1
27	17	0.45	0.09	39.52	2635	3429	1	13.50	900	1006	1
27	17	0.45	0.11	39.52	2635	3429	1	13.50	900	1006	1
27	18	0.45	0.11	39.52	2635	3429	1	13.50	900	1006	1
27	18	0.45	0.16	39.52	2635	3429	1	13.50	900	1006	1
28	18	0.45	0.16	39.52	2635	3429	1	13.50	900	1006	1
28	18	0.45	0.29	39.52	2635	3429	1	13.50	900	1006	1
29	18	0.45	0.30	39.52	2635	3429	1	13.50	900	1006	1
29	18	0.45	0.32	39.52	2635	3429	1	13.50	900	1006	1
29	19	0.45	0.25	39.52	2635	3429	1	13.50	900	1006	1
29	19	0.45	0.40	39.52	2635	3429	1	13.50	900	1006	1
30	19	0.45	0.40	39.52	2635	3429	1	13.50	900	1006	1
30	19	0.45	0.60	39.52	2635	3429	1	13.50	900	1006	1
30	20	0.45	0.39	39.52	2635	3429	1	13.50	900	1006	1
30	20	0.45	0.41	39.52	2635	3429	1	13.50	900	1006	1
31	20	0.44	0.41	40.79	2720	3429	1	13.29	886	1006	1
31	20	0.44	0.63	40.79	2720	3429	1	13.29	886	1006	1
32	20	0.42	0.62	44.46	2965	3429	1	12.73	848	1006	1
32	20	0.46	0.74	37.55	2504	3429	1	13.85	923	1006	1
32	21	0.46	0.56	37.55	2504	3429	1	13.85	923	1006	1
32	21	0.44	0.71	40.79	2720	3429	1	13.29	886	1006	1
33	21	0.42	0.76	45.98	3066	3429	1	12.51	834	1006	1
33	21	0.44	0.58	42.12	2809	3429	1	13.07	872	1006	1
33	22	0.44	0.77	42.12	2809	3429	1	13.07	872	1006	1
33	22	0.40	0.60	50.40	3361	3429	1	11.95	797	1006	1
34	22	0.42	0.63	45.98	3066	3429	1	12.51	834	1006	1
34	22	0.42	0.35	45.98	3066	3429	1	12.51	834	1006	1
35	22	0.44	0.39	41.22	2748	3429	1	13.22	881	1006	1
35	22	0.44	0.36	41.22	2748	3429	1	13.22	881	1006	1
35	23	0.44	0.56	41.22	2748	3429	1	13.22	881	1006	1
35	23	0.44	0.29	41.22	2748	3429	1	13.22	881	1006	1
36	23	0.44	0.30	41.22	2748	3429	1	13.22	881	1006	1
36	23	0.44	0.19	41.22	2748	3429	1	13.22	881	1006	1
36	24	0.44	0.19	41.22	2748	3429	1	13.22	881	1006	1
36	24	0.44	0.16	41.22	2748	3429	1	13.22	881	1006	1

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm^4)	Iv	VStf No	γh·req	Ih·req (cm^4)	Ih	HStf No
37	24	0.44	0.15	41.22	2748	3429	1	13.22	881	1006	1
37	24	0.44	0.15	41.22	2748	3429	1	13.22	881	1006	1
38	25	0.44	0.15	41.22	2748	3429	1	13.22	881	1006	1
38	25	0.44	0.17	41.22	2748	3429	1	13.22	881	1006	1
38	26	0.44	0.16	41.22	2748	3429	1	13.22	881	1006	1
38	26	0.44	0.19	41.22	2748	3429	1	13.22	881	1006	1
39	26	0.44	0.19	41.22	2748	3429	1	13.22	881	1006	1
39	26	0.44	0.25	41.22	2748	3429	1	13.22	881	1006	1
40	26	0.44	0.25	41.22	2748	3429	1	13.22	881	1006	1
40	26	0.44	0.26	41.22	2748	3429	1	13.22	881	1006	1
40	27	0.44	0.24	41.22	2748	3429	1	13.22	881	1006	1
40	27	0.44	0.31	41.22	2748	3429	1	13.22	881	1006	1
41	27	0.44	0.30	41.22	2748	3429	1	13.22	881	1006	1
41	27	0.44	0.37	41.22	2748	3429	1	13.22	881	1006	1
41	28	0.44	0.35	41.22	2748	3429	1	13.22	881	1006	1
41	28	0.44	0.36	41.22	2748	3429	1	13.22	881	1006	1
42	28	0.44	0.37	41.22	2748	3429	1	13.22	881	1006	1
42	28	0.45	0.41	40.12	2675	3429	1	13.40	893	1006	1
43	28	0.44	0.41	42.09	2807	3429	1	13.08	872	1006	1
43	28	0.46	0.44	38.07	2539	3429	1	13.75	917	1006	1
43	29	0.46	0.43	38.07	2539	3429	1	13.75	917	1006	1
43	29	0.41	0.43	46.79	3120	3429	1	12.41	827	1006	1
44	29	0.44	0.43	42.08	2806	3429	1	13.08	872	1006	1
44	29	0.44	0.45	41.39	2760	3429	1	13.19	879	1006	1
45	29	0.40	0.44	49.35	3290	3429	1	12.08	805	1006	1
45	29	0.48	0.45	35.09	2340	3429	1	14.32	955	1006	1
45	30	0.48	0.45	35.09	2340	3429	1	14.32	955	1006	1
45	30	0.44	0.41	41.31	2755	3429	1	13.20	880	1006	1
46	30	0.44	0.41	41.31	2754	3429	1	13.20	880	1006	1
46	30	0.44	0.41	41.31	2754	3429	1	13.20	880	1006	1
46	30	0.46	0.40	38.00	2534	3429	1	13.77	918	1006	1
46	31	0.46	0.40	38.00	2534	3429	1	13.77	918	1006	1
46	31	0.46	0.40	38.00	2534	3429	1	13.77	918	1006	1
47	31	0.44	0.40	41.30	2754	3429	1	13.20	880	1006	1
47	31	0.44	0.37	41.29	2753	3429	1	13.20	880	1006	1
48	31	0.44	0.37	41.29	2753	3429	1	13.20	880	1006	1
48	31	0.44	0.36	41.29	2753	3429	1	13.21	880	1006	1
48	32	0.44	0.37	41.29	2753	3429	1	13.21	880	1006	1
48	32	0.44	0.34	41.28	2753	3429	1	13.21	881	1006	1
49	32	0.44	0.33	41.28	2752	3429	1	13.21	881	1006	1
49	32	0.44	0.28	41.27	2752	3429	1	13.21	881	1006	1
50	32	0.44	0.28	41.27	2752	3429	1	13.21	881	1006	1
50	32	0.44	0.28	41.27	2752	3429	1	13.21	881	1006	1
50	33	0.44	0.29	41.27	2752	3429	1	13.21	881	1006	1
50	33	0.44	0.24	41.26	2751	3429	1	13.21	881	1006	1

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm^4)	Iv	VStf No	γh·req	Ih·req (cm^4)	Ih	HStf No
51	33	0.44	0.27	41.26	2751	3429	1	13.21	881	1006	1
51	33	0.44	0.21	41.25	2750	3429	1	13.21	881	1006	1
51	34	0.44	0.22	41.25	2750	3429	1	13.21	881	1006	1
51	34	0.44	0.22	41.25	2750	3429	1	13.21	881	1006	1
52	34	0.44	0.22	40.87	2725	3429	1	13.27	885	1006	1
52	34	0.44	0.19	40.52	2702	3429	1	13.33	889	1006	1
53	34	0.44	0.17	41.41	2761	3429	1	13.19	879	1006	1
53	34	0.44	0.16	40.46	2698	3429	1	13.34	890	1006	1
53	35	0.44	0.17	40.46	2698	3429	1	13.34	890	1006	1
53	35	0.44	0.17	40.46	2698	3429	1	13.34	890	1006	1
54	35	0.43	0.17	42.30	2820	3429	1	13.05	870	1006	1
54	35	0.43	0.18	42.30	2820	3429	1	13.05	870	1006	1

4）Main girder G2　 Web name：RWEB

(a) Check of section and web thickness

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm^2)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
1	1	4655	3	1164	1	0	47	SM490Y	2727	14	13.0
1	1	4655	3	1164	1	-30	42	SM490Y	2727	14	13.0
2	1	4654	3	1164	1	-30	42	SM490Y	2727	14	13.0
2	1	4654	3	1164	1	-47	40	SM490Y	2727	14	13.0
2	2	4654	3	1164	1	-47	40	SM490Y	2727	14	13.0
2	2	4654	3	1164	1	-56	39	SM490Y	2727	14	13.0
3	2	4754	3	1189	1	-56	33	SM490Y	2727	14	13.0
3	2	4754	3	1189	1	-75	28	SM490Y	2727	14	13.0
4	2	4754	3	1189	1	-75	28	SM490Y	2727	14	13.0
4	2	4754	3	1189	1	-81	27	SM490Y	2727	14	13.0
4	3	4754	3	1189	1	-77	26	SM490Y	2727	14	13.0
4	3	4754	3	1189	1	-85	24	SM490Y	2727	14	13.0
5	3	4754	3	1189	1	-85	23	SM490Y	2727	14	13.0
5	3	4754	3	1189	1	-95	18	SM490Y	2727	14	13.0
6	3	4754	3	1189	1	-95	18	SM490Y	2727	14	13.0
6	3	4754	3	1189	1	-96	18	SM490Y	2727	14	13.0
6	4	4754	3	1189	1	-96	18	SM490Y	2727	14	13.0
6	4	4754	3	1189	1	-102	15	SM490Y	2727	14	13.0
7	4	4754	3	1189	1	-102	11	SM490Y	2727	14	13.0
7	4	4754	3	1189	1	-103	8	SM490Y	2727	14	13.0
7	4	4754	3	1189	1	-103	8	SM490Y	2727	14	13.0
7	5	4754	3	1189	1	-103	8	SM490Y	2727	14	13.0
7	5	4754	3	1189	1	-103	9	SM490Y	2727	14	13.0
8	5	4754	3	1189	1	-103	9	SM490Y	2727	14	13.0
8	5	4754	3	1189	1	-100	14	SM490Y	2727	14	13.0

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm²)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
9	5	4754	3	1189	1	-100	15	SM490Y	2727	14	13.0
9	5	4754	3	1189	1	-96	17	SM490Y	2727	14	13.0
9	6	4754	3	1189	1	-96	17	SM490Y	2727	14	13.0
9	6	4754	3	1189	1	-92	18	SM490Y	2727	14	13.0
10	6	4754	3	1189	1	-92	19	SM490Y	2727	14	13.0
10	6	4754	3	1189	1	-82	23	SM490Y	2727	14	13.0
11	6	4754	3	1189	1	-82	25	SM490Y	2727	14	13.0
11	6	4754	3	1189	1	-76	27	SM490Y	2727	14	13.0
11	7	4754	3	1189	1	-80	27	SM490Y	2727	14	13.0
11	7	4754	3	1189	1	-70	29	SM490Y	2727	14	13.0
12	7	4754	3	1189	1	-70	30	SM490Y	2727	14	13.0
12	7	4754	3	1189	1	-50	34	SM490Y	2727	14	13.0
13	8	4754	3	1189	1	-48	40	SM490Y	2727	14	13.0
13	8	4754	3	1189	1	-45	40	SM490Y	2727	14	13.0
13	9	4754	3	1189	1	-45	40	SM490Y	2727	14	13.0
13	9	4754	3	1189	1	-21	43	SM490Y	2727	14	13.0
14	9	4754	3	1189	1	-21	43	SM490Y	2727	14	13.0
14	9	4754	3	1189	1	-57	47	SM490Y	2727	14	13.0
14	10	4754	3	1189	1	-52	47	SM490Y	2727	14	13.0
14	10	4754	3	1189	1	-59	48	SM490Y	2727	14	13.0
15	10	4654	3	1164	1	-59	48	SM490Y	2727	14	13.0
15	10	4654	3	1164	1	-117	52	SM490Y	2727	14	13.0
16	10	4654	3	1164	1	-117	51	SM490Y	2727	14	13.0
16	10	4654	3	1164	1	-141	53	SM490Y	2727	14	13.0
16	11	4654	3	1164	1	-131	53	SM490Y	2727	14	13.0
16	11	4654	3	1164	1	-171	56	SM490Y	2727	14	13.0
17	11	4729	3	1182	1	-171	44	SM490Y	2727	14	13.0
17	11	4729	3	1182	1	-141	41	SM490Y	2727	14	13.0
17	12	4729	3	1182	1	-152	42	SM490Y	2727	14	13.0
17	12	4729	3	1182	1	-134	40	SM490Y	2727	14	13.0
18	12	4729	3	1182	1	-134	40	SM490Y	2727	14	13.0
18	12	4729	3	1182	1	-93	36	SM490Y	2727	14	13.0
19	12	4804	3	1201	1	-93	36	SM490Y	2727	14	13.0
19	12	4804	3	1201	1	-88	35	SM490Y	2727	14	13.0
19	13	4804	3	1201	1	-95	35	SM490Y	2727	14	13.0
19	13	4804	3	1201	1	-64	31	SM490Y	2727	14	13.0
20	13	4804	3	1201	1	-64	31	SM490Y	2727	14	13.0
20	13	4804	3	1201	1	-40	28	SM490Y	2727	14	13.0
20	14	4804	3	1201	1	-40	28	SM490Y	2727	14	13.0
20	14	4804	3	1201	1	-37	28	SM490Y	2727	14	13.0
21	14	4804	3	1201	1	-37	25	SM490Y	2727	14	13.0
21	14	4804	3	1201	1	-22	20	SM490Y	2727	14	13.0

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm²)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
22	14	4804	3	1201	1	-22	20	SM490Y	2727	14	13.0
22	14	4804	3	1201	1	-28	18	SM490Y	2727	14	13.0
22	15	4804	3	1201	1	-28	18	SM490Y	2727	14	13.0
22	15	4804	3	1201	1	-31	17	SM490Y	2727	14	13.0
23	15	4804	3	1201	1	-31	14	SM490Y	2727	14	13.0
23	15	4804	3	1201	1	-33	10	SM490Y	2727	14	13.0
24	15	4804	3	1201	1	-33	10	SM490Y	2727	14	13.0
24	15	4804	3	1201	1	-33	11	SM490Y	2727	14	13.0
24	16	4804	3	1201	1	-33	11	SM490Y	2727	14	13.0
24	16	4804	3	1201	1	-33	12	SM490Y	2727	14	13.0
24	16	4804	3	1201	1	-32	15	SM490Y	2727	14	13.0
25	16	4804	3	1201	1	-32	16	SM490Y	2727	14	13.0
25	16	4804	3	1201	1	-33	19	SM490Y	2727	14	13.0
25	17	4804	3	1201	1	-33	19	SM490Y	2727	14	13.0
25	17	4804	3	1201	1	-35	20	SM490Y	2727	14	13.0
26	17	4804	3	1201	1	-35	20	SM490Y	2727	14	13.0
26	17	4804	3	1201	1	-57	24	SM490Y	2727	14	13.0
27	17	4804	3	1201	1	-57	26	SM490Y	2727	14	13.0
27	17	4804	3	1201	1	-67	27	SM490Y	2727	14	13.0
27	18	4804	3	1201	1	-67	27	SM490Y	2727	14	13.0
27	18	4804	3	1201	1	-85	29	SM490Y	2727	14	13.0
28	18	4804	3	1201	1	-85	29	SM490Y	2727	14	13.0
28	18	4804	3	1201	1	-119	34	SM490Y	2727	14	13.0
29	18	4804	3	1201	1	-119	35	SM490Y	2727	14	13.0
29	18	4804	3	1201	1	-123	36	SM490Y	2727	14	13.0
29	19	4804	3	1201	1	-106	36	SM490Y	2727	14	13.0
29	19	4804	3	1201	1	-139	39	SM490Y	2727	14	13.0
30	19	4804	3	1201	1	-139	39	SM490Y	2727	14	13.0
30	19	4804	3	1201	1	-176	43	SM490Y	2727	14	13.0
30	20	4804	3	1201	1	-133	42	SM490Y	2727	14	13.0
30	20	4804	3	1201	1	-138	43	SM490Y	2727	14	13.0
31	20	4729	3	1182	1	-138	45	SM490Y	2727	14	13.0
31	20	4729	3	1182	1	-177	49	SM490Y	2727	14	13.0
32	20	4729	3	1132	1	-177	49	SM490Y	2727	14	13.0
32	20	4729	3	1232	1	-191	51	SM490Y	2727	14	13.0
32	21	4729	3	1232	1	-160	50	SM490Y	2727	14	13.0
32	21	4729	3	1182	1	-187	53	SM490Y	2727	14	13.0
33	21	4454	3	1113	1	-187	67	SM490Y	2727	14	13.0
33	21	4454	3	1163	1	-153	65	SM490Y	2727	14	13.0
33	22	4454	3	1163	1	-187	65	SM490Y	2727	14	13.0
33	22	4454	3	1063	1	-167	64	SM490Y	2727	14	13.0
34	22	4454	3	1113	1	-167	64	SM490Y	2727	14	13.0
34	22	4454	3	1113	1	-111	61	SM490Y	2727	14	13.0

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm^2)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
35	22	4704	3	1176	1	-111	62	SM490Y	2727	14	13.0
35	22	4704	3	1176	1	-105	61	SM490Y	2727	14	13.0
35	23	4704	3	1176	1	-150	62	SM490Y	2727	14	13.0
35	23	4704	3	1176	1	-88	58	SM490Y	2727	14	13.0
36	23	4704	3	1176	1	-88	58	SM490Y	2727	14	13.0
36	23	4704	3	1176	1	-48	56	SM490Y	2727	14	13.0
36	24	4704	3	1176	1	-48	56	SM490Y	2727	14	13.0
36	24	4704	3	1176	1	-25	55	SM490Y	2727	14	13.0
37	24	4704	3	1176	1	-25	53	SM490Y	2727	14	13.0
37	24	4704	3	1176	1	-48	48	SM490Y	2727	14	13.0
38	25	4704	3	1176	1	-49	49	SM490Y	2727	14	13.0
38	25	4704	3	1176	1	-62	47	SM490Y	2727	14	13.0
38	26	4704	3	1176	1	-59	47	SM490Y	2727	14	13.0
38	26	4704	3	1176	1	-78	44	SM490Y	2727	14	13.0
39	26	4704	3	1176	1	-78	46	SM490Y	2727	14	13.0
39	26	4704	3	1176	1	-108	41	SM490Y	2727	14	13.0
40	26	4704	3	1176	1	-108	41	SM490Y	2727	14	13.0
40	26	4704	3	1176	1	-111	40	SM490Y	2727	14	13.0
40	27	4704	3	1176	1	-106	40	SM490Y	2727	14	13.0
40	27	4704	3	1176	1	-128	37	SM490Y	2727	14	13.0
41	27	4704	3	1176	1	-128	35	SM490Y	2727	14	13.0
41	27	4704	3	1176	1	-146	31	SM490Y	2727	14	13.0
41	28	4704	3	1176	1	-142	31	SM490Y	2727	14	13.0
41	28	4704	3	1176	1	-145	31	SM490Y	2727	14	13.0
42	28	4704	3	1176	1	-145	30	SM490Y	2727	14	13.0
42	28	4704	3	1176	1	-157	27	SM490Y	2727	14	13.0
43	28	4704	3	1176	1	-157	25	SM490Y	2727	14	13.0
43	28	4704	3	1236	1	-163	22	SM490Y	2727	14	13.0
43	29	4704	3	1236	1	-162	22	SM490Y	2727	14	13.0
43	29	4704	3	1116	1	-164	21	SM490Y	2727	14	13.0
44	29	4704	3	1176	1	-164	20	SM490Y	2727	14	13.0
44	29	4704	3	1176	1	-169	17	SM490Y	2727	14	13.0
45	29	4705	3	1076	1	-169	15	SM490Y	2727	14	13.0
45	29	4705	3	1276	1	-170	14	SM490Y	2727	14	13.0
45	30	4705	3	1276	1	-170	14	SM490Y	2727	14	13.0
45	30	4705	3	1176	1	-164	11	SM490Y	2727	14	13.0
46	30	4705	3	1176	1	-164	11	SM490Y	2727	14	13.0
46	30	4705	3	1176	1	-163	10	SM490Y	2727	14	13.0
46	30	4705	3	1226	1	-162	12	SM490Y	2727	14	13.0
46	31	4705	3	1226	1	-162	12	SM490Y	2727	14	13.0
46	31	4705	3	1226	1	-161	13	SM490Y	2727	14	13.0
47	31	4706	3	1176	1	-161	14	SM490Y	2727	14	13.0
47	31	4706	3	1177	1	-154	18	SM490Y	2727	14	13.0

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm²)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
48	31	4706	3	1177	1	-154	18	SM490Y	2727	14	13.0
48	31	4706	3	1177	1	-151	19	SM490Y	2727	14	13.0
48	32	4706	3	1177	1	-153	19	SM490Y	2727	14	13.0
48	32	4706	3	1177	1	-146	22	SM490Y	2727	14	13.0
49	32	4707	3	1177	1	-141	27	SM490Y	2727	14	13.0
49	32	4707	3	1177	1	-127	31	SM490Y	2727	14	13.0
50	32	4708	3	1177	1	-127	31	SM490Y	2727	14	13.0
50	32	4708	3	1177	1	-125	32	SM490Y	2727	14	13.0
50	33	4708	3	1177	1	-127	32	SM490Y	2727	14	13.0
50	33	4708	3	1177	1	-112	36	SM490Y	2727	14	13.0
51	33	4708	3	1177	1	-112	43	SM490Y	2727	14	13.0
51	33	4708	3	1177	1	-88	47	SM490Y	2727	14	13.0
51	34	4708	3	1177	1	-92	48	SM490Y	2727	14	13.0
51	34	4708	3	1177	1	-89	49	SM490Y	2727	14	13.0
52	34	4708	3	1177	1	-89	50	SM490Y	2727	14	13.0
52	34	4708	3	1177	1	-61	55	SM490Y	2727	14	13.0
53	34	4656	3	1164	1	-61	53	SM490Y	2727	14	13.0
53	34	4656	3	1164	1	-44	55	SM490Y	2727	14	13.0
53	35	4656	3	1164	1	-47	57	SM490Y	2727	14	13.0
53	35	4656	3	1164	1	-36	58	SM490Y	2727	14	13.0
54	35	4650	3	1163	1	-36	59	SM490Y	2727	14	13.0
54	35	4650	3	1163	1	0	65	SM490Y	2727	14	13.0

(b)Check of spacing and required stiffness

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm⁴)	Iv	VStf No	γh·req	Ih·req (cm⁴)	Ih	HStf No
1	1	0.43	0.12	43.92	2988	3429	1	12.80	871	1006	1
1	1	0.43	0.11	43.95	2990	3429	1	12.80	871	1006	1
2	1	0.43	0.11	43.95	2990	3429	1	12.80	871	1006	1
2	1	0.43	0.13	43.95	2990	3429	1	12.80	871	1006	1
2	2	0.43	0.13	43.95	2990	3429	1	12.80	871	1006	1
2	2	0.43	0.14	43.95	2990	3429	1	12.80	871	1006	1
3	2	0.44	0.12	42.12	2865	3429	1	13.07	889	1006	1
3	2	0.44	0.15	42.12	2865	3429	1	13.07	889	1006	1
4	2	0.44	0.15	42.12	2865	3429	1	13.07	889	1006	1
4	2	0.44	0.16	42.12	2865	3429	1	13.07	889	1006	1
4	3	0.44	0.15	42.12	2865	3429	1	13.07	889	1006	1
4	3	0.44	0.16	42.12	2865	3429	1	13.07	889	1006	1
5	3	0.44	0.16	42.12	2865	3429	1	13.07	889	1006	1
5	3	0.44	0.18	42.12	2865	3429	1	13.07	889	1006	1
6	3	0.44	0.18	42.12	2865	3429	1	13.07	889	1006	1
6	3	0.44	0.18	42.12	2865	3429	1	13.07	889	1006	1
6	4	0.44	0.18	42.12	2865	3429	1	13.07	889	1006	1
6	4	0.44	0.20	42.12	2865	3429	1	13.07	889	1006	1

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm^4)	Iv	VStf No	γh·req	Ih·req (cm^4)	Ih	HStf No
7	4	0.44	0.19	42.12	2865	3429	1	13.07	889	1006	1
7	4	0.44	0.19	42.12	2865	3429	1	13.07	889	1006	1
7	4	0.44	0.19	42.12	2865	3429	1	13.07	889	1006	1
7	5	0.44	0.19	42.12	2865	3429	1	13.07	889	1006	1
7	5	0.44	0.19	42.12	2865	3429	1	13.07	889	1006	1
8	5	0.44	0.19	42.12	2865	3429	1	13.07	889	1006	1
8	5	0.44	0.19	42.12	2865	3429	1	13.07	889	1006	1
9	5	0.44	0.19	42.12	2865	3429	1	13.07	889	1006	1
9	5	0.44	0.18	42.12	2865	3429	1	13.07	889	1006	1
9	6	0.44	0.18	42.12	2865	3429	1	13.07	889	1006	1
9	6	0.44	0.17	42.12	2865	3429	1	13.07	889	1006	1
10	6	0.44	0.17	42.12	2865	3429	1	13.07	889	1006	1
10	6	0.44	0.15	42.12	2865	3429	1	13.07	889	1006	1
11	6	0.44	0.16	42.12	2865	3429	1	13.07	889	1006	1
11	6	0.44	0.15	42.12	2865	3429	1	13.07	889	1006	1
11	7	0.44	0.16	42.12	2865	3429	1	13.07	889	1006	1
11	7	0.44	0.14	42.12	2865	3429	1	13.07	889	1006	1
12	7	0.44	0.14	42.12	2865	3429	1	13.07	889	1006	1
12	7	0.44	0.11	42.12	2865	3429	1	13.07	889	1006	1
13	8	0.44	0.13	42.12	2865	3429	1	13.07	889	1006	1
13	8	0.44	0.13	42.12	2865	3429	1	13.07	889	1006	1
13	9	0.44	0.13	42.12	2865	3429	1	13.07	889	1006	1
13	9	0.44	0.12	42.12	2865	3429	1	13.07	889	1006	1
14	9	0.44	0.12	42.12	2865	3429	1	13.07	889	1006	1
14	9	0.44	0.19	42.12	2865	3429	1	13.07	889	1006	1
14	10	0.44	0.18	42.12	2865	3429	1	13.07	889	1006	1
14	10	0.44	0.20	42.12	2865	3429	1	13.07	889	1006	1
15	10	0.43	0.19	43.95	2990	3429	1	12.80	871	1006	1
15	10	0.43	0.39	43.95	2990	3429	1	12.80	871	1006	1
16	10	0.43	0.39	43.95	2990	3429	1	12.80	871	1006	1
16	10	0.43	0.51	43.95	2990	3429	1	12.80	871	1006	1
16	11	0.43	0.46	43.95	2990	3429	1	12.80	871	1006	1
16	11	0.43	0.69	43.95	2990	3429	1	12.80	871	1006	1
17	11	0.43	0.64	42.57	2896	3429	1	13.01	885	1006	1
17	11	0.43	0.45	42.57	2896	3429	1	13.01	885	1006	1
17	12	0.43	0.51	42.57	2896	3429	1	13.01	885	1006	1
17	12	0.43	0.41	42.57	2896	3429	1	13.01	885	1006	1
18	12	0.43	0.41	42.57	2896	3429	1	13.01	885	1006	1
18	12	0.43	0.23	42.57	2896	3429	1	13.01	885	1006	1
19	12	0.44	0.23	41.25	2806	3429	1	13.21	899	1006	1
19	12	0.44	0.21	41.25	2806	3429	1	13.21	899	1006	1
19	13	0.44	0.24	41.25	2806	3429	1	13.21	899	1006	1
19	13	0.44	0.13	41.25	2806	3429	1	13.21	899	1006	1

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm^4)	Iv	VStf No	γh·req	Ih·req (cm^4)	Ih	HStf No
20	13	0.44	0.13	41.25	2806	3429	1	13.21	899	1006	1
20	13	0.44	0.08	41.25	2806	3429	1	13.21	899	1006	1
20	14	0.44	0.08	41.25	2806	3429	1	13.21	899	1006	1
20	14	0.44	0.07	41.25	2806	3429	1	13.21	899	1006	1
21	14	0.44	0.06	41.25	2806	3429	1	13.21	899	1006	1
21	14	0.44	0.03	41.25	2806	3429	1	13.21	899	1006	1
22	14	0.44	0.03	41.25	2806	3429	1	13.21	899	1006	1
22	14	0.44	0.03	41.25	2806	3429	1	13.21	899	1006	1
22	15	0.44	0.03	41.25	2806	3429	1	13.21	899	1006	1
22	15	0.44	0.03	41.25	2806	3429	1	13.21	899	1006	1
23	15	0.44	0.03	41.25	2806	3429	1	13.21	899	1006	1
23	15	0.44	0.03	41.25	2806	3429	1	13.21	899	1006	1
24	15	0.44	0.03	41.25	2806	3429	1	13.21	899	1006	1
24	15	0.44	0.03	41.25	2806	3429	1	13.21	899	1006	1
24	16	0.44	0.03	41.25	2806	3429	1	13.21	899	1006	1
24	16	0.44	0.03	41.25	2806	3429	1	13.21	899	1006	1
24	16	0.44	0.03	41.25	2806	3429	1	13.21	899	1006	1
25	16	0.44	0.03	41.25	2806	3429	1	13.21	899	1006	1
25	16	0.44	0.04	41.25	2806	3429	1	13.21	899	1006	1
25	17	0.44	0.04	41.25	2806	3429	1	13.21	899	1006	1
25	17	0.44	0.05	41.25	2806	3429	1	13.21	899	1006	1
26	17	0.44	0.05	41.25	2806	3429	1	13.21	899	1006	1
26	17	0.44	0.09	41.25	2806	3429	1	13.21	899	1006	1
27	17	0.44	0.10	41.25	2806	3429	1	13.21	899	1006	1
27	17	0.44	0.12	41.25	2806	3429	1	13.21	899	1006	1
27	18	0.44	0.12	41.25	2806	3429	1	13.21	899	1006	1
27	18	0.44	0.18	41.25	2806	3429	1	13.21	899	1006	1
28	18	0.44	0.18	41.25	2806	3429	1	13.21	899	1006	1
28	18	0.44	0.32	41.25	2806	3429	1	13.21	899	1006	1
29	18	0.44	0.33	41.25	2806	3429	1	13.21	899	1006	1
29	18	0.44	0.35	41.25	2806	3429	1	13.21	899	1006	1
29	19	0.44	0.28	41.25	2806	3429	1	13.21	899	1006	1
29	19	0.44	0.43	41.25	2806	3429	1	13.21	899	1006	1
30	19	0.44	0.44	41.25	2806	3429	1	13.21	899	1006	1
30	19	0.44	0.66	41.25	2806	3429	1	13.21	899	1006	1
30	20	0.44	0.43	41.25	2806	3429	1	13.21	899	1006	1
30	20	0.44	0.45	41.25	2806	3429	1	13.21	899	1006	1
31	20	0.43	0.45	42.57	2896	3429	1	13.01	885	1006	1
31	20	0.43	0.69	42.57	2896	3429	1	13.01	885	1006	1
32	20	0.42	0.68	46.41	3157	3429	1	12.46	847	1006	1
32	20	0.45	0.82	39.18	2665	3429	1	13.56	922	1006	1
32	21	0.45	0.62	39.18	2665	3429	1	13.56	922	1006	1
32	21	0.43	0.78	42.57	2896	3429	1	13.01	885	1006	1

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm^4)	Iv	VStf No	γh·req	Ih·req (cm^4)	Ih	HStf No
33	21	0.41	0.84	47.99	3265	3429	1	12.25	833	1006	1
33	21	0.43	0.64	43.95	2990	3429	1	12.80	871	1006	1
33	22	0.43	0.85	43.95	2990	3429	1	12.80	871	1006	1
33	22	0.39	0.66	52.61	3579	3429	1	11.70	796	1006	1
[Iv < Iv・req → Vertical stiffener interval uses Maximum Spacing]											
34	22	0.41	0.69	47.99	3265	3429	1	12.25	833	1006	1
34	22	0.41	0.39	47.99	3265	3429	1	12.25	833	1006	1
35	22	0.43	0.44	43.02	2926	3429	1	12.94	880	1006	1
35	22	0.43	0.41	43.02	2926	3429	1	12.94	880	1006	1
35	23	0.43	0.62	43.02	2926	3429	1	12.94	880	1006	1
35	23	0.43	0.33	43.02	2926	3429	1	12.94	880	1006	1
36	23	0.43	0.33	43.02	2926	3429	1	12.94	880	1006	1
36	23	0.43	0.22	43.02	2926	3429	1	12.94	880	1006	1
36	24	0.43	0.22	43.02	2926	3429	1	12.94	880	1006	1
36	24	0.43	0.18	43.02	2926	3429	1	12.94	880	1006	1
37	24	0.43	0.17	43.02	2926	3429	1	12.94	880	1006	1
37	24	0.43	0.17	43.02	2926	3429	1	12.94	880	1006	1
38	25	0.43	0.18	43.02	2926	3429	1	12.94	880	1006	1
38	25	0.43	0.20	43.02	2926	3429	1	12.94	880	1006	1
38	26	0.43	0.18	43.02	2926	3429	1	12.94	880	1006	1
38	26	0.43	0.22	43.02	2926	3429	1	12.94	880	1006	1
39	26	0.43	0.23	43.02	2926	3429	1	12.94	880	1006	1
39	26	0.43	0.30	43.02	2926	3429	1	12.94	880	1006	1
40	26	0.43	0.30	43.02	2926	3429	1	12.94	880	1006	1
40	26	0.43	0.31	43.02	2926	3429	1	12.94	880	1006	1
40	27	0.43	0.29	43.02	2926	3429	1	12.94	880	1006	1
40	27	0.43	0.37	43.02	2926	3429	1	12.94	880	1006	1
41	27	0.43	0.36	43.02	2926	3429	1	12.94	880	1006	1
41	27	0.43	0.44	43.02	2926	3429	1	12.94	880	1006	1
41	28	0.43	0.41	43.02	2926	3429	1	12.94	880	1006	1
41	28	0.43	0.43	43.02	2926	3429	1	12.94	880	1006	1
42	28	0.43	0.42	43.02	2926	3429	1	12.94	880	1006	1
42	28	0.43	0.48	43.01	2926	3429	1	12.94	880	1006	1
43	28	0.43	0.47	43.01	2926	3429	1	12.94	880	1006	1
43	28	0.45	0.51	38.94	2649	3429	1	13.60	925	1006	1
43	29	0.45	0.50	38.94	2649	3429	1	13.60	925	1006	1
43	29	0.41	0.50	47.77	3250	3429	1	12.28	835	1006	1
44	29	0.43	0.50	43.02	2926	3429	1	12.94	880	1006	1
44	29	0.43	0.52	43.01	2926	3429	1	12.94	880	1006	1
45	29	0.39	0.52	51.37	3495	3429	1	11.84	805	1006	1
[Iv < Iv・req → Vertical stiffener interval uses Maximum Spacing]											
45	29	0.47	0.53	36.53	2485	3429	1	14.04	955	1006	1
45	30	0.47	0.53	36.53	2485	3429	1	14.04	955	1006	1
45	30	0.43	0.48	43.01	2926	3429	1	12.94	880	1006	1

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm^4)	Iv	VStf No	γh·req	Ih·req (cm^4)	Ih	HStf No
46	30	0.43	0.48	43.00	2925	3429	1	12.94	880	1006	1
46	30	0.43	0.48	43.00	2925	3429	1	12.94	880	1006	1
46	30	0.45	0.47	39.56	2691	3429	1	13.49	918	1006	1
46	31	0.45	0.47	39.56	2691	3429	1	13.49	918	1006	1
46	31	0.45	0.47	39.56	2691	3429	1	13.49	918	1006	1
47	31	0.43	0.47	42.99	2925	3429	1	12.94	880	1006	1
47	31	0.43	0.44	42.99	2924	3429	1	12.94	880	1006	1
48	31	0.43	0.44	42.99	2924	3429	1	12.94	880	1006	1
48	31	0.43	0.43	42.99	2924	3429	1	12.94	880	1006	1
48	32	0.43	0.44	42.99	2924	3429	1	12.94	880	1006	1
48	32	0.43	0.41	42.98	2924	3429	1	12.94	881	1006	1
49	32	0.43	0.40	42.97	2923	3429	1	12.94	881	1006	1
49	32	0.43	0.34	42.96	2923	3429	1	12.95	881	1006	1
50	32	0.43	0.34	42.96	2923	3429	1	12.95	881	1006	1
50	32	0.43	0.33	42.96	2923	3429	1	12.95	881	1006	1
50	33	0.43	0.35	42.96	2923	3429	1	12.95	881	1006	1
50	33	0.43	0.30	42.96	2922	3429	1	12.95	881	1006	1
51	33	0.43	0.33	42.95	2922	3429	1	12.95	881	1006	1
51	33	0.43	0.27	42.94	2921	3429	1	12.95	881	1006	1
51	34	0.43	0.28	42.94	2921	3429	1	12.95	881	1006	1
51	34	0.43	0.28	42.94	2921	3429	1	12.95	881	1006	1
52	34	0.43	0.28	42.93	2921	3429	1	12.95	881	1006	1
52	34	0.43	0.24	42.95	2922	3429	1	12.95	881	1006	1
53	34	0.43	0.22	43.89	2986	3429	1	12.81	871	1006	1
53	34	0.43	0.20	43.93	2988	3429	1	12.80	871	1006	1
53	35	0.43	0.22	43.93	2988	3429	1	12.80	871	1006	1
53	35	0.43	0.21	43.92	2988	3429	1	12.80	871	1006	1
54	35	0.43	0.21	44.02	2995	3429	1	12.79	870	1006	1
54	35	0.43	0.23	44.02	2995	3429	1	12.79	870	1006	1

５）Main girder G3　 Web name：LWEB

(ａ) Check of section and web thickness

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm²)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
1	1	4645	3	1161	1	0	51	SM490Y	2727	14	13.0
1	1	4645	3	1162	1	-26	45	SM490Y	2727	14	13.0
2	1	4646	3	1162	1	-26	44	SM490Y	2727	14	13.0
2	1	4646	3	1162	1	-39	41	SM490Y	2727	14	13.0
2	2	4646	3	1162	1	-38	40	SM490Y	2727	14	13.0
2	2	4646	3	1162	1	-45	38	SM490Y	2727	14	13.0
3	2	4746	3	1187	1	-45	38	SM490Y	2727	14	13.0
3	2	4746	3	1187	1	-62	32	SM490Y	2727	14	13.0
4	2	4746	3	1187	1	-62	32	SM490Y	2727	14	13.0
4	2	4746	3	1187	1	-68	30	SM490Y	2727	14	13.0
4	3	4746	3	1187	1	-65	30	SM490Y	2727	14	13.0
4	3	4746	3	1187	1	-72	26	SM490Y	2727	14	13.0
5	3	4746	3	1187	1	-72	25	SM490Y	2727	14	13.0
5	3	4746	3	1187	1	-81	19	SM490Y	2727	14	13.0
6	3	4746	3	1187	1	-81	19	SM490Y	2727	14	13.0
6	3	4746	3	1187	1	-82	18	SM490Y	2727	14	13.0
6	4	4746	3	1187	1	-81	18	SM490Y	2727	14	13.0
6	4	4746	3	1187	1	-85	14	SM490Y	2727	14	13.0
7	4	4746	3	1187	1	-85	13	SM490Y	2727	14	13.0
7	4	4746	3	1187	1	-86	9	SM490Y	2727	14	13.0
7	4	4746	3	1187	1	-86	9	SM490Y	2727	14	13.0
7	5	4746	3	1187	1	-86	9	SM490Y	2727	14	13.0
7	5	4746	3	1187	1	-86	9	SM490Y	2727	14	13.0
8	5	4746	3	1187	1	-86	10	SM490Y	2727	14	13.0
8	5	4746	3	1187	1	-84	16	SM490Y	2727	14	13.0
9	5	4746	3	1187	1	-84	16	SM490Y	2727	14	13.0
9	5	4746	3	1187	1	-81	19	SM490Y	2727	14	13.0
9	6	4746	3	1187	1	-82	19	SM490Y	2727	14	13.0
9	6	4746	3	1187	1	-79	21	SM490Y	2727	14	13.0
10	6	4746	3	1187	1	-79	21	SM490Y	2727	14	13.0
10	6	4746	3	1187	1	-71	26	SM490Y	2727	14	13.0
11	6	4746	3	1187	1	-71	28	SM490Y	2727	14	13.0
11	6	4746	3	1187	1	-66	29	SM490Y	2727	14	13.0
11	7	4746	3	1187	1	-70	30	SM490Y	2727	14	13.0
11	7	4746	3	1187	1	-61	33	SM490Y	2727	14	13.0
12	7	4746	3	1187	1	-61	34	SM490Y	2727	14	13.0
12	7	4746	3	1187	1	-42	39	SM490Y	2727	14	13.0

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm^2)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
13	8	4746	3	1187	1	-41	39	SM490Y	2727	14	13.0
13	8	4746	3	1187	1	-39	40	SM490Y	2727	14	13.0
13	9	4746	3	1187	1	-39	40	SM490Y	2727	14	13.0
13	9	4746	3	1187	1	-20	45	SM490Y	2727	14	13.0
14	9	4746	3	1187	1	-20	45	SM490Y	2727	14	13.0
14	9	4746	3	1187	1	-59	49	SM490Y	2727	14	13.0
14	10	4746	3	1187	1	-55	49	SM490Y	2727	14	13.0
14	10	4746	3	1187	1	-62	50	SM490Y	2727	14	13.0
15	10	4646	3	1162	1	-62	47	SM490Y	2727	14	13.0
15	10	4646	3	1162	1	-122	52	SM490Y	2727	14	13.0
16	10	4646	3	1162	1	-122	52	SM490Y	2727	14	13.0
16	10	4646	3	1162	1	-148	54	SM490Y	2727	14	13.0
16	11	4646	3	1162	1	-125	54	SM490Y	2727	14	13.0
16	11	4646	3	1162	1	-164	57	SM490Y	2727	14	13.0
17	11	4721	3	1180	1	-164	46	SM490Y	2727	14	13.0
17	11	4721	3	1180	1	-135	42	SM490Y	2727	14	13.0
17	12	4721	3	1180	1	-160	43	SM490Y	2727	14	13.0
17	12	4721	3	1180	1	-141	41	SM490Y	2727	14	13.0
18	12	4721	3	1180	1	-141	40	SM490Y	2727	14	13.0
18	12	4721	3	1180	1	-99	35	SM490Y	2727	14	13.0
19	12	4796	3	1199	1	-99	38	SM490Y	2727	14	13.0
19	12	4796	3	1199	1	-94	37	SM490Y	2727	14	13.0
19	13	4796	3	1199	1	-102	38	SM490Y	2727	14	13.0
19	13	4796	3	1199	1	-69	33	SM490Y	2727	14	13.0
20	13	4796	3	1199	1	-69	33	SM490Y	2727	14	13.0
20	13	4796	3	1199	1	-44	29	SM490Y	2727	14	13.0
20	14	4796	3	1199	1	-44	29	SM490Y	2727	14	13.0
20	14	4796	3	1199	1	-42	28	SM490Y	2727	14	13.0
21	14	4796	3	1199	1	-42	28	SM490Y	2727	14	13.0
21	14	4796	3	1199	1	-24	23	SM490Y	2727	14	13.0
22	14	4796	3	1199	1	-24	23	SM490Y	2727	14	13.0
22	14	4796	3	1199	1	-25	20	SM490Y	2727	14	13.0
22	15	4796	3	1199	1	-25	20	SM490Y	2727	14	13.0
22	15	4796	3	1199	1	-27	18	SM490Y	2727	14	13.0
23	15	4796	3	1199	1	-27	15	SM490Y	2727	14	13.0
23	15	4796	3	1199	1	-30	11	SM490Y	2727	14	13.0
24	15	4796	3	1199	1	-30	11	SM490Y	2727	14	13.0
24	15	4796	3	1199	1	-30	11	SM490Y	2727	14	13.0
24	16	4796	3	1199	1	-30	11	SM490Y	2727	14	13.0
24	16	4796	3	1199	1	-30	12	SM490Y	2727	14	13.0
24	16	4796	3	1199	1	-28	16	SM490Y	2727	14	13.0
25	16	4796	3	1199	1	-28	15	SM490Y	2727	14	13.0
25	16	4796	3	1199	1	-34	19	SM490Y	2727	14	13.0
25	17	4796	3	1199	1	-34	19	SM490Y	2727	14	13.0
25	17	4796	3	1199	1	-36	20	SM490Y	2727	14	13.0

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm²)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
26	17	4796	3	1199	1	−36	20	SM490Y	2727	14	13.0
26	17	4796	3	1199	1	−59	25	SM490Y	2727	14	13.0
27	17	4796	3	1199	1	−59	26	SM490Y	2727	14	13.0
27	17	4796	3	1199	1	−69	28	SM490Y	2727	14	13.0
27	18	4796	3	1199	1	−69	28	SM490Y	2727	14	13.0
27	18	4796	3	1199	1	−88	31	SM490Y	2727	14	13.0
28	18	4796	3	1199	1	−88	31	SM490Y	2727	14	13.0
28	18	4796	3	1199	1	−123	36	SM490Y	2727	14	13.0
29	18	4796	3	1199	1	−123	35	SM490Y	2727	14	13.0
29	18	4796	3	1199	1	−127	36	SM490Y	2727	14	13.0
29	19	4796	3	1199	1	−109	35	SM490Y	2727	14	13.0
29	19	4796	3	1199	1	−143	39	SM490Y	2727	14	13.0
30	19	4796	3	1199	1	−143	40	SM490Y	2727	14	13.0
30	19	4796	3	1199	1	−181	44	SM490Y	2727	14	13.0
30	20	4796	3	1199	1	−134	44	SM490Y	2727	14	13.0
30	20	4796	3	1199	1	−138	44	SM490Y	2727	14	13.0
31	20	4721	3	1180	1	−138	44	SM490Y	2727	14	13.0
31	20	4721	3	1180	1	−176	49	SM490Y	2727	14	13.0
32	20	4721	3	1130	1	−176	49	SM490Y	2727	14	13.0
32	20	4721	3	1230	1	−190	51	SM490Y	2727	14	13.0
32	21	4721	3	1230	1	−160	51	SM490Y	2727	14	13.0
32	21	4721	3	1180	1	−186	54	SM490Y	2727	14	13.0
33	21	4446	3	1112	1	−186	67	SM490Y	2727	14	13.0
33	21	4446	3	1162	1	−153	65	SM490Y	2727	14	13.0
33	22	4446	3	1162	1	−186	65	SM490Y	2727	14	13.0
33	22	4446	3	1062	1	−167	64	SM490Y	2727	14	13.0
34	22	4446	3	1112	1	−167	64	SM490Y	2727	14	13.0
34	22	4446	3	1112	1	−112	61	SM490Y	2727	14	13.0
35	22	4696	3	1174	1	−112	61	SM490Y	2727	14	13.0
35	22	4696	3	1174	1	−106	61	SM490Y	2727	14	13.0
35	23	4696	3	1174	1	−150	62	SM490Y	2727	14	13.0
35	23	4696	3	1174	1	−89	58	SM490Y	2727	14	13.0
36	23	4696	3	1174	1	−89	59	SM490Y	2727	14	13.0
36	23	4696	3	1174	1	−49	57	SM490Y	2727	14	13.0
36	24	4696	3	1174	1	−53	57	SM490Y	2727	14	13.0
36	24	4696	3	1174	1	−29	55	SM490Y	2727	14	13.0
37	24	4696	3	1174	1	−29	54	SM490Y	2727	14	13.0
37	24	4696	3	1174	1	−47	49	SM490Y	2727	14	13.0
38	25	4696	3	1174	1	−48	50	SM490Y	2727	14	13.0
38	25	4696	3	1174	1	−61	48	SM490Y	2727	14	13.0
38	26	4696	3	1174	1	−58	47	SM490Y	2727	14	13.0
38	26	4696	3	1174	1	−77	45	SM490Y	2727	14	13.0

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm²)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
39	26	4696	3	1174	1	−77	45	SM490Y	2727	14	13.0
39	26	4696	3	1174	1	−106	40	SM490Y	2727	14	13.0
40	26	4696	3	1174	1	−106	40	SM490Y	2727	14	13.0
40	26	4696	3	1174	1	−109	39	SM490Y	2727	14	13.0
40	27	4696	3	1174	1	−104	39	SM490Y	2727	14	13.0
40	27	4696	3	1174	1	−125	36	SM490Y	2727	14	13.0
41	27	4696	3	1174	1	−125	33	SM490Y	2727	14	13.0
41	27	4696	3	1174	1	−141	29	SM490Y	2727	14	13.0
41	28	4696	3	1174	1	−138	29	SM490Y	2727	14	13.0
41	28	4696	3	1174	1	−140	29	SM490Y	2727	14	13.0
42	28	4696	3	1174	1	−140	28	SM490Y	2727	14	13.0
42	28	4696	3	1174	1	−155	25	SM490Y	2727	14	13.0
43	28	4697	3	1174	1	−155	25	SM490Y	2727	14	13.0
43	28	4697	3	1234	1	−163	22	SM490Y	2727	14	13.0
43	29	4697	3	1234	1	−161	22	SM490Y	2727	14	13.0
43	29	4697	3	1114	1	−164	21	SM490Y	2727	14	13.0
44	29	4698	3	1175	1	−158	25	SM490Y	2727	14	13.0
44	29	4698	3	1175	1	−164	21	SM490Y	2727	14	13.0
45	29	4698	3	1075	1	−165	20	SM490Y	2727	14	13.0
45	29	4698	3	1275	1	−165	19	SM490Y	2727	14	13.0
45	30	4698	3	1275	1	−165	19	SM490Y	2727	14	13.0
45	30	4698	3	1174	1	−165	16	SM490Y	2727	14	13.0
46	30	4697	3	1174	1	−165	16	SM490Y	2727	14	13.0
46	30	4697	3	1174	1	−165	14	SM490Y	2727	14	13.0
46	30	4697	3	1224	1	−158	16	SM490Y	2727	14	13.0
46	31	4697	3	1224	1	−158	16	SM490Y	2727	14	13.0
46	31	4697	3	1224	1	−158	17	SM490Y	2727	14	13.0
47	31	4696	3	1174	1	−158	18	SM490Y	2727	14	13.0
47	31	4696	3	1174	1	−151	22	SM490Y	2727	14	13.0
48	31	4696	3	1174	1	−151	22	SM490Y	2727	14	13.0
48	31	4696	3	1174	1	−149	23	SM490Y	2727	14	13.0
48	32	4696	3	1174	1	−149	23	SM490Y	2727	14	13.0
48	32	4696	3	1174	1	−143	26	SM490Y	2727	14	13.0
49	32	4695	3	1174	1	−143	31	SM490Y	2727	14	13.0
49	32	4695	3	1174	1	−124	35	SM490Y	2727	14	13.0
50	32	4695	3	1174	1	−124	35	SM490Y	2727	14	13.0
50	32	4695	3	1174	1	−122	35	SM490Y	2727	14	13.0
50	33	4695	3	1174	1	−125	36	SM490Y	2727	14	13.0
50	33	4695	3	1174	1	−109	40	SM490Y	2727	14	13.0
51	33	4694	3	1174	1	−109	44	SM490Y	2727	14	13.0
51	33	4694	3	1174	1	−88	48	SM490Y	2727	14	13.0
51	34	4694	3	1174	1	−93	49	SM490Y	2727	14	13.0
51	34	4694	3	1174	1	−90	49	SM490Y	2727	14	13.0

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm²)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
52	34	4694	3	1174	1	-90	49	SM490Y	2727	14	13.0
52	34	4694	3	1173	1	-62	54	SM490Y	2727	14	13.0
53	34	4645	3	1161	1	-62	51	SM490Y	2727	14	13.0
53	34	4645	3	1161	1	-44	54	SM490Y	2727	14	13.0
53	35	4645	3	1161	1	-47	55	SM490Y	2727	14	13.0
53	35	4645	3	1161	1	-35	57	SM490Y	2727	14	13.0
54	35	4650	3	1163	1	-35	57	SM490Y	2727	14	13.0
54	35	4650	3	1163	1	0	63	SM490Y	2727	14	13.0

(b)Check of spacing and required stiffness

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm⁴)	Iv	VStf No	γh·req	Ih·req (cm⁴)	Ih	HStf No
1	1	0.43	0.14	44.12	3001	3429	1	12.77	869	1006	1
1	1	0.43	0.12	44.10	3000	3429	1	12.78	869	1006	1
2	1	0.43	0.12	44.10	3000	3429	1	12.78	869	1006	1
2	1	0.43	0.12	44.10	3000	3429	1	12.78	869	1006	1
2	2	0.43	0.11	44.10	3000	3429	1	12.78	869	1006	1
2	2	0.43	0.11	44.10	3000	3429	1	12.78	869	1006	1
3	2	0.44	0.12	42.26	2875	3429	1	13.05	888	1006	1
3	2	0.44	0.13	42.26	2875	3429	1	13.05	888	1006	1
4	2	0.44	0.13	42.26	2875	3429	1	13.05	888	1006	1
4	2	0.44	0.13	42.26	2875	3429	1	13.05	888	1006	1
4	3	0.44	0.13	42.26	2875	3429	1	13.05	888	1006	1
4	3	0.44	0.13	42.26	2875	3429	1	13.05	888	1006	1
5	3	0.44	0.13	42.26	2875	3429	1	13.05	888	1006	1
5	3	0.44	0.14	42.26	2875	3429	1	13.05	888	1006	1
6	3	0.44	0.14	42.26	2875	3429	1	13.05	888	1006	1
6	3	0.44	0.14	42.26	2875	3429	1	13.05	888	1006	1
6	4	0.44	0.13	42.26	2875	3429	1	13.05	888	1006	1
6	4	0.44	0.14	42.26	2875	3429	1	13.05	888	1006	1
7	4	0.44	0.14	42.26	2875	3429	1	13.05	888	1006	1
7	4	0.44	0.14	42.26	2875	3429	1	13.05	888	1006	1
7	4	0.44	0.14	42.26	2875	3429	1	13.05	888	1006	1
7	5	0.44	0.14	42.26	2875	3429	1	13.05	888	1006	1
7	5	0.44	0.14	42.26	2875	3429	1	13.05	888	1006	1
8	5	0.44	0.14	42.26	2875	3429	1	13.05	888	1006	1
8	5	0.44	0.14	42.26	2875	3429	1	13.05	888	1006	1
9	5	0.44	0.14	42.26	2875	3429	1	13.05	888	1006	1
9	5	0.44	0.14	42.26	2875	3429	1	13.05	888	1006	1
9	6	0.44	0.14	42.26	2875	3429	1	13.05	888	1006	1
9	6	0.44	0.14	42.26	2875	3429	1	13.05	888	1006	1
10	6	0.44	0.14	42.26	2875	3429	1	13.05	888	1006	1
10	6	0.44	0.13	42.26	2875	3429	1	13.05	888	1006	1

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm^4)	Iv	VStf No	γh·req	Ih·req (cm^4)	Ih	HStf No
11	6	0.44	0.13	42.26	2875	3429	1	13.05	888	1006	1
11	6	0.44	0.13	42.26	2875	3429	1	13.05	888	1006	1
11	7	0.44	0.14	42.26	2875	3429	1	13.05	888	1006	1
11	7	0.44	0.13	42.26	2875	3429	1	13.05	888	1006	1
12	7	0.44	0.13	42.26	2875	3429	1	13.05	888	1006	1
12	7	0.44	0.12	42.26	2875	3429	1	13.05	888	1006	1
13	8	0.44	0.12	42.26	2875	3429	1	13.05	888	1006	1
13	8	0.44	0.12	42.26	2875	3429	1	13.05	888	1006	1
13	9	0.44	0.12	42.26	2875	3429	1	13.05	888	1006	1
13	9	0.44	0.12	42.26	2875	3429	1	13.05	888	1006	1
14	9	0.44	0.12	42.26	2875	3429	1	13.05	888	1006	1
14	9	0.44	0.20	42.26	2875	3429	1	13.05	888	1006	1
14	10	0.44	0.19	42.26	2875	3429	1	13.05	888	1006	1
14	10	0.44	0.21	42.26	2875	3429	1	13.05	888	1006	1
15	10	0.43	0.19	44.10	3000	3429	1	12.78	869	1006	1
15	10	0.43	0.41	44.10	3000	3429	1	12.78	869	1006	1
16	10	0.43	0.41	44.10	3000	3429	1	12.78	869	1006	1
16	10	0.43	0.55	44.10	3000	3429	1	12.78	869	1006	1
16	11	0.43	0.43	44.10	3000	3429	1	12.78	869	1006	1
16	11	0.43	0.65	44.10	3000	3429	1	12.78	869	1006	1
17	11	0.43	0.60	42.70	2905	3429	1	12.98	883	1006	1
17	11	0.43	0.43	42.70	2905	3429	1	12.98	883	1006	1
17	12	0.43	0.56	42.70	2905	3429	1	12.98	883	1006	1
17	12	0.43	0.45	42.70	2905	3429	1	12.98	883	1006	1
18	12	0.43	0.45	42.70	2905	3429	1	12.98	883	1006	1
18	12	0.43	0.25	42.70	2905	3429	1	12.98	883	1006	1
19	12	0.44	0.26	41.38	2815	3429	1	13.19	897	1006	1
19	12	0.44	0.24	41.38	2815	3429	1	13.19	897	1006	1
19	13	0.44	0.27	41.38	2815	3429	1	13.19	897	1006	1
19	13	0.44	0.15	41.38	2815	3429	1	13.19	897	1006	1
20	13	0.44	0.15	41.38	2815	3429	1	13.19	897	1006	1
20	13	0.44	0.08	41.38	2815	3429	1	13.19	897	1006	1
20	14	0.44	0.08	41.38	2815	3429	1	13.19	897	1006	1
20	14	0.44	0.08	41.38	2815	3429	1	13.19	897	1006	1
21	14	0.44	0.08	41.38	2815	3429	1	13.19	897	1006	1
21	14	0.44	0.04	41.38	2815	3429	1	13.19	897	1006	1
22	14	0.44	0.04	41.38	2815	3429	1	13.19	897	1006	1
22	14	0.44	0.03	41.38	2815	3429	1	13.19	897	1006	1
22	15	0.44	0.03	41.38	2815	3429	1	13.19	897	1006	1
22	15	0.44	0.03	41.38	2815	3429	1	13.19	897	1006	1
23	15	0.44	0.03	41.38	2815	3429	1	13.19	897	1006	1
23	15	0.44	0.02	41.38	2815	3429	1	13.19	897	1006	1

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm^4)	Iv	VStf No	γh·req	Ih·req (cm^4)	Ih	HStf No
24	15	0.44	0.02	41.38	2815	3429	1	13.19	897	1006	1
24	15	0.44	0.02	41.38	2815	3429	1	13.19	897	1006	1
24	16	0.44	0.02	41.38	2815	3429	1	13.19	897	1006	1
24	16	0.44	0.02	41.38	2815	3429	1	13.19	897	1006	1
24	16	0.44	0.03	41.38	2815	3429	1	13.19	897	1006	1
25	16	0.44	0.03	41.38	2815	3429	1	13.19	897	1006	1
25	16	0.44	0.04	41.38	2815	3429	1	13.19	897	1006	1
25	17	0.44	0.04	41.38	2815	3429	1	13.19	897	1006	1
25	17	0.44	0.05	41.38	2815	3429	1	13.19	897	1006	1
26	17	0.44	0.05	41.38	2815	3429	1	13.19	897	1006	1
26	17	0.44	0.10	41.38	2815	3429	1	13.19	897	1006	1
27	17	0.44	0.10	41.38	2815	3429	1	13.19	897	1006	1
27	17	0.44	0.13	41.38	2815	3429	1	13.19	897	1006	1
27	18	0.44	0.13	41.38	2815	3429	1	13.19	897	1006	1
27	18	0.44	0.19	41.38	2815	3429	1	13.19	897	1006	1
28	18	0.44	0.19	41.38	2815	3429	1	13.19	897	1006	1
28	18	0.44	0.35	41.38	2815	3429	1	13.19	897	1006	1
29	18	0.44	0.34	41.38	2815	3429	1	13.19	897	1006	1
29	18	0.44	0.37	41.38	2815	3429	1	13.19	897	1006	1
29	19	0.44	0.29	41.38	2815	3429	1	13.19	897	1006	1
29	19	0.44	0.46	41.38	2815	3429	1	13.19	897	1006	1
30	19	0.44	0.46	41.38	2815	3429	1	13.19	897	1006	1
30	19	0.44	0.70	41.38	2815	3429	1	13.19	897	1006	1
30	20	0.44	0.43	41.38	2815	3429	1	13.19	897	1006	1
30	20	0.44	0.46	41.38	2815	3429	1	13.19	897	1006	1
31	20	0.43	0.45	42.70	2905	3429	1	12.98	883	1006	1
31	20	0.43	0.69	42.70	2905	3429	1	12.98	883	1006	1
32	20	0.41	0.67	46.57	3168	3429	1	12.43	846	1006	1
32	20	0.45	0.81	39.30	2674	3429	1	13.53	921	1006	1
32	21	0.45	0.62	39.30	2674	3429	1	13.53	921	1006	1
32	21	0.43	0.79	42.70	2905	3429	1	12.98	883	1006	1
33	21	0.41	0.83	48.15	3275	3429	1	12.23	832	1006	1
33	21	0.43	0.64	44.09	2999	3429	1	12.78	869	1006	1
33	22	0.43	0.85	44.09	2999	3429	1	12.78	869	1006	1
33	22	0.39	0.66	52.79	3591	3429	1	11.68	794	1006	1

[Iv ＜ Iv・req → Vertical stiffener interval uses Maximum Spacing]

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm^4)	Iv	VStf No	γh·req	Ih·req (cm^4)	Ih	HStf No
34	22	0.41	0.69	48.15	3275	3429	1	12.23	832	1006	1
34	22	0.41	0.40	48.15	3275	3429	1	12.23	832	1006	1
35	22	0.43	0.44	43.16	2936	3429	1	12.92	879	1006	1
35	22	0.43	0.41	43.16	2936	3429	1	12.92	879	1006	1
35	23	0.43	0.62	43.16	2936	3429	1	12.92	879	1006	1
35	23	0.43	0.33	43.16	2936	3429	1	12.92	879	1006	1
36	23	0.43	0.33	43.16	2936	3429	1	12.92	879	1006	1
36	23	0.43	0.22	43.16	2936	3429	1	12.92	879	1006	1
36	24	0.43	0.23	43.16	2936	3429	1	12.92	879	1006	1
36	24	0.43	0.19	43.16	2936	3429	1	12.92	879	1006	1

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm^4)	Iv	VStf No	γh·req	Ih·req (cm^4)	Ih	HStf No
37	24	0.43	0.18	43.16	2936	3429	1	12.92	879	1006	1
37	24	0.43	0.18	43.16	2936	3429	1	12.92	879	1006	1
38	25	0.43	0.18	43.16	2936	3429	1	12.92	879	1006	1
38	25	0.43	0.20	43.16	2936	3429	1	12.92	879	1006	1
38	26	0.43	0.19	43.16	2936	3429	1	12.92	879	1006	1
38	26	0.43	0.22	43.16	2936	3429	1	12.92	879	1006	1
39	26	0.43	0.22	43.16	2936	3429	1	12.92	879	1006	1
39	26	0.43	0.29	43.16	2936	3429	1	12.92	879	1006	1
40	26	0.43	0.29	43.16	2936	3429	1	12.92	879	1006	1
40	26	0.43	0.30	43.16	2936	3429	1	12.92	879	1006	1
40	27	0.43	0.28	43.16	2936	3429	1	12.92	879	1006	1
40	27	0.43	0.35	43.16	2936	3429	1	12.92	879	1006	1
41	27	0.43	0.34	43.16	2936	3429	1	12.92	879	1006	1
41	27	0.43	0.40	43.16	2936	3429	1	12.92	879	1006	1
41	28	0.43	0.39	43.16	2936	3429	1	12.92	879	1006	1
41	28	0.43	0.40	43.16	2936	3429	1	12.92	879	1006	1
42	28	0.43	0.39	43.16	2936	3429	1	12.92	879	1006	1
42	28	0.43	0.46	43.17	2937	3429	1	12.91	879	1006	1
43	28	0.43	0.46	43.15	2936	3429	1	12.92	879	1006	1
43	28	0.45	0.50	39.06	2657	3429	1	13.58	924	1006	1
43	29	0.45	0.49	39.06	2657	3429	1	13.58	924	1006	1
43	29	0.41	0.50	47.92	3260	3429	1	12.26	834	1006	1
44	29	0.43	0.48	43.13	2935	3429	1	12.92	879	1006	1
44	29	0.43	0.51	43.13	2934	3429	1	12.92	879	1006	1
45	29	0.39	0.50	51.54	3506	3429	1	11.82	804	1006	1
[Iv < Iv・req → Vertical stiffener interval uses Maximum Spacing]											
45	29	0.47	0.51	36.63	2492	3429	1	14.02	954	1006	1
45	30	0.47	0.51	36.63	2492	3429	1	14.02	954	1006	1
45	30	0.43	0.50	43.14	2935	3429	1	12.92	879	1006	1
46	30	0.43	0.50	43.15	2936	3429	1	12.92	879	1006	1
46	30	0.43	0.49	43.15	2935	3429	1	12.92	879	1006	1
46	30	0.45	0.46	39.70	2701	3429	1	13.47	916	1006	1
46	31	0.45	0.46	39.70	2701	3429	1	13.47	916	1006	1
46	31	0.45	0.46	39.70	2701	3429	1	13.47	916	1006	1
47	31	0.43	0.46	43.16	2936	3429	1	12.92	879	1006	1
47	31	0.43	0.43	43.16	2936	3429	1	12.92	879	1006	1
48	31	0.43	0.43	43.17	2937	3429	1	12.91	879	1006	1
48	31	0.43	0.42	43.17	2937	3429	1	12.91	879	1006	1
48	32	0.43	0.43	43.17	2937	3429	1	12.91	879	1006	1
48	32	0.43	0.40	43.18	2937	3429	1	12.91	879	1006	1
49	32	0.43	0.42	43.18	2937	3429	1	12.91	879	1006	1
49	32	0.43	0.34	43.18	2938	3429	1	12.91	878	1006	1

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm^4)	Iv	VStf No	γh·req	Ih·req (cm^4)	Ih	HStf No
50	32	0.43	0.34	43.19	2938	3429	1	12.91	878	1006	1
50	32	0.43	0.33	43.19	2938	3429	1	12.91	878	1006	1
50	33	0.43	0.35	43.19	2938	3429	1	12.91	878	1006	1
50	33	0.43	0.30	43.19	2938	3429	1	12.91	878	1006	1
51	33	0.43	0.32	43.20	2939	3429	1	12.91	878	1006	1
51	33	0.43	0.27	43.20	2939	3429	1	12.91	878	1006	1
51	34	0.43	0.29	43.20	2939	3429	1	12.91	878	1006	1
51	34	0.43	0.28	43.20	2939	3429	1	12.91	878	1006	1
52	34	0.43	0.28	43.20	2939	3429	1	12.91	878	1006	1
52	34	0.43	0.23	43.21	2939	3429	1	12.91	878	1006	1
53	34	0.43	0.21	44.14	3003	3429	1	12.77	869	1006	1
53	34	0.43	0.19	44.11	3000	3429	1	12.78	869	1006	1
53	35	0.43	0.20	44.11	3000	3429	1	12.78	869	1006	1
53	35	0.43	0.20	44.11	3000	3429	1	12.78	869	1006	1
54	35	0.43	0.20	44.02	2995	3429	1	12.79	870	1006	1
54	35	0.43	0.22	44.02	2995	3429	1	12.79	870	1006	1

６）Main girder G3　　Web name：RWEB

（a）Check of section and web thickness

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm^2)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
1	1	4638	3	1159	1	0	55	SM490Y	2673	14	12.8
1	1	4638	3	1160	1	-24	48	SM490Y	2673	14	12.8
2	1	4640	3	1160	1	-24	48	SM490Y	2673	14	12.8
2	1	4640	3	1160	1	-36	44	SM490Y	2673	14	12.8
2	2	4640	3	1160	1	-35	43	SM490Y	2673	14	12.8
2	2	4640	3	1160	1	-41	41	SM490Y	2673	14	12.8
3	2	4740	3	1185	1	-41	41	SM490Y	2673	14	12.8
3	2	4740	3	1185	1	-58	35	SM490Y	2673	14	12.8
4	2	4740	3	1185	1	-58	34	SM490Y	2673	14	12.8
4	2	4740	3	1185	1	-63	32	SM490Y	2673	14	12.8
4	3	4740	3	1185	1	-61	32	SM490Y	2673	14	12.8
4	3	4740	3	1185	1	-68	28	SM490Y	2673	14	12.8
5	3	4740	3	1185	1	-68	27	SM490Y	2673	14	12.8
5	3	4740	3	1185	1	-76	20	SM490Y	2673	14	12.8
6	3	4740	3	1185	1	-76	20	SM490Y	2673	14	12.8
6	3	4740	3	1185	1	-77	19	SM490Y	2673	14	12.8
6	4	4740	3	1185	1	-76	19	SM490Y	2673	14	12.8
6	4	4740	3	1185	1	-80	14	SM490Y	2673	14	12.8
7	4	4740	3	1185	1	-80	14	SM490Y	2673	14	12.8
7	4	4740	3	1185	1	-81	9	SM490Y	2673	14	12.8
7	4	4740	3	1185	1	-81	9	SM490Y	2673	14	12.8
7	5	4740	3	1185	1	-81	9	SM490Y	2673	14	12.8
7	5	4740	3	1185	1	-81	10	SM490Y	2673	14	12.8

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm²)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
8	5	4740	3	1185	1	-81	10	SM490Y	2673	14	12.8
8	5	4740	3	1185	1	-79	17	SM490Y	2673	14	12.8
9	5	4740	3	1185	1	-79	16	SM490Y	2673	14	12.8
9	5	4740	3	1185	1	-76	20	SM490Y	2673	14	12.8
9	6	4740	3	1185	1	-77	20	SM490Y	2673	14	12.8
9	6	4740	3	1185	1	-75	22	SM490Y	2673	14	12.8
10	6	4740	3	1185	1	-75	22	SM490Y	2673	14	12.8
10	6	4740	3	1185	1	-67	28	SM490Y	2673	14	12.8
11	6	4740	3	1185	1	-67	29	SM490Y	2673	14	12.8
11	6	4740	3	1185	1	-62	31	SM490Y	2673	14	12.8
11	7	4740	3	1185	1	-65	31	SM490Y	2673	14	12.8
11	7	4740	3	1185	1	-56	35	SM490Y	2673	14	12.8
12	7	4740	3	1185	1	-56	35	SM490Y	2673	14	12.8
12	7	4740	3	1185	1	-39	41	SM490Y	2673	14	12.8
13	8	4740	3	1185	1	-39	41	SM490Y	2673	14	12.8
13	8	4740	3	1185	1	-36	41	SM490Y	2673	14	12.8
13	9	4740	3	1185	1	-37	42	SM490Y	2673	14	12.8
13	9	4740	3	1185	1	-18	46	SM490Y	2673	14	12.8
14	9	4740	3	1185	1	-18	46	SM490Y	2673	14	12.8
14	9	4740	3	1185	1	-59	51	SM490Y	2673	14	12.8
14	10	4740	3	1185	1	-55	51	SM490Y	2673	14	12.8
14	10	4740	3	1185	1	-62	52	SM490Y	2673	14	12.8
15	10	4640	3	1160	1	-62	49	SM490Y	2673	14	12.8
15	10	4640	3	1160	1	-122	54	SM490Y	2673	14	12.8
16	10	4640	3	1160	1	-122	54	SM490Y	2673	14	12.8
16	10	4640	3	1160	1	-148	56	SM490Y	2673	14	12.8
16	11	4640	3	1160	1	-125	56	SM490Y	2673	14	12.8
16	11	4640	3	1160	1	-164	59	SM490Y	2673	14	12.8
17	11	4715	3	1179	1	-164	48	SM490Y	2673	14	12.8
17	11	4715	3	1179	1	-135	44	SM490Y	2673	14	12.8
17	12	4715	3	1179	1	-160	44	SM490Y	2673	14	12.8
17	12	4715	3	1179	1	-141	42	SM490Y	2673	14	12.8
18	12	4715	3	1179	1	-141	42	SM490Y	2673	14	12.8
18	12	4715	3	1179	1	-99	37	SM490Y	2673	14	12.8
19	12	4790	3	1197	1	-99	39	SM490Y	2673	14	12.8
19	12	4790	3	1197	1	-94	39	SM490Y	2673	14	12.8
19	13	4790	3	1197	1	-102	39	SM490Y	2673	14	12.8
19	13	4790	3	1197	1	-69	34	SM490Y	2673	14	12.8
20	13	4790	3	1197	1	-69	34	SM490Y	2673	14	12.8
20	13	4790	3	1197	1	-44	29	SM490Y	2673	14	12.8
20	14	4790	3	1197	1	-44	29	SM490Y	2673	14	12.8
20	14	4790	3	1197	1	-42	29	SM490Y	2673	14	12.8

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm²)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
21	14	4790	3	1197	1	-42	29	SM490Y	2673	14	12.8
21	14	4790	3	1197	1	-24	23	SM490Y	2673	14	12.8
22	14	4790	3	1197	1	-24	23	SM490Y	2673	14	12.8
22	14	4790	3	1197	1	-23	20	SM490Y	2673	14	12.8
22	15	4790	3	1197	1	-23	20	SM490Y	2673	14	12.8
22	15	4790	3	1197	1	-25	18	SM490Y	2673	14	12.8
23	15	4790	3	1197	1	-25	16	SM490Y	2673	14	12.8
23	15	4790	3	1197	1	-28	11	SM490Y	2673	14	12.8
24	15	4790	3	1197	1	-28	11	SM490Y	2673	14	12.8
24	15	4790	3	1197	1	-28	12	SM490Y	2673	14	12.8
24	16	4790	3	1197	1	-28	12	SM490Y	2673	14	12.8
24	16	4790	3	1197	1	-28	12	SM490Y	2673	14	12.8
24	16	4790	3	1197	1	-27	16	SM490Y	2673	14	12.8
25	16	4790	3	1197	1	-27	15	SM490Y	2673	14	12.8
25	16	4790	3	1197	1	-34	20	SM490Y	2673	14	12.8
25	17	4790	3	1197	1	-34	20	SM490Y	2673	14	12.8
25	17	4790	3	1197	1	-36	20	SM490Y	2673	14	12.8
26	17	4790	3	1197	1	-36	20	SM490Y	2673	14	12.8
26	17	4790	3	1197	1	-59	25	SM490Y	2673	14	12.8
27	17	4790	3	1197	1	-59	26	SM490Y	2673	14	12.8
27	17	4790	3	1197	1	-69	28	SM490Y	2673	14	12.8
27	18	4790	3	1197	1	-69	28	SM490Y	2673	14	12.8
27	18	4790	3	1197	1	-88	31	SM490Y	2673	14	12.8
28	18	4790	3	1197	1	-88	31	SM490Y	2673	14	12.8
28	18	4790	3	1197	1	-123	36	SM490Y	2673	14	12.8
29	18	4790	3	1197	1	-123	36	SM490Y	2673	14	12.8
29	18	4790	3	1197	1	-128	36	SM490Y	2673	14	12.8
29	19	4790	3	1197	1	-110	36	SM490Y	2673	14	12.8
29	19	4790	3	1197	1	-143	40	SM490Y	2673	14	12.8
30	19	4790	3	1197	1	-143	40	SM490Y	2673	14	12.8
30	19	4790	3	1197	1	-181	44	SM490Y	2673	14	12.8
30	20	4790	3	1197	1	-134	43	SM490Y	2673	14	12.8
30	20	4790	3	1197	1	-138	44	SM490Y	2673	14	12.8
31	20	4715	3	1179	1	-138	44	SM490Y	2673	14	12.8
31	20	4715	3	1179	1	-177	48	SM490Y	2673	14	12.8
32	20	4715	3	1129	1	-177	49	SM490Y	2673	14	12.8
32	20	4715	3	1229	1	-190	50	SM490Y	2673	14	12.8
32	21	4715	3	1229	1	-160	50	SM490Y	2673	14	12.8
32	21	4715	3	1179	1	-187	53	SM490Y	2673	14	12.8
33	21	4440	3	1110	1	-187	66	SM490Y	2673	14	12.8
33	21	4440	3	1160	1	-153	62	SM490Y	2673	14	12.8
33	22	4440	3	1160	1	-186	63	SM490Y	2673	14	12.8
33	22	4440	3	1060	1	-167	62	SM490Y	2673	14	12.8

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress (N/mm²) σc	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
34	22	4440	3	1110	1	-167	62	SM490Y	2673	14	12.8
34	22	4440	3	1110	1	-112	58	SM490Y	2673	14	12.8
35	22	4690	3	1172	1	-112	59	SM490Y	2673	14	12.8
35	22	4690	3	1172	1	-106	58	SM490Y	2673	14	12.8
35	23	4690	3	1172	1	-150	60	SM490Y	2673	14	12.8
35	23	4690	3	1172	1	-89	56	SM490Y	2673	14	12.8
36	23	4690	3	1172	1	-89	55	SM490Y	2673	14	12.8
36	23	4690	3	1172	1	-49	53	SM490Y	2673	14	12.8
36	24	4690	3	1172	1	-53	54	SM490Y	2673	14	12.8
36	24	4690	3	1172	1	-29	52	SM490Y	2673	14	12.8
37	24	4690	3	1172	1	-29	51	SM490Y	2673	14	12.8
37	24	4690	3	1172	1	-44	46	SM490Y	2673	14	12.8
38	25	4690	3	1172	1	-45	47	SM490Y	2673	14	12.8
38	25	4690	3	1172	1	-57	46	SM490Y	2673	14	12.8
38	26	4690	3	1172	1	-55	44	SM490Y	2673	14	12.8
38	26	4690	3	1172	1	-73	42	SM490Y	2673	14	12.8
39	26	4690	3	1172	1	-73	42	SM490Y	2673	14	12.8
39	26	4690	3	1172	1	-100	38	SM490Y	2673	14	12.8
40	26	4690	3	1172	1	-100	37	SM490Y	2673	14	12.8
40	26	4690	3	1172	1	-104	37	SM490Y	2673	14	12.8
40	27	4690	3	1172	1	-99	36	SM490Y	2673	14	12.8
40	27	4690	3	1172	1	-120	33	SM490Y	2673	14	12.8
41	27	4690	3	1172	1	-120	31	SM490Y	2673	14	12.8
41	27	4690	3	1172	1	-135	27	SM490Y	2673	14	12.8
41	28	4690	3	1172	1	-133	27	SM490Y	2673	14	12.8
41	28	4690	3	1172	1	-135	27	SM490Y	2673	14	12.8
42	28	4653	3	1172	1	-136	26	SM490Y	2673	14	12.8
42	28	4653	3	1154	1	-150	23	SM490Y	2673	14	12.8
43	28	4655	3	1164	1	-150	24	SM490Y	2673	14	12.8
43	28	4655	3	1224	1	-157	21	SM490Y	2673	14	12.8
43	29	4655	3	1224	1	-156	21	SM490Y	2673	14	12.8
43	29	4655	3	1104	1	-159	20	SM490Y	2673	14	12.8
44	29	4675	3	1164	1	-153	23	SM490Y	2673	14	12.8
44	29	4675	3	1174	1	-159	20	SM490Y	2673	14	12.8
45	29	4698	3	1075	1	-158	19	SM490Y	2673	14	12.8
45	29	4698	3	1275	1	-159	18	SM490Y	2673	14	12.8
45	30	4698	3	1275	1	-159	18	SM490Y	2673	14	12.8
45	30	4698	3	1174	1	-159	15	SM490Y	2673	14	12.8
46	30	4697	3	1174	1	-159	15	SM490Y	2673	14	12.8
46	30	4697	3	1174	1	-158	14	SM490Y	2673	14	12.8
46	30	4697	3	1224	1	-151	15	SM490Y	2673	14	12.8
46	31	4697	3	1224	1	-151	15	SM490Y	2673	14	12.8
46	31	4697	3	1224	1	-151	16	SM490Y	2673	14	12.8

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm²)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
47	31	4696	3	1174	1	-151	17	SM490Y	2673	14	12.8
47	31	4696	3	1174	1	-145	20	SM490Y	2673	14	12.8
48	31	4696	3	1174	1	-145	20	SM490Y	2673	14	12.8
48	31	4696	3	1174	1	-142	22	SM490Y	2673	14	12.8
48	32	4696	3	1174	1	-143	22	SM490Y	2673	14	12.8
48	32	4696	3	1174	1	-137	24	SM490Y	2673	14	12.8
49	32	4695	3	1174	1	-137	28	SM490Y	2673	14	12.8
49	32	4695	3	1174	1	-119	31	SM490Y	2673	14	12.8
50	32	4695	3	1174	1	-119	31	SM490Y	2673	14	12.8
50	32	4695	3	1174	1	-116	32	SM490Y	2673	14	12.8
50	33	4695	3	1174	1	-119	32	SM490Y	2673	14	12.8
50	33	4695	3	1174	1	-104	36	SM490Y	2673	14	12.8
51	33	4694	3	1174	1	-104	39	SM490Y	2673	14	12.8
51	33	4694	3	1174	1	-84	42	SM490Y	2673	14	12.8
51	34	4694	3	1174	1	-88	43	SM490Y	2673	14	12.8
51	34	4694	3	1174	1	-85	44	SM490Y	2673	14	12.8
52	34	4726	3	1179	1	-84	43	SM490Y	2673	14	12.8
52	34	4726	3	1184	1	-58	47	SM490Y	2673	14	12.8
53	34	4646	3	1171	1	-58	45	SM490Y	2673	14	12.8
53	34	4646	3	1152	1	-41	47	SM490Y	2673	14	12.8
53	35	4646	3	1152	1	-43	49	SM490Y	2673	14	12.8
53	35	4646	3	1152	1	-32	50	SM490Y	2673	14	12.8
54	35	4650	3	1163	1	-33	51	SM490Y	2673	14	12.8
54	35	4650	3	1163	1	0	56	SM490Y	2673	14	12.8

(b)Check of spacing and required stiffness

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm⁴)	Iv	VStf No	γh·req	Ih·req (cm⁴)	Ih	HStf No
1	1	0.43	0.16	42.55	2837	3429	1	13.01	867	1006	1
1	1	0.43	0.13	42.48	2832	3429	1	13.02	868	1006	1
2	1	0.43	0.13	42.48	2832	3429	1	13.02	868	1006	1
2	1	0.43	0.12	42.48	2832	3429	1	13.02	868	1006	1
2	2	0.43	0.12	42.48	2832	3429	1	13.02	868	1006	1
2	2	0.43	0.12	42.48	2832	3429	1	13.02	868	1006	1
3	2	0.44	0.12	40.71	2715	3429	1	13.30	887	1006	1
3	2	0.44	0.12	40.71	2715	3429	1	13.30	887	1006	1
4	2	0.44	0.12	40.71	2715	3429	1	13.30	887	1006	1
4	2	0.44	0.12	40.71	2715	3429	1	13.30	887	1006	1
4	3	0.44	0.12	40.71	2715	3429	1	13.30	887	1006	1
4	3	0.44	0.12	40.71	2715	3429	1	13.30	887	1006	1
5	3	0.44	0.12	40.71	2715	3429	1	13.30	887	1006	1
5	3	0.44	0.12	40.71	2715	3429	1	13.30	887	1006	1

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm^4)	Iv	VStf No	γh·req	Ih·req (cm^4)	Ih	HStf No
6	3	0.44	0.12	40.71	2715	3429	1	13.30	887	1006	1
6	3	0.44	0.12	40.71	2715	3429	1	13.30	887	1006	1
6	4	0.44	0.12	40.71	2715	3429	1	13.30	887	1006	1
6	4	0.44	0.12	40.71	2715	3429	1	13.30	887	1006	1
7	4	0.44	0.11	40.71	2715	3429	1	13.30	887	1006	1
7	4	0.44	0.11	40.71	2715	3429	1	13.30	887	1006	1
7	4	0.44	0.11	40.71	2715	3429	1	13.30	887	1006	1
7	5	0.44	0.11	40.71	2715	3429	1	13.30	887	1006	1
7	5	0.44	0.11	40.71	2715	3429	1	13.30	887	1006	1
8	5	0.44	0.11	40.71	2715	3429	1	13.30	887	1006	1
8	5	0.44	0.12	40.71	2715	3429	1	13.30	887	1006	1
9	5	0.44	0.12	40.71	2715	3429	1	13.30	887	1006	1
9	5	0.44	0.12	40.71	2715	3429	1	13.30	887	1006	1
9	6	0.44	0.12	40.71	2715	3429	1	13.30	887	1006	1
9	6	0.44	0.12	40.71	2715	3429	1	13.30	887	1006	1
10	6	0.44	0.12	40.71	2715	3429	1	13.30	887	1006	1
10	6	0.44	0.12	40.71	2715	3429	1	13.30	887	1006	1
11	6	0.44	0.12	40.71	2715	3429	1	13.30	887	1006	1
11	6	0.44	0.12	40.71	2715	3429	1	13.30	887	1006	1
11	7	0.44	0.13	40.71	2715	3429	1	13.30	887	1006	1
11	7	0.44	0.12	40.71	2715	3429	1	13.30	887	1006	1
12	7	0.44	0.12	40.71	2715	3429	1	13.30	887	1006	1
12	7	0.44	0.12	40.71	2715	3429	1	13.30	887	1006	1
13	8	0.44	0.12	40.71	2715	3429	1	13.30	887	1006	1
13	8	0.44	0.12	40.71	2715	3429	1	13.30	887	1006	1
13	9	0.44	0.12	40.71	2715	3429	1	13.30	887	1006	1
13	9	0.44	0.13	40.71	2715	3429	1	13.30	887	1006	1
14	9	0.44	0.13	40.71	2715	3429	1	13.30	887	1006	1
14	9	0.44	0.21	40.71	2715	3429	1	13.30	887	1006	1
14	10	0.44	0.20	40.71	2715	3429	1	13.30	887	1006	1
14	10	0.44	0.21	40.71	2715	3429	1	13.30	887	1006	1
15	10	0.43	0.19	42.48	2832	3429	1	13.02	868	1006	1
15	10	0.43	0.40	42.48	2832	3429	1	13.02	868	1006	1
16	10	0.43	0.40	42.48	2832	3429	1	13.02	868	1006	1
16	10	0.43	0.53	42.48	2832	3429	1	13.02	868	1006	1
16	11	0.43	0.42	42.48	2832	3429	1	13.02	868	1006	1
16	11	0.43	0.63	42.48	2832	3429	1	13.02	868	1006	1
17	11	0.44	0.57	41.14	2743	3429	1	13.23	882	1006	1
17	11	0.44	0.41	41.14	2743	3429	1	13.23	882	1006	1
17	12	0.44	0.53	41.14	2743	3429	1	13.23	882	1006	1
17	12	0.44	0.43	41.14	2743	3429	1	13.23	882	1006	1
18	12	0.44	0.43	41.14	2743	3429	1	13.23	882	1006	1
18	12	0.44	0.24	41.14	2743	3429	1	13.23	882	1006	1

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm^4)	Iv	VStf No	γh·req	Ih·req (cm^4)	Ih	HStf No
19	12	0.45	0.25	39.87	2658	3429	1	13.44	896	1006	1
19	12	0.45	0.23	39.87	2658	3429	1	13.44	896	1006	1
19	13	0.45	0.26	39.87	2658	3429	1	13.44	896	1006	1
19	13	0.45	0.15	39.87	2658	3429	1	13.44	896	1006	1
20	13	0.45	0.15	39.87	2658	3429	1	13.44	896	1006	1
20	13	0.45	0.08	39.87	2658	3429	1	13.44	896	1006	1
20	14	0.45	0.08	39.87	2658	3429	1	13.44	896	1006	1
20	14	0.45	0.08	39.87	2658	3429	1	13.44	896	1006	1
21	14	0.45	0.08	39.87	2658	3429	1	13.44	896	1006	1
21	14	0.45	0.04	39.87	2658	3429	1	13.44	896	1006	1
22	14	0.45	0.04	39.87	2658	3429	1	13.44	896	1006	1
22	14	0.45	0.03	39.87	2658	3429	1	13.44	896	1006	1
22	15	0.45	0.03	39.87	2658	3429	1	13.44	896	1006	1
22	15	0.45	0.03	39.87	2658	3429	1	13.44	896	1006	1
23	15	0.45	0.03	39.87	2658	3429	1	13.44	896	1006	1
23	15	0.45	0.02	39.87	2658	3429	1	13.44	896	1006	1
24	15	0.45	0.02	39.87	2658	3429	1	13.44	896	1006	1
24	15	0.45	0.02	39.87	2658	3429	1	13.44	896	1006	1
24	16	0.45	0.02	39.87	2658	3429	1	13.44	896	1006	1
24	16	0.45	0.02	39.87	2658	3429	1	13.44	896	1006	1
24	16	0.45	0.03	39.87	2658	3429	1	13.44	896	1006	1
25	16	0.45	0.03	39.87	2658	3429	1	13.44	896	1006	1
25	16	0.45	0.04	39.87	2658	3429	1	13.44	896	1006	1
25	17	0.45	0.04	39.87	2658	3429	1	13.44	896	1006	1
25	17	0.45	0.05	39.87	2658	3429	1	13.44	896	1006	1
26	17	0.45	0.05	39.87	2658	3429	1	13.44	896	1006	1
26	17	0.45	0.10	39.87	2658	3429	1	13.44	896	1006	1
27	17	0.45	0.10	39.87	2658	3429	1	13.44	896	1006	1
27	17	0.45	0.13	39.87	2658	3429	1	13.44	896	1006	1
27	18	0.45	0.13	39.87	2658	3429	1	13.44	896	1006	1
27	18	0.45	0.18	39.87	2658	3429	1	13.44	896	1006	1
28	18	0.45	0.18	39.87	2658	3429	1	13.44	896	1006	1
28	18	0.45	0.33	39.87	2658	3429	1	13.44	896	1006	1
29	18	0.45	0.32	39.87	2658	3429	1	13.44	896	1006	1
29	18	0.45	0.34	39.87	2658	3429	1	13.44	896	1006	1
29	19	0.45	0.27	39.87	2658	3429	1	13.44	896	1006	1
29	19	0.45	0.43	39.87	2658	3429	1	13.44	896	1006	1
30	19	0.45	0.43	39.87	2658	3429	1	13.44	896	1006	1
30	19	0.45	0.65	39.87	2658	3429	1	13.44	896	1006	1
30	20	0.45	0.40	39.87	2658	3429	1	13.44	896	1006	1
30	20	0.45	0.43	39.87	2658	3429	1	13.44	896	1006	1
31	20	0.44	0.42	41.14	2743	3429	1	13.23	882	1006	1
31	20	0.44	0.64	41.14	2743	3429	1	13.23	882	1006	1

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm^4)	Iv	VStf No	γh·req	Ih·req (cm^4)	Ih	HStf No
32	20	0.42	0.63	44.87	2992	3429	1	12.67	845	1006	1
32	20	0.46	0.76	37.86	2525	3429	1	13.79	920	1006	1
32	21	0.46	0.58	37.86	2525	3429	1	13.79	920	1006	1
32	21	0.44	0.73	41.14	2743	3429	1	13.23	882	1006	1
33	21	0.42	0.77	46.38	3093	3429	1	12.46	831	1006	1
33	21	0.43	0.59	42.47	2832	3429	1	13.02	868	1006	1
33	22	0.43	0.78	42.47	2832	3429	1	13.02	868	1006	1
33	22	0.40	0.61	50.86	3391	3429	1	11.90	793	1006	1
34	22	0.42	0.64	46.38	3093	3429	1	12.46	831	1006	1
34	22	0.42	0.36	46.38	3093	3429	1	12.46	831	1006	1
35	22	0.44	0.40	41.58	2773	3429	1	13.16	877	1006	1
35	22	0.44	0.37	41.58	2773	3429	1	13.16	877	1006	1
35	23	0.44	0.57	41.58	2773	3429	1	13.16	877	1006	1
35	23	0.44	0.30	41.58	2773	3429	1	13.16	877	1006	1
36	23	0.44	0.30	41.58	2773	3429	1	13.16	877	1006	1
36	23	0.44	0.20	41.58	2773	3429	1	13.16	877	1006	1
36	24	0.44	0.21	41.58	2773	3429	1	13.16	877	1006	1
36	24	0.44	0.17	41.58	2773	3429	1	13.16	877	1006	1
37	24	0.44	0.16	41.58	2773	3429	1	13.16	877	1006	1
37	24	0.44	0.15	41.58	2773	3429	1	13.16	877	1006	1
38	25	0.44	0.15	41.58	2773	3429	1	13.16	877	1006	1
38	25	0.44	0.17	41.58	2773	3429	1	13.16	877	1006	1
38	26	0.44	0.16	41.58	2773	3429	1	13.16	877	1006	1
38	26	0.44	0.19	41.58	2773	3429	1	13.16	877	1006	1
39	26	0.44	0.18	41.58	2773	3429	1	13.16	877	1006	1
39	26	0.44	0.24	41.58	2773	3429	1	13.16	877	1006	1
40	26	0.44	0.24	41.58	2773	3429	1	13.16	877	1006	1
40	26	0.44	0.25	41.58	2773	3429	1	13.16	877	1006	1
40	27	0.44	0.23	41.58	2773	3429	1	13.16	877	1006	1
40	27	0.44	0.30	41.58	2773	3429	1	13.16	877	1006	1
41	27	0.44	0.29	41.58	2773	3429	1	13.16	877	1006	1
41	27	0.44	0.34	41.58	2773	3429	1	13.16	877	1006	1
41	28	0.44	0.33	41.58	2773	3429	1	13.16	877	1006	1
41	28	0.44	0.34	41.58	2773	3429	1	13.16	877	1006	1
42	28	0.44	0.34	41.58	2773	3429	1	13.16	877	1006	1
42	28	0.43	0.40	42.93	2862	3429	1	12.95	864	1006	1
43	28	0.44	0.40	42.21	2815	3429	1	13.06	871	1006	1
43	28	0.46	0.43	38.17	2545	3429	1	13.73	916	1006	1
43	29	0.46	0.43	38.17	2545	3429	1	13.73	916	1006	1
43	29	0.41	0.43	46.92	3128	3429	1	12.39	826	1006	1
44	29	0.44	0.41	42.19	2813	3429	1	13.06	871	1006	1
44	29	0.44	0.44	41.47	2765	3429	1	13.18	879	1006	1

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm^4)	Iv	VStf No	γh·req	Ih·req (cm^4)	Ih	HStf No
45	29	0.40	0.42	49.50	3300	3429	1	12.06	804	1006	1
45	29	0.48	0.44	35.18	2346	3429	1	14.31	954	1006	1
45	30	0.48	0.44	35.18	2346	3429	1	14.31	954	1006	1
45	30	0.44	0.42	41.44	2763	3429	1	13.18	879	1006	1
46	30	0.44	0.42	41.44	2763	3429	1	13.18	879	1006	1
46	30	0.44	0.42	41.44	2763	3429	1	13.18	879	1006	1
46	30	0.46	0.39	38.13	2543	3429	1	13.74	916	1006	1
46	31	0.46	0.39	38.13	2543	3429	1	13.74	916	1006	1
46	31	0.46	0.39	38.13	2543	3429	1	13.74	916	1006	1
47	31	0.44	0.39	41.46	2764	3429	1	13.18	879	1006	1
47	31	0.44	0.37	41.46	2764	3429	1	13.18	879	1006	1
48	31	0.44	0.37	41.47	2765	3429	1	13.18	879	1006	1
48	31	0.44	0.36	41.47	2765	3429	1	13.18	879	1006	1
48	32	0.44	0.36	41.47	2765	3429	1	13.18	879	1006	1
48	32	0.44	0.34	41.47	2765	3429	1	13.18	879	1006	1
49	32	0.44	0.35	41.47	2765	3429	1	13.18	879	1006	1
49	32	0.44	0.29	41.48	2766	3429	1	13.17	878	1006	1
50	32	0.44	0.29	41.49	2766	3429	1	13.17	878	1006	1
50	32	0.44	0.28	41.49	2766	3429	1	13.17	878	1006	1
50	33	0.44	0.29	41.49	2766	3429	1	13.17	878	1006	1
50	33	0.44	0.25	41.49	2766	3429	1	13.17	878	1006	1
51	33	0.44	0.26	41.50	2767	3429	1	13.17	878	1006	1
51	33	0.44	0.21	41.50	2767	3429	1	13.17	878	1006	1
51	34	0.44	0.23	41.50	2767	3429	1	13.17	878	1006	1
51	34	0.44	0.22	41.50	2767	3429	1	13.17	878	1006	1
52	34	0.44	0.22	41.13	2742	3429	1	13.23	882	1006	1
52	34	0.44	0.18	40.78	2719	3429	1	13.29	886	1006	1
53	34	0.44	0.17	41.66	2778	3429	1	13.15	877	1006	1
53	34	0.43	0.14	43.09	2873	3429	1	12.93	862	1006	1
53	35	0.43	0.16	43.09	2873	3429	1	12.93	862	1006	1
53	35	0.43	0.15	43.09	2873	3429	1	12.93	862	1006	1
54	35	0.43	0.16	42.30	2820	3429	1	13.05	870	1006	1
54	35	0.43	0.17	42.30	2820	3429	1	13.05	870	1006	1

７）Main girder G4　 Web name：LWEB

(ａ) Check of section and web thickness

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm²)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
1	1	4621	3	1154	1	−1	62	SM490Y	2728	15	13.1
1	1	4621	3	1157	1	−28	53	SM490Y	2728	15	13.1
2	1	4628	3	1157	1	−28	53	SM490Y	2728	15	13.1
2	1	4628	3	1157	1	−43	48	SM490Y	2728	15	13.1
2	2	4628	3	1157	1	−39	47	SM490Y	2728	15	13.1
2	2	4628	3	1157	1	−47	44	SM490Y	2728	15	13.1
3	2	4728	3	1182	1	−46	47	SM490Y	2728	15	13.1
3	2	4728	3	1182	1	−63	40	SM490Y	2728	15	13.1
4	2	4728	3	1182	1	−64	39	SM490Y	2728	15	13.1
4	2	4728	3	1182	1	−69	37	SM490Y	2728	15	13.1
4	3	4728	3	1182	1	−66	36	SM490Y	2728	15	13.1
4	3	4728	3	1182	1	−73	32	SM490Y	2729	15	13.1
5	3	4728	3	1182	1	−73	31	SM490Y	2729	15	13.1
5	3	4728	3	1182	1	−82	24	SM490Y	2729	15	13.1
6	3	4728	3	1182	1	−82	23	SM490Y	2729	15	13.1
6	3	4728	3	1182	1	−83	23	SM490Y	2729	15	13.1
6	4	4728	3	1182	1	−82	23	SM490Y	2729	15	13.1
6	4	4728	3	1182	1	−84	17	SM490Y	2729	15	13.1
7	4	4728	3	1182	1	−86	16	SM490Y	2729	15	13.1
7	4	4728	3	1282	1	−88	13	SM490Y	2729	15	13.1
7	4	4728	3	1282	1	−88	13	SM490Y	2729	15	13.1
7	5	4728	3	1282	1	−88	13	SM490Y	2729	15	13.1
7	5	4728	3	1282	1	−88	14	SM490Y	2729	15	13.1
8	5	4728	3	1182	1	−88	13	SM490Y	2729	15	13.1
8	5	4728	3	1182	1	−88	19	SM490Y	2729	15	13.1
9	5	4728	3	1182	1	−88	17	SM490Y	2729	15	13.1
9	5	4728	3	1182	1	−82	22	SM490Y	2729	15	13.1
9	6	4728	3	1182	1	−83	22	SM490Y	2729	15	13.1
9	6	4728	3	1182	1	−81	24	SM490Y	2729	15	13.1
10	6	4728	3	1182	1	−83	24	SM490Y	2729	15	13.1
10	6	4728	3	1182	1	−73	31	SM490Y	2729	15	13.1
11	6	4728	3	1182	1	−72	31	SM490Y	2729	15	13.1
11	6	4728	3	1182	1	−66	34	SM490Y	2729	15	13.1
11	7	4728	3	1182	1	−69	34	SM490Y	2729	15	13.1
11	7	4728	3	1182	1	−60	39	SM490Y	2729	15	13.1
12	7	4728	3	1182	1	−61	39	SM490Y	2729	15	13.1
12	7	4728	3	1182	1	−42	46	SM490Y	2729	15	13.1

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm²)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
13	8	4728	3	1182	1	-41	43	SM490Y	2729	15	13.1
13	8	4728	3	1182	1	-39	43	SM490Y	2729	15	13.1
13	9	4728	3	1182	1	-42	45	SM490Y	2729	15	13.1
13	9	4728	3	1182	1	-22	51	SM490Y	2729	15	13.1
14	9	4728	3	1182	1	-22	51	SM490Y	2729	15	13.1
14	9	4728	3	1182	1	-66	57	SM490Y	2729	15	13.1
14	10	4728	3	1182	1	-60	50	SM490Y	2729	17	13.1
14	10	4728	3	1182	1	-68	51	SM490Y	2729	17	13.1
15	10	4628	3	1157	1	-68	51	SM490Y	2729	17	13.1
15	10	4628	3	1157	1	-146	57	SM490Y	2729	17	13.1
16	10	4628	3	1157	1	-146	57	SM490Y	2729	17	13.1
16	10	4628	3	1157	1	-180	59	SM490Y	2729	17	13.1
16	11	4628	3	1157	1	-134	57	SM490Y	2729	17	13.1
16	11	4628	3	1157	1	-179	61	SM490Y	2730	17	13.1
17	11	4703	3	1176	1	-179	51	SM490Y	2730	17	13.1
17	11	4703	3	1176	1	-144	47	SM490Y	2730	17	13.1
17	12	4703	3	1176	1	-178	47	SM490Y	2730	17	13.1
17	12	4703	3	1176	1	-154	45	SM490Y	2730	17	13.1
18	12	4703	3	1176	1	-154	45	SM490Y	2730	17	13.1
18	12	4703	3	1176	1	-100	38	SM490Y	2730	17	13.1
19	12	4778	3	1194	1	-100	38	SM490Y	2730	17	13.1
19	12	4778	3	1194	1	-95	37	SM490Y	2730	17	13.1
19	13	4778	3	1194	1	-124	43	SM490Y	2730	15	13.1
19	13	4778	3	1194	1	-81	36	SM490Y	2730	15	13.1
20	13	4778	3	1194	1	-81	36	SM490Y	2730	15	13.1
20	13	4778	3	1194	1	-48	30	SM490Y	2730	15	13.1
20	14	4778	3	1194	1	-48	30	SM490Y	2730	15	13.1
20	14	4778	3	1194	1	-45	29	SM490Y	2730	15	13.1
21	14	4778	3	1194	1	-45	30	SM490Y	2730	15	13.1
21	14	4778	3	1194	1	-24	23	SM490Y	2730	15	13.1
22	14	4778	3	1194	1	-24	23	SM490Y	2730	15	13.1
22	14	4778	3	1194	1	-23	19	SM490Y	2730	15	13.1
22	15	4778	3	1194	1	-23	19	SM490Y	2730	15	13.1
22	15	4778	3	1194	1	-25	16	SM490Y	2730	15	13.1
23	15	4778	3	1194	1	-25	18	SM490Y	2730	15	13.1
23	15	4778	3	1194	1	-28	11	SM490Y	2730	15	13.1
24	15	4778	3	1194	1	-28	11	SM490Y	2730	15	13.1
24	15	4778	3	1194	1	-28	12	SM490Y	2730	15	13.1
24	15	4778	3	1194	1	-28	12	SM490Y	2730	15	13.1
24	16	4778	3	1194	1	-28	12	SM490Y	2730	15	13.1
24	16	4778	3	1195	1	-26	18	SM490Y	2730	15	13.1
25	16	4778	3	1195	1	-26	13	SM490Y	2730	15	13.1
25	16	4778	3	1194	1	-34	19	SM490Y	2730	15	13.1
25	17	4778	3	1194	1	-34	19	SM490Y	2730	15	13.1
25	17	4778	3	1194	1	-37	20	SM490Y	2730	15	13.1

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm²)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
26	17	4782	3	1195	1	-37	20	SM490Y	2730	15	13.1
26	17	4782	3	1196	1	-64	27	SM490Y	2729	15	13.1
27	17	4791	3	1198	1	-64	26	SM490Y	2729	15	13.1
27	17	4791	3	1198	1	-77	29	SM490Y	2729	15	13.1
27	18	4791	3	1198	1	-72	29	SM490Y	2729	15	13.1
27	18	4791	3	1198	1	-95	33	SM490Y	2729	15	13.1
28	18	4792	3	1198	1	-95	33	SM490Y	2729	15	13.1
28	18	4792	3	1198	1	-139	39	SM490Y	2729	15	13.1
29	18	4793	3	1198	1	-139	40	SM490Y	2729	15	13.1
29	18	4793	3	1198	1	-145	41	SM490Y	2729	15	13.1
29	19	4793	3	1198	1	-100	40	SM490Y	2729	15	13.1
29	19	4793	3	1198	1	-142	45	SM490Y	2729	15	13.1
30	19	4794	3	1198	1	-142	45	SM490Y	2729	15	13.1
30	19	4794	3	1198	1	-186	50	SM490Y	2729	15	13.1
30	20	4794	3	1198	1	-127	43	SM490Y	2729	17	13.1
30	20	4794	3	1198	1	-131	44	SM490Y	2729	17	13.1
31	20	4719	3	1180	1	-131	45	SM490Y	2729	17	13.1
31	20	4719	3	1180	1	-171	50	SM490Y	2729	17	13.1
32	20	4720	3	680	1	-172	49	SM490Y	2729	17	13.1
32	20	4720	3	1680	1	-185	51	SM490Y	2729	17	13.1
32	21	4720	3	1680	1	-158	50	SM490Y	2729	17	13.1
32	21	4720	3	1180	1	-184	54	SM490Y	2729	17	13.1
33	21	4446	3	1112	1	-185	64	SM490Y	2729	17	13.1
33	21	4446	3	1542	1	-149	61	SM490Y	2729	17	13.1
33	22	4446	3	1542	1	-183	61	SM490Y	2729	17	13.1
33	22	4446	3	682	1	-163	59	SM490Y	2729	17	13.1
34	22	4447	3	1112	1	-164	59	SM490Y	2729	17	13.1
34	22	4447	3	1112	1	-108	54	SM490Y	2729	17	13.1
35	22	4698	3	1174	1	-109	52	SM490Y	2729	17	13.1
35	22	4698	3	1174	1	-102	52	SM490Y	2729	17	13.1
35	23	4698	3	1174	1	-153	60	SM490Y	2729	15	13.1
35	23	4698	3	1174	1	-89	55	SM490Y	2729	15	13.1
36	23	4689	3	1173	1	-89	58	SM490Y	2729	15	13.1
36	23	4689	3	1172	1	-49	55	SM490Y	2730	15	13.1
36	24	4689	3	1172	1	-63	57	SM490Y	2730	15	13.1
36	24	4689	3	1172	1	-34	54	SM490Y	2730	15	13.1
37	24	4686	3	1172	1	-34	52	SM490Y	2730	15	13.1
37	24	4686	3	1172	1	-48	47	SM490Y	2730	15	13.1
38	25	4686	3	1172	1	-49	47	SM490Y	2730	15	13.1
38	25	4686	3	1172	1	-63	46	SM490Y	2730	15	13.1
38	26	4686	3	1172	1	-58	44	SM490Y	2730	15	13.1
38	26	4686	3	1172	1	-77	41	SM490Y	2730	15	13.1

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm^2)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
39	26	4686	3	1172	1	-77	38	SM490Y	2730	15	13.1
39	26	4686	3	1172	1	-102	33	SM490Y	2730	15	13.1
40	26	4686	3	1172	1	-102	33	SM490Y	2730	15	13.1
40	26	4686	3	1172	1	-105	32	SM490Y	2730	15	13.1
40	27	4686	3	1172	1	-103	28	SM570	2730	17	14.5
40	27	4686	3	1172	1	-120	25	SM570	2730	17	14.5
41	27	4686	3	1172	1	-120	26	SM570	2730	17	14.5
41	27	4686	3	1172	1	-135	22	SM570	2730	17	14.5
41	28	4686	3	1172	1	-131	22	SM570	2730	17	14.5
41	28	4686	3	1172	1	-133	21	SM570	2730	17	14.5
42	28	4626	3	1172	1	-132	21	SM570	2730	17	14.5
42	28	4626	3	1142	1	-144	16	SM570	2730	17	14.5
43	28	4629	3	1157	1	-144	20	SM570	2730	17	14.5
43	28	4629	3	1357	1	-150	17	SM570	2730	17	14.5
43	29	4629	3	1357	1	-149	17	SM570	2730	17	14.5
43	29	4629	3	957	1	-152	15	SM570	2730	17	14.5
44	29	4662	3	1157	1	-152	18	SM570	2730	17	14.5
44	29	4662	3	1173	1	-157	14	SM570	2730	17	14.5
45	29	4698	3	875	1	-157	17	SM570	2730	17	14.5
45	29	4698	3	1475	1	-159	15	SM570	2730	17	14.5
45	30	4698	3	1475	1	-159	15	SM570	2730	17	14.5
45	30	4698	3	1174	1	-159	12	SM570	2730	17	14.5
45	30	4698	3	1174	1	-159	12	SM570	2730	17	14.5
46	30	4697	3	1174	1	-159	12	SM570	2730	17	14.5
46	30	4697	3	1414	1	-157	16	SM570	2730	17	14.5
46	31	4697	3	1414	1	-157	16	SM570	2730	17	14.5
46	31	4697	3	1414	1	-157	16	SM570	2730	17	14.5
47	31	4696	3	1174	1	-157	15	SM570	2730	17	14.5
47	31	4696	3	1174	1	-150	19	SM570	2730	17	14.5
48	31	4696	3	1034	1	-150	19	SM570	2730	17	14.5
48	31	4696	3	1314	1	-146	21	SM570	2730	17	14.5
48	32	4696	3	1314	1	-149	21	SM570	2730	17	14.5
48	32	4696	3	1174	1	-141	25	SM570	2730	17	14.5
49	32	4695	3	1174	1	-141	22	SM570	2730	17	14.5
49	32	4695	3	1174	1	-127	26	SM570	2730	17	14.5
50	32	4695	3	1174	1	-127	26	SM570	2730	17	14.5
50	32	4695	3	1174	1	-125	27	SM570	2730	17	14.5
50	33	4695	3	1174	1	-130	27	SM570	2730	17	14.5
50	33	4695	3	1174	1	-113	31	SM570	2730	17	14.5
51	33	4694	3	1174	1	-113	26	SM570	2730	17	14.5
51	33	4694	3	1174	1	-96	30	SM570	2730	17	14.5
51	34	4694	3	1174	1	-99	34	SM490Y	2730	15	13.1
51	34	4694	3	1174	1	-96	35	SM490Y	2730	15	13.1

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm²)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
52	34	4745	3	1182	1	-97	34	SM490Y	2730	15	13.1
52	34	4745	3	1190	1	-71	40	SM490Y	2730	15	13.1
53	34	4647	3	1178	1	-71	41	SM490Y	2730	15	13.1
53	34	4647	3	1146	1	-51	45	SM490Y	2730	15	13.1
53	35	4647	3	1146	1	-56	46	SM490Y	2730	15	13.1
53	35	4647	3	1146	1	-42	48	SM490Y	2730	15	13.1
54	35	4650	3	1163	1	-42	48	SM490Y	2730	15	13.1
54	35	4650	3	1163	1	0	55	SM490Y	2730	15	13.1

(b)Check of spacing and required stiffness

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm⁴)	Iv	VStf No	γh·req	Ih·req (cm⁴)	Ih	HStf No
1	1	0.42	0.16	44.74	3745	8755	2	12.69	1062	2321	2
1	1	0.42	0.13	44.50	3725	8755	2	12.72	1065	2321	2
2	1	0.42	0.13	44.49	3725	8755	2	12.72	1065	2321	2
2	1	0.42	0.12	44.48	3723	8755	2	12.72	1065	2321	2
2	2	0.42	0.11	44.48	3723	8755	2	12.72	1065	2321	2
2	2	0.42	0.11	44.48	3723	8755	2	12.72	1065	2321	2
3	2	0.43	0.13	42.62	3568	8755	2	13.00	1088	2321	2
3	2	0.43	0.12	42.63	3568	8755	2	13.00	1088	2321	2
4	2	0.43	0.12	42.63	3568	8755	2	13.00	1088	2321	2
4	2	0.43	0.12	42.63	3569	8755	2	13.00	1088	2321	2
4	3	0.43	0.12	42.63	3569	8755	2	13.00	1088	2321	2
4	3	0.43	0.12	42.63	3569	8755	2	13.00	1088	2321	2
5	3	0.43	0.12	42.63	3569	8755	2	13.00	1088	2321	2
5	3	0.43	0.12	42.63	3569	8755	2	13.00	1088	2321	2
6	3	0.43	0.12	42.63	3569	8755	2	13.00	1088	2321	2
6	3	0.43	0.12	42.63	3569	8755	2	13.00	1088	2321	2
6	4	0.43	0.11	42.63	3569	8755	2	13.00	1088	2321	2
6	4	0.43	0.11	42.64	3570	8755	2	13.00	1088	2321	2
7	4	0.43	0.11	42.64	3570	8755	2	13.00	1088	2321	2
7	4	0.47	0.11	36.25	3035	8755	2	14.09	1180	2321	2
7	4	0.47	0.11	36.25	3035	8755	2	14.09	1180	2321	2
7	5	0.47	0.11	36.25	3035	8755	2	14.09	1180	2321	2
7	5	0.47	0.12	36.25	3035	8755	2	14.09	1180	2321	2
8	5	0.43	0.11	42.64	3570	8755	2	12.99	1088	2321	2
8	5	0.43	0.12	42.64	3570	8755	2	12.99	1088	2321	2
9	5	0.43	0.12	42.64	3570	8755	2	12.99	1088	2321	2
9	5	0.43	0.11	42.64	3571	8755	2	12.99	1088	2321	2
9	6	0.43	0.11	42.64	3571	8755	2	12.99	1088	2321	2
9	6	0.43	0.11	42.64	3571	8755	2	12.99	1088	2321	2
10	6	0.43	0.12	42.64	3571	8755	2	12.99	1088	2321	2
10	6	0.43	0.11	42.65	3571	8755	2	12.99	1088	2321	2

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm^4)	Iv	VStf No	γh·req	Ih·req (cm^4)	Ih	HStf No
11	6	0.43	0.11	42.65	3571	8755	2	12.99	1088	2321	2
11	6	0.43	0.11	42.65	3571	8755	2	12.99	1088	2321	2
11	7	0.43	0.12	42.65	3571	8755	2	12.99	1088	2321	2
11	7	0.43	0.11	42.65	3571	8755	2	12.99	1088	2321	2
12	7	0.43	0.12	42.65	3571	8755	2	12.99	1088	2321	2
12	7	0.43	0.11	42.65	3572	8755	2	12.99	1088	2321	2
13	8	0.43	0.10	42.65	3572	8755	2	12.99	1088	2321	2
13	8	0.43	0.10	42.65	3572	8755	2	12.99	1088	2321	2
13	9	0.43	0.11	42.65	3572	8755	2	12.99	1088	2321	2
13	9	0.43	0.12	42.65	3572	8755	2	12.99	1088	2321	2
14	9	0.43	0.12	42.65	3572	8755	2	12.99	1088	2321	2
14	9	0.43	0.20	42.66	3572	8755	2	12.99	1088	2321	2
14	10	0.43	0.10	42.66	5200	8755	2	12.99	1584	2321	2
14	10	0.43	0.11	42.66	5200	8755	2	12.99	1584	2321	2
15	10	0.42	0.10	44.51	5426	8755	2	12.72	1550	2321	2
15	10	0.42	0.26	44.51	5427	8755	2	12.72	1550	2321	2
16	10	0.42	0.25	44.51	5427	8755	2	12.72	1550	2321	2
16	10	0.42	0.35	44.52	5427	8755	2	12.72	1550	2321	2
16	11	0.42	0.23	44.52	5427	8755	2	12.72	1550	2321	2
16	11	0.42	0.36	44.52	5427	8755	2	12.72	1550	2321	2
17	11	0.43	0.33	43.11	5256	8755	2	12.92	1575	2321	2
17	11	0.43	0.23	43.11	5256	8755	2	12.92	1575	2321	2
17	12	0.43	0.32	43.11	5256	8755	2	12.92	1575	2321	2
17	12	0.43	0.25	43.11	5256	8755	2	12.92	1575	2321	2
18	12	0.43	0.25	43.11	5256	8755	2	12.92	1575	2321	2
18	12	0.43	0.12	43.12	5257	8755	2	12.92	1575	2321	2
19	12	0.44	0.12	41.78	5094	8755	2	13.13	1600	2321	2
19	12	0.44	0.11	41.78	5094	8755	2	13.13	1600	2321	2
19	13	0.44	0.29	41.78	3499	8755	2	13.13	1099	2321	2
19	13	0.44	0.15	41.79	3500	8755	2	13.13	1099	2321	2
20	13	0.44	0.15	41.79	3500	8755	2	13.13	1099	2321	2
20	13	0.44	0.07	41.79	3500	8755	2	13.13	1099	2321	2
20	14	0.44	0.07	41.79	3500	8755	2	13.13	1099	2321	2
20	14	0.44	0.07	41.79	3500	8755	2	13.13	1099	2321	2
21	14	0.44	0.07	41.79	3500	8755	2	13.13	1099	2321	2
21	14	0.44	0.03	41.79	3500	8755	2	13.13	1099	2321	2
22	14	0.44	0.03	41.79	3500	8755	2	13.13	1099	2321	2
22	14	0.44	0.02	41.79	3500	8755	2	13.13	1099	2321	2
22	15	0.44	0.02	41.79	3500	8755	2	13.13	1099	2321	2
22	15	0.44	0.02	41.79	3500	8755	2	13.13	1099	2321	2
23	15	0.44	0.02	41.79	3500	8755	2	13.13	1099	2321	2
23	15	0.44	0.02	41.79	3500	8755	2	13.13	1099	2321	2

Panel No.	Sec. No.	a/b	Spacing Check	γv・req	Iv・req (cm^4)	Iv	VStf No	γh・req	Ih・req (cm^4)	Ih	HStf No
24	15	0.44	0.02	41.79	3500	8755	2	13.13	1099	2321	2
24	15	0.44	0.02	41.79	3500	8755	2	13.13	1099	2321	2
24	15	0.44	0.02	41.79	3500	8755	2	13.13	1099	2321	2
24	16	0.44	0.02	41.79	3500	8755	2	13.13	1099	2321	2
24	16	0.44	0.02	41.79	3500	8755	2	13.13	1099	2321	2
25	16	0.44	0.02	41.79	3500	8755	2	13.13	1099	2321	2
25	16	0.44	0.03	41.79	3501	8755	2	13.13	1099	2321	2
25	17	0.44	0.03	41.79	3501	8755	2	13.13	1099	2321	2
25	17	0.44	0.04	41.79	3501	8755	2	13.13	1099	2321	2
26	17	0.44	0.04	41.79	3500	8755	2	13.13	1099	2321	2
26	17	0.44	0.09	41.61	3484	8755	2	13.15	1101	2321	2
27	17	0.44	0.09	41.52	3476	8755	2	13.17	1102	2321	2
27	17	0.44	0.12	41.52	3476	8755	2	13.17	1102	2321	2
27	18	0.44	0.11	41.52	3476	8755	2	13.17	1102	2321	2
27	18	0.44	0.17	41.52	3476	8755	2	13.17	1103	2321	2
28	18	0.44	0.17	41.51	3475	8755	2	13.17	1103	2321	2
28	18	0.44	0.33	41.50	3475	8755	2	13.17	1103	2321	2
29	18	0.44	0.33	41.50	3474	8755	2	13.17	1103	2321	2
29	18	0.44	0.36	41.50	3474	8755	2	13.17	1103	2321	2
29	19	0.44	0.21	41.50	3474	8755	2	13.17	1103	2321	2
29	19	0.44	0.36	41.49	3474	8755	2	13.17	1103	2321	2
30	19	0.44	0.36	41.49	3473	8755	2	13.17	1103	2321	2
30	19	0.44	0.58	41.48	3473	8755	2	13.18	1103	2321	2
30	20	0.44	0.18	41.48	5055	8755	2	13.18	1606	2321	2
30	20	0.44	0.19	41.48	5055	8755	2	13.17	1606	2321	2
31	20	0.43	0.19	42.80	5216	8755	2	12.97	1581	2321	2
31	20	0.43	0.31	42.79	5215	8755	2	12.97	1581	2321	2
32	20	0.25	0.25	128.83	15702	8755	2	7.48	911	2321	2
		[Iv ＜ Iv・req → Vertical stiffener interval uses Maximum Spacing]									
32	20	0.62	0.48	21.11	2573	8755	2	18.47	2251	2321	2
32	21	0.62	0.40	21.11	2573	8755	2	18.47	2251	2321	2
32	21	0.43	0.35	42.78	5214	8755	2	12.97	1581	2321	2
33	21	0.41	0.37	48.22	5877	8755	2	12.22	1489	2321	2
33	21	0.56	0.40	25.07	3055	8755	2	16.95	2066	2321	2
33	22	0.56	0.50	25.07	3055	8755	2	16.95	2066	2321	2
33	22	0.25	0.23	128.24	15630	8755	2	7.49	913	2321	2
		[Iv ＜ Iv・req → Vertical stiffener interval uses Maximum Spacing]									
34	22	0.41	0.30	48.21	5875	8755	2	12.22	1490	2321	2
34	22	0.41	0.16	48.20	5875	8755	2	12.22	1490	2321	2
35	22	0.43	0.17	43.20	5266	8755	2	12.91	1573	2321	2
35	22	0.43	0.15	43.20	5266	8755	2	12.91	1573	2321	2
35	23	0.43	0.47	43.20	3617	8755	2	12.91	1081	2321	2
35	23	0.43	0.24	43.20	3617	8755	2	12.91	1081	2321	2

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm^4)	Iv	VStf No	γh·req	Ih·req (cm^4)	Ih	HStf No
36	23	0.43	0.25	43.29	3625	8755	2	12.90	1080	2321	2
36	23	0.43	0.16	43.43	3637	8755	2	12.88	1078	2321	2
36	24	0.43	0.19	43.43	3637	8755	2	12.88	1078	2321	2
36	24	0.43	0.14	43.44	3639	8755	2	12.87	1078	2321	2
37	24	0.43	0.13	43.44	3639	8755	2	12.87	1078	2321	2
37	24	0.43	0.13	43.44	3639	8755	2	12.87	1078	2321	2
38	25	0.43	0.13	43.44	3639	8755	2	12.87	1078	2321	2
38	25	0.43	0.14	43.44	3639	8755	2	12.87	1078	2321	2
38	26	0.43	0.13	43.44	3639	8755	2	12.87	1078	2321	2
38	26	0.43	0.15	43.44	3639	8755	2	12.87	1078	2321	2
39	26	0.43	0.14	43.44	3639	8755	2	12.87	1078	2321	2
39	26	0.43	0.19	43.44	3639	8755	2	12.87	1078	2321	2
40	26	0.43	0.19	43.44	3639	8755	2	12.87	1078	2321	2
40	26	0.43	0.19	43.44	3639	8755	2	12.87	1078	2321	2
40	27	0.43	0.11	43.44	5297	8755	2	12.87	1570	2321	2
40	27	0.43	0.13	43.44	5297	8755	2	12.87	1570	2321	2
41	27	0.43	0.14	43.44	5297	8755	2	12.87	1570	2321	2
41	27	0.43	0.16	43.44	5297	8755	2	12.87	1570	2321	2
41	28	0.43	0.15	43.44	5297	8755	2	12.87	1570	2321	2
41	28	0.43	0.16	43.44	5297	8755	2	12.87	1570	2321	2
42	28	0.43	0.15	43.44	5297	8755	2	12.87	1570	2321	2
42	28	0.42	0.18	45.75	5579	8755	2	12.54	1530	2321	2
43	28	0.42	0.18	44.54	5431	8755	2	12.71	1550	2321	2
43	28	0.50	0.20	32.37	3948	8755	2	14.91	1819	2321	2
43	29	0.50	0.19	32.37	3948	8755	2	14.91	1819	2321	2
43	29	0.35	0.19	65.09	7937	8755	2	10.52	1283	2321	2
44	29	0.42	0.20	44.52	5429	8755	2	12.72	1551	2321	2
44	29	0.43	0.21	43.31	5282	8755	2	12.89	1572	2321	2
45	29	0.32	0.21	77.98	9509	8755	2	9.61	1172	2321	2
		[Iv ＜ Iv・req → Vertical stiffener interval uses Maximum Spacing]									
45	29	0.54	0.22	27.43	3345	8755	2	16.20	1976	2321	2
45	30	0.54	0.22	27.43	3345	8755	2	16.20	1976	2321	2
45	30	0.43	0.21	43.24	5273	8755	2	12.90	1574	2321	2
45	30	0.43	0.21	43.24	5273	8755	2	12.90	1574	2321	2
46	30	0.43	0.21	43.25	5273	8755	2	12.90	1573	2321	2
46	30	0.52	0.21	29.82	3636	8755	2	15.54	1895	2321	2
46	31	0.52	0.21	29.82	3636	8755	2	15.54	1895	2321	2
46	31	0.52	0.21	29.82	3636	8755	2	15.54	1895	2321	2
47	31	0.43	0.21	43.26	5275	8755	2	12.90	1573	2321	2
47	31	0.43	0.19	43.26	5275	8755	2	12.90	1573	2321	2
48	31	0.38	0.19	55.77	6801	8755	2	11.36	1385	2321	2
48	31	0.48	0.19	34.54	4211	8755	2	14.44	1761	2321	2
48	32	0.48	0.20	34.54	4211	8755	2	14.44	1761	2321	2
48	32	0.43	0.18	43.27	5276	8755	2	12.90	1573	2321	2

Panel No.	Sec. No.	a/b	Spacing Check	γv・req	Iv・req (cm^4)	Iv	VStf No	γh・req	Ih・req (cm^4)	Ih	HStf No
49	32	0.43	0.18	43.27	5276	8755	2	12.90	1573	2321	2
49	32	0.43	0.15	43.28	5277	8755	2	12.90	1573	2321	2
50	32	0.43	0.15	43.29	5278	8755	2	12.90	1573	2321	2
50	32	0.43	0.15	43.29	5278	8755	2	12.90	1573	2321	2
50	33	0.43	0.16	43.29	5278	8755	2	12.90	1573	2321	2
50	33	0.43	0.13	43.28	5278	8755	2	12.90	1573	2321	2
51	33	0.43	0.12	43.29	5279	8755	2	12.90	1573	2321	2
51	33	0.43	0.10	43.29	5279	8755	2	12.90	1573	2321	2
51	34	0.43	0.18	43.29	3626	8755	2	12.90	1080	2321	2
51	34	0.43	0.18	43.29	3626	8755	2	12.90	1080	2321	2
52	34	0.43	0.18	42.67	3574	8755	2	12.99	1088	2321	2
52	34	0.44	0.14	42.08	3524	8755	2	13.08	1096	2321	2
53	34	0.43	0.14	42.99	3601	8755	2	12.94	1084	2321	2
53	34	0.42	0.11	45.41	3804	8755	2	12.59	1055	2321	2
53	35	0.42	0.13	45.41	3804	8755	2	12.59	1055	2321	2
53	35	0.42	0.12	45.41	3804	8755	2	12.59	1055	2321	2
54	35	0.43	0.12	44.12	3695	8755	2	12.77	1070	2321	2
54	35	0.43	0.13	44.12	3695	8755	2	12.77	1070	2321	2

８）Main girder G4　　Web name：RWEB

（a）Check of section and web thickness

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm^2)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
1	1	4767	3	1227	1	-1	51	SM490Y	3064	15	14.7
1	1	4767	3	1157	1	-25	44	SM490Y	3064	15	14.7
2	1	4626	3	1157	1	-25	44	SM490Y	3064	15	14.7
2	1	4626	3	1156	1	-39	41	SM490Y	3064	15	14.7
2	2	4626	3	1156	1	-37	39	SM490Y	3064	15	14.7
2	2	4626	3	1156	1	-43	36	SM490Y	3064	15	14.7
3	2	4714	3	1178	1	-43	40	SM490Y	3064	15	14.7
3	2	4714	3	1178	1	-58	34	SM490Y	3064	15	14.7
4	2	4714	3	1178	1	-60	33	SM490Y	3064	15	14.7
4	2	4714	3	1178	1	-65	31	SM490Y	3064	15	14.7
4	3	4714	3	1178	1	-62	31	SM490Y	3064	15	14.7
4	3	4714	3	1178	1	-69	27	SM490Y	3064	15	14.7
5	3	4714	3	1178	1	-69	26	SM490Y	3064	15	14.7
5	3	4714	3	1179	1	-78	21	SM490Y	3064	15	14.7
6	3	4714	3	1179	1	-78	20	SM490Y	3064	15	14.7
6	3	4714	3	1179	1	-78	19	SM490Y	3064	15	14.7
6	4	4714	3	1179	1	-78	19	SM490Y	3064	15	14.7
6	4	4714	3	1179	1	-80	15	SM490Y	3064	15	14.7

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm²)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
7	4	4714	3	1179	1	-82	14	SM490Y	3064	15	14.7
7	4	4714	3	1279	1	-83	11	SM490Y	3064	15	14.7
7	4	4714	3	1279	1	-83	11	SM490Y	3064	15	14.7
7	5	4714	3	1279	1	-83	11	SM490Y	3064	15	14.7
7	5	4714	3	1279	1	-83	12	SM490Y	3064	15	14.7
8	5	4714	3	1179	1	-83	11	SM490Y	3064	15	14.7
8	5	4714	3	1179	1	-83	16	SM490Y	3063	15	14.7
9	5	4714	3	1179	1	-83	15	SM490Y	3063	15	14.7
9	5	4714	3	1179	1	-78	18	SM490Y	3063	15	14.7
9	6	4714	3	1179	1	-79	18	SM490Y	3063	15	14.7
9	6	4714	3	1179	1	-76	20	SM490Y	3063	15	14.7
10	6	4714	3	1179	1	-78	20	SM490Y	3063	15	14.7
10	6	4714	3	1179	1	-68	26	SM490Y	3063	15	14.7
11	6	4714	3	1179	1	-68	27	SM490Y	3063	15	14.7
11	6	4714	3	1179	1	-62	28	SM490Y	3063	15	14.7
11	7	4714	3	1179	1	-65	29	SM490Y	3063	15	14.7
11	7	4714	3	1179	1	-56	33	SM490Y	3063	15	14.7
12	7	4714	3	1179	1	-57	33	SM490Y	3063	15	14.7
12	7	4714	3	1179	1	-40	39	SM490Y	3063	15	14.7
13	8	4714	3	1179	1	-39	37	SM490Y	3063	15	14.7
13	8	4714	3	1179	1	-37	37	SM490Y	3063	15	14.7
13	9	4714	3	1179	1	-39	39	SM490Y	3063	15	14.7
13	9	4714	3	1179	1	-21	44	SM490Y	3063	15	14.7
14	9	4714	3	1179	1	-20	44	SM490Y	3063	15	14.7
14	9	4714	3	1179	1	-66	50	SM490Y	3063	15	14.7
14	10	4714	3	1179	1	-60	44	SM490Y	3063	17	14.7
14	10	4714	3	1179	1	-69	44	SM490Y	3063	17	14.7
15	10	4615	3	1154	1	-69	44	SM490Y	3063	17	14.7
15	10	4615	3	1154	1	-147	49	SM490Y	3063	17	14.7
16	10	4554	3	1154	1	-147	49	SM490Y	3063	17	14.7
16	10	4554	3	1154	1	-180	51	SM490Y	3063	17	14.7
16	11	4554	3	1154	1	-135	49	SM490Y	3063	17	14.7
16	11	4554	3	1123	1	-180	52	SM490Y	3063	17	14.7
17	11	4750	3	1203	1	-180	44	SM490Y	3063	17	14.7
17	11	4750	3	1172	1	-144	41	SM490Y	3063	17	14.7
17	12	4750	3	1172	1	-179	42	SM490Y	3063	17	14.7
17	12	4750	3	1172	1	-155	40	SM490Y	3063	17	14.7
18	12	4689	3	1172	1	-155	39	SM490Y	3063	17	14.7
18	12	4689	3	1172	1	-101	34	SM490Y	3063	17	14.7
19	12	4763	3	1191	1	-101	33	SM490Y	3063	17	14.7
19	12	4763	3	1191	1	-95	33	SM490Y	3063	17	14.7
19	13	4763	3	1191	1	-124	38	SM490Y	3063	15	14.7
19	13	4763	3	1191	1	-81	33	SM490Y	3063	15	14.7

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm²)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
20	13	4763	3	1191	1	-81	33	SM490Y	3063	15	14.7
20	13	4763	3	1191	1	-48	28	SM490Y	3063	15	14.7
20	14	4763	3	1191	1	-48	28	SM490Y	3063	15	14.7
20	14	4763	3	1191	1	-45	27	SM490Y	3063	15	14.7
21	14	4763	3	1191	1	-45	27	SM490Y	3063	15	14.7
21	14	4763	3	1191	1	-24	21	SM490Y	3063	15	14.7
22	14	4763	3	1191	1	-24	21	SM490Y	3063	15	14.7
22	14	4763	3	1191	1	-22	18	SM490Y	3063	15	14.7
22	15	4763	3	1191	1	-22	18	SM490Y	3063	15	14.7
22	15	4763	3	1191	1	-23	15	SM490Y	3063	15	14.7
23	15	4763	3	1191	1	-23	16	SM490Y	3063	15	14.7
23	15	4763	3	1191	1	-26	10	SM490Y	3063	15	14.7
24	15	4763	3	1191	1	-26	11	SM490Y	3063	15	14.7
24	15	4763	3	1191	1	-26	11	SM490Y	3063	15	14.7
24	15	4763	3	1191	1	-26	11	SM490Y	3063	15	14.7
24	16	4763	3	1191	1	-26	11	SM490Y	3063	15	14.7
24	16	4763	3	1191	1	-24	17	SM490Y	3063	15	14.7
25	16	4767	3	1191	1	-24	12	SM490Y	3063	15	14.7
25	16	4767	3	1192	1	-34	17	SM490Y	3063	15	14.7
25	17	4767	3	1192	1	-34	17	SM490Y	3063	15	14.7
25	17	4767	3	1192	1	-37	18	SM490Y	3062	15	14.7
26	17	4992	3	1193	1	-37	18	SM490Y	3062	15	14.7
26	17	4992	3	1303	1	-64	24	SM490Y	3064	15	14.7
27	17	4784	3	1196	1	-64	24	SM490Y	3064	15	14.7
27	17	4784	3	1196	1	-77	26	SM490Y	3064	15	14.7
27	18	4784	3	1196	1	-72	26	SM490Y	3064	15	14.7
27	18	4784	3	1196	1	-95	29	SM490Y	3064	15	14.7
28	18	4785	3	1196	1	-95	29	SM490Y	3064	15	14.7
28	18	4785	3	1196	1	-139	36	SM490Y	3064	15	14.7
29	18	4785	3	1196	1	-139	36	SM490Y	3064	15	14.7
29	18	4785	3	1196	1	-146	37	SM490Y	3064	15	14.7
29	19	4785	3	1196	1	-101	35	SM490Y	3064	15	14.7
29	19	4785	3	1196	1	-143	41	SM490Y	3064	15	14.7
30	19	4786	3	1197	1	-142	40	SM490Y	3064	15	14.7
30	19	4786	3	1197	1	-187	45	SM490Y	3064	15	14.7
30	20	4786	3	1197	1	-127	39	SM490Y	3064	17	14.7
30	20	4786	3	1197	1	-132	39	SM490Y	3064	17	14.7
31	20	4712	3	1178	1	-132	40	SM490Y	3064	17	14.7
31	20	4712	3	1178	1	-172	45	SM490Y	3064	17	14.7
32	20	4496	3	678	1	-172	45	SM490Y	3064	17	14.7
32	20	4496	3	1678	1	-186	47	SM490Y	3063	17	14.7
32	21	4496	3	1678	1	-159	46	SM490Y	3063	17	14.7
32	21	4496	3	1070	1	-185	50	SM490Y	3063	17	14.7

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm²)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
33	21	4657	3	1219	1	-186	60	SM490Y	3063	17	14.7
33	21	4657	3	1540	1	-150	56	SM490Y	3063	17	14.7
33	22	4657	3	1540	1	-184	57	SM490Y	3063	17	14.7
33	22	4657	3	680	1	-164	55	SM490Y	3063	17	14.7
34	22	4440	3	1110	1	-165	56	SM490Y	3063	17	14.7
34	22	4440	3	1110	1	-109	52	SM490Y	3063	17	14.7
35	22	4690	3	1173	1	-109	51	SM490Y	3063	17	14.7
35	22	4690	3	1173	1	-103	51	SM490Y	3063	17	14.7
35	23	4690	3	1173	1	-154	59	SM490Y	3063	15	14.7
35	23	4690	3	1173	1	-90	54	SM490Y	3063	15	14.7
36	23	4465	3	1063	1	-89	58	SM490Y	3063	15	14.7
36	23	4465	3	1170	1	-49	55	SM490Y	3063	15	14.7
36	24	4465	3	1170	1	-63	57	SM490Y	3063	15	14.7
36	24	4465	3	1170	1	-34	55	SM490Y	3062	15	14.7
37	24	4679	3	1170	1	-34	53	SM490Y	3062	15	14.7
37	24	4679	3	1170	1	-45	48	SM490Y	3062	15	14.7
38	25	4679	3	1170	1	-46	49	SM490Y	3062	15	14.7
38	25	4679	3	1170	1	-59	47	SM490Y	3062	15	14.7
38	26	4679	3	1170	1	-55	45	SM490Y	3062	15	14.7
38	26	4679	3	1170	1	-73	42	SM490Y	3062	15	14.7
39	26	4679	3	1170	1	-73	39	SM490Y	3062	15	14.7
39	26	4679	3	1170	1	-97	34	SM490Y	3062	15	14.7
40	26	4679	3	1170	1	-97	33	SM490Y	3062	15	14.7
40	26	4679	3	1170	1	-99	33	SM490Y	3062	15	14.7
40	27	4679	3	1170	1	-98	29	SM570	3062	17	16.3
40	27	4679	3	1170	1	-114	25	SM570	3062	17	16.3
41	27	4679	3	1170	1	-114	27	SM570	3062	17	16.3
41	27	4679	3	1170	1	-128	22	SM570	3062	17	16.3
41	28	4679	3	1170	1	-124	22	SM570	3062	17	16.3
41	28	4679	3	1170	1	-126	21	SM570	3062	17	16.3
42	28	4578	3	1170	1	-127	21	SM570	3062	17	16.3
42	28	4578	3	1119	1	-138	17	SM570	3062	17	16.3
43	28	4582	3	1145	1	-138	21	SM570	3062	17	16.3
43	28	4582	3	1346	1	-144	17	SM570	3062	17	16.3
43	29	4582	3	1346	1	-143	17	SM570	3062	17	16.3
43	29	4582	3	946	1	-146	15	SM570	3062	17	16.3
44	29	4636	3	1146	1	-146	19	SM570	3062	17	16.3
44	29	4636	3	1173	1	-150	14	SM570	3062	17	16.3
45	29	4698	3	875	1	-150	17	SM570	3062	17	16.3
45	29	4698	3	1475	1	-151	15	SM570	3062	17	16.3
45	30	4698	3	1475	1	-151	15	SM570	3062	17	16.3
45	30	4698	3	1174	1	-152	12	SM570	3062	17	16.3
45	30	4698	3	1174	1	-152	12	SM570	3062	17	16.3

Pnl. No.	Sec. No.	Panel Length (mm)	Stiff. Qtty	Stiff. Spacing (mm)	Stiff. rumg	Stress σc (N/mm²)	τ	Web Grade	Web height (mm)	Web thk. (mm)	Rq'd thk. (mm)
46	30	4697	3	1174	1	-152	12	SM570	3062	17	16.3
46	30	4697	3	1414	1	-150	16	SM570	3062	17	16.3
46	31	4697	3	1414	1	-150	16	SM570	3062	17	16.3
46	31	4697	3	1414	1	-149	17	SM570	3062	17	16.3
47	31	4696	3	1174	1	-149	15	SM570	3062	17	16.3
47	31	4696	3	1174	1	-142	20	SM570	3062	17	16.3
48	31	4696	3	1034	1	-142	20	SM570	3062	17	16.3
48	31	4696	3	1314	1	-139	21	SM570	3062	17	16.3
48	32	4696	3	1314	1	-141	22	SM570	3062	17	16.3
48	32	4696	3	1174	1	-134	25	SM570	3062	17	16.3
49	32	4695	3	1174	1	-134	22	SM570	3062	17	16.3
49	32	4695	3	1174	1	-121	26	SM570	3062	17	16.3
50	32	4695	3	1174	1	-121	26	SM570	3062	17	16.3
50	32	4695	3	1174	1	-119	27	SM570	3062	17	16.3
50	33	4695	3	1174	1	-123	27	SM570	3062	17	16.3
50	33	4695	3	1174	1	-107	32	SM570	3062	17	16.3
51	33	4694	3	1174	1	-107	27	SM570	3062	17	16.3
51	33	4694	3	1174	1	-91	31	SM570	3062	17	16.3
51	34	4694	3	1174	1	-93	35	SM490Y	3062	15	14.7
51	34	4694	3	1174	1	-91	35	SM490Y	3062	15	14.7
52	34	4780	3	1188	1	-90	35	SM490Y	3062	15	14.7
52	34	4780	3	1202	1	-66	41	SM490Y	3062	15	14.7
53	34	4649	3	1189	1	-66	42	SM490Y	3062	15	14.7
53	34	4649	3	1135	1	-48	45	SM490Y	3062	15	14.7
53	35	4649	3	1135	1	-51	47	SM490Y	3062	15	14.7
53	35	4649	3	1135	1	-39	49	SM490Y	3062	15	14.7
54	35	4650	3	1163	1	-39	50	SM490Y	3062	15	14.7
54	35	4650	3	1163	1	0	57	SM490Y	3062	15	14.7

(b)Check of spacing and required stiffness

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm⁴)	Iv	VStf No	γh·req	Ih·req (cm⁴)	Ih	HStf No
1	1	0.40	0.14	49.91	4691	8755	2	12.01	1129	2321	2
1	1	0.38	0.10	56.12	5276	8755	2	11.33	1065	2321	2
2	1	0.38	0.10	56.11	5275	8755	2	11.33	1065	2321	2
2	1	0.38	0.11	56.19	5282	8755	2	11.32	1064	2321	2
2	2	0.38	0.09	56.19	5282	8755	2	11.32	1064	2321	2
2	2	0.38	0.10	56.19	5282	8755	2	11.32	1064	2321	2
3	2	0.38	0.11	54.08	5084	8755	2	11.54	1085	2321	2
3	2	0.38	0.13	54.08	5084	8755	2	11.54	1085	2321	2
4	2	0.38	0.13	54.08	5084	8755	2	11.54	1085	2321	2
4	2	0.38	0.14	54.08	5084	8755	2	11.54	1085	2321	2
4	3	0.38	0.13	54.08	5084	8755	2	11.54	1085	2321	2
4	3	0.38	0.14	54.08	5083	8755	2	11.54	1085	2321	2

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm^4)	Iv	VStf No	γh·req	Ih·req (cm^4)	Ih	HStf No
5	3	0.38	0.13	54.08	5083	8755	2	11.54	1085	2321	2
5	3	0.38	0.15	54.07	5082	8755	2	11.54	1085	2321	2
6	3	0.38	0.15	54.07	5082	8755	2	11.54	1085	2321	2
6	3	0.38	0.15	54.06	5082	8755	2	11.54	1085	2321	2
6	4	0.38	0.15	54.06	5082	8755	2	11.54	1085	2321	2
6	4	0.38	0.15	54.06	5082	8755	2	11.54	1085	2321	2
7	4	0.38	0.15	54.06	5082	8755	2	11.54	1085	2321	2
7	4	0.42	0.16	45.93	4318	8755	2	12.52	1177	2321	2
7	4	0.42	0.16	45.93	4318	8755	2	12.52	1177	2321	2
7	5	0.42	0.16	45.93	4318	8755	2	12.52	1177	2321	2
7	5	0.42	0.16	45.93	4317	8755	2	12.52	1177	2321	2
8	5	0.38	0.15	54.06	5081	8755	2	11.54	1085	2321	2
8	5	0.38	0.16	54.06	5081	8755	2	11.54	1085	2321	2
9	5	0.38	0.16	54.06	5081	8755	2	11.54	1085	2321	2
9	5	0.38	0.15	54.06	5081	8755	2	11.54	1085	2321	2
9	6	0.38	0.15	54.06	5081	8755	2	11.54	1085	2321	2
9	6	0.38	0.14	54.05	5081	8755	2	11.54	1085	2321	2
10	6	0.38	0.15	54.05	5081	8755	2	11.54	1085	2321	2
10	6	0.38	0.13	54.05	5080	8755	2	11.54	1085	2321	2
11	6	0.38	0.13	54.05	5080	8755	2	11.54	1085	2321	2
11	6	0.38	0.12	54.05	5080	8755	2	11.54	1085	2321	2
11	7	0.38	0.13	54.05	5080	8755	2	11.54	1085	2321	2
11	7	0.38	0.12	54.05	5080	8755	2	11.54	1085	2321	2
12	7	0.38	0.12	54.05	5080	8755	2	11.54	1085	2321	2
12	7	0.38	0.10	54.05	5079	8755	2	11.54	1085	2321	2
13	8	0.38	0.10	54.05	5079	8755	2	11.54	1085	2321	2
13	8	0.38	0.09	54.05	5079	8755	2	11.54	1085	2321	2
13	9	0.38	0.10	54.05	5079	8755	2	11.54	1085	2321	2
13	9	0.38	0.10	54.04	5079	8755	2	11.54	1085	2321	2
14	9	0.38	0.10	54.04	5079	8755	2	11.54	1085	2321	2
14	9	0.38	0.21	54.04	5079	8755	2	11.54	1085	2321	2
14	10	0.38	0.10	54.04	7393	8755	2	11.54	1579	2321	2
14	10	0.38	0.12	54.04	7393	8755	2	11.54	1579	2321	2
15	10	0.38	0.11	56.39	7715	8755	2	11.30	1546	2321	2
15	10	0.38	0.34	56.39	7714	8755	2	11.30	1546	2321	2
16	10	0.38	0.34	56.39	7714	8755	2	11.30	1546	2321	2
16	10	0.38	0.49	56.39	7714	8755	2	11.30	1546	2321	2
16	11	0.38	0.30	56.39	7714	8755	2	11.30	1546	2321	2
16	11	0.37	0.49	59.48	8137	8755	2	11.00	1505	2321	2
17	11	0.39	0.48	51.89	7098	8755	2	11.78	1612	2321	2
17	11	0.38	0.32	54.61	7471	8755	2	11.48	1571	2321	2
17	12	0.38	0.46	54.61	7471	8755	2	11.48	1571	2321	2
17	12	0.38	0.36	54.61	7470	8755	2	11.48	1571	2321	2

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm^4)	Iv	VStf No	γh·req	Ih·req (cm^4)	Ih	HStf No
18	12	0.38	0.36	54.61	7470	8755	2	11.48	1571	2321	2
18	12	0.38	0.16	54.61	7470	8755	2	11.48	1571	2321	2
19	12	0.39	0.17	52.91	7239	8755	2	11.66	1596	2321	2
19	12	0.39	0.15	52.91	7238	8755	2	11.66	1596	2321	2
19	13	0.39	0.40	52.91	4972	8755	2	11.66	1096	2321	2
19	13	0.39	0.19	52.91	4972	8755	2	11.67	1096	2321	2
20	13	0.39	0.19	52.91	4972	8755	2	11.67	1096	2321	2
20	13	0.39	0.09	52.91	4972	8755	2	11.67	1096	2321	2
20	14	0.39	0.09	52.91	4972	8755	2	11.67	1096	2321	2
20	14	0.39	0.08	52.91	4972	8755	2	11.67	1096	2321	2
21	14	0.39	0.08	52.91	4972	8755	2	11.67	1096	2321	2
21	14	0.39	0.03	52.91	4972	8755	2	11.67	1096	2321	2
22	14	0.39	0.03	52.91	4972	8755	2	11.67	1096	2321	2
22	14	0.39	0.02	52.91	4972	8755	2	11.67	1096	2321	2
22	15	0.39	0.02	52.91	4972	8755	2	11.67	1096	2321	2
22	15	0.39	0.02	52.91	4972	8755	2	11.67	1096	2321	2
23	15	0.39	0.02	52.91	4972	8755	2	11.67	1096	2321	2
23	15	0.39	0.02	52.91	4971	8755	2	11.67	1096	2321	2
24	15	0.39	0.02	52.91	4971	8755	2	11.67	1096	2321	2
24	15	0.39	0.02	52.91	4971	8755	2	11.67	1096	2321	2
24	15	0.39	0.02	52.91	4971	8755	2	11.67	1096	2321	2
24	16	0.39	0.02	52.91	4971	8755	2	11.67	1096	2321	2
24	16	0.39	0.03	52.91	4971	8755	2	11.67	1096	2321	2
25	16	0.39	0.02	52.91	4971	8755	2	11.67	1096	2321	2
25	16	0.39	0.04	52.77	4959	8755	2	11.68	1098	2321	2
25	17	0.39	0.04	52.77	4959	8755	2	11.68	1098	2321	2
25	17	0.39	0.04	52.77	4959	8755	2	11.68	1098	2321	2
26	17	0.39	0.04	52.74	4956	8755	2	11.68	1098	2321	2
26	17	0.43	0.13	44.21	4155	8755	2	12.76	1200	2321	2
27	17	0.39	0.12	52.50	4935	8755	2	11.71	1101	2321	2
27	17	0.39	0.16	52.50	4935	8755	2	11.71	1101	2321	2
27	18	0.39	0.14	52.50	4935	8755	2	11.71	1101	2321	2
27	18	0.39	0.24	52.49	4934	8755	2	11.71	1101	2321	2
28	18	0.39	0.24	52.48	4933	8755	2	11.71	1101	2321	2
28	18	0.39	0.48	52.47	4932	8755	2	11.71	1101	2321	2
29	18	0.39	0.48	52.47	4932	8755	2	11.71	1101	2321	2
29	18	0.39	0.52	52.47	4932	8755	2	11.71	1101	2321	2
29	19	0.39	0.28	52.47	4932	8755	2	11.71	1101	2321	2
29	19	0.39	0.52	52.46	4931	8755	2	11.72	1101	2321	2
30	19	0.39	0.51	52.45	4930	8755	2	11.72	1101	2321	2
30	19	0.39	0.85	52.44	4929	8755	2	11.72	1101	2321	2
30	20	0.39	0.26	52.44	7175	8755	2	11.72	1603	2321	2
30	20	0.39	0.27	52.44	7175	8755	2	11.72	1603	2321	2

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm⁴)	Iv	VStf No	γh·req	Ih·req (cm⁴)	Ih	HStf No
31	20	0.38	0.27	54.11	7403	8755	2	11.54	1578	2321	2
31	20	0.38	0.44	54.10	7402	8755	2	11.54	1579	2321	2
32	20	0.22	0.39	163.23	22335	8755	2	6.64	909	2321	2
		[Iv < Iv・req → Vertical stiffener interval uses Maximum Spacing]									
32	20	0.55	0.64	26.66	3648	8755	2	16.43	2249	2321	2
32	21	0.55	0.52	26.66	3648	8755	2	16.43	2249	2321	2
32	21	0.35	0.50	65.63	8979	8755	2	10.47	1433	2321	2
		[Iv < Iv・req → Vertical stiffener interval uses Maximum Spacing]									
33	21	0.40	0.56	50.56	6918	8755	2	11.93	1633	2321	2
33	21	0.50	0.51	31.66	4332	8755	2	15.08	2063	2321	2
33	22	0.50	0.66	31.66	4332	8755	2	15.08	2063	2321	2
33	22	0.22	0.36	162.41	22222	8755	2	6.66	911	2321	2
		[Iv < Iv・req → Vertical stiffener interval uses Maximum Spacing]									
34	22	0.36	0.43	60.93	8337	8755	2	10.87	1487	2321	2
34	22	0.36	0.22	60.92	8336	8755	2	10.87	1487	2321	2
35	22	0.38	0.23	54.60	7471	8755	2	11.48	1571	2321	2
35	22	0.38	0.21	54.60	7471	8755	2	11.48	1571	2321	2
35	23	0.38	0.67	54.60	5132	8755	2	11.48	1079	2321	2
35	23	0.38	0.31	54.59	5131	8755	2	11.48	1079	2321	2
36	23	0.35	0.28	66.46	6247	8755	2	10.41	978	2321	2
36	23	0.38	0.19	54.85	5155	8755	2	11.46	1077	2321	2
36	24	0.38	0.23	54.85	5155	8755	2	11.46	1077	2321	2
36	24	0.38	0.16	54.84	5153	8755	2	11.46	1077	2321	2
37	24	0.38	0.16	54.84	5153	8755	2	11.46	1077	2321	2
37	24	0.38	0.15	54.84	5153	8755	2	11.46	1077	2321	2
38	25	0.38	0.15	54.84	5153	8755	2	11.46	1077	2321	2
38	25	0.38	0.17	54.84	5153	8755	2	11.46	1077	2321	2
38	26	0.38	0.15	54.84	5153	8755	2	11.46	1077	2321	2
38	26	0.38	0.19	54.84	5153	8755	2	11.46	1077	2321	2
39	26	0.38	0.18	54.84	5153	8755	2	11.46	1077	2321	2
39	26	0.38	0.25	54.84	5153	8755	2	11.46	1077	2321	2
40	26	0.38	0.25	54.84	5153	8755	2	11.46	1077	2321	2
40	26	0.38	0.26	54.84	5153	8755	2	11.46	1077	2321	2
40	27	0.38	0.15	54.84	7501	8755	2	11.46	1567	2321	2
40	27	0.38	0.19	54.84	7501	8755	2	11.46	1567	2321	2
41	27	0.38	0.19	54.84	7501	8755	2	11.46	1567	2321	2
41	27	0.38	0.23	54.84	7501	8755	2	11.46	1567	2321	2
41	28	0.38	0.21	54.84	7501	8755	2	11.46	1567	2321	2
41	28	0.38	0.22	54.84	7501	8755	2	11.46	1567	2321	2
42	28	0.38	0.22	54.84	7501	8755	2	11.46	1567	2321	2
42	28	0.37	0.25	59.88	8191	8755	2	10.96	1500	2321	2
43	28	0.37	0.26	57.20	7823	8755	2	11.22	1535	2321	2
43	28	0.44	0.28	41.44	5668	8755	2	13.18	1803	2321	2
43	29	0.44	0.28	41.44	5668	8755	2	13.18	1803	2321	2
43	29	0.31	0.28	83.92	11478	8755	2	9.26	1267	2321	2
		[Iv < Iv・req → Vertical stiffener interval uses Maximum Spacing]									

Panel No.	Sec. No.	a/b	Spacing Check	γv·req	Iv·req (cm⁴)	Iv	VStf No	γh·req	Ih·req (cm⁴)	Ih	HStf No
44	29	0.37	0.28	57.16	7818	8755	2	11.22	1535	2321	2
44	29	0.38	0.30	54.56	7462	8755	2	11.49	1571	2321	2
45	29	0.29	0.29	98.10	13417	8755	2	8.57	1172	2321	2
		[Iv ＜ Iv・req → Vertical stiffener interval uses Maximum Spacing]									
45	29	0.48	0.31	34.51	4719	8755	2	14.45	1976	2321	2
45	30	0.48	0.31	34.51	4719	8755	2	14.45	1976	2321	2
45	30	0.38	0.30	54.39	7440	8755	2	11.51	1574	2321	2
45	30	0.38	0.30	54.39	7440	8755	2	11.51	1574	2321	2
46	30	0.38	0.30	54.40	7441	8755	2	11.50	1573	2321	2
46	30	0.46	0.30	37.51	5131	8755	2	13.85	1895	2321	2
46	31	0.46	0.30	37.51	5131	8755	2	13.85	1895	2321	2
46	31	0.46	0.30	37.51	5131	8755	2	13.85	1895	2321	2
47	31	0.38	0.29	54.42	7444	8755	2	11.50	1573	2321	2
47	31	0.38	0.27	54.42	7444	8755	2	11.50	1573	2321	2
48	31	0.34	0.27	70.17	9598	8755	2	10.13	1385	2321	2
		[Iv ＜ Iv・req → Vertical stiffener interval uses Maximum Spacing]									
48	31	0.43	0.27	43.45	5943	8755	2	12.87	1761	2321	2
48	32	0.43	0.28	43.45	5943	8755	2	12.87	1761	2321	2
48	32	0.38	0.25	54.44	7447	8755	2	11.50	1573	2321	2
49	32	0.38	0.25	54.44	7447	8755	2	11.50	1573	2321	2
49	32	0.38	0.21	54.45	7448	8755	2	11.50	1573	2321	2
50	32	0.38	0.21	54.46	7449	8755	2	11.50	1573	2321	2
50	32	0.38	0.20	54.46	7449	8755	2	11.50	1573	2321	2
50	33	0.38	0.22	54.46	7449	8755	2	11.50	1573	2321	2
50	33	0.38	0.18	54.46	7449	8755	2	11.50	1573	2321	2
51	33	0.38	0.17	54.47	7451	8755	2	11.50	1573	2321	2
51	33	0.38	0.13	54.47	7451	8755	2	11.50	1573	2321	2
51	34	0.38	0.24	54.47	5118	8755	2	11.50	1080	2321	2
51	34	0.38	0.23	54.47	5118	8755	2	11.50	1080	2321	2
52	34	0.39	0.23	53.16	4995	8755	2	11.64	1094	2321	2
52	34	0.39	0.18	51.92	4879	8755	2	11.78	1106	2321	2
53	34	0.39	0.18	53.05	4984	8755	2	11.65	1095	2321	2
53	34	0.37	0.13	58.23	5472	8755	2	11.12	1045	2321	2
53	35	0.37	0.15	58.23	5472	8755	2	11.12	1045	2321	2
53	35	0.37	0.13	58.23	5472	8755	2	11.12	1045	2321	2
54	35	0.38	0.14	55.52	5217	8755	2	11.39	1070	2321	2
54	35	0.38	0.14	55.52	5217	8755	2	11.39	1070	2321	2

９）Check of spacing of Maximum Spacing & Calculation of Required stiffness

(a) Main girder G1　　Web name：LWEB

Panel No.	Sec. No.	a/b	Spacing Check	Maximum Spacing	γv·req	Iv·req (cm^4)	Iv	VStf No	γh·req	Ih·req (cm^4)	Ih	HStf No
32	20	0.25	0.40	2754	9.90	1354	8755	2	7.41	1014	2321	2
33	22	0.25	0.38	2240	14.96	2046	8755	2	7.42	1015	2321	2
43	29	0.29	0.30	4594	3.56	486	8755	2	8.69	1189	2321	2
45	29	0.26	0.31	4594	3.56	486	8755	2	7.90	1080	2321	2
48	31	0.34	0.28	4594	3.56	486	8755	2	10.15	1389	2321	2

(b) Main girder G1　　Web name：RWEB

Panel No.	Sec. No.	a/b	Spacing Check	Maximum Spacing	γv·req	Iv·req (cm^4)	Iv	VStf No	γh·req	Ih·req (cm^4)	Ih	HStf No
32	20	0.28	0.25	4095	3.56	434	8755	2	8.29	1011	2321	2
33	22	0.28	0.24	3039	6.46	787	8755	2	8.31	1013	2321	2
43	29	0.33	0.20	4095	3.56	434	8755	2	9.88	1204	2321	2
45	29	0.30	0.22	4095	3.56	434	8755	2	8.86	1080	2321	2

(c) Main girder G2　　Web name：RWEB

Panel No.	Sec. No.	a/b	Spacing Check	Maximum Spacing	γv·req	Iv·req (cm^4)	Iv	VStf No	γh·req	Ih·req (cm^4)	Ih	HStf No
33	22	0.39	0.66	1510	26.10	1775	3429	1	11.70	796	1006	1
45	29	0.39	0.52	4091	3.56	242	3429	1	11.84	805	1006	1

(d) Main girder G3　　Web name：LWEB

Panel No.	Sec. No.	a/b	Spacing Check	Maximum Spacing	γv·req	Iv·req (cm^4)	Iv	VStf No	γh·req	Ih·req (cm^4)	Ih	HStf No
33	22	0.39	0.66	1511	26.04	1772	3429	1	11.68	794	1006	1
45	29	0.39	0.50	4091	3.56	242	3429	1	11.82	804	1006	1

(e) Main girder G4　　Web name：LWEB

Panel No.	Sec. No.	a/b	Spacing Check	Maximum Spacing	γv·req	Iv·req (cm^4)	Iv	VStf No	γh·req	Ih·req (cm^4)	Ih	HStf No
32	20	0.25	0.25	4093	3.56	433	8755	2	7.48	911	2321	2
33	22	0.25	0.23	2849	7.34	895	8755	2	7.49	913	2321	2
45	29	0.32	0.21	4095	3.56	434	8755	2	9.61	1172	2321	2

(f) Main girder G5　　Web name：RWEB

Panel No.	Sec. No.	a/b	Spacing Check	Maximum Spacing	γv·req	Iv·req (cm^4)	Iv	VStf No	γh·req	Ih·req (cm^4)	Ih	HStf No
32	20	0.22	0.39	2860	9.18	1256	8755	2	6.64	909	2321	2
32	21	0.35	0.50	2391	13.13	1797	8755	2	10.47	1433	2321	2
33	22	0.22	0.36	2330	13.83	1892	8755	2	6.66	911	2321	2
43	29	0.31	0.28	4593	3.56	486	8755	2	9.26	1267	2321	2
45	29	0.29	0.29	4593	3.56	486	8755	2	8.57	1172	2321	2
48	31	0.34	0.27	4594	3.56	486	8755	2	10.13	1385	2321	2

（３）Check of stress of horizontal stiffener

１）Main girder G1　　Web name：LWEB

Pnl. No.	Sec. No.	Web Grade	Web height (mm)	Edge stress of the web σc (N/mm²)	σt	Neutral axis Point (mm)	Stiff. rumg	Stiff. Point (mm)	Stiff. Stress (N/mm²)	Stiff. Grade
2	1	SM490Y	3062	-46	121	848	1	612	-13	SM400
4	2	SM490Y	3062	-79	170	968	1	612	-29	SM400
6	3	SM490Y	3062	-94	166	1110	1	612	-42	SM400
7	4	SM490Y	3062	-99	165	1147	1	612	-46	SM400
7	5	SM490Y	3062	-99	165	1147	1	612	-46	SM400
9	6	SM490Y	3062	-93	167	1097	1	612	-41	SM400
11	7	SM490Y	3062	-76	168	954	1	612	-27	SM400
13	8	SM490Y	3062	-42	84	1020	1	612	-17	SM400
14	9	SM490Y	3062	-63	27	2141	1	612	-45	SM400
16	10	SM490Y	3062	-172	78	2104	1	612	-122	SM400
17	11	SM490Y	3062	-186	100	1987	1	612	-128	SM490Y
17	12	SM490Y	3062	-174	82	2076	1	612	-122	SM400
19	13	SM490Y	3062	-103	44	2141	1	612	-73	SM400
20	14	SM490Y	3062	-42	18	2142	1	612	-30	SM400
24	15	SM490Y	3062	-28	65	921	1	612	-9	SM400
25	16	SM490Y	3062	-34	14	2142	1	612	-24	SM400
27	17	SM490Y	3062	-72	31	2142	1	612	-52	SM400
29	18	SM490Y	3062	-137	62	2112	1	612	-97	SM400
30	19	SM490Y	3062	-187	105	1963	1	612	-129	SM400
32	20	SM490Y	3062	-186	148	1703	1	612	-119	SM400
32	21	SM490Y	3062	-187	171	1598	1	612	-115	SM400
33	22	SM490Y	3062	-185	143	1731	1	612	-120	SM400
35	23	SM490Y	3062	-150	84	1966	1	612	-104	SM400
36	24	SM490Y	3062	-53	25	2089	1	612	-38	SM400
38	25	SM490Y	3062	-63	146	925	1	612	-21	SM400
40	26	SM490Y	3062	-104	177	1134	1	612	-48	SM400
41	27	SM570	3062	-133	211	1183	1	612	-64	SM400
43	28	SM570	3063	-149	207	1282	1	613	-78	SM400
44	29	SM570	3062	-155	206	1312	1	612	-82	SM400
45	30	SM570	3062	-155	208	1310	1	612	-83	SM400
46	31	SM570	3062	-153	204	1310	1	612	-81	SM400
48	32	SM570	3062	-144	209	1249	1	612	-73	SM400
50	33	SM570	3062	-125	215	1126	1	612	-57	SM400
51	34	SM490Y	3062	-95	177	1072	1	612	-41	SM400
53	35	SM490Y	3062	-53	133	878	1	612	-16	SM400

２）Main girder G1　　Web name：RWEB

Pnl. No.	Sec. No.	Web Grade	Web height	Edge stress of the web σc	σt	Neutral axis Point	Stiff. rumg	Stiff. Point	Stiff. Stress	Stiff. Grade
			(mm)	(N/mm^2)		(mm)		(mm)	(N/mm^2)	
2	1	SM490Y	2730	-50	121	799	1	546	-16	SM400
4	2	SM490Y	2730	-84	170	905	1	546	-33	SM400
6	3	SM490Y	2730	-100	165	1028	1	546	-47	SM400
7	4	SM490Y	2730	-105	165	1060	1	546	-51	SM400
7	5	SM490Y	2730	-105	165	1060	1	546	-51	SM400
9	6	SM490Y	2730	-99	166	1017	1	546	-46	SM400
11	7	SM490Y	2730	-81	168	892	1	546	-32	SM400
13	8	SM490Y	2730	-45	84	950	1	546	-19	SM400
14	9	SM490Y	2730	-63	29	1867	1	546	-44	SM400
16	10	SM490Y	2730	-171	84	1834	1	546	-120	SM400
17	11	SM490Y	2730	-185	107	1731	1	546	-127	SM490Y
17	12	SM490Y	2730	-173	88	1809	1	546	-121	SM400
19	13	SM490Y	2730	-103	47	1867	1	546	-73	SM400
20	14	SM490Y	2730	-42	20	1867	1	546	-30	SM400
24	15	SM490Y	2730	-30	65	863	1	546	-11	SM400
25	16	SM490Y	2730	-34	16	1867	1	546	-24	SM400
27	17	SM490Y	2730	-72	33	1867	1	546	-51	SM400
29	18	SM490Y	2730	-137	66	1841	1	546	-96	SM400
30	19	SM490Y	2730	-187	111	1711	1	546	-127	SM400
32	20	SM490Y	2730	-185	156	1483	1	546	-117	SM400
32	21	SM490Y	2730	-186	179	1391	1	546	-113	SM400
33	22	SM490Y	2730	-185	150	1508	1	546	-118	SM400
35	23	SM490Y	2730	-150	89	1714	1	546	-102	SM400
36	24	SM490Y	2730	-53	27	1821	1	546	-37	SM400
38	25	SM490Y	2730	-68	146	866	1	546	-25	SM400
40	26	SM490Y	2730	-111	177	1050	1	546	-53	SM400
41	27	SM570	2730	-141	211	1093	1	546	-70	SM400
43	28	SM570	2730	-155	206	1175	1	546	-83	SM400
45	29	SM570	2730	-162	206	1203	1	546	-89	SM400
45	30	SM570	2730	-163	207	1203	1	546	-89	SM400
46	31	SM570	2730	-160	203	1203	1	546	-88	SM400
48	32	SM570	2730	-151	208	1150	1	546	-79	SM400
50	33	SM570	2730	-132	214	1043	1	546	-63	SM400
51	34	SM490Y	2730	-101	176	995	1	546	-46	SM400
53	35	SM490Y	2730	-58	133	828	1	546	-20	SM400

３）Main girder G2　 Web name：LWEB

Pnl. No.	Sec. No.	Web Grade	Web height (mm)	Edge stress of the web σc (N/mm²)	σt	Neutral axis Point (mm)	Stiff. rumg	Stiff. Point (mm)	Stiff. Stress (N/mm²)	Stiff. Grade
2	1	SM490Y	2673	-44	97	840	1	535	-16	SM400
4	2	SM490Y	2673	-76	165	840	1	535	-28	SM400
6	3	SM490Y	2673	-91	161	966	1	535	-41	SM400
7	4	SM490Y	2673	-97	172	966	1	535	-43	SM400
7	5	SM490Y	2673	-97	172	966	1	535	-43	SM400
9	6	SM490Y	2673	-91	160	966	1	535	-40	SM400
11	7	SM490Y	2673	-75	165	840	1	535	-27	SM400
13	8	SM490Y	2673	-46	87	920	1	535	-19	SM400
14	9	SM490Y	2673	-57	29	1769	1	535	-40	SM400
16	10	SM490Y	2673	-141	77	1725	1	535	-97	SM400
17	11	SM490Y	2673	-171	100	1686	1	535	-117	SM400
17	12	SM490Y	2673	-152	83	1725	1	535	-105	SM400
19	13	SM490Y	2673	-95	49	1769	1	535	-66	SM400
20	14	SM490Y	2673	-40	21	1753	1	535	-28	SM400
24	15	SM490Y	2673	-31	60	920	1	535	-13	SM400
25	16	SM490Y	2673	-33	17	1753	1	535	-23	SM400
27	17	SM490Y	2673	-67	35	1753	1	535	-46	SM400
29	18	SM490Y	2673	-123	64	1753	1	535	-85	SM400
30	19	SM490Y	2673	-175	102	1691	1	535	-120	SM400
32	20	SM490Y	2673	-191	141	1536	1	535	-125	SM400
32	21	SM490Y	2673	-187	161	1434	1	535	-117	SM400
33	22	SM490Y	2673	-187	135	1551	1	535	-122	SM400
35	23	SM490Y	2673	-150	79	1748	1	535	-104	SM400
36	24	SM490Y	2673	-48	25	1751	1	535	-33	SM400
38	25	SM490Y	2673	-58	122	862	1	535	-22	SM400
40	26	SM490Y	2673	-105	180	985	1	535	-48	SM400
41	27	SM490Y	2673	-140	181	1164	1	535	-76	SM400
43	28	SM490Y	2673	-158	175	1268	1	535	-91	SM400
44	29	SM490Y	2673	-164	173	1298	1	535	-96	SM400
45	30	SM490Y	2673	-163	174	1294	1	535	-96	SM400
46	31	SM490Y	2673	-155	174	1261	1	535	-89	SM400
48	32	SM490Y	2673	-146	176	1211	1	535	-82	SM400
50	33	SM490Y	2673	-121	178	1083	1	535	-61	SM400
51	34	SM490Y	2673	-87	180	871	1	535	-34	SM400
53	35	SM490Y	2673	-43	119	710	1	535	-11	SM400

４）Main girder G2　 Web name：RWEB

Pnl. No.	Sec. No.	Web Grade	Web height	Edge stress of the web		Neutral axis Point	Stiff. rumg	Stiff. Point	Stiff. Stress	Stiff. Grade
				σc	σt					
			(mm)	(N/mm²)		(mm)		(mm)	(N/mm²)	
2	1	SM490Y	2727	-47	97	894	1	545	-18	SM400
4	2	SM490Y	2727	-81	166	894	1	545	-31	SM400
6	3	SM490Y	2727	-96	161	1020	1	545	-45	SM400
7	4	SM490Y	2727	-103	172	1020	1	545	-48	SM400
7	5	SM490Y	2727	-103	172	1020	1	545	-48	SM400
9	6	SM490Y	2727	-96	160	1020	1	545	-45	SM400
11	7	SM490Y	2727	-80	165	894	1	545	-31	SM400
13	8	SM490Y	2727	-48	87	974	1	545	-21	SM400
14	9	SM490Y	2727	-57	31	1769	1	545	-39	SM400
16	10	SM490Y	2727	-141	82	1725	1	545	-96	SM400
17	11	SM490Y	2727	-171	106	1686	1	545	-116	SM400
17	12	SM490Y	2727	-152	88	1725	1	545	-104	SM400
19	13	SM490Y	2727	-95	52	1769	1	545	-66	SM400
20	14	SM490Y	2727	-40	22	1753	1	545	-28	SM400
24	15	SM490Y	2727	-33	60	974	1	545	-15	SM400
25	16	SM490Y	2727	-33	18	1753	1	545	-23	SM400
27	17	SM490Y	2727	-67	37	1753	1	545	-46	SM400
29	18	SM490Y	2727	-123	68	1753	1	545	-85	SM400
30	19	SM490Y	2727	-176	108	1691	1	545	-119	SM400
32	20	SM490Y	2727	-191	148	1536	1	545	-123	SM400
32	21	SM490Y	2727	-187	169	1434	1	545	-116	SM400
33	22	SM490Y	2727	-187	142	1551	1	545	-121	SM400
35	23	SM490Y	2727	-150	84	1748	1	545	-103	SM400
36	24	SM490Y	2727	-48	27	1751	1	545	-33	SM400
38	25	SM490Y	2727	-62	122	916	1	545	-25	SM400
40	26	SM490Y	2727	-111	181	1039	1	545	-53	SM400
41	27	SM490Y	2727	-146	181	1218	1	545	-81	SM400
43	28	SM490Y	2727	-163	173	1322	1	545	-96	SM400
45	29	SM490Y	2727	-170	174	1348	1	545	-101	SM400
45	30	SM490Y	2727	-170	174	1348	1	545	-101	SM400
46	31	SM490Y	2727	-162	174	1315	1	545	-95	SM400
48	32	SM490Y	2727	-153	176	1266	1	545	-87	SM400
50	33	SM490Y	2727	-127	178	1137	1	545	-66	SM400
51	34	SM490Y	2727	-92	180	925	1	545	-38	SM400
53	35	SM490Y	2727	-47	120	764	1	545	-13	SM400

５）Main girder G3　　Web name：LWEB

Pnl. No.	Sec. No.	Web Grade	Web height (mm)	Edge stress of the web σc (N/mm²)	σt	Neutral axis Point (mm)	Stiff. rumg	Stiff. Point (mm)	Stiff. Stress (N/mm²)	Stiff. Grade
2	1	SM490Y	2727	-39	110	711	1	545	-9	SM400
4	2	SM490Y	2727	-68	168	781	1	545	-20	SM400
6	3	SM490Y	2727	-82	173	874	1	545	-31	SM400
7	4	SM490Y	2727	-86	171	913	1	545	-35	SM400
7	5	SM490Y	2727	-86	171	913	1	545	-35	SM400
9	6	SM490Y	2727	-82	171	885	1	545	-31	SM400
11	7	SM490Y	2727	-70	170	795	1	545	-22	SM400
13	8	SM490Y	2727	-41	88	868	1	545	-15	SM400
14	9	SM490Y	2727	-59	26	1900	1	545	-42	SM400
16	10	SM490Y	2727	-148	72	1835	1	545	-104	SM400
17	11	SM490Y	2727	-164	93	1743	1	545	-113	SM400
17	12	SM490Y	2727	-160	78	1833	1	545	-112	SM400
19	13	SM490Y	2727	-102	46	1879	1	545	-72	SM400
20	14	SM490Y	2727	-44	20	1880	1	545	-31	SM400
24	15	SM490Y	2727	-30	66	850	1	545	-11	SM400
25	16	SM490Y	2727	-34	15	1877	1	545	-24	SM400
27	17	SM490Y	2727	-69	32	1860	1	545	-49	SM400
29	18	SM490Y	2727	-127	61	1847	1	545	-90	SM400
30	19	SM490Y	2727	-181	100	1756	1	545	-125	SM400
32	20	SM490Y	2727	-190	139	1576	1	545	-124	SM400
32	21	SM490Y	2727	-186	159	1470	1	545	-117	SM400
33	22	SM490Y	2727	-186	135	1580	1	545	-122	SM400
35	23	SM490Y	2727	-150	83	1757	1	545	-103	SM400
36	24	SM490Y	2727	-53	29	1772	1	545	-37	SM400
38	25	SM490Y	2727	-61	124	894	1	545	-24	SM400
40	26	SM490Y	2727	-109	183	1020	1	545	-51	SM400
41	27	SM490Y	2727	-141	179	1203	1	545	-77	SM400
43	28	SM490Y	2727	-163	177	1305	1	545	-95	SM400
43	29	SM490Y	2727	-164	166	1357	1	545	-98	SM400
45	30	SM490Y	2727	-165	176	1323	1	545	-97	SM400
46	31	SM490Y	2727	-158	176	1290	1	545	-91	SM400
48	32	SM490Y	2727	-149	176	1253	1	545	-84	SM400
50	33	SM490Y	2727	-125	178	1122	1	545	-64	SM400
51	34	SM490Y	2727	-93	182	924	1	545	-38	SM400
53	35	SM490Y	2727	-47	117	780	1	545	-14	SM400

６）Main girder G3　　Web name：RWEB

Pnl. No.	Sec. No.	Web Grade	Web height (mm)	Edge stress of the web σc (N/mm^2)	σt	Neutral axis Point (mm)	Stiff. rumg	Stiff. Point (mm)	Stiff. Stress (N/mm^2)	Stiff. Grade
2	1	SM490Y	2673	-36	110	657	1	535	-7	SM400
4	2	SM490Y	2673	-63	168	727	1	535	-17	SM400
6	3	SM490Y	2673	-77	173	820	1	535	-27	SM400
7	4	SM490Y	2673	-81	172	859	1	535	-31	SM400
7	5	SM490Y	2673	-81	172	859	1	535	-31	SM400
9	6	SM490Y	2673	-77	171	831	1	535	-28	SM400
11	7	SM490Y	2673	-65	170	741	1	535	-18	SM400
13	8	SM490Y	2673	-39	88	814	1	535	-13	SM400
14	9	SM490Y	2673	-59	24	1900	1	535	-43	SM400
16	10	SM490Y	2673	-148	68	1835	1	535	-105	SM400
17	11	SM490Y	2673	-164	88	1743	1	535	-114	SM400
17	12	SM490Y	2673	-160	73	1833	1	535	-113	SM400
19	13	SM490Y	2673	-102	43	1879	1	535	-73	SM400
20	14	SM490Y	2673	-44	19	1880	1	535	-32	SM400
24	15	SM490Y	2673	-28	66	796	1	535	-9	SM400
25	16	SM490Y	2673	-34	14	1877	1	535	-24	SM400
27	17	SM490Y	2673	-69	30	1860	1	535	-49	SM400
29	18	SM490Y	2673	-128	57	1847	1	535	-91	SM400
30	19	SM490Y	2673	-181	95	1756	1	535	-126	SM400
32	20	SM490Y	2673	-190	133	1576	1	535	-126	SM400
32	21	SM490Y	2673	-187	153	1470	1	535	-119	SM400
33	22	SM490Y	2673	-186	129	1580	1	535	-123	SM400
35	23	SM490Y	2673	-150	78	1757	1	535	-104	SM400
36	24	SM490Y	2673	-53	27	1772	1	535	-37	SM400
38	25	SM490Y	2673	-57	125	840	1	535	-21	SM400
40	26	SM490Y	2673	-104	183	966	1	535	-46	SM400
41	27	SM490Y	2673	-135	179	1149	1	535	-72	SM400
43	28	SM490Y	2673	-157	179	1250	1	535	-90	SM400
43	29	SM490Y	2673	-159	167	1302	1	535	-94	SM400
45	30	SM490Y	2673	-159	176	1269	1	535	-92	SM400
46	31	SM490Y	2673	-151	176	1235	1	535	-86	SM400
48	32	SM490Y	2673	-143	176	1198	1	535	-79	SM400
50	33	SM490Y	2673	-119	178	1068	1	535	-59	SM400
51	34	SM490Y	2673	-88	182	870	1	535	-34	SM400
53	35	SM490Y	2673	-43	116	726	1	535	-11	SM400

7) Main girder G4　Web name : LWEB

Pnl. No.	Sec. No.	Web Grade	Web height (mm)	Edge stress of the web σc (N/mm^2)	σt	Neutral axis Point (mm)	Stiff. rumg	Stiff. Point (mm)	Stiff. Stress (N/mm^2)	Stiff. Grade
2	1	SM490Y	2728	-43	140	641	1	546	-6	SM400
4	2	SM490Y	2728	-69	165	807	1	546	-22	SM400
6	3	SM490Y	2729	-83	161	930	1	546	-34	SM400
7	4	SM490Y	2729	-88	159	971	1	546	-38	SM400
8	5	SM490Y	2729	-88	154	989	1	546	-39	SM400
10	6	SM490Y	2729	-83	155	950	1	546	-35	SM400
11	7	SM490Y	2729	-69	164	812	1	546	-23	SM400
13	8	SM490Y	2729	-41	84	898	1	546	-16	SM400
14	9	SM490Y	2729	-66	24	1994	1	546	-48	SM400
16	10	SM490Y	2729	-180	76	1916	1	546	-128	SM490Y
16	11	SM490Y	2730	-179	97	1774	1	546	-124	SM490Y
17	12	SM490Y	2730	-178	80	1880	1	546	-126	SM490Y
19	13	SM490Y	2730	-124	44	2008	1	546	-90	SM400
20	14	SM490Y	2730	-48	17	2007	1	546	-35	SM400
24	15	SM490Y	2730	-28	76	737	1	546	-7	SM400
25	16	SM490Y	2730	-34	13	1992	1	546	-25	SM400
27	17	SM490Y	2729	-77	27	2013	1	546	-56	SM400
29	18	SM490Y	2729	-145	57	1964	1	546	-105	SM400
30	19	SM490Y	2729	-186	101	1768	1	546	-129	SM400
32	20	SM490Y	2729	-185	142	1546	1	546	-120	SM400
32	21	SM490Y	2729	-184	164	1446	1	546	-115	SM400
33	22	SM490Y	2729	-183	142	1539	1	546	-118	SM400
35	23	SM490Y	2729	-153	89	1723	1	546	-105	SM400
36	24	SM490Y	2730	-63	31	1838	1	546	-44	SM400
38	25	SM490Y	2730	-63	138	853	1	546	-23	SM400
40	26	SM490Y	2730	-105	174	1028	1	546	-49	SM400
41	27	SM570	2730	-135	212	1063	1	546	-66	SM400
43	28	SM570	2730	-150	207	1148	1	546	-79	SM400
45	29	SM570	2730	-159	206	1186	1	546	-86	SM400
45	30	SM570	2730	-159	208	1186	1	546	-86	SM400
46	31	SM570	2730	-157	205	1186	1	546	-85	SM400
48	32	SM570	2730	-149	210	1131	1	546	-77	SM400
50	33	SM570	2730	-130	214	1032	1	546	-61	SM400
51	34	SM490Y	2730	-99	176	983	1	546	-44	SM400
53	35	SM490Y	2730	-56	128	828	1	546	-19	SM400

８）Main girder G4　　Web name：RWEB

Pnl. No.	Sec. No.	Web Grade	Web height (mm)	Edge stress of the web σc (N/mm²)	σt	Neutral axis Point (mm)	Stiff. rumg	Stiff. Point (mm)	Stiff. Stress (N/mm²)	Stiff. Grade
2	1	SM490Y	3064	-39	140	672	1	613	-3	SM400
4	2	SM490Y	3064	-65	165	862	1	613	-19	SM400
6	3	SM490Y	3064	-78	161	1002	1	613	-30	SM400
7	4	SM490Y	3064	-83	160	1048	1	613	-35	SM400
8	5	SM490Y	3063	-83	155	1069	1	613	-35	SM400
10	6	SM490Y	3063	-78	155	1025	1	613	-31	SM400
11	7	SM490Y	3063	-65	165	866	1	613	-19	SM400
13	8	SM490Y	3063	-39	85	964	1	613	-14	SM400
14	9	SM490Y	3063	-66	23	2285	1	613	-49	SM400
16	10	SM490Y	3063	-180	71	2197	1	613	-130	SM490Y
16	11	SM490Y	3063	-180	91	2034	1	613	-126	SM490Y
17	12	SM490Y	3063	-179	75	2155	1	613	-128	SM490Y
19	13	SM490Y	3063	-124	41	2302	1	613	-91	SM400
20	14	SM490Y	3063	-48	16	2301	1	613	-35	SM400
24	15	SM490Y	3063	-26	77	779	1	613	-6	SM400
25	16	SM490Y	3063	-34	12	2284	1	613	-25	SM400
27	17	SM490Y	3064	-77	25	2307	1	613	-56	SM400
29	18	SM490Y	3064	-146	53	2252	1	613	-106	SM400
30	19	SM490Y	3064	-187	96	2027	1	613	-130	SM400
32	20	SM490Y	3063	-186	135	1774	1	613	-122	SM400
32	21	SM490Y	3063	-185	157	1660	1	613	-117	SM400
33	22	SM490Y	3063	-184	135	1766	1	613	-120	SM400
35	23	SM490Y	3063	-154	85	1976	1	613	-106	SM400
36	24	SM490Y	3063	-63	29	2107	1	613	-45	SM400
38	25	SM490Y	3062	-59	139	911	1	612	-19	SM400
40	26	SM490Y	3062	-99	174	1110	1	612	-44	SM400
41	27	SM570	3062	-128	213	1150	1	612	-60	SM400
43	28	SM570	3062	-144	209	1251	1	612	-74	SM400
45	29	SM570	3062	-151	207	1290	1	612	-79	SM400
45	30	SM570	3062	-152	208	1290	1	612	-80	SM400
46	31	SM570	3062	-150	206	1290	1	612	-79	SM400
48	32	SM570	3062	-141	211	1228	1	612	-71	SM400
50	33	SM570	3062	-123	215	1114	1	612	-55	SM400
51	34	SM490Y	3062	-93	176	1059	1	612	-39	SM400
53	35	SM490Y	3062	-51	128	878	1	612	-16	SM400

(4) Checking of overlap range of horizontal stiffeners

Description of symbol in the calculation

UorL	: Checking point(Upper side:Upper flange side, Lower side: Lower flange side)
PN	: Panel number
Vst	: Vertical stiffener number
WMxc	: Section factor at compressive edge of web due to Mx.
Wmxt	: Section factor at tensile edge of web due to Mx.
Wsy	: Section factor at compressive edge of web due to Sy.
WT	: Section factor at compressive edge of web due to T.
σc	: Compressive stress at web edge (Negative)
σt	: Tensile stress at horizontal stiffener(Positive)
Στ	: Shear stress of total due to shear force(Sy) of web edge and Torsion moment(T)
a	: Spacing of vertical stiffeners
b	: Web height
Tw	: Web thickness
Nh	: Number of rungs of horizontal stiffeners

Symbol at the end of line

#U : K > 1 (Overstressed against the buckling)
→ Horizontal stiffener(s) are required at upper side of the web.

#L : ditto.
→ Horizontal stiffener(s) are required at lower side of the web.

#W : ditto.
→ Horizontal stiffeners are required at upper and lower side of the web.(Overlap arrangement is required)

-- : A portion where the checking is not required.
(The part the stress does not alternate.)
※Because the panel point is a starting point for checking the overlap range, indicated figures are for reference only.

1）Main girder G1　 Web name：LWEB

（a）Section forces, section factor and stress

Check point			Sec. force			Section factor				Stress		
UorL	PN	Vst	Mx (kN･m)	Sy (kN)	T (kN･m)	WMxc (cm^3)	WMxt (cm^3)	WSy (cm^2)	WT (cm^3)	σc	σt (N/mm^2)	Στ
Upper side	14	0	6566	2114	1628	-328737	141325	756	184635	-20	33	37
	14	1	4422	2226	1628	-328737	141325	756	184635	-13	22	38
	14	2	2190	2338	1628	-328737	141325	756	184635	-7	11	40
Lower side	13	4	-1347	2114	1617	141325	-328737	1416	184497	-10	1	24
	14	0	-1348	2114	1628	141325	-328737	1416	184497	-10	1	24
	14	1	-3225	2226	1628	141325	-328737	1416	184497	-23	3	25
	14	2	-5201	2338	1628	141325	-328737	1416	184497	-37	5	25
	14	3	-7300	2449	1628	141325	-328737	1416	184497	-52	7	26
	14	4	-9547	2561	1628	140605	-308876	1683	209293	-68	11	23
Upper side	20	2	529	1265	1085	-311918	134173	756	184635	-2	3	23
	20	3	1556	1162	1085	-311918	134173	756	184635	-5	8	21
	20	4	2567	1059	1085	-328737	141325	756	184635	-8	13	20
	21	0	2568	1341	879	-328737	141325	756	184635	-8	13	22
	21	1	3606	1227	879	-328737	141325	756	184635	-11	18	21
	21	2	4633	1114	879	-328737	141325	756	184635	-14	23	19
	21	3	5583	1001	879	-328737	141325	756	184635	-17	28	18
	21	4	6385	887	879	-328737	141325	756	184635	-19	32	16
	22	0	6386	887	883	-328737	141325	756	184635	-19	32	17
	22	1	7002	785	883	-328737	141325	756	184635	-21	35	15
	22	2	7475	683	883	-328737	141325	756	184635	-23	38	14
	22	3	7862	581	883	-328737	141325	756	184635	-24	40	12
	22	4	8217	479	883	-328737	141325	756	184635	-25	42	11
Lower side	22	0	-3127	887	883	141325	-328737	1416	184497	-22	3	11
	22	1	-2728	785	883	141325	-328737	1416	184497	-19	3	10
	22	2	-2423	683	883	141325	-328737	1416	184497	-17	2	10
	22	3	-2183	581	883	141325	-328737	1416	184497	-15	2	9
	22	4	-1983	479	883	141325	-328737	1416	184497	-14	2	8
	23	0	-1983	825	652	141325	-328737	1416	184497	-14	2	9
	23	1	-1794	710	652	141325	-328737	1416	184497	-13	2	9
	23	2	-1638	595	652	141325	-328737	1416	184497	-12	2	8
	23	3	-1560	480	652	141325	-328737	1416	184497	-11	2	7
	23	4	-1605	415	652	141325	-328737	1416	184497	-11	2	6
	24	0	-1605	415	663	141325	-328737	1416	184497	-11	2	7
	24	1	-1805	530	663	141325	-328737	1416	184497	-13	2	7
	24	2	-2128	645	663	141325	-328737	1416	184497	-15	2	8
	24	3	-2529	761	663	141325	-328737	1416	184497	-18	3	9
	24	4	-2964	876	663	141325	-328737	1416	184497	-21	3	10

Check point			Sec. force			Section factor				Stress		
UorL	PN	Vst	Mx	Sy	T	WMxc	WMxt	WSy	WT	σc	σt	Στ
			(kN·m)	(kN)	(kN·m)	(cm^3)	(cm^3)	(cm^2)	(cm^3)		(N/mm^2)	
Upper												
side	25	0	8452	517	703	-328737	141325	756	184635	-26	43	11
	25	1	8140	618	703	-328737	141325	756	184635	-25	41	12
	25	2	7790	719	703	-328737	141325	756	184635	-24	39	13
	25	3	7356	820	703	-328737	141325	756	184635	-22	37	15
	25	4	6792	921	703	-328737	141325	756	184635	-21	34	16
	26	0	6792	921	707	-328737	141325	756	184635	-21	34	16
	26	1	6078	1035	707	-328737	141325	756	184635	-18	31	18
	26	2	5240	1148	707	-328737	141325	756	184635	-16	26	19
	26	3	4307	1262	707	-328737	141325	756	184635	-13	22	21
	26	4	3305	1375	707	-328737	141325	756	184635	-10	17	22
	27	0	3305	1146	885	-328737	141325	756	184635	-10	17	20
	27	1	2253	1248	885	-328737	141325	756	184635	-7	11	21
	27	2	1132	1350	885	-333196	149844	767	184679	-3	5	22
Lower												
side	24	0	-1605	415	663	141325	-328737	1416	184497	-11	2	7
	24	1	-1805	530	663	141325	-328737	1416	184497	-13	2	7
	24	2	-2128	645	663	141325	-328737	1416	184497	-15	2	8
	24	3	-2529	761	663	141325	-328737	1416	184497	-18	3	9
	24	4	-2964	876	663	141325	-328737	1416	184497	-21	3	10
	25	0	-2964	517	703	141325	-328737	1416	184497	-21	3	7
	25	1	-3411	618	703	141325	-328737	1416	184497	-24	3	8
	25	2	-3897	719	703	141325	-328737	1416	184497	-28	4	9
	25	3	-4450	820	703	141325	-328737	1416	184497	-31	5	10
	25	4	-5096	921	703	141325	-328737	1416	184497	-36	5	10

Upper												
side	36	3	1544	2977	2144	-339227	162656	781	184745	-5	7	50
	36	4	4562	2888	2144	-339227	162656	781	184745	-13	20	49
	37	0	4563	3078	1680	-339227	162656	781	184745	-13	20	48
	37	1	7638	2982	1680	-339227	162656	781	184745	-23	33	47
	37	2	10735	2885	1680	-339227	162656	781	184745	-32	46	46
	37	3	13789	2789	1680	-339227	162656	781	184745	-41	60	45
	37	4	16733	2692	1680	-339227	162656	781	184745	-49	72	44
Lower												
side	37	0	-4103	3078	1680	162656	-339227	1264	184607	-25	5	33
	37	1	-1408	2982	1680	162656	-339227	1264	184607	-9	2	33

(b) Checking of web against buckling

UorL	PN	Vst	a	b	a/b	Tw	Nh	ϕ	η	$\kappa\ \sigma$	$\kappa\ \tau$	νB	R	K	
Upper side	14	0	1193	2450	0.487	15	1	-1.661	1.841	25.797	26.527	1.250	1.066	0.25	
	14	1	1193	2450	0.487	15	1	-1.661	2.843	25.797	26.527	1.250	1.066	0.24	
	14	2	1193	2450	0.487	15	1	-1.661	5.962	25.797	26.527	1.250	1.066	0.24	
Lower side	13	4	1193	2450	0.487	15	1	-0.144	2.486	13.031	26.527	1.250	0.914	0.27	
	14	0	1193	2450	0.487	15	1	-0.144	2.490	13.031	26.527	1.250	0.914	0.27	
	14	1	1193	2450	0.487	15	1	-0.144	1.076	13.031	26.527	1.253	0.914	0.45	
	14	2	1193	2450	0.487	15	1	-0.144	0.688	13.031	26.527	1.264	0.914	0.67	
	14	3	1193	2450	0.487	15	1	-0.144	0.506	13.031	26.527	1.282	0.914	0.93	--
	14	4	1193	2450	0.487	17	1	-0.164	0.339	13.164	26.527	1.314	0.916	0.94	--
Upper side	20	2	1205	2450	0.492	15	1	-1.660	13.326	25.677	26.060	1.250	1.066	0.14	
	20	3	1205	2450	0.492	15	1	-1.660	4.258	25.677	26.060	1.250	1.066	0.13	
	20	4	1205	2450	0.492	15	1	-1.661	2.546	25.677	26.060	1.250	1.066	0.13	
	21	0	1205	2450	0.492	15	1	-1.661	2.878	25.677	26.060	1.250	1.066	0.14	
	21	1	1205	2450	0.492	15	1	-1.661	1.913	25.677	26.060	1.250	1.066	0.14	
	21	2	1205	2450	0.492	15	1	-1.661	1.383	25.677	26.060	1.250	1.066	0.15	
	21	3	1205	2450	0.492	15	1	-1.661	1.059	25.677	26.060	1.251	1.066	0.15	
	21	4	1205	2450	0.492	15	1	-1.661	0.849	25.677	26.060	1.251	1.066	0.16	
	22	0	1205	2450	0.492	15	1	-1.661	0.850	25.677	26.060	1.251	1.066	0.16	
	22	1	1205	2450	0.492	15	1	-1.661	0.712	25.677	26.060	1.252	1.066	0.16	
	22	2	1205	2450	0.492	15	1	-1.661	0.608	25.677	26.060	1.254	1.066	0.17	
	22	3	1205	2450	0.492	15	1	-1.661	0.521	25.677	26.060	1.255	1.066	0.17	
	22	4	1205	2450	0.492	15	1	-1.661	0.445	25.677	26.060	1.258	1.066	0.17	
Lower side	22	0	1205	2450	0.492	15	1	-0.144	0.499	12.879	26.060	1.283	0.914	0.40	
	22	1	1205	2450	0.492	15	1	-0.144	0.535	12.879	26.060	1.278	0.914	0.35	
	22	2	1205	2450	0.492	15	1	-0.144	0.561	12.879	26.060	1.275	0.914	0.31	
	22	3	1205	2450	0.492	15	1	-0.144	0.575	12.879	26.060	1.273	0.914	0.28	
	22	4	1205	2450	0.492	15	1	-0.144	0.582	12.879	26.060	1.273	0.914	0.26	
	23	0	1205	2450	0.492	15	1	-0.144	0.667	12.879	26.060	1.266	0.914	0.26	
	23	1	1205	2450	0.492	15	1	-0.144	0.673	12.879	26.060	1.265	0.914	0.24	
	23	2	1205	2450	0.492	15	1	-0.144	0.667	12.879	26.060	1.266	0.914	0.21	
	23	3	1205	2450	0.492	15	1	-0.144	0.627	12.879	26.060	1.269	0.914	0.20	
	23	4	1205	2450	0.492	15	1	-0.144	0.569	12.879	26.060	1.274	0.914	0.21	
	24	0	1205	2450	0.492	15	1	-0.144	0.574	12.879	26.060	1.274	0.914	0.21	
	24	1	1205	2450	0.492	15	1	-0.144	0.574	12.879	26.060	1.274	0.914	0.23	
	24	2	1205	2450	0.492	15	1	-0.144	0.541	12.879	26.060	1.277	0.914	0.28	
	24	3	1205	2450	0.492	15	1	-0.144	0.501	12.879	26.060	1.282	0.914	0.33	
	24	4	1205	2450	0.492	15	1	-0.144	0.466	12.879	26.060	1.287	0.914	0.38	

UorL	PN	Vst	a	b	a/b	Tw	Nh	ϕ	η	$\kappa\ \sigma$	$\kappa\ \tau$	νB	R	K	
Upper side	25	0	1205	2450	0.492	15	1	-1.661	0.414	25.677	26.060	1.259	1.066	0.18	
	25	1	1205	2450	0.492	15	1	-1.661	0.484	25.677	26.060	1.256	1.066	0.17	
	25	2	1205	2450	0.492	15	1	-1.661	0.562	25.677	26.060	1.255	1.066	0.17	
	25	3	1205	2450	0.492	15	1	-1.661	0.655	25.677	26.060	1.253	1.066	0.17	
	25	4	1205	2450	0.492	15	1	-1.661	0.774	25.677	26.060	1.252	1.066	0.16	
	26	0	1205	2450	0.492	15	1	-1.661	0.775	25.677	26.060	1.252	1.066	0.16	
	26	1	1205	2450	0.492	15	1	-1.661	0.947	25.677	26.060	1.251	1.066	0.16	
	26	2	1205	2450	0.492	15	1	-1.661	1.193	25.677	26.060	1.250	1.066	0.15	
	26	3	1205	2450	0.492	15	1	-1.661	1.566	25.677	26.060	1.250	1.066	0.15	
	26	4	1205	2450	0.492	15	1	-1.661	2.189	25.677	26.060	1.250	1.066	0.15	
	27	0	1205	2450	0.492	15	1	-1.661	1.984	25.677	26.060	1.250	1.066	0.13	
	27	1	1205	2450	0.492	15	1	-1.661	3.107	25.677	26.060	1.250	1.066	0.13	
	27	2	1205	2450	0.492	15	1	-1.579	6.590	25.677	26.060	1.250	1.058	0.14	
Lower side	24	0	1205	2450	0.492	15	1	-0.144	0.574	12.879	26.060	1.274	0.914	0.21	
	24	1	1205	2450	0.492	15	1	-0.144	0.574	12.879	26.060	1.274	0.914	0.23	
	24	2	1205	2450	0.492	15	1	-0.144	0.541	12.879	26.060	1.277	0.914	0.28	
	24	3	1205	2450	0.492	15	1	-0.144	0.501	12.879	26.060	1.282	0.914	0.33	
	24	4	1205	2450	0.492	15	1	-0.144	0.466	12.879	26.060	1.287	0.914	0.38	
	25	0	1205	2450	0.492	15	1	-0.144	0.356	12.879	26.060	1.310	0.914	0.38	
	25	1	1205	2450	0.492	15	1	-0.144	0.339	12.879	26.060	1.315	0.914	0.44	
	25	2	1205	2450	0.492	15	1	-0.144	0.322	12.879	26.060	1.320	0.914	0.51	
	25	3	1205	2450	0.492	15	1	-0.144	0.305	12.879	26.060	1.325	0.914	0.58	
	25	4	1205	2450	0.492	15	1	-0.144	0.286	12.879	26.060	1.331	0.914	0.67	
Upper side	36	3	1180	2450	0.482	15	1	-1.468	10.917	25.923	27.009	1.250	1.047	0.31	
	36	4	1180	2450	0.482	15	1	-1.468	3.611	25.923	27.009	1.250	1.047	0.31	
	37	0	1180	2450	0.482	15	1	-1.468	3.604	25.923	27.009	1.250	1.047	0.31	
	37	1	1180	2450	0.482	15	1	-1.468	2.098	25.923	27.009	1.250	1.047	0.32	
	37	2	1180	2450	0.482	15	1	-1.468	1.454	25.923	27.009	1.250	1.047	0.34	--
	37	3	1180	2450	0.482	15	1	-1.468	1.101	25.923	27.009	1.251	1.047	0.38	--
	37	4	1180	2450	0.482	15	1	-1.468	0.883	25.923	27.009	1.252	1.047	0.41	--
Lower side	37	0	1180	2450	0.482	15	1	-0.184	1.326	13.455	27.009	1.251	0.918	0.51	
	37	1	1180	2450	0.482	15	1	-0.184	3.776	13.455	27.009	1.250	0.918	0.32	

２）Main girder G1　　Web name：RWEB

（a）Section forces, section factor and stress

Check point			Sec. force			Section factor				Stress		
UorL	PN	Vst	Mx (kN･m)	Sy (kN)	T (kN･m)	WMxc (cm^3)	WMxt (cm^3)	WSy (cm^2)	WT (cm^3)	σc	σt (N/mm^2)	Στ
Upper side	14	0	6566	2114	1628	-306354	141588	779	184125	-21	33	36
	14	1	4422	2226	1628	-306354	141588	779	184125	-14	22	37
	14	2	2190	2338	1628	-306354	141588	779	184125	-7	11	39
Lower side	13	4	-1347	2114	1617	141588	-306354	1308	184125	-10	2	25
	14	0	-1348	2114	1628	141588	-306354	1308	184125	-10	2	25
	14	1	-3225	2226	1628	141588	-306354	1308	184125	-23	4	26
	14	2	-5201	2338	1628	141588	-306354	1308	184125	-37	6	27
	14	3	-7300	2449	1628	141588	-306354	1308	184125	-52	9	28
	14	4	-9547	2561	1628	140948	-288599	1562	208871	-68	13	24
Upper side	20	2	529	1265	1085	-290687	134423	779	184125	-2	3	22
	20	3	1556	1162	1085	-290687	134423	779	184125	-5	8	21
	20	4	2567	1059	1085	-306354	141588	779	184124	-8	13	19
	21	0	2568	1341	879	-306354	141588	779	184124	-8	13	22
	21	1	3606	1227	879	-306354	141588	779	184124	-12	18	21
	21	2	4633	1114	879	-306354	141588	779	184124	-15	23	19
	21	3	5583	1001	879	-306354	141588	779	184124	-18	28	18
	21	4	6385	887	879	-306354	141588	779	184124	-21	32	16
	22	0	6386	887	883	-306354	141588	779	184124	-21	32	16
	22	1	7002	785	883	-306354	141588	779	184124	-23	35	15
	22	2	7475	683	883	-306354	141588	779	184124	-24	37	14
	22	3	7862	581	883	-306354	141588	779	184125	-26	39	12
	22	4	8217	479	883	-306354	141588	779	184125	-27	41	11
Lower side	22	0	-3127	887	883	141588	-306354	1308	184124	-22	4	12
	22	1	-2728	785	883	141588	-306354	1308	184124	-19	3	11
	22	2	-2423	683	883	141588	-306354	1308	184124	-17	3	10
	22	3	-2183	581	883	141588	-306354	1308	184125	-15	3	9
	22	4	-1983	479	883	141588	-306354	1308	184125	-14	2	8
	23	0	-1983	825	652	141588	-306354	1308	184125	-14	2	10
	23	1	-1794	710	652	141588	-306354	1308	184125	-13	2	9
	23	2	-1638	595	652	141588	-306354	1308	184125	-12	2	8
	23	3	-1560	480	652	141588	-306354	1308	184125	-11	2	7
	23	4	-1605	415	652	141588	-306354	1308	184125	-11	2	7
	24	0	-1605	415	663	141588	-306354	1308	184125	-11	2	7
	24	1	-1805	530	663	141588	-306354	1308	184125	-13	2	8
	24	2	-2128	645	663	141588	-306354	1308	184125	-15	3	9
	24	3	-2529	761	663	141588	-306354	1308	184125	-18	3	9
	24	4	-2964	876	663	141588	-306354	1308	184125	-21	4	10

Check point			Sec. force			Section factor				Stress		
UorL	PN	Vst	Mx (kN·m)	Sy (kN)	T (kN·m)	WMxc (cm^3)	WMxt (cm^3)	WSy (cm^2)	WT (cm^3)	σc (N/mm^2)	σt (N/mm^2)	Στ (N/mm^2)
Upper side	25	0	8452	517	703	-306354	141588	779	184125	-28	42	10
	25	1	8140	618	703	-306354	141588	779	184125	-27	41	12
	25	2	7790	719	703	-306354	141588	779	184125	-25	39	13
	25	3	7356	820	703	-306354	141588	779	184125	-24	37	14
	25	4	6792	921	703	-306354	141588	779	184125	-22	34	16
	26	0	6792	921	707	-306354	141588	779	184125	-22	34	16
	26	1	6078	1035	707	-306354	141588	779	184125	-20	30	17
	26	2	5240	1148	707	-306354	141588	779	184125	-17	26	19
	26	3	4307	1262	707	-306354	141588	779	184125	-14	22	20
	26	4	3305	1375	707	-306354	141588	779	184125	-11	17	21
	27	0	3305	1146	885	-306354	141588	779	184125	-11	17	20
	27	1	2253	1248	885	-306354	141588	779	184125	-7	11	21
	27	2	1132	1350	885	-311148	150129	787	184170	-4	5	22
Lower side	24	0	-1605	415	663	141588	-306354	1308	184125	-11	2	7
	24	1	-1805	530	663	141588	-306354	1308	184125	-13	2	8
	24	2	-2128	645	663	141588	-306354	1308	184125	-15	3	9
	24	3	-2529	761	663	141588	-306354	1308	184125	-18	3	9
	24	4	-2964	876	663	141588	-306354	1308	184125	-21	4	10
	25	0	-2964	517	703	141588	-306354	1308	184125	-21	4	8
	25	1	-3411	618	703	141588	-306354	1308	184125	-24	4	9
	25	2	-3897	719	703	141588	-306354	1308	184125	-28	5	9
	25	3	-4450	820	703	141588	-306354	1308	184125	-31	5	10
	25	4	-5096	921	703	141588	-306354	1308	184125	-36	6	11

Upper side	36	3	1544	2977	2144	-317661	162974	799	184237	-5	7	49
	36	4	4562	2888	2144	-317661	162974	799	184237	-14	20	48
	37	0	4563	3078	1680	-317661	162974	799	184237	-14	20	48
	37	1	7638	2982	1680	-317661	162974	799	184237	-24	33	46
	37	2	10735	2885	1680	-317661	162974	799	184237	-34	46	45
	37	3	13789	2789	1680	-317661	162974	799	184237	-43	59	44
	37	4	16733	2692	1680	-317661	162974	799	184237	-53	72	43
Lower side	37	0	-4103	3078	1680	162974	-317661	1185	184237	-25	5	35
	37	1	-1408	2982	1680	162974	-317661	1185	184237	-9	2	34

(b) Checking of web against buckling

UorL	PN	Vst	a	b	a/b	Tw	Nh	ϕ	η	$\kappa\ \sigma$	$\kappa\ \tau$	ν B	R	K	
Upper side	14	0	1191	2184	0.545	15	1	-1.531	1.679	24.715	21.955	1.250	1.053	0.24	
	14	1	1191	2184	0.545	15	1	-1.531	2.592	24.715	21.955	1.250	1.053	0.23	
	14	2	1191	2184	0.545	15	1	-1.531	5.433	24.715	21.955	1.250	1.053	0.23	
Lower side	13	4	1191	2184	0.545	15	1	-0.170	2.622	11.757	21.955	1.250	0.917	0.26	
	14	0	1191	2184	0.545	15	1	-0.170	2.626	11.757	21.955	1.250	0.917	0.26	
	14	1	1191	2184	0.545	15	1	-0.170	1.136	11.757	21.955	1.252	0.917	0.41	
	14	2	1191	2184	0.545	15	1	-0.170	0.727	11.757	21.955	1.262	0.917	0.60	
	14	3	1191	2184	0.545	15	1	-0.170	0.535	11.757	21.955	1.278	0.917	0.82	--
	14	4	1191	2184	0.545	17	1	-0.191	0.357	11.914	21.955	1.308	0.919	0.82	--
Upper side	20	2	1204	2184	0.551	15	1	-1.530	12.159	24.639	21.583	1.250	1.053	0.13	
	20	3	1204	2184	0.551	15	1	-1.530	3.887	24.639	21.583	1.250	1.053	0.13	
	20	4	1204	2184	0.551	15	1	-1.531	2.325	24.639	21.583	1.250	1.053	0.12	
	21	0	1204	2184	0.551	15	1	-1.531	2.622	24.639	21.583	1.250	1.053	0.14	
	21	1	1204	2184	0.551	15	1	-1.531	1.744	24.639	21.583	1.250	1.053	0.14	
	21	2	1204	2184	0.551	15	1	-1.531	1.261	24.639	21.583	1.250	1.053	0.14	
	21	3	1204	2184	0.551	15	1	-1.531	0.967	24.639	21.583	1.251	1.053	0.14	
	21	4	1204	2184	0.551	15	1	-1.531	0.776	24.639	21.583	1.253	1.053	0.15	
	22	0	1204	2184	0.551	15	1	-1.531	0.776	24.639	21.583	1.252	1.053	0.15	
	22	1	1204	2184	0.551	15	1	-1.531	0.651	24.639	21.583	1.254	1.053	0.15	
	22	2	1204	2184	0.551	15	1	-1.531	0.556	24.639	21.583	1.256	1.053	0.15	
	22	3	1204	2184	0.551	15	1	-1.531	0.478	24.639	21.583	1.259	1.053	0.16	
	22	4	1204	2184	0.551	15	1	-1.531	0.408	24.639	21.583	1.262	1.053	0.16	
Lower side	22	0	1204	2184	0.551	15	1	-0.170	0.524	11.643	21.583	1.279	0.917	0.36	
	22	1	1204	2184	0.551	15	1	-0.170	0.560	11.643	21.583	1.275	0.917	0.31	
	22	2	1204	2184	0.551	15	1	-0.170	0.586	11.643	21.583	1.272	0.917	0.28	
	22	3	1204	2184	0.551	15	1	-0.170	0.599	11.643	21.583	1.271	0.917	0.25	
	22	4	1204	2184	0.551	15	1	-0.170	0.604	11.643	21.583	1.270	0.917	0.23	
	23	0	1204	2184	0.551	15	1	-0.170	0.703	11.643	21.583	1.263	0.917	0.23	
	23	1	1204	2184	0.551	15	1	-0.170	0.708	11.643	21.583	1.263	0.917	0.21	
	23	2	1204	2184	0.551	15	1	-0.170	0.699	11.643	21.583	1.264	0.917	0.19	
	23	3	1204	2184	0.551	15	1	-0.170	0.654	11.643	21.583	1.266	0.917	0.18	
	23	4	1204	2184	0.551	15	1	-0.170	0.592	11.643	21.583	1.272	0.917	0.18	
	24	0	1204	2184	0.551	15	1	-0.170	0.597	11.643	21.583	1.271	0.917	0.18	
	24	1	1204	2184	0.551	15	1	-0.170	0.600	11.643	21.583	1.271	0.917	0.21	
	24	2	1204	2184	0.551	15	1	-0.170	0.568	11.643	21.583	1.274	0.917	0.24	
	24	3	1204	2184	0.551	15	1	-0.170	0.527	11.643	21.583	1.278	0.917	0.29	
	24	4	1204	2184	0.551	15	1	-0.170	0.492	11.643	21.583	1.283	0.917	0.34	

UorL	PN	Vst	a	b	a/b	Tw	Nh	ϕ	η	$\kappa\ \sigma$	$\kappa\ \tau$	νB	R	K
Upper side	25	0	1204	2184	0.551	15	1	-1.531	0.379	24.639	21.583	1.264	1.053	0.16
	25	1	1204	2184	0.551	15	1	-1.531	0.442	24.639	21.583	1.261	1.053	0.16
	25	2	1204	2184	0.551	15	1	-1.531	0.513	24.639	21.583	1.258	1.053	0.16
	25	3	1204	2184	0.551	15	1	-1.531	0.597	24.639	21.583	1.255	1.053	0.15
	25	4	1204	2184	0.551	15	1	-1.531	0.706	24.639	21.583	1.253	1.053	0.15
	26	0	1204	2184	0.551	15	1	-1.531	0.707	24.639	21.583	1.253	1.053	0.15
	26	1	1204	2184	0.551	15	1	-1.531	0.863	24.639	21.583	1.252	1.053	0.15
	26	2	1204	2184	0.551	15	1	-1.531	1.086	24.639	21.583	1.251	1.053	0.14
	26	3	1204	2184	0.551	15	1	-1.531	1.425	24.639	21.583	1.250	1.053	0.14
	26	4	1204	2184	0.551	15	1	-1.531	1.992	24.639	21.583	1.250	1.053	0.14
	27	0	1204	2184	0.551	15	1	-1.531	1.809	24.639	21.583	1.250	1.053	0.13
	27	1	1204	2184	0.551	15	1	-1.531	2.832	24.639	21.583	1.250	1.053	0.13
	27	2	1204	2184	0.551	15	1	-1.458	6.033	24.639	21.583	1.250	1.046	0.14
Lower side	24	0	1204	2184	0.551	15	1	-0.170	0.597	11.643	21.583	1.271	0.917	0.18
	24	1	1204	2184	0.551	15	1	-0.170	0.600	11.643	21.583	1.271	0.917	0.21
	24	2	1204	2184	0.551	15	1	-0.170	0.568	11.643	21.583	1.274	0.917	0.24
	24	3	1204	2184	0.551	15	1	-0.170	0.527	11.643	21.583	1.278	0.917	0.29
	24	4	1204	2184	0.551	15	1	-0.170	0.492	11.643	21.583	1.283	0.917	0.34
	25	0	1204	2184	0.551	15	1	-0.170	0.371	11.643	21.583	1.306	0.917	0.34
	25	1	1204	2184	0.551	15	1	-0.170	0.355	11.643	21.583	1.310	0.917	0.39
	25	2	1204	2184	0.551	15	1	-0.170	0.338	11.643	21.583	1.314	0.917	0.44
	25	3	1204	2184	0.551	15	1	-0.170	0.321	11.643	21.583	1.319	0.917	0.51
	25	4	1204	2184	0.551	15	1	-0.170	0.302	11.643	21.583	1.325	0.917	0.58

Upper side	36	3	1179	2184	0.540	15	1	-1.359	10.060	24.796	22.339	1.250	1.036	0.30	
	36	4	1179	2184	0.540	15	1	-1.359	3.328	24.796	22.339	1.250	1.036	0.30	
	37	0	1179	2184	0.540	15	1	-1.359	3.318	24.796	22.339	1.250	1.036	0.30	
	37	1	1179	2184	0.540	15	1	-1.359	1.932	24.796	22.339	1.250	1.036	0.31	
	37	2	1179	2184	0.540	15	1	-1.359	1.339	24.796	22.339	1.250	1.036	0.33	--
	37	3	1179	2184	0.540	15	1	-1.359	1.014	24.796	22.339	1.251	1.036	0.35	--
	37	4	1179	2184	0.540	15	1	-1.359	0.813	24.796	22.339	1.253	1.036	0.39	--
Lower side	37	0	1179	2184	0.540	15	1	-0.210	1.394	12.187	22.339	1.251	0.921	0.47	
	37	1	1179	2184	0.540	15	1	-0.210	3.967	12.187	22.339	1.250	0.921	0.31	

３）Main girder G2　　Web name：LWEB

（a）Section forces, section factor and stress

Check point			Sec. force			Section factor				Stress		
UorL	PN	Vst	Mx (kN・m)	Sy (kN)	T (kN・m)	WMxc (cm^3)	WMxt (cm^3)	WSy (cm^2)	WT (cm^3)	σc	σt (N/mm^2)	Στ
Upper side	14	0	6726	2209	2005	-339702	178180	782	205688	-20	26	38
	14	1	4463	2281	2005	-339702	178180	782	205688	-13	17	39
	14	2	2172	2354	2005	-339702	178180	782	205688	-6	8	40
Lower side	13	4	-1992	2209	1994	178180	-339702	1084	205688	-11	2	30
	14	0	-1993	2209	2005	178180	-339702	1084	205688	-11	2	30
	14	1	-4070	2281	2005	178180	-339702	1084	205688	-23	5	31
	14	2	-6224	2354	2005	178180	-339702	1084	205688	-35	8	31
	14	3	-8474	2427	2005	178180	-339702	1084	205688	-48	10	32
	14	4	-10839	2500	2005	180758	-328969	1047	205763	-60	14	34
Upper side	20	2	178	1480	1394	-332210	169657	782	205688	-1	1	26
	20	3	1655	1420	1394	-332210	169657	782	205688	-5	7	25
	20	4	2988	1360	1394	-339702	178180	782	205688	-9	12	24
	21	0	2988	1268	1142	-339702	178180	782	205688	-9	12	22
	21	1	4144	1193	1142	-339702	178180	782	205688	-12	16	21
	21	2	5168	1119	1142	-339702	178180	782	205688	-15	20	20
	21	3	6099	1045	1142	-339702	178180	782	205688	-18	24	19
	21	4	6975	971	1142	-339702	178180	782	205688	-21	27	18
	22	0	6975	971	1147	-339702	178180	782	205688	-21	27	18
	22	1	7829	911	1147	-339702	178180	782	205688	-23	31	17
	22	2	8633	852	1147	-339702	178180	782	205688	-25	34	16
	22	3	9336	792	1147	-339702	178180	782	205688	-27	36	16
	22	4	9885	733	1147	-339702	178180	782	205688	-29	39	15
Lower side	22	0	-3988	971	1147	178180	-339702	1084	205688	-22	5	15
	22	1	-3451	911	1147	178180	-339702	1084	205688	-19	4	14
	22	2	-2963	852	1147	178180	-339702	1084	205688	-17	4	13
	22	3	-2553	792	1147	178180	-339702	1084	205688	-14	3	13
	22	4	-2251	733	1147	178180	-339702	1084	205688	-13	3	12
	23	0	-2251	636	832	178180	-339702	1084	205688	-13	3	10
	23	1	-2066	562	832	178180	-339702	1084	205688	-12	3	9
	23	2	-1980	488	832	178180	-339702	1084	205688	-11	2	9
	23	3	-1988	414	832	178180	-339702	1084	205688	-11	2	8
	23	4	-2083	388	832	178180	-339702	1084	205688	-12	3	8
	24	0	-2083	388	843	178180	-339702	1084	205688	-12	3	8
	24	1	-2259	462	843	178180	-339702	1084	205688	-13	3	8
	24	2	-2520	537	843	178180	-339702	1084	205688	-14	3	9
	24	3	-2878	611	843	178180	-339702	1084	205688	-16	4	10
	24	4	-3343	685	843	178180	-339702	1084	205688	-19	4	10

Check point			Sec. force			Section factor				Stress		
UorL	PN	Vst	Mx	Sy	T	WMxc	WMxt	WSy	WT	σc	σt	Στ
			(kN·m)	(kN)	(kN·m)	(cm^3)	(cm^3)	(cm^2)	(cm^3)		(N/mm^2)	
Upper side	25	0	10262	774	864	-339702	178180	782	205688	-30	40	14
	25	1	9802	833	864	-339702	178180	782	205688	-29	38	15
	25	2	9187	891	864	-339702	178180	782	205688	-27	36	16
	25	3	8469	950	864	-339702	178180	782	205688	-25	33	16
	25	4	7699	1008	864	-339702	178180	782	205688	-23	30	17
	26	0	7699	1008	867	-339702	178180	782	205688	-23	30	17
	26	1	6907	1082	867	-339702	178180	782	205688	-20	27	18
	26	2	6060	1155	867	-339702	178180	782	205688	-18	24	19
	26	3	5118	1229	867	-339702	178180	782	205688	-15	20	20
	26	4	4041	1303	867	-339702	178180	782	205688	-12	16	21
	27	0	4041	1338	1096	-339702	178180	782	205688	-12	16	22
	27	1	2802	1399	1096	-339702	178180	782	205688	-8	11	23
	27	2	1428	1459	1096	-339702	178180	782	205688	-4	6	24
Lower side	24	0	-2083	388	843	178180	-339702	1084	205688	-12	3	8
	24	1	-2259	462	843	178180	-339702	1084	205688	-13	3	8
	24	2	-2520	537	843	178180	-339702	1084	205688	-14	3	9
	24	3	-2878	611	843	178180	-339702	1084	205688	-16	4	10
	24	4	-3343	685	843	178180	-339702	1084	205688	-19	4	10
	25	0	-3343	774	864	178180	-339702	1084	205688	-19	4	11
	25	1	-3934	833	864	178180	-339702	1084	205688	-22	5	12
	25	2	-4641	891	864	178180	-339702	1084	205688	-26	6	12
	25	3	-5429	950	864	178180	-339702	1084	205688	-30	7	13
	25	4	-6263	1008	864	178180	-339702	1084	205688	-35	8	13
Upper side	36	3	1491	2863	2507	-341988	185488	788	205726	-4	6	49
	36	4	4400	2805	2507	-341988	185488	788	205726	-13	16	48
	37	0	4401	2826	2031	-341988	185488	788	205726	-13	16	46
	37	1	7246	2753	2031	-341988	185488	788	205726	-21	27	45
	37	2	10038	2681	2031	-341988	185488	788	205726	-29	37	44
	37	3	12779	2608	2031	-341988	185488	788	205726	-37	48	43
	37	4	15472	2535	2031	-341988	185488	788	205726	-45	58	42
Lower side	37	0	-4531	2826	2031	185488	-341988	1065	205726	-24	6	36
	37	1	-1991	2753	2031	185488	-341988	1065	205726	-11	3	36

（b）Checking of web against buckling

UorL	PN	Vst	a	b	a/b	Tw	Nh	ϕ	η	$\kappa\sigma$	$\kappa\tau$	νB	R	K	
Upper side	14	0	1190	2138	0.557	14	1	-1.325	1.918	24.571	21.241	1.250	1.033	0.29	
	14	1	1190	2138	0.557	14	1	-1.325	2.962	24.571	21.241	1.250	1.033	0.28	
	14	2	1190	2138	0.557	14	1	-1.325	6.231	24.571	21.241	1.250	1.033	0.28	
Lower side	13	4	1190	2138	0.557	14	1	-0.220	2.689	11.934	21.241	1.250	0.922	0.34	
	14	0	1190	2138	0.557	14	1	-0.220	2.692	11.934	21.241	1.250	0.922	0.34	
	14	1	1190	2138	0.557	14	1	-0.220	1.348	11.934	21.241	1.251	0.922	0.47	
	14	2	1190	2138	0.557	14	1	-0.220	0.900	11.934	21.241	1.256	0.922	0.64	
	14	3	1190	2138	0.557	14	1	-0.220	0.675	11.934	21.241	1.265	0.922	0.83	--
	14	4	1190	2138	0.557	14	1	-0.240	0.561	12.105	21.241	1.274	0.924	1.01	--
Upper side	20	2	1203	2138	0.562	14	1	-1.367	47.944	24.502	20.884	1.250	1.037	0.18	
	20	3	1203	2138	0.562	14	1	-1.367	5.005	24.502	20.884	1.250	1.037	0.18	
	20	4	1203	2138	0.562	14	1	-1.325	2.748	24.502	20.884	1.250	1.033	0.18	
	21	0	1203	2138	0.562	14	1	-1.325	2.474	24.502	20.884	1.250	1.033	0.16	
	21	1	1203	2138	0.562	14	1	-1.325	1.706	24.502	20.884	1.250	1.033	0.17	
	21	2	1203	2138	0.562	14	1	-1.325	1.305	24.502	20.884	1.250	1.033	0.17	
	21	3	1203	2138	0.562	14	1	-1.325	1.053	24.502	20.884	1.251	1.033	0.17	
	21	4	1203	2138	0.562	14	1	-1.325	0.875	24.502	20.884	1.252	1.033	0.18	
	22	0	1203	2138	0.562	14	1	-1.325	0.876	24.502	20.884	1.252	1.033	0.18	
	22	1	1203	2138	0.562	14	1	-1.325	0.747	24.502	20.884	1.254	1.033	0.19	
	22	2	1203	2138	0.562	14	1	-1.325	0.648	24.502	20.884	1.256	1.033	0.20	
	22	3	1203	2138	0.562	14	1	-1.325	0.571	24.502	20.884	1.259	1.033	0.20	
	22	4	1203	2138	0.562	14	1	-1.325	0.514	24.502	20.884	1.261	1.033	0.21	
Lower side	22	0	1203	2138	0.562	14	1	-0.220	0.649	11.829	20.884	1.266	0.922	0.39	
	22	1	1203	2138	0.562	14	1	-0.220	0.722	11.829	20.884	1.262	0.922	0.34	
	22	2	1203	2138	0.562	14	1	-0.220	0.808	11.829	20.884	1.258	0.922	0.30	
	22	3	1203	2138	0.562	14	1	-0.220	0.899	11.829	20.884	1.256	0.922	0.27	
	22	4	1203	2138	0.562	14	1	-0.220	0.976	11.829	20.884	1.254	0.922	0.24	
	23	0	1203	2138	0.562	14	1	-0.220	0.784	11.829	20.884	1.259	0.922	0.23	
	23	1	1203	2138	0.562	14	1	-0.220	0.796	11.829	20.884	1.259	0.922	0.21	
	23	2	1203	2138	0.562	14	1	-0.220	0.768	11.829	20.884	1.260	0.922	0.20	
	23	3	1203	2138	0.562	14	1	-0.220	0.704	11.829	20.884	1.263	0.922	0.20	
	23	4	1203	2138	0.562	14	1	-0.220	0.652	11.829	20.884	1.266	0.922	0.21	
	24	0	1203	2138	0.562	14	1	-0.220	0.657	11.829	20.884	1.266	0.922	0.21	
	24	1	1203	2138	0.562	14	1	-0.220	0.660	11.829	20.884	1.266	0.922	0.22	
	24	2	1203	2138	0.562	14	1	-0.220	0.640	11.829	20.884	1.267	0.922	0.25	
	24	3	1203	2138	0.562	14	1	-0.220	0.602	11.829	20.884	1.270	0.922	0.28	
	24	4	1203	2138	0.562	14	1	-0.220	0.555	11.829	20.884	1.275	0.922	0.33	

UorL	PN	Vst	a	b	a/b	Tw	Nh	φ	η	κσ	κτ	νB	R	K	
Upper side	25	0	1203	2138	0.562	14	1	-1.325	0.467	24.502	20.884	1.264	1.033	0.21	
	25	1	1203	2138	0.562	14	1	-1.325	0.515	24.502	20.884	1.261	1.033	0.21	
	25	2	1203	2138	0.562	14	1	-1.325	0.577	24.502	20.884	1.258	1.033	0.20	
	25	3	1203	2138	0.562	14	1	-1.325	0.656	24.502	20.884	1.256	1.033	0.19	
	25	4	1203	2138	0.562	14	1	-1.325	0.754	24.502	20.884	1.254	1.033	0.18	
	26	0	1203	2138	0.562	14	1	-1.325	0.755	24.502	20.884	1.254	1.033	0.18	
	26	1	1203	2138	0.562	14	1	-1.325	0.887	24.502	20.884	1.252	1.033	0.18	
	26	2	1203	2138	0.562	14	1	-1.325	1.064	24.502	20.884	1.251	1.033	0.17	
	26	3	1203	2138	0.562	14	1	-1.325	1.323	24.502	20.884	1.250	1.033	0.17	
	26	4	1203	2138	0.562	14	1	-1.325	1.754	24.502	20.884	1.250	1.033	0.16	
	27	0	1203	2138	0.562	14	1	-1.325	1.886	24.502	20.884	1.250	1.033	0.18	
	27	1	1203	2138	0.562	14	1	-1.325	2.814	24.502	20.884	1.250	1.033	0.17	
	27	2	1203	2138	0.562	14	1	-1.325	5.705	24.502	20.884	1.250	1.033	0.17	
Lower side	24	0	1203	2138	0.562	14	1	-0.220	0.657	11.829	20.884	1.266	0.922	0.21	
	24	1	1203	2138	0.562	14	1	-0.220	0.660	11.829	20.884	1.266	0.922	0.22	
	24	2	1203	2138	0.562	14	1	-0.220	0.640	11.829	20.884	1.267	0.922	0.25	
	24	3	1203	2138	0.562	14	1	-0.220	0.602	11.829	20.884	1.270	0.922	0.28	
	24	4	1203	2138	0.562	14	1	-0.220	0.555	11.829	20.884	1.275	0.922	0.33	
	25	0	1203	2138	0.562	14	1	-0.220	0.604	11.829	20.884	1.270	0.922	0.33	
	25	1	1203	2138	0.562	14	1	-0.220	0.538	11.829	20.884	1.276	0.922	0.38	
	25	2	1203	2138	0.562	14	1	-0.220	0.477	11.829	20.884	1.284	0.922	0.45	
	25	3	1203	2138	0.562	14	1	-0.220	0.425	11.829	20.884	1.293	0.922	0.52	
	25	4	1203	2138	0.562	14	1	-0.220	0.384	11.829	20.884	1.301	0.922	0.60	
Upper side	36	3	1178	2138	0.551	14	1	-1.275	11.129	24.645	21.610	1.250	1.027	0.34	
	36	4	1178	2138	0.551	14	1	-1.275	3.713	24.645	21.610	1.250	1.027	0.34	
	37	0	1178	2138	0.551	14	1	-1.275	3.553	24.645	21.610	1.250	1.027	0.33	
	37	1	1178	2138	0.551	14	1	-1.275	2.114	24.645	21.610	1.250	1.027	0.34	
	37	2	1178	2138	0.551	14	1	-1.275	1.495	24.645	21.610	1.250	1.027	0.35	--
	37	3	1178	2138	0.551	14	1	-1.275	1.150	24.645	21.610	1.251	1.027	0.38	--
	37	4	1178	2138	0.551	14	1	-1.275	0.929	24.645	21.610	1.252	1.027	0.40	--
Lower side	37	0	1178	2138	0.551	14	1	-0.234	1.491	12.164	21.610	1.250	0.923	0.52	
	37	1	1178	2138	0.551	14	1	-0.234	3.328	12.164	21.610	1.250	0.923	0.37	

4）Main girder G2　　Web name：RWEB

（a）Section forces, section factor and stress

Check point			Sec. force			Section factor				Stress		
UorL	PN	Vst	Mx (kN･m)	Sy (kN)	T (kN･m)	WMxc (cm^3)	WMxt (cm^3)	WSy (cm^2)	WT (cm^3)	σc	σt (N/mm^2)	Στ
Upper side	14	0	6726	2209	2005	-320429	177939	728	205133	-21	26	40
	14	1	4463	2281	2005	-320429	177939	728	205133	-14	17	41
	14	2	2172	2354	2005	-320429	177939	728	205133	-7	8	42
Lower side	13	4	-1992	2209	1994	177939	-320429	968	205133	-11	3	33
	14	0	-1993	2209	2005	177939	-320429	968	205133	-11	3	33
	14	1	-4070	2281	2005	177939	-320429	968	205133	-23	6	33
	14	2	-6224	2354	2005	177939	-320429	968	205133	-35	9	34
	14	3	-8474	2427	2005	177939	-320429	968	205133	-48	12	35
	14	4	-10839	2500	2005	180514	-310818	935	205209	-60	16	37
Upper side	20	2	178	1480	1394	-313054	169428	728	205133	-1	1	27
	20	3	1655	1420	1394	-313054	169428	728	205133	-5	7	26
	20	4	2988	1360	1394	-320429	177939	728	205133	-9	12	25
	21	0	2988	1268	1142	-320429	177939	728	205133	-9	12	23
	21	1	4144	1193	1142	-320429	177939	728	205133	-13	16	22
	21	2	5168	1119	1142	-320429	177939	728	205133	-16	20	21
	21	3	6099	1045	1142	-320429	177939	728	205133	-19	24	20
	21	4	6975	971	1142	-320429	177939	728	205133	-22	27	19
	22	0	6975	971	1147	-320429	177939	728	205133	-22	27	19
	22	1	7829	911	1147	-320429	177939	728	205133	-24	30	18
	22	2	8633	852	1147	-320429	177939	728	205133	-27	33	17
	22	3	9336	792	1147	-320429	177939	728	205133	-29	36	16
	22	4	9885	733	1147	-320429	177939	728	205133	-31	38	16
Lower side	22	0	-3988	971	1147	177939	-320429	968	205133	-22	5	16
	22	1	-3451	911	1147	177939	-320429	968	205133	-19	5	15
	22	2	-2963	852	1147	177939	-320429	968	205133	-17	4	14
	22	3	-2553	792	1147	177939	-320429	968	205133	-14	4	14
	22	4	-2251	733	1147	177939	-320429	968	205133	-13	3	13
	23	0	-2251	636	832	177939	-320429	968	205133	-13	3	11
	23	1	-2066	562	832	177939	-320429	968	205133	-12	3	10
	23	2	-1980	488	832	177939	-320429	968	205133	-11	3	9
	23	3	-1988	414	832	177939	-320429	968	205133	-11	3	8
	23	4	-2083	388	832	177939	-320429	968	205133	-12	3	8
	24	0	-2083	388	843	177939	-320429	968	205133	-12	3	8
	24	1	-2259	462	843	177939	-320429	968	205133	-13	3	9
	24	2	-2520	537	843	177939	-320429	968	205133	-14	3	10
	24	3	-2878	611	843	177939	-320429	968	205133	-16	4	10
	24	4	-3343	685	843	177939	-320429	968	205133	-19	5	11

Check point			Sec. force			Section factor				Stress		
UorL	PN	Vst	Mx	Sy	T	WMxc	WMxt	WSy	WT	σc	σt	Στ
			(kN·m)	(kN)	(kN·m)	(cm^3)	(cm^3)	(cm^2)	(cm^3)		(N/mm^2)	
Upper												
side	25	0	10262	774	864	-320429	177939	728	205133	-32	40	15
	25	1	9802	833	864	-320429	177939	728	205133	-31	38	16
	25	2	9187	891	864	-320429	177939	728	205133	-29	36	16
	25	3	8469	950	864	-320429	177939	728	205133	-26	33	17
	25	4	7699	1008	864	-320429	177939	728	205133	-24	30	18
	26	0	7699	1008	867	-320429	177939	728	205133	-24	30	18
	26	1	6907	1082	867	-320429	177939	728	205133	-22	27	19
	26	2	6060	1155	867	-320429	177939	728	205133	-19	23	20
	26	3	5118	1229	867	-320429	177939	728	205133	-16	20	21
	26	4	4041	1303	867	-320429	177939	728	205133	-13	16	22
	27	0	4041	1338	1096	-320429	177939	728	205133	-13	16	24
	27	1	2802	1399	1096	-320429	177939	728	205133	-9	11	25
	27	2	1428	1459	1096	-320429	177939	728	205133	-4	6	25
Lower												
side	24	0	-2083	388	843	177939	-320429	968	205133	-12	3	8
	24	1	-2259	462	843	177939	-320429	968	205133	-13	3	9
	24	2	-2520	537	843	177939	-320429	968	205133	-14	3	10
	24	3	-2878	611	843	177939	-320429	968	205133	-16	4	10
	24	4	-3343	685	843	177939	-320429	968	205133	-19	5	11
	25	0	-3343	774	864	177939	-320429	968	205133	-19	5	12
	25	1	-3934	833	864	177939	-320429	968	205133	-22	5	13
	25	2	-4641	891	864	177939	-320429	968	205133	-26	6	13
	25	3	-5429	950	864	177939	-320429	968	205133	-31	7	14
	25	4	-6263	1008	864	177939	-320429	968	205133	-35	9	15

Upper												
side	36	3	1491	2863	2507	-322973	185238	732	205171	-5	6	51
	36	4	4400	2805	2507	-322973	185238	732	205171	-14	16	51
	37	0	4401	2826	2031	-322973	185238	732	205171	-14	16	49
	37	1	7246	2753	2031	-322973	185238	732	205171	-22	27	48
	37	2	10038	2681	2031	-322973	185238	732	205171	-31	37	47
	37	3	12779	2608	2031	-322973	185238	732	205171	-40	47	46
	37	4	15472	2535	2031	-322973	185238	732	205171	-48	57	45
Lower												
side	37	0	-4531	2826	2031	185238	-322973	950	205171	-24	6	40
	37	1	-1991	2753	2031	185238	-322973	950	205171	-11	3	39

(b) Checking of web against buckling

UorL	PN	Vst	a	b	a/b	Tw	Nh	φ	η	κσ	κτ	νB	R	K	
Upper side	14	0	1188	2182	0.545	14	1	-1.241	1.911	24.723	21.993	1.250	1.024	0.32	
	14	1	1188	2182	0.545	14	1	-1.241	2.952	24.723	21.993	1.250	1.024	0.31	
	14	2	1188	2182	0.545	14	1	-1.241	6.212	24.723	21.993	1.250	1.024	0.31	
Lower side	13	4	1188	2182	0.545	14	1	-0.244	2.905	12.368	21.993	1.250	0.924	0.36	
	14	0	1188	2182	0.545	14	1	-0.244	2.908	12.368	21.993	1.250	0.924	0.36	
	14	1	1188	2182	0.545	14	1	-0.244	1.457	12.368	21.993	1.251	0.924	0.49	
	14	2	1188	2182	0.545	14	1	-0.244	0.974	12.368	21.993	1.254	0.924	0.65	
	14	3	1188	2182	0.545	14	1	-0.244	0.731	12.368	21.993	1.261	0.924	0.84	--
	14	4	1188	2182	0.545	14	1	-0.265	0.608	12.551	21.993	1.269	0.926	1.02	--
Upper side	20	2	1201	2182	0.551	14	1	-1.278	47.686	24.647	21.620	1.250	1.028	0.20	
	20	3	1201	2182	0.551	14	1	-1.278	4.975	24.647	21.620	1.250	1.028	0.19	
	20	4	1201	2182	0.551	14	1	-1.241	2.733	24.647	21.620	1.250	1.024	0.20	
	21	0	1201	2182	0.551	14	1	-1.241	2.465	24.647	21.620	1.250	1.024	0.18	
	21	1	1201	2182	0.551	14	1	-1.241	1.698	24.647	21.620	1.250	1.024	0.18	
	21	2	1201	2182	0.551	14	1	-1.241	1.298	24.647	21.620	1.250	1.024	0.18	
	21	3	1201	2182	0.551	14	1	-1.241	1.047	24.647	21.620	1.251	1.024	0.19	
	21	4	1201	2182	0.551	14	1	-1.241	0.868	24.647	21.620	1.253	1.024	0.20	
	22	0	1201	2182	0.551	14	1	-1.241	0.869	24.647	21.620	1.253	1.024	0.20	
	22	1	1201	2182	0.551	14	1	-1.241	0.741	24.647	21.620	1.255	1.024	0.21	
	22	2	1201	2182	0.551	14	1	-1.241	0.642	24.647	21.620	1.257	1.024	0.22	
	22	3	1201	2182	0.551	14	1	-1.241	0.565	24.647	21.620	1.260	1.024	0.23	
	22	4	1201	2182	0.551	14	1	-1.241	0.508	24.647	21.620	1.263	1.024	0.23	
Lower side	22	0	1201	2182	0.551	14	1	-0.244	0.697	12.258	21.620	1.263	0.924	0.40	
	22	1	1201	2182	0.551	14	1	-0.244	0.773	12.258	21.620	1.259	0.924	0.35	
	22	2	1201	2182	0.551	14	1	-0.244	0.864	12.258	21.620	1.256	0.924	0.31	
	22	3	1201	2182	0.551	14	1	-0.244	0.960	12.258	21.620	1.254	0.924	0.27	
	22	4	1201	2182	0.551	14	1	-0.244	1.040	12.258	21.620	1.253	0.924	0.24	
	23	0	1201	2182	0.551	14	1	-0.244	0.839	12.258	21.620	1.257	0.924	0.23	
	23	1	1201	2182	0.551	14	1	-0.244	0.849	12.258	21.620	1.257	0.924	0.21	
	23	2	1201	2182	0.551	14	1	-0.244	0.817	12.258	21.620	1.258	0.924	0.20	
	23	3	1201	2182	0.551	14	1	-0.244	0.745	12.258	21.620	1.261	0.924	0.20	
	23	4	1201	2182	0.551	14	1	-0.244	0.689	12.258	21.620	1.264	0.924	0.21	
	24	0	1201	2182	0.551	14	1	-0.244	0.693	12.258	21.620	1.263	0.924	0.21	
	24	1	1201	2182	0.551	14	1	-0.244	0.700	12.258	21.620	1.263	0.924	0.22	
	24	2	1201	2182	0.551	14	1	-0.244	0.681	12.258	21.620	1.264	0.924	0.25	
	24	3	1201	2182	0.551	14	1	-0.244	0.644	12.258	21.620	1.267	0.924	0.28	
	24	4	1201	2182	0.551	14	1	-0.244	0.595	12.258	21.620	1.270	0.924	0.33	

UorL	PN	Vst	a	b	a/b	Tw	Nh	ϕ	η	$\kappa\ \sigma$	$\kappa\ \tau$	νB	R	K	
Upper side	25	0	1201	2182	0.551	14	1	-1.241	0.464	24.647	21.620	1.266	1.024	0.24	
	25	1	1201	2182	0.551	14	1	-1.241	0.512	24.647	21.620	1.263	1.024	0.23	
	25	2	1201	2182	0.551	14	1	-1.241	0.574	24.647	21.620	1.260	1.024	0.22	
	25	3	1201	2182	0.551	14	1	-1.241	0.653	24.647	21.620	1.257	1.024	0.21	
	25	4	1201	2182	0.551	14	1	-1.241	0.752	24.647	21.620	1.254	1.024	0.20	
	26	0	1201	2182	0.551	14	1	-1.241	0.752	24.647	21.620	1.254	1.024	0.20	
	26	1	1201	2182	0.551	14	1	-1.241	0.885	24.647	21.620	1.253	1.024	0.20	
	26	2	1201	2182	0.551	14	1	-1.241	1.063	24.647	21.620	1.251	1.024	0.19	
	26	3	1201	2182	0.551	14	1	-1.241	1.321	24.647	21.620	1.250	1.024	0.19	
	26	4	1201	2182	0.551	14	1	-1.241	1.754	24.647	21.620	1.250	1.024	0.18	
	27	0	1201	2182	0.551	14	1	-1.241	1.881	24.647	21.620	1.250	1.024	0.19	
	27	1	1201	2182	0.551	14	1	-1.241	2.808	24.647	21.620	1.250	1.024	0.19	
	27	2	1201	2182	0.551	14	1	-1.241	5.696	24.647	21.620	1.250	1.024	0.19	
Lower side	24	0	1201	2182	0.551	14	1	-0.244	0.693	12.258	21.620	1.263	0.924	0.21	
	24	1	1201	2182	0.551	14	1	-0.244	0.700	12.258	21.620	1.263	0.924	0.22	
	24	2	1201	2182	0.551	14	1	-0.244	0.681	12.258	21.620	1.264	0.924	0.25	
	24	3	1201	2182	0.551	14	1	-0.244	0.644	12.258	21.620	1.267	0.924	0.28	
	24	4	1201	2182	0.551	14	1	-0.244	0.595	12.258	21.620	1.270	0.924	0.33	
	25	0	1201	2182	0.551	14	1	-0.244	0.650	12.258	21.620	1.266	0.924	0.33	
	25	1	1201	2182	0.551	14	1	-0.244	0.579	12.258	21.620	1.272	0.924	0.38	
	25	2	1201	2182	0.551	14	1	-0.244	0.514	12.258	21.620	1.279	0.924	0.45	
	25	3	1201	2182	0.551	14	1	-0.244	0.459	12.258	21.620	1.287	0.924	0.52	
	25	4	1201	2182	0.551	14	1	-0.244	0.415	12.258	21.620	1.294	0.924	0.60	
Upper side	36	3	1176	2182	0.539	14	1	-1.195	11.122	24.805	22.378	1.250	1.019	0.37	
	36	4	1176	2182	0.539	14	1	-1.195	3.709	24.805	22.378	1.250	1.019	0.37	
	37	0	1176	2182	0.539	14	1	-1.195	3.560	24.805	22.378	1.250	1.019	0.36	
	37	1	1176	2182	0.539	14	1	-1.195	2.118	24.805	22.378	1.250	1.019	0.37	
	37	2	1176	2182	0.539	14	1	-1.195	1.497	24.805	22.378	1.250	1.019	0.39	--
	37	3	1176	2182	0.539	14	1	-1.195	1.151	24.805	22.378	1.251	1.019	0.41	--
	37	4	1176	2182	0.539	14	1	-1.195	0.930	24.805	22.378	1.252	1.019	0.44	--
Lower side	37	0	1176	2182	0.539	14	1	-0.259	1.620	12.613	22.378	1.250	0.926	0.54	
	37	1	1176	2182	0.539	14	1	-0.259	3.616	12.613	22.378	1.250	0.926	0.40	

５）Main girder G3　 Web name：LWEB

（a）Section forces, section factor and stress

Check point			Sec. force			Section factor				Stress		
UorL	PN	Vst	Mx (kN·m)	Sy (kN)	T (kN·m)	WMxc (cm^3)	WMxt (cm^3)	WSy (cm^2)	WT (cm^3)	σc (N/mm²)	σt (N/mm²)	Στ (N/mm²)
Upper side	14	0	7957	2415	1943	-412177	180957	740	205688	-19	31	42
	14	1	5443	2510	1943	-412177	180957	740	205688	-13	21	43
	14	2	2847	2604	1943	-412177	180957	740	205688	-7	11	45
	14	3	207	2699	1943	-412177	180957	740	205688	-1	1	46
Lower side	13	4	-1931	2415	1931	180957	-412177	1076	205688	-11	2	32
	14	0	-1932	2415	1943	180957	-412177	1076	205688	-11	2	32
	14	1	-4167	2510	1943	180957	-412177	1076	205688	-23	3	33
	14	2	-6509	2604	1943	180957	-412177	1076	205688	-36	5	34
	14	3	-8956	2699	1943	180957	-412177	1076	205688	-49	7	35
	14	4	-11506	2793	1943	183136	-376868	1033	205763	-63	12	36
Upper side	20	2	140	1558	1587	-380910	171918	739	205688	-0	1	29
	20	3	1632	1475	1587	-380910	171918	739	205688	-4	7	28
	20	4	3032	1391	1587	-399566	180585	738	205688	-8	12	27
	21	0	3032	1478	1339	-399566	180585	738	205688	-8	12	27
	21	1	4342	1386	1339	-399566	180585	738	205688	-11	17	25
	21	2	5572	1294	1339	-399566	180585	738	205688	-14	22	24
	21	3	6711	1202	1339	-399566	180585	738	205688	-17	26	23
	21	4	7746	1110	1339	-399566	180585	738	205688	-19	30	22
	22	0	7745	1110	1346	-399566	180585	738	205688	-19	30	22
	22	1	8683	1027	1346	-399566	180585	738	205688	-22	34	20
	22	2	9528	945	1346	-399566	180585	738	205688	-24	37	19
	22	3	10259	863	1346	-399063	180569	738	205688	-26	40	18
	22	4	10856	780	1346	-399063	180569	738	205688	-27	43	17
Lower side	22	0	-4409	1110	1346	180585	-399566	1063	205688	-24	4	17
	22	1	-3808	1027	1346	180585	-399566	1063	205688	-21	3	16
	22	2	-3276	945	1346	180585	-399566	1063	205688	-18	3	15
	22	3	-2833	863	1346	180569	-399063	1063	205688	-16	3	15
	22	4	-2495	780	1346	180569	-399063	1063	205688	-14	2	14
	23	0	-2495	763	875	180569	-399063	1063	205688	-14	2	11
	23	1	-2262	672	875	180569	-399063	1063	205688	-13	2	11
	23	2	-2126	580	875	180569	-399063	1063	205688	-12	2	10
	23	3	-2096	489	875	180569	-399063	1063	205688	-12	2	9
	23	4	-2182	431	875	180569	-399063	1063	205688	-12	2	8
	24	0	-2182	431	889	180569	-399063	1063	205688	-12	2	8
	24	1	-2392	522	889	180569	-399051	1062	205688	-13	2	9
	24	2	-2720	614	889	180569	-399051	1062	205688	-15	2	10
	24	3	-3148	705	889	180569	-399051	1062	205688	-17	3	11
	24	4	-3660	797	889	180569	-399051	1062	205688	-20	3	12

Check point			Sec. force			Section factor				Stress		
UorL	PN	Vst	Mx	Sy	T	WMxc	WMxt	WSy	WT	σc	σt	Στ
			(kN·m)	(kN)	(kN·m)	(cm^3)	(cm^3)	(cm^2)	(cm^3)	(N/mm^2)		
Upper												
side	25	0	11366	777	716	-399051	180569	738	205688	-28	45	14
	25	1	10902	858	716	-399051	180569	738	205688	-27	43	15
	25	2	10306	940	716	-399051	180569	738	205688	-26	40	16
	25	3	9596	1022	716	-399051	180569	738	205688	-24	38	17
	25	4	8791	1103	716	-386935	180415	737	205687	-23	34	18
	26	0	8791	1103	718	-386935	180415	737	205687	-23	34	18
	26	1	7890	1194	718	-386935	180415	737	205687	-20	31	20
	26	2	6885	1284	718	-386935	180415	737	205687	-18	27	21
	26	3	5783	1375	718	-386935	180415	737	205687	-15	23	22
	26	4	4587	1466	718	-386935	180415	737	205687	-12	18	23
	27	0	4592	1359	1199	-386935	180415	737	205687	-12	18	24
	27	1	3305	1439	1199	-386935	180415	737	205687	-9	13	25
	27	2	1924	1520	1199	-377799	180101	736	205687	-5	8	26
	27	3	446	1601	1199	-377799	180101	736	205687	-1	2	28
Lower												
side	24	0	-2182	431	889	180569	-399063	1063	205688	-12	2	8
	24	1	-2392	522	889	180569	-399051	1062	205688	-13	2	9
	24	2	-2720	614	889	180569	-399051	1062	205688	-15	2	10
	24	3	-3148	705	889	180569	-399051	1062	205688	-17	3	11
	24	4	-3660	797	889	180569	-399051	1062	205688	-20	3	12
	25	0	-3660	777	716	180569	-399051	1062	205688	-20	3	11
	25	1	-4259	858	716	180569	-399051	1062	205688	-24	4	12
	25	2	-4951	940	716	180569	-399051	1062	205688	-27	4	12
	25	3	-5725	1022	716	180569	-399051	1062	205688	-32	5	13
	25	4	-6571	1103	716	180415	-386935	1050	205687	-36	6	14
Upper												
side	36	3	949	2922	2438	-320713	178170	728	205686	-3	4	52
	36	4	3886	2862	2438	-320713	178170	728	205686	-12	15	51
	37	0	3887	2839	2142	-320713	178170	728	205686	-12	15	49
	37	1	6740	2766	2142	-320713	178170	728	205686	-21	26	48
	37	2	9527	2694	2142	-320713	178170	728	205686	-30	37	47
	37	3	12258	2621	2142	-320713	178170	728	205686	-38	47	46
	37	4	14944	2548	2142	-320713	178170	728	205686	-47	58	45
Lower												
side	37	0	-5017	2839	2142	178170	-320713	968	205686	-28	7	40
	37	1	-2439	2766	2142	178170	-320713	968	205686	-14	3	39

(b) Checking of web against buckling

UorL	PN	Vst	a	b	a/b	Tw	Nh	ϕ	η	$\kappa\ \sigma$	$\kappa\ \tau$	νB	R	K
Upper side	14	0	1187	2182	0.544	14	1	-1.622	2.181	24.736	22.053	1.250	1.062	0.30
	14	1	1187	2182	0.544	14	1	-1.622	3.284	24.736	22.053	1.250	1.062	0.29
	14	2	1187	2182	0.544	14	1	-1.622	6.465	24.736	22.053	1.250	1.062	0.30
	14	3	1187	2182	0.544	14	1	-1.622	91.664	24.736	22.053	1.250	1.062	0.31
Lower side	13	4	1187	2182	0.544	14	1	-0.151	2.983	11.655	22.053	1.250	0.915	0.36
	14	0	1187	2182	0.544	14	1	-0.151	2.987	11.655	22.053	1.250	0.915	0.36
	14	1	1187	2182	0.544	14	1	-0.151	1.423	11.655	22.053	1.251	0.915	0.52
	14	2	1187	2182	0.544	14	1	-0.151	0.936	11.655	22.053	1.255	0.915	0.71
	14	3	1187	2182	0.544	14	1	-0.151	0.698	11.655	22.053	1.264	0.915	0.93
	14	4	1187	2182	0.544	14	1	-0.189	0.580	11.929	22.053	1.272	0.919	1.13 --
Upper side	20	2	1199	2182	0.550	14	1	-1.573	78.252	24.659	21.679	1.250	1.057	0.20
	20	3	1199	2182	0.550	14	1	-1.573	6.460	24.659	21.679	1.250	1.057	0.19
	20	4	1199	2182	0.550	14	1	-1.570	3.500	24.659	21.679	1.250	1.057	0.19
	21	0	1199	2182	0.550	14	1	-1.570	3.496	24.659	21.679	1.250	1.057	0.18
	21	1	1199	2182	0.550	14	1	-1.570	2.326	24.659	21.679	1.250	1.057	0.18
	21	2	1199	2182	0.550	14	1	-1.570	1.723	24.659	21.679	1.250	1.057	0.18
	21	3	1199	2182	0.550	14	1	-1.570	1.356	24.659	21.679	1.250	1.057	0.18
	21	4	1199	2182	0.550	14	1	-1.570	1.111	24.659	21.679	1.251	1.057	0.18
	22	0	1199	2182	0.550	14	1	-1.570	1.113	24.659	21.679	1.251	1.057	0.18
	22	1	1199	2182	0.550	14	1	-1.570	0.941	24.659	21.679	1.251	1.057	0.19
	22	2	1199	2182	0.550	14	1	-1.570	0.811	24.659	21.679	1.252	1.057	0.19
	22	3	1199	2182	0.550	14	1	-1.568	0.709	24.659	21.679	1.253	1.057	0.20
	22	4	1199	2182	0.550	14	1	-1.568	0.629	24.659	21.679	1.254	1.057	0.20
Lower side	22	0	1199	2182	0.550	14	1	-0.162	0.696	11.613	21.679	1.264	0.916	0.46
	22	1	1199	2182	0.550	14	1	-0.162	0.769	11.613	21.679	1.260	0.916	0.40
	22	2	1199	2182	0.550	14	1	-0.162	0.851	11.613	21.679	1.257	0.916	0.35
	22	3	1199	2182	0.550	14	1	-0.162	0.935	11.616	21.679	1.255	0.916	0.31
	22	4	1199	2182	0.550	14	1	-0.162	1.005	11.616	21.679	1.254	0.916	0.28
	23	0	1199	2182	0.550	14	1	-0.162	0.827	11.616	21.679	1.258	0.916	0.27
	23	1	1199	2182	0.550	14	1	-0.162	0.844	11.616	21.679	1.257	0.916	0.24
	23	2	1199	2182	0.550	14	1	-0.162	0.825	11.616	21.679	1.258	0.916	0.23
	23	3	1199	2182	0.550	14	1	-0.162	0.763	11.616	21.679	1.260	0.916	0.22
	23	4	1199	2182	0.550	14	1	-0.162	0.688	11.616	21.679	1.264	0.916	0.23
	24	0	1199	2182	0.550	14	1	-0.162	0.693	11.616	21.679	1.264	0.916	0.23
	24	1	1199	2182	0.550	14	1	-0.162	0.697	11.616	21.679	1.264	0.916	0.25
	24	2	1199	2182	0.550	14	1	-0.162	0.670	11.616	21.679	1.265	0.916	0.28
	24	3	1199	2182	0.550	14	1	-0.162	0.629	11.616	21.679	1.268	0.916	0.33
	24	4	1199	2182	0.550	14	1	-0.162	0.583	11.616	21.679	1.272	0.916	0.38

UorL	PN	Vst	a	b	a/b	Tw	Nh	ϕ	η	$\kappa\sigma$	$\kappa\tau$	νB	R	K	
Upper side	25	0	1199	2182	0.550	14	1	-1.568	0.491	24.659	21.679	1.258	1.057	0.20	
	25	1	1199	2182	0.550	14	1	-1.568	0.553	24.659	21.679	1.256	1.057	0.19	
	25	2	1199	2182	0.550	14	1	-1.568	0.628	24.659	21.679	1.254	1.057	0.19	
	25	3	1199	2182	0.550	14	1	-1.568	0.720	24.659	21.679	1.253	1.057	0.19	
	25	4	1199	2182	0.550	14	1	-1.516	0.812	24.659	21.679	1.252	1.052	0.19	
	26	0	1199	2182	0.550	14	1	-1.516	0.812	24.659	21.679	1.252	1.052	0.19	
	26	1	1199	2182	0.550	14	1	-1.516	0.965	24.659	21.679	1.251	1.052	0.18	
	26	2	1199	2182	0.550	14	1	-1.516	1.175	24.659	21.679	1.250	1.052	0.18	
	26	3	1199	2182	0.550	14	1	-1.516	1.481	24.659	21.679	1.250	1.052	0.17	
	26	4	1199	2182	0.550	14	1	-1.516	1.971	24.659	21.679	1.250	1.052	0.17	
	27	0	1199	2182	0.550	14	1	-1.516	2.043	24.659	21.679	1.250	1.052	0.18	
	27	1	1199	2182	0.550	14	1	-1.516	2.967	24.659	21.679	1.250	1.052	0.18	
	27	2	1199	2182	0.550	14	1	-1.478	5.199	24.659	21.679	1.250	1.048	0.19	
	27	3	1199	2182	0.550	14	1	-1.478	23.342	24.659	21.679	1.250	1.048	0.19	
Lower side	24	0	1199	2182	0.550	14	1	-0.162	0.693	11.616	21.679	1.264	0.916	0.23	
	24	1	1199	2182	0.550	14	1	-0.162	0.697	11.616	21.679	1.264	0.916	0.25	
	24	2	1199	2182	0.550	14	1	-0.162	0.670	11.616	21.679	1.265	0.916	0.28	
	24	3	1199	2182	0.550	14	1	-0.162	0.629	11.616	21.679	1.268	0.916	0.33	
	24	4	1199	2182	0.550	14	1	-0.162	0.583	11.616	21.679	1.272	0.916	0.38	
	25	0	1199	2182	0.550	14	1	-0.162	0.532	11.616	21.679	1.278	0.916	0.37	
	25	1	1199	2182	0.550	14	1	-0.162	0.490	11.616	21.679	1.284	0.916	0.44	
	25	2	1199	2182	0.550	14	1	-0.162	0.450	11.616	21.679	1.290	0.916	0.51	
	25	3	1199	2182	0.550	14	1	-0.162	0.413	11.616	21.679	1.297	0.916	0.58	
	25	4	1199	2182	0.550	14	1	-0.173	0.384	11.697	21.679	1.303	0.917	0.67	
Upper side	36	3	1174	2182	0.538	14	1	-1.240	17.554	24.818	22.439	1.250	1.024	0.37	
	36	4	1174	2182	0.538	14	1	-1.240	4.222	24.818	22.439	1.250	1.024	0.37	
	37	0	1174	2182	0.538	14	1	-1.240	4.075	24.818	22.439	1.250	1.024	0.36	
	37	1	1174	2182	0.538	14	1	-1.240	2.303	24.818	22.439	1.250	1.024	0.37	
	37	2	1174	2182	0.538	14	1	-1.240	1.596	24.818	22.439	1.250	1.024	0.38	--
	37	3	1174	2182	0.538	14	1	-1.240	1.214	24.818	22.439	1.251	1.024	0.41	--
	37	4	1174	2182	0.538	14	1	-1.240	0.974	24.818	22.439	1.252	1.024	0.44	--
Lower side	37	0	1174	2182	0.538	14	1	-0.244	1.412	12.503	22.439	1.251	0.924	0.58	
	37	1	1174	2182	0.538	14	1	-0.244	2.849	12.503	22.439	1.250	0.924	0.42	

６）Main girder G3　　Web name：RWEB

（a）Section forces, section factor and stress

Check point			Sec. force			Section factor				Stress		
UorL	PN	Vst	Mx	Sy	T	WMxc	WMxt	WSy	WT	σc	σt	Στ
			(kN･m)	(kN)	(kN･m)	(cm^3)	(cm^3)	(cm^2)	(cm^3)		(N/mm^2)	
Upper side	14	0	7957	2415	1943	-440191	180712	697	205132	-18	32	44
	14	1	5443	2510	1943	-440191	180712	697	205132	-12	22	45
	14	2	2847	2604	1943	-440191	180712	697	205132	-6	11	47
	14	3	207	2699	1943	-440191	180712	697	205132	-0	1	48
Lower side	13	4	-1931	2415	1931	180712	-440191	1002	205132	-11	1	34
	14	0	-1932	2415	1943	180712	-440191	1002	205132	-11	1	34
	14	1	-4167	2510	1943	180712	-440191	1002	205132	-23	3	35
	14	2	-6509	2604	1943	180712	-440191	1002	205132	-36	5	35
	14	3	-8956	2699	1943	180712	-440191	1002	205132	-50	6	36
	14	4	-11506	2793	1943	182889	-400616	970	205207	-63	10	38
Upper side	20	2	140	1558	1587	-406264	171686	703	205131	-0	1	30
	20	3	1632	1475	1587	-406264	171686	703	205131	-4	7	29
	20	4	3032	1391	1587	-426134	180340	705	205131	-7	12	27
	21	0	3032	1478	1339	-426134	180340	705	205131	-7	12	27
	21	1	4342	1386	1339	-426134	180340	705	205131	-10	17	26
	21	2	5572	1294	1339	-426134	180340	705	205131	-13	22	25
	21	3	6711	1202	1339	-426134	180340	705	205131	-16	27	24
	21	4	7746	1110	1339	-426134	180340	705	205131	-18	31	22
	22	0	7745	1110	1346	-426134	180340	705	205131	-18	31	22
	22	1	8683	1027	1346	-426134	180340	705	205131	-20	34	21
	22	2	9528	945	1346	-426134	180340	705	205131	-22	38	20
	22	3	10259	863	1346	-425574	180325	705	205131	-24	41	19
	22	4	10856	780	1346	-425574	180325	705	205131	-26	43	18
Lower side	22	0	-4409	1110	1346	180340	-426134	1010	205131	-24	3	18
	22	1	-3808	1027	1346	180340	-426134	1010	205131	-21	3	17
	22	2	-3276	945	1346	180340	-426134	1010	205131	-18	3	16
	22	3	-2833	863	1346	180325	-425574	1010	205131	-16	2	15
	22	4	-2495	780	1346	180325	-425574	1010	205131	-14	2	14
	23	0	-2495	763	875	180325	-425574	1010	205131	-14	2	12
	23	1	-2262	672	875	180325	-425574	1010	205131	-13	2	11
	23	2	-2126	580	875	180325	-425574	1010	205131	-12	2	10
	23	3	-2096	489	875	180325	-425574	1010	205131	-12	2	9
	23	4	-2182	431	875	180325	-425574	1010	205131	-12	2	9
	24	0	-2182	431	889	180325	-425574	1010	205131	-12	2	9
	24	1	-2392	522	889	180324	-425561	1010	205131	-13	2	10
	24	2	-2720	614	889	180324	-425561	1010	205131	-15	2	10
	24	3	-3148	705	889	180324	-425561	1010	205131	-17	2	11
	24	4	-3660	797	889	180324	-425561	1010	205131	-20	3	12

Check point			Sec. force			Section factor				Stress		
UorL	PN	Vst	Mx	Sy	T	WMxc	WMxt	WSy	WT	σc	σt	Στ
			(kN·m)	(kN)	(kN·m)	(cm^3)	(cm^3)	(cm^2)	(cm^3)		(N/mm^2)	
Upper												
side	25	0	11366	777	716	−425561	180324	705	205131	−27	45	14
	25	1	10902	858	716	−425561	180324	705	205131	−26	43	16
	25	2	10306	940	716	−425561	180324	705	205131	−24	41	17
	25	3	9596	1022	716	−425561	180324	705	205131	−23	38	18
	25	4	8791	1103	716	−412072	180171	716	205131	−21	35	19
	26	0	8791	1103	718	−412072	180171	716	205131	−21	35	19
	26	1	7890	1194	718	−412072	180171	716	205131	−19	31	20
	26	2	6885	1284	718	−412072	180171	716	205131	−17	27	21
	26	3	5783	1375	718	−412072	180171	716	205131	−14	23	23
	26	4	4587	1466	718	−412072	180171	716	205131	−11	18	24
	27	0	4592	1359	1199	−412072	180171	716	205131	−11	18	25
	27	1	3305	1439	1199	−412072	180171	716	205131	−8	13	26
	27	2	1924	1520	1199	−401943	179858	722	205131	−5	8	27
	27	3	446	1601	1199	−401943	179858	722	205131	−1	2	28
Lower												
side	24	0	−2182	431	889	180325	−425574	1010	205131	−12	2	9
	24	1	−2392	522	889	180324	−425561	1010	205131	−13	2	10
	24	2	−2720	614	889	180324	−425561	1010	205131	−15	2	10
	24	3	−3148	705	889	180324	−425561	1010	205131	−17	2	11
	24	4	−3660	797	889	180324	−425561	1010	205131	−20	3	12
	25	0	−3660	777	716	180324	−425561	1010	205131	−20	3	11
	25	1	−4259	858	716	180324	−425561	1010	205131	−24	3	12
	25	2	−4951	940	716	180324	−425561	1010	205131	−27	4	13
	25	3	−5725	1022	716	180324	−425561	1010	205131	−32	4	14
	25	4	−6571	1103	716	180171	−412072	1021	205131	−36	5	14

Upper												
side	36	3	949	2922	2438	−339079	177929	782	205130	−3	4	49
	36	4	3886	2862	2438	−339079	177929	782	205130	−11	15	48
	37	0	3887	2839	2142	−339079	177929	782	205130	−11	15	47
	37	1	6740	2766	2142	−339079	177929	782	205130	−20	26	46
	37	2	9527	2694	2142	−339079	177929	782	205130	−28	37	45
	37	3	12258	2621	2142	−339079	177929	782	205130	−36	48	44
	37	4	14944	2548	2142	−339079	177929	782	205130	−44	58	43
Lower												
side	37	0	−5017	2839	2142	177929	−339079	1085	205130	−28	6	37
	37	1	−2439	2766	2142	177929	−339079	1085	205130	−14	3	36

(b) Checking of web against buckling

UorL	PN	Vst	a	b	a/b	Tw	Nh	ϕ	η	$\kappa \sigma$	$\kappa \tau$	νB	R	K
Upper side	14	0	1185	2138	0.554	14	1	-1.749	2.440	24.601	21.392	1.250	1.075	0.29
	14	1	1185	2138	0.554	14	1	-1.749	3.676	24.601	21.392	1.250	1.075	0.30
	14	2	1185	2138	0.554	14	1	-1.749	7.239	24.601	21.392	1.250	1.075	0.30
	14	3	1185	2138	0.554	14	1	-1.749	102.68	24.601	21.392	1.250	1.075	0.31
Lower side	13	4	1185	2138	0.554	14	1	-0.128	3.136	11.298	21.392	1.250	0.913	0.38
	14	0	1185	2138	0.554	14	1	-0.128	3.140	11.298	21.392	1.250	0.913	0.38
	14	1	1185	2138	0.554	14	1	-0.128	1.497	11.298	21.392	1.250	0.913	0.53
	14	2	1185	2138	0.554	14	1	-0.128	0.984	11.298	21.392	1.254	0.913	0.72
	14	3	1185	2138	0.554	14	1	-0.128	0.734	11.298	21.392	1.262	0.913	0.94
	14	4	1185	2138	0.554	14	1	-0.165	0.608	11.552	21.392	1.270	0.917	1.13 --

UorL	PN	Vst	a	b	a/b	Tw	Nh	ϕ	η	$\kappa \sigma$	$\kappa \tau$	νB	R	K
Upper side	20	2	1197	2138	0.560	14	1	-1.693	86.598	24.531	21.031	1.250	1.069	0.20
	20	3	1197	2138	0.560	14	1	-1.693	7.146	24.531	21.031	1.250	1.069	0.19
	20	4	1197	2138	0.560	14	1	-1.690	3.861	24.531	21.031	1.250	1.069	0.18
	21	0	1197	2138	0.560	14	1	-1.690	3.863	24.531	21.031	1.250	1.069	0.18
	21	1	1197	2138	0.560	14	1	-1.690	2.570	24.531	21.031	1.250	1.069	0.18
	21	2	1197	2138	0.560	14	1	-1.690	1.902	24.531	21.031	1.250	1.069	0.18
	21	3	1197	2138	0.560	14	1	-1.690	1.497	24.531	21.031	1.250	1.069	0.18
	21	4	1197	2138	0.560	14	1	-1.690	1.225	24.531	21.031	1.250	1.069	0.18
	22	0	1197	2138	0.560	14	1	-1.690	1.227	24.531	21.031	1.250	1.069	0.18
	22	1	1197	2138	0.560	14	1	-1.690	1.037	24.531	21.031	1.251	1.069	0.18
	22	2	1197	2138	0.560	14	1	-1.690	0.893	24.531	21.031	1.251	1.069	0.18
	22	3	1197	2138	0.560	14	1	-1.688	0.779	24.531	21.031	1.252	1.069	0.18
	22	4	1197	2138	0.560	14	1	-1.688	0.691	24.531	21.031	1.252	1.069	0.18
Lower side	22	0	1197	2138	0.560	14	1	-0.139	0.718	11.255	21.031	1.263	0.914	0.46
	22	1	1197	2138	0.560	14	1	-0.139	0.793	11.255	21.031	1.259	0.914	0.40
	22	2	1197	2138	0.560	14	1	-0.139	0.876	11.255	21.031	1.256	0.914	0.35
	22	3	1197	2138	0.560	14	1	-0.139	0.961	11.258	21.031	1.254	0.914	0.31
	22	4	1197	2138	0.560	14	1	-0.139	1.032	11.258	21.031	1.253	0.914	0.28
	23	0	1197	2138	0.560	14	1	-0.139	0.854	11.258	21.031	1.257	0.914	0.27
	23	1	1197	2138	0.560	14	1	-0.139	0.870	11.258	21.031	1.257	0.914	0.24
	23	2	1197	2138	0.560	14	1	-0.139	0.849	11.258	21.031	1.257	0.914	0.23
	23	3	1197	2138	0.560	14	1	-0.139	0.783	11.258	21.031	1.260	0.914	0.22
	23	4	1197	2138	0.560	14	1	-0.139	0.705	11.258	21.031	1.263	0.914	0.23
	24	0	1197	2138	0.560	14	1	-0.139	0.711	11.258	21.031	1.263	0.914	0.23
	24	1	1197	2138	0.560	14	1	-0.139	0.716	11.258	21.031	1.263	0.914	0.25
	24	2	1197	2138	0.560	14	1	-0.139	0.690	11.258	21.031	1.264	0.914	0.28
	24	3	1197	2138	0.560	14	1	-0.139	0.648	11.258	21.031	1.267	0.914	0.33
	24	4	1197	2138	0.560	14	1	-0.139	0.602	11.258	21.031	1.271	0.914	0.38

UorL	PN	Vst	a	b	a/b	Tw	Nh	ϕ	η	$\kappa\ \sigma$	$\kappa\ \tau$	νB	R	K
Upper side	25	0	1197	2138	0.560	14	1	-1.688	0.543	24.531	21.031	1.255	1.069	0.18
	25	1	1197	2138	0.560	14	1	-1.688	0.611	24.531	21.031	1.253	1.069	0.18
	25	2	1197	2138	0.560	14	1	-1.688	0.694	24.531	21.031	1.252	1.069	0.18
	25	3	1197	2138	0.560	14	1	-1.688	0.797	24.531	21.031	1.252	1.069	0.17
	25	4	1197	2138	0.560	14	1	-1.630	0.886	24.531	21.031	1.251	1.063	0.17
	26	0	1197	2138	0.560	14	1	-1.630	0.887	24.531	21.031	1.251	1.063	0.17
	26	1	1197	2138	0.560	14	1	-1.630	1.054	24.531	21.031	1.251	1.063	0.17
	26	2	1197	2138	0.560	14	1	-1.630	1.284	24.531	21.031	1.250	1.063	0.17
	26	3	1197	2138	0.560	14	1	-1.630	1.619	24.531	21.031	1.250	1.063	0.17
	26	4	1197	2138	0.560	14	1	-1.630	2.155	24.531	21.031	1.250	1.063	0.17
	27	0	1197	2138	0.560	14	1	-1.630	2.228	24.531	21.031	1.250	1.063	0.17
	27	1	1197	2138	0.560	14	1	-1.630	3.237	24.531	21.031	1.250	1.063	0.18
	27	2	1197	2138	0.560	14	1	-1.588	5.617	24.531	21.031	1.250	1.059	0.18
	27	3	1197	2138	0.560	14	1	-1.588	25.220	24.531	21.031	1.250	1.059	0.19
Lower side	24	0	1197	2138	0.560	14	1	-0.139	0.711	11.258	21.031	1.263	0.914	0.23
	24	1	1197	2138	0.560	14	1	-0.139	0.716	11.258	21.031	1.263	0.914	0.25
	24	2	1197	2138	0.560	14	1	-0.139	0.690	11.258	21.031	1.264	0.914	0.28
	24	3	1197	2138	0.560	14	1	-0.139	0.648	11.258	21.031	1.267	0.914	0.33
	24	4	1197	2138	0.560	14	1	-0.139	0.602	11.258	21.031	1.271	0.914	0.38
	25	0	1197	2138	0.560	14	1	-0.139	0.551	11.258	21.031	1.276	0.914	0.37
	25	1	1197	2138	0.560	14	1	-0.139	0.507	11.258	21.031	1.281	0.914	0.43
	25	2	1197	2138	0.560	14	1	-0.139	0.466	11.258	21.031	1.288	0.914	0.50
	25	3	1197	2138	0.560	14	1	-0.139	0.428	11.258	21.031	1.294	0.914	0.58
	25	4	1197	2138	0.560	14	1	-0.150	0.392	11.333	21.031	1.301	0.915	0.66

Upper side	36	3	1172	2138	0.548	14	1	-1.325	17.590	24.676	21.764	1.250	1.032	0.34
	36	4	1172	2138	0.548	14	1	-1.325	4.232	24.676	21.764	1.250	1.032	0.34
	37	0	1172	2138	0.548	14	1	-1.325	4.078	24.676	21.764	1.250	1.032	0.33
	37	1	1172	2138	0.548	14	1	-1.325	2.305	24.676	21.764	1.250	1.032	0.34
	37	2	1172	2138	0.548	14	1	-1.325	1.598	24.676	21.764	1.250	1.032	0.35 --
	37	3	1172	2138	0.548	14	1	-1.325	1.216	24.676	21.764	1.251	1.032	0.37 --
	37	4	1172	2138	0.548	14	1	-1.325	0.977	24.676	21.764	1.252	1.032	0.40 --
Lower side	37	0	1172	2138	0.548	14	1	-0.220	1.298	12.090	21.764	1.251	0.922	0.57
	37	1	1172	2138	0.548	14	1	-0.220	2.622	12.090	21.764	1.250	0.922	0.40

７）Main girder G4　　Web name：LWEB

（a）Section forces, section factor and stress

Check point			Sec. force			Section factor				Stress		
UorL	PN	Vst	Mx (kN·m)	Sy (kN)	T (kN·m)	WMxc (cm^3)	WMxt (cm^3)	WSy (cm^2)	WT (cm^3)	σc (N/mm^2)	σt (N/mm^2)	Στ (N/mm^2)
Upper side	1	0	40	3245	1795	-478818	146992	650	184735	-0	0	60
	1	1	3704	3111	1795	-478818	146992	650	184735	-8	19	58
	1	2	7189	2977	1795	-478818	146992	650	184735	-15	36	55
	1	3	10503	2843	1795	-478818	146992	650	184735	-22	53	53
	1	4	13636	2709	1795	-478818	146992	650	184735	-28	69	51
Lower side	1	0	-87	3245	1795	146992	-478818	1120	184735	-1	0	39
Upper side	14	0	9509	2763	1504	-442976	161005	682	184731	-21	43	49
	14	1	6726	2877	1504	-442976	161005	682	184731	-15	30	50
	14	2	3861	2991	1504	-442976	161005	682	184731	-9	17	52
	14	3	946	3105	1504	-442976	161005	682	184731	-2	4	54
Lower side	13	4	-1128	2763	1476	161005	-442976	1080	184731	-7	1	34
	14	0	-1128	2763	1504	161005	-442976	1080	184731	-7	1	34
	14	1	-3546	2877	1504	161005	-442976	1080	184731	-22	2	35
	14	2	-6070	2991	1504	161005	-442976	1080	184731	-38	3	36
	14	3	-8744	3105	1504	161005	-442976	1080	184731	-54	5	37
	14	4	-11608	3219	1504	167969	-395700	1228	209617	-69	10	33
Upper side	20	2	640	1645	1382	-388214	139503	687	184672	-2	3	31
	20	3	1962	1535	1382	-388214	139503	687	184672	-5	10	30
	20	4	3229	1425	1382	-396329	146455	696	184677	-8	16	28
	21	0	3219	1541	1156	-396329	146455	696	184677	-8	16	28
	21	1	4463	1427	1156	-396329	146455	696	184677	-11	22	27
	21	2	5661	1313	1156	-396329	146455	696	184677	-14	28	25
	21	3	6756	1199	1156	-396329	146455	696	184677	-17	33	23
	21	4	7691	1085	1156	-396329	146455	696	184677	-19	38	22
	22	0	7687	1085	1174	-396329	146455	696	184677	-19	38	22
	22	1	8424	978	1174	-396329	146455	696	184677	-21	42	20
	22	2	9000	870	1174	-396329	146455	696	184677	-23	45	19
	22	3	9475	762	1174	-395666	146422	697	184678	-24	47	17
	22	4	9910	654	1174	-395666	146422	697	184678	-25	49	16
Lower side	22	0	-3538	1085	1174	146455	-396329	1178	184677	-24	2	16
	22	1	-3015	978	1174	146455	-396329	1178	184677	-21	2	15
	22	2	-2587	870	1174	146455	-396329	1178	184677	-18	2	14
	22	3	-2238	762	1174	146422	-395666	1179	184678	-15	1	13
	22	4	-1951	654	1174	146422	-395666	1179	184678	-13	1	12
	23	0	-1952	907	730	146422	-395666	1179	184678	-13	1	12
	23	1	-1707	795	730	146422	-395666	1179	184678	-12	1	11
	23	2	-1518	682	730	146422	-395666	1179	184678	-10	1	10
	23	3	-1422	570	730	146422	-395666	1179	184678	-10	1	9
	23	4	-1457	470	730	146422	-395666	1179	184678	-10	1	8
	24	0	-1457	470	761	146422	-395666	1179	184678	-10	1	8
	24	1	-1647	581	761	146422	-395662	1179	184678	-11	1	9
	24	2	-1968	693	761	146422	-395662	1179	184678	-13	1	10
	24	3	-2382	804	761	146422	-395662	1179	184678	-16	2	11
	24	4	-2854	915	761	146422	-395662	1179	184678	-19	2	12

Check point			Sec. force			Section factor				Stress		
UorL	PN	Vst	Mx (kN·m)	Sy (kN)	T (kN·m)	WMxc (cm^3)	WMxt (cm^3)	WSy (cm^2)	WT (cm^3)	σc (N/mm²)	σt (N/mm²)	Στ (N/mm²)
Upper												
side	25	0	10454	654	615	-395662	146422	697	184678	-26	52	13
	25	1	10110	759	615	-395662	146422	697	184678	-26	50	14
	25	2	9704	865	615	-395662	146422	697	184678	-25	48	16
	25	3	9202	971	615	-395662	146422	697	184678	-23	46	17
	25	4	8571	1077	615	-412214	146669	685	184466	-21	43	19
	26	0	8570	1077	661	-412214	146669	685	184466	-21	43	19
	26	1	7780	1190	661	-412214	146669	685	184466	-19	39	21
	26	2	6863	1304	661	-412214	146669	685	184466	-17	34	23
	26	3	5827	1417	661	-412214	146669	685	184466	-14	29	24
	26	4	4686	1531	661	-412214	146669	685	184466	-11	23	26
	27	0	4684	1364	980	-412214	146669	685	184466	-11	23	25
	27	1	3471	1470	980	-412214	146669	685	184466	-8	17	27
	27	2	2156	1577	980	-396909	154530	704	184512	-5	10	28
	27	3	731	1684	980	-396909	154530	704	184512	-2	3	29
Lower												
side	24	0	-1457	470	761	146422	-395666	1179	184678	-10	1	8
	24	1	-1647	581	761	146422	-395662	1179	184678	-11	1	9
	24	2	-1968	693	761	146422	-395662	1179	184678	-13	1	10
	24	3	-2382	804	761	146422	-395662	1179	184678	-16	2	11
	24	4	-2854	915	761	146422	-395662	1179	184678	-19	2	12
	25	0	-2854	654	615	146422	-395662	1179	184678	-19	2	9
	25	1	-3370	759	615	146422	-395662	1179	184678	-23	2	10
	25	2	-3951	865	615	146422	-395662	1179	184678	-27	3	11
	25	3	-4611	971	615	146422	-395662	1179	184678	-31	3	12
	25	4	-5363	1077	615	146669	-412214	1161	184466	-37	3	13

Upper												
side	36	3	293	3094	2215	-316020	158826	796	184584	-1	1	51
	36	4	3240	3008	2215	-316020	158826	796	184584	-10	14	50
	37	0	3255	3049	1791	-316020	158826	796	184584	-10	14	48
	37	1	6289	2953	1791	-316020	158826	796	184584	-20	28	47
	37	2	9314	2858	1791	-316020	158826	796	184584	-29	41	46
	37	3	12285	2762	1791	-316020	158826	796	184584	-39	54	44
	37	4	15157	2667	1791	-316020	158826	796	184584	-48	67	43
Lower												
side	37	0	-5176	3049	1791	158826	-316020	1206	184584	-33	7	35
	37	1	-2441	2953	1791	158826	-316020	1206	184584	-15	3	34

（b）Checking of web against buckling

UorL	PN	Vst	a	b	a/b	Tw	Nh	ϕ	η	$\kappa\ \sigma$	$\kappa\ \tau$	νB	R	K	
Upper side	1	0	1154	2183	0.529	15	1	-2.406	713.18	24.965	23.110	1.250	1.141	0.29	
	1	1	1154	2183	0.529	15	1	-2.406	7.439	24.965	23.110	1.250	1.141	0.27	--
	1	2	1157	2183	0.530	15	1	-2.406	3.696	24.943	23.012	1.250	1.141	0.26	--
	1	3	1157	2183	0.530	15	1	-2.406	2.436	24.943	23.012	1.250	1.141	0.26	--
	1	4	1157	2183	0.530	15	1	-2.406	1.804	24.943	23.012	1.250	1.141	0.26	--
Lower side	1	0	1154	2183	0.529	15	1	-0.046	65.200	11.377	23.110	1.250	0.905	0.30	
Upper side	14	0	1182	2183	0.541	15	1	-2.001	2.266	24.771	22.222	1.250	1.100	0.27	
	14	1	1182	2183	0.541	15	1	-2.001	3.313	24.771	22.222	1.250	1.100	0.27	
	14	2	1182	2183	0.541	15	1	-2.001	5.963	24.771	22.222	1.250	1.100	0.28	
	14	3	1182	2184	0.541	15	1	-2.001	25.102	24.771	22.223	1.250	1.100	0.29	
Lower side	13	4	1182	2183	0.541	15	1	-0.091	4.796	11.327	22.222	1.250	0.909	0.31	
	14	0	1182	2183	0.541	15	1	-0.091	4.814	11.327	22.222	1.250	0.909	0.31	
	14	1	1182	2183	0.541	15	1	-0.091	1.580	11.327	22.222	1.250	0.909	0.46	
	14	2	1182	2183	0.541	15	1	-0.091	0.951	11.327	22.222	1.255	0.909	0.68	
	14	3	1182	2184	0.541	15	1	-0.091	0.679	11.327	22.223	1.265	0.909	0.93	
	14	4	1182	2184	0.541	17	1	-0.140	0.483	11.629	22.223	1.285	0.914	0.87	--
Upper side	20	2	1194	2184	0.547	15	1	-2.026	19.071	24.694	21.850	1.250	1.103	0.17	
	20	3	1194	2184	0.547	15	1	-2.026	5.900	24.694	21.850	1.250	1.103	0.16	
	20	4	1194	2184	0.547	15	1	-1.965	3.430	24.694	21.850	1.250	1.096	0.15	
	21	0	1194	2184	0.547	15	1	-1.965	3.496	24.694	21.850	1.250	1.096	0.16	
	21	1	1194	2184	0.547	15	1	-1.965	2.376	24.694	21.850	1.250	1.096	0.15	
	21	2	1194	2184	0.547	15	1	-1.965	1.759	24.694	21.850	1.250	1.096	0.15	
	21	3	1194	2184	0.547	15	1	-1.965	1.378	24.694	21.851	1.250	1.096	0.15	
	21	4	1194	2184	0.547	15	1	-1.965	1.126	24.694	21.851	1.250	1.096	0.15	
	22	0	1194	2184	0.547	15	1	-1.965	1.131	24.694	21.851	1.250	1.096	0.15	
	22	1	1194	2184	0.547	15	1	-1.965	0.960	24.694	21.851	1.250	1.096	0.15	
	22	2	1194	2184	0.547	15	1	-1.965	0.830	24.694	21.851	1.250	1.096	0.15	
	22	3	1194	2184	0.547	15	1	-1.962	0.722	24.694	21.851	1.250	1.096	0.15	
	22	4	1194	2184	0.547	15	1	-1.962	0.629	24.694	21.851	1.250	1.096	0.15	
Lower side	22	0	1194	2184	0.547	15	1	-0.096	0.644	11.238	21.851	1.268	0.910	0.41	
	22	1	1194	2184	0.547	15	1	-0.096	0.712	11.238	21.851	1.263	0.910	0.36	
	22	2	1194	2184	0.547	15	1	-0.096	0.778	11.238	21.851	1.260	0.910	0.31	
	22	3	1194	2184	0.547	15	1	-0.096	0.839	11.240	21.851	1.258	0.910	0.27	
	22	4	1194	2184	0.547	15	1	-0.096	0.893	11.240	21.851	1.256	0.910	0.24	
	23	0	1194	2184	0.547	15	1	-0.096	0.873	11.240	21.851	1.257	0.910	0.24	
	23	1	1194	2184	0.547	15	1	-0.096	0.917	11.240	21.852	1.256	0.910	0.21	
	23	2	1194	2184	0.547	15	1	-0.096	0.939	11.240	21.852	1.255	0.910	0.19	
	23	3	1194	2184	0.547	15	1	-0.096	0.905	11.240	21.852	1.256	0.910	0.17	
	23	4	1194	2184	0.547	15	1	-0.096	0.798	11.241	21.852	1.259	0.910	0.17	
	24	0	1194	2184	0.547	15	1	-0.096	0.815	11.241	21.852	1.259	0.910	0.17	
	24	1	1194	2184	0.547	15	1	-0.096	0.805	11.241	21.852	1.259	0.910	0.20	
	24	2	1194	2184	0.547	15	1	-0.096	0.744	11.241	21.852	1.262	0.910	0.23	
	24	3	1194	2184	0.547	15	1	-0.096	0.673	11.241	21.852	1.266	0.910	0.28	
	24	4	1194	2184	0.547	15	1	-0.096	0.610	11.241	21.853	1.271	0.910	0.33	

UorL	PN	Vst	a	b	a/b	Tw	Nh	ϕ	η	$\kappa\sigma$	$\kappa\tau$	νB	R	K	
Upper side	25	0	1194	2184	0.547	15	1	-1.962	0.481	24.694	21.853	1.251	1.096	0.15	
	25	1	1194	2184	0.547	15	1	-1.962	0.557	24.694	21.853	1.251	1.096	0.15	
	25	2	1194	2184	0.547	15	1	-1.962	0.642	24.694	21.853	1.250	1.096	0.15	
	25	3	1194	2184	0.547	15	1	-1.962	0.742	24.694	21.853	1.250	1.096	0.14	
	25	4	1194	2184	0.547	15	1	-2.048	0.916	24.694	21.853	1.250	1.105	0.14	
	26	0	1194	2184	0.547	15	1	-2.048	0.929	24.694	21.853	1.250	1.105	0.14	
	26	1	1194	2184	0.547	15	1	-2.048	1.111	24.693	21.849	1.250	1.105	0.14	
	26	2	1196	2183	0.548	15	1	-2.048	1.359	24.680	21.786	1.250	1.105	0.14	
	26	3	1196	2183	0.548	15	1	-2.048	1.718	24.680	21.781	1.250	1.105	0.14	
	26	4	1196	2183	0.548	15	1	-2.048	2.282	24.679	21.777	1.250	1.105	0.14	
	27	0	1198	2183	0.549	15	1	-2.048	2.220	24.671	21.738	1.250	1.105	0.14	
	27	1	1198	2183	0.549	15	1	-2.048	3.181	24.671	21.739	1.250	1.105	0.15	
	27	2	1198	2183	0.549	15	1	-1.855	5.104	24.670	21.736	1.250	1.085	0.16	
	27	3	1198	2183	0.549	15	1	-1.855	15.872	24.670	21.736	1.250	1.085	0.17	
Lower side	24	0	1194	2184	0.547	15	1	-0.096	0.815	11.241	21.852	1.259	0.910	0.17	
	24	1	1194	2184	0.547	15	1	-0.096	0.805	11.241	21.852	1.259	0.910	0.20	
	24	2	1194	2184	0.547	15	1	-0.096	0.744	11.241	21.852	1.262	0.910	0.23	
	24	3	1194	2184	0.547	15	1	-0.096	0.673	11.241	21.852	1.266	0.910	0.28	
	24	4	1194	2184	0.547	15	1	-0.096	0.610	11.241	21.853	1.271	0.910	0.33	
	25	0	1194	2184	0.547	15	1	-0.096	0.455	11.241	21.853	1.290	0.910	0.33	
	25	1	1194	2184	0.547	15	1	-0.096	0.424	11.241	21.853	1.296	0.910	0.39	
	25	2	1194	2184	0.547	15	1	-0.096	0.395	11.241	21.853	1.302	0.910	0.46	
	25	3	1194	2184	0.547	15	1	-0.096	0.367	11.241	21.853	1.309	0.910	0.53	
	25	4	1194	2184	0.547	15	1	-0.085	0.345	11.175	21.853	1.315	0.908	0.62	

Upper side	36	3	1171	2184	0.536	15	1	-1.392	54.788	24.843	22.557	1.250	1.039	0.31	
	36	4	1171	2184	0.536	15	1	-1.392	4.857	24.844	22.560	1.250	1.039	0.30	
	37	0	1171	2184	0.536	15	1	-1.392	4.661	24.844	22.560	1.250	1.039	0.29	
	37	1	1171	2184	0.536	15	1	-1.392	2.352	24.844	22.560	1.250	1.039	0.30	
	37	2	1171	2184	0.536	15	1	-1.392	1.548	24.844	22.560	1.250	1.039	0.31	--
	37	3	1171	2184	0.536	15	1	-1.392	1.143	24.844	22.560	1.251	1.039	0.33	--
	37	4	1171	2184	0.536	15	1	-1.392	0.901	24.844	22.560	1.252	1.039	0.36	--
Lower side	37	0	1171	2184	0.536	15	1	-0.202	1.073	12.187	22.560	1.253	0.920	0.55	
	37	1	1171	2184	0.536	15	1	-0.202	2.225	12.187	22.560	1.250	0.920	0.36	

8） Main girder G4　 Web name：RWEB

（a） Section forces, section factor and stress

Check point			Sec. force			Section factor				Stress		
UorL	PN	Vst	Mx (kN･m)	Sy (kN)	T (kN･m)	WMxc (cm^3)	WMxt (cm^3)	WSy (cm^2)	WT (cm^3)	σc	σt (N/mm^2)	Στ
Upper side	1	0	40	3245	1795	-521547	146428	817	183687	-0	0	49
	1	1	3814	3107	1795	-521547	146428	817	183687	-7	19	48
	1	2	7397	2969	1795	-521547	146428	817	183687	-14	38	46
	1	3	10601	2839	1795	-521547	146428	817	183687	-20	54	45
	1	4	13636	2709	1795	-521547	146428	817	183687	-26	69	43
Lower side	1	0	-87	3245	1795	146428	-521547	2144	183963	-1	0	25
Upper side	14	0	9509	2763	1504	-478525	160370	816	183693	-20	43	42
	14	1	6726	2877	1504	-478525	160370	816	183693	-14	31	43
	14	2	3861	2991	1504	-478525	160370	816	183693	-8	18	45
	14	3	946	3105	1504	-478525	160370	816	183693	-2	4	46
Lower side	13	4	-1128	2763	1476	160370	-478525	1702	183969	-7	0	24
	14	0	-1128	2763	1504	160370	-478525	1702	183969	-7	0	24
	14	1	-3546	2877	1504	160370	-478525	1702	183969	-22	2	25
	14	2	-6070	2991	1504	160370	-478525	1702	183969	-38	3	26
	14	3	-8744	3105	1504	160370	-478525	1702	183969	-55	4	26
	14	4	-11608	3219	1504	167204	-423983	1942	208757	-69	8	24
Upper side	20	2	640	1645	1382	-420172	138954	790	183634	-2	3	28
	20	3	1962	1535	1382	-420172	138954	790	183634	-5	10	27
	20	4	3229	1425	1382	-428457	145876	786	183640	-8	16	26
	21	0	3219	1541	1156	-428457	145876	786	183640	-8	16	26
	21	1	4463	1427	1156	-428457	145876	786	183640	-10	22	24
	21	2	5661	1313	1156	-428457	145876	786	183640	-13	28	23
	21	3	6756	1199	1156	-428457	145876	786	183640	-16	34	22
	21	4	7691	1085	1156	-428457	145876	786	183640	-18	39	20
	22	0	7687	1085	1174	-428457	145876	786	183640	-18	39	20
	22	1	8424	978	1174	-428457	145876	786	183640	-20	42	19
	22	2	9000	870	1174	-428457	145876	786	183640	-21	45	17
	22	3	9475	762	1174	-427795	145844	786	183641	-22	48	16
	22	4	9910	654	1174	-427795	145844	786	183641	-23	50	15
Lower side	22	0	-3538	1085	1174	145876	-428457	1738	183916	-24	2	13
	22	1	-3015	978	1174	145876	-428457	1738	183916	-21	1	12
	22	2	-2587	870	1174	145876	-428457	1738	183916	-18	1	11
	22	3	-2238	762	1174	145844	-427795	1735	183917	-15	1	11
	22	4	-1951	654	1174	145844	-427795	1735	183917	-13	1	10
	23	0	-1952	907	730	145844	-427795	1735	183917	-13	1	9
	23	1	-1707	795	730	145844	-427795	1735	183917	-12	1	9
	23	2	-1518	682	730	145844	-427795	1735	183917	-10	1	8
	23	3	-1422	570	730	145844	-427795	1735	183917	-10	1	7
	23	4	-1457	470	730	145844	-427795	1735	183917	-10	1	7
	24	0	-1457	470	761	145844	-427795	1735	183917	-10	1	7
	24	1	-1647	581	761	145843	-427791	1735	183917	-11	1	7
	24	2	-1968	693	761	145843	-427791	1735	183917	-13	1	8
	24	3	-2382	804	761	145843	-427791	1735	183917	-16	1	9
	24	4	-2854	915	761	145843	-427791	1735	183917	-20	1	9

Check point			Sec. force			Section factor				Stress		
UorL	PN	Vst	Mx (kN·m)	Sy (kN)	T (kN·m)	WMxc (cm^3)	WMxt (cm^3)	WSy (cm^2)	WT (cm^3)	σc (N/mm^2)	σt (N/mm^2)	Στ (N/mm^2)
Upper												
side	25	0	10454	654	615	-427791	145843	786	183641	-24	52	12
	25	1	10110	759	615	-427791	145843	786	183641	-24	51	13
	25	2	9705	865	615	-427791	145843	786	183641	-23	49	14
	25	3	9202	971	615	-427791	145843	786	183641	-22	46	16
	25	4	8571	1077	615	-445756	146203	789	183943	-19	43	17
	26	0	8570	1077	661	-445756	146203	789	183943	-19	43	17
	26	1	7817	1185	661	-445756	146203	789	183943	-18	39	19
	26	2	6947	1294	661	-445756	146203	789	183943	-16	35	20
	26	3	5874	1412	661	-445756	146203	789	183943	-13	30	21
	26	4	4686	1531	661	-445756	146203	789	183943	-11	24	23
	27	0	4684	1364	980	-445756	146203	789	183943	-11	24	23
	27	1	3471	1470	980	-445756	146203	789	183943	-8	17	24
	27	2	2156	1577	980	-427038	154030	796	183992	-5	10	25
	27	3	731	1684	980	-427038	154030	796	183992	-2	3	26
Lower												
side	24	0	-1457	470	761	145844	-427795	1735	183917	-10	1	7
	24	1	-1647	581	761	145843	-427791	1735	183917	-11	1	7
	24	2	-1968	693	761	145843	-427791	1735	183917	-13	1	8
	24	3	-2382	804	761	145843	-427791	1735	183917	-16	1	9
	24	4	-2854	915	761	145843	-427791	1735	183917	-20	1	9
	25	0	-2854	654	615	145843	-427791	1735	183917	-20	1	7
	25	1	-3370	759	615	145843	-427791	1735	183917	-23	2	8
	25	2	-3951	865	615	145843	-427791	1735	183917	-27	2	8
	25	3	-4611	971	615	145843	-427791	1735	183917	-32	2	9
	25	4	-5363	1077	615	146203	-445756	1782	184082	-37	2	9

Upper												
side	36	3	150	3098	2215	-336771	158279	775	184072	-0	1	52
	36	4	3240	3008	2215	-336771	158279	775	184072	-10	14	51
	37	0	3255	3049	1791	-336771	158279	775	184072	-10	15	49
	37	1	6289	2953	1791	-336771	158279	775	184072	-19	28	48
	37	2	9314	2858	1791	-336771	158279	775	184072	-28	42	47
	37	3	12285	2762	1791	-336771	158279	775	184072	-36	55	45
	37	4	15157	2667	1791	-336771	158279	775	184072	-45	68	44
Lower												
side	37	0	-5176	3049	1791	158279	-336771	1289	184211	-33	6	33
	37	1	-2441	2953	1791	158279	-336771	1289	184211	-15	3	33

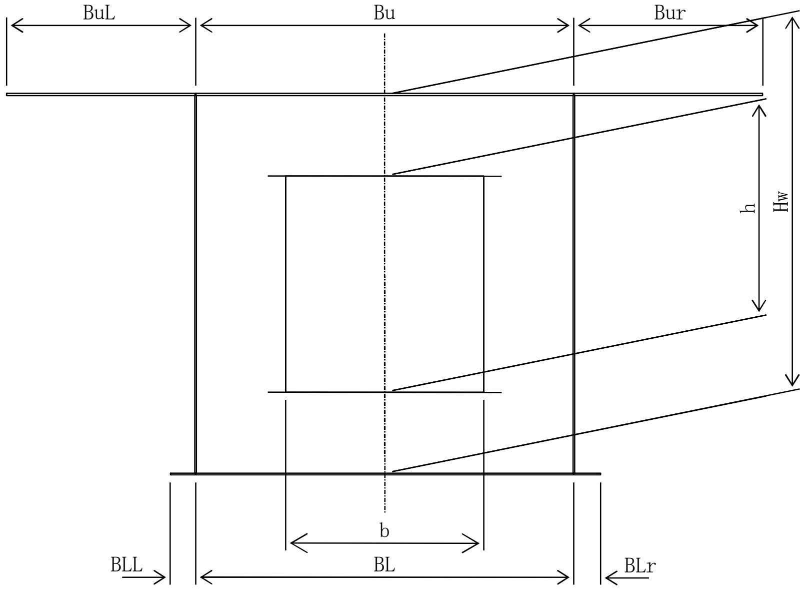
(b) Checking of web against buckling

UorL	PN	Vst	a	b	a/b	Tw	Nh	ϕ	η	$\kappa\ \sigma$	$\kappa\ \tau$	νB	R	K	
Upper side	1	0	1227	2451	0.500	15	1	-2.649	645.135	25.49	25.319	1.250	1.165	0.27	
	1	1	1227	2451	0.500	15	1	-2.649	6.538	25.490	25.319	1.250	1.165	0.25	--
	1	2	1227	2451	0.500	15	1	-2.649	3.252	25.490	25.319	1.250	1.165	0.24	--
	1	3	1157	2451	0.472	15	1	-2.649	2.191	26.181	27.975	1.250	1.165	0.22	--
	1	4	1157	2451	0.472	15	1	-2.649	1.642	26.181	27.975	1.250	1.165	0.23	--
Lower side	1	0	1227	2451	0.500	15	1	-0.025	41.776	12.012	25.319	1.250	0.902	0.23	
Upper side	14	0	1178	2450	0.481	15	1	-2.187	2.117	25.945	27.089	1.250	1.119	0.24	
	14	1	1178	2450	0.481	15	1	-2.187	3.092	25.944	27.089	1.250	1.119	0.23	
	14	2	1178	2450	0.481	15	1	-2.187	5.560	25.944	27.089	1.250	1.119	0.24	
	14	3	1178	2450	0.481	15	1	-2.187	23.383	25.944	27.089	1.250	1.119	0.25	
Lower side	13	4	1178	2450	0.481	15	1	-0.068	3.450	12.794	27.089	1.250	0.907	0.25	
	14	0	1178	2450	0.481	15	1	-0.068	3.470	12.794	27.089	1.250	0.907	0.25	
	14	1	1178	2450	0.481	15	1	-0.068	1.134	12.794	27.089	1.252	0.907	0.45	
	14	2	1178	2450	0.481	15	1	-0.068	0.680	12.794	27.089	1.266	0.907	0.72	
	14	3	1178	2450	0.481	15	1	-0.068	0.484	12.794	27.089	1.286	0.907	1.02	#L
	14	4	1178	2450	0.481	17	1	-0.115	0.342	13.044	27.088	1.315	0.912	0.99	--
Upper side	20	2	1191	2450	0.486	15	1	-2.219	18.630	25.818	26.605	1.250	1.122	0.15	
	20	3	1191	2450	0.486	15	1	-2.219	5.774	25.818	26.605	1.250	1.122	0.14	
	20	4	1191	2450	0.486	15	1	-2.150	3.403	25.818	26.605	1.250	1.115	0.14	
	21	0	1191	2450	0.486	15	1	-2.150	3.447	25.818	26.605	1.250	1.115	0.14	
	21	1	1191	2450	0.486	15	1	-2.150	2.347	25.817	26.605	1.250	1.115	0.14	
	21	2	1191	2450	0.486	15	1	-2.150	1.741	25.817	26.604	1.250	1.115	0.14	
	21	3	1191	2450	0.486	15	1	-2.150	1.367	25.817	26.604	1.250	1.115	0.14	
	21	4	1191	2450	0.486	15	1	-2.150	1.120	25.817	26.604	1.250	1.115	0.14	
	22	0	1191	2450	0.486	15	1	-2.150	1.126	25.817	26.604	1.250	1.115	0.14	
	22	1	1191	2450	0.486	15	1	-2.150	0.957	25.817	26.604	1.250	1.115	0.15	
	22	2	1191	2450	0.486	15	1	-2.150	0.831	25.817	26.604	1.250	1.115	0.15	
	22	3	1191	2450	0.486	15	1	-2.147	0.726	25.817	26.604	1.250	1.115	0.15	
	22	4	1191	2450	0.486	15	1	-2.147	0.635	25.817	26.603	1.250	1.115	0.15	
Lower side	22	0	1191	2450	0.486	15	1	-0.072	0.521	12.654	26.604	1.281	0.907	0.46	
	22	1	1191	2450	0.486	15	1	-0.072	0.581	12.654	26.604	1.274	0.907	0.39	
	22	2	1191	2450	0.486	15	1	-0.072	0.642	12.654	26.604	1.268	0.907	0.34	
	22	3	1191	2450	0.486	15	1	-0.073	0.702	12.655	26.604	1.264	0.907	0.29	
	22	4	1191	2450	0.486	15	1	-0.073	0.759	12.655	26.603	1.261	0.907	0.26	
	23	0	1191	2450	0.486	15	1	-0.073	0.687	12.655	26.603	1.265	0.907	0.26	
	23	1	1191	2450	0.486	15	1	-0.073	0.730	12.655	26.603	1.263	0.907	0.23	
	23	2	1191	2450	0.486	15	1	-0.073	0.759	12.655	26.603	1.261	0.907	0.20	
	23	3	1191	2450	0.486	15	1	-0.073	0.744	12.655	26.603	1.262	0.907	0.19	
	23	4	1191	2450	0.486	15	1	-0.073	0.668	12.655	26.603	1.266	0.907	0.19	
	24	0	1191	2450	0.486	15	1	-0.073	0.685	12.655	26.603	1.265	0.907	0.19	
	24	1	1191	2450	0.486	15	1	-0.073	0.663	12.655	26.603	1.267	0.907	0.22	
	24	2	1191	2450	0.486	15	1	-0.073	0.603	12.655	26.603	1.272	0.907	0.26	
	24	3	1191	2450	0.486	15	1	-0.073	0.537	12.655	26.602	1.279	0.907	0.31	
	24	4	1191	2450	0.486	15	1	-0.073	0.481	12.655	26.602	1.287	0.907	0.37	

UorL	PN	Vst	a	b	a/b	Tw	Nh	ϕ	η	$\kappa\ \sigma$	$\kappa\ \tau$	νB	R	K	
Upper															
side	25	0	1191	2450	0.486	15	1	-2.147	0.477	25.817	26.602	1.250	1.115	0.15	
	25	1	1191	2450	0.486	15	1	-2.147	0.550	25.817	26.602	1.250	1.115	0.15	
	25	2	1192	2450	0.487	15	1	-2.147	0.633	25.802	26.544	1.250	1.115	0.15	
	25	3	1192	2450	0.487	15	1	-2.147	0.730	25.802	26.544	1.250	1.115	0.15	
	25	4	1192	2450	0.487	15	1	-2.239	0.883	25.802	26.543	1.250	1.124	0.14	
	26	0	1193	2450	0.487	15	1	-2.239	0.896	25.799	26.534	1.250	1.124	0.14	
	26	1	1193	2450	0.487	15	1	-2.239	1.061	25.800	26.539	1.250	1.124	0.13	
	26	2	1303	2450	0.532	15	1	-2.239	1.282	24.913	22.878	1.250	1.124	0.15	
	26	3	1303	2451	0.532	15	1	-2.239	1.630	24.914	22.881	1.250	1.124	0.15	
	26	4	1303	2451	0.532	15	1	-2.239	2.187	24.915	22.885	1.250	1.124	0.15	
	27	0	1196	2451	0.488	15	1	-2.239	2.151	25.772	26.429	1.250	1.124	0.13	
	27	1	1196	2451	0.488	15	1	-2.239	3.077	25.772	26.429	1.250	1.124	0.13	
	27	2	1196	2451	0.488	15	1	-2.018	4.977	25.771	26.425	1.250	1.102	0.14	
	27	3	1196	2451	0.488	15	1	-2.018	15.459	25.771	26.425	1.250	1.102	0.15	
Lower															
side	24	0	1191	2450	0.486	15	1	-0.073	0.685	12.655	26.603	1.265	0.907	0.19	
	24	1	1191	2450	0.486	15	1	-0.073	0.663	12.655	26.603	1.267	0.907	0.22	
	24	2	1191	2450	0.486	15	1	-0.073	0.603	12.655	26.603	1.272	0.907	0.26	
	24	3	1191	2450	0.486	15	1	-0.073	0.537	12.655	26.602	1.279	0.907	0.31	
	24	4	1191	2450	0.486	15	1	-0.073	0.481	12.655	26.602	1.287	0.907	0.37	
	25	0	1191	2450	0.486	15	1	-0.073	0.363	12.655	26.602	1.311	0.907	0.37	
	25	1	1191	2450	0.486	15	1	-0.073	0.334	12.655	26.602	1.319	0.907	0.44	
	25	2	1192	2450	0.487	15	1	-0.073	0.307	12.635	26.544	1.327	0.907	0.52	
	25	3	1192	2450	0.487	15	1	-0.073	0.283	12.635	26.544	1.336	0.907	0.61	
	25	4	1192	2450	0.487	15	1	-0.062	0.256	12.585	26.543	1.347	0.906	0.71	
Upper															
side	36	3	1170	2450	0.477	15	1	-1.502	116.59	26.035	27.431	1.250	1.050	0.32	
	36	4	1170	2450	0.477	15	1	-1.502	5.284	26.034	27.427	1.250	1.050	0.31	
	37	0	1170	2450	0.477	15	1	-1.502	5.075	26.034	27.427	1.250	1.050	0.30	
	37	1	1170	2450	0.477	15	1	-1.502	2.561	26.034	27.427	1.250	1.050	0.31	
	37	2	1170	2450	0.477	15	1	-1.502	1.685	26.034	27.427	1.250	1.050	0.33	--
	37	3	1170	2450	0.477	15	1	-1.502	1.244	26.034	27.427	1.250	1.050	0.35	--
	37	4	1170	2450	0.477	15	1	-1.502	0.981	26.034	27.427	1.251	1.050	0.39	--
Lower															
side	37	0	1170	2450	0.477	15	1	-0.176	1.020	13.538	27.427	1.253	0.918	0.61	
	37	1	1170	2450	0.477	15	1	-0.176	2.115	13.538	27.427	1.250	0.918	0.38	

４．１１． Calculation of intermediate DIAPHRAGM

Sketch for symbols



・aperture ratio ρ

$\rho = \sqrt{\ \{ (b * h) / ((Bu+BL) * Hw / 2) \}}$

$\rho \leqq 0.40$: To be calculated as solid type

$\rho \geqq 0.80$: To be calculated as frame type

$0.40 < \rho < 0.80$: To be calculated as frame type, provided that stiffness is to be modified.

・Required stiffness of diaphragm

Kreq = 20 * Es * Idw / Ldreq^3 N･mm

Es : Young's modulus of steel = $2.0*10^5$ N/mm^2

Idw : Warping constant

Ld : Actual interval of diaphragms

$$Idw = 1/3 \quad \alpha 1^2 * Fu * (1 + (BuL + Bur) / Bu)^2 + \alpha 2^2 * FL * (1 + (BLL + BLr) / BL)^2 + 2 * (\alpha 1^2 - \alpha 1 * \alpha 2 + \alpha 2^2) * Fh$$

$$\alpha 1 = e / (e + f) * (Bu + BL) / 4 * Hw$$

$$\alpha 2 = f / (e + f) * (Bu + BL) / 4 * Hw$$

$$e = IL / BL + ((Bu + 2 * BL) / 12) * Fh$$

$$f = Iu / Bu + ((2 * Bu + BL) / 12) * Fh$$

Iu : Moment of inertia about vertical axis for upper flange incl. ribs cm^4

IL : Moment of inertia about vertical axis for lower flange incl. ribs cm^4

Fu : Total section area of upper flange (including ribs) cm^2

BuL : Over edge length at left side of upper flange cm

Bur : Over edge length at right side of upper flange cm

FL : Total section area of lower flange (including ribs) cm^2

BLL : Over edge length at left side of lower flange cm

BLr : Over edge length at right side of lower flange cm

Fh : Section area of web par piece cm^2

Hw : Height of web cm

Actual stiffness (in case of frame type)

$$K = \frac{48 * Es * (bb/IIu + bb/IIL + 6*hh/IIh)}{3*hh^2/IIh^2 + 2*bb*hh/IIu*IIh + 2*bb*hh/IIh*IIL + bb^2/IIu*IIL} \text{ N·mm}$$

Where,

Es : Young's modulus of steel = $2.0*10^5$ N/mm^2

bb : Distance between neutral axes of vertical members cm

hh : Distance between neutral axes of horizontal members cm

IIu : Moment of inertia of upper member of the frame cm^4

(Effective width of upper flange is up to 24 times thickness)

IIL : Moment of inertia of lower member of the frame cm^4

(Effective width of lower flange is up to 24 times thickness)

IIh : Moment of inertia of vertical members of the frame cm^4

(Effective width of web is up to 24 times thickness)

In case "$0.4 < \rho < 0.8$", β shall be multiplied

β : Correction coefficient of stiffness shown in chapter "Design of diaphragm (Frame type)" of "Designing manual of steel highway bridge."

Where, "β" can be obtained by complementing and using following values and (a)(b) of Figure-3.50 .

H:Height of web of box girde

B:distance of webs of box girder

Af/Aw : Ratio of collar plate section area of diaphragm and web section area

Provided, that maximum ratio among upper, lower and vertical members is applied for safety side.

・Actual stiffness (in case of solid type)

K = 4 * Gs * A * Td N・mm

Gs : Shear elastic modulus of steel = $7.7*10^4$ N/mm^2

A : Section area of main girder cm^2

Td : Thickness of diaphragm cm

（１）Section

			L-Cantilever	U-flange	R-Cantilever	L-web	R-web	L-flange
G1	D-1	Width(mm)	1350	3000	825	2670	2730	1500
		Thickness(mm)	16	16	16	15	15	10
		Rib number	3	5	1	0	0	2
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
	D-2	Width(mm)	1350	3000	825	2670	2730	1500
		Thickness(mm)	16	16	16	15	15	18
		Rib number	3	5	1	0	0	2
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
	D-3	Width(mm)	1350	3000	825	2670	2730	1500
		Thickness(mm)	16	16	16	15	15	18
		Rib number	3	5	1	0	0	2
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
	D-4	Width(mm)	1350	3000	825	2670	2730	1500
		Thickness(mm)	16	16	16	15	15	27
		Rib number	3	5	1	0	0	2
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
	D-5	Width(mm)	1350	3000	825	2670	2730	1500
		Thickness(mm)	16	16	16	15	15	27
		Rib number	3	5	1	0	0	2
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
	D-6	Width(mm)	1350	3000	825	2670	2730	1500
		Thickness(mm)	16	16	16	15	15	30
		Rib number	3	5	1	0	0	2
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
	D-7	Width(mm)	1350	3000	825	2670	2730	1500
		Thickness(mm)	16	16	16	15	15	30
		Rib number	3	5	1	0	0	2
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
	D-8	Width(mm)	1350	3000	825	2670	2730	1500
		Thickness(mm)	16	16	16	15	15	30
		Rib number	3	5	1	0	0	2
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
	D-9	Width(mm)	1350	3000	825	2670	2730	1500
		Thickness(mm)	16	16	16	15	15	26
		Rib number	3	5	1	0	0	2
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
	D-10	Width(mm)	1350	3000	825	2670	2730	1500
		Thickness(mm)	16	16	16	15	15	26
		Rib number	3	5	1	0	0	2
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
	D-11	Width(mm)	1350	3000	825	2670	2730	1500
		Thickness(mm)	16	16	16	15	15	17
		Rib number	3	5	1	0	0	2
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17

		L-Cantilever	U-flange	R-Cantilever	L-web	R-web	L-flange
D-12	Width(mm)	1350	3000	825	2670	2730	1500
	Thickness(mm)	16	16	16	15	15	17
	Rib number	3	5	1	0	0	2
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-13	Width(mm)	1350	3000	825	2670	2730	1500
	Thickness(mm)	16	16	16	15	15	10
	Rib number	3	5	1	0	0	5
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-14	Width(mm)	1350	3000	825	2670	2730	1500
	Thickness(mm)	16	16	16	17	17	10
	Rib number	3	5	1	0	0	5
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-15	Width(mm)	1350	3000	825	2670	2730	1500
	Thickness(mm)	16	16	16	17	17	10
	Rib number	3	5	1	0	0	5
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-16	Width(mm)	1350	3000	825	2670	2730	1500
	Thickness(mm)	16	16	16	17	17	12
	Rib number	3	5	1	0	0	5
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-17	Width(mm)	1350	3000	825	2670	2730	1500
	Thickness(mm)	16	16	16	17	17	12
	Rib number	3	5	1	0	0	5
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-18	Width(mm)	1350	3000	825	2670	2730	1500
	Thickness(mm)	16	16	16	15	15	10
	Rib number	3	5	1	0	0	5
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-19	Width(mm)	1350	3000	825	2670	2730	1500
	Thickness(mm)	16	16	16	15	15	10
	Rib number	3	5	1	0	0	5
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-20	Width(mm)	1350	3000	825	2670	2730	1500
	Thickness(mm)	16	16	16	15	15	10
	Rib number	3	5	1	0	0	5
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-21	Width(mm)	1350	3000	825	2670	2730	1500
	Thickness(mm)	16	16	16	15	15	10
	Rib number	3	5	1	0	0	5
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-22	Width(mm)	1350	3000	825	2670	2730	1500
	Thickness(mm)	16	16	16	15	15	10
	Rib number	3	5	1	0	0	5
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17

		L-Cantilever	U-flange	R-Cantilever	L-web	R-web	L-flange
D-23	Width(mm)	1350	3000	825	2670	2730	1500
	Thickness(mm)	16	16	16	15	15	10
	Rib number	3	5	1	0	0	5
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-24	Width(mm)	1350	3000	825	2670	2730	1500
	Thickness(mm)	16	16	16	15	15	10
	Rib number	3	5	1	0	0	5
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-25	Width(mm)	1350	3000	825	2670	2730	1500
	Thickness(mm)	16	16	16	15	15	10
	Rib number	3	5	1	0	0	5
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-26	Width(mm)	1350	3000	825	2670	2730	1500
	Thickness(mm)	16	16	16	15	15	12
	Rib number	3	5	1	0	0	5
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-27	Width(mm)	1350	3000	825	2670	2730	1500
	Thickness(mm)	16	16	16	15	15	12
	Rib number	3	5	1	0	0	5
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-28	Width(mm)	1350	3000	825	2670	2730	1500
	Thickness(mm)	16	16	16	15	15	21
	Rib number	3	5	1	0	0	5
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
D-29	Width(mm)	1350	3000	825	2670	2730	1500
	Thickness(mm)	16	16	16	17	17	41
	Rib number	3	5	1	0	0	5
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
D-30	Width(mm)	1350	3000	825	2670	2730	1500
	Thickness(mm)	16	16	16	17	17	41
	Rib number	3	5	1	0	0	5
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
D-31	Width(mm)	1350	3000	825	2670	2730	1500
	Thickness(mm)	16	16	16	17	17	38
	Rib number	3	5	1	0	0	5
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
D-32	Width(mm)	1350	3000	825	2670	2730	1500
	Thickness(mm)	16	16	16	17	17	38
	Rib number	3	5	1	0	0	5
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
D-33	Width(mm)	1350	3000	825	2670	2730	1500
	Thickness(mm)	16	16	16	15	15	19
	Rib number	3	5	1	0	0	5
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22

		L-Cantilever	U-flange	R-Cantilever	L-web	R-web	L-flange
D-34	Width(mm)	1350	3000	825	2670	2730	1500
	Thickness(mm)	16	16	16	15	15	15
	Rib number	3	5	1	0	0	5
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-35	Width(mm)	1350	3000	825	2670	2730	1500
	Thickness(mm)	16	16	16	15	15	15
	Rib number	3	5	1	0	0	5
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-36	Width(mm)	1350	3000	825	2670	2730	1500
	Thickness(mm)	16	16	16	15	15	29
	Rib number	3	5	1	0	0	2
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
D-37	Width(mm)	1350	3000	825	2670	2730	1500
	Thickness(mm)	16	16	16	15	15	29
	Rib number	3	5	1	0	0	2
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
D-38	Width(mm)	1350	3000	825	2670	2730	1500
	Thickness(mm)	16	16	16	17	17	32
	Rib number	3	5	1	0	0	2
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
D-39	Width(mm)	1350	3000	825	2670	2730	1500
	Thickness(mm)	16	16	16	17	17	41
	Rib number	3	5	1	0	0	2
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
D-40	Width(mm)	1350	3000	825	2670	2730	1500
	Thickness(mm)	16	16	16	17	17	41
	Rib number	3	5	1	0	0	2
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
D-41	Width(mm)	1350	3000	825	2670	2730	1500
	Thickness(mm)	16	16	16	17	17	44
	Rib number	3	5	1	0	0	2
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
D-42	Width(mm)	1350	3000	825	2670	2730	1500
	Thickness(mm)	16	16	16	17	17	44
	Rib number	3	5	1	0	0	2
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
D-43	Width(mm)	1350	3000	825	2670	2730	1500
	Thickness(mm)	16	16	16	17	17	44
	Rib number	3	5	1	0	0	2
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
D-44	Width(mm)	1350	3000	825	2670	2730	1500
	Thickness(mm)	16	16	16	17	17	44
	Rib number	3	5	1	0	0	2
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22

			L-Cantilever	U-flange	R-Cantilever	L-web	R-web	L-flange
	D-45	Width(mm)	1350	3000	825	2670	2730	1500
		Thickness(mm)	16	16	16	17	17	44
		Rib number	3	5	1	0	0	2
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
	D-46	Width(mm)	1350	3000	825	2670	2730	1500
		Thickness(mm)	16	16	16	17	17	38
		Rib number	3	5	1	0	0	2
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
	D-47	Width(mm)	1350	3000	825	2670	2730	1500
		Thickness(mm)	16	16	16	17	17	38
		Rib number	3	5	1	0	0	2
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
	D-48	Width(mm)	1350	3000	825	2670	2730	1500
		Thickness(mm)	16	16	16	17	17	27
		Rib number	3	5	1	0	0	2
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
	D-49	Width(mm)	1350	3000	825	2670	2730	1500
		Thickness(mm)	16	16	16	15	15	24
		Rib number	3	5	1	0	0	2
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
	D-50	Width(mm)	1350	3000	825	2670	2730	1500
		Thickness(mm)	16	16	16	15	15	24
		Rib number	3	5	1	0	0	2
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
	D-51	Width(mm)	1350	3000	825	2670	2730	1500
		Thickness(mm)	16	16	16	15	15	12
		Rib number	3	5	1	0	0	2
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
G2	D-1	Width(mm)	825	2700	1650	2673	2727	2700
		Thickness(mm)	16	16	16	14	14	10
		Rib number	1	4	3	0	0	3
		Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17
	D-2	Width(mm)	825	2700	1650	2673	2727	2700
		Thickness(mm)	16	16	16	14	14	10
		Rib number	1	4	3	0	0	3
		Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17
	D-3	Width(mm)	825	2700	1650	2673	2727	2700
		Thickness(mm)	16	16	16	14	14	10
		Rib number	1	4	3	0	0	3
		Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17
	D-4	Width(mm)	825	2700	1650	2673	2727	2700
		Thickness(mm)	16	16	16	14	14	16
		Rib number	1	4	3	0	0	3
		Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17

		L-Cantilever	U-flange	R-Cantilever	L-web	R-web	L-flange
D-5	Width(mm)	825	2700	1650	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	16
	Rib number	1	4	3	0	0	3
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17
D-6	Width(mm)	825	2700	1650	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	16
	Rib number	1	4	3	0	0	3
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17
D-7	Width(mm)	825	2700	1650	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	16
	Rib number	1	4	3	0	0	3
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17
D-8	Width(mm)	825	2700	1650	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	16
	Rib number	1	4	3	0	0	3
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17
D-9	Width(mm)	825	2700	1650	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	16
	Rib number	1	4	3	0	0	3
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17
D-10	Width(mm)	825	2700	1650	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	16
	Rib number	1	4	3	0	0	3
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17
D-11	Width(mm)	825	2700	1650	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	10
	Rib number	1	4	3	0	0	3
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17
D-12	Width(mm)	825	2700	1650	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	10
	Rib number	1	4	3	0	0	3
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17
D-13	Width(mm)	825	2700	1650	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	10
	Rib number	1	4	3	0	0	7
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17
D-14	Width(mm)	825	2700	1650	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	12
	Rib number	1	4	3	0	0	7
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17
D-15	Width(mm)	825	2700	1650	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	12
	Rib number	1	4	3	0	0	7
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17

		L-Cantilever	U-flange	R-Cantilever	L-web	R-web	L-flange
D-16	Width(mm)	825	2700	1650	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	12
	Rib number	1	4	3	0	0	7
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17
D-17	Width(mm)	825	2700	1650	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	12
	Rib number	1	4	3	0	0	7
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17
D-18	Width(mm)	825	2700	1650	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	10
	Rib number	1	4	3	0	0	7
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17
D-19	Width(mm)	825	2700	1650	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	10
	Rib number	1	4	3	0	0	7
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17
D-20	Width(mm)	825	2700	1650	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	10
	Rib number	1	4	3	0	0	7
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17
D-21	Width(mm)	825	2700	1650	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	10
	Rib number	1	4	3	0	0	7
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17
D-22	Width(mm)	825	2700	1650	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	10
	Rib number	1	4	3	0	0	7
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17
D-23	Width(mm)	825	2700	1650	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	10
	Rib number	1	4	3	0	0	7
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17
D-24	Width(mm)	825	2700	1650	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	10
	Rib number	1	4	3	0	0	7
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17
D-25	Width(mm)	825	2700	1650	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	10
	Rib number	1	4	3	0	0	7
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17
D-26	Width(mm)	825	2700	1650	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	10
	Rib number	1	4	3	0	0	7
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17

		L-Cantilever	U-flange	R-Cantilever	L-web	R-web	L-flange
D-27	Width(mm)	825	2700	1650	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	10
	Rib number	1	4	3	0	0	7
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17
D-28	Width(mm)	825	2700	1650	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	14
	Rib number	1	4	3	0	0	7
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17
D-29	Width(mm)	825	2700	1650	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	20
	Rib number	1	4	3	0	0	7
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 200* 22
D-30	Width(mm)	825	2700	1650	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	20
	Rib number	1	4	3	0	0	7
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 200* 22
D-31	Width(mm)	825	2700	1650	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	19
	Rib number	1	4	3	0	0	7
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 200* 22
D-32	Width(mm)	825	2700	1650	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	19
	Rib number	1	4	3	0	0	7
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 200* 22
D-33	Width(mm)	825	2700	1650	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	11
	Rib number	1	4	3	0	0	7
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17
D-34	Width(mm)	825	2700	1650	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	11
	Rib number	1	4	3	0	0	7
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17
D-35	Width(mm)	825	2700	1650	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	11
	Rib number	1	4	3	0	0	7
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17
D-36	Width(mm)	825	2700	1650	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	17
	Rib number	1	4	3	0	0	3
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17
D-37	Width(mm)	825	2700	1650	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	17
	Rib number	1	4	3	0	0	3
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17

		L-Cantilever	U-flange	R-Cantilever	L-web	R-web	L-flange
D-38	Width(mm)	825	2700	1650	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	26
	Rib number	1	4	3	0	0	3
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 200* 22
D-39	Width(mm)	825	2700	1650	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	35
	Rib number	1	4	3	0	0	3
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 200* 22
D-40	Width(mm)	825	2700	1651	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	35
	Rib number	1	4	4	0	0	3
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 200* 22
D-41	Width(mm)	825	2700	1692	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	38
	Rib number	1	4	4	0	0	3
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 200* 22
D-42	Width(mm)	825	2700	1799	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	38
	Rib number	1	4	4	0	0	3
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 200* 22
D-43	Width(mm)	825	2700	1917	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	38
	Rib number	1	4	5	0	0	3
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 200* 22
D-44	Width(mm)	825	2700	2035	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	38
	Rib number	1	4	5	0	0	3
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 200* 22
D-45	Width(mm)	825	2700	2153	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	38
	Rib number	1	4	5	0	0	3
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 200* 22
D-46	Width(mm)	825	2700	2271	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	35
	Rib number	1	4	5	0	0	3
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 200* 22
D-47	Width(mm)	825	2700	2388	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	35
	Rib number	1	4	6	0	0	3
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 200* 22
D-48	Width(mm)	825	2700	2506	2673	2727	2700
	Thickness(mm)	16	16	16	14	14	28
	Rib number	1	4	6	0	0	3
	Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 200* 22

			L-Cantilever	U-flange	R-Cantilever	L-web	R-web	L-flange
	D-49	Width(mm)	825	2700	2624	2673	2727	2700
		Thickness(mm)	16	16	16	14	14	18
		Rib number	1	4	7	0	0	3
		Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17
	D-50	Width(mm)	825	2700	2722	2673	2727	2700
		Thickness(mm)	16	16	16	14	14	18
		Rib number	1	4	7	0	0	3
		Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17
	D-51	Width(mm)	825	2700	2750	2673	2727	2700
		Thickness(mm)	16	16	16	14	14	10
		Rib number	1	4	6	0	0	3
		Rib section	U-320*240*8	U-320*240*8	U-320*240*8			PL 170* 17
G3	D-1	Width(mm)	1650	2700	3987	2727	2673	2700
		Thickness(mm)	16	16	16	14	14	10
		Rib number	3	4	6	0	0	3
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
	D-2	Width(mm)	1650	2700	3866	2727	2673	2700
		Thickness(mm)	16	16	16	14	14	13
		Rib number	3	4	6	0	0	3
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
	D-3	Width(mm)	1650	2700	3743	2727	2673	2700
		Thickness(mm)	16	16	16	14	14	13
		Rib number	3	4	6	0	0	3
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
	D-4	Width(mm)	1650	2700	3626	2727	2673	2700
		Thickness(mm)	16	16	16	14	14	18
		Rib number	3	4	5	0	0	3
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
	D-5	Width(mm)	1650	2700	3515	2727	2673	2700
		Thickness(mm)	16	16	16	14	14	18
		Rib number	3	4	5	0	0	3
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
	D-6	Width(mm)	1650	2700	3409	2727	2673	2700
		Thickness(mm)	16	16	16	14	14	20
		Rib number	3	4	5	0	0	3
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
	D-7	Width(mm)	1650	2700	3308	2727	2673	2700
		Thickness(mm)	16	16	16	14	14	20
		Rib number	3	4	5	0	0	3
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
	D-8	Width(mm)	1650	2700	3213	2727	2673	2700
		Thickness(mm)	16	16	16	14	14	20
		Rib number	3	4	5	0	0	3
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17

		L-Cantilever	U-flange	R-Cantilever	L-web	R-web	L-flange
D-9	Width(mm)	1650	2700	3124	2727	2673	2700
	Thickness(mm)	16	16	16	14	14	18
	Rib number	3	4	5	0	0	3
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-10	Width(mm)	1650	2700	3040	2727	2673	2700
	Thickness(mm)	16	16	16	14	14	18
	Rib number	3	4	4	0	0	3
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-11	Width(mm)	1650	2700	2962	2727	2673	2700
	Thickness(mm)	16	16	16	14	14	12
	Rib number	3	4	4	0	0	3
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-12	Width(mm)	1650	2700	2890	2727	2673	2700
	Thickness(mm)	16	16	16	14	14	12
	Rib number	3	4	4	0	0	3
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-13	Width(mm)	1650	2700	2823	2727	2673	2700
	Thickness(mm)	16	16	16	14	14	10
	Rib number	3	4	4	0	0	7
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-14	Width(mm)	1650	2700	2761	2727	2673	2700
	Thickness(mm)	16	16	16	14	14	12
	Rib number	3	4	4	0	0	7
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-15	Width(mm)	1650	2700	2706	2727	2673	2700
	Thickness(mm)	16	16	16	14	14	12
	Rib number	3	4	4	0	0	7
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-16	Width(mm)	1650	2700	2612	2727	2673	2700
	Thickness(mm)	16	16	16	14	14	12
	Rib number	3	4	4	0	0	7
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-17	Width(mm)	1650	2700	2572	2727	2673	2700
	Thickness(mm)	16	16	16	14	14	12
	Rib number	3	4	4	0	0	7
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-18	Width(mm)	1650	2700	2538	2727	2673	2700
	Thickness(mm)	16	16	16	14	14	10
	Rib number	3	4	4	0	0	7
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-19	Width(mm)	1650	2700	2509	2727	2673	2700
	Thickness(mm)	16	16	16	14	14	10
	Rib number	3	4	4	0	0	7
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17

		L-Cantilever	U-flange	R-Cantilever	L-web	R-web	L-flange
D-20	Width(mm)	1650	2700	2486	2727	2673	2700
	Thickness(mm)	16	16	16	14	14	10
	Rib number	3	4	4	0	0	7
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-21	Width(mm)	1650	2700	2469	2727	2673	2700
	Thickness(mm)	16	16	16	14	14	10
	Rib number	3	4	4	0	0	7
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-22	Width(mm)	1650	2700	2457	2727	2673	2700
	Thickness(mm)	16	16	16	14	14	10
	Rib number	3	4	4	0	0	7
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-23	Width(mm)	1650	2700	2451	2727	2673	2700
	Thickness(mm)	16	16	16	14	14	10
	Rib number	3	4	4	0	0	7
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-24	Width(mm)	1650	2700	2450	2727	2673	2700
	Thickness(mm)	16	16	16	14	14	10
	Rib number	3	4	4	0	0	7
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-25	Width(mm)	1650	2700	2396	2727	2673	2700
	Thickness(mm)	16	16	16	14	14	10
	Rib number	3	4	3	0	0	7
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-26	Width(mm)	1650	2700	2223	2727	2673	2700
	Thickness(mm)	16	16	16	14	14	10
	Rib number	3	4	3	0	0	7
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-27	Width(mm)	1650	2700	2050	2727	2673	2700
	Thickness(mm)	16	16	16	14	14	10
	Rib number	3	4	3	0	0	7
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-28	Width(mm)	1650	2700	1876	2727	2673	2700
	Thickness(mm)	16	16	16	14	14	14
	Rib number	3	4	3	0	0	7
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-29	Width(mm)	1650	2700	1703	2727	2673	2700
	Thickness(mm)	16	16	16	14	14	21
	Rib number	3	4	2	0	0	7
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
D-30	Width(mm)	1650	2700	1532	2727	2673	2700
	Thickness(mm)	16	16	16	14	14	21
	Rib number	3	4	2	0	0	7
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22

		L-Cantilever	U-flange	R-Cantilever	L-web	R-web	L-flange
D-31	Width(mm)	1650	2700	1201	2727	2673	2700
	Thickness(mm)	16	16	16	14	14	20
	Rib number	3	4	2	0	0	7
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
D-32	Width(mm)	1650	2700	1040	2727	2673	2700
	Thickness(mm)	16	16	16	14	14	20
	Rib number	3	4	2	0	0	7
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
D-33	Width(mm)	1650	2700	871	2727	2673	2700
	Thickness(mm)	16	16	16	14	14	12
	Rib number	3	4	1	0	0	7
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-34	Width(mm)	1650	2700	825	2727	2673	2700
	Thickness(mm)	16	16	16	14	14	10
	Rib number	3	4	1	0	0	7
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-35	Width(mm)	1650	2700	825	2727	2673	2700
	Thickness(mm)	16	16	16	14	14	10
	Rib number	3	4	1	0	0	7
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-36	Width(mm)	1650	2700	825	2727	2673	2700
	Thickness(mm)	16	16	16	14	14	16
	Rib number	3	4	1	0	0	3
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-37	Width(mm)	1650	2700	825	2727	2673	2700
	Thickness(mm)	16	16	16	14	14	16
	Rib number	3	4	1	0	0	3
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
D-38	Width(mm)	1650	2700	825	2727	2673	2700
	Thickness(mm)	16	16	16	14	14	25
	Rib number	3	4	1	0	0	3
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
D-39	Width(mm)	1650	2700	825	2727	2673	2700
	Thickness(mm)	16	16	16	14	14	32
	Rib number	3	4	1	0	0	3
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
D-40	Width(mm)	1651	2700	825	2727	2673	2700
	Thickness(mm)	16	16	16	14	14	32
	Rib number	3	4	1	0	0	3
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
D-41	Width(mm)	1691	2700	825	2727	2673	2700
	Thickness(mm)	16	16	16	14	14	36
	Rib number	3	4	1	0	0	3
	Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22

			L-Cantilever	U-flange	R-Cantilever	L-web	R-web	L-flange
	D-42	Width(mm)	1798	2700	825	2727	2673	2700
		Thickness(mm)	16	16	16	14	14	36
		Rib number	4	4	1	0	0	3
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
	D-43	Width(mm)	1916	2700	825	2727	2673	2700
		Thickness(mm)	16	16	16	14	14	36
		Rib number	4	4	1	0	0	3
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
	D-44	Width(mm)	2034	2700	825	2727	2673	2700
		Thickness(mm)	16	16	16	14	14	36
		Rib number	5	4	1	0	0	3
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
	D-45	Width(mm)	2152	2700	825	2727	2673	2700
		Thickness(mm)	16	16	16	14	14	36
		Rib number	5	4	1	0	0	3
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
	D-46	Width(mm)	2271	2700	825	2727	2673	2700
		Thickness(mm)	16	16	16	14	14	34
		Rib number	5	4	1	0	0	3
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
	D-47	Width(mm)	2389	2700	825	2727	2673	2700
		Thickness(mm)	16	16	16	14	14	34
		Rib number	6	4	1	0	0	3
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
	D-48	Width(mm)	2507	2700	825	2727	2673	2700
		Thickness(mm)	16	16	16	14	14	27
		Rib number	6	4	1	0	0	3
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 200* 22
	D-49	Width(mm)	2625	2700	825	2727	2673	2700
		Thickness(mm)	16	16	16	14	14	17
		Rib number	6	4	1	0	0	3
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
	D-50	Width(mm)	2723	2700	825	2727	2673	2700
		Thickness(mm)	16	16	16	14	14	17
		Rib number	6	4	1	0	0	3
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
	D-51	Width(mm)	2750	2700	825	2727	2673	2700
		Thickness(mm)	16	16	16	14	14	10
		Rib number	6	4	1	0	0	3
		Rib section	PL 250* 24	U-320*240*8	U-320*240*8			PL 170* 17
G4	D-1	Width(mm)	3982	3000	1350	2728	2672	1500
		Thickness(mm)	16	16	16	15	15	14
		Rib number	8	5	3	0	0	2
		Rib section	PL 250* 24	U-320*240*8	PL 250* 24			PL 170* 17

		L-Cantilever	U-flange	R-Cantilever	L-web	R-web	L-flange
D-2	Width(mm)	3860	3000	1350	2728	2672	1500
	Thickness(mm)	16	16	16	15	15	28
	Rib number	7	5	3	0	0	2
	Rib section	PL 250* 24	U-320*240*8	PL 250* 24			PL 200* 22
D-3	Width(mm)	3739	3000	1350	2728	2672	1500
	Thickness(mm)	16	16	16	15	15	28
	Rib number	7	5	3	0	0	2
	Rib section	PL 250* 24	U-320*240*8	PL 250* 24			PL 200* 22
D-4	Width(mm)	3621	3000	1350	2728	2672	1500
	Thickness(mm)	16	16	16	15	15	41
	Rib number	8	5	3	0	0	2
	Rib section	PL 250* 24	U-320*240*8	PL 250* 24			PL 200* 22
D-5	Width(mm)	3510	3000	1350	2729	2671	1500
	Thickness(mm)	16	16	16	15	15	41
	Rib number	7	5	3	0	0	2
	Rib section	PL 250* 24	U-320*240*8	PL 250* 24			PL 200* 22
D-6	Width(mm)	3406	3000	1350	2729	2671	1500
	Thickness(mm)	16	16	16	15	15	45
	Rib number	7	5	3	0	0	2
	Rib section	PL 250* 24	U-320*240*8	PL 250* 24			PL 200* 22
D-7	Width(mm)	3305	3000	1350	2729	2671	1500
	Thickness(mm)	16	16	16	15	15	45
	Rib number	7	5	3	0	0	2
	Rib section	PL 250* 24	U-320*240*8	PL 250* 24			PL 200* 22
D-8	Width(mm)	3211	3000	1350	2729	2671	1500
	Thickness(mm)	16	16	16	15	15	45
	Rib number	6	5	3	0	0	2
	Rib section	PL 250* 24	U-320*240*8	PL 250* 24			PL 200* 22
D-9	Width(mm)	3122	3000	1350	2729	2671	1500
	Thickness(mm)	16	16	16	15	15	40
	Rib number	6	5	3	0	0	2
	Rib section	PL 250* 24	U-320*240*8	PL 250* 24			PL 200* 22
D-10	Width(mm)	3038	3000	1350	2729	2671	1500
	Thickness(mm)	16	16	16	15	15	40
	Rib number	6	5	3	0	0	2
	Rib section	PL 250* 24	U-320*240*8	PL 250* 24			PL 200* 22
D-11	Width(mm)	2961	3000	1350	2729	2671	1500
	Thickness(mm)	16	16	16	15	15	26
	Rib number	6	5	3	0	0	2
	Rib section	PL 250* 24	U-320*240*8	PL 250* 24			PL 200* 22
D-12	Width(mm)	2888	3000	1350	2729	2671	1500
	Thickness(mm)	16	16	16	15	15	26
	Rib number	6	5	3	0	0	2
	Rib section	PL 250* 24	U-320*240*8	PL 250* 24			PL 200* 22

		L-Cantilever	U-flange	R-Cantilever	L-web	R-web	L-flange
D-13	Width(mm)	2821	3000	1350	2729	2671	1500
	Thickness(mm)	16	16	16	15	15	13
	Rib number	6	5	3	0	0	5
	Rib section	PL 250* 24	U-320*240*8	PL 250* 24			PL 170* 17
D-14	Width(mm)	2760	3000	1350	2729	2671	1500
	Thickness(mm)	16	16	16	17	17	15
	Rib number	6	5	3	0	0	5
	Rib section	PL 250* 24	U-320*240*8	PL 250* 24			PL 170* 17
D-15	Width(mm)	2705	3000	1350	2729	2671	1500
	Thickness(mm)	16	16	16	17	17	15
	Rib number	6	5	3	0	0	5
	Rib section	PL 250* 24	U-320*240*8	PL 250* 24			PL 170* 17
D-16	Width(mm)	2611	3000	1350	2730	2670	1500
	Thickness(mm)	16	16	16	17	17	15
	Rib number	5	5	3	0	0	5
	Rib section	PL 250* 24	U-320*240*8	PL 250* 24			PL 200* 22
D-17	Width(mm)	2572	3000	1350	2730	2670	1500
	Thickness(mm)	16	16	16	17	17	15
	Rib number	5	5	3	0	0	5
	Rib section	PL 250* 24	U-320*240*8	PL 250* 24			PL 200* 22
D-18	Width(mm)	2538	3000	1350	2730	2670	1500
	Thickness(mm)	16	16	16	15	15	10
	Rib number	5	5	3	0	0	5
	Rib section	PL 250* 24	U-320*240*8	PL 250* 24			PL 170* 17
D-19	Width(mm)	2509	3000	1350	2730	2670	1500
	Thickness(mm)	16	16	16	15	15	10
	Rib number	5	5	3	0	0	5
	Rib section	PL 250* 24	U-320*240*8	PL 250* 24			PL 170* 17
D-20	Width(mm)	2486	3000	1350	2730	2670	1500
	Thickness(mm)	16	16	16	15	15	10
	Rib number	4	5	3	0	0	5
	Rib section	PL 250* 24	U-320*240*8	PL 250* 24			PL 170* 17
D-21	Width(mm)	2469	3000	1350	2730	2670	1500
	Thickness(mm)	16	16	16	15	15	10
	Rib number	4	5	3	0	0	5
	Rib section	PL 250* 24	U-320*240*8	PL 250* 24			PL 170* 17
D-22	Width(mm)	2457	3000	1350	2730	2670	1500
	Thickness(mm)	16	16	16	15	15	10
	Rib number	4	5	3	0	0	5
	Rib section	PL 250* 24	U-320*240*8	PL 250* 24			PL 170* 17
D-23	Width(mm)	2451	3000	1350	2730	2670	1500
	Thickness(mm)	16	16	16	15	15	10
	Rib number	4	5	3	0	0	5
	Rib section	PL 250* 24	U-320*240*8	PL 250* 24			PL 170* 17

		L-Cantilever	U-flange	R-Cantilever	L-web	R-web	L-flange
D-24	Width(mm)	2450	3000	1350	2730	2670	1500
	Thickness(mm)	16	16	16	15	15	10
	Rib number	4	5	3	0	0	5
	Rib section	PL 250* 24	U-320*240*8	PL 250* 24			PL 170* 17
D-25	Width(mm)	2396	3000	1348	2729	2671	1500
	Thickness(mm)	16	16	16	15	15	10
	Rib number	6	5	3	0	0	5
	Rib section	PL 250* 24	U-320*240*8	PL 250* 24			PL 170* 17
D-26	Width(mm)	2217	3000	1350	2729	2671	1500
	Thickness(mm)	16	16	16	15	15	12
	Rib number	5	5	3	0	0	5
	Rib section	PL 250* 24	U-320*240*8	PL 250* 24			PL 170* 17
D-27	Width(mm)	2044	3000	1350	2729	2671	1500
	Thickness(mm)	16	16	16	15	15	12
	Rib number	5	5	3	0	0	5
	Rib section	PL 250* 24	U-320*240*8	PL 250* 24			PL 170* 17
D-28	Width(mm)	1871	3000	1350	2729	2671	1500
	Thickness(mm)	16	16	16	15	15	24
	Rib number	4	5	3	0	0	5
	Rib section	PL 250* 24	U-320*240*8	PL 250* 24			PL 200* 22
D-29	Width(mm)	1698	3000	1350	2729	2671	1500
	Thickness(mm)	16	16	16	17	17	45
	Rib number	5	5	3	0	0	5
	Rib section	PL 250* 24	U-320*240*8	PL 250* 24			PL 200* 22
D-30	Width(mm)	1528	3000	1350	2729	2671	1500
	Thickness(mm)	16	16	16	17	17	45
	Rib number	4	5	3	0	0	5
	Rib section	PL 250* 24	U-320*240*8	PL 250* 24			PL 200* 22
D-31	Width(mm)	1198	3000	1350	2729	2671	1500
	Thickness(mm)	16	16	16	17	17	42
	Rib number	3	5	3	0	0	5
	Rib section	PL 250* 24	U-320*240*8	PL 250* 24			PL 200* 22
D-32	Width(mm)	1038	3000	1350	2729	2671	1500
	Thickness(mm)	16	16	16	17	17	42
	Rib number	2	5	3	0	0	5
	Rib section	PL 250* 24	U-320*240*8	PL 250* 24			PL 200* 22
D-33	Width(mm)	868	3000	1350	2729	2671	1500
	Thickness(mm)	16	16	16	15	15	21
	Rib number	2	5	3	0	0	5
	Rib section	PL 250* 24	U-320*240*8	PL 250* 24			PL 200* 22
D-34	Width(mm)	825	3000	1350	2730	2670	1500
	Thickness(mm)	16	16	16	15	15	14
	Rib number	1	5	3	0	0	5
	Rib section	U-320*240*8	U-320*240*8	PL 250* 24			PL 170* 17

		L-Cantilever	U-flange	R-Cantilever	L-web	R-web	L-flange
D-35	Width(mm)	825	3000	1350	2730	2670	1500
	Thickness(mm)	16	16	16	15	15	14
	Rib number	1	5	3	0	0	5
	Rib section	U-320*240*8	U-320*240*8	PL 250* 24			PL 170* 17
D-36	Width(mm)	825	3000	1350	2730	2670	1500
	Thickness(mm)	16	16	16	15	15	27
	Rib number	1	5	3	0	0	2
	Rib section	U-320*240*8	U-320*240*8	PL 250* 24			PL 200* 22
D-37	Width(mm)	825	3000	1350	2730	2670	1500
	Thickness(mm)	16	16	16	15	15	27
	Rib number	1	5	3	0	0	2
	Rib section	U-320*240*8	U-320*240*8	PL 250* 24			PL 200* 22
D-38	Width(mm)	825	3000	1350	2730	2670	1500
	Thickness(mm)	16	16	16	17	17	29
	Rib number	1	5	3	0	0	2
	Rib section	U-320*240*8	U-320*240*8	PL 250* 24			PL 200* 22
D-39	Width(mm)	825	3000	1350	2730	2670	1500
	Thickness(mm)	16	16	16	17	17	38
	Rib number	1	5	3	0	0	2
	Rib section	U-320*240*8	U-320*240*8	PL 250* 24			PL 200* 22
D-40	Width(mm)	825	3000	1350	2730	2670	1500
	Thickness(mm)	16	16	16	17	17	38
	Rib number	1	5	3	0	0	2
	Rib section	U-320*240*8	U-320*240*8	PL 250* 24			PL 200* 22
D-41	Width(mm)	825	3000	1350	2730	2670	1500
	Thickness(mm)	16	16	16	17	17	42
	Rib number	1	5	3	0	0	2
	Rib section	U-320*240*8	U-320*240*8	PL 250* 24			PL 200* 22
D-42	Width(mm)	825	3000	1350	2730	2670	1500
	Thickness(mm)	16	16	16	17	17	42
	Rib number	1	5	3	0	0	2
	Rib section	U-320*240*8	U-320*240*8	PL 250* 24			PL 200* 22
D-43	Width(mm)	825	3000	1350	2730	2670	1500
	Thickness(mm)	16	16	16	17	17	42
	Rib number	1	5	3	0	0	2
	Rib section	U-320*240*8	U-320*240*8	PL 250* 24			PL 200* 22
D-44	Width(mm)	825	3000	1350	2730	2670	1500
	Thickness(mm)	16	16	16	17	17	42
	Rib number	1	5	3	0	0	2
	Rib section	U-320*240*8	U-320*240*8	PL 250* 24			PL 200* 22
D-45	Width(mm)	825	3000	1350	2730	2670	1500
	Thickness(mm)	16	16	16	17	17	42
	Rib number	1	5	3	0	0	2
	Rib section	U-320*240*8	U-320*240*8	PL 250* 24			PL 200* 22

		L-Cantilever	U-flange	R-Cantilever	L-web	R-web	L-flange
D-46	Width(mm)	825	3000	1350	2730	2670	1500
	Thickness(mm)	16	16	16	17	17	36
	Rib number	1	5	3	0	0	2
	Rib section	U-320*240*8	U-320*240*8	PL 250* 24			PL 200* 22
D-47	Width(mm)	825	3000	1350	2730	2670	1500
	Thickness(mm)	16	16	16	17	17	36
	Rib number	1	5	3	0	0	2
	Rib section	U-320*240*8	U-320*240*8	PL 250* 24			PL 200* 22
D-48	Width(mm)	825	3000	1350	2730	2670	1500
	Thickness(mm)	16	16	16	17	17	26
	Rib number	1	5	3	0	0	2
	Rib section	U-320*240*8	U-320*240*8	PL 250* 24			PL 200* 22
D-49	Width(mm)	825	3000	1350	2730	2670	1500
	Thickness(mm)	16	16	16	15	15	23
	Rib number	1	5	3	0	0	2
	Rib section	U-320*240*8	U-320*240*8	PL 250* 24			PL 200* 22
D-50	Width(mm)	825	3000	1350	2730	2670	1500
	Thickness(mm)	16	16	16	15	15	23
	Rib number	1	5	3	0	0	2
	Rib section	U-320*240*8	U-320*240*8	PL 250* 24			PL 200* 22
D-51	Width(mm)	825	3000	1350	2730	2670	1500
	Thickness(mm)	16	16	16	15	15	12
	Rib number	1	5	3	0	0	2
	Rib section	U-320*240*8	U-320*240*8	PL 250* 24			PL 170* 17

（2）Limit span

		Equivalent span Lu(m)	Radius of curvature R(m)	Equivalent span Central angle θ (rad)	Limit interval Ldreq(m)	Actual interval Ld(m)
G1	D-1	60.710	2007.000	0.030	7.364	4.671
	D-2	60.710	2007.000	0.030	7.364	4.768
	D-3	60.710	2007.000	0.030	7.364	4.768
	D-4	60.710	2007.000	0.030	7.364	4.768
	D-5	60.710	2007.000	0.030	7.364	4.768
	D-6	60.710	2007.000	0.030	7.364	4.768
	D-7	60.710	2007.000	0.030	7.364	4.768
	D-8	60.710	2007.000	0.030	7.364	4.768
	D-9	60.710	2007.000	0.030	7.364	4.768
	D-10	60.710	2007.000	0.030	7.364	4.768
	D-11	60.710	2007.000	0.030	7.364	4.768
	D-12	60.710	2007.000	0.030	7.364	4.768
	D-13	58.570	2007.000	0.029	7.075	4.768
	D-14	49.090	2007.000	0.024	5.951	4.768
	D-15	39.811	2007.000	0.020	5.960	4.667
	D-16	35.333	2007.000	0.018	5.965	4.743
	D-17	40.132	2007.000	0.020	5.960	4.818
	D-18	45.006	2007.000	0.022	5.955	4.818
	D-19	46.072	2007.000	0.023	5.954	4.818
	D-20	46.072	2007.000	0.023	5.954	4.818
	D-21	46.072	2007.000	0.023	5.954	4.818
	D-22	46.072	2007.000	0.023	5.954	4.818
	D-23	46.072	2007.000	0.023	5.954	4.818
	D-24	46.072	2007.000	0.023	5.954	4.818
	D-25	46.072	2007.000	0.023	5.954	4.818
	D-26	46.072	2007.000	0.023	5.954	4.818
	D-27	46.072	2007.000	0.023	5.954	4.818
	D-28	45.380	2007.000	0.023	5.955	4.818
	D-29	42.219	2007.000	0.021	5.958	4.818
	D-30	39.107	2007.000	0.019	5.961	4.743
	D-31	46.073	2007.000	0.023	5.954	4.467
	D-32	56.150	2007.000	0.028	6.749	4.718
	D-33	66.793	2007.000	0.033	8.181	4.718
	D-34	77.436	2007.000	0.039	9.601	4.718
	D-35	82.553	2007.000	0.041	10.280	4.718
	D-36	82.553	2007.000	0.041	10.280	4.718
	D-37	82.553	2007.000	0.041	10.280	4.718
	D-38	82.553	2007.000	0.041	10.280	4.718
	D-39	82.553	293.000	0.282	8.801	4.788
	D-40	82.553	293.000	0.282	8.801	4.788
	D-41	82.553	293.000	0.282	8.801	4.654
	D-42	82.553	293.000	0.282	8.801	4.705
	D-43	82.553	∞	0	10.557	4.705
	D-44	82.553	∞	0	10.557	4.706
	D-45	82.553	∞	0	10.557	4.706
	D-46	82.553	∞	0	10.557	4.707
	D-47	82.553	∞	0	10.557	4.708
	D-48	82.553	∞	0	10.557	4.708
	D-49	82.553	306.000	0.270	8.870	4.777
	D-50	82.553	306.000	0.270	8.870	4.809
	D-51	82.553	306.000	0.270	8.870	4.809

		Equivalent span Lu(m)	Radius of curvature R(m)	Equivalent span Central angle θ (rad)	Limit interval Ldreq(m)	Actual interval Ld(m)
G2	D-1	60.572	2003.000	0.030	7.345	4.658
	D-2	60.572	2003.000	0.030	7.345	4.757
	D-3	60.572	2003.000	0.030	7.345	4.757
	D-4	60.572	2003.000	0.030	7.345	4.757
	D-5	60.572	2003.000	0.030	7.345	4.757
	D-6	60.572	2003.000	0.030	7.345	4.757
	D-7	60.572	2003.000	0.030	7.345	4.757
	D-8	60.572	2003.000	0.030	7.345	4.757
	D-9	60.572	2003.000	0.030	7.345	4.757
	D-10	60.572	2003.000	0.030	7.345	4.757
	D-11	60.572	2003.000	0.030	7.345	4.757
	D-12	60.572	2003.000	0.030	7.345	4.757
	D-13	58.445	2003.000	0.029	7.058	4.757
	D-14	48.987	2003.000	0.024	5.951	4.757
	D-15	39.729	2003.000	0.020	5.960	4.657
	D-16	35.254	2003.000	0.018	5.965	4.732
	D-17	40.041	2003.000	0.020	5.960	4.807
	D-18	44.905	2003.000	0.022	5.955	4.807
	D-19	45.969	2003.000	0.023	5.954	4.807
	D-20	45.969	2003.000	0.023	5.954	4.807
	D-21	45.969	2003.000	0.023	5.954	4.807
	D-22	45.969	2003.000	0.023	5.954	4.807
	D-23	45.969	2003.000	0.023	5.954	4.807
	D-24	45.969	2003.000	0.023	5.954	4.807
	D-25	45.969	2003.000	0.023	5.954	4.807
	D-26	45.969	2003.000	0.023	5.954	4.807
	D-27	45.969	2003.000	0.023	5.954	4.807
	D-28	45.281	2003.000	0.023	5.955	4.807
	D-29	42.128	2003.000	0.021	5.958	4.807
	D-30	39.023	2003.000	0.019	5.961	4.732
	D-31	45.972	2003.000	0.023	5.954	4.457
	D-32	56.027	2003.000	0.028	6.732	4.707
	D-33	66.646	2003.000	0.033	8.161	4.707
	D-34	77.265	2003.000	0.039	9.578	4.707
	D-35	82.378	2003.000	0.041	10.256	4.707
	D-36	82.378	2003.000	0.041	10.256	4.707
	D-37	82.378	2003.000	0.041	10.256	4.707
	D-38	82.378	2003.000	0.041	10.256	4.707
	D-39	82.378	297.000	0.277	8.806	4.723
	D-40	82.378	297.000	0.277	8.806	4.723
	D-41	82.378	297.000	0.277	8.806	4.693
	D-42	82.378	297.000	0.277	8.806	4.705
	D-43	82.378	∞	0	10.533	4.705
	D-44	82.378	∞	0	10.533	4.706
	D-45	82.378	∞	0	10.533	4.706
	D-46	82.378	∞	0	10.533	4.707
	D-47	82.378	∞	0	10.533	4.708
	D-48	82.378	∞	0	10.533	4.708
	D-49	82.378	302.000	0.273	8.832	4.724
	D-50	82.378	302.000	0.273	8.832	4.724
	D-51	82.378	302.000	0.273	8.832	4.691

		Equivalent span Lu(m)	Radius of curvature R(m)	Equivalent span Central angle θ (rad)	Limit interval Ldreq(m)	Actual interval Ld(m)
G3	D-1	60.388	1997.000	0.030	7.320	4.643
	D-2	60.388	1997.000	0.030	7.320	4.743
	D-3	60.388	1997.000	0.030	7.320	4.743
	D-4	60.388	1997.000	0.030	7.320	4.743
	D-5	60.388	1997.000	0.030	7.320	4.743
	D-6	60.388	1997.000	0.030	7.320	4.743
	D-7	60.388	1997.000	0.030	7.320	4.743
	D-8	60.388	1997.000	0.030	7.320	4.743
	D-9	60.388	1997.000	0.030	7.320	4.743
	D-10	60.388	1997.000	0.030	7.320	4.743
	D-11	60.388	1997.000	0.030	7.320	4.743
	D-12	60.388	1997.000	0.030	7.320	4.743
	D-13	58.261	1997.000	0.029	7.033	4.743
	D-14	48.831	1997.000	0.024	5.951	4.743
	D-15	39.601	1997.000	0.020	5.960	4.643
	D-16	35.148	1997.000	0.018	5.965	4.718
	D-17	39.921	1997.000	0.020	5.960	4.793
	D-18	44.771	1997.000	0.022	5.955	4.793
	D-19	45.831	1997.000	0.023	5.954	4.793
	D-20	45.831	1997.000	0.023	5.954	4.793
	D-21	45.831	1997.000	0.023	5.954	4.793
	D-22	45.831	1997.000	0.023	5.954	4.793
	D-23	45.831	1997.000	0.023	5.954	4.793
	D-24	45.831	1997.000	0.023	5.954	4.793
	D-25	45.831	1997.000	0.023	5.954	4.793
	D-26	45.831	1997.000	0.023	5.954	4.793
	D-27	45.831	1997.000	0.023	5.954	4.793
	D-28	45.141	1997.000	0.023	5.955	4.793
	D-29	41.997	1997.000	0.021	5.958	4.793
	D-30	38.901	1997.000	0.019	5.961	4.718
	D-31	45.830	1997.000	0.023	5.954	4.443
	D-32	55.853	1997.000	0.028	6.708	4.693
	D-33	66.440	1997.000	0.033	8.132	4.693
	D-34	77.027	1997.000	0.039	9.545	4.693
	D-35	82.121	1997.000	0.041	10.221	4.693
	D-36	82.121	1997.000	0.041	10.221	4.693
	D-37	82.121	1997.000	0.041	10.221	4.693
	D-38	82.121	1997.000	0.041	10.221	4.693
	D-39	82.121	297.000	0.277	8.782	4.693
	D-40	82.121	297.000	0.277	8.782	4.676
	D-41	82.121	297.000	0.277	8.782	4.687
	D-42	82.121	297.000	0.277	8.782	4.698
	D-43	82.121	∞	0	10.497	4.698
	D-44	82.121	∞	0	10.497	4.697
	D-45	82.121	∞	0	10.497	4.696
	D-46	82.121	∞	0	10.497	4.696
	D-47	82.121	∞	0	10.497	4.695
	D-48	82.121	∞	0	10.497	4.695
	D-49	82.121	302.000	0.272	8.808	4.710
	D-50	82.121	302.000	0.272	8.808	4.710
	D-51	82.121	302.000	0.272	8.808	4.650

		Equivalent span Lu(m)	Radius of curvature R(m)	Equivalent span Central angle θ(rad)	Limit interval Ldreq(m)	Actual interval Ld(m)
G4	D-1	60.148	999.000	0.060	7.157	4.694
	D-2	60.148	999.000	0.060	7.157	4.721
	D-3	60.148	999.000	0.060	7.157	4.721
	D-4	60.148	999.000	0.060	7.157	4.721
	D-5	60.148	999.000	0.060	7.157	4.721
	D-6	60.148	999.000	0.060	7.157	4.721
	D-7	60.148	999.000	0.060	7.157	4.721
	D-8	60.148	999.000	0.060	7.157	4.721
	D-9	60.148	999.000	0.060	7.157	4.721
	D-10	60.148	999.000	0.060	7.157	4.721
	D-11	60.148	999.000	0.060	7.157	4.721
	D-12	60.148	999.000	0.060	7.157	4.721
	D-13	57.955	999.000	0.058	6.872	4.721
	D-14	48.575	999.000	0.049	5.903	4.721
	D-15	39.393	999.000	0.039	5.921	4.622
	D-16	35.062	999.000	0.035	5.930	4.726
	D-17	39.819	999.000	0.040	5.920	4.771
	D-18	44.653	999.000	0.045	5.911	4.771
	D-19	45.710	999.000	0.046	5.908	4.771
	D-20	45.710	999.000	0.046	5.908	4.771
	D-21	45.710	999.000	0.046	5.908	4.771
	D-22	45.710	999.000	0.046	5.908	4.771
	D-23	45.710	999.000	0.046	5.908	4.772
	D-24	45.710	999.000	0.046	5.908	4.887
	D-25	45.710	1989.000	0.023	5.954	4.887
	D-26	45.710	1989.000	0.023	5.954	4.788
	D-27	45.710	1989.000	0.023	5.954	4.789
	D-28	44.974	1990.000	0.023	5.955	4.790
	D-29	41.837	1990.000	0.021	5.958	4.790
	D-30	38.748	1990.000	0.019	5.961	4.716
	D-31	46.002	1991.000	0.023	5.954	4.552
	D-32	56.030	1991.000	0.028	6.732	4.694
	D-33	66.622	1992.000	0.033	8.156	4.694
	D-34	76.950	1992.000	0.039	9.535	4.682
	D-35	81.974	1992.000	0.041	10.201	4.682
	D-36	81.974	1992.000	0.041	10.201	4.682
	D-37	81.974	1992.000	0.041	10.201	4.682
	D-38	81.974	1992.000	0.041	10.201	4.682
	D-39	81.974	293.000	0.280	8.747	4.682
	D-40	81.974	293.000	0.280	8.747	4.605
	D-41	81.974	293.000	0.280	8.747	4.649
	D-42	81.974	293.000	0.280	8.747	4.698
	D-43	81.974	∞	0	10.476	4.698
	D-44	81.974	∞	0	10.476	4.697
	D-45	81.974	∞	0	10.476	4.696
	D-46	81.974	∞	0	10.476	4.696
	D-47	81.974	∞	0	10.476	4.695
	D-48	81.974	∞	0	10.476	4.695
	D-49	81.974	306.000	0.268	8.814	4.763
	D-50	81.974	306.000	0.268	8.814	4.763
	D-51	81.974	306.000	0.268	8.814	4.650

（３）Shape of diaphragm

		U-Web Spacing	L-Web Spacing	Center Girder height	Manhole width	height	Aperture ratio	type
		Bu(m)	BL(m)	Hw(m)	b(m)	h(m)	ρ	
G1	D-1	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-2	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-3	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-4	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-5	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-6	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-7	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-8	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-9	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-10	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-11	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-12	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-13	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-14	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-15	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-16	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-17	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-18	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-19	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-20	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-21	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-22	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-23	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-24	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-25	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-26	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-27	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-28	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-29	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-30	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-31	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-32	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-33	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-34	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-35	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-36	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-37	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-38	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-39	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-40	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-41	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-42	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-43	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-44	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-45	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-46	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-47	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-48	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-49	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-50	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-51	3.000	1.500	2.700	0.700	1.340	0.393	Solid

		U-Web Spacing	L-Web Spacing	Center Girder height	Manhole width	height	Aperture ratio	type
		Bu(m)	BL(m)	Hw(m)	b(m)	h(m)	ρ	
G2	D-1	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-2	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-3	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-4	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-5	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-6	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-7	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-8	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-9	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-10	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-11	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-12	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-13	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-14	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-15	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-16	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-17	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-18	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-19	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-20	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-21	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-22	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-23	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-24	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-25	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-26	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-27	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-28	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-29	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-30	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-31	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-32	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-33	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-34	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-35	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-36	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-37	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-38	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-39	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-40	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-41	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-42	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-43	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-44	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-45	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-46	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-47	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-48	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-49	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-50	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-51	2.700	2.700	2.700	0.700	1.340	0.359	Solid

		U-Web Spacing	L-Web Spacing	Center Girder height	Manhole width	height	Aperture ratio	type
		Bu(m)	BL(m)	Hw(m)	b(m)	h(m)	ρ	
G3	D-1	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-2	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-3	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-4	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-5	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-6	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-7	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-8	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-9	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-10	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-11	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-12	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-13	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-14	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-15	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-16	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-17	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-18	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-19	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-20	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-21	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-22	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-23	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-24	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-25	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-26	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-27	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-28	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-29	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-30	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-31	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-32	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-33	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-34	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-35	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-36	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-37	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-38	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-39	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-40	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-41	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-42	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-43	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-44	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-45	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-46	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-47	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-48	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-49	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-50	2.700	2.700	2.700	0.700	1.340	0.359	Solid
	D-51	2.700	2.700	2.700	0.700	1.340	0.359	Solid

		U-Web Spacing	L-Web Spacing	Center Girder height	Manhole width	height	Aperture ratio	type
		Bu(m)	BL(m)	Hw(m)	b(m)	h(m)	ρ	
G4	D-1	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-2	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-3	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-4	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-5	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-6	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-7	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-8	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-9	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-10	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-11	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-12	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-13	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-14	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-15	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-16	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-17	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-18	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-19	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-20	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-21	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-22	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-23	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-24	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-25	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-26	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-27	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-28	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-29	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-30	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-31	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-32	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-33	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-34	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-35	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-36	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-37	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-38	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-39	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-40	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-41	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-42	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-43	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-44	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-45	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-46	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-47	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-48	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-49	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-50	3.000	1.500	2.700	0.700	1.340	0.393	Solid
	D-51	3.000	1.500	2.700	0.700	1.340	0.393	Solid

（4）Required stiffness of diaphragm

		UFLG Moment of inertia Iu(cm^4)	LFLG Moment of inertia IL(cm^4)	UFLG Area Fu(cm^2)	LFLG Area FL(cm^2)	One-side web Area Fh(cm^2)	Web Height Hw(cm)	Warping constant Idw(*10^{16})	Required stiffness Kreq(*10^{13})
G1	D-1	31068545	475127	1331.6	231.8	434.4	289.6	25.838	0.259
	D-2	31068545	826329	1331.6	371.0	434.4	289.6	29.422	0.295
	D-3	31068545	826329	1331.6	371.0	434.4	289.6	29.422	0.295
	D-4	31068545	1240305	1331.6	557.8	434.4	289.6	34.070	0.341
	D-5	31068545	1240305	1331.6	557.8	434.4	289.6	34.070	0.341
	D-6	31068545	1372006	1331.6	610.0	434.4	289.6	35.301	0.354
	D-7	31068545	1372006	1331.6	610.0	434.4	289.6	35.301	0.354
	D-8	31068545	1372006	1331.6	610.0	434.4	289.6	35.301	0.354
	D-9	31068545	1196405	1331.6	540.4	434.4	289.6	33.655	0.337
	D-10	31068545	1196405	1331.6	540.4	434.4	289.6	33.655	0.337
	D-11	31068545	782428	1331.6	353.6	434.4	289.6	28.983	0.290
	D-12	31068545	782428	1331.6	353.6	434.4	289.6	28.983	0.290
	D-13	31068545	619627	1331.6	318.5	434.4	289.6	28.181	0.318
	D-14	31068545	619627	1331.6	318.5	492.4	289.6	29.823	0.566
	D-15	31068545	619627	1331.6	318.5	492.4	289.6	29.823	0.563
	D-16	31068545	707427	1331.6	353.3	492.4	289.6	30.684	0.578
	D-17	31068545	707427	1331.6	353.3	492.4	289.6	30.684	0.580
	D-18	31068545	619627	1331.6	318.5	434.4	289.6	28.181	0.534
	D-19	31068545	619627	1331.6	318.5	434.4	289.6	28.181	0.534
	D-20	31068545	619627	1331.6	318.5	434.4	289.6	28.181	0.534
	D-21	31068545	619627	1331.6	318.5	434.4	289.6	28.181	0.534
	D-22	31068545	619627	1331.6	318.5	434.4	289.6	28.181	0.534
	D-23	31068545	619627	1331.6	318.5	434.4	289.6	28.181	0.534
	D-24	31068545	619627	1331.6	318.5	434.4	289.6	28.181	0.534
	D-25	31068545	619627	1331.6	318.5	434.4	289.6	28.181	0.534
	D-26	31068545	707427	1331.6	353.3	434.4	289.6	29.069	0.551
	D-27	31068545	707427	1331.6	353.3	434.4	289.6	29.069	0.551
	D-28	31068545	1196904	1331.6	585.4	434.4	289.6	34.891	0.661
	D-29	31068545	2074908	1331.6	933.4	492.4	289.6	43.950	0.831
	D-30	31068545	2074908	1331.6	933.4	492.4	289.6	43.950	0.830
	D-31	31068545	1943208	1331.6	881.2	492.4	289.6	42.858	0.812
	D-32	31068545	1943208	1331.6	881.2	492.4	289.6	42.858	0.558
	D-33	31068545	1109104	1331.6	550.6	434.4	289.6	34.063	0.249
	D-34	31068545	839128	1331.6	405.5	434.4	289.6	30.383	0.137
	D-35	31068545	839128	1331.6	405.5	434.4	289.6	30.383	0.112
	D-36	31068545	1328106	1331.6	592.6	434.4	289.6	34.893	0.128
	D-37	31068545	1328106	1331.6	592.6	434.4	289.6	34.893	0.128
	D-38	31068545	1459806	1331.6	644.8	492.4	289.6	37.528	0.138
	D-39	31068545	1854908	1331.6	801.4	492.4	289.6	40.977	0.240
	D-40	31064487	1854908	1331.4	801.4	492.4	289.6	40.974	0.240
	D-41	31068545	1986609	1331.6	853.6	492.4	289.6	42.091	0.247
	D-42	31068545	1986609	1331.6	853.6	492.4	289.6	42.091	0.247
	D-43	31068545	1986609	1331.6	853.6	492.4	289.6	42.091	0.143
	D-44	31068545	1986609	1331.6	853.6	492.4	289.6	42.091	0.143
	D-45	31068545	1986609	1331.6	853.6	492.4	289.6	42.091	0.143
	D-46	31068545	1723208	1331.6	749.2	492.4	289.6	39.845	0.135
	D-47	31068545	1723208	1331.6	749.2	492.4	289.6	39.845	0.135
	D-48	31068545	1240305	1331.6	557.8	492.4	289.6	35.542	0.121
	D-49	31068545	1108605	1331.6	505.6	434.4	289.6	32.819	0.188
	D-50	31068545	1108605	1331.6	505.6	434.4	289.6	32.819	0.188
	D-51	31068545	562927	1331.6	266.6	434.4	289.6	26.749	0.153

		UFLG Moment of inertia Iu(cm^4)	LFLG Moment of inertia IL(cm^4)	UFLG Area Fu(cm^2)	LFLG Area FL(cm^2)	One-side web Area Fh(cm^2)	Web Height Hw(cm)	Warping constant Idw(*10^{16})	Required stiffness Kreq(*10^{13})
G2	D-1	30243446	2381033	1259.4	380.7	378.0	270.0	38.403	0.388
	D-2	30243446	2381033	1259.4	380.7	378.0	270.0	38.403	0.388
	D-3	30243446	2381033	1259.4	380.7	378.0	270.0	38.403	0.388
	D-4	30243446	3651642	1259.4	557.1	378.0	270.0	43.949	0.444
	D-5	30243446	3651642	1259.4	557.1	378.0	270.0	43.949	0.444
	D-6	30243446	3651642	1259.4	557.1	378.0	270.0	43.949	0.444
	D-7	30243446	3651642	1259.4	557.1	378.0	270.0	43.949	0.444
	D-8	30243446	3651642	1259.4	557.1	378.0	270.0	43.949	0.444
	D-9	30243446	3651642	1259.4	557.1	378.0	270.0	43.949	0.444
	D-10	30243446	3651642	1259.4	557.1	378.0	270.0	43.949	0.444
	D-11	30243446	2381033	1259.4	380.7	378.0	270.0	38.403	0.388
	D-12	30243446	2381033	1259.4	380.7	378.0	270.0	38.403	0.388
	D-13	30243446	3039411	1259.4	496.3	378.0	270.0	42.107	0.479
	D-14	30243446	3462948	1259.4	555.1	378.0	270.0	43.922	0.834
	D-15	30243446	3462948	1259.4	555.1	378.0	270.0	43.922	0.830
	D-16	30243446	3462948	1259.4	555.1	378.0	270.0	43.922	0.828
	D-17	30243446	3462948	1259.4	555.1	378.0	270.0	43.922	0.830
	D-18	30243446	3039411	1259.4	496.3	378.0	270.0	42.107	0.797
	D-19	30243446	3039411	1259.4	496.3	378.0	270.0	42.107	0.798
	D-20	30243446	3039411	1259.4	496.3	378.0	270.0	42.107	0.798
	D-21	30243446	3039411	1259.4	496.3	378.0	270.0	42.107	0.798
	D-22	30243446	3039411	1259.4	496.3	378.0	270.0	42.107	0.798
	D-23	30243446	3039411	1259.4	496.3	378.0	270.0	42.107	0.798
	D-24	30243446	3039411	1259.4	496.3	378.0	270.0	42.107	0.798
	D-25	30243446	3039411	1259.4	496.3	378.0	270.0	42.107	0.798
	D-26	30243446	3039411	1259.4	496.3	378.0	270.0	42.107	0.798
	D-27	30243446	3039411	1259.4	496.3	378.0	270.0	42.107	0.798
	D-28	30243446	3886484	1259.4	613.9	378.0	270.0	45.703	0.866
	D-29	30243446	5638689	1259.4	896.0	378.0	270.0	53.881	1.019
	D-30	30243446	5638689	1259.4	896.0	378.0	270.0	53.881	1.017
	D-31	30243446	5426921	1259.4	866.6	378.0	270.0	53.068	1.006
	D-32	30243446	5426921	1259.4	866.6	378.0	270.0	53.068	0.696
	D-33	30243446	3251180	1259.4	525.7	378.0	270.0	43.018	0.317
	D-34	30243446	3251180	1259.4	525.7	378.0	270.0	43.018	0.196
	D-35	30243446	3251180	1259.4	525.7	378.0	270.0	43.018	0.160
	D-36	30243446	3863411	1259.4	586.5	378.0	270.0	44.843	0.166
	D-37	30243446	3863411	1259.4	586.5	378.0	270.0	44.843	0.166
	D-38	30243446	5906923	1259.4	896.4	378.0	270.0	53.831	0.200
	D-39	30243446	7812837	1259.4	1161.0	378.0	270.0	60.844	0.356
	D-40	32925983	7812837	1313.3	1161.0	378.0	270.0	61.761	0.362
	D-41	33736985	8448142	1320.0	1249.2	378.0	270.0	64.462	0.378
	D-42	35931026	8448142	1337.1	1249.2	378.0	270.0	65.554	0.384
	D-43	41535433	8448142	1409.9	1249.2	378.0	270.0	67.646	0.232
	D-44	44438029	8448142	1428.8	1249.2	378.0	270.0	68.779	0.235
	D-45	47514422	8448142	1447.7	1249.2	378.0	270.0	69.882	0.239
	D-46	50769870	7812837	1466.5	1161.0	378.0	270.0	68.285	0.234
	D-47	57919203	7812837	1539.2	1161.0	378.0	270.0	70.026	0.240
	D-48	61735294	6330460	1558.1	955.2	378.0	270.0	64.125	0.220
	D-49	69876022	4075179	1630.8	615.9	378.0	270.0	53.111	0.308
	D-50	73531389	4075179	1646.5	615.9	378.0	270.0	53.542	0.311
	D-51	70265642	2381033	1597.1	380.7	378.0	270.0	44.191	0.257

		UFLG Moment of inertia Iu(cm^4)	LFLG Moment of inertia IL(cm^4)	UFLG Area Fu(cm^2)	LFLG Area FL(cm^2)	One-side web Area Fh(cm^2)	Web Height Hw(cm)	Warping constant Idw(*10^{16})	Required stiffness Kreq(*10^{13})
G3	D-1	144289392	2381033	2053.2	380.7	378.0	270.0	48.655	0.496
	D-2	137418237	3016338	2033.8	468.9	378.0	270.0	52.446	0.535
	D-3	130714056	3016338	2014.1	468.9	378.0	270.0	52.230	0.533
	D-4	118631893	4075179	1941.5	615.9	378.0	270.0	58.257	0.594
	D-5	113274122	4075179	1923.8	615.9	378.0	270.0	57.999	0.592
	D-6	108355791	4498715	1906.8	674.7	378.0	270.0	60.244	0.614
	D-7	103845966	4498715	1890.6	674.7	378.0	270.0	59.976	0.612
	D-8	99758254	4498715	1875.4	674.7	378.0	270.0	59.715	0.609
	D-9	96061840	4075179	1861.2	615.9	378.0	270.0	57.011	0.582
	D-10	87854837	4075179	1793.8	615.9	378.0	270.0	56.527	0.577
	D-11	84961745	2804570	1781.4	439.5	378.0	270.0	48.964	0.499
	D-12	82372750	2804570	1769.8	439.5	378.0	270.0	48.793	0.498
	D-13	80032791	3039411	1759.1	496.3	378.0	270.0	51.011	0.587
	D-14	77926065	3462948	1749.2	555.1	378.0	270.0	53.255	1.011
	D-15	76103720	3462948	1740.4	555.1	378.0	270.0	53.094	1.003
	D-16	73088852	3462948	1725.3	555.1	378.0	270.0	52.813	0.995
	D-17	71843538	3462948	1718.9	555.1	378.0	270.0	52.691	0.996
	D-18	70802449	3039411	1713.5	496.3	378.0	270.0	50.221	0.951
	D-19	69927016	3039411	1708.9	496.3	378.0	270.0	50.136	0.950
	D-20	69240871	3039411	1705.2	496.3	378.0	270.0	50.069	0.949
	D-21	68738338	3039411	1702.5	496.3	378.0	270.0	50.018	0.948
	D-22	68385961	3039411	1700.5	496.3	378.0	270.0	49.983	0.947
	D-23	68210501	3039411	1699.6	496.3	378.0	270.0	49.965	0.947
	D-24	68181304	3039411	1699.4	496.3	378.0	270.0	49.962	0.947
	D-25	62885988	3039411	1636.9	496.3	378.0	270.0	49.524	0.938
	D-26	58423000	3039411	1609.2	496.3	378.0	270.0	48.968	0.928
	D-27	54330528	3039411	1581.5	496.3	378.0	270.0	48.380	0.917
	D-28	50571385	3886484	1553.7	613.9	378.0	270.0	52.108	0.987
	D-29	44444057	5850457	1472.1	925.4	378.0	270.0	61.627	1.166
	D-30	41618996	5850457	1444.7	925.4	378.0	270.0	60.555	1.144
	D-31	36952574	5638689	1391.7	896.0	378.0	270.0	57.450	1.089
	D-32	35037099	5638689	1366.0	896.0	378.0	270.0	56.343	0.747
	D-33	31507975	3462948	1285.0	555.1	378.0	270.0	44.362	0.330
	D-34	31108324	3039411	1277.7	496.3	378.0	270.0	42.288	0.194
	D-35	31108324	3039411	1277.7	496.3	378.0	270.0	42.288	0.158
	D-36	31108324	3651642	1277.7	557.1	378.0	270.0	44.137	0.165
	D-37	31108324	3651642	1277.7	557.1	378.0	270.0	44.137	0.165
	D-38	31108324	5695155	1277.7	867.0	378.0	270.0	53.269	0.200
	D-39	31108324	7177532	1277.7	1072.8	378.0	270.0	58.857	0.348
	D-40	31126895	7177532	1277.8	1072.8	378.0	270.0	58.866	0.348
	D-41	31878513	8024605	1284.2	1190.4	378.0	270.0	62.315	0.368
	D-42	37154737	8024605	1361.4	1190.4	378.0	270.0	64.381	0.380
	D-43	39795050	8024605	1380.2	1190.4	378.0	270.0	65.508	0.227
	D-44	46155655	8024605	1459.1	1190.4	378.0	270.0	67.554	0.234
	D-45	49325172	8024605	1478.0	1190.4	378.0	270.0	68.604	0.237
	D-46	52705486	7601069	1497.0	1131.6	378.0	270.0	67.817	0.235
	D-47	60401546	7601069	1575.9	1131.6	378.0	270.0	69.581	0.241
	D-48	64343060	6118691	1594.8	925.8	378.0	270.0	63.533	0.220
	D-49	68487506	3863411	1613.7	586.5	378.0	270.0	51.874	0.304
	D-50	72087529	3863411	1629.4	586.5	378.0	270.0	52.295	0.306
	D-51	73105005	2381033	1633.7	380.7	378.0	270.0	44.403	0.260

		UFLG Moment of inertia Iu(cm⁴)	LFLG Moment of inertia IL(cm⁴)	UFLG Area Fu(cm²)	LFLG Area FL(cm²)	One-side web Area Fh(cm²)	Web Height Hw(cm)	Warping constant Idw(*10¹⁶)	Required stiffness Kreq(*10¹³)
G4	D-1	173683781	650728	2262.7	301.4	434.4	289.6	35.931	0.392
	D-2	157839446	1284206	2183.2	575.2	434.4	289.6	45.529	0.497
	D-3	150432554	1284206	2163.8	575.2	434.4	289.6	45.327	0.495
	D-4	150695798	1854908	2204.9	801.4	434.4	289.6	53.191	0.580
	D-5	137187026	1854908	2127.2	801.4	434.4	289.6	52.686	0.575
	D-6	131496982	2030509	2110.5	871.0	434.4	289.6	54.773	0.598
	D-7	126160820	2030509	2094.4	871.0	434.4	289.6	54.506	0.595
	D-8	115075955	2030509	2019.3	871.0	434.4	289.6	53.922	0.588
	D-9	110866083	1811008	2005.1	784.0	434.4	289.6	50.831	0.555
	D-10	107016427	1811008	1991.6	784.0	434.4	289.6	50.599	0.552
	D-11	103591454	1196405	1979.3	540.4	434.4	289.6	42.393	0.463
	D-12	100434788	1196405	1967.6	540.4	434.4	289.6	42.230	0.461
	D-13	97613916	751328	1956.9	370.7	434.4	289.6	36.433	0.449
	D-14	95108370	839128	1947.2	405.5	492.4	289.6	39.958	0.777
	D-15	92899889	839128	1938.4	405.5	492.4	289.6	39.830	0.767
	D-16	84187816	933503	1863.3	481.0	492.4	289.6	41.820	0.802
	D-17	82782354	933503	1857.1	481.0	492.4	289.6	41.715	0.804
	D-18	81575533	619627	1851.6	318.5	434.4	289.6	33.918	0.657
	D-19	80559669	619627	1847.0	318.5	434.4	289.6	33.860	0.657
	D-20	74959919	619627	1783.3	318.5	434.4	289.6	33.565	0.651
	D-21	74407725	619627	1780.6	318.5	434.4	289.6	33.529	0.650
	D-22	74028983	619627	1778.8	318.5	434.4	289.6	33.505	0.650
	D-23	73836057	619627	1777.9	318.5	434.4	289.6	33.493	0.649
	D-24	73803952	619627	1777.7	318.5	434.4	289.6	33.490	0.649
	D-25	81324915	619627	1888.6	318.5	434.4	289.6	33.866	0.642
	D-26	71005025	707427	1800.3	353.3	434.4	289.6	34.365	0.651
	D-27	65901527	707427	1772.6	353.3	434.4	289.6	33.963	0.644
	D-28	57469979	1328605	1684.9	637.6	434.4	289.6	41.757	0.791
	D-29	56860891	2250509	1717.2	1003.0	492.3	289.6	53.352	1.009
	D-30	49772105	2250509	1630.0	1003.0	492.3	289.6	51.771	0.978
	D-31	40895416	2118808	1517.2	950.8	492.4	289.6	47.986	0.909
	D-32	36029635	2118808	1431.6	950.8	492.4	289.6	46.354	0.608
	D-33	33978204	1196904	1404.4	585.4	434.4	289.6	35.657	0.263
	D-34	31068545	795228	1331.6	388.1	434.4	289.6	29.947	0.138
	D-35	31068545	795228	1331.6	388.1	434.4	289.6	29.947	0.113
	D-36	31068545	1240305	1331.6	557.8	434.4	289.6	34.070	0.128
	D-37	31068545	1240305	1331.6	557.8	434.4	289.6	34.070	0.128
	D-38	31068545	1328106	1331.6	592.6	492.4	289.6	36.343	0.137
	D-39	31068545	1723208	1331.6	749.2	492.4	289.6	39.845	0.238
	D-40	31068545	1723208	1331.6	749.2	492.4	289.6	39.845	0.238
	D-41	31068545	1898808	1331.6	818.8	492.4	289.6	41.350	0.247
	D-42	31068545	1898808	1331.6	818.8	492.4	289.6	41.350	0.247
	D-43	31068545	1898808	1331.6	818.8	492.4	289.6	41.350	0.144
	D-44	31068545	1898808	1331.6	818.8	492.4	289.6	41.350	0.144
	D-45	31068545	1898808	1331.6	818.8	492.4	289.6	41.350	0.144
	D-46	31068545	1635407	1331.6	714.4	492.4	289.6	39.081	0.136
	D-47	31068545	1635407	1331.6	714.4	492.4	289.6	39.081	0.136
	D-48	31068545	1196405	1331.6	540.4	492.4	289.6	35.138	0.122
	D-49	31068545	1064705	1331.6	488.2	434.4	289.6	32.397	0.189
	D-50	31068545	1064705	1331.6	488.2	434.4	289.6	32.397	0.189
	D-51	31068545	562927	1331.6	266.6	434.4	289.6	26.749	0.156

（５）Actual stiffness of diaphragm (Solid type)

		Thickness Td(cm)	Grade	U-web Spacing Bu(cm)	L-web Spacing BL(cm)	WEB height Hw(cm)	Stiffness Kd(*10^{13})	Required stiffness Kreq(*10^{13})
G1	D-1	0.9	SM400	300.0	150.0	270.0	1.684	0.259
	D-2	0.9	SM400	300.0	150.0	270.0	1.684	0.295
	D-3	0.9	SM400	300.0	150.0	270.0	1.684	0.295
	D-4	0.9	SM400	300.0	150.0	270.0	1.684	0.341
	D-5	0.9	SM400	300.0	150.0	270.0	1.684	0.341
	D-6	0.9	SM400	300.0	150.0	270.0	1.684	0.354
	D-7	0.9	SM400	300.0	150.0	270.0	1.684	0.354
	D-8	0.9	SM400	300.0	150.0	270.0	1.684	0.354
	D-9	0.9	SM400	300.0	150.0	270.0	1.684	0.337
	D-10	0.9	SM400	300.0	150.0	270.0	1.684	0.337
	D-11	0.9	SM400	300.0	150.0	270.0	1.684	0.290
	D-12	0.9	SM400	300.0	150.0	270.0	1.684	0.290
	D-13	0.9	SM400	300.0	150.0	270.0	1.684	0.318
	D-14	0.9	SM400	300.0	150.0	270.0	1.684	0.566
	D-15	0.9	SM400	300.0	150.0	270.0	1.684	0.563
	D-16	0.9	SM400	300.0	150.0	270.0	1.684	0.578
	D-17	0.9	SM400	300.0	150.0	270.0	1.684	0.580
	D-18	0.9	SM400	300.0	150.0	270.0	1.684	0.534
	D-19	0.9	SM400	300.0	150.0	270.0	1.684	0.534
	D-20	0.9	SM400	300.0	150.0	270.0	1.684	0.534
	D-21	0.9	SM400	300.0	150.0	270.0	1.684	0.534
	D-22	0.9	SM400	300.0	150.0	270.0	1.684	0.534
	D-23	0.9	SM400	300.0	150.0	270.0	1.684	0.534
	D-24	0.9	SM400	300.0	150.0	270.0	1.684	0.534
	D-25	0.9	SM400	300.0	150.0	270.0	1.684	0.534
	D-26	0.9	SM400	300.0	150.0	270.0	1.684	0.551
	D-27	0.9	SM400	300.0	150.0	270.0	1.684	0.551
	D-28	0.9	SM400	300.0	150.0	270.0	1.684	0.661
	D-29	0.9	SM400	300.0	150.0	270.0	1.684	0.831
	D-30	0.9	SM400	300.0	150.0	270.0	1.684	0.830
	D-31	0.9	SM400	300.0	150.0	270.0	1.684	0.812
	D-32	0.9	SM400	300.0	150.0	270.0	1.684	0.558
	D-33	0.9	SM400	300.0	150.0	270.0	1.684	0.249
	D-34	0.9	SM400	300.0	150.0	270.0	1.684	0.137
	D-35	0.9	SM400	300.0	150.0	270.0	1.684	0.112
	D-36	0.9	SM400	300.0	150.0	270.0	1.684	0.128
	D-37	0.9	SM400	300.0	150.0	270.0	1.684	0.128
	D-38	0.9	SM400	300.0	150.0	270.0	1.684	0.138
	D-39	0.9	SM400	300.0	150.0	270.0	1.684	0.240
	D-40	0.9	SM400	300.0	150.0	270.0	1.684	0.240
	D-41	0.9	SM400	300.0	150.0	270.0	1.684	0.247
	D-42	0.9	SM400	300.0	150.0	270.0	1.684	0.247
	D-43	0.9	SM400	300.0	150.0	270.0	1.684	0.143
	D-44	0.9	SM400	300.0	150.0	270.0	1.684	0.143
	D-45	0.9	SM400	300.0	150.0	270.0	1.684	0.143
	D-46	0.9	SM400	300.0	150.0	270.0	1.684	0.135
	D-47	0.9	SM400	300.0	150.0	270.0	1.684	0.135
	D-48	0.9	SM400	300.0	150.0	270.0	1.684	0.121
	D-49	0.9	SM400	300.0	150.0	270.0	1.684	0.188
	D-50	0.9	SM400	300.0	150.0	270.0	1.684	0.188
	D-51	0.9	SM400	300.0	150.0	270.0	1.684	0.153

		Thickness	Grade	U-web Spacing	L-web Spacing	WEB height	Stiffness	Required stiffness
		Td(cm)		Bu(cm)	BL(cm)	Hw(cm)	Kd(*10^13)	Kreq(*10^13)
G2	D-1	0.9	SM400	270.0	270.0	270.0	2.021	0.388
	D-2	0.9	SM400	270.0	270.0	270.0	2.021	0.388
	D-3	0.9	SM400	270.0	270.0	270.0	2.021	0.388
	D-4	0.9	SM400	270.0	270.0	270.0	2.021	0.444
	D-5	0.9	SM400	270.0	270.0	270.0	2.021	0.444
	D-6	0.9	SM400	270.0	270.0	270.0	2.021	0.444
	D-7	0.9	SM400	270.0	270.0	270.0	2.021	0.444
	D-8	0.9	SM400	270.0	270.0	270.0	2.021	0.444
	D-9	0.9	SM400	270.0	270.0	270.0	2.021	0.444
	D-10	0.9	SM400	270.0	270.0	270.0	2.021	0.444
	D-11	0.9	SM400	270.0	270.0	270.0	2.021	0.388
	D-12	0.9	SM400	270.0	270.0	270.0	2.021	0.388
	D-13	0.9	SM400	270.0	270.0	270.0	2.021	0.479
	D-14	0.9	SM400	270.0	270.0	270.0	2.021	0.834
	D-15	0.9	SM400	270.0	270.0	270.0	2.021	0.830
	D-16	0.9	SM400	270.0	270.0	270.0	2.021	0.828
	D-17	0.9	SM400	270.0	270.0	270.0	2.021	0.830
	D-18	0.9	SM400	270.0	270.0	270.0	2.021	0.797
	D-19	0.9	SM400	270.0	270.0	270.0	2.021	0.798
	D-20	0.9	SM400	270.0	270.0	270.0	2.021	0.798
	D-21	0.9	SM400	270.0	270.0	270.0	2.021	0.798
	D-22	0.9	SM400	270.0	270.0	270.0	2.021	0.798
	D-23	0.9	SM400	270.0	270.0	270.0	2.021	0.798
	D-24	0.9	SM400	270.0	270.0	270.0	2.021	0.798
	D-25	0.9	SM400	270.0	270.0	270.0	2.021	0.798
	D-26	0.9	SM400	270.0	270.0	270.0	2.021	0.798
	D-27	0.9	SM400	270.0	270.0	270.0	2.021	0.798
	D-28	0.9	SM400	270.0	270.0	270.0	2.021	0.866
	D-29	0.9	SM400	270.0	270.0	270.0	2.021	1.019
	D-30	0.9	SM400	270.0	270.0	270.0	2.021	1.017
	D-31	0.9	SM400	270.0	270.0	270.0	2.021	1.006
	D-32	0.9	SM400	270.0	270.0	270.0	2.021	0.696
	D-33	0.9	SM400	270.0	270.0	270.0	2.021	0.317
	D-34	0.9	SM400	270.0	270.0	270.0	2.021	0.196
	D-35	0.9	SM400	270.0	270.0	270.0	2.021	0.160
	D-36	0.9	SM400	270.0	270.0	270.0	2.021	0.166
	D-37	0.9	SM400	270.0	270.0	270.0	2.021	0.166
	D-38	0.9	SM400	270.0	270.0	270.0	2.021	0.200
	D-39	0.9	SM400	270.0	270.0	270.0	2.021	0.356
	D-40	0.9	SM400	270.0	270.0	270.0	2.021	0.362
	D-41	0.9	SM400	270.0	270.0	270.0	2.021	0.378
	D-42	0.9	SM400	270.0	270.0	270.0	2.021	0.384
	D-43	0.9	SM400	270.0	270.0	270.0	2.021	0.232
	D-44	0.9	SM400	270.0	270.0	270.0	2.021	0.235
	D-45	0.9	SM400	270.0	270.0	270.0	2.021	0.239
	D-46	0.9	SM400	270.0	270.0	270.0	2.021	0.234
	D-47	0.9	SM400	270.0	270.0	270.0	2.021	0.240
	D-48	0.9	SM400	270.0	270.0	270.0	2.021	0.220
	D-49	0.9	SM400	270.0	270.0	270.0	2.021	0.308
	D-50	0.9	SM400	270.0	270.0	270.0	2.021	0.311
	D-51	0.9	SM400	270.0	270.0	270.0	2.021	0.257

		Thickness Td(cm)	Grade	U-web Spacing Bu(cm)	L-web Spacing BL(cm)	WEB height Hw(cm)	Stiffness Kd(*10^13)	Required stiffness Kreq(*10^13)
G3	D-1	0.9	SM400	270.0	270.0	270.0	2.021	0.496
	D-2	0.9	SM400	270.0	270.0	270.0	2.021	0.535
	D-3	0.9	SM400	270.0	270.0	270.0	2.021	0.533
	D-4	0.9	SM400	270.0	270.0	270.0	2.021	0.594
	D-5	0.9	SM400	270.0	270.0	270.0	2.021	0.592
	D-6	0.9	SM400	270.0	270.0	270.0	2.021	0.614
	D-7	0.9	SM400	270.0	270.0	270.0	2.021	0.612
	D-8	0.9	SM400	270.0	270.0	270.0	2.021	0.609
	D-9	0.9	SM400	270.0	270.0	270.0	2.021	0.582
	D-10	0.9	SM400	270.0	270.0	270.0	2.021	0.577
	D-11	0.9	SM400	270.0	270.0	270.0	2.021	0.499
	D-12	0.9	SM400	270.0	270.0	270.0	2.021	0.498
	D-13	0.9	SM400	270.0	270.0	270.0	2.021	0.587
	D-14	0.9	SM400	270.0	270.0	270.0	2.021	1.011
	D-15	0.9	SM400	270.0	270.0	270.0	2.021	1.003
	D-16	0.9	SM400	270.0	270.0	270.0	2.021	0.995
	D-17	0.9	SM400	270.0	270.0	270.0	2.021	0.996
	D-18	0.9	SM400	270.0	270.0	270.0	2.021	0.951
	D-19	0.9	SM400	270.0	270.0	270.0	2.021	0.950
	D-20	0.9	SM400	270.0	270.0	270.0	2.021	0.949
	D-21	0.9	SM400	270.0	270.0	270.0	2.021	0.948
	D-22	0.9	SM400	270.0	270.0	270.0	2.021	0.947
	D-23	0.9	SM400	270.0	270.0	270.0	2.021	0.947
	D-24	0.9	SM400	270.0	270.0	270.0	2.021	0.947
	D-25	0.9	SM400	270.0	270.0	270.0	2.021	0.938
	D-26	0.9	SM400	270.0	270.0	270.0	2.021	0.928
	D-27	0.9	SM400	270.0	270.0	270.0	2.021	0.917
	D-28	0.9	SM400	270.0	270.0	270.0	2.021	0.987
	D-29	0.9	SM400	270.0	270.0	270.0	2.021	1.166
	D-30	0.9	SM400	270.0	270.0	270.0	2.021	1.144
	D-31	0.9	SM400	270.0	270.0	270.0	2.021	1.089
	D-32	0.9	SM400	270.0	270.0	270.0	2.021	0.747
	D-33	0.9	SM400	270.0	270.0	270.0	2.021	0.330
	D-34	0.9	SM400	270.0	270.0	270.0	2.021	0.194
	D-35	0.9	SM400	270.0	270.0	270.0	2.021	0.158
	D-36	0.9	SM400	270.0	270.0	270.0	2.021	0.165
	D-37	0.9	SM400	270.0	270.0	270.0	2.021	0.165
	D-38	0.9	SM400	270.0	270.0	270.0	2.021	0.200
	D-39	0.9	SM400	270.0	270.0	270.0	2.021	0.348
	D-40	0.9	SM400	270.0	270.0	270.0	2.021	0.348
	D-41	0.9	SM400	270.0	270.0	270.0	2.021	0.368
	D-42	0.9	SM400	270.0	270.0	270.0	2.021	0.380
	D-43	0.9	SM400	270.0	270.0	270.0	2.021	0.227
	D-44	0.9	SM400	270.0	270.0	270.0	2.021	0.234
	D-45	0.9	SM400	270.0	270.0	270.0	2.021	0.237
	D-46	0.9	SM400	270.0	270.0	270.0	2.021	0.235
	D-47	0.9	SM400	270.0	270.0	270.0	2.021	0.241
	D-48	0.9	SM400	270.0	270.0	270.0	2.021	0.220
	D-49	0.9	SM400	270.0	270.0	270.0	2.021	0.304
	D-50	0.9	SM400	270.0	270.0	270.0	2.021	0.306
	D-51	0.9	SM400	270.0	270.0	270.0	2.021	0.260

		Thickness	Grade	U-web Spacing	L-web Spacing	WEB height	Stiffness	Required stiffness
		Td(cm)		Bu(cm)	BL(cm)	Hw(cm)	Kd(*10^{13})	Kreq(*10^{13})
G4	D-1	0.9	SM400	300.0	150.0	270.0	1.684	0.392
	D-2	0.9	SM400	300.0	150.0	270.0	1.684	0.497
	D-3	0.9	SM400	300.0	150.0	270.0	1.684	0.495
	D-4	0.9	SM400	300.0	150.0	270.0	1.684	0.580
	D-5	0.9	SM400	300.0	150.0	270.0	1.684	0.575
	D-6	0.9	SM400	300.0	150.0	270.0	1.684	0.598
	D-7	0.9	SM400	300.0	150.0	270.0	1.684	0.595
	D-8	0.9	SM400	300.0	150.0	270.0	1.684	0.588
	D-9	0.9	SM400	300.0	150.0	270.0	1.684	0.555
	D-10	0.9	SM400	300.0	150.0	270.0	1.684	0.552
	D-11	0.9	SM400	300.0	150.0	270.0	1.684	0.463
	D-12	0.9	SM400	300.0	150.0	270.0	1.684	0.461
	D-13	0.9	SM400	300.0	150.0	270.0	1.684	0.449
	D-14	0.9	SM400	300.0	150.0	270.0	1.684	0.777
	D-15	0.9	SM400	300.0	150.0	270.0	1.684	0.767
	D-16	0.9	SM400	300.0	150.0	270.0	1.684	0.802
	D-17	0.9	SM400	300.0	150.0	270.0	1.684	0.804
	D-18	0.9	SM400	300.0	150.0	270.0	1.684	0.657
	D-19	0.9	SM400	300.0	150.0	270.0	1.684	0.657
	D-20	0.9	SM400	300.0	150.0	270.0	1.684	0.651
	D-21	0.9	SM400	300.0	150.0	270.0	1.684	0.650
	D-22	0.9	SM400	300.0	150.0	270.0	1.684	0.650
	D-23	0.9	SM400	300.0	150.0	270.0	1.684	0.649
	D-24	0.9	SM400	300.0	150.0	270.0	1.684	0.649
	D-25	0.9	SM400	300.0	150.0	270.0	1.684	0.642
	D-26	0.9	SM400	300.0	150.0	270.0	1.684	0.651
	D-27	0.9	SM400	300.0	150.0	270.0	1.684	0.644
	D-28	0.9	SM400	300.0	150.0	270.0	1.684	0.791
	D-29	0.9	SM400	300.0	150.0	270.0	1.684	1.009
	D-30	0.9	SM400	300.0	150.0	270.0	1.684	0.978
	D-31	0.9	SM400	300.0	150.0	270.0	1.684	0.909
	D-32	0.9	SM400	300.0	150.0	270.0	1.684	0.608
	D-33	0.9	SM400	300.0	150.0	270.0	1.684	0.263
	D-34	0.9	SM400	300.0	150.0	270.0	1.684	0.138
	D-35	0.9	SM400	300.0	150.0	270.0	1.684	0.113
	D-36	0.9	SM400	300.0	150.0	270.0	1.684	0.128
	D-37	0.9	SM400	300.0	150.0	270.0	1.684	0.128
	D-38	0.9	SM400	300.0	150.0	270.0	1.684	0.137
	D-39	0.9	SM400	300.0	150.0	270.0	1.684	0.238
	D-40	0.9	SM400	300.0	150.0	270.0	1.684	0.238
	D-41	0.9	SM400	300.0	150.0	270.0	1.684	0.247
	D-42	0.9	SM400	300.0	150.0	270.0	1.684	0.247
	D-43	0.9	SM400	300.0	150.0	270.0	1.684	0.144
	D-44	0.9	SM400	300.0	150.0	270.0	1.684	0.144
	D-45	0.9	SM400	300.0	150.0	270.0	1.684	0.144
	D-46	0.9	SM400	300.0	150.0	270.0	1.684	0.136
	D-47	0.9	SM400	300.0	150.0	270.0	1.684	0.136
	D-48	0.9	SM400	300.0	150.0	270.0	1.684	0.122
	D-49	0.9	SM400	300.0	150.0	270.0	1.684	0.189
	D-50	0.9	SM400	300.0	150.0	270.0	1.684	0.189
	D-51	0.9	SM400	300.0	150.0	270.0	1.684	0.156

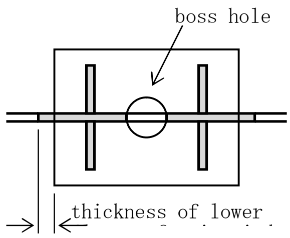
４．１２． Calculation of supporting joint DIAPHRAGM

（１）Calculation of support diaphragm

Stress at support diaphragm is checked by the following policy.

（ａ） Check of bearing stress

$\sigma b = Rv / An \leqq \sigma ba$



σb : bearing stress

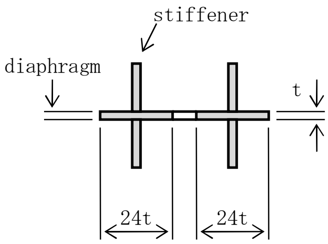
Rv : reaction force for support

An : Effective section area of bearing (shown in the left sketch in gray)

σba : allowable bearing stress

（ｂ） vertical stress of stiffeners

$\sigma v = Rv / Ag \leqq \sigma ca$



σv : Vertical stress

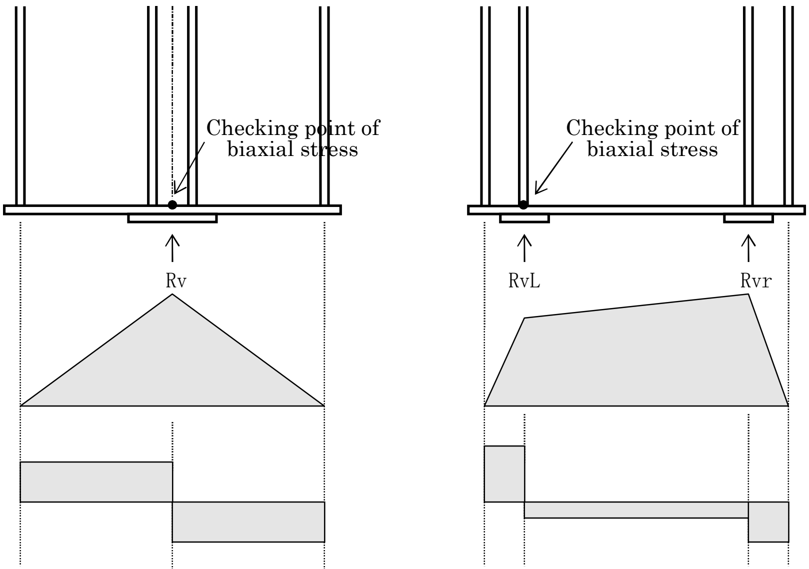
Rv : Reaction force

Ag : Effective area of stiffeners (Colored area in the figure)

σca : allowable compressive stress

（ｃ） Check of horizontal stress of diaphragm

The diaphragm is assumed as a simple beam supported at webs, and bending and shear stresses caused by the reaction force are checked.



(In case of 1 shoe)　　(In case of 2 shoes)

(d) Check of biaxial stress

Biaxial stress of the diaphragm is checked using actual stresses calculated from (b) and (c).

$$(\sigma v / \sigma a)^2 - (\sigma v / \sigma a) * (\sigma L / \sigma a) + (\sigma L / \sigma a)^2 + (\tau / \tau a)^2 \leqq 1.2$$

$\sigma v \cdot \sigma L$: Actual stress calculated at (b) and (c).

σa : Allowable tensile stress

τa : Allowable shear stress

(e) Calculation of fillet weld size

Between vertical stiffener and diaphragm

Required throat thickness: $Areq = 2 * Rv / (n * h * \tau a)$

Required size : $Sreq = Areq / 0.707$

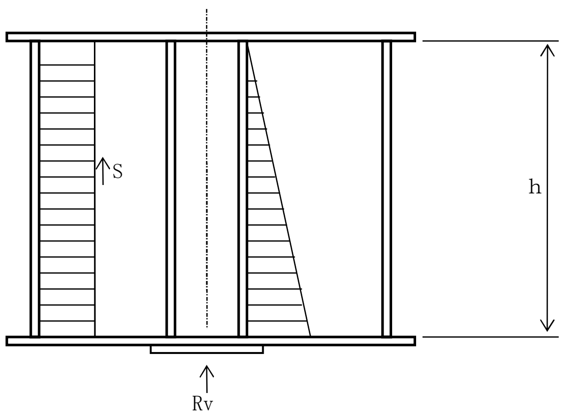
Between diaphragm and web of main girder

Required throat thickness: $Areq = S / (n * h * \tau a)$

Required size : $Sreq = Areq / 0.707$

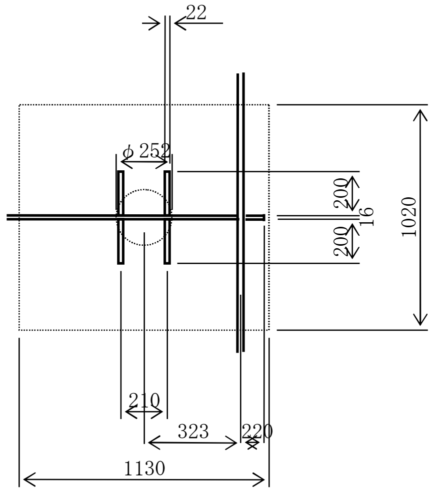
Where

n : Number of welding lines



(Distribution of shear force)

1) Main girder: G1・G4　Support: S1



Reaction force　Rv = 3334.9 (kN) :G4

Torsion momen　Tm = 1794.6 (kN·m) :G4

(a) Check of bearing stress

					$Ag(cm^2)$		Boss hole void		$An(cm^2)$
4-STIFF	PL	200*22	(SM400)	=	176.00				176.00
1-DIA	PL	1126*16	(SM400)	=	180.16	-	25.2*1.6	=	139.84

(DIA L = 565 + 323 + 210 + 14 + 14)　　ΣAn = 315.84 cm^2

$\sigma b = 3334.9*10^3 / 31584 = 106\ N/mm^2 < \sigma ba = 210\ N/mm^2$

(b) Check of vertical stress

					$Ag(cm^2)$	$I(cm^4)$
4-STIFF	PL	200*22	(SM400)	=	176.00	26397
1-DIA	PL	594*16	(SM400)	=	95.04	0
				ΣAg =	271.04 cm^2	26397 cm^4

From "1.7 * Astiff = 299.20", Av = 271.04 cm^2

$\sigma cao = 140\ N/mm^2$

I = 26397 cm^4 ,　r = 9.87 cm

L = 135.00 cm ,　L/r = 13.68

$\sigma cag = 140\ N/mm^2$

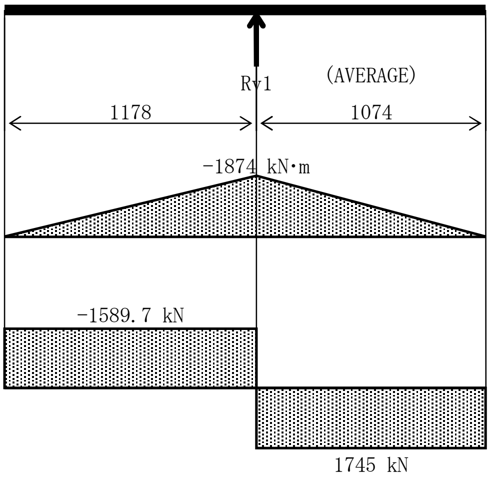
b/t = 200 / 22 = 9.091 < 12.8

$\sigma cal = 140\ N/mm^2$

$\sigma ca = \sigma cag * \sigma cal / \sigma cao = 140 * 140 / 140 = 140\ N/mm^2$

$\sigma v = 3334.9*10^3 / 27104 = 123\ N/mm^2 < \sigma ca = 140\ N/mm^2$

（c）Check of horizontal stress



Bending moment Mmax = -1874.0 (kN·m)

Shear force Smax = 1745.1 (kN)

Torsion moment Tm = 1794.6 (kN·m)

			A(cm^2)	Y(cm)	AY(cm^3)	I(cm^4)
1-FLG PL	384*16	(SM400) =	61.44	-135.8	-8344	1133054
1-WEB PL	2700*16	(SM400) =	432.00	0.0	0	2624400
1-FLG PL	336*14	(SM490Y) =	47.04	135.7	6383	866218
			540.48		-1960	4623672
						-7109
					I =	4616563

e = -1960 / 540.48 = -3.63 cm

Yu = -132.97 cm , YL = 140.03 cm

①Bending stress

$\sigma u = -1874.0*10^6 * -1329.7 / 4616563*10^4 = 54\ N/mm^2 < \sigma ta = 140\ N/mm^2$

$\sigma L = -1874.0*10^6 * 1400.3 / 4616563*10^4 = -57\ N/mm^2 < \sigma ca = 210\ N/mm^2$

②Shear stress

Checking at manhole

$Aw = (270.0 - 0.0) * 1.6 = 432.0 \ cm^2$

$\tau s = 1745.1*10^3 / 43200 = 40 \ N/mm^2$

Shear stress due to torsion moment

$\tau t = 1794.6*10^6 / (2 * 2700 * 2253 * 16) = 9 \ N/mm^2$

Sum of shear stress

$\Sigma \tau = 40 + 9 = 50 \ N/mm^2 < \tau a = 80 \ N/mm^2$

③Shear stress

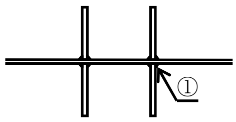
$\kappa = (-57 / 140)^2 + (50 / 80)^2 = 0.55 < 1.2$

(d) Check of biaxial stress

$\alpha = (-123 / 140)^2 - (-123 / 140) * (-57 / 140)$
$+ (-57 / 140)^2 + (50 / 80)^2 = 0.97 < 1.2$

(e) Weld size

Maximum weld size: $Smax = 12$ mm



i) Between stiffener and diaphragm (①)

Required throat thickness: $Areq = (2 * 3334.9*10^3) / (8 * 2700 * 80)$
$= 3.9$ mm $< 0.707 * \min(Smax$, Member thickness=16mm$) = 8.48$ mm

Required size: $Sreq = 3.9 / 0.707 = 5.5$ mm → 7 mm ($\sqrt{(2t)} = \sqrt{(2 * 22)} = 6.6$)

ii) Between diaphragm and web of main girder

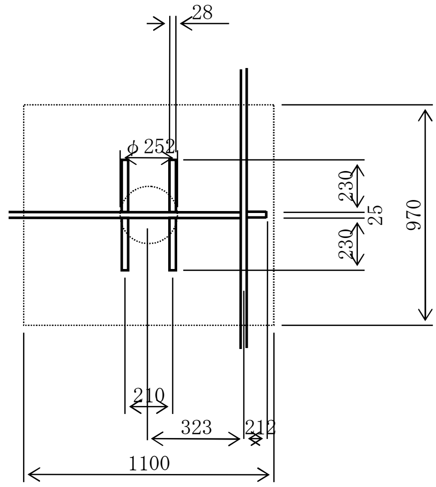
Required throat thickness: $Areq = 1745.1*10^3 / (2 * 2728 * 80)$
$+ 1794.6*10^6 / (2 * 2 * 2700 * 2253 * 80)$
$= 4.9$ mm $< 0.707 * \min(Smax$, Member thickness=15mm$) = 8.48$ mm

Required size: $Sreq = 4.9 / 0.707 = 6.9$ mm → 7 mm ($\sqrt{(2t)} = \sqrt{(2 * 16)} = 5.7$)

iii) Between lower flange and diaphragm

Full penetration weld is applied. (Within sole plate)

２）Main girder: G1・G4　Support: P6・P7



Reaction force　　Rv　=　8315.5 (kN) :G4-P7

Torsion momen　Tm　=　1411.8 (kN·m) :G4-P7

(a) Check of bearing stress

				$Ag(cm^2)$		Boss hole void		$An(cm^2)$
4-STIFF	PL	230*28 (SM490Y)	=	257.60				257.60
1-DIA	PL	1187*25 (SM490Y)	=	296.75	-	25.2*2.5	=	233.75

(DIA L = 550 + 323 + 200 + 57 + 57)　　　　　ΣAn = 491.35 cm^2

$\sigma b = 8315.5*10^3 / 49135 = 169\ N/mm^2 < \sigma ba = 315\ N/mm^2$

(b) Check of vertical stress

				$Ag(cm^2)$	$I(cm^4)$
4-STIFF	PL	230*28 (SM490Y)	=	257.60	53239
1-DIA	PL	723*25 (SM490Y)	=	180.74	0
		ΣAg	=	438.34 cm^2	53239 cm^4

From "1.7 * Astiff = 437.92",　Av = 437.92 cm^2

$\sigma cao = 210\ N/mm^2$

I = 53239 cm^4 , r = 11.03 cm

L = 135.00 cm , L/r = 12.24

$\sigma cag = 210\ N/mm^2$

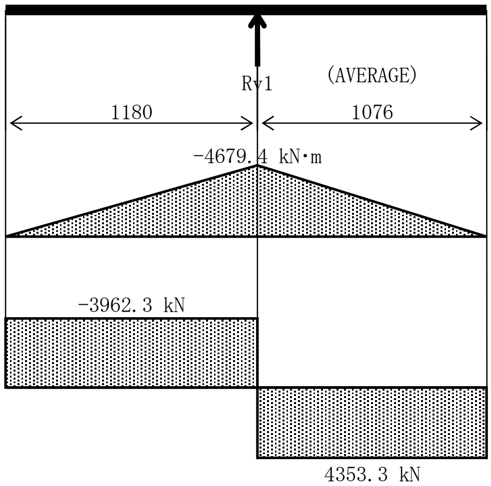
b/t = 230 / 28 = 8.214 < 10.5

$\sigma cal = 210\ N/mm^2$

$\sigma ca = \sigma cag * \sigma cal / \sigma cao = 210 * 210 / 210 = 210\ N/mm^2$

$\sigma v = 8315.5*10^3 / 43792 = 190\ N/mm^2 < \sigma ca = 210\ N/mm^2$

(c) Check of horizontal stress



Bending moment Mmax = -4679.4 (kN·m)

Shear force Smax = 4353.3 (kN)

Torsion moment Tm = 1411.8 (kN·m)

		$A(cm^2)$	Y(cm)	$AY(cm^3)$	$I(cm^4)$
1-FLG PL	384*16 (SM490Y) =	61.44	-135.8	-8344	1133054
1-WEB PL	2700*25 (SM490Y) =	675.00	0.0	0	4100625
1-FLG PL	1368*57 (SM520-H) =	779.76	137.8	107490	14817485
		1516.20		99146	20051164
					-6483315
				I =	13567850

e = 99146 / 1516.20 = 65.39 cm

Yu = -201.99 cm , YL = 75.31 cm

①Bending stress

σu = $-4679.4*10^6$ * -2019.9 / $13567850*10^4$ = 70 N/mm^2 < σta = 210 N/mm^2

σL = $-4679.4*10^6$ * 753.1 / $13567850*10^4$ = -26 N/mm^2 < σca = 210 N/mm^2

②Shear stress

Checking at manhole

$Aw = (270.0 - 0.0) * 2.5 = 675.0\ cm^2$

$\tau s = 4353.3*10^3 / 67500 = 64\ N/mm^2$

Shear stress due to torsion moment

$\tau t = 1411.8*10^6 / (2 * 2700 * 2256 * 25) = 5\ N/mm^2$

Sum of shear stress

$\Sigma \tau = 64 + 5 = 69\ N/mm^2 < \tau a = 120\ N/mm^2$

③Shear stress

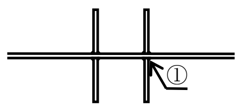
$\kappa = (70 / 210)^2 + (69 / 120)^2 = 0.44 < 1.2$

(d) Check of biaxial stress

$\alpha = (-190 / 210)^2 - (-190 / 210) * (-26 / 210)$
$+ (-26 / 210)^2 + (69 / 120)^2 = 1.05 < 1.2$

(e) Weld size

Maximum weld size: Smax = 12 mm



i) Between stiffener and diaphragm (①)

Required throat thickness: $Areq = (2 * 8315.5*10^3) / (8 * 2700 * 120)$
$= 6.4\ mm < 0.707 * min(Smax, Member\ thickness=25mm) = 8.48\ mm$

Required size: $Sreq = 6.4 / 0.707 = 9.1\ mm \rightarrow 10\ mm$ ($\sqrt{(2t)} = \sqrt{(2 * 25)} = 7.1$)

ii) Between diaphragm and web of main girder

Required throat thickness: $Areq = 4353.3*10^3 / (2 * 2729 * 120)$
$+ 1411.8*10^6 / (2 * 2 * 2700 * 2256 * 120)$
$= 7.1\ mm > 0.707 * min(Smax, Member\ thickness=17mm) = 8.48\ mm$

Required size: $Sreq = 7.1 / 0.707 = 10.0\ mm \rightarrow 11\ mm$ ($\sqrt{(2t)} = \sqrt{(2 * 25)} = 7.1$)

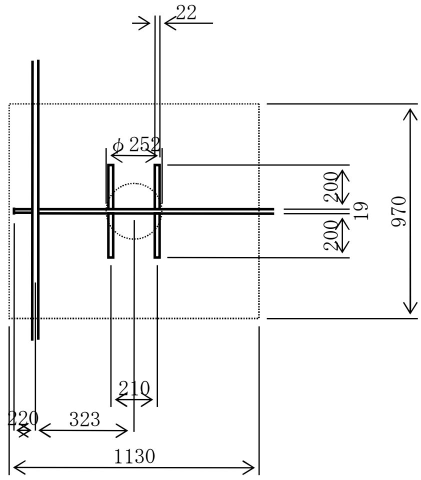
iii) Between lower flange and diaphragm

Full penetration weld is applied. (Within sole plate)

３）Main girder: G1・G4　Support: S2

Reaction force　Rv = 4024.1 (kN) : G1

Torsion momen　Tm = 2311.4 (kN·m) : G1



（a）Check of bearing stress

				Ag(cm^2)	Boss hole void	An(cm^2)
4-STIFF	PL	200*22	(SM400) =	176.00		176.00
1-DIA	PL	1122*19	(SM400) =	213.18 -	25.2*1.9 =	165.30

(DIA L = 565 + 323 + 210 + 12 + 12)　　ΣAn = 341.30 cm^2

$\sigma b = 4024.1*10^3 / 34130 = 118\ N/mm^2 < \sigma ba = 210\ N/mm^2$

（b）Check of vertical stress

				Ag(cm^2)	I(cm^4)
4-STIFF	PL	200*22	(SM400) =	176.00	26972
1-DIA	PL	651*19	(SM400) =	123.69	0
			ΣAg =	299.69 cm^2	26972 cm^4

From "1.7 * Astiff = 299.20", Av = 299.20 cm^2

$\sigma cao = 140\ N/mm^2$

I = 26972 cm^4 , r = 9.49 cm

L = 135.00 cm , L/r = 14.22

$\sigma cag = 140\ N/mm^2$

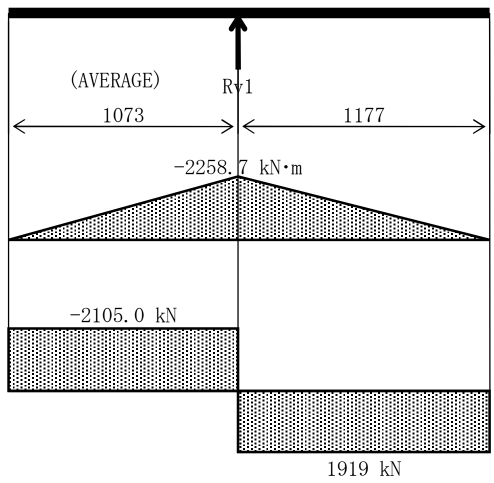
b/t = 200 / 22 = 9.091 < 12.8

$\sigma cal = 140\ N/mm^2$

$\sigma ca = \sigma cag * \sigma cal / \sigma cao = 140 * 140 / 140 = 140\ N/mm^2$

$\sigma v = 4024.1*10^3 / 29920 = 134\ N/mm^2 < \sigma ca = 140\ N/mm^2$

（c）Check of horizontal stress



Bending moment Mmax = -2258.7 (kN·m)

Shear force Smax = -2105.0 (kN)

Torsion moment Tm = 2311.4 (kN·m)

		$A(cm^2)$	$Y(cm)$	$AY(cm^3)$	$I(cm^4)$
1-FLG PL	384*16 (SM400) =	61.44	-135.8	-8344	1133054
1-WEB PL	2700*19 (SM400) =	513.00	0.0	0	3116475
1-FLG PL	288*12 (SM490Y) =	34.56	135.6	4686	635467
		609.00		-3657	4884997
					-21963
				I =	4863034

e = -3657 / 609.00 = -6.01 cm

Yu = -130.59 cm , YL = 142.21 cm

①Bending stress

$\sigma u = -2258.7*10^6 * -1305.9 / 4863034*10^4 = 61\ N/mm^2 < \sigma ta = 140\ N/mm^2$

$\sigma L = -2258.7*10^6 * 1422.1 / 4863034*10^4 = -66\ N/mm^2 < \sigma ca = 210\ N/mm^2$

②Shear stress

Checking at manhole

$Aw = (270.0 - 0.0) * 1.9 = 513.0\ cm^2$

$\tau s = 2105.0*10^3 / 51300 = 41\ N/mm^2$

Shear stress due to torsion moment

$\tau t = 2311.4*10^6 / (2 * 2700 * 2250 * 19) = 10\ N/mm^2$

Sum of shear stress

$\Sigma \tau = 41 + 10 = 51\ N/mm^2 < \tau a = 80\ N/mm^2$

③Shear stress

$\kappa = (-66 / 140)^2 + (51 / 80)^2 = 0.63 < 1.2$

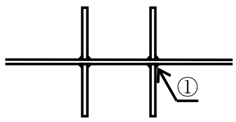
(d) Check of biaxial stress

$\alpha = (-134 / 140)^2 - (-134 / 140) * (-66 / 140)$

$+ (-66 / 140)^2 + (51 / 80)^2 = 1.10 < 1.2$

(e) Weld size

Maximum weld size: Smax = 12 mm



i) Between stiffener and diaphragm (①)

Required throat thickness: $Areq = (2 * 4024.1*10^3) / (8 * 2700 * 80)$

$= 4.7\ mm < 0.707 * \min(Smax, Member\ thickness=19mm) = 8.48\ mm$

Required size: $Sreq = 4.7 / 0.707 = 6.6\ mm \rightarrow 7\ mm$ ($\sqrt{(2t)} = \sqrt{(2 * 22)} = 6.6$)

ii) Between diaphragm and web of main girder

Required throat thickness: $Areq = 2105.0*10^3 / (2 * 2730 * 80)$

$+ 2311.4*10^6 / (2 * 2 * 2700 * 2250 * 80)$

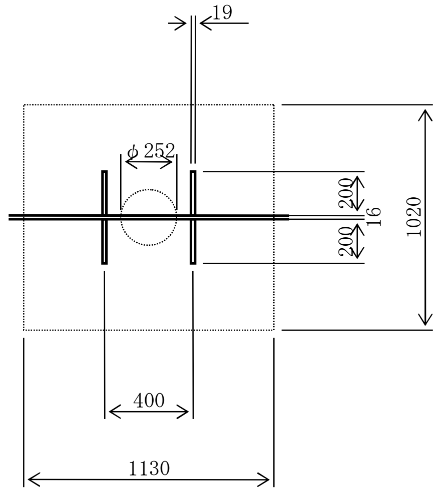
$= 6.0\ mm < 0.707 * \min(Smax, Member\ thickness=15mm) = 8.48\ mm$

Required size: $Sreq = 6.0 / 0.707 = 8.5\ mm \rightarrow 9\ mm$ ($\sqrt{(2t)} = \sqrt{(2 * 19)} = 6.2$)

iii) Between lower flange and diaphragm

Full penetration weld is applied. (Within sole plate)

4) Main girder: G2・G3　Support: S1



Reaction force　Rv = 2786.9 (kN) : G3

Torsion momen　Tm = 2391.0 (kN·m) : G3

(a) Check of bearing stress

				$Ag(cm^2)$	Boss hole void	$An(cm^2)$
4-STIFF	PL	200*19	(SM400) =	152.00		152.00
1-DIA	PL	1150*16	(SM400) =	184.00 −	25.2*1.6 =	143.68

(DIA L = 1130 + 10 + 10)　　ΣAn = 295.68 cm^2

$\sigma b = 2786.9*10^3 / 29568 = 94\ N/mm^2 < \sigma ba = 210\ N/mm^2$

(b) Check of vertical stress

				$Ag(cm^2)$	$I(cm^4)$
4-STIFF	PL	200*19	(SM400) =	152.00	22797
1-DIA	PL	768*16	(SM400) =	122.88	0
			ΣAg =	274.88 cm^2	22797 cm^4

From "1.7 * Astiff = 258.40", Av = 258.40 cm^2

$\sigma cao = 140\ N/mm^2$

I = 22797 cm^4 , r = 9.39 cm

L = 135.00 cm , L/r = 14.37

$\sigma cag = 140\ N/mm^2$

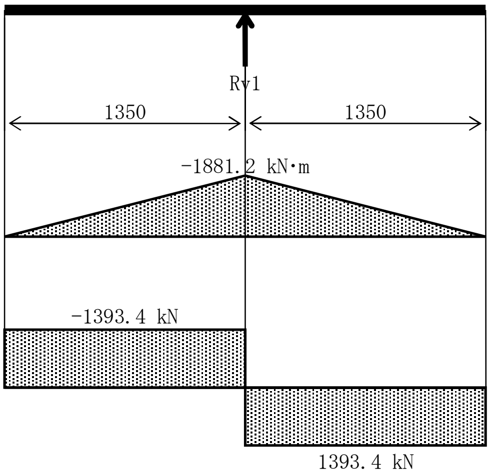
b/t = 200 / 19 = 10.526 < 12.8

$\sigma cal = 140\ N/mm^2$

$\sigma ca = \sigma cag * \sigma cal / \sigma cao = 140 * 140 / 140 = 140\ N/mm^2$

$\sigma v = 2786.9*10^3 / 25840 = 108\ N/mm^2 < \sigma ca = 140\ N/mm^2$

（c） Check of horizontal stress



Bending moment Mmax = -1881.2 (kN·m)

Shear force Smax = -1393.4 (kN)

Torsion moment Tm = 2391.0 (kN·m)

			$A(cm^2)$	$Y(cm)$	$AY(cm^3)$	$I(cm^4)$
1-FLG PL	384*16	(SM400) =	61.44	-135.8	-8344	1133054
1-WEB PL	2700*16	(SM400) =	432.00	0.0	0	2624400
1-FLG PL	240*10	(SM490Y) =	24.00	135.5	3252	440646
			517.44		-5092	4198100
						-50100
					I =	4148000

e = -5092 / 517.44 = -9.84 cm

Yu = -126.76 cm , YL = 145.84 cm

①Bending stress

σu = $-1881.2*10^6 * -1267.6 / 4148000*10^4$ = 57 N/mm^2 ＜ σta = 140 N/mm^2

σL = $-1881.2*10^6 * 1458.4 / 4148000*10^4$ = -66 N/mm^2 ＜ σca = 210 N/mm^2

②Shear stress

Checking at manhole

$Aw = (270.0 - 0.0) * 1.6 = 432.0\ cm^2$

$\tau s = 1393.4*10^3 / 43200 = 32\ N/mm^2$

Shear stress due to torsion moment

$\tau t = 2391.0*10^6 / (2 * 2700 * 2700 * 16) = 10\ N/mm^2$

Sum of shear stress

$\Sigma \tau = 32 + 10 = 43\ N/mm^2 < \tau a = 80\ N/mm^2$

③Shear stress

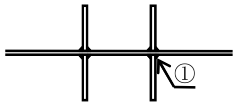
$\kappa = (-66 / 140)^2 + (43 / 80)^2 = 0.51 < 1.2$

(d) Check of biaxial stress

$\alpha = (-108 / 140)^2 - (-108 / 140) * (-66 / 140)$
$+ (-66 / 140)^2 + (43 / 80)^2 = 0.74 < 1.2$

(e) Weld size

Maximum weld size: Smax = 12 mm



i) Between stiffener and diaphragm (①)

Required throat thickness: $Areq = (2 * 2786.9*10^3) / (8 * 2700 * 80)$
$= 3.2\ mm < 0.707 * \min(Smax,\ \text{Member thickness}=16mm) = 8.48\ mm$

Required size: $Sreq = 3.2 / 0.707 = 4.5\ mm \rightarrow 7\ mm$ ($\sqrt{(2t)} = \sqrt{(2 * 19)} = 6.2$)

ii) Between diaphragm and web of main girder

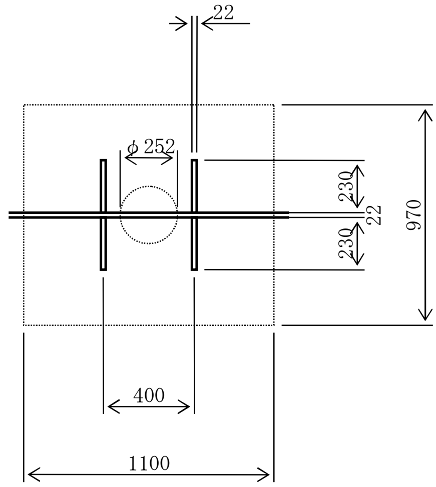
Required throat thickness: $Areq = 1393.4*10^3 / (2 * 2673 * 80)$
$+ 2391.0*10^6 / (2 * 2 * 2700 * 2700 * 80)$
$= 4.3\ mm < 0.707 * \min(Smax,\ \text{Member thickness}=14mm) = 8.48\ mm$

Required size: $Sreq = 4.3 / 0.707 = 6.1\ mm \rightarrow 7\ mm$ ($\sqrt{(2t)} = \sqrt{(2 * 16)} = 5.7$)

iii) Between lower flange and diaphragm

Full penetration weld is applied. (Within sole plate)

５）Main girder: G2・G3　 Support: P6・P7



Reaction force　Rv　=　 6419.8 (kN) : G3-P7

Torsion momen　Tm　=　 2518.9 (kN・m) : G3-P7

(ａ) Check of bearing stress

				Ag(cm^2)	Boss hole void		An(cm^2)
4-STIFF	PL	230*22 (SM490Y)	=	202.40			202.40
1-DIA	PL	1156*22 (SM490Y)	=	254.32 -	25.2*2.2	=	198.88

(DIA L = 1100 + 28 + 28)　　　　　　　　　　ΣAn　=　401.28 cm^2

σb = 6419.8*10^3 / 40128　=　160 N/mm^2　<　σba = 315 N/mm^2

(ｂ) Check of vertical stress

				Ag(cm^2)	I(cm^4)
4-STIFF	PL	230*22 (SM490Y)	=	202.40	41059
1-DIA	PL	928*22 (SM490Y)	=	204.16	0
		ΣAg	=	406.56 cm^2	41059 cm^4

From "1.7 * Astiff = 344.08",　Av = 344.08 cm^2

σcao = 210 N/mm^2

I　=　41059 cm^4　,　r　=　10.92 cm

L　=　135.00 cm　,　L/r =　12.36

σcag = 210 N/mm^2

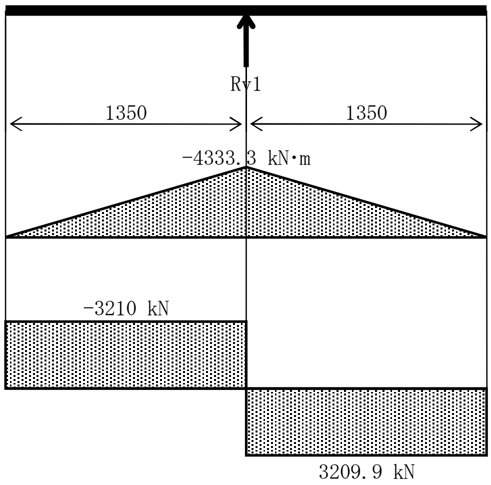
b/t　=　230 / 22　=　10.455　<　10.5

σcal = 210 N/mm^2

σca = σcag * σcal / σcao = 210 * 210 / 210 = 210 N/mm^2

σv = 6419.8*10^3 / 34408 = 187 N/mm^2　<　σca = 210 N/mm^2

(c) Check of horizontal stress



Bending moment Mmax = -4333.3 (kN·m)

Shear force Smax = -3209.9 (kN)

Torsion moment Tm = 2518.9 (kN·m)

		A(cm^2)	Y(cm)	AY(cm^3)	I(cm^4)
1-FLG PL	384*16 (SM490Y) =	61.44	-135.8	-8344	1133054
1-WEB PL	2700*22 (SM490Y) =	594.00	0.0	0	3608550
1-FLG PL	672*28 (SM490Y) =	188.16	136.4	25665	3500709
		843.60		17321	8242314
					-355658
				I =	7886655

e = 17321 / 843.60 = 20.53 cm

Yu = -157.13 cm , YL = 117.27 cm

①Bending stress

σu = $-4333.3*10^6 * -1571.3 / 7886655*10^4$ = 86 N/mm^2 < σta = 210 N/mm^2

σL = $-4333.3*10^6 * 1172.7 / 7886655*10^4$ = -64 N/mm^2 < σca = 210 N/mm^2

②Shear stress

Checking at manhole

$A_w = (270.0 - 0.0) * 2.2 = 594.0\ cm^2$

$\tau s = 3209.9*10^3 / 59400 = 54\ N/mm^2$

Shear stress due to torsion moment

$\tau t = 2518.9*10^6 / (2 * 2700 * 2700 * 22) = 8\ N/mm^2$

Sum of shear stress

$\Sigma \tau = 54 + 8 = 62\ N/mm^2 < \tau a = 120\ N/mm^2$

③Shear stress

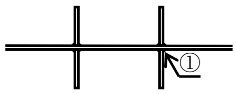
$\kappa = (86 / 210)^2 + (62 / 120)^2 = 0.44 < 1.2$

(d) Check of biaxial stress

$\alpha = (-187 / 210)^2 - (-187 / 210) * (-64 / 210)$
$+ (-64 / 210)^2 + (62 / 120)^2 = 0.88 < 1.2$

(e) Weld size

Maximum weld size: Smax = 12 mm



i) Between stiffener and diaphragm (①)

Required throat thickness: $A_{req} = (2 * 6419.8*10^3) / (8 * 2700 * 120)$

$= 5.0\ mm < 0.707 * \min(S_{max}, \text{Member thickness}=22mm) = 8.48\ mm$

Required size: $S_{req} = 5.0 / 0.707 = 7.1\ mm \rightarrow 8\ mm$ ($\sqrt{(2t)} = \sqrt{(2 * 22)} = 6.6$)

ii) Between diaphragm and web of main girder

Required throat thickness: $A_{req} = 3209.9*10^3 / (2 * 2673 * 120)$

$+ 2518.9*10^6 / (2 * 2 * 2700 * 2700 * 120)$

$= 5.7\ mm < 0.707 * \min(S_{max}, \text{Member thickness}=14mm) = 8.48\ mm$

Required size: $S_{req} = 5.7 / 0.707 = 8.1\ mm \rightarrow 9\ mm$ ($\sqrt{(2t)} = \sqrt{(2 * 22)} = 6.6$)

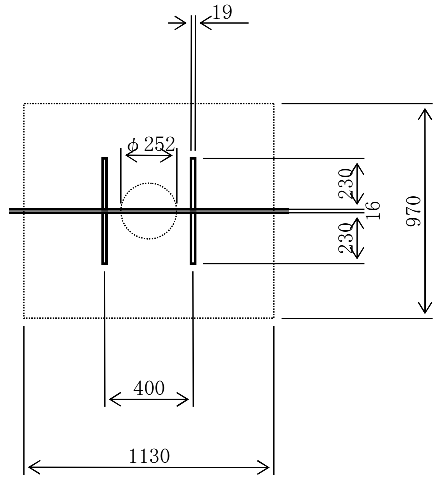
iii) Between lower flange and diaphragm

Full penetration weld is applied. (Within sole plate)

6) Main girder: G2・G3   Support: S2

Reaction force R_v = 3653.5 (kN) : G3

Torsion momen T_m = 2605.0 (kN·m) : G3



(a) Check of bearing stress

				Ag(cm²)	Boss hole void	An(cm²)
4-STIFF	PL	230*19	(SM400) =	174.80		174.80
1-DIA	PL	1150*16	(SM400) =	184.00 −	25.2*1.6 =	143.68

(DIA L = 1130 + 10 + 10) ΣAn = 318.48 cm²

$\sigma b = 3653.5 * 10^3 / 31848 = 115\ N/mm^2 < \sigma ba = 210\ N/mm^2$

(b) Check of vertical stress

				Ag(cm²)	I(cm⁴)
4-STIFF	PL	230*19	(SM400) =	174.80	34153
1-DIA	PL	768*16	(SM400) =	122.88	0
			ΣAg =	297.68 cm²	34153 cm⁴

From "1.7 * Astiff = 297.16", Av = 297.16 cm²

$\sigma cao = 140\ N/mm^2$

I = 34153 cm⁴ , r = 10.72 cm

L = 135.00 cm , L/r = 12.59

$\sigma cag = 140\ N/mm^2$

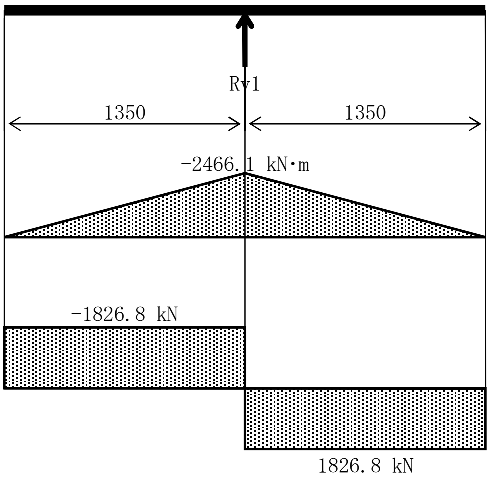
b/t = 230 / 19 = 12.105 < 12.8

$\sigma cal = 140\ N/mm^2$

$\sigma ca = \sigma cag * \sigma cal / \sigma cao = 140 * 140 / 140 = 140\ N/mm^2$

$\sigma v = 3653.5 * 10^3 / 29716 = 123\ N/mm^2 < \sigma ca = 140\ N/mm^2$

(c) Check of horizontal stress



Bending moment Mmax = -2466.1 (kN·m)

Shear force Smax = -1826.8 (kN)

Torsion moment Tm = 2605.0 (kN·m)

		$A(cm^2)$	Y(cm)	$AY(cm^3)$	$I(cm^4)$
1-FLG PL	384*16 (SM400) =	61.44	-135.8	-8344	1133054
1-WEB PL	2700*16 (SM400) =	432.00	0.0	0	2624400
1-FLG PL	240*10 (SM490Y) =	24.00	135.5	3252	440646
		517.44		-5092	4198100
					-50100
				I =	4148000

e = -5092 / 517.44 = -9.84 cm

Yu = -126.76 cm , YL = 145.84 cm

①Bending stress

σu = $-2466.1*10^6$ * -1267.6 / $4148000*10^4$ = 75 N/mm^2 < σta = 140 N/mm^2

σL = $-2466.1*10^6$ * 1458.4 / $4148000*10^4$ = -87 N/mm^2 < σca = 210 N/mm^2

②Shear stress

Checking at manhole

$A_w = (270.0 - 0.0) * 1.6 = 432.0\ cm^2$

$\tau s = 1826.8*10^3 / 43200 = 42\ N/mm^2$

Shear stress due to torsion moment

$\tau t = 2605.0*10^6 / (2 * 2700 * 2700 * 16) = 11\ N/mm^2$

Sum of shear stress

$\Sigma \tau = 42 + 11 = 53\ N/mm^2 < \tau a = 80\ N/mm^2$

③Shear stress

$\kappa = (-87 / 140)^2 + (53 / 80)^2 = 0.83 < 1.2$

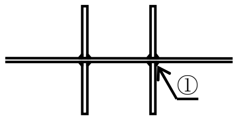
(d) Check of biaxial stress

$\alpha = (-123 / 140)^2 - (-123 / 140) * (-87 / 140)$

$+ (-87 / 140)^2 + (53 / 80)^2 = 1.06 < 1.2$

(e) Weld size

Maximum weld size: Smax = 12 mm



i) Between stiffener and diaphragm (①)

Required throat thickness: $Areq = (2 * 3653.5*10^3) / (8 * 2700 * 80)$

$= 4.2\ mm < 0.707 * \min(Smax, \text{Member thickness}=16mm) = 8.48\ mm$

Required size: $Sreq = 4.2 / 0.707 = 5.9\ mm \rightarrow 7\ mm$ ($\sqrt{(2t)} = \sqrt{(2 * 22)} = 6.6$)

ii) Between diaphragm and web of main girder

Required throat thickness: $Areq = 1826.8*10^3 / (2 * 2673 * 80)$

$+ 2605.0*10^6 / (2 * 2 * 2700 * 2700 * 80)$

$= 5.4\ mm < 0.707 * \min(Smax, \text{Member thickness}=14mm) = 8.48\ mm$

Required size: $Sreq = 5.4 / 0.707 = 7.6\ mm \rightarrow 8\ mm$ ($\sqrt{(2t)} = \sqrt{(2 * 16)} = 5.7$)

iii) Between lower flange and diaphragm

Full penetration weld is applied. (Within sole plate)

（2） Calculations of stiffening rib

1） Main gigder : G1･G4　Support : S1

(a) Design conditions

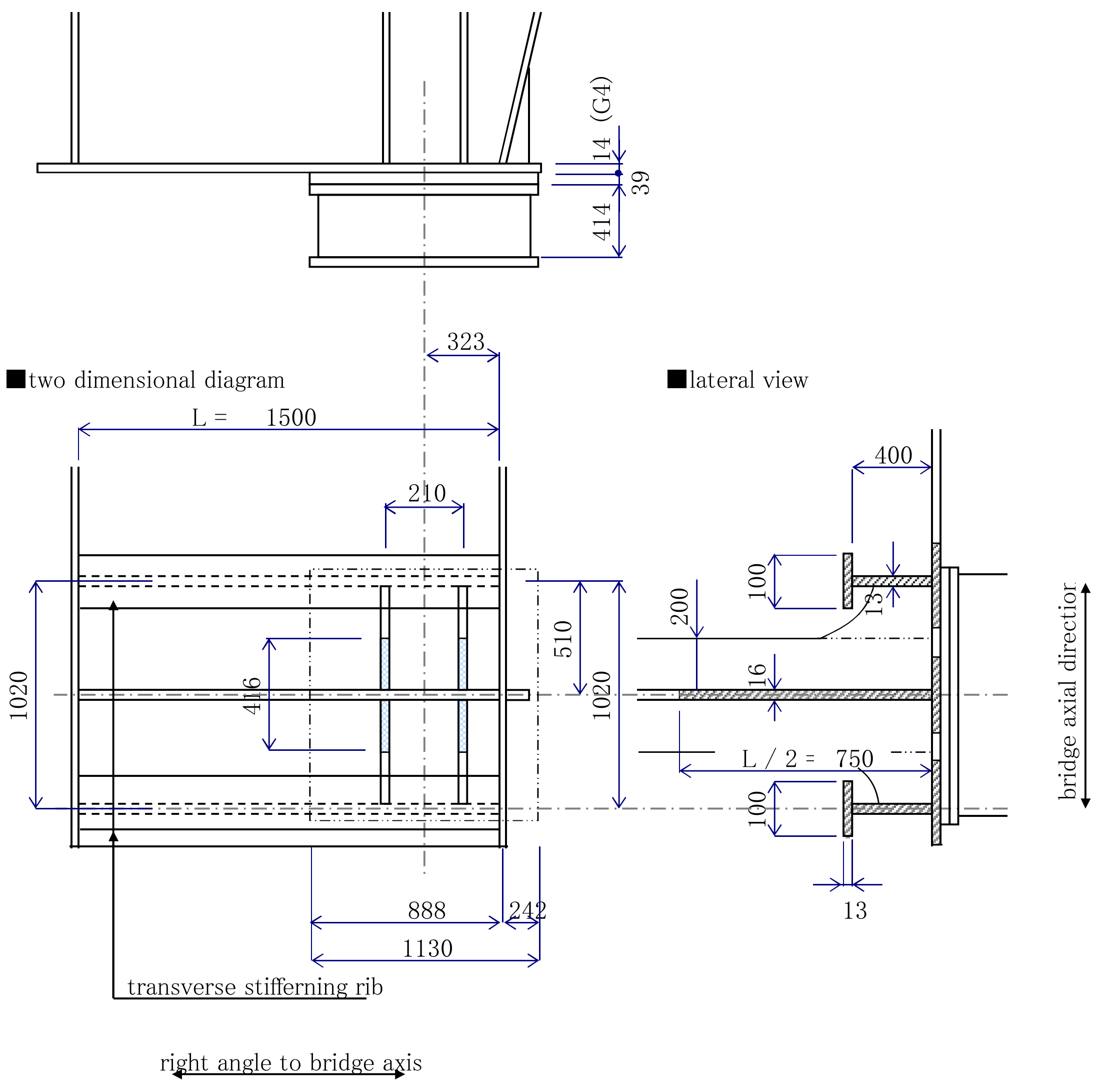
material of main girder = SM490Y

estimated seismic horizontal force F

bridge axial direction (L1) = 1432 kN

longitudinal direction (L1) = 494 kN

■cross sectional diagram



strucural diagram reinforcing supporting point

(b) Calculations of stiffening rib

① Relative stiffness

a) effective width

supporting joint diaphragm

$b = \frac{510}{2} = 255$ mm $l = 1500$ mm $\frac{b}{l} = \frac{255}{1500} = 0.17$

$\frac{\lambda_D}{2} = \{1.1 - 2(b/l)\}b = 194$ mm $\therefore \lambda_D = 388$ mm

stiffening rib

$b_1 = \frac{510}{2} = 255$ mm $l = 1500$ mm $\frac{b}{l} = \frac{255}{1500} = 0.17$

$\frac{\lambda_{RL1}}{2} = \{1.1 - 2(b/l)\}b = 194$ mm

$b_2 = 290$ mm $l = 1500$ mm $\frac{b}{l} = \frac{290}{1500} = 0.193$

$\frac{\lambda_{RL2}}{2} = \{1.1 - 2(b/l)\}b = 207$ mm $\therefore \lambda_{RL} = \lambda_{RL1} + \lambda_{RL2} = 401$ mm

b) Relative stiffness

supporting joint diaphragm

	b(mm)		t(mm)	A(mm^2)	y(mm)	Ay(mm^3)	Ay^2 + I (mm^4)
1 − DIA	750	×	16	12000	−	−	56250 $\times 10^4$
1 − L.Flg	388	×	14	5432	382.0	2075024	79266 $\times 10^4$
			A =	17432		2075024	135516 $\times 10^4$
						$-\Sigma A \cdot \delta^2$ =	−24685 $\times 10^4$
$\delta = \Sigma(A \cdot y) / \Sigma A =$				119.0 mm			110831 $\times 10^4$

stiffening rib

	b(mm)		t(mm)	A(mm^2)	y(mm)	Ay(mm^3)	Ay^2 + I (mm^4)
1 − U.Flg	100	×	13	1300	−206.5	−268450	5543 $\times 10^4$
1 − Web	400	×	13	5200	−	−	6933 $\times 10^4$
1 − L.Flg	401	×	14	5614	207.0	1162098	24055 $\times 10^4$
			A =	12114		893648	36531 $\times 10^4$
						$-\Sigma A \cdot \delta^2$ =	−6598 $\times 10^4$
$\delta = \Sigma(A \cdot y) / \Sigma A =$				73.8 mm			29933 $\times 10^4$

② Acting force

Acting height

L.Flg	0.014	m
Sole PL	0.039	m
bearing support	0.414	m
Acting height	0.467	m

bridge axial direction

$F = 1432$ kN

bending moment

$M_E = 1432 \text{ kN} \times 0.467 \text{ m} = 669 \text{ kN·m}$

Acting force

$$q_{1EM} = \frac{M_E}{D \times L_B} = 580 \text{ kN/m}$$

Acting force(Usually equivalent)

$q_{1E} = q_{1EM}/1.5 = 387$ kN/m

③ design cross-sectional force

$L = 1.500$ m

$a = 1.056$ m

$b = 0.444$ m

$\lambda = 0.888$ m

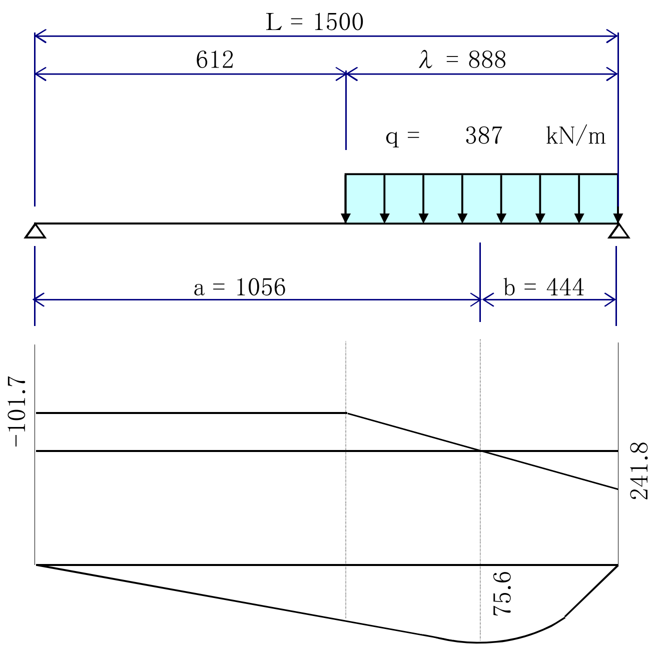
$q = 387$ kN/m

$$M = \frac{a \cdot b \cdot \lambda \cdot q}{L^2} \times \left(L - \frac{\lambda}{2}\right)$$

$= 75.6$ kN·m

$$S = \frac{q \cdot b \cdot \lambda}{L}$$

$= 241.8$ kN



④ cross-section calculation of stiffening rib

(SM400)	b(mm)		t(mm)	$A(mm^2)$	y(mm)	$Ay(mm^3)$	$Ay^2 + I\ (mm^4)$
1 − U.Flg	100.0	×	13	1300	−206.5	−268450	5543×10^4
1 − Web	400.0	×	13	5200	−	−	6933 ×105
1 − L.Flg	401.0	×	14	5614	207.0	1162098	24055×10^4
			A =	12114		893648	36531×10^4
						$-\Sigma A \cdot \delta^2 =$	-6598×10^4
							29933×10^4

$\delta = \Sigma(A \cdot y) / \Sigma A =$ 74 mm

Yu = −287 mm ∴ Zu = −1043689 mm^3

Yl = 140 mm ∴ Zl = 2135021 mm^3

$$\sigma u = \frac{M}{Zu} = \frac{75.6 \times 10^6}{-1043689} = -72\ N/mm^2 < 111\ N/mm^2$$

$$\sigma l = \frac{M}{Zl} = \frac{75.6 \times 10^6}{2135021} = 35\ N/mm^2 < 125\ N/mm^2 \quad \text{(Sole PL:SS400)}$$

$$\tau = \frac{S}{Aw} = \frac{241.8 \times 10^3}{5200} = 47\ N/mm^2 < 80\ N/mm^2$$

compound stress $\left(\frac{-72}{111}\right)^2 + \left(\frac{47}{80}\right)^2 = 0.8 < 1.2$

L/b = 1500 / 100 = 15.0 > 9/k = 4.025 k = 2.236

Aw/Ac = 4.0 > 2.0 b/t = 7.2 < 12.8

∴ $\sigma ca = 140 - 1.2(K \cdot L/b - 9) = 111\ N/mm^2$

Weld size (Between stiffening rib and web of main girder)

$$Sreg1 = \frac{S}{H \cdot \tau a \cdot 2 \cdot 0.707}$$

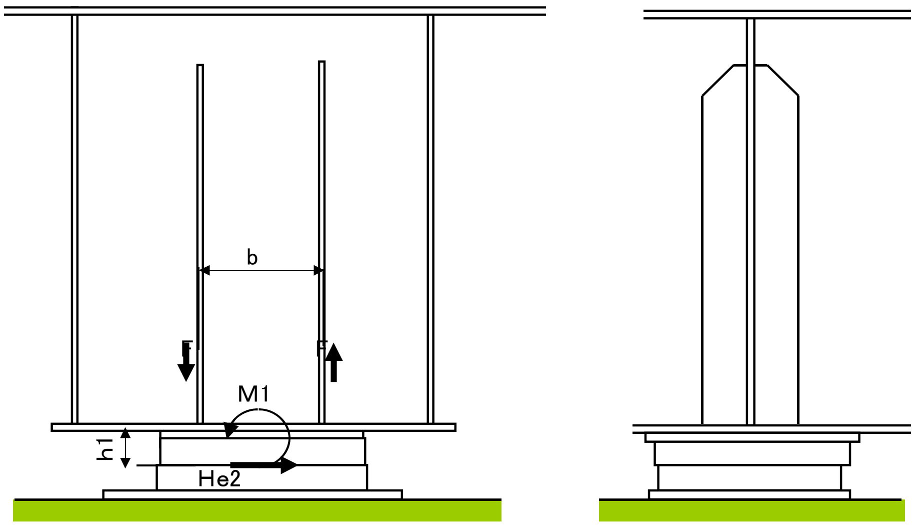
$$= \frac{241.8 \times 10^3}{(400 - 35) \times 80 \times 2 \times 0.707} = 5.9\ mm$$

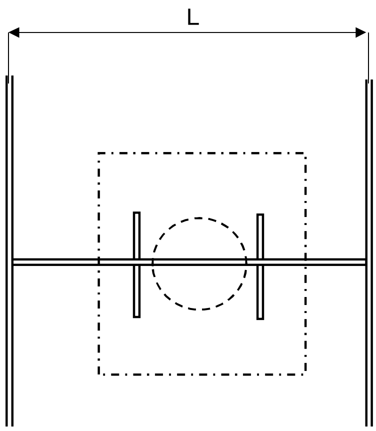
$$Sreg2 = \sqrt{2t} = \sqrt{(2 \cdot 13)} = 5.1\ mm$$

∴ Fillet welding S = 6 mm

(c) The reinforcement by earchquake of longitudinal direction

① shape





h1 ＝ 260 mm
b ＝ 210 mm

② design cross-sectional force

Reaction of dead load Rd = 2050.2 kN (G4)

	longitudinal direction	Remarks
	He2	
Horizontal force H(kN)	494	
Horizontal force H'(kN)	329	He/1.5

bending moment (kN・m)	longitudinal direction	Remarks
	M2	M＝H'×h
	85.5	Usually equivalent

③ checking of stiffener

Design method is couple of force by earchquake is transmitted to diaphragm via vertical stiffener.

[seismic load] stress of stiffener

Couple of force

$F = M2 / b$

$= 85.5 / 0.210 = 407.1$ kN

section of stiffener 4 − 200 × 22 (SM400) $A = 17600$ mm^2

stress $\sigma e = F / A = 23$ N/mm^2 < $\sigma a = 140$ N/mm^2

[dead load] stress of stiffener

Reaction of dead load $Rd = 2050.2$ kN

Sectional area $Ag = 27104$ mm^2

(4. 12. Calculation of supporting joint DIAPHRAGM)

stress $\sigma d = Rd / Ag / 1.7 = 44$ N/mm^2

Total

$\sigma d = \sigma e + \sigma d = 68$ N/mm^2 < $\sigma a = 140$ N/mm^2 *OK*

I do not install the reinforcement for earchquake of longitudinal direction.

2） Main gigder : G1・G4　Support : P6・P7

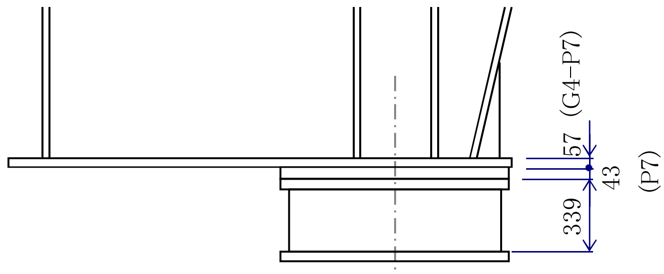
（a）Design conditions

material of main girder　=　SM490Y

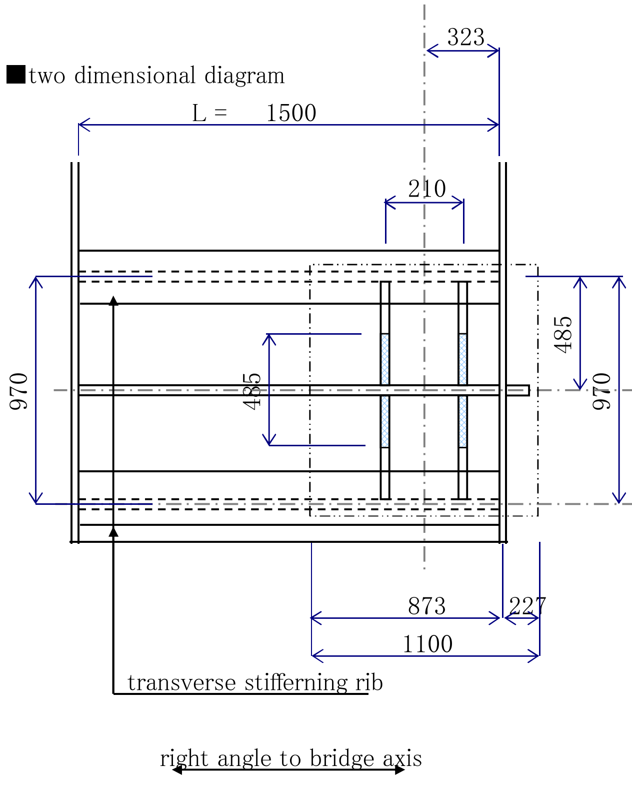
estimated seismic horizontal force　F

bridge axial direction（L1）	=	1147	kN	(P6)
longitudinal direction（L1）	=	1724	kN	(P7)

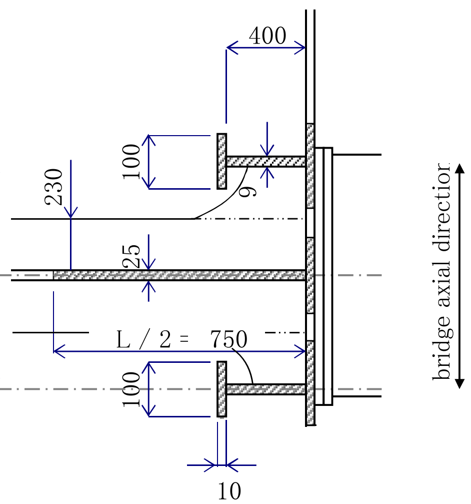
■cross sectional diagram



■two dimensional diagram



■lateral view



strucural diagram reinforcing supporting point

(b) Calculations of stiffening rib

① Relative stiffness

a) effective width

supporting joint diaphragm

$b = \frac{485}{2} = 243$ mm $l = 1500$ mm $\frac{b}{l} = \frac{243}{1500} = 0.162$

$\frac{\lambda_D}{2} = \{1.1 - 2(b/l)\} b = 188$ mm $\therefore \lambda_D = 376$ mm

stiffening rib

$b_1 = \frac{485}{2} = 243$ mm $l = 1500$ mm $\frac{b}{l} = \frac{243}{1500} = 0.162$

$\frac{\lambda_{RL1}}{2} = \{1.1 - 2(b/l)\} b = 188$ mm

$b_2 = \frac{2233}{2} = 1117$ mm $l = 1500$ mm $\frac{b}{l} = \frac{1117}{1500} = 0.744$

$\frac{\lambda_{RL2}}{2} = 0.15 \cdot l = 225$ mm $\therefore \lambda_{RL} = \lambda_{RL1} + \lambda_{RL2} = 413$ mm

b) Relative stiffness

supporting joint diaphragm

	b(mm)		t(mm)	A(mm²)	y(mm)	Ay(mm³)	Ay² + I (mm⁴)
1 − DIA	750	×	25	18750	−	−	87891 $\times 10^4$
1 − L.Flg	376	×	57	21432	403.5	8647812	348939 $\times 10^4$
			A =	40182		8647812	436830 $\times 10^4$
						$-\Sigma A \cdot \delta^2$ =	−186087 $\times 10^4$
							250743 $\times 10^4$

$\delta = \Sigma(A \cdot y) / \Sigma A = 215.2$ mm

stiffening rib

	b(mm)		t(mm)	A(mm²)	y(mm)	Ay(mm³)	Ay² + I (mm⁴)
1 − U.Flg	100	×	10	1000	−205.0	−205000	4203 $\times 10^4$
1 − Web	400	×	9	3600	−	−	4800 $\times 10^4$
1 − L.Flg	413	×	57	23541	228.5	5379119	122913 $\times 10^4$
			A =	28141		5174119	131916 $\times 10^4$
						$-\Sigma A \cdot \delta^2$ =	−95171 $\times 10^4$
							36745 $\times 10^4$

$\delta = \Sigma(A \cdot y) / \Sigma A = 183.9$ mm

② Acting force

Acting height

L.Flg	0.057	m
Sole PL	0.043	m
bearing support	0.339	m
Acting height	0.439	m

bridge axial direction

$F = 1147$ kN

bending moment

$M_E = 1147\ \text{kN} \times 0.439\ \text{m} = 504\ \text{kN·m}$

Acting force

$$q_{1EM} = \frac{M_E}{D \times L_B} = 472\ \text{kN/m}$$

Acting force(Usually equivalent)

$q_{1E} = q_{1EM}/1.5 = 315$ kN/m

③ design cross-sectional force

$L = 1.500$ m

$a = 1.064$ m

$b = 0.437$ m

$\lambda = 0.873$ m

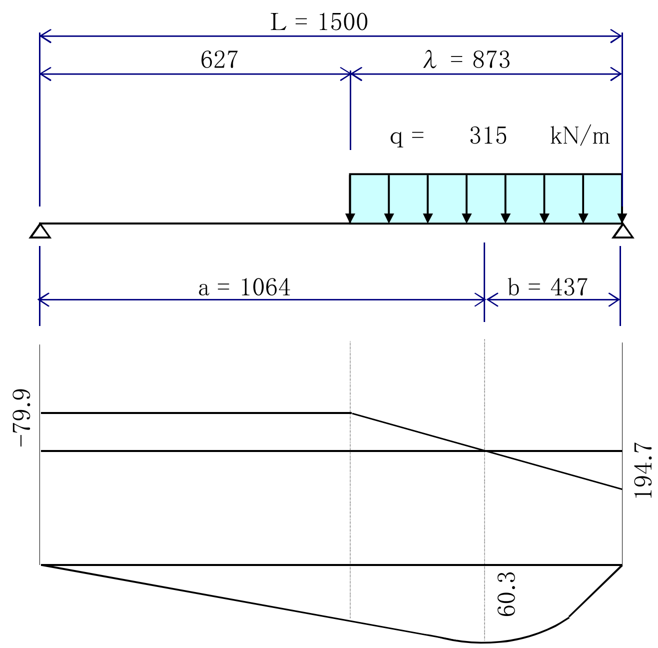
$q = 315$ kN/m

$$M = \frac{a \cdot b \cdot \lambda \cdot q}{L^2} \times \left(L - \frac{\lambda}{2}\right)$$

$= 60.3$ kN·m

$$S = \frac{q \cdot b \cdot \lambda}{L}$$

$= 194.7$ kN



④ cross-section calculation of stiffening rib

(SM400)	b(mm)		t(mm)	A(mm^2)	y(mm)	Ay(mm^3)	Ay^2 + I (mm^4)
1 − U.Flg	100.0	×	10	1000	−205.0	−205000	4203 $\times 10^4$
1 − Web	400.0	×	9	3600	−	−	4800 ×105
1 − L.Flg	413.0	×	57	23541	228.5	5379119	122913 $\times 10^4$
			A =	28141		5174119	131916 $\times 10^4$
						$-\Sigma A\cdot\delta^2$ =	−95171 $\times 10^4$
							36745 $\times 10^4$

$\delta = \Sigma(A\cdot y) / \Sigma A = 184$ mm

Yu = −394 mm ∴ Zu = −932851 mm^3

Yl = 73 mm ∴ Zl = 5026676 mm^3

$$\sigma u = \frac{M}{Zu} = \frac{60.3 \times 10^6}{-932851} = -65\ N/mm^2 < 111\ N/mm^2$$

$$\sigma l = \frac{M}{Zl} = \frac{60.3 \times 10^6}{5026676} = 12\ N/mm^2 < 140\ N/mm^2$$ (Sole PL:SS400)

$$\tau = \frac{S}{Aw} = \frac{194.7 \times 10^3}{3600} = 54\ N/mm^2 < 80\ N/mm^2$$

compound stress $\left(\frac{-65}{111}\right)^2 + \left(\frac{54}{80}\right)^2 = 0.8 < 1.2$

L/b = 1500 / 100 = 15.0 > 9/k = 4.108 k = 2.191

Aw/Ac = 3.6 > 2.0 b/t = 9.6 < 12.8

∴ $\sigma ca = 140 - 1.2(K\cdot L/b - 9) = 111\ N/mm^2$

Weld size (Between stiffening rib and web of main girder)

$$Sreg1 = \frac{S}{H\cdot \tau a \cdot 2 \cdot 0.707}$$

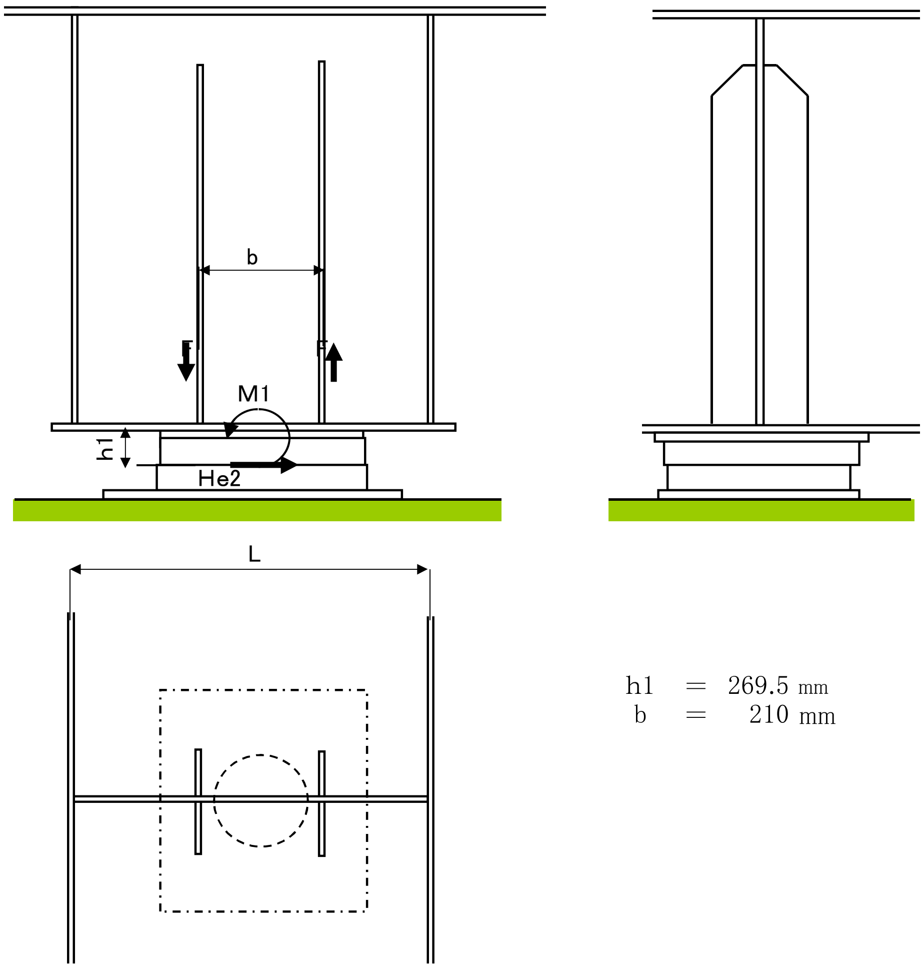
$$= \frac{194.7 \times 10^3}{(400 - 35) \times 80 \times 2 \times 0.707} = 4.7\ mm$$

$$Sreg2 = \sqrt{2t} = \sqrt{(2\cdot 9)} = 4.2\ mm$$

∴ Fillet welding S = 6 mm

(c) The reinforcement by earchquake of longitudinal direction

① shape



h1 = 269.5 mm
b = 210 mm

② design cross-sectional force

Reaction of dead load Rd = 5950.8 kN (G4-P7)

	longitudinal direction	Remarks
	He2	
Horizontal force H(kN)	1724	
Horizontal force H'(kN)	1149	He/1.5

bending moment (kN・m)	longitudinal direction	Remarks
	M2	M=H'×h
	309.7	Usually equivalent

③ checking of stiffener

Design method is couple of force by earchquake is transmitted to diaphragm via vertical stiffener.

[seismic load] stress of stiffener

Couple of force

$F = M2 / b$

$= 309.7 / 0.210 = 1475$ kN

section of stiffener 4 - 230 × 28 (SM490Y) A = 25760 mm^2

stress σe = F / A = 57 N/mm^2 < σa = 210 N/mm^2

[dead load] stress of stiffener

Reaction of dead load Rd = 5950.8 kN

Sectional area Ag = 43834 mm^2
(4. 12. Calculation of supporting joint DIAPHRAGM)

stress σd = Rd / Ag / 1.7 = 80 N/mm^2

Total

$\sigma d = \sigma e + \sigma d = 137$ N/mm^2 < σa = 210 N/mm^2 *OK*

I do not install the reinforcement for earchquake of longitudinal direction.

3） Main gigder : G1・G4　Support : S2

(a) Design conditions

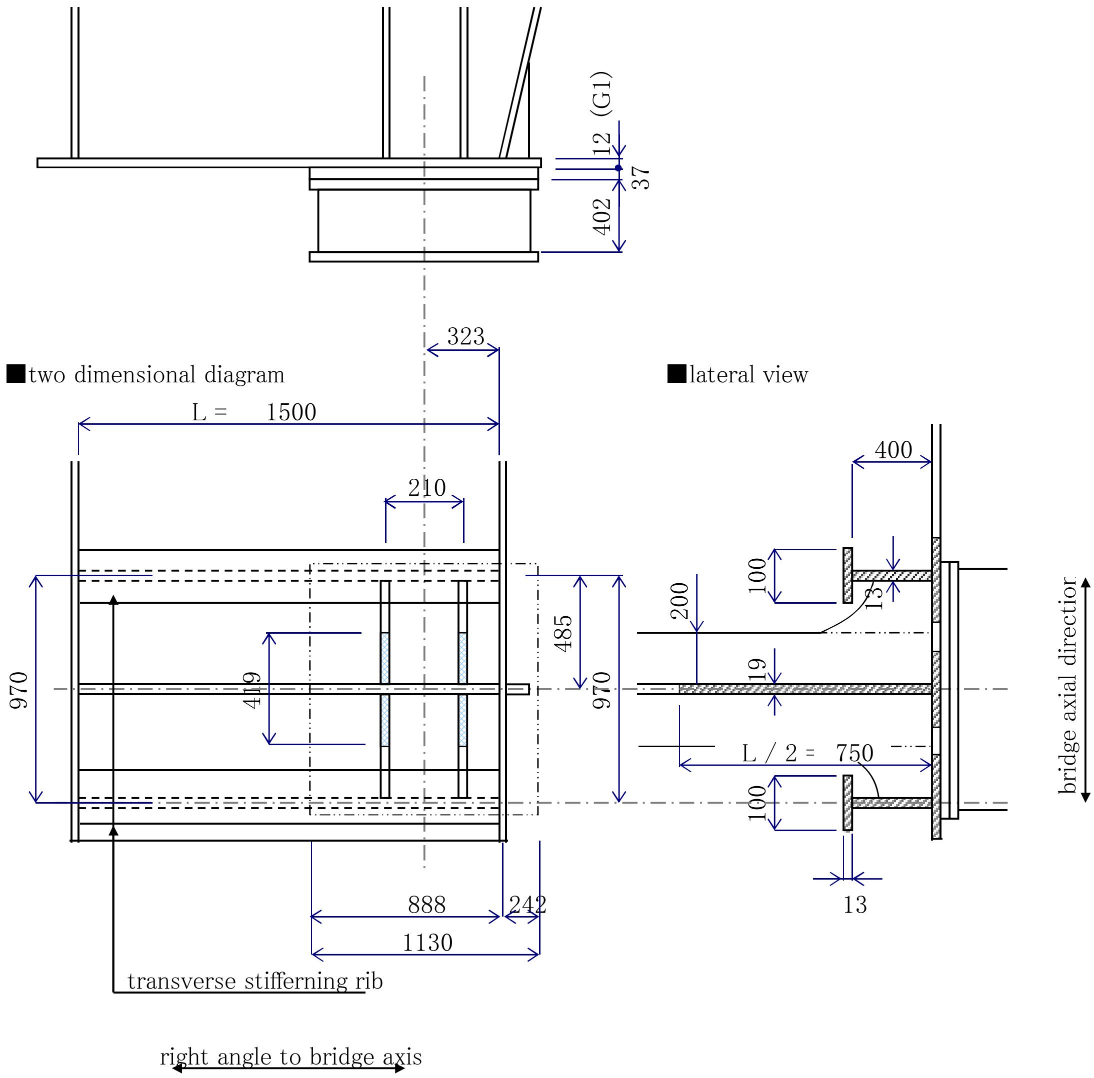
material of main girder　=　SM490Y

estimated seismic horizontal force　F

bridge axial direction (L1)　=　1318　kN

longitudinal direction (L1)　=　625　kN

■cross sectional diagram



strucural diagram reinforcing supporting point

(b) Calculations of stiffening rib

① Relative stiffness

a) effective width

supporting joint diaphragm

$b = \dfrac{485}{2} = 243$ mm $l = 1500$ mm $\dfrac{b}{l} = \dfrac{243}{1500} = 0.162$

$\dfrac{\lambda_D}{2} = \{1.1 - 2(b/l)\}b = 188$ mm $\therefore \lambda_D = 376$ mm

stiffening rib

$b_1 = \dfrac{485}{2} = 243$ mm $l = 1500$ mm $\dfrac{b}{l} = \dfrac{243}{1500} = 0.162$

$\dfrac{\lambda_{RL1}}{2} = \{1.1 - 2(b/l)\}b = 188$ mm

$b_2 = 515$ mm $l = 1500$ mm $\dfrac{b}{l} = \dfrac{515}{1500} = 0.343$

$\dfrac{\lambda_{RL2}}{2} = 0.15 \cdot l = 225$ mm $\therefore \lambda_{RL} = \lambda_{RL1} + \lambda_{RL2} = 413$ mm

b) Relative stiffness

supporting joint diaphragm

	b(mm)		t(mm)	A(mm²)	y(mm)	Ay(mm³)	Ay² + I (mm⁴)
1 − DIA	750	×	19	14250	−	−	66797 ×10⁴
1 − L.Flg	376	×	12	4512	381.0	1719072	65497 ×10⁴
			A =	18762		1719072	132294 ×10⁴
						$-\Sigma A \cdot \delta^2$ =	−15742 ×10⁴
$\delta = \Sigma(A \cdot y) / \Sigma A$ =				91.6 mm			116552 ×10⁴

stiffening rib

	b(mm)		t(mm)	A(mm²)	y(mm)	Ay(mm³)	Ay² + I (mm⁴)
1 − U.Flg	100	×	13	1300	−206.5	−268450	5543 ×10⁴
1 − Web	400	×	13	5200	−	−	6933 ×10⁴
1 − L.Flg	413	×	12	4956	206.0	1020936	21031 ×10⁴
			A =	11456		752486	33507 ×10⁴
						$-\Sigma A \cdot \delta^2$ =	−4945 ×10⁴
$\delta = \Sigma(A \cdot y) / \Sigma A$ =				65.7 mm			28562 ×10⁴

② Acting force

Acting height

L.Flg	0.012	m
Sole PL	0.037	m
bearing support	0.402	m
Acting height	0.451	m

bridge axial direction

$F = 1318$ kN

bending moment

$M_E = 1318 \text{ kN} \times 0.451 \text{ m} = 594 \text{ kN·m}$

Acting force

$$q_{1EM} = \frac{M_E}{D \times L_B} = 542 \text{ kN/m}$$

Acting force(Usually equivalent)

$q_{1E} = q_{1EM}/1.5 = 362$ kN/m

③ design cross-sectional force

$L = 1.500$ m

$a = 1.056$ m

$b = 0.444$ m

$\lambda = 0.888$ m

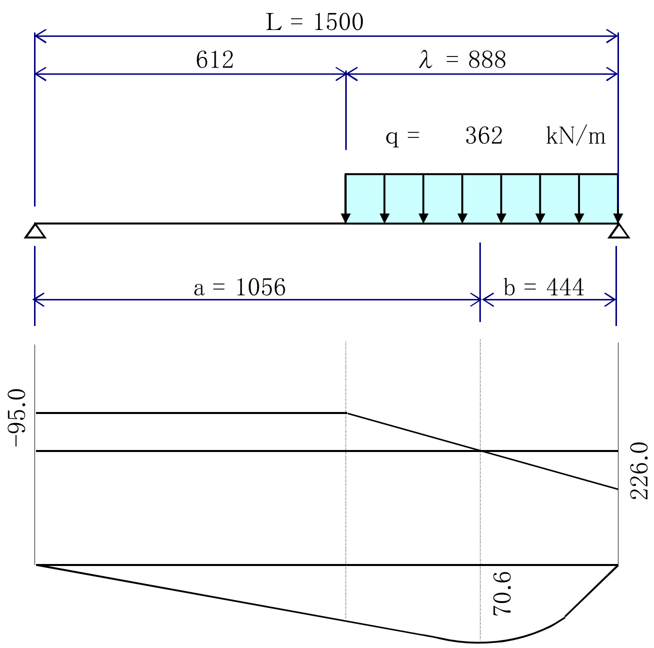
$q = 362$ kN/m

$$M = \frac{a \cdot b \cdot \lambda \cdot q}{L^2} \times \left(L - \frac{\lambda}{2}\right)$$

$= 70.6$ kN·m

$$S = \frac{q \cdot b \cdot \lambda}{L}$$

$= 226.0$ kN



④ cross-section calculation of stiffening rib

(SM400)	b(mm)	t(mm)	$A(mm^2)$	y(mm)	$Ay(mm^3)$	$Ay^2 + I\ (mm^4)$
1 − U.Flg	100.0 ×	13	1300	−206.5	−268450	5543×10^4
1 − Web	400.0 ×	13	5200	−	−	6933 ×105
1 − L.Flg	413.0 ×	12	4956	206.0	1020936	21031×10^4
		A =	11456		752486	33507×10^4
					$-\Sigma A \cdot \delta^2 =$	-4945×10^4
						28562×10^4

$\delta = \Sigma(A \cdot y) / \Sigma A =$ 66 mm

Yu = −279 mm ∴ Zu = −1024830 mm^3

Yl = 146 mm ∴ Zl = 1952290 mm^3

$$\sigma u = \frac{M}{Zu} = \frac{70.6 \times 10^6}{-1024830} = -69\ N/mm^2 < 111\ N/mm^2$$

$$\sigma l = \frac{M}{Zl} = \frac{70.6 \times 10^6}{1952290} = 36\ N/mm^2 < 125\ N/mm^2$$

(Sole PL:SS400)

$$\tau = \frac{S}{Aw} = \frac{226.0 \times 10^3}{5200} = 43\ N/mm^2 < 80\ N/mm^2$$

compound stress $\left(\frac{-69}{111}\right)^2 + \left(\frac{43}{80}\right)^2 = 0.7 < 1.2$

L/b = 1500 / 100 = 15.0 > 9/k = 4.025 k = 2.236

Aw/Ac = 4.0 > 2.0 b/t = 7.2 < 12.8

∴ σca = 140 − 1.2(K·L/b − 9) = 111 N/mm^2

Weld size (Between stiffening rib and web of main girder)

$$Sreg1 = \frac{S}{H \cdot \tau a \cdot 2 \cdot 0.707}$$

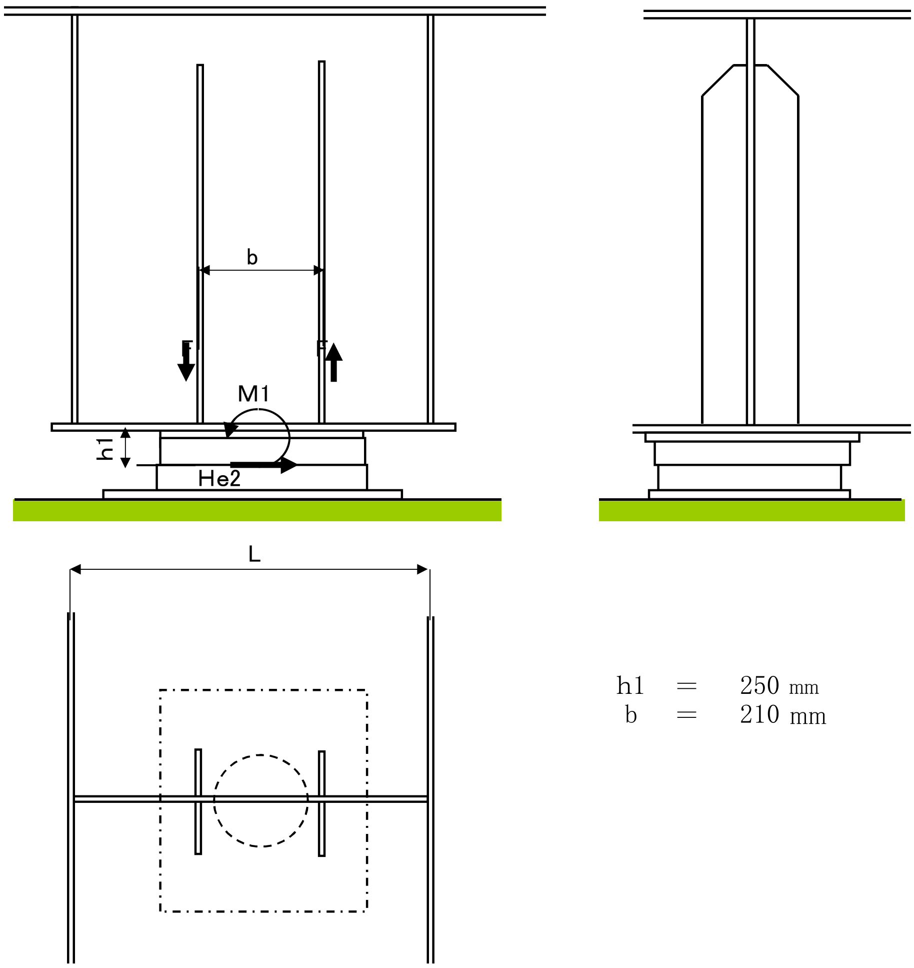
$$= \frac{226.0 \times 10^3}{(400 - 35) \times 80 \times 2 \times 0.707} = 5.5\ mm$$

$$Sreg2 = \sqrt{2t} = \sqrt{(2 \cdot 13)} = 5.1\ mm$$

∴ Fillet welding S = 6 mm

(c) The reinforcement by earchquake of longitudinal direction

① shape



h1 = 250 mm
b = 210 mm

② design cross-sectional force

Reaction of dead load Rd = 2422.5 kN (G1)

	longitudinal direction	Remarks
	He2	
Horizontal force H(kN)	625	
Horizontal force H'(kN)	417	He/1.5

bending moment (kN・m)	longitudinal direction	Remarks
	M2	M=H'×h
	104.3	Usually equivalent

③ checking of stiffener

Design method is couple of force by earchquake is transmitted to diaphragm via vertical stiffener.

[seismic load] stress of stiffener

Couple of force

$F = M2 / b$

$= 104.3 / 0.210 = 496.7$ kN

section of stiffener 4 − 200 × 22 (SM400) $A = 17600$ mm^2

stress $\sigma e = F / A = 28$ N/mm^2 < $\sigma a = 140$ N/mm^2

[dead load] stress of stiffener

Reaction of dead load $Rd = 2422.5$ kN

Sectional area $Ag = 29969$ mm^2

(4. 12. Calculation of supporting joint DIAPHRAGM)

stress $\sigma d = Rd / Ag / 1.7 = 48$ N/mm^2

Total

$\sigma d = \sigma e + \sigma d = 76$ N/mm^2 < $\sigma a = 140$ N/mm^2 *OK*

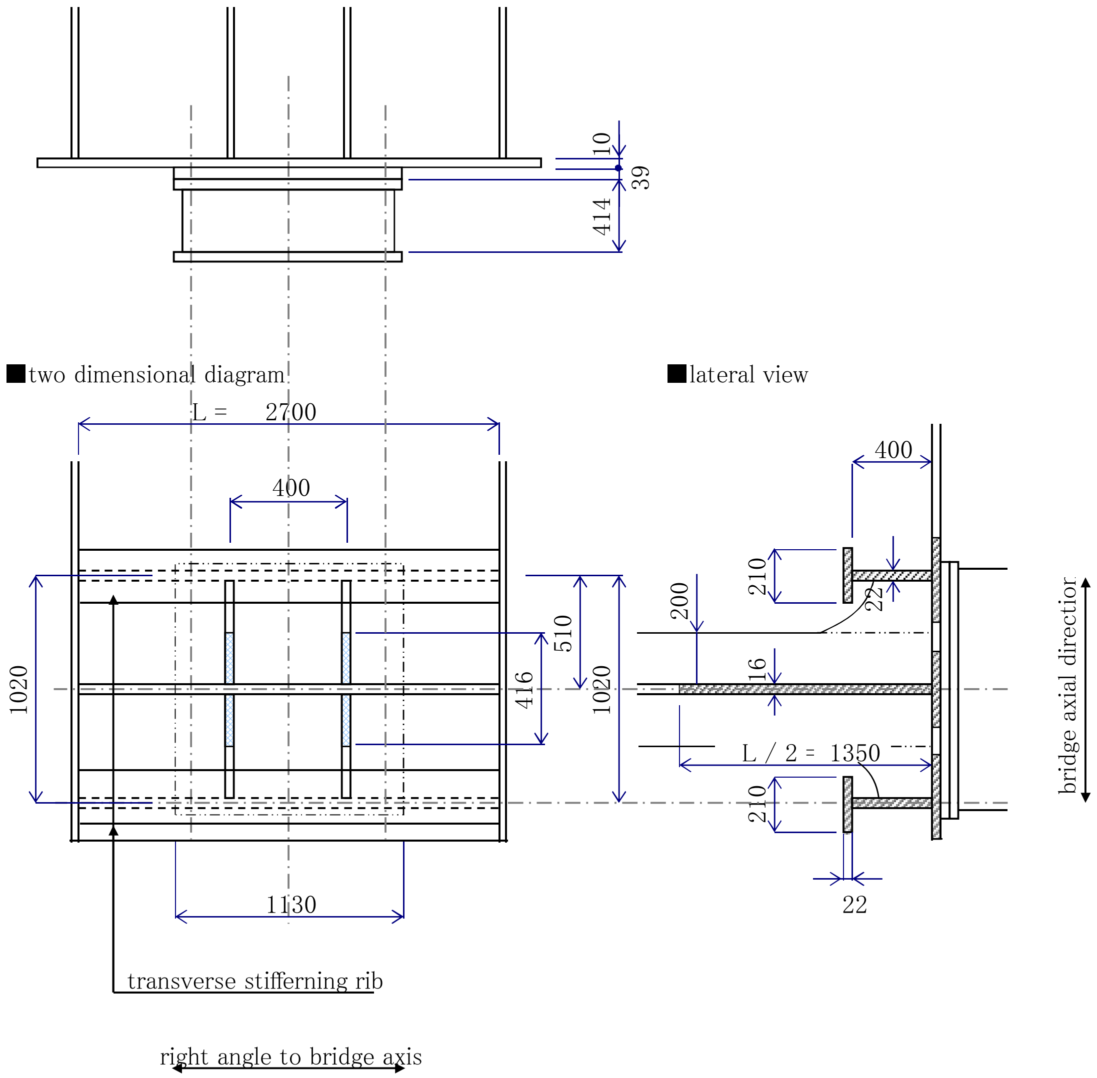
I do not install the reinforcement for earchquake of longitudinal direction.

4） Main gigder : G2･G3　Support : S1

(a) Design conditions

material of main girder	=	SM490Y	
estimated seismic horizontal force F			
bridge axial direction (L1)	=	1432	kN
longitudinal direction (L1)	=	494	kN

■cross sectional diagram



strucural diagram reinforcing supporting point

(b) Calculations of stiffening rib

① Relative stiffness

a) effective width

supporting joint diaphragm

$$b = \frac{510}{2} = 255 \text{ mm} \qquad l = 2700 \text{ mm} \qquad \frac{b}{l} = \frac{255}{2700} = 0.094$$

$$\frac{\lambda_D}{2} = \{1.1 - 2(b/l)\}b = 233 \text{ mm} \qquad \therefore \lambda_D = 465 \text{ mm}$$

stiffening rib

$$b_1 = \frac{510}{2} = 255 \text{ mm} \qquad l = 2700 \text{ mm} \qquad \frac{b}{l} = \frac{255}{2700} = 0.094$$

$$\frac{\lambda_{RL1}}{2} = \{1.1 - 2(b/l)\}b = 233 \text{ mm}$$

$$b_2 = 290 \text{ mm} \qquad l = 2700 \text{ mm} \qquad \frac{b}{l} = \frac{290}{2700} = 0.107$$

$$\frac{\lambda_{RL2}}{2} = \{1.1 - 2(b/l)\}b = 257 \text{ mm} \qquad \therefore \lambda_{RL} = \lambda_{RL1} + \lambda_{RL2} = 490 \text{ mm}$$

b) Relative stiffness

supporting joint diaphragm

	b(mm)		t(mm)	A(mm^2)	y(mm)	Ay(mm^3)	$Ay^2 + I$ (mm^4)
1 − DIA	1350	×	16	21600	−	−	328050 $\times 10^4$
1 − L.Flg	465	×	10	4650	680.0	3162000	215016 $\times 10^4$
			A =	26250		3162000	543066 $\times 10^4$
						$-\Sigma A \cdot \delta^2$ =	−38116 $\times 10^4$
$\delta = \Sigma(A \cdot y) / \Sigma A$ =				120.5 mm			504950 $\times 10^4$

stiffening rib

	b(mm)		t(mm)	A(mm^2)	y(mm)	Ay(mm^3)	$Ay^2 + I$ (mm^4)
1 − U.Flg	210	×	22	4620	−211.0	−974820	20569 $\times 10^4$
1 − Web	400	×	22	8800	−	−	11733 $\times 10^4$
1 − L.Flg	490	×	10	4900	205.0	1004500	20592 $\times 10^4$
			A =	18320		29680	52894 $\times 10^4$
						$-\Sigma A \cdot \delta^2$ =	−5 $\times 10^4$
$\delta = \Sigma(A \cdot y) / \Sigma A$ =				1.6 mm			52889 $\times 10^4$

② Acting force

Acting height

L.Flg	0.010	m
Sole PL	0.039	m
bearing support	0.414	m
Acting height	0.463	m

bridge axial direction

F = 1432 kN

bending moment

M_E = 1432 kN × 0.463 m = 663 kN・m

Acting force

$$q_{1EM} = \frac{M_E}{D \times L_B} = 575 \text{ kN/m}$$

Acting force(Usually equivalent)

q_{1E} = q_{1EM}/1.5 = 383 kN/m

③ design cross-sectional force

L = 2.700 m

a = 0.785 m

b = 1.130 m

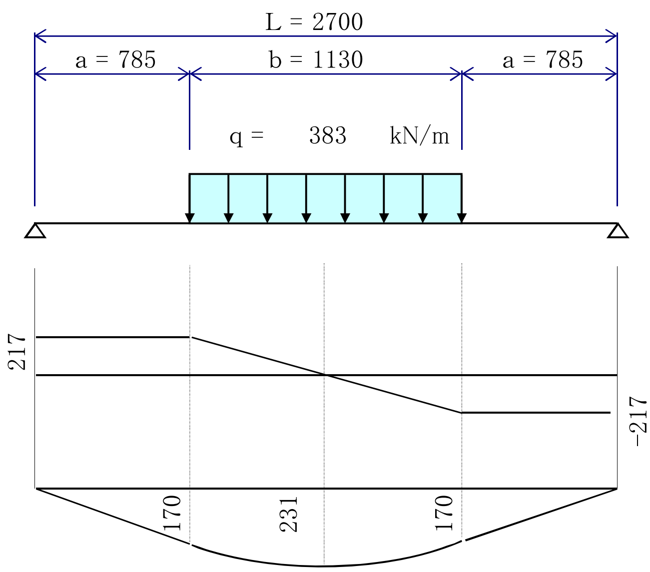
q = 383 kN/m

$$M = \frac{q \cdot a \cdot b}{2} + \frac{q \cdot b^2}{8}$$

= 231.3 kN・m

$$S = \frac{q \cdot b}{2}$$

= 216.7 kN



④ cross-section calculation of stiffening rib

(SM400)	b(mm)		t(mm)	A(mm^2)	y(mm)	Ay(mm^3)	Ay^2 + I (mm^4)
1 − U.Flg	210.0	×	22	4620	−211.0	−974820	20569 $\times 10^4$
1 − Web	400.0	×	22	8800	−	−	11733 ×105
1 − L.Flg	490.0	×	10	4900	205.0	1004500	20592 $\times 10^4$
			A =	18320		29680	52894 $\times 10^4$
						$-\Sigma A \cdot \delta^2$ =	−5 $\times 10^4$
							52889 $\times 10^4$

$\delta = \Sigma(A \cdot y) / \Sigma A =$ 2 mm

Yu = −224 mm ∴ Zu = −2365340 mm^3

Yl = 208 mm ∴ Zl = 2537860 mm^3

$$\sigma u = \frac{M}{Zu} = \frac{231.3 \times 10^6}{-2365340} = -98 \text{ N/mm}^2 < 120 \text{ N/mm}^2$$

$$\sigma l = \frac{M}{Zl} = \frac{231.3 \times 10^6}{2537860} = 91 \text{ N/mm}^2 < 125 \text{ N/mm}^2$$

(Sole PL:SS400)

$$\tau = \frac{S}{Aw} = \frac{216.7 \times 10^3}{8800} = 25 \text{ N/mm}^2 < 80 \text{ N/mm}^2$$

合成応力 $\left(\frac{-98}{120}\right)^2 + \left(\frac{25}{80}\right)^2 = 0.8 < 1.2$

L/b = 2700 / 210 = 12.9 > 4.500

Aw/Ac = 1.9 ≦ 2.0 b/t = 9.0 < 12.8

∴ $\sigma ca = 140 - 2.4(L/b - 4.5) = 120$ N/mm^2

Weld size (Between stiffening rib and web of main girder)

$$Sreg1 = \frac{S}{H \cdot \tau a \cdot 2 \cdot 0.707}$$

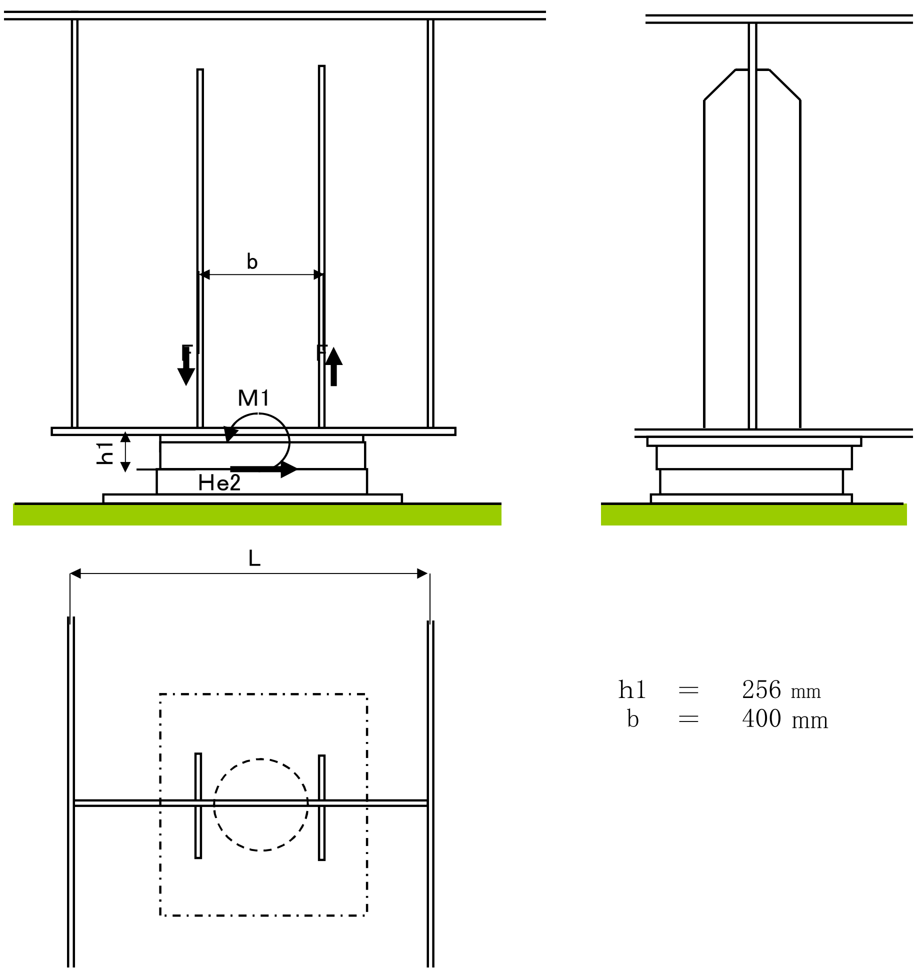
$$= \frac{216.7 \times 10^3}{(400 - 35) \times 80 \times 2 \times 0.707} = 5.2 \text{ mm}$$

$$Sreg2 = \sqrt{2t} = \sqrt{(2 \cdot 22)} = 6.6 \text{ mm}$$

∴ Fillet welding S = 7 mm

(c) The reinforcement by earchquake of longitudinal direction

① shape



h1 = 256 mm
b = 400 mm

② design cross-sectional force

Reaction of dead load Rd = 1895.1 kN (G3)

	longitudinal direction	Remarks
	He2	
Horizontal force H(kN)	494	
Horizontal force H'(kN)	329	He/1.5

bending moment (kN・m)	longitudinal direction	Remarks
	M2	M=H'×h
	84.2	Usually equivalent

③ checking of stiffener

Design method is couple of force by earchquake is transmitted to diaphragm via vertical stiffener.

[seismic load] stress of stiffener

Couple of force

$F = M2 / b$

$= 84.2 / 0.400 = 210.5$ kN

section of stiffener 4 − 200 × 19 (SM400) $A = 15200$ mm^2

stress $\sigma e = F / A = 14$ N/mm^2 < $\sigma a = 140$ N/mm^2

[dead load] stress of stiffener

Reaction of dead load $Rd = 1895.1$ kN

Sectional area $Ag = 27488$ mm^2

（4．12． Calculation of supporting joint DIAPHRAGM）

stress $\sigma d = Rd / Ag / 1.7 = 41$ N/mm^2

Total

$\sigma d = \sigma e + \sigma d = 54$ N/mm^2 < $\sigma a = 140$ N/mm^2 *OK*

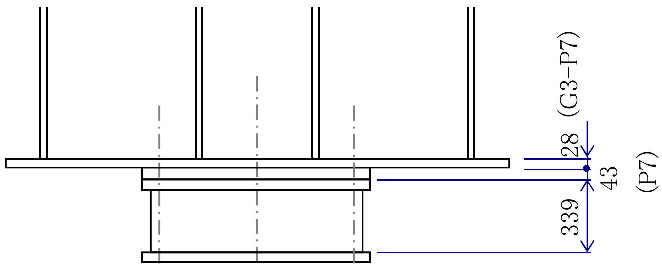
I do not install the reinforcement for earchquake of longitudinal direction.

5） Main gigder : G2・G3　Support : P6・P7

(a) Design conditions

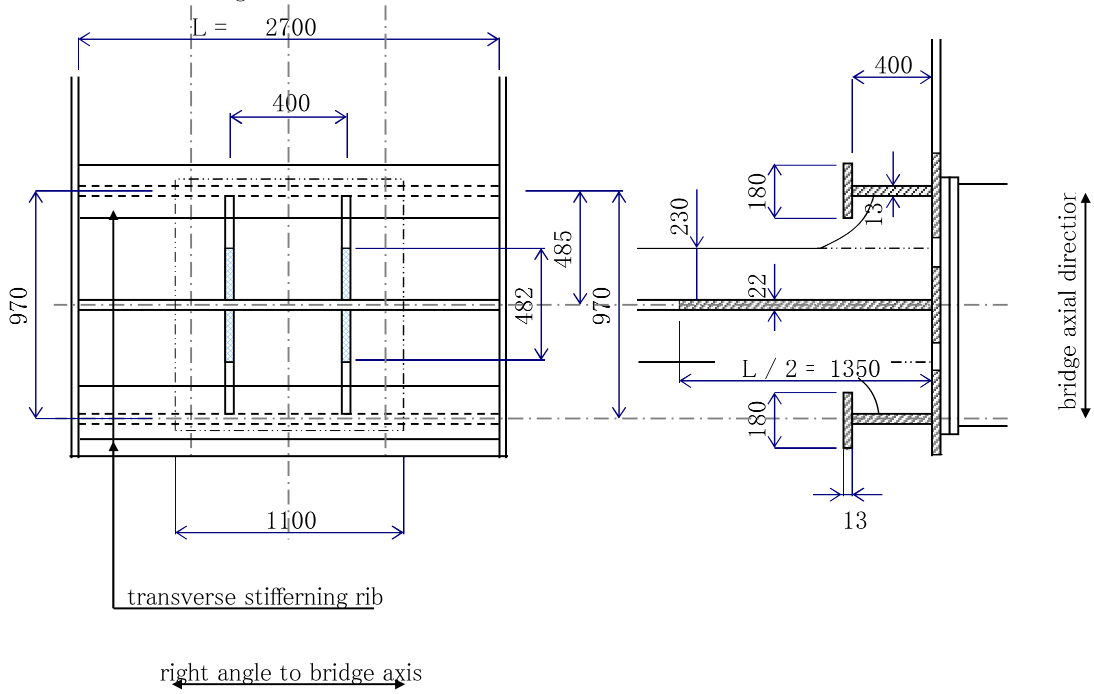
material of main girder	=	SM490Y		
estimated seismic horizontal force F				
bridge axial direction (L1)	=	1147	kN	(P6)
longitudinal direction (L1)	=	1724	kN	(P7)

■cross sectional diagram



■two dimensional diagram

■lateral view



strucural diagram reinforcing supporting point

（b）Calculations of stiffening rib

① Relative stiffness

a）effective width

supporting joint diaphragm

$b = \frac{485}{2} = 243$ mm $l = 2700$ mm $\frac{b}{l} = \frac{243}{2700} = 0.09$

$\frac{\lambda_D}{2} = \{1.1 - 2(b/l)\}b = 223$ mm $\therefore \lambda_D = 446$ mm

stiffening rib

$b_1 = \frac{485}{2} = 243$ mm $l = 2700$ mm $\frac{b}{l} = \frac{243}{2700} = 0.09$

$\frac{\lambda_{RL1}}{2} = \{1.1 - 2(b/l)\}b = 223$ mm

$b_2 = \frac{2222}{2} = 1111$ mm $l = 2700$ mm $\frac{b}{l} = \frac{1111}{2700} = 0.411$

$\frac{\lambda_{RL2}}{2} = 0.15 \cdot l = 405$ mm $\therefore \lambda_{RL} = \lambda_{RL1} + \lambda_{RL2} = 628$ mm

b）Relative stiffness

supporting joint diaphragm

	b(mm)		t(mm)	A(mm²)	y(mm)	Ay(mm³)	Ay² + I (mm⁴)
1 − DIA	1350	×	22	29700	−	−	451069 ×10⁴
1 − L.Flg	446	×	28	12488	689.0	8604232	592832 ×10⁴
			A =	42188		8604232	1043901 ×10⁴
						$-\Sigma A \cdot \delta^2$ =	−175397 ×10⁴
							868504 ×10⁴

$\delta = \Sigma(A \cdot y) / \Sigma A = 203.9$ mm

stiffening rib

	b(mm)		t(mm)	A(mm²)	y(mm)	Ay(mm³)	Ay² + I (mm⁴)
1 − U.Flg	180	×	13	2340	−206.5	−483210	9978 ×10⁴
1 − Web	400	×	13	5200	−	−	6933 ×10⁴
1 − L.Flg	628	×	28	17584	214.0	3762976	80528 ×10⁴
			A =	25124		3279766	97439 ×10⁴
						$-\Sigma A \cdot \delta^2$ =	−42787 ×10⁴
							54652 ×10⁴

$\delta = \Sigma(A \cdot y) / \Sigma A = 130.5$ mm

② Acting force

Acting height

L.Flg	0.028	m
Sole PL	0.043	m
bearing support	0.339	m
Acting height	0.410	m

bridge axial direction

F = 1147 kN

bending moment

M_E = 1147 kN × 0.410 m = 470 kN・m

Acting force

$$q_{1EM} = \frac{M_E}{D \times L_B} = 441 \text{ kN/m}$$

Acting force(Usually equivalent)

q_{1E} = $q_{1EM}/1.5$ = 294 kN/m

③ design cross-sectional force

L = 2.700 m

a = 0.800 m

b = 1.100 m

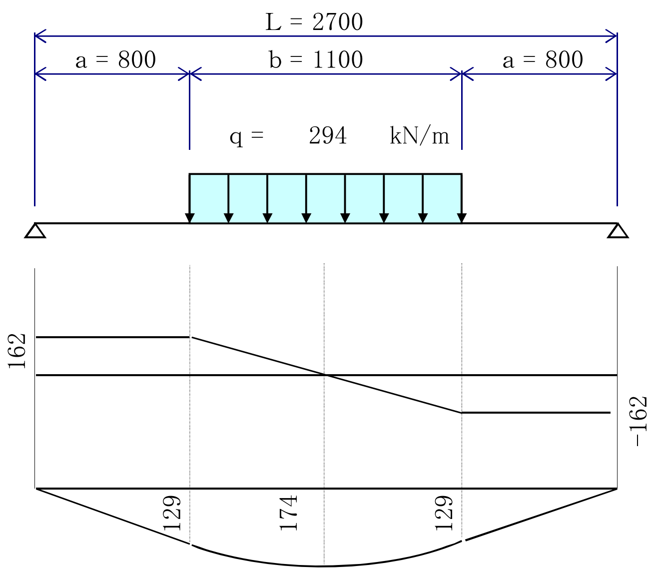
q = 294 kN/m

$$M = \frac{q \cdot a \cdot b}{2} + \frac{q \cdot b^2}{8}$$

= 173.7 kN・m

$$S = \frac{q \cdot b}{2}$$

= 161.6 kN



④ cross-section calculation of stiffening rib

(SM400)	b(mm)		t(mm)	A(mm^2)	y(mm)	Ay(mm^3)	Ay^2 + I (mm^4)
1 - U.Flg	180.0	×	13	2340	-206.5	-483210	9978 $\times 10^4$
1 - Web	400.0	×	13	5200	-	-	6933 ×105
1 - L.Flg	628.0	×	28	17584	214.0	3762976	80528 $\times 10^4$
			A =	25124		3279766	97439 $\times 10^4$
						$-\Sigma A \cdot \delta^2$ =	-42787 $\times 10^4$
							54652 $\times 10^4$

$\delta = \Sigma(A \cdot y) / \Sigma A =$ 131 mm

Yu = -344 mm ∴ Zu = -1591033 mm^3

Yl = 98 mm ∴ Zl = 5605333 mm^3

$$\sigma u = \frac{M}{Zu} = \frac{173.7 \times 10^6}{-1591033} = -109\ N/mm^2 < 115\ N/mm^2$$

(Sole PL:SS400)

$$\sigma l = \frac{M}{Zl} = \frac{173.7 \times 10^6}{5605333} = 31\ N/mm^2 < 140\ N/mm^2$$

$$\tau = \frac{S}{Aw} = \frac{161.6 \times 10^3}{5200} = 31\ N/mm^2 < 80\ N/mm^2$$

合成応力 $\left(\frac{-109}{115}\right)^2 + \left(\frac{31}{80}\right)^2 = 1.1 < 1.2$

L/b = 2700 / 180 = 15.0 > 4.500

Aw/Ac = 2.2 > 2.0 b/t = 13.3 > 12.8

∴ σca = 140 - 2.4(L/b - 4.5) = 115 N/mm^2

Weld size (Between stiffening rib and web of main girder)

$$Sreg1 = \frac{S}{H \cdot \tau a \cdot 2 \cdot 0.707}$$

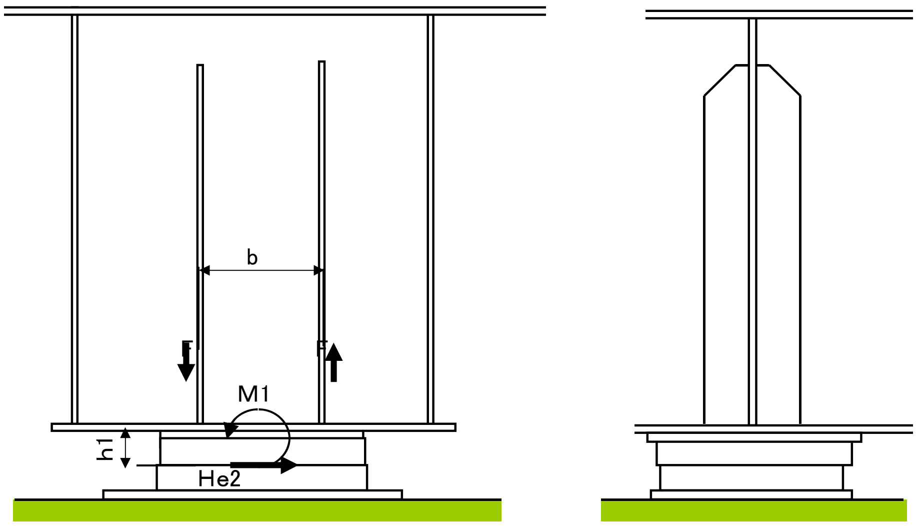
$$= \frac{161.6 \times 10^3}{(400 - 35) \times 80 \times 2 \times 0.707} = 3.9\ mm$$

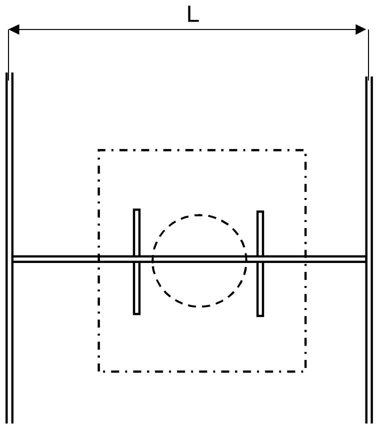
$$Sreg2 = \sqrt{2t} = \sqrt{(2 \cdot 13)} = 5.1\ mm$$

∴ Fillet welding S = 6 mm

(c) The reinforcement by earchquake of longitudinal direction

① shape





h1 = 240.5 mm
b = 400 mm

② design cross-sectional force

Reaction of dead load Rd = 4812.0 kN (G3-P8)

	longitudinal direction	Remarks
	He2	
Horizontal force H(kN)	1724	
Horizontal force H'(kN)	1149	He/1.5

bending moment (kN･m)	longitudinal direction	Remarks
	M2	M=H'×h
	276.3	Usually equivalent

③ checking of stiffener

Design method is couple of force by earchquake is transmitted to diaphragm via vertical stiffener.

[seismic load] stress of stiffener

Couple of force

$F = M2 / b$

$= 276.3 / 0.400 = 690.8$ kN

section of stiffener 4 − 230 × 22 (SM490Y) $A = 20240$ mm²

stress $\sigma e = F / A = 34$ N/mm² < $\sigma a = 210$ N/mm²

[dead load] stress of stiffener

Reaction of dead load $Rd = 4812.0$ kN

Sectional area $Ag = 40656$ mm²

(4. 12. Calculation of supporting joint DIAPHRAGM)

stress $\sigma d = Rd / Ag / 1.7 = 70$ N/mm²

Total

$\sigma d = \sigma e + \sigma d = 104$ N/mm² < $\sigma a = 210$ N/mm² *OK*

I do not install the reinforcement for earchquake of longitudinal direction.

6） Main gigder : G2・G3　Support : S2

(a) Design conditions

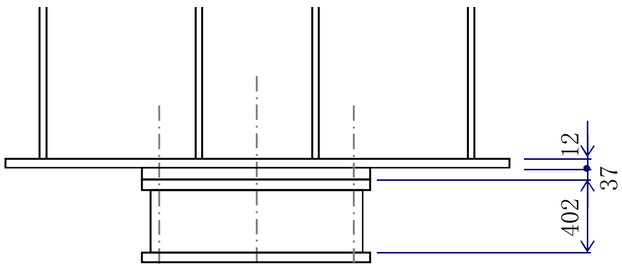
material of main girder = SM490Y

estimated seismic horizontal force F

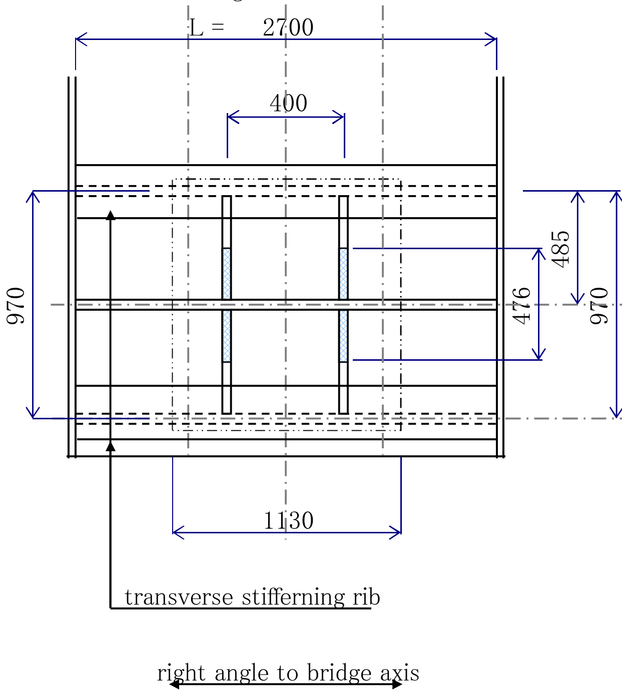
bridge axial direction (L1) = 1318 kN

longitudinal direction (L1) = 625 kN

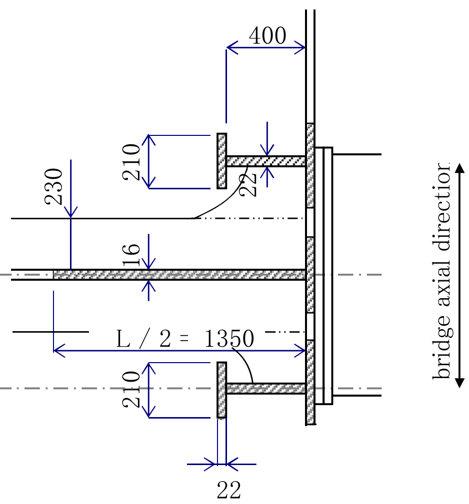
■cross sectional diagram



■two dimensional diagram



■lateral view



strucural diagram reinforcing supporting point

(b) Calculations of stiffening rib

① Relative stiffness

a) effective width

supporting joint diaphragm

$$b = \frac{485}{2} = 243 \text{ mm} \qquad l = 2700 \text{ mm} \qquad \frac{b}{l} = \frac{243}{2700} = 0.09$$

$$\frac{\lambda_D}{2} = \{1.1 - 2(b/l)\} b = 223 \text{ mm} \qquad \therefore \lambda_D = 446 \text{ mm}$$

stiffening rib

$$b_1 = \frac{485}{2} = 243 \text{ mm} \qquad l = 2700 \text{ mm} \qquad \frac{b}{l} = \frac{243}{2700} = 0.09$$

$$\frac{\lambda_{RL1}}{2} = \{1.1 - 2(b/l)\} b = 223 \text{ mm}$$

$$b_2 = 515 \text{ mm} \qquad l = 2700 \text{ mm} \qquad \frac{b}{l} = \frac{515}{2700} = 0.191$$

$$\frac{\lambda_{RL2}}{2} = \{1.1 - 2(b/l)\} b = 370 \text{ mm} \qquad \therefore \lambda_{RL} = \lambda_{RL1} + \lambda_{RL2} = 593 \text{ mm}$$

b) Relative stiffness

supporting joint diaphragm

	b(mm)		t(mm)	A(mm²)	y(mm)	Ay(mm³)	Ay² + I (mm⁴)
1 − DIA	1350	×	16	21600	−	−	328050 ×10⁴
1 − L.Flg	446	×	12	5352	681.0	3644712	248205 ×10⁴
			A =	26952		3644712	576255 ×10⁴
						−ΣA・δ² =	−49266 ×10⁴
	δ = Σ(A•y) / ΣA =			135.2 mm			526989 ×10⁴

stiffening rib

	b(mm)		t(mm)	A(mm²)	y(mm)	Ay(mm³)	Ay² + I (mm⁴)
1 − U.Flg	210	×	22	4620	−211.0	−974820	20569 ×10⁴
1 − Web	400	×	22	8800	−	−	11733 ×10⁴
1 − L.Flg	593	×	12	7116	206.0	1465896	30197 ×10⁴
			A =	20536		491076	62499 ×10⁴
						−ΣA・δ² =	−1173 ×10⁴
	δ = Σ(A•y) / ΣA =			23.9 mm			61326 ×10⁴

② Acting force

Acting height

L.Flg	0.012	m
Sole PL	0.037	m
bearing support	0.402	m
Acting height	0.451	m

bridge axial direction

$F = 1318$ kN

bending moment

$M_E = 1318 \text{ kN} \times 0.451 \text{ m} = 594 \text{ kN·m}$

Acting force

$$q_{1EM} = \frac{M_E}{D \times L_B} = 542 \text{ kN/m}$$

Acting force(Usually equivalent)

$q_{1E} = q_{1EM}/1.5 = 362$ kN/m

③ design cross-sectional force

$L = 2.700$ m

$a = 0.785$ m

$b = 1.130$ m

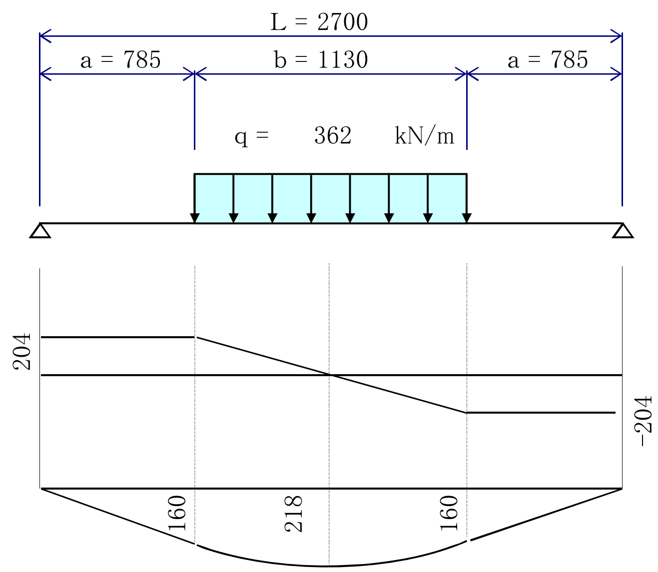
$q = 362$ kN/m

$$M = \frac{q \cdot a \cdot b}{2} + \frac{q \cdot b^2}{8}$$

$= 218.0$ kN·m

$$S = \frac{q \cdot b}{2}$$

$= 204.3$ kN



④ cross-section calculation of stiffening rib

(SM400)	b(mm)	t(mm)	A(mm^2)	y(mm)	Ay(mm^3)	Ay^2 + I (mm^4)
1 − U.Flg	210.0 ×	22	4620	−211.0	−974820	20569 $\times 10^4$
1 − Web	400.0 ×	22	8800	−	−	11733 ×105
1 − L.Flg	593.0 ×	12	7116	206.0	1465896	30197 $\times 10^4$
		A =	20536		491076	62499 $\times 10^4$
					$-\Sigma A \cdot \delta^2$ =	−1173 $\times 10^4$
$\delta = \Sigma(A \cdot y) / \Sigma A$ =			24	mm		61326 $\times 10^4$

Yu = −246 mm ∴ Zu = −2493941 mm^3

Yl = 188 mm ∴ Zl = 3260287 mm^3

$$\sigma u = \frac{M}{Zu} = \frac{218.0 \times 10^6}{-2493941} = -87\ N/mm^2 < 120\ N/mm^2$$

$$\sigma l = \frac{M}{Zl} = \frac{218.0 \times 10^6}{3260287} = 67\ N/mm^2 < 125\ N/mm^2$$ (Sole PL:SS400)

$$\tau = \frac{S}{Aw} = \frac{204.3 \times 10^3}{8800} = 23\ N/mm^2 < 80\ N/mm^2$$

合成応力 $$\left(\frac{-87}{120}\right)^2 + \left(\frac{23}{80}\right)^2 = 0.6 < 1.2$$

L/b = 2700 / 210 = 12.9 > 4.500

Aw/Ac = 1.9 ≦ 2.0 b/t = 9.0 < 12.8

∴ σca = 140 − 2.4(L/b − 4.5) = 120 N/mm^2

Weld size (Between stiffening rib and web of main girder)

$$Sreg1 = \frac{S}{H \cdot \tau a \cdot 2 \cdot 0.707}$$

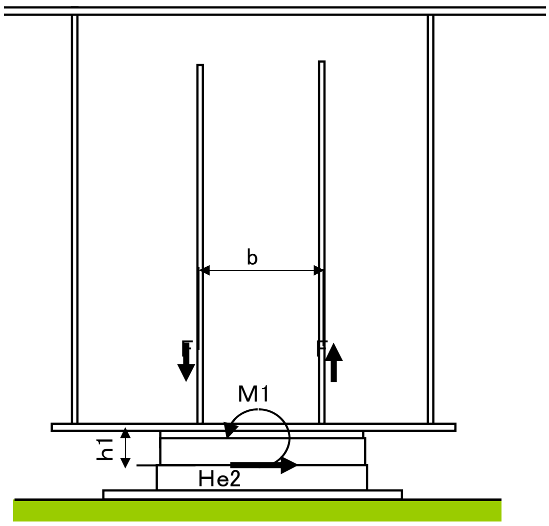
$$= \frac{204.3 \times 10^3}{(400 - 35) \times 80 \times 2 \times 0.707} = 4.9\ mm$$

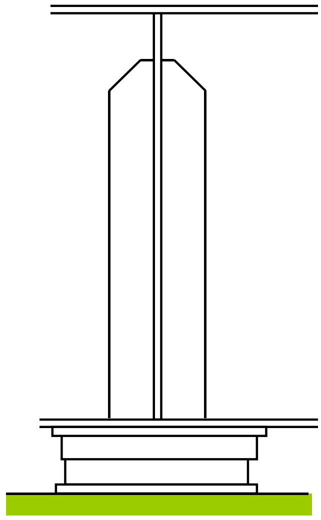
$$Sreg2 = \sqrt{2t} = \sqrt{(2 \cdot 22)} = 6.6\ mm$$

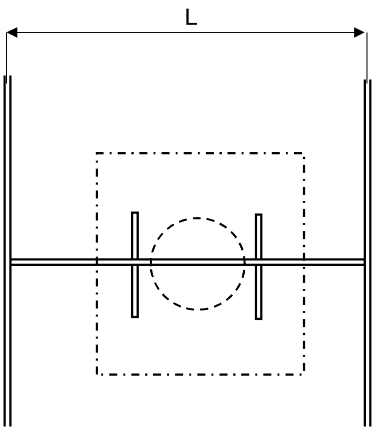
∴ Fillet welding S = 7 mm

(c) The reinforcement by earchquake of longitudinal direction

① shape







h1 = 250 mm
b = 400 mm

② design cross-sectional force

Reaction of dead load Rd = 2483.9 kN (G3)

	longitudinal direction	Remarks
	He2	
Horizontal force H(kN)	625	
Horizontal force H'(kN)	417	He/1.5

bending moment (kN・m)	longitudinal direction	Remarks
	M2	M=H'×h
	104.3	Usually equivalent

③ checking of stiffener

Design method is couple of force by earchquake is transmitted to diaphragm via vertical stiffener.

[seismic load] stress of stiffener

Couple of force

$F = M2 / b$

$= 104.3 / 0.400 = 260.8$ kN

section of stiffener 4 − 230 × 19 (SM400) A = 17480 mm^2

stress $\sigma e = F / A = 15$ N/mm^2 < $\sigma a = 140$ N/mm^2

[dead load] stress of stiffener

Reaction of dead load Rd = 2483.9 kN

Sectional area Ag = 29768 mm^2

(4. 12. Calculation of supporting joint DIAPHRAGM)

stress $\sigma d = Rd / Ag / 1.7 = 49$ N/mm^2

Total

$\sigma d = \sigma e + \sigma d = 64$ N/mm^2 < $\sigma a = 140$ N/mm^2 *OK*

I do not install the reinforcement for earchquake of longitudinal direction.

4－13 Investigation on multipoint fixed temperature

Because this is a 3 span continuous non-compositional bridge in which the intermediate support is fixed, thermal difference stress acts on the main girder according to temperature change.
Implement investigation on stress intensity by temperature using reaction by temperature in the bridge axial dire calculated by dynamic analysis.

temperature change ±30°

・Investigation on cross-section

Investigate only steel cross-section, in order to fail safe to horizontal force by temperature.
Consider maximum bridge axial direction reaction as axial force, and calculate stress intensity at minimum cross-section of main girder.

< horizontal force by temperatu … from dynamic analysis results (P10)

	axial force per 1 main girder (kN)
designed horizontal force	1666.8

Implement investigation of cross-section at 【G2-SEC1】 where cross-sectional area is leas

					area measurement(mm^2)
U-FLG	1 ×	5176 ×	16	=	82816
WEB	2 ×	2700 ×	14	=	75600
L-FLG	1 ×	2940 ×	10	=	29400
			ΣA	=	187816

$\sigma = N / \Sigma A = 1666800 / 187816$
$= 8.9\ N/mm^2 < 140 \times 0.15 = 21.0\ N/mm^2$

※Unnecessary to expand cross-section according to temperature because generating stress intensity is less than 15% premium rate.

４．１４　Investigations on flexure and relative stiffness ratio

(1) Stiffness ratio

＊Stiffness ratio of each span

Main girder　G1

Span No.	Bending Stiff. (Assumed stiff.)	Bending Stiff. (Actual stiff.)	S. R.	Torsional (Assumed stiff.)	Torsional (Actual stiff.)	S. R.
	Ixa(m4)	Ixr(m4)	Ixa/Ixr	Ja(m4)	Jr(m4)	Ja/Jr
1	0.30332	0.30369	1.00	0.23110	0.23049	1.00
2	0.29571	0.29834	0.99	0.22311	0.22404	1.00
3	0.37994	0.37233	1.02	0.25566	0.25447	1.00

Main girder　G2

Span No.	Bending Stiff. (Assumed stiff.)	Bending Stiff. (Actual stiff.)	S. R.	Torsional (Assumed stiff.)	Torsional (Actual stiff.)	S. R.
	Ixa(m4)	Ixr(m4)	Ixa/Ixr	Ja(m4)	Jr(m4)	Ja/Jr
1	0.31136	0.31141	1.00	0.27979	0.27988	1.00
2	0.32669	0.32832	1.00	0.27337	0.27414	1.00
3	0.41089	0.42653	0.96	0.31162	0.31755	0.98

Main girder　G3

Span No.	Bending Stiff. (Assumed stiff.)	Bending Stiff. (Actual stiff.)	S. R.	Torsional (Assumed stiff.)	Torsional (Actual stiff.)	S. R.
	Ixa(m4)	Ixr(m4)	Ixa/Ixr	Ja(m4)	Jr(m4)	Ja/Jr
1	0.35854	0.36601	0.98	0.28617	0.28901	0.99
2	0.35043	0.35409	0.99	0.27339	0.27451	1.00
3	0.40580	0.41942	0.97	0.31123	0.31573	0.99

Main girder　G4

Span No.	Bending Stiff. (Assumed stiff.)	Bending Stiff. (Actual stiff.)	S. R.	Torsional (Assumed stiff.)	Torsional (Actual stiff.)	S. R.
	Ixa(m4)	Ixr(m4)	Ixa/Ixr	Ja(m4)	Jr(m4)	Ja/Jr
1	0.40713	0.41949	0.97	0.23964	0.24109	0.99
2	0.33670	0.33863	0.99	0.22576	0.22586	1.00
3	0.37761	0.37031	1.02	0.25485	0.25370	1.00

＊Stiffness ratio of each panel

Main girder　G1

Panel No.	Bending Stiff. (Assumed stiff.)	Bending Stiff. (Actual stiff.)	S.R.	Torsional (Assumed stiff.)	Torsional (Actual stiff.)	S.R.
	Ixa(m4)	Ixr(m4)	Ixa/Ixr	Ja(m4)	Jr(m4)	Ja/Jr
1	0.23601	0.23601	1.00	0.20872	0.20872	1.00
2	0.25469	0.25469	1.00	0.21684	0.21684	1.00
3	0.28581	0.28581	1.00	0.23036	0.23036	1.00
4	0.32205	0.32205	1.00	0.23705	0.23705	1.00
5	0.34379	0.34379	1.00	0.24106	0.24106	1.00
6	0.35279	0.35722	0.99	0.24246	0.24310	1.00
7	0.35408	0.35914	0.99	0.24266	0.24339	1.00
8	0.35408	0.35914	0.99	0.24266	0.24339	1.00
9	0.34826	0.35142	0.99	0.24173	0.24219	1.00
10	0.33856	0.33856	1.00	0.24019	0.24019	1.00
11	0.29811	0.30188	0.99	0.23173	0.23294	0.99
12	0.27384	0.27986	0.98	0.22665	0.22860	0.99
13	0.26477	0.26548	1.00	0.21096	0.21120	1.00
14	0.25549	0.25402	1.01	0.21160	0.21052	1.01
15	0.27054	0.26013	1.04	0.23178	0.22312	1.04
16	0.29699	0.28615	1.04	0.24060	0.23440	1.03
17	0.29699	0.29050	1.02	0.24060	0.23765	1.01
18	0.27181	0.27181	1.00	0.23178	0.23178	1.00
19	0.25550	0.25550	1.00	0.21160	0.21160	1.00
20	0.26035	0.26035	1.00	0.20872	0.20872	1.00
21	0.26456	0.26456	1.00	0.20872	0.20872	1.00
22	0.26456	0.26456	1.00	0.20872	0.20872	1.00
23	0.26456	0.26456	1.00	0.20872	0.20872	1.00
24	0.26456	0.26456	1.00	0.20872	0.20872	1.00
25	0.26456	0.26456	1.00	0.20872	0.20872	1.00
26	0.26456	0.26456	1.00	0.20872	0.20872	1.00
27	0.26456	0.27212	0.97	0.20872	0.21346	0.98
28	0.26560	0.27667	0.96	0.20872	0.21630	0.96
29	0.32668	0.33274	0.98	0.23034	0.23247	0.99
30	0.34114	0.34679	0.98	0.23787	0.23918	0.99
31	0.42186	0.43014	0.98	0.26895	0.26997	1.00
32	0.44352	0.45337	0.98	0.27195	0.27301	1.00
33	0.44007	0.44876	0.98	0.27154	0.27247	1.00
34	0.40968	0.41386	0.99	0.26783	0.26840	1.00
35	0.33200	0.33253	1.00	0.23645	0.23652	1.00
36	0.30903	0.30903	1.00	0.22916	0.22916	1.00
37	0.28974	0.28974	1.00	0.22449	0.22449	1.00
38	0.32486	0.32170	1.01	0.23630	0.23585	1.00
39	0.35914	0.35408	1.01	0.24339	0.24266	1.00

Panel No.	Bending Stiff. (Assumed stiff.)	Bending Stiff. (Actual stiff.)	S.R.	Torsional (Assumed stiff.)	Torsional (Actual stiff.)	S.R.
	Ixa(m4)	Ixr(m4)	Ixa/Ixr	Ja(m4)	Jr(m4)	Ja/Jr
40	0.38328	0.37425	1.02	0.26315	0.26182	1.01
41	0.39183	0.38305	1.02	0.26659	0.26533	1.00
42	0.42729	0.41852	1.02	0.26969	0.26874	1.00
43	0.43367	0.42306	1.03	0.27033	0.26923	1.00
44	0.44431	0.43160	1.03	0.27140	0.27015	1.00
45	0.44452	0.43182	1.03	0.27248	0.27123	1.00
46	0.44452	0.43182	1.03	0.27248	0.27123	1.00
47	0.44452	0.43182	1.03	0.27248	0.27123	1.00
48	0.42841	0.41478	1.03	0.27082	0.26932	1.01
49	0.41875	0.40528	1.03	0.26983	0.26826	1.01
50	0.37461	0.35972	1.04	0.26443	0.26132	1.01
51	0.36450	0.34914	1.04	0.26071	0.25741	1.01
52	0.33880	0.32816	1.03	0.24096	0.23902	1.01
53	0.30697	0.29797	1.03	0.23296	0.23058	1.01
54	0.25525	0.24891	1.03	0.21925	0.21618	1.01

Main girder G2

Panel No.	Bending Stiff. (Assumed stiff.)	Bending Stiff. (Actual stiff.)	S.R.	Torsional (Assumed stiff.)	Torsional (Actual stiff.)	S.R.
	Ixa(m4)	Ixr(m4)	Ixa/Ixr	Ja(m4)	Jr(m4)	Ja/Jr
1	0.27842	0.27842	1.00	0.26105	0.26105	1.00
2	0.27842	0.27842	1.00	0.26105	0.26105	1.00
3	0.27842	0.27842	1.00	0.26105	0.26105	1.00
4	0.30792	0.31343	0.98	0.28138	0.28431	0.99
5	0.32562	0.33445	0.97	0.29358	0.29826	0.98
6	0.34090	0.33445	1.02	0.30140	0.29826	1.01
7	0.34308	0.33445	1.03	0.30252	0.29826	1.01
8	0.34308	0.33445	1.03	0.30252	0.29826	1.01
9	0.33654	0.33445	1.01	0.29917	0.29826	1.00
10	0.32562	0.33445	0.97	0.29358	0.29826	0.98
11	0.29612	0.29943	0.99	0.27325	0.27501	0.99
12	0.27842	0.27842	1.00	0.26105	0.26105	1.00
13	0.30823	0.30823	1.00	0.26105	0.26105	1.00
14	0.30354	0.30354	1.00	0.26296	0.26296	1.00
15	0.31515	0.31515	1.00	0.27633	0.27633	1.00
16	0.32126	0.32126	1.00	0.28389	0.28389	1.00
17	0.32127	0.32127	1.00	0.28389	0.28389	1.00
18	0.31517	0.31517	1.00	0.27633	0.27633	1.00
19	0.30356	0.30356	1.00	0.26296	0.26296	1.00
20	0.30824	0.30824	1.00	0.26105	0.26105	1.00
21	0.31216	0.31216	1.00	0.26105	0.26105	1.00
22	0.31216	0.31216	1.00	0.26105	0.26105	1.00
23	0.31216	0.31216	1.00	0.26105	0.26105	1.00
24	0.31216	0.31216	1.00	0.26105	0.26105	1.00
25	0.31216	0.31216	1.00	0.26105	0.26105	1.00
26	0.31216	0.31216	1.00	0.26105	0.26105	1.00
27	0.31216	0.31216	1.00	0.26105	0.26105	1.00
28	0.31216	0.31216	1.00	0.26105	0.26105	1.00
29	0.33176	0.33924	0.98	0.28000	0.28501	0.98
30	0.33780	0.34559	0.98	0.28654	0.29154	0.98
31	0.39698	0.39947	0.99	0.31332	0.31332	1.00
32	0.41715	0.42560	0.98	0.32304	0.32526	0.99
33	0.41124	0.42242	0.97	0.32046	0.32407	0.99
34	0.38098	0.39066	0.98	0.30643	0.31001	0.99
35	0.31834	0.31956	1.00	0.27382	0.27427	1.00
36	0.31117	0.31117	1.00	0.26917	0.26917	1.00
37	0.31672	0.31672	1.00	0.26917	0.26917	1.00
38	0.31162	0.32254	0.97	0.28443	0.29001	0.98
39	0.32936	0.34308	0.96	0.29358	0.30252	0.97

Panel No.	Bending Stiff. (Assumed stiff.)	Bending Stiff. (Actual stiff.)	S.R.	Torsional (Assumed stiff.)	Torsional (Actual stiff.)	S.R.
	Ixa(m4)	Ixr(m4)	Ixa/Ixr	Ja(m4)	Jr(m4)	Ja/Jr
40	0.39572	0.41221	0.96	0.31835	0.32558	0.98
41	0.41139	0.43026	0.96	0.32371	0.33101	0.98
42	0.46238	0.48417	0.96	0.33673	0.34421	0.98
43	0.47381	0.49564	0.96	0.33853	0.34553	0.98
44	0.48669	0.50963	0.95	0.34148	0.34798	0.98
45	0.49291	0.51631	0.95	0.34118	0.34768	0.98
46	0.50243	0.52610	0.96	0.34118	0.34768	0.98
47	0.50582	0.52965	0.95	0.34118	0.34769	0.98
48	0.49796	0.52075	0.96	0.33824	0.34529	0.98
49	0.50426	0.52527	0.96	0.33647	0.34395	0.98
50	0.46196	0.48459	0.95	0.32592	0.33447	0.97
51	0.44889	0.47127	0.95	0.32056	0.32960	0.97
52	0.37046	0.38873	0.95	0.29294	0.30577	0.96
53	0.34049	0.35729	0.95	0.28072	0.28873	0.97
54	0.30251	0.30251	1.00	0.26109	0.26109	1.00

Main girder G3

Panel No.	Bending Stiff. (Assumed stiff.)	Bending Stiff. (Actual stiff.)	S.R.	Torsional (Assumed stiff.)	Torsional (Actual stiff.)	S.R.
	Ixa(m4)	Ixr(m4)	Ixa/Ixr	Ja(m4)	Jr(m4)	Ja/Jr
1	0.31241	0.31241	1.00	0.26099	0.26099	1.00
2	0.32076	0.32509	0.99	0.26672	0.26912	0.99
3	0.33417	0.34564	0.97	0.27627	0.28265	0.98
4	0.36706	0.37785	0.97	0.29265	0.29748	0.98
5	0.38683	0.39723	0.97	0.30248	0.30638	0.99
6	0.40399	0.41405	0.98	0.30904	0.31242	0.99
7	0.40568	0.41567	0.98	0.30998	0.31329	0.99
8	0.40484	0.41479	0.98	0.30998	0.31329	0.99
9	0.39640	0.40645	0.98	0.30717	0.31071	0.99
10	0.38173	0.39189	0.97	0.30250	0.30640	0.99
11	0.33962	0.35040	0.97	0.28166	0.28760	0.98
12	0.31494	0.32612	0.97	0.26915	0.27632	0.97
13	0.34837	0.34038	1.02	0.26916	0.26296	1.02
14	0.33925	0.33132	1.02	0.26916	0.26296	1.02
15	0.33236	0.34227	0.97	0.26916	0.27633	0.97
16	0.34565	0.36194	0.96	0.28120	0.28389	0.99
17	0.34624	0.36152	0.96	0.28389	0.28389	1.00
18	0.33976	0.33976	1.00	0.27633	0.27633	1.00
19	0.32796	0.32796	1.00	0.26297	0.26297	1.00
20	0.33472	0.33472	1.00	0.26106	0.26106	1.00
21	0.33908	0.33908	1.00	0.26106	0.26106	1.00
22	0.33892	0.33892	1.00	0.26106	0.26106	1.00
23	0.33880	0.33880	1.00	0.26106	0.26106	1.00
24	0.33873	0.33873	1.00	0.26106	0.26106	1.00
25	0.33870	0.33870	1.00	0.26106	0.26106	1.00
26	0.33727	0.33727	1.00	0.26106	0.26106	1.00
27	0.33508	0.33508	1.00	0.26107	0.26107	1.00
28	0.33343	0.33343	1.00	0.26108	0.26108	1.00
29	0.35338	0.36170	0.98	0.28003	0.28503	0.98
30	0.35596	0.36542	0.97	0.28657	0.29196	0.98
31	0.41615	0.42631	0.98	0.31337	0.31643	0.99
32	0.43485	0.45063	0.96	0.32309	0.32761	0.99
33	0.42864	0.44434	0.96	0.32186	0.32651	0.99
34	0.39868	0.40863	0.98	0.31007	0.31338	0.99
35	0.32480	0.33398	0.97	0.27433	0.28101	0.98
36	0.31147	0.31361	0.99	0.26923	0.27067	0.99
37	0.31673	0.30762	1.03	0.26923	0.26112	1.03
38	0.31164	0.31345	0.99	0.28450	0.28438	1.00
39	0.32563	0.33446	0.97	0.29366	0.29833	0.98

Panel No.	Bending Stiff. (Assumed stiff.)	Bending Stiff. (Actual stiff.)	S.R.	Torsional (Assumed stiff.)	Torsional (Actual stiff.)	S.R.
	Ixa(m4)	Ixr(m4)	Ixa/Ixr	Ja(m4)	Jr(m4)	Ja/Jr
40	0.39020	0.40501	0.96	0.31842	0.32321	0.99
41	0.40464	0.42167	0.96	0.32356	0.32861	0.98
42	0.44294	0.46140	0.96	0.33497	0.33991	0.99
43	0.45219	0.47035	0.96	0.33683	0.34184	0.99
44	0.47779	0.49770	0.96	0.33998	0.34554	0.98
45	0.48113	0.50117	0.96	0.33968	0.34525	0.98
46	0.48741	0.50782	0.96	0.33969	0.34525	0.98
47	0.49629	0.51697	0.96	0.33969	0.34525	0.98
48	0.49163	0.51189	0.96	0.33768	0.34355	0.98
49	0.49378	0.51436	0.96	0.33647	0.34260	0.98
50	0.45458	0.47688	0.95	0.32375	0.33262	0.97
51	0.43907	0.45976	0.96	0.31839	0.32742	0.97
52	0.35967	0.37465	0.96	0.29300	0.30194	0.97
53	0.33559	0.34813	0.96	0.28086	0.28646	0.98
54	0.30251	0.30251	1.00	0.26109	0.26109	1.00

Main girder G4

Panel No.	Bending Stiff. (Assumed stiff.)	Bending Stiff. (Actual stiff.)	S.R.	Torsional (Assumed stiff.)	Torsional (Actual stiff.)	S.R.
	Ixa(m4)	Ixr(m4)	Ixa/Ixr	Ja(m4)	Jr(m4)	Ja/Jr
1	0.30163	0.30945	0.97	0.21918	0.22188	0.99
2	0.33896	0.34885	0.97	0.22692	0.22925	0.99
3	0.40424	0.41771	0.97	0.23989	0.24158	0.99
4	0.44941	0.46566	0.97	0.24479	0.24627	0.99
5	0.47679	0.49472	0.96	0.24773	0.24909	0.99
6	0.49486	0.51548	0.96	0.24891	0.25046	0.99
7	0.49418	0.51477	0.96	0.24908	0.25066	0.99
8	0.49039	0.51082	0.96	0.24907	0.25065	0.99
9	0.47949	0.49947	0.96	0.24819	0.24990	0.99
10	0.45830	0.47739	0.96	0.24671	0.24863	0.99
11	0.40880	0.42589	0.96	0.24124	0.24317	0.99
12	0.37714	0.39018	0.97	0.23795	0.23987	0.99
13	0.32192	0.32965	0.98	0.21879	0.22171	0.99
14	0.30539	0.31078	0.98	0.21947	0.22184	0.99
15	0.33298	0.32646	1.02	0.24337	0.24089	1.01
16	0.37516	0.36928	1.02	0.25307	0.25146	1.01
17	0.38213	0.37635	1.02	0.25314	0.25154	1.01
18	0.34885	0.34263	1.02	0.24336	0.24088	1.01
19	0.28951	0.28873	1.00	0.21285	0.21254	1.00
20	0.28882	0.28882	1.00	0.20849	0.20849	1.00
21	0.29420	0.29420	1.00	0.20849	0.20849	1.00
22	0.29164	0.29164	1.00	0.20849	0.20849	1.00
23	0.29151	0.29151	1.00	0.20849	0.20849	1.00
24	0.29143	0.29143	1.00	0.20849	0.20849	1.00
25	0.29140	0.29140	1.00	0.20849	0.20849	1.00
26	0.29351	0.29351	1.00	0.20853	0.20853	1.00
27	0.30235	0.30235	1.00	0.21322	0.21322	1.00
28	0.30582	0.30582	1.00	0.21605	0.21605	1.00
29	0.36913	0.37923	0.97	0.23327	0.23522	0.99
30	0.38149	0.39267	0.97	0.24009	0.24214	0.99
31	0.47802	0.48712	0.98	0.27058	0.27146	1.00
32	0.49601	0.50966	0.97	0.27316	0.27430	1.00
33	0.48127	0.49612	0.97	0.27251	0.27391	0.99
34	0.43873	0.45186	0.97	0.26859	0.27010	0.99
35	0.34337	0.34960	0.98	0.23756	0.23892	0.99
36	0.31031	0.31356	0.99	0.22880	0.22963	1.00
37	0.28235	0.28235	1.00	0.22184	0.22184	1.00
38	0.31606	0.31283	1.01	0.23419	0.23368	1.00
39	0.34884	0.34367	1.02	0.24160	0.24078	1.00

Panel No.	Bending Stiff. (Assumed stiff.)	Bending Stiff. (Actual stiff.)	S.R.	Torsional (Assumed stiff.)	Torsional (Actual stiff.)	S.R.
	Ixa(m4)	Ixr(m4)	Ixa/Ixr	Ja(m4)	Jr(m4)	Ja/Jr
40	0.36922	0.35991	1.03	0.26076	0.25922	1.01
41	0.37795	0.36834	1.03	0.26427	0.26274	1.01
42	0.41847	0.40499	1.03	0.26875	0.26718	1.01
43	0.42497	0.41118	1.03	0.26944	0.26790	1.01
44	0.43582	0.42286	1.03	0.27059	0.26924	1.00
45	0.43604	0.42310	1.03	0.27167	0.27032	1.00
46	0.43604	0.42310	1.03	0.27166	0.27032	1.00
47	0.43605	0.42310	1.03	0.27166	0.27032	1.00
48	0.42243	0.40572	1.04	0.27020	0.26825	1.01
49	0.41346	0.39604	1.04	0.26933	0.26710	1.01
50	0.36877	0.35397	1.04	0.26293	0.26028	1.01
51	0.35863	0.34393	1.04	0.25915	0.25639	1.01
52	0.33348	0.32271	1.03	0.24002	0.23794	1.01
53	0.30506	0.29591	1.03	0.23274	0.23029	1.01
54	0.25522	0.24888	1.03	0.21925	0.21618	1.01

＊Stiffness ratio of cross beam

Cross beam No.－ Betweeen main girder No.	Inertia (assume)	Inertia (Actual)	Stiffness ratio
	Ixa(m4)	Ixr(m4)	Ixa/Ixr
1 － 1	0.49387	0.49387	1.00
1 － 2	0.19426	0.19426	1.00
1 － 3	0.09422	0.09422	1.00
3 － 1	0.38511	0.38511	1.00
3 － 2	0.17320	0.17320	1.00
3 － 3	0.09398	0.09398	1.00
5 － 1	0.38511	0.38511	1.00
5 － 2	0.17320	0.17320	1.00
5 － 3	0.09740	0.09740	1.00
7 － 1	0.38511	0.38511	1.00
7 － 2	0.17320	0.17320	1.00
7 － 3	0.10102	0.10102	1.00
9 － 1	0.38511	0.38511	1.00
9 － 2	0.17320	0.17320	1.00
9 － 3	0.10479	0.10479	1.00
11 － 1	0.38511	0.38511	1.00
11 － 2	0.17320	0.17320	1.00
11 － 3	0.10862	0.10862	1.00
13 － 1	0.38511	0.38511	1.00
13 － 2	0.17320	0.17320	1.00
13 － 3	0.11244	0.11244	1.00
15 － 1	0.38511	0.38511	1.00
15 － 2	0.17320	0.17320	1.00
15 － 3	0.11611	0.11611	1.00
17 － 1	0.38511	0.38511	1.00
17 － 2	0.17320	0.17320	1.00
17 － 3	0.11941	0.11941	1.00
19 － 1	0.38511	0.38511	1.00
19 － 2	0.17320	0.17320	1.00
19 － 3	0.12234	0.12234	1.00
21 － 1	0.38511	0.38511	1.00
21 － 2	0.17320	0.17320	1.00
21 － 3	0.12468	0.12468	1.00
23 － 1	0.38511	0.38511	1.00
23 － 2	0.17320	0.17320	1.00
23 － 3	0.12627	0.12627	1.00
25 － 1	0.38511	0.38511	1.00
25 － 2	0.17320	0.17320	1.00
25 － 3	0.12699	0.12699	1.00
27 － 1	0.38511	0.38511	1.00
27 － 2	0.17320	0.17320	1.00
27 － 3	0.12929	0.12929	1.00
29 － 1	0.38511	0.38511	1.00
29 － 2	0.17320	0.17320	1.00

Cross beam No.— Betweeen main girder No.	Inertia (assume)	Inertia (Actual)	Stiffness ratio
	Ixa(m4)	Ixr(m4)	Ixa/Ixr
29 - 3	0.12554	0.12554	1.00
31 - 1	0.38511	0.38511	1.00
31 - 2	0.17320	0.17320	1.00
31 - 3	0.15040	0.15040	1.00
33 - 1	0.38511	0.38511	1.00
33 - 2	0.17320	0.17320	1.00
33 - 3	0.19298	0.19298	1.00
35 - 1	0.38511	0.38511	1.00
35 - 2	0.17320	0.17320	1.00
35 - 3	0.27333	0.27333	1.00
37 - 1	0.38511	0.38511	1.00
37 - 2	0.17320	0.17320	1.00
37 - 3	0.38507	0.38507	1.00
39 - 1	0.38511	0.38511	1.00
39 - 2	0.17320	0.17320	1.00
39 - 3	0.38507	0.38507	1.00
41 - 1	0.38511	0.38511	1.00
41 - 2	0.17320	0.17320	1.00
41 - 3	0.38507	0.38507	1.00
43 - 1	0.38511	0.38511	1.00
43 - 2	0.17312	0.17312	1.00
43 - 3	0.38507	0.38507	1.00
45 - 1	0.38511	0.38511	1.00
45 - 2	0.15918	0.15918	1.00
45 - 3	0.38507	0.38507	1.00
47 - 1	0.38511	0.38511	1.00
47 - 2	0.14231	0.14231	1.00
47 - 3	0.38507	0.38507	1.00
49 - 1	0.38511	0.38511	1.00
49 - 2	0.12988	0.12988	1.00
49 - 3	0.38507	0.38507	1.00
51 - 1	0.38511	0.38511	1.00
51 - 2	0.12037	0.12037	1.00
51 - 3	0.38507	0.38507	1.00
53 - 1	0.38511	0.38511	1.00
53 - 2	0.11347	0.11347	1.00
53 - 3	0.38507	0.38507	1.00
55 - 1	0.52884	0.52884	1.00
55 - 2	0.13294	0.13294	1.00
55 - 3	0.52884	0.52884	1.00

（２）Check of deflection due to live load

Main girder G1

Span No.	Span length	Actual Deflection	Allowable deflection	Actual def./Span Length	Allowable def./Span Length
	L span(mm)	δ (mm)	δ a(mm)	δ ／L span	δ a／L span
1	75887	72.8	151.8	1/1043	1/500
2	76787	58.6	153.6	1/1310	1/500
3	103191	158.6	206.4	1/651	1/500

Main girder G2

Span No.	Span length	Actual Deflection	Allowable deflection	Actual def./Span Length	Allowable def./Span Length
	L span(mm)	δ (mm)	δ a(mm)	δ ／L span	δ a／L span
1	75715	72.0	151.4	1/1051	1/500
2	76615	58.7	153.2	1/1306	1/500
3	102972	157.0	205.9	1/656	1/500

Main girder G3

Span No.	Span length	Actual Deflection	Allowable deflection	Actual def./Span Length	Allowable def./Span Length
	L span(mm)	δ (mm)	δ a(mm)	δ ／L span	δ a／L span
1	75485	71.2	151.0	1/1060	1/500
2	76385	59.2	152.8	1/1290	1/500
3	102651	154.9	205.3	1/663	1/500

Main girder G4

Span No.	Span length	Actual Deflection	Allowable deflection	Actual def./Span Length	Allowable def./Span Length
	L span(mm)	δ (mm)	δ a(mm)	δ ／L span	δ a／L span
1	75185	71.6	150.4	1/1051	1/500
2	76184	61.1	152.4	1/1246	1/500
3	102467	153.8	204.9	1/666	1/500

4－15 Investigations on ratio by weight of steel

calculation inertia $\Sigma w1$ = 33909.1 kN (from analysis results)

real inertia $\Sigma w2$ = 3424.6 ton (from quantity calculation sheet)
= 33583.5 kN

error $\dfrac{|\ 33909.1 - 33583.5\ |}{33909.1} \times 100 = 1.0\ \% < 5.0\ \%$

therefore, it is an acceptable range because value is within 5%.

５．Design of the cross beam

５．１．Design principle

＊ Use the larger value between the section force caused by main truss action and section force caused by floor system action as design section force.

＊ Use values calculated for the analysis of the steel deck plate for the calculation of section force caused by floor system action.

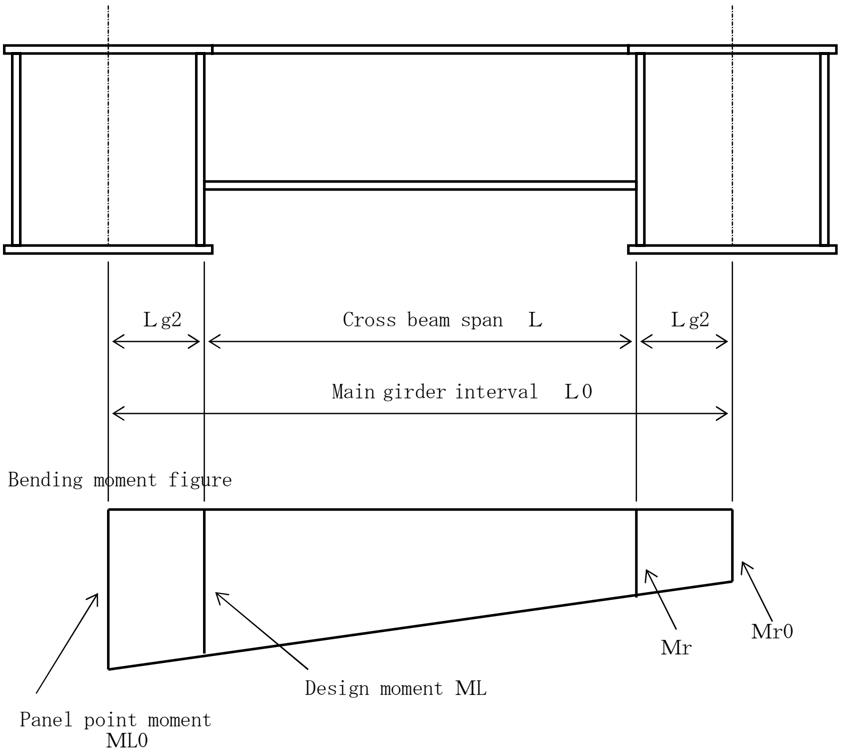
＊ Because the cross beam bending moment is calculated using lattice calculation focusing on the main girder, the section force caused by main truss action is calculated by converting to the bending moment at the cross beam installation location. The method of conversion is shown in the following equations, considering that bending moment linearly changes between the main girder intercentrally.

Left side bending moment $ML = ML0 + (Mr0 - ML0) * (Lg2 / L0)$

Right side bending moment $Mr = Mr0 + (ML0 - Mr0) * (Lg2 / L0)$

＊ Use the larger value of the left and right side for calculation of maximum bending moment and minimum bending moment.

＊ Of the results from lattice calculation, use the value with larger absolute value for shearing force.



＊ Implement inspection on the superimposing of stress intensity caused by floor system action and stress intensity caused by lattice action.

＊For the calculation of the splice point of design cross-section force, use directly the value of cross-section calculation point.

5．2．Section forces

Name of cross beam	Left-side node Moment M0(kN.m)	Right-side node Moment M0(kN.m)	Main girder Crossbeam span L0,L(m)	Width of main girder/2 Lg2(m)	Installation point of cross beam Moment M(kN.m)	Shear force S(kN)
CR1-001(End)	MAX: 821.2	1742.3	L0= 4.500	L= 1.500	MAX: 1466.0	913.9
	MIN:-2074.9	-635.2	L = 1.650	R= 1.350	MIN:-1595.0	
CR1-003(Int)	MAX: 658.5	18.1	L0= 4.500	L= 1.500	MAX: 445.0	-476.5
	MIN: -146.8	-1431.7	L = 1.650	R= 1.350	MIN:-1046.2	
CR1-005(Int)	MAX: 630.9	631.4	L0= 4.500	L= 1.500	MAX: 631.3	-314.5
	MIN: -564.1	-839.3	L = 1.650	R= 1.350	MIN: -756.7	
CR1-007(Int)	MAX: 848.1	382.2	L0= 4.500	L= 1.500	MAX: 692.8	-419.5
	MIN: -500.5	-1088.5	L = 1.650	R= 1.350	MIN: -912.1	
CR1-009(Int)	MAX: 807.3	447.7	L0= 4.500	L= 1.500	MAX: 687.4	-392.4
	MIN: -557.7	-1028.1	L = 1.650	R= 1.350	MIN: -887.0	
CR1-011(Int)	MAX: 635.3	431.9	L0= 4.500	L= 1.500	MAX: 567.5	-364.1
	MIN: -628.9	-1063.4	L = 1.650	R= 1.350	MIN: -933.1	
CR1-013(Int)	MAX: 646.7	-162.2	L0= 4.500	L= 1.500	MAX: 377.0	-521.0
	MIN: -320.8	-1670.6	L = 1.650	R= 1.350	MIN:-1265.6	
CR1-015(Int)	MAX: 478.4	311.4	L0= 4.500	L= 1.500	MAX: 422.8	-323.8
	MIN: -508.4	-1053.6	L = 1.650	R= 1.350	MIN: -890.0	
CR1-017(Sup)	MAX: 817.7	866.5	L0= 4.500	L= 1.500	MAX: 851.9	457.0
	MIN:-1042.5	-701.4	L = 1.650	R= 1.350	MIN: -928.8	
CR1-019(Int)	MAX: 486.2	559.3	L0= 4.500	L= 1.500	MAX: 537.3	-263.2
	MIN: -533.6	-817.4	L = 1.650	R= 1.350	MIN: -732.3	
CR1-021(Int)	MAX: 615.7	185.4	L0= 4.500	L= 1.500	MAX: 472.2	-433.1
	MIN: -386.4	-1322.9	L = 1.650	R= 1.350	MIN:-1041.9	
CR1-023(Int)	MAX: 667.0	58.3	L0= 4.500	L= 1.500	MAX: 464.1	-472.7
	MIN: -562.9	-1441.8	L = 1.650	R= 1.350	MIN:-1178.2	
CR1-025(Int)	MAX: 673.2	45.5	L0= 4.500	L= 1.500	MAX: 464.0	-478.2
	MIN: -626.3	-1453.0	L = 1.650	R= 1.350	MIN:-1205.0	
CR1-027(Int)	MAX: 570.2	351.2	L0= 4.500	L= 1.500	MAX: 497.2	-386.4
	MIN: -642.0	-1166.1	L = 1.650	R= 1.350	MIN:-1008.9	
CR1-029(Int)	MAX: 396.1	704.9	L0= 4.500	L= 1.500	MAX: 612.3	-253.6
	MIN: -684.4	-787.9	L = 1.650	R= 1.350	MIN: -756.9	
CR1-031(Int)	MAX: 518.5	448.3	L0= 4.500	L= 1.500	MAX: 495.1	-278.4
	MIN: -578.4	-859.8	L = 1.650	R= 1.350	MIN: -775.4	

Name of cross beam	Left-side node Moment M0(kN.m)	Right-side node Moment M0(kN.m)	Main girder Crossbeam span L0,L(m)	Width of main girder/2 Lg2(m)	Installation point of cross beam Moment M(kN.m)	Installation point of cross beam Shear force S(kN)
CR1-033(Sup)	MAX: 948.0	953.5	L0= 4.500	L= 1.500	MAX: 951.9	486.6
	MIN:-1078.9	-804.1	L = 1.650	R= 1.350	MIN: -987.3	
CR1-035(Int)	MAX: 741.5	579.4	L0= 4.500	L= 1.500	MAX: 687.4	-270.3
	MIN: -336.3	-640.7	L = 1.650	R= 1.350	MIN: -549.4	
CR1-037(Int)	MAX: 799.5	405.8	L0= 4.500	L= 1.500	MAX: 668.2	-402.8
	MIN: -152.8	-1002.9	L = 1.650	R= 1.350	MIN: -747.8	
CR1-039(Int)	MAX: 535.9	805.4	L0= 4.500	L= 1.500	MAX: 724.6	-246.6
	MIN: -516.0	-617.4	L = 1.650	R= 1.350	MIN: -587.0	
CR1-041(Int)	MAX: 742.4	435.7	L0= 4.500	L= 1.500	MAX: 640.2	-373.1
	MIN: -465.2	-965.2	L = 1.650	R= 1.350	MIN: -815.2	
CR1-043(Int)	MAX: 875.5	207.6	L0= 4.500	L= 1.500	MAX: 652.9	-459.1
	MIN: -400.5	-1173.9	L = 1.650	R= 1.350	MIN: -941.9	
CR1-045(Int)	MAX: 1017.0	437.1	L0= 4.500	L= 1.500	MAX: 823.7	-425.9
	MIN: -291.8	-917.9	L = 1.650	R= 1.350	MIN: -730.1	
CR1-047(Int)	MAX: 711.8	332.2	L0= 4.500	L= 1.500	MAX: 585.3	-379.8
	MIN: -561.1	-1018.1	L = 1.650	R= 1.350	MIN: -881.0	
CR1-049(Int)	MAX: 796.1	-48.5	L0= 4.500	L= 1.500	MAX: 514.6	-498.7
	MIN: -436.9	-1403.7	L = 1.650	R= 1.350	MIN:-1113.6	
CR1-051(Int)	MAX: 860.8	-341.3	L0= 4.500	L= 1.500	MAX: 460.1	-602.6
	MIN: -230.2	-1745.6	L = 1.650	R= 1.350	MIN:-1291.0	
CR1-053(Int)	MAX: 56.2	702.4	L0= 4.500	L= 1.500	MAX: 508.6	294.1
	MIN: -709.1	-634.4	L = 1.650	R= 1.350	MIN: -684.2	
CR1-055(End)	MAX: 1093.4	2468.2	L0= 4.500	L= 1.500	MAX: 2055.8	1144.0
	MIN:-2311.4	-1199.8	L = 1.650	R= 1.350	MIN:-1940.8	
CR2-001(End)	MAX: 429.2	1226.6	L0= 6.000	L= 1.350	MAX: 1047.2	338.6
	MIN: -805.4	-736.3	L = 3.300	R= 1.350	MIN: -789.8	
CR2-003(Int)	MAX: 362.2	881.7	L0= 6.000	L= 1.350	MAX: 764.8	260.2
	MIN:-1030.4	-843.0	L = 3.300	R= 1.350	MIN: -988.2	
CR2-005(Int)	MAX: 971.8	1261.2	L0= 6.000	L= 1.350	MAX: 1196.0	248.5
	MIN: -954.0	-821.0	L = 3.300	R= 1.350	MIN: -924.1	
CR2-007(Int)	MAX: 981.7	1265.7	L0= 6.000	L= 1.350	MAX: 1201.8	266.9
	MIN:-1191.6	-829.5	L = 3.300	R= 1.350	MIN:-1110.1	
CR2-009(Int)	MAX: 1024.9	1149.4	L0= 6.000	L= 1.350	MAX: 1121.4	-257.6
	MIN:-1184.4	-935.9	L = 3.300	R= 1.350	MIN:-1128.5	
CR2-011(Int)	MAX: 783.6	1081.2	L0= 6.000	L= 1.350	MAX: 1014.2	258.6
	MIN:-1267.9	-972.5	L = 3.300	R= 1.350	MIN:-1201.5	

Name of cross beam	Left-side node Moment M0(kN.m)	Right-side node Moment M0(kN.m)	Main girder Crossbeam span L0,L(m)	Width of main girder/2 Lg2(m)	Installation point of cross beam Moment M(kN.m)	Shear force S(kN)
CR2-013(Int)	MAX: 163.3	722.9	L0= 6.000	L= 1.350	MAX: 597.0	267.6
	MIN:-1546.3	-1180.9	L = 3.300	R= 1.350	MIN:-1464.1	
CR2-015(Int)	MAX: 445.0	677.8	L0= 6.000	L= 1.350	MAX: 625.4	221.8
	MIN:-1167.2	-859.9	L = 3.300	R= 1.350	MIN:-1098.1	
CR2-017(Sup)	MAX: 286.9	508.7	L0= 6.000	L= 1.350	MAX: 458.8	144.9
	MIN: -360.7	-391.4	L = 3.300	R= 1.350	MIN: -384.5	
CR2-019(Int)	MAX: 768.3	942.7	L0= 6.000	L= 1.350	MAX: 903.5	227.6
	MIN: -916.8	-591.4	L = 3.300	R= 1.350	MIN: -843.6	
CR2-021(Int)	MAX: 503.7	858.5	L0= 6.000	L= 1.350	MAX: 778.7	238.2
	MIN:-1242.3	-1037.9	L = 3.300	R= 1.350	MIN:-1196.3	
CR2-023(Int)	MAX: 379.6	595.4	L0= 6.000	L= 1.350	MAX: 546.8	243.8
	MIN:-1617.5	-1394.6	L = 3.300	R= 1.350	MIN:-1567.4	
CR2-025(Int)	MAX: 352.2	636.8	L0= 6.000	L= 1.350	MAX: 572.8	262.0
	MIN:-1732.3	-1384.7	L = 3.300	R= 1.350	MIN:-1654.1	
CR2-027(Int)	MAX: 525.6	952.8	L0= 6.000	L= 1.350	MAX: 856.7	271.8
	MIN:-1456.8	-1023.3	L = 3.300	R= 1.350	MIN:-1359.3	
CR2-029(Int)	MAX: 706.8	1156.5	L0= 6.000	L= 1.350	MAX: 1055.3	259.4
	MIN:-1031.5	-597.4	L = 3.300	R= 1.350	MIN: -933.8	
CR2-031(Int)	MAX: 545.7	868.7	L0= 6.000	L= 1.350	MAX: 796.0	264.1
	MIN:-1081.8	-750.4	L = 3.300	R= 1.350	MIN:-1007.2	
CR2-033(Sup)	MAX: 261.2	411.7	L0= 6.000	L= 1.350	MAX: 377.8	123.6
	MIN: -331.0	-316.3	L = 3.300	R= 1.350	MIN: -327.7	
CR2-035(Int)	MAX: 1057.9	677.6	L0= 6.000	L= 1.350	MAX: 972.4	-260.3
	MIN: -549.5	-810.9	L = 3.300	R= 1.350	MIN: -752.1	
CR2-037(Int)	MAX: 913.0	405.5	L0= 6.000	L= 1.350	MAX: 798.8	-276.6
	MIN: -625.3	-1137.1	L = 3.300	R= 1.350	MIN:-1021.9	
CR2-039(Int)	MAX: 1078.3	832.3	L0= 6.000	L= 1.350	MAX: 1023.0	-256.1
	MIN: -588.0	-845.5	L = 3.300	R= 1.350	MIN: -787.6	
CR2-041(Int)	MAX: 863.0	687.2	L0= 6.000	L= 1.350	MAX: 823.4	-267.0
	MIN: -871.4	-1085.7	L = 3.300	R= 1.350	MIN:-1037.5	
CR2-043(Int)	MAX: 697.3	1616.7	L0= 6.001	L= 1.350	MAX: 1409.8	413.8
	MIN:-1120.3	-323.1	L = 3.301	R= 1.350	MIN: -941.0	
CR2-045(Int)	MAX: 1166.4	930.1	L0= 6.298	L= 1.350	MAX: 1115.8	-299.1
	MIN: -716.2	-971.5	L = 3.598	R= 1.350	MIN: -916.7	
CR2-047(Int)	MAX: 688.3	657.3	L0= 6.770	L= 1.350	MAX: 682.2	-244.9
	MIN:-1149.8	-1191.8	L = 4.070	R= 1.350	MIN:-1183.4	

Name of cross beam	Left-side node Moment M0(kN.m)	Right-side node Moment M0(kN.m)	Main girder Crossbeam span L0,L(m)	Width of main girder/2 Lg2(m)	Installation point of cross beam Moment M(kN.m)	Installation point of cross beam Shear force S(kN)
CR2-049(Int)	MAX: 379.7	271.6	L0= 7.243	L= 1.350	MAX: 359.5	-234.7
	MIN:-1397.2	-1526.5	L = 4.543	R= 1.350	MIN:-1502.4	
CR2-051(Int)	MAX: 115.5	198.4	L0= 7.715	L= 1.350	MAX: 183.9	179.6
	MIN:-1421.3	-1364.8	L = 5.015	R= 1.350	MIN:-1411.4	
CR2-053(Int)	MAX: 366.3	555.6	L0= 8.146	L= 1.350	MAX: 524.2	143.0
	MIN: -800.3	-641.8	L = 5.446	R= 1.350	MIN: -774.0	
CR2-055(End)	MAX: 173.2	317.3	L0= 8.200	L= 1.350	MAX: 293.6	78.5
	MIN: -326.3	-180.4	L = 5.500	R= 1.350	MIN: -302.3	
CR3-001(End)	MAX: 498.8	1902.5	L0=11.058	L= 1.350	MAX: 1711.8	286.3
	MIN:-1171.7	-718.5	L = 8.206	R= 1.502	MIN:-1116.3	
CR3-003(Int)	MAX: 654.9	732.1	L0=10.581	L= 1.350	MAX: 721.2	164.0
	MIN: -960.1	93.0	L = 7.731	R= 1.500	MIN: -825.8	
CR3-005(Int)	MAX: 1234.3	776.3	L0=10.102	L= 1.350	MAX: 1173.1	178.0
	MIN: -984.5	-458.0	L = 7.252	R= 1.500	MIN: -914.1	
CR3-007(Int)	MAX: 1275.8	843.4	L0= 9.667	L= 1.350	MAX: 1215.4	200.4
	MIN:-1054.7	-631.0	L = 6.817	R= 1.500	MIN: -995.6	
CR3-009(Int)	MAX: 1144.4	844.8	L0= 9.277	L= 1.350	MAX: 1100.8	221.9
	MIN:-1166.3	-656.4	L = 6.427	R= 1.500	MIN:-1092.1	
CR3-011(Int)	MAX: 985.5	743.7	L0= 8.931	L= 1.350	MAX: 948.9	228.9
	MIN:-1237.0	-620.7	L = 6.081	R= 1.500	MIN:-1143.8	
CR3-013(Int)	MAX: 453.9	827.9	L0= 8.629	L= 1.350	MAX: 762.9	294.3
	MIN:-1625.6	-273.8	L = 5.779	R= 1.500	MIN:-1414.1	
CR3-015(Int)	MAX: 588.7	475.1	L0= 8.372	L= 1.350	MAX: 570.4	157.6
	MIN: -930.5	-710.7	L = 5.522	R= 1.500	MIN: -895.1	
CR3-017(Sup)	MAX: 647.5	657.4	L0= 8.163	L= 1.350	MAX: 655.6	-217.5
	MIN: -499.3	-1059.0	L = 5.313	R= 1.500	MIN: -956.2	
CR3-019(Int)	MAX: 1027.8	417.6	L0= 7.995	L= 1.350	MAX: 924.7	-219.7
	MIN: -506.9	-808.1	L = 5.145	R= 1.500	MIN: -751.6	
CR3-021(Int)	MAX: 767.2	625.0	L0= 7.868	L= 1.350	MAX: 742.8	248.5
	MIN:-1251.2	-504.7	L = 5.018	R= 1.500	MIN:-1123.1	
CR3-023(Int)	MAX: 314.2	899.4	L0= 7.787	L= 1.350	MAX: 786.7	361.4
	MIN:-1798.7	-398.9	L = 4.937	R= 1.500	MIN:-1556.0	
CR3-025(Int)	MAX: 300.8	883.8	L0= 7.752	L= 1.350	MAX: 771.0	368.7
	MIN:-1860.1	-419.9	L = 4.902	R= 1.500	MIN:-1609.3	
CR3-027(Int)	MAX: 667.4	570.9	L0= 7.643	L= 1.350	MAX: 650.4	276.5
	MIN:-1464.2	-565.6	L = 4.793	R= 1.500	MIN:-1305.5	

Name of cross beam	Left-side node Moment M0(kN.m)	Right-side node Moment M0(kN.m)	Main girder Crossbeam span L0,L(m)	Width of main girder/2 Lg2(m)	Installation point of cross beam Moment M(kN.m)	Shear force S(kN)
CR3-029(Int)	MAX: 951.5	366.1	L0= 6.949	L= 1.350	MAX: 837.8	-224.8
	MIN: -937.4	-744.2	L = 4.099	R= 1.500	MIN: -899.8	
CR3-031(Int)	MAX: 562.2	537.4	L0= 6.256	L= 1.350	MAX: 556.8	209.1
	MIN: -830.4	-638.6	L = 3.406	R= 1.500	MIN: -789.0	
CR3-033(Sup)	MAX: 775.5	950.9	L0= 5.577	L= 1.350	MAX: 903.6	-356.1
	MIN: -789.5	-1097.2	L = 2.723	R= 1.504	MIN:-1014.3	
CR3-035(Int)	MAX: 970.0	426.4	L0= 4.931	L= 1.350	MAX: 821.2	-383.8
	MIN: -434.1	-883.0	L = 2.081	R= 1.500	MIN: -746.5	
CR3-037(Int)	MAX: 390.4	402.6	L0= 4.500	L= 1.350	MAX: 398.6	299.5
	MIN:-1000.2	-825.7	L = 1.650	R= 1.500	MIN: -947.8	
CR3-039(Int)	MAX: 763.0	417.4	L0= 4.500	L= 1.350	MAX: 659.3	-267.3
	MIN: -652.3	-687.3	L = 1.650	R= 1.500	MIN: -675.6	
CR3-041(Int)	MAX: 292.8	831.7	L0= 4.500	L= 1.350	MAX: 652.1	424.7
	MIN:-1082.7	-410.7	L = 1.650	R= 1.500	MIN: -881.1	
CR3-043(Int)	MAX: 515.7	1430.4	L0= 4.500	L= 1.350	MAX: 1125.5	498.4
	MIN: -837.7	53.5	L = 1.650	R= 1.500	MIN: -570.4	
CR3-045(Int)	MAX: 421.7	914.4	L0= 4.500	L= 1.350	MAX: 750.2	403.2
	MIN: -927.4	-410.3	L = 1.650	R= 1.500	MIN: -772.2	
CR3-047(Int)	MAX: 367.8	647.5	L0= 4.500	L= 1.350	MAX: 554.3	355.6
	MIN: -983.2	-634.0	L = 1.650	R= 1.500	MIN: -878.4	
CR3-049(Int)	MAX: -103.5	761.7	L0= 4.500	L= 1.350	MAX: 473.3	504.0
	MIN:-1458.9	-477.6	L = 1.650	R= 1.500	MIN:-1164.5	
CR3-051(Int)	MAX: -277.0	865.6	L0= 4.500	L= 1.350	MAX: 484.8	584.8
	MIN:-1673.0	-237.7	L = 1.650	R= 1.500	MIN:-1242.4	
CR3-053(Int)	MAX: 738.2	185.6	L0= 4.500	L= 1.350	MAX: 572.4	-272.1
	MIN: -580.8	-592.7	L = 1.650	R= 1.500	MIN: -588.7	
CR3-055(End)	MAX: 1415.5	2160.6	L0= 4.500	L= 1.350	MAX: 1912.3	1064.9
	MIN:-2287.9	-1335.6	L = 1.650	R= 1.500	MIN:-2002.2	

５．３．Section force acting on floor system

＊ Use values calculated in the chapter regarding analysis of the steel deck plate.

Edge cross beam

Bending moment	M =	1002.7 kN·m
Shearing force	S =	-673.9 kN

Intermediate cross beam

Bending moment	M =	1002.7 kN·m
Shearing force	S =	-673.9 kN

５．４． Calculations of cross-section

(1) Cross beam over end support Ｓ１[between Ｇ１-Ｇ２] : Representative CR1-001(S1)

Section forces and condition of the calculation

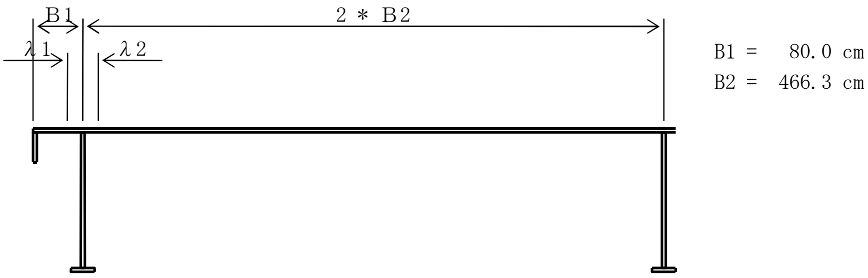
acting on main girder	M = -1595.0 kN·m	S = 913.9 kN
acting on floor system	M = -1002.7 kN·m	S = -673.9 kN
Section force at joint	Mj= -1595.0 kN·m	Sj= 913.9 kN
Shearing stress at defect	Sk= 913.9 kN	
Distance between fixing points	L = 1.650 m	

Equivalent span length (acting on main girder)

Li = 1.0 * Lc = 1.0 * 165.0 = 165.0 cm

Lc: main girder web interval

Effective width (acting on main girder)



B1/Li = 80.0 / 165.0 = 0.48

λ1 = 0.15 * Li = 0.15 * 165.0 = 24.7 cm

B2/Li = 466.3 / 165.0 = 2.83

λ2 = 0.15 * Li = 0.15 * 165.0 = 24.7 cm

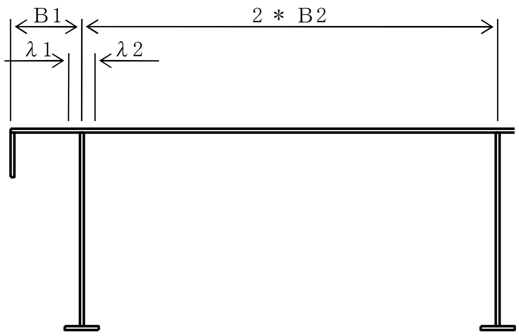
Sum of effective width λ = λ1 + λ2 = 24.7 + 24.7 = 49.5 cm

Equivalent span length (acting on floor system)

Li = 0.6 * Lc = 0.6 * 165.0 = 99.0 cm

Lc: main girder web interval

Effective width (acting on floor system)



B1 = 80.0 cm
B2 = 233.2 cm

B1/Li = 80.0 / 99.0 = 0.81

λ1 = 0.15 * Li = 0.15 * 99.0 = 14.8 cm

B2/Li = 233.2 / 99.0 = 2.36

λ2 = 0.15 * Li = 0.15 * 99.0 = 14.8 cm

Sum of effective width λ = λ1 + λ2 = 14.8 + 14.8 = 29.7 cm

Section area and moment of inertia (acting on main girder)

			$A(cm^2)$	$Y(cm)$	$AY(cm^3)$	$I(cm^4)$
1-DECK	PL	495 * 16(SM400)	79.20	-109.45	-8668	948761
1-WEB	PL	2173 * 9(SM400)	195.57	0.00	0	769556
1-LFLG	PL	380 * 16(SM400)	60.80	109.45	6655	728342
			335.57		-2014	2446659

E = -2014/ 335.57 = -6.00 cm

I = 2446659 - 335.57 * -6.00^2 = 2434573 cm^4

Yu = -104.25 cm , YL = 116.25 cm

Section area and moment of inertia (acting on floor system)

			$A(cm^2)$	$Y(cm)$	$AY(cm^3)$	$I(cm^4)$
1-DECK	PL	297 * 16(SM400)	47.52	-109.45	-5201	569256
1-WEB	PL	2173 * 9(SM400)	195.57	0.00	0	769556
1-LFLG	PL	380 * 16(SM400)	60.80	109.45	6655	728342
			303.89		1453	2067154

E = 1453/ 303.89 = 4.78 cm

I = 2067154 - 303.89 * 4.78^2 = 2060202 cm^4

Yu = -115.03 cm , YL = 105.47 cm

＊Acting on main girder

Allowable stress

・LFLG

Allowable stress due to lateral buckling

$Aw/Ac = 195.57 / 60.80 = 3.217 > 2$

$K*L/b = \sqrt{(3 + 195.57 / (2 * 60.80))} * 165.0 / 38.0 = 9.321 > 9$

$\sigma ba = 140 - 1.2*(9.321 - 9) = 140$ N/mm^2

Allowable stress due to local buckling

$\sigma cal = 140$ N/mm^2

Allowable stress $\sigma ca = 140$ N/mm^2

Bending stress

$\sigma u = -1595.0*10^6 * -1042.5 / (2434573*10^4) = 68$ N/mm^2 $< \sigma ta = 140$ N/mm^2

$\sigma L = -1595.0*10^6 * 1162.5 / (2434573*10^4) = -76$ N/mm^2 $< \sigma ca = 140$ N/mm^2

Shear stress

$\tau = 913.9*10^3 / 19557 = 47$ N/mm^2 $< \tau a = 80$ N/mm^2

Combined stress

$\kappa = (-75 / 140)^2 + (47 / 80)^2 = 0.63 < 1.2$

＊acting on floor system

Bending stress

$\sigma u = -1002.7*10^6 * -1150.3 / (2060202*10^4) = 56$ N/mm^2 $< \sigma ta = 140$ N/mm^2

$\sigma L = -1002.7*10^6 * 1054.7 / (2060202*10^4) = -51$ N/mm^2 $< \sigma ca = 140$ N/mm^2

Shear stress

$\tau = -673.9*10^3 / 19557 = 34$ N/mm^2 $< \tau a = 80$ N/mm^2

Combined stress

$\kappa = (55 / 140)^2 + (34 / 80)^2 = 0.34 < 1.2$

*For the joint

Bending stress

$\sigma u = -1595.0*10^6 * -1042.5 / (2434573*10^4) = 68\ N/mm^2 < \sigma ta = 140\ N/mm^2$

$\sigma L = -1595.0*10^6 * 1162.5 / (2434573*10^4) = -76\ N/mm^2 < \sigma ca = 140\ N/mm^2$

Shear stress

$\tau = 913.9*10^3 / 19557 = 47\ N/mm^2 < \tau a = 80\ N/mm^2$

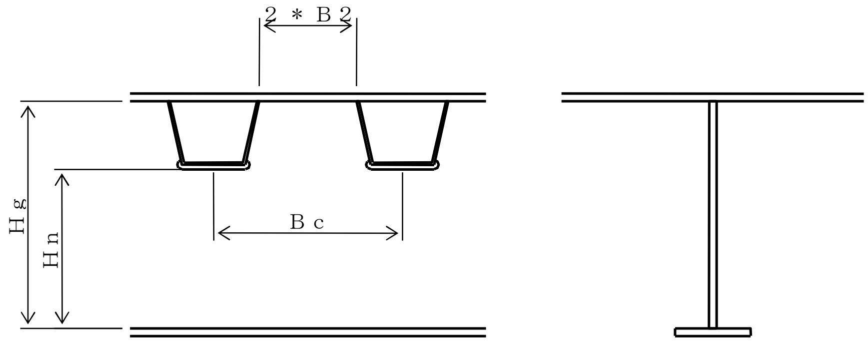
Combined stress

$\kappa = (-75 / 140)^2 + (47 / 80)^2 = 0.63 < 1.2$

Superimposing stress intensity acting on main girder and floor system

DECK $(68) + (56) = 124\ N/mm^2 < \sigma a = 195\ N/mm^2$

Shear stress at defect of longitudinal rib



$\tau k = 913.9*10^3 / 19557 = 47\ N/mm^2 < \tau a = 80\ N/mm^2$

$\tau v = \tau k * Hg / Hn = 47 * 217.3 / 189.6 = 54\ N/mm^2 < \tau a$

(2) Cross beam over end support Ｓ１[between Ｇ２-Ｇ３] : Representative CR2-001(S1)

Section forces and condition of the calculation

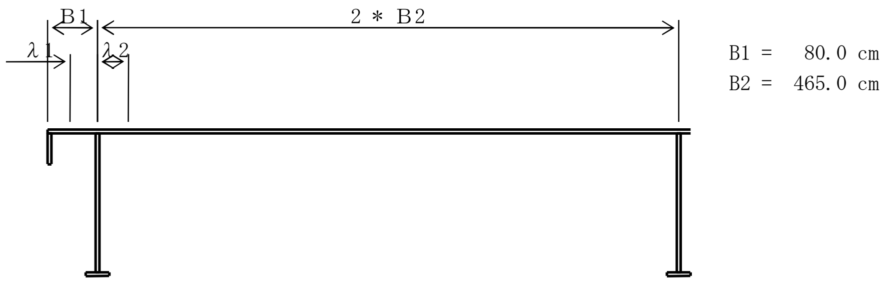
acting on main girder	M = -1047.2 kN·m	S = 338.6 kN
acting on floor system	M = -1002.7 kN·m	S = -673.9 kN
Section force at joint	Mj= -1047.2 kN·m	Sj= -673.9 kN
Shearing stress at defect	Sk= -673.9 kN	
Distance between fixing points	L = 3.300 m	

Equivalent span length (acting on main girder)

Li = 1.0 * Lc = 1.0 * 330.0 = 330.0 cm

Lc: main girder web interval

Effective width (acting on main girder)



B1/Li = 80.0 / 330.0 = 0.24

$\lambda 1 = \{ 1.06 - 3.2 * (B1/Li) + 4.5 * (B1/Li)^2 \} * B1$

$= \{ 1.06 - 3.2 * 0.24 + 4.5 * 0.24^2 \} * 80.0 = 43.9$ cm

B2/Li = 465.0 / 330.0 = 1.41

$\lambda 2 = 0.15 * Li = 0.15 * 330.0 = 49.5$ cm

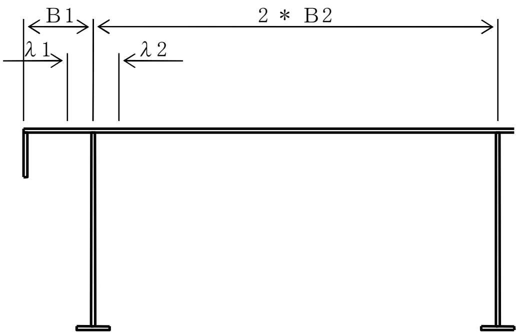
Sum of effective width $\lambda = \lambda 1 + \lambda 2 = 43.9 + 49.5 = 93.4$ cm

Equivalent span length (acting on floor system)

Li = 0.6 * Lc = 0.6 * 330.0 = 198.0 cm

Lc: main girder web interval

Effective width (acting on floor system)



B1 = 80.0 cm
B2 = 232.5 cm

B1/Li = 80.0 / 198.0 = 0.40

$\lambda 1$ = 0.15 * Li = 0.15 * 198.0 = 29.7 cm

B2/Li = 232.5 / 198.0 = 1.17

$\lambda 2$ = 0.15 * Li = 0.15 * 198.0 = 29.7 cm

Sum of effective width λ = $\lambda 1$ + $\lambda 2$ = 29.7 + 29.7 = 59.4 cm

Section area and moment of inertia (acting on main girder)

			$A(cm^2)$	Y(cm)	$AY(cm^3)$	$I(cm^4)$
1-DECK	PL	934 * 16(SM400)	149.43	-112.15	-16759	1879528
1-WEB	PL	2227 * 9(SM400)	200.43	0.00	0	828365
1-LFLG	PL	380 * 16(SM400)	60.80	112.15	6819	764719
			410.66		-9940	3472613

E = -9940/ 410.66 = -24.21 cm

I = 3472613 - 410.66 * -24.21^2 = 3232002 cm^4

Yu = -88.74 cm , YL = 137.16 cm

Section area and moment of inertia (acting on floor system)

			$A(cm^2)$	Y(cm)	$AY(cm^3)$	$I(cm^4)$
1-DECK	PL	594 * 16(SM400)	95.04	-112.15	-10659	1195377
1-WEB	PL	2227 * 9(SM400)	200.43	0.00	0	828365
1-LFLG	PL	380 * 16(SM400)	60.80	112.15	6819	764719
			356.27		-3840	2788462

E = -3840/ 356.27 = -10.78 cm

I = 2788462 - 356.27 * -10.78^2 = 2747073 cm^4

Yu = -102.17 cm , YL = 123.73 cm

＊acting on main girder

Allowable stress

・LFLG

Allowable stress due to lateral buckling

$Aw/Ac = 200.43 / 60.80 = 3.297 > 2$

$K*L/b = \sqrt{(3 + 200.43 / (2 * 60.80))} * 330.0 / 38.0 = 18.723 > 9$

$\sigma ba = 140 - 1.2*(18.723 - 9) = 128$ N/mm^2

Allowable stress due to local buckling

$\sigma cal = 140$ N/mm^2

Allowable stress $\sigma ca = 128$ N/mm^2

Bending stress

$\sigma u = -1047.2*10^6 * -887.4 / (3232002*10^4) = 29$ N/mm^2 $< \sigma ta = 140$ N/mm^2

$\sigma L = -1047.2*10^6 * 1371.6 / (3232002*10^4) = -44$ N/mm^2 $< \sigma ca = 128$ N/mm^2

Shear stress

$\tau = 338.6*10^3 / 20043 = 17$ N/mm^2 $< \tau a = 80$ N/mm^2

Combined stress

$\kappa = (-44 / 140)^2 + (17 / 80)^2 = 0.14 < 1.2$

＊acting on floor system

Bending stress

$\sigma u = -1002.7*10^6 * -1021.7 / (2747073*10^4) = 37$ N/mm^2 $< \sigma ta = 140$ N/mm^2

$\sigma L = -1002.7*10^6 * 1237.3 / (2747073*10^4) = -45$ N/mm^2 $< \sigma ca = 128$ N/mm^2

Shear stress

$\tau = -673.9*10^3 / 20043 = 34$ N/mm^2 $< \tau a = 80$ N/mm^2

Combined stress

$\kappa = (-45 / 140)^2 + (34 / 80)^2 = 0.28 < 1.2$

＊For the joint

Bending stress

$\sigma u = -1047.2*10^6 * -887.4 / (3232002*10^4) = 29\ N/mm^2 < \sigma ta = 140\ N/mm^2$

$\sigma L = -1047.2*10^6 * 1371.6 / (3232002*10^4) = -44\ N/mm^2 < \sigma ca = 128\ N/mm^2$

Shear stress

$\tau = -673.9*10^3 / 20043 = 34\ N/mm^2 < \tau a = 80\ N/mm^2$

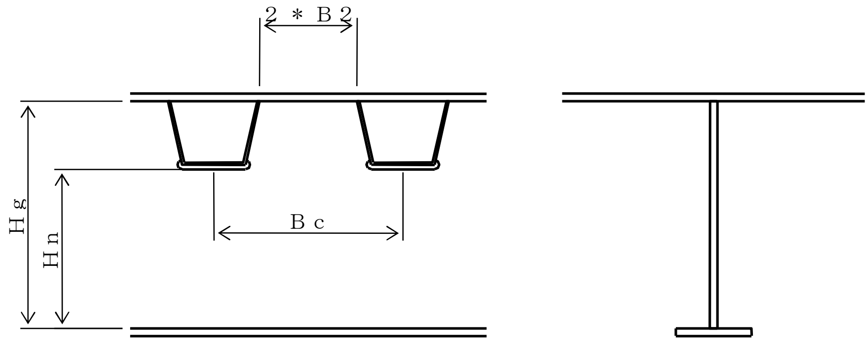
Combined stress

$\kappa = (-44 / 140)^2 + (34 / 80)^2 = 0.28 < 1.2$

Superimposing stress intensity acting on main girder and floor system

DECK (29) + (37) = 66 N/mm² < σa = 195 N/mm²

Shear stress at defect of longitudinal rib



$\tau k = -673.9*10^3 / 20043 = -34\ N/mm^2 < \tau a = 80\ N/mm^2$

$\tau v = \tau k * Hg / Hn = -34 * 222.7 / 195.0 = -38\ N/mm^2 < \tau a$

(3) Cross beam over end support Ｓ１[between Ｇ３-Ｇ４] : Representative CR3-001(S1)

Section forces and condition of the calculation

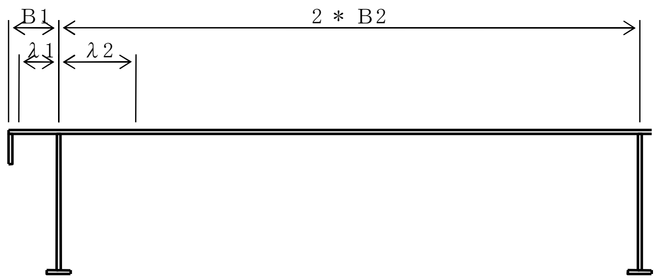
acting on main girder	M = -1711.8 kN·m	S = 286.3 kN
acting on floor system	M = -1002.7 kN·m	S = -673.9 kN
Section force at joint	Mj= -1711.8 kN·m	Sj= -673.9 kN
Shearing stress at defect	Sk= -673.9 kN	
Distance between fixing points	L = 8.206 m	

Equivalent span length (acting on main girder)

Li = 1.0 * Lc = 1.0 * 820.6 = 820.6 cm

Lc: main girder web interval

Effective width (acting on main girder)



B1 = 80.0 cm
B2 = 463.2 cm

B1/Li = 80.0 / 820.6 = 0.10

$\lambda 1 = \{ 1.06 - 3.2 * (B1/Li) + 4.5 * (B1/Li)^2 \} * B1$

$= \{ 1.06 - 3.2 * 0.10 + 4.5 * 0.10^2 \} * 80.0 = 63.3$ cm

B2/Li = 463.2 / 820.6 = 0.56

$\lambda 2 = 0.15 * Li = 0.15 * 820.6 = 123.1$ cm

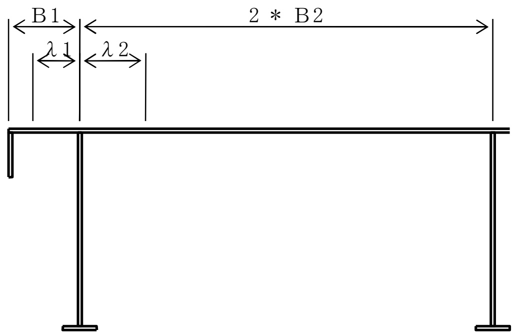
Sum of effective width $\lambda = \lambda 1 + \lambda 2 = 63.3 + 123.1 = 186.4$ cm

Equivalent span length (acting on floor system)

Li = 0.6 * Lc = 0.6 * 820.6 = 492.4 cm

Lc: main girder web interval

Effective width (acting on floor system)



B1 = 80.0 cm
B2 = 231.6 cm

B1/Li = 80.0 / 492.4 = 0.16

$\lambda 1 = \{ 1.06 - 3.2 * (B1/Li) + 4.5 * (B1/Li)^2 \} * B1$

$= \{ 1.06 - 3.2 * 0.16 + 4.5 * 0.16^2 \} * 80.0 = 52.7$ cm

B2/Li = 231.6 / 492.4 = 0.47

$\lambda 2 = 0.15 * Li = 0.15 * 492.4 = 73.9$ cm

Sum of effective width $\lambda = \lambda 1 + \lambda 2 = 52.7 + 73.9 = 126.6$ cm

Section area and moment of inertia (acting on main girder)

			$A(cm^2)$	Y(cm)	$AY(cm^3)$	$I(cm^4)$
1-DECK	PL	1864 * 16(SM400)	298.17	-109.45	-32634	3571829
1-WEB	PL	2173 * 9(SM400)	195.57	0.00	0	769556
1-LFLG	PL	380 * 16(SM400)	60.80	109.45	6655	728342
			554.54		-25980	5069727

E = -25980/ 554.54 = -46.85 cm

$I = 5069727 - 554.54 * -46.85^2 = 3852586\ cm^4$

Yu = -63.40 cm , YL = 157.10 cm

Section area and moment of inertia (acting on floor system)

			$A(cm^2)$	Y(cm)	$AY(cm^3)$	$I(cm^4)$
1-DECK	PL	1266 * 16(SM400)	202.50	-109.45	-22164	2425812
1-WEB	PL	2173 * 9(SM400)	195.57	0.00	0	769556
1-LFLG	PL	380 * 16(SM400)	60.80	109.45	6655	728342
			458.87		-15509	3923710

E = -15509/ 458.87 = -33.80 cm

$I = 3923710 - 458.87 * -33.80^2 = 3399527\ cm^4$

Yu = -76.45 cm , YL = 144.05 cm

＊acting on main girder

Allowable stress

・LFLG

Allowable stress due to lateral buckling

$Aw/Ac = 195.57 / 60.80 = 3.217 > 2$

$K*L/b = \sqrt{(3 + 195.57 / (2 * 60.80))} * 820.6 / 38.0 = 46.357 > 9$

$\sigma ba = 140 - 1.2*(46.357 - 9) = 95\ N/mm^2$

Allowable stress due to local buckling

$\sigma cal = 140\ N/mm^2$

Allowable stress $\sigma ca = 95\ N/mm^2$

Bending stress

$\sigma u = -1711.8*10^6 * -634.0 / (3852586*10^4) = 28\ N/mm^2 < \sigma ta = 140\ N/mm^2$

$\sigma L = -1711.8*10^6 * 1571.0 / (3852586*10^4) = -70\ N/mm^2 < \sigma ca = 95\ N/mm^2$

Shear stress

$\tau = 286.3*10^3 / 19557 = 15\ N/mm^2 < \tau a = 80\ N/mm^2$

Combined stress

$\kappa = (-69 / 140)^2 + (15 / 80)^2 = 0.28 < 1.2$

＊acting on floor system

Bending stress

$\sigma u = -1002.7*10^6 * -764.5 / (3399527*10^4) = 23\ N/mm^2 < \sigma ta = 140\ N/mm^2$

$\sigma L = -1002.7*10^6 * 1440.5 / (3399527*10^4) = -42\ N/mm^2 < \sigma ca = 95\ N/mm^2$

Shear stress

$\tau = -673.9*10^3 / 19557 = 34\ N/mm^2 < \tau a = 80\ N/mm^2$

Combined stress

$\kappa = (-42 / 140)^2 + (34 / 80)^2 = 0.28 < 1.2$

＊For the joint

Bending stress

$\sigma u = -1711.8*10^6 * -634.0 / (3852586*10^4) = 28\ N/mm^2 < \sigma ta = 140\ N/mm^2$

$\sigma L = -1711.8*10^6 * 1571.0 / (3852586*10^4) = -70\ N/mm^2 < \sigma ca = 95\ N/mm^2$

Shear stress

$\tau = -673.9*10^3 / 19557 = 34\ N/mm^2 < \tau a = 80\ N/mm^2$

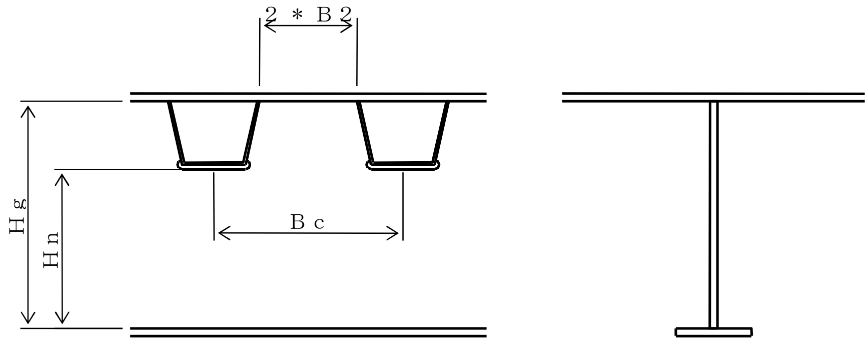
Combined stress

$\kappa = (-69 / 140)^2 + (34 / 80)^2 = 0.43 < 1.2$

Superimposing stress intensity acting on main girder and floor system

DECK (28) + (23) = 51 N/mm^2 < σa = 195 N/mm^2

Shear stress at defect of longitudinal rib



$\tau k = -673.9*10^3 / 19557 = -34\ N/mm^2 < \tau a = 80\ N/mm^2$

$\tau v = \tau k * Hg / Hn = -34 * 217.3 / 189.6 = -39\ N/mm^2 < \tau a$

(4) Cross beam over end support Ｓ２[between Ｇ１-Ｇ２] : Representative CR1-055(S2)

Section forces and condition of the calculation

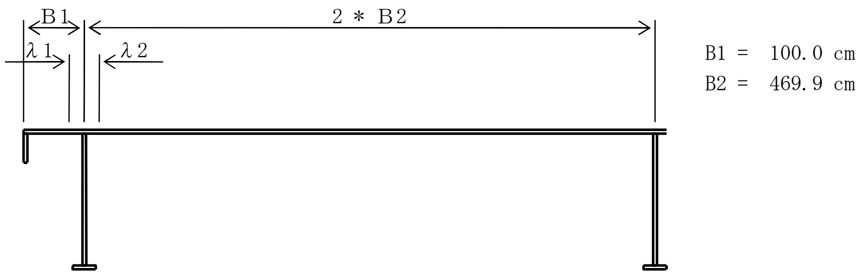
acting on main girder	M = -2055.8 kN·m	S = 1144.0 kN
acting on floor system	M = -1002.7 kN·m	S = -673.9 kN
Section force at joint	Mj= -2055.8 kN·m	Sj= 1144.0 kN
Shearing stress at defect	Sk= 1144.0 kN	
Distance between fixing points	L = 1.650 m	

Equivalent span length (acting on main girder)

Li = 1.0 * Lc = 1.0 * 165.0 = 165.0 cm

Lc: main girder web interval

Effective width (acting on main girder)



B1/Li = 100.0 / 165.0 = 0.61

λ1 = 0.15 * Li = 0.15 * 165.0 = 24.7 cm

B2/Li = 469.9 / 165.0 = 2.85

λ2 = 0.15 * Li = 0.15 * 165.0 = 24.7 cm

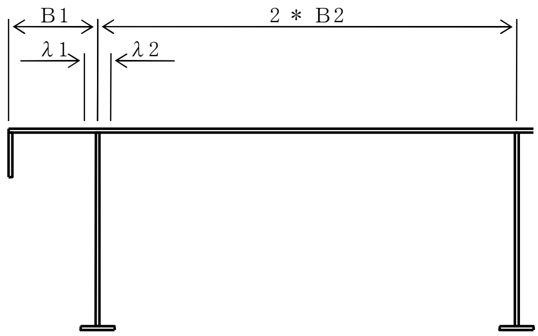
Sum of effective width λ = λ1 + λ2 = 24.7 + 24.7 = 49.5 cm

Equivalent span length (acting on floor system)

Li = 0.6 * Lc = 0.6 * 165.0 = 99.0 cm

Lc: main girder web interval

Effective width (acting on floor system)



B1 = 100.0 cm
B2 = 235.0 cm

B1/Li = 100.0 / 99.0 = 1.01

λ1 = 0.15 * Li = 0.15 * 99.0 = 14.8 cm

B2/Li = 235.0 / 99.0 = 2.37

λ2 = 0.15 * Li = 0.15 * 99.0 = 14.8 cm

Sum of effective width λ = λ1 + λ2 = 14.8 + 14.8 = 29.7 cm

Section area and moment of inertia (acting on main girder)

			A(cm^2)	Y(cm)	AY(cm^3)	I(cm^4)
1-DECK	PL	495 * 16(SM400)	79.20	-109.45	-8668	948761
1-WEB	PL	2173 * 11(SM400)	239.03	0.00	0	940569
1-LFLG	PL	380 * 16(SM400)	60.80	109.45	6655	728342
			379.03		-2014	2617671

E = -2014/ 379.03 = -5.31 cm

I = 2617671 - 379.03 * -5.31^2 = 2606971 cm^4

Yu = -104.94 cm , YL = 115.56 cm

Section area and moment of inertia (acting on floor system)

			A(cm^2)	Y(cm)	AY(cm^3)	I(cm^4)
1-DECK	PL	297 * 16(SM400)	47.52	-109.45	-5201	569256
1-WEB	PL	2173 * 11(SM400)	239.03	0.00	0	940569
1-LFLG	PL	380 * 16(SM400)	60.80	109.45	6655	728342
			347.35		1453	2238167

E = 1453/ 347.35 = 4.18 cm

I = 2238167 - 347.35 * 4.18^2 = 2232085 cm^4

Yu = -114.43 cm , YL = 106.07 cm

＊acting on main girder

Allowable stress

・LFLG

Allowable stress due to lateral buckling

$Aw/Ac = 239.03 / 60.80 = 3.931 > 2$

$K*L/b = \sqrt{(3 + 239.03 / (2 * 60.80))} * 165.0 / 38.0 = 9.676 > 9$

$\sigma ba = 140 - 1.2*(9.676 - 9) = 139\ N/mm^2$

Allowable stress due to local buckling

$\sigma cal = 140\ N/mm^2$

Allowable stress $\sigma ca = 139\ N/mm^2$

Bending stress

$\sigma u = -2055.8*10^6 * -1049.4 / (2606971*10^4) = 83\ N/mm^2 < \sigma ta = 140\ N/mm^2$

$\sigma L = -2055.8*10^6 * 1155.6 / (2606971*10^4) = -91\ N/mm^2 < \sigma ca = 139\ N/mm^2$

Shear stress

$\tau = 1144.0*10^3 / 23903 = 48\ N/mm^2 < \tau a = 80\ N/mm^2$

Combined stress

$\kappa = (-90 / 140)^2 + (48 / 80)^2 = 0.77 < 1.2$

＊acting on floor system

Bending stress

$\sigma u = -1002.7*10^6 * -1144.3 / (2232085*10^4) = 51\ N/mm^2 < \sigma ta = 140\ N/mm^2$

$\sigma L = -1002.7*10^6 * 1060.7 / (2232085*10^4) = -48\ N/mm^2 < \sigma ca = 139\ N/mm^2$

Shear stress

$\tau = -673.9*10^3 / 23903 = 28\ N/mm^2 < \tau a = 80\ N/mm^2$

Combined stress

$\kappa = (51 / 140)^2 + (28 / 80)^2 = 0.26 < 1.2$

＊For the joint

Bending stress

$\sigma u = -2055.8*10^6 * -1049.4 / (2606971*10^4) = 83\ N/mm^2 < \sigma ta = 140\ N/mm^2$

$\sigma L = -2055.8*10^6 * 1155.6 / (2606971*10^4) = -91\ N/mm^2 < \sigma ca = 139\ N/mm^2$

Shear stress

$\tau = 1144.0*10^3 / 23903 = 48\ N/mm^2 < \tau a = 80\ N/mm^2$

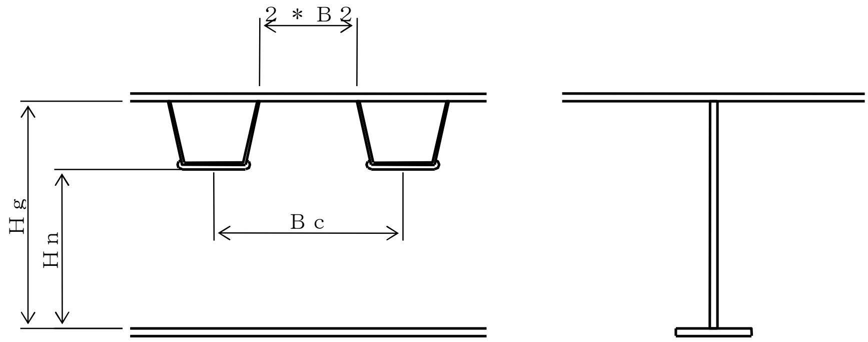
Combined stress

$\kappa = (-90 / 140)^2 + (48 / 80)^2 = 0.77 < 1.2$

Superimposing stress intensity acting on main girder and floor system

DECK (83) + (51) = 134 N/mm^2 < σa = 195 N/mm^2

Shear stress at defect of longitudinal rib



$\tau k = 1144.0*10^3 / 23903 = 48\ N/mm^2 < \tau a = 80\ N/mm^2$

$\tau v = \tau k * Hg / Hn = 48 * 217.3 / 189.6 = 55\ N/mm^2 < \tau a$

(5) Cross beam over end support Ｓ２[between Ｇ２-Ｇ３] : Representative CR2-055(S2)

Section forces and condition of the calculation

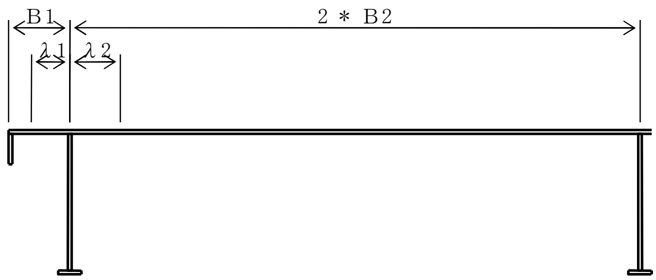
acting on main girder	M = -302.3 kN･m	S = 78.5 kN
acting on floor system	M = -1002.7 kN･m	S = -673.9 kN
Section force at joint	Mj= -1002.7 kN･m	Sj= -673.9 kN
Shearing stress at defect	Sk= -673.9 kN	
Distance between fixing points	L = 5.500 m	

Equivalent span length (acting on main girder)

Li = 1.0 ＊ Lc = 1.0 ＊ 550.0 = 550.0 cm

Lc: main girder web interval

Effective width (acting on main girder)



B1 = 100.0 cm
B2 = 465.0 cm

B1/Li = 100.0 / 550.0 = 0.18

$\lambda 1 = \{ 1.06 - 3.2 * (B1/Li) + 4.5 * (B1/Li)^2 \} * B1$

$= \{ 1.06 - 3.2 * 0.18 + 4.5 * 0.18^2 \} * 100.0 = 62.7$ cm

B2/Li = 465.0 / 550.0 = 0.85

$\lambda 2 = 0.15 * Li = 0.15 * 550.0 = 82.5$ cm

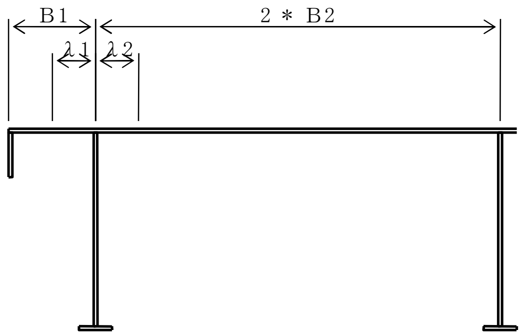
Sum of effective width $\lambda = \lambda 1 + \lambda 2 = 62.7 + 82.5 = 145.2$ cm

Equivalent span length (acting on floor system)

Li = 0.6 ＊ Lc = 0.6 ＊ 550.0 = 330.0 cm

Lc: main girder web interval

Effective width (acting on floor system)



B1 = 100.0 cm
B2 = 232.5 cm

B1/Li = 100.0 / 330.0 = 0.30

λ1 = 0.15 * Li = 0.15 * 330.0 = 49.5 cm

B2/Li = 232.5 / 330.0 = 0.70

λ2 = 0.15 * Li = 0.15 * 330.0 = 49.5 cm

Sum of effective width λ = λ1 + λ2 = 49.5 + 49.5 = 99.0 cm

Section area and moment of inertia (acting on main girder)

			$A(cm^2)$	Y(cm)	$AY(cm^3)$	$I(cm^4)$
1-DECK	PL	1452 * 16(SM400)	232.31	-112.15	-26054	2921917
1-WEB	PL	2227 * 11(SM400)	244.97	0.00	0	1012447
1-LFLG	PL	380 * 16(SM400)	60.80	112.15	6819	764719
			538.08		-19235	4699083

E = -19235/ 538.08 = -35.75 cm

I = 4699083 - 538.08 * -35.75^2 = 4011486 cm^4

Yu = -77.20 cm , YL = 148.70 cm

Section area and moment of inertia (acting on floor system)

			$A(cm^2)$	Y(cm)	$AY(cm^3)$	$I(cm^4)$
1-DECK	PL	990 * 16(SM400)	158.40	-112.15	-17765	1992295
1-WEB	PL	2227 * 11(SM400)	244.97	0.00	0	1012447
1-LFLG	PL	380 * 16(SM400)	60.80	112.15	6819	764719
			464.17		-10946	3769461

E = -10946/ 464.17 = -23.58 cm

I = 3769461 - 464.17 * -23.58^2 = 3511342 cm^4

Yu = -89.37 cm , YL = 136.53 cm

＊acting on main girder

Allowable stress

・LFLG

Allowable stress due to lateral buckling

$Aw/Ac = 244.97 / 60.80 = 4.029 > 2$

$K*L/b = \sqrt{(3 + 244.97 / (2 * 60.80))} * 550.0 / 38.0 = 32.411 > 9$

$\sigma ba = 140 - 1.2*(32.411 - 9) = 112$ N/mm^2

Allowable stress due to local buckling

$\sigma cal = 140$ N/mm^2

Allowable stress $\sigma ca = 112$ N/mm^2

Bending stress

$\sigma u = -302.3*10^6 * -772.0 / (4011486*10^4) = 6$ N/mm^2 $<$ $\sigma ta = 140$ N/mm^2

$\sigma L = -302.3*10^6 * 1487.0 / (4011486*10^4) = -11$ N/mm^2 $<$ $\sigma ca = 112$ N/mm^2

Shear stress

$\tau = 78.5*10^3 / 24497 = 3$ N/mm^2 $<$ $\tau a = 80$ N/mm^2

Combined stress

$\kappa = (-11 / 140)^2 + (3 / 80)^2 = 0.01 < 1.2$

＊acting on floor system

Bending stress

$\sigma u = -1002.7*10^6 * -893.7 / (3511342*10^4) = 26$ N/mm^2 $<$ $\sigma ta = 140$ N/mm^2

$\sigma L = -1002.7*10^6 * 1365.3 / (3511342*10^4) = -39$ N/mm^2 $<$ $\sigma ca = 112$ N/mm^2

Shear stress

$\tau = -673.9*10^3 / 24497 = 28$ N/mm^2 $<$ $\tau a = 80$ N/mm^2

Combined stress

$\kappa = (-39 / 140)^2 + (28 / 80)^2 = 0.19 < 1.2$

＊For the joint

Bending stress

$\sigma u = -1002.7*10^6 * -893.7 / (3511342*10^4) = 26\ N/mm^2 < \sigma ta = 140\ N/mm^2$

$\sigma L = -1002.7*10^6 * 1365.3 / (3511342*10^4) = -39\ N/mm^2 < \sigma ca = 112\ N/mm^2$

Shear stress

$\tau = -673.9*10^3 / 24497 = 28\ N/mm^2 < \tau a = 80\ N/mm^2$

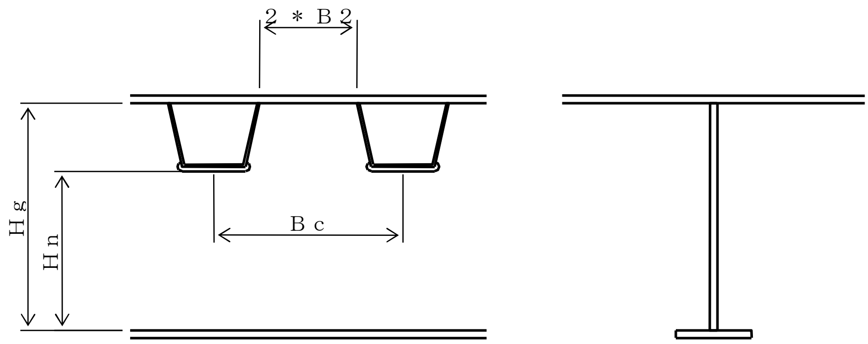
Combined stress

$\kappa = (-39 / 140)^2 + (28 / 80)^2 = 0.19 < 1.2$

Superimposing stress intensity acting on main girder and floor system

DECK $(6) + (26) = 31\ N/mm^2 < \sigma a = 195\ N/mm^2$

Shear stress at defect of longitudinal rib



$\tau k = -673.9*10^3 / 24497 = -28\ N/mm^2 < \tau a = 80\ N/mm^2$

$\tau v = \tau k * Hg / Hn = -28 * 222.7 / 195.0 = -31\ N/mm^2 < \tau a$

(6) Cross beam over end support Ｓ２[between Ｇ３－Ｇ４] : Representative CR3-055(S2)

Section forces and condition of the calculation

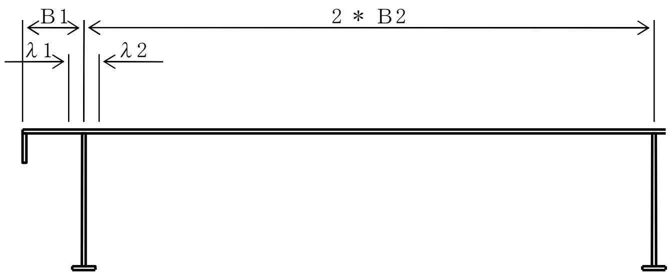
acting on main girder	M = -2002.2 kN·m	S = 1064.9 kN
acting on floor system	M = -1002.7 kN·m	S = -673.9 kN
Section force at joint	Mj= -2002.2 kN·m	Sj= 1064.9 kN
Shearing stress at defect	Sk= 1064.9 kN	
Distance between fixing points	L = 1.650 m	

Equivalent span length (acting on main girder)

Li = 1.0 * Lc = 1.0 * 165.0 = 165.0 cm

Lc: main girder web interval

Effective width (acting on main girder)



B1 = 100.0 cm
B2 = 464.8 cm

B1/Li = 100.0 / 165.0 = 0.61

$\lambda 1$ = 0.15 * Li = 0.15 * 165.0 = 24.7 cm

B2/Li = 464.8 / 165.0 = 2.82

$\lambda 2$ = 0.15 * Li = 0.15 * 165.0 = 24.7 cm

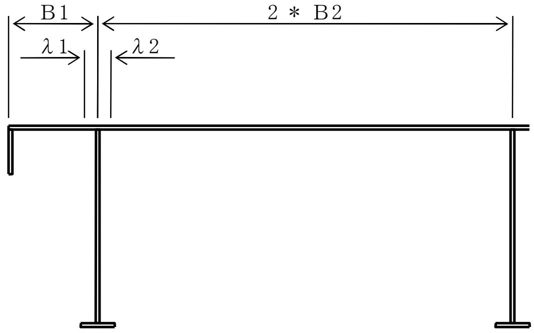
Sum of effective width $\lambda = \lambda 1 + \lambda 2$ = 24.7 + 24.7 = 49.5 cm

Equivalent span length (acting on floor system)

Li = 0.6 * Lc = 0.6 * 165.0 = 99.0 cm

Lc: main girder web interval

Effective width (acting on floor system)



B1 = 100.0 cm
B2 = 232.4 cm

B1/Li = 100.0 / 99.0 = 1.01

λ1 = 0.15 * Li = 0.15 * 99.0 = 14.8 cm

B2/Li = 232.4 / 99.0 = 2.35

λ2 = 0.15 * Li = 0.15 * 99.0 = 14.8 cm

Sum of effective width λ = λ1 + λ2 = 14.8 + 14.8 = 29.7 cm

Section area and moment of inertia (acting on main girder)

			$A(cm^2)$	Y(cm)	$AY(cm^3)$	$I(cm^4)$
1-DECK	PL	495 * 16(SM400)	79.20	-109.45	-8668	948761
1-WEB	PL	2173 * 11(SM400)	239.03	0.00	0	940569
1-LFLG	PL	380 * 16(SM400)	60.80	109.45	6655	728342
			379.03		-2014	2617671

E = -2014/ 379.03 = -5.31 cm

I = 2617671 - 379.03 * -5.31^2 = 2606971 cm^4

Yu = -104.94 cm , YL = 115.56 cm

Section area and moment of inertia (acting on floor system)

			$A(cm^2)$	Y(cm)	$AY(cm^3)$	$I(cm^4)$
1-DECK	PL	297 * 16(SM400)	47.52	-109.45	-5201	569256
1-WEB	PL	2173 * 11(SM400)	239.03	0.00	0	940569
1-LFLG	PL	380 * 16(SM400)	60.80	109.45	6655	728342
			347.35		1453	2238167

E = 1453/ 347.35 = 4.18 cm

I = 2238167 - 347.35 * 4.18^2 = 2232085 cm^4

Yu = -114.43 cm , YL = 106.07 cm

＊acting on main girder

Allowable stress

・LFLG

Allowable stress due to lateral buckling

$Aw/Ac = 239.03 / 60.80 = 3.931 > 2$

$K*L/b = \sqrt{(3 + 239.03 / (2 * 60.80))} * 165.0 / 38.0 = 9.676 > 9$

$\sigma ba = 140 - 1.2*(9.676 - 9) = 139\ N/mm^2$

Allowable stress due to local buckling

$\sigma cal = 140\ N/mm^2$

Allowable stress $\sigma ca = 139\ N/mm^2$

Bending stress

$\sigma u = -2002.2*10^6 * -1049.4 / (2606971*10^4) = 81\ N/mm^2 < \sigma ta = 140\ N/mm^2$

$\sigma L = -2002.2*10^6 * 1155.6 / (2606971*10^4) = -89\ N/mm^2 < \sigma ca = 139\ N/mm^2$

Shear stress

$\tau = 1064.9*10^3 / 23903 = 45\ N/mm^2 < \tau a = 80\ N/mm^2$

Combined stress

$\kappa = (-88 / 140)^2 + (45 / 80)^2 = 0.70 < 1.2$

＊acting on floor system

Bending stress

$\sigma u = -1002.7*10^6 * -1144.3 / (2232085*10^4) = 51\ N/mm^2 < \sigma ta = 140\ N/mm^2$

$\sigma L = -1002.7*10^6 * 1060.7 / (2232085*10^4) = -48\ N/mm^2 < \sigma ca = 139\ N/mm^2$

Shear stress

$\tau = -673.9*10^3 / 23903 = 28\ N/mm^2 < \tau a = 80\ N/mm^2$

Combined stress

$\kappa = (51 / 140)^2 + (28 / 80)^2 = 0.26 < 1.2$

＊For the joint

Bending stress

$\sigma u = -2002.2*10^6 * -1049.4 / (2606971*10^4) = 81\ N/mm^2 < \sigma ta = 140\ N/mm^2$

$\sigma L = -2002.2*10^6 * 1155.6 / (2606971*10^4) = -89\ N/mm^2 < \sigma ca = 139\ N/mm^2$

Shear stress

$\tau = 1064.9*10^3 / 23903 = 45\ N/mm^2 < \tau a = 80\ N/mm^2$

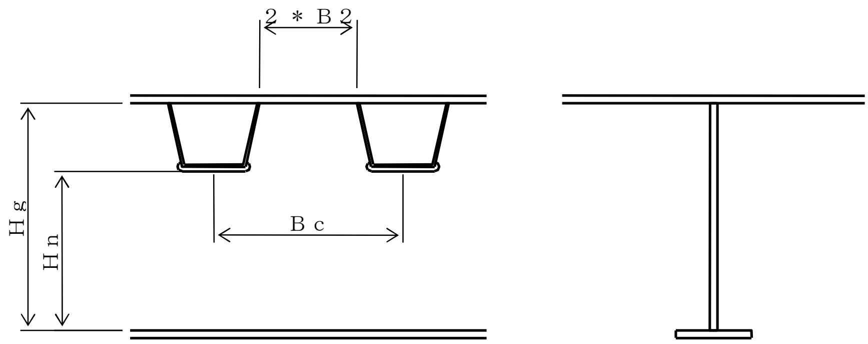
Combined stress

$\kappa = (-88 / 140)^2 + (45 / 80)^2 = 0.70 < 1.2$

Superimposing stress intensity acting on main girder and floor system

DECK (81) + (51) = 132 N/mm^2 < σa = 195 N/mm^2

Shear stress at defect of longitudinal rib



$\tau k = 1064.9*10^3 / 23903 = 45\ N/mm^2 < \tau a = 80\ N/mm^2$

$\tau v = \tau k * Hg / Hn = 45 * 217.3 / 189.6 = 51\ N/mm^2 < \tau a$

(7) Cross beam over intermediate support Ｐ６・Ｐ７[between Ｇ１－Ｇ２]：Representative CR1-033(P7)

Section forces and condition of the calculation

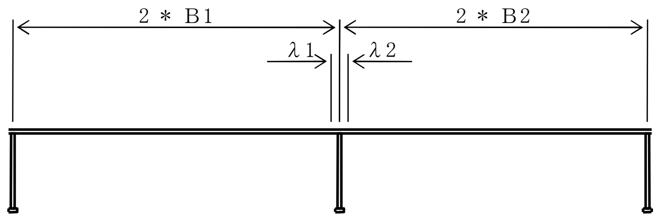
acting on main girder	M = -987.3 kN·m	S = 486.6 kN
acting on floor system	M = -712.8 kN·m	S = -509.2 kN
Section force at joint	Mj= -987.3 kN·m	Sj= -509.2 kN
Shearing stress at defect	Sk= -509.2 kN	
Distance between fixing points	L = 1.650 m	

Equivalent span length (acting on main girder)

Li = 1.0 ＊ Lc = 1.0 ＊ 165.0 = 165.0 cm

Lc: main girder web interval

Effective width (acting on main girder)



B1 = 473.7 cm
B2 = 446.2 cm

B1/Li = 473.7 / 165.0 = 2.87

λ1 = 0.15 ＊ Li = 0.15 ＊ 165.0 = 24.7 cm

B2/Li = 446.2 / 165.0 = 2.70

λ2 = 0.15 ＊ Li = 0.15 ＊ 165.0 = 24.7 cm

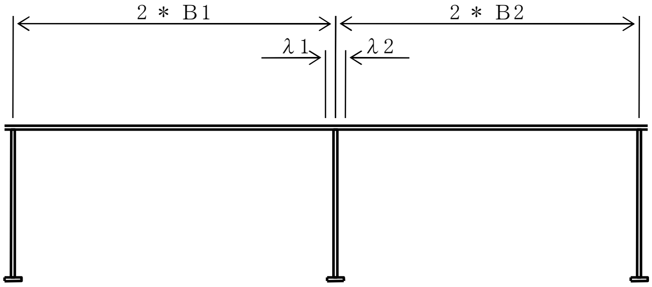
Sum of effective width λ = λ1 + λ2 = 24.7 + 24.7 = 49.5 cm

Equivalent span length (acting on floor system)

Li = 0.6 ＊ Lc = 0.6 ＊ 165.0 = 99.0 cm

Lc: main girder web interval

Effective width (acting on floor system)



B1 = 236.9 cm
B2 = 223.1 cm

B1/Li = 236.9 / 99.0 = 2.39

$\lambda 1 = 0.15 * Li = 0.15 * 99.0 = 14.8$ cm

B2/Li = 223.1 / 99.0 = 2.25

$\lambda 2 = 0.15 * Li = 0.15 * 99.0 = 14.8$ cm

Sum of effective width $\lambda = \lambda 1 + \lambda 2 = 14.8 + 14.8 = 29.7$ cm

Section area and moment of inertia (acting on main girder)

			$A(cm^2)$	$Y(cm)$	$AY(cm^3)$	$I(cm^4)$
1-DECK	PL	495 * 16(SM400)	79.20	-109.45	-8668	948761
1-WEB	PL	2173 * 9(SM400)	195.57	0.00	0	769556
1-LFLG	PL	250 * 10(SM400)	25.00	109.15	2729	297843
			299.77		-5940	2016160

E = -5940/ 299.77 = -19.81 cm

$I = 2016160 - 299.77 * -19.81^2 = 1898470\ cm^4$

Yu = -90.44 cm , YL = 129.46 cm

Section area and moment of inertia (acting on floor system)

			$A(cm^2)$	$Y(cm)$	$AY(cm^3)$	$I(cm^4)$
1-DECK	PL	297 * 16(SM400)	47.52	-109.45	-5201	569256
1-WEB	PL	2173 * 9(SM400)	195.57	0.00	0	769556
1-LFLG	PL	250 * 10(SM400)	25.00	109.15	2729	297843
			268.09		-2472	1636656

E = -2472/ 268.09 = -9.22 cm

$I = 1636656 - 268.09 * -9.22^2 = 1613856\ cm^4$

Yu = -101.03 cm , YL = 118.87 cm

＊acting on main girder

Allowable stress

・LFLG

Allowable stress due to lateral buckling

$Aw/Ac = 195.57 / 25.00 = 7.823 > 2$

$K*L/b = \sqrt{(3 + 195.57 / (2 * 25.00))} * 165.0 / 25.0 = 17.351 > 9$

$\sigma ba = 140 - 1.2*(17.351 - 9) = 130$ N/mm^2

Allowable stress due to local buckling

$\sigma cal = 140$ N/mm^2

Allowable stress $\sigma ca = 130$ N/mm^2

Bending stress

$\sigma u = -987.3*10^6 * -904.4 / (1898470*10^4) = 47$ N/mm^2 $<$ $\sigma ta = 140$ N/mm^2

$\sigma L = -987.3*10^6 * 1294.6 / (1898470*10^4) = -67$ N/mm^2 $<$ $\sigma ca = 130$ N/mm^2

Shear stress

$\tau = 486.6*10^3 / 19557 = 25$ N/mm^2 $<$ $\tau a = 80$ N/mm^2

Combined stress

$\kappa = (-67 / 140)^2 + (25 / 80)^2 = 0.32 < 1.2$

＊acting on floor system

Bending stress

$\sigma u = -712.8*10^6 * -1010.3 / (1613856*10^4) = 45$ N/mm^2 $<$ $\sigma ta = 140$ N/mm^2

$\sigma L = -712.8*10^6 * 1188.7 / (1613856*10^4) = -53$ N/mm^2 $<$ $\sigma ca = 130$ N/mm^2

Shear stress

$\tau = -509.2*10^3 / 19557 = 26$ N/mm^2 $<$ $\tau a = 80$ N/mm^2

Combined stress

$\kappa = (-52 / 140)^2 + (26 / 80)^2 = 0.24 < 1.2$

＊For the joint

Bending stress

$\sigma u = -987.3*10^{6} * -904.4 / (1898470*10^{4}) = 47\ N/mm^2 < \sigma ta = 140\ N/mm^2$

$\sigma L = -987.3*10^{6} * 1294.6 / (1898470*10^{4}) = -67\ N/mm^2 < \sigma ca = 130\ N/mm^2$

Shear stress

$\tau = -509.2*10^{3} / 19557 = 26\ N/mm^2 < \tau a = 80\ N/mm^2$

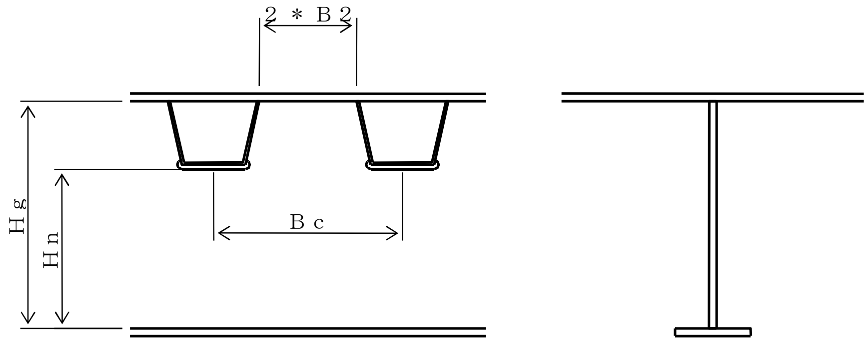
Combined stress

$\kappa = (-67 / 140)^2 + (26 / 80)^2 = 0.33 < 1.2$

Superimposing stress intensity acting on main girder and floor system

DECK $(47) + (45) = 92\ N/mm^2 < \sigma a = 195\ N/mm^2$

Shear stress at defect of longitudinal rib



$\tau k = -509.2*10^{3} / 19557 = -26\ N/mm^2 < \tau a = 80\ N/mm^2$

$\tau v = \tau k * Hg / Hn = -26 * 217.3 / 189.6 = -30\ N/mm^2 < \tau a$

(8) Cross beam over intermediate support Ｐ６・Ｐ７[between Ｇ２－Ｇ３] : Representative CR2-017(P6)

Section forces and condition of the calculation

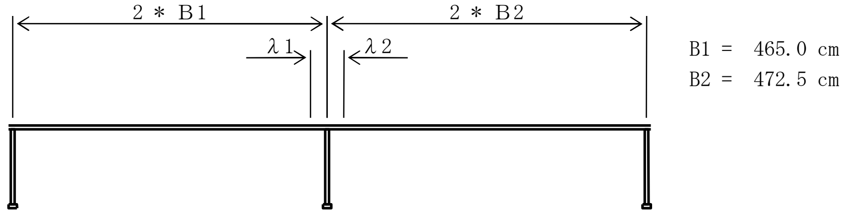
acting on main girder	M = -458.8 kN·m	S = 144.9 kN
acting on floor system	M = -712.8 kN·m	S = -509.2 kN
Section force at joint	Mj= -712.8 kN·m	Sj= -509.2 kN
Shearing stress at defect	Sk= -509.2 kN	
Distance between fixing points	L = 3.300 m	

Equivalent span length (acting on main girder)

Li = 1.0 ∗ Lc = 1.0 ∗ 330.0 = 330.0 cm

Lc: main girder web interval

Effective width (acting on main girder)



B1/Li = 465.0 / 330.0 = 1.41

λ1 = 0.15 ∗ Li = 0.15 ∗ 330.0 = 49.5 cm

B2/Li = 472.5 / 330.0 = 1.43

λ2 = 0.15 ∗ Li = 0.15 ∗ 330.0 = 49.5 cm

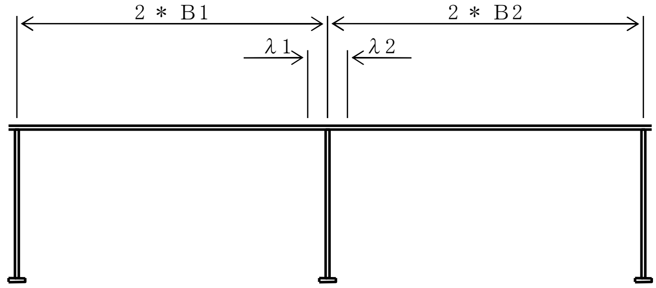
Sum of effective width λ = λ1 + λ2 = 49.5 + 49.5 = 99.0 cm

Equivalent span length (acting on floor system)

Li = 0.6 ∗ Lc = 0.6 ∗ 330.0 = 198.0 cm

Lc: main girder web interval

Effective width (acting on floor system)



B1 = 232.5 cm
B2 = 236.3 cm

B1/Li = 232.5 / 198.0 = 1.17

$\lambda 1 = 0.15 * Li = 0.15 * 198.0 = 29.7$ cm

B2/Li = 236.3 / 198.0 = 1.19

$\lambda 2 = 0.15 * Li = 0.15 * 198.0 = 29.7$ cm

Sum of effective width $\lambda = \lambda 1 + \lambda 2 = 29.7 + 29.7 = 59.4$ cm

Section area and moment of inertia (acting on main girder)

			$A(cm^2)$	Y(cm)	$AY(cm^3)$	$I(cm^4)$
1-DECK	PL	990 * 16(SM400)	158.40	-112.15	-17765	1992295
1-WEB	PL	2227 * 9(SM400)	200.43	0.00	0	828365
1-LFLG	PL	250 * 16(SM400)	40.00	112.15	4486	503105
			398.83		-13279	3323766

E = -13279/ 398.83 = -33.29 cm

I = $3323766 - 398.83 * -33.29^2$ = 2881672 cm^4

Yu = -79.66 cm , YL = 146.24 cm

Section area and moment of inertia (acting on floor system)

			$A(cm^2)$	Y(cm)	$AY(cm^3)$	$I(cm^4)$
1-DECK	PL	594 * 16(SM400)	95.04	-112.15	-10659	1195377
1-WEB	PL	2227 * 9(SM400)	200.43	0.00	0	828365
1-LFLG	PL	250 * 16(SM400)	40.00	112.15	4486	503105
			335.47		-6173	2526847

E = -6173/ 335.47 = -18.40 cm

I = $2526847 - 335.47 * -18.40^2$ = 2413268 cm^4

Yu = -94.55 cm , YL = 131.35 cm

＊acting on main girder

Allowable stress

・LFLG

Allowable stress due to lateral buckling

$Aw/Ac = 200.43 / 40.00 = 5.011 > 2$

$K*L/b = \sqrt{(3 + 200.43 / (2 * 40.00))} * 330.0 / 25.0 = 30.972 > 9$

$\sigma ba = 140 - 1.2*(30.972 - 9) = 114$ N/mm^2

Allowable stress due to local buckling

$\sigma cal = 140$ N/mm^2

Allowable stress $\sigma ca = 114$ N/mm^2

Bending stress

$\sigma u = -458.8*10^6 * -796.6 / (2881672*10^4) = 13$ N/mm^2 $<$ $\sigma ta = 140$ N/mm^2

$\sigma L = -458.8*10^6 * 1462.4 / (2881672*10^4) = -23$ N/mm^2 $<$ $\sigma ca = 114$ N/mm^2

Shear stress

$\tau = 144.9*10^3 / 20043 = 7$ N/mm^2 $<$ $\tau a = 80$ N/mm^2

Combined stress

$\kappa = (-23 / 140)^2 + (7 / 80)^2 = 0.04 < 1.2$

＊acting on floor system

Bending stress

$\sigma u = -712.8*10^6 * -945.5 / (2413268*10^4) = 28$ N/mm^2 $<$ $\sigma ta = 140$ N/mm^2

$\sigma L = -712.8*10^6 * 1313.5 / (2413268*10^4) = -39$ N/mm^2 $<$ $\sigma ca = 114$ N/mm^2

Shear stress

$\tau = -509.2*10^3 / 20043 = 25$ N/mm^2 $<$ $\tau a = 80$ N/mm^2

Combined stress

$\kappa = (-38 / 140)^2 + (25 / 80)^2 = 0.18 < 1.2$

＊For the joint

Bending stress

$\sigma u = -712.8*10^6 * -945.5 / (2413268*10^4) = 28\ N/mm^2 < \sigma ta = 140\ N/mm^2$

$\sigma L = -712.8*10^6 * 1313.5 / (2413268*10^4) = -39\ N/mm^2 < \sigma ca = 114\ N/mm^2$

Shear stress

$\tau = -509.2*10^3 / 20043 = 25\ N/mm^2 < \tau a = 80\ N/mm^2$

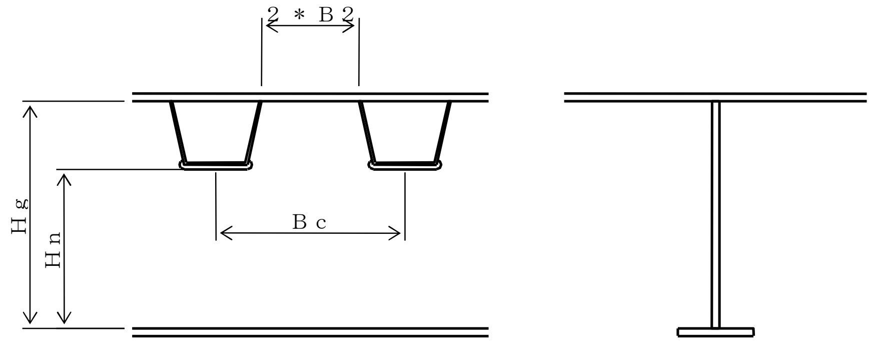
Combined stress

$\kappa = (-38 / 140)^2 + (25 / 80)^2 = 0.18 < 1.2$

Superimposing stress intensity acting on main girder and floor system

DECK (13) + (28) = 41 N/mm^2 < σa = 195 N/mm^2

Shear stress at defect of longitudinal rib



$\tau k = -509.2*10^3 / 20043 = -25\ N/mm^2 < \tau a = 80\ N/mm^2$

$\tau v = \tau k * Hg / Hn = -25 * 222.7 / 195.0 = -29\ N/mm^2 < \tau a$

(9) Cross beam over intermediate support P6 [between G3-G4] : Representative CR3-017(P6)

Section forces and condition of the calculation

acting on main girder M = -956.2 kN·m S = -217.5 kN

acting on floor system M = -712.8 kN·m S = -509.2 kN

Section force at joint Mj= -956.2 kN·m Sj= -509.2 kN

Shearing stress at defect Sk= -509.2 kN

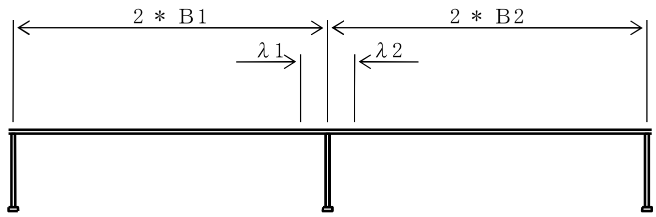
Distance between fixing points L = 5.313 m

Equivalent span length (acting on main girder)

Li = 1.0 * Lc = 1.0 * 531.3 = 531.3 cm

Lc: main girder web interval

Effective width (acting on main girder)



B1 = 463.4 cm
B2 = 470.9 cm

B1/Li = 463.4 / 531.3 = 0.87

λ1 = 0.15 * Li = 0.15 * 531.3 = 79.7 cm

B2/Li = 470.9 / 531.3 = 0.89

λ2 = 0.15 * Li = 0.15 * 531.3 = 79.7 cm

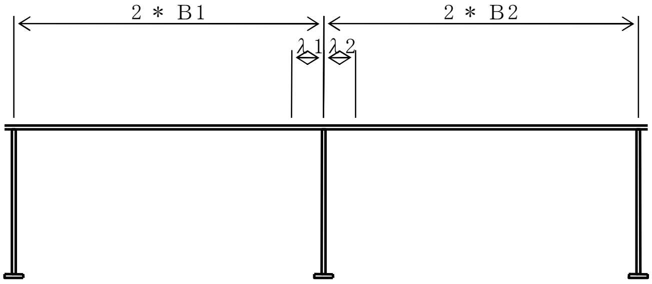
Sum of effective width λ = λ1 + λ2 = 79.7 + 79.7 = 159.4 cm

Equivalent span length (acting on floor system)

Li = 0.6 * Lc = 0.6 * 531.3 = 318.8 cm

Lc: main girder web interval

Effective width (acting on floor system)



B1/Li = 231.7 / 318.8 = 0.73

$\lambda 1 = 0.15 * Li = 0.15 * 318.8 = 47.8$ cm

B2/Li = 235.4 / 318.8 = 0.74

$\lambda 2 = 0.15 * Li = 0.15 * 318.8 = 47.8$ cm

Sum of effective width $\lambda = \lambda 1 + \lambda 2 = 47.8 + 47.8 = 95.6$ cm

Section area and moment of inertia (acting on main girder)

			$A(cm^2)$	Y(cm)	$AY(cm^3)$	$I(cm^4)$
1-DECK	PL	1594 * 16(SM400)	255.02	-109.45	-27912	3055010
1-WEB	PL	2173 * 9(SM400)	195.57	0.00	0	769556
1-LFLG	PL	280 * 16(SM400)	44.80	109.45	4903	536673
			495.39		-23009	4361239

E = -23009/ 495.39 = -46.45 cm

I = $4361239 - 495.39 * -46.45^2 =$ 3292564 cm^4

Yu = -63.80 cm , YL = 156.70 cm

Section area and moment of inertia (acting on floor system)

			$A(cm^2)$	Y(cm)	$AY(cm^3)$	$I(cm^4)$
1-DECK	PL	956 * 16(SM400)	153.01	-109.45	-16747	1833006
1-WEB	PL	2173 * 9(SM400)	195.57	0.00	0	769556
1-LFLG	PL	280 * 16(SM400)	44.80	109.45	4903	536673
			393.38		-11844	3139235

E = -11844/ 393.38 = -30.11 cm

I = $3139235 - 393.38 * -30.11^2 =$ 2782632 cm^4

Yu = -80.14 cm , YL = 140.36 cm

＊acting on main girder

Allowable stress

・LFLG

Allowable stress due to lateral buckling

$Aw/Ac = 195.57 / 44.80 = 4.365 > 2$

$K*L/b = \sqrt{(3 + 195.57 / (2 * 44.80))} * 531.3 / 28.0 = 43.198 > 9$

$\sigma ba = 140 - 1.2*(43.198 - 9) = 99\ N/mm^2$

Allowable stress due to local buckling

$\sigma cal = 140\ N/mm^2$

Allowable stress $\sigma ca = 99\ N/mm^2$

Bending stress

$\sigma u = -956.2*10^6 * -638.0 / (3292564*10^4) = 19\ N/mm^2 < \sigma ta = 140\ N/mm^2$

$\sigma L = -956.2*10^6 * 1567.0 / (3292564*10^4) = -46\ N/mm^2 < \sigma ca = 99\ N/mm^2$

Shear stress

$\tau = -217.5*10^3 / 19557 = 11\ N/mm^2 < \tau a = 80\ N/mm^2$

Combined stress

$\kappa = (-45 / 140)^2 + (11 / 80)^2 = 0.12 < 1.2$

＊acting on floor system

Bending stress

$\sigma u = -712.8*10^6 * -801.4 / (2782632*10^4) = 21\ N/mm^2 < \sigma ta = 140\ N/mm^2$

$\sigma L = -712.8*10^6 * 1403.6 / (2782632*10^4) = -36\ N/mm^2 < \sigma ca = 99\ N/mm^2$

Shear stress

$\tau = -509.2*10^3 / 19557 = 26\ N/mm^2 < \tau a = 80\ N/mm^2$

Combined stress

$\kappa = (-36 / 140)^2 + (26 / 80)^2 = 0.17 < 1.2$

＊For the joint

Bending stress

$\sigma u = -956.2*10^6 * -638.0 / (3292564*10^4) = 19\ N/mm^2 < \sigma ta = 140\ N/mm^2$

$\sigma L = -956.2*10^6 * 1567.0 / (3292564*10^4) = -46\ N/mm^2 < \sigma ca = 99\ N/mm^2$

Shear stress

$\tau = -509.2*10^3 / 19557 = 26\ N/mm^2 < \tau a = 80\ N/mm^2$

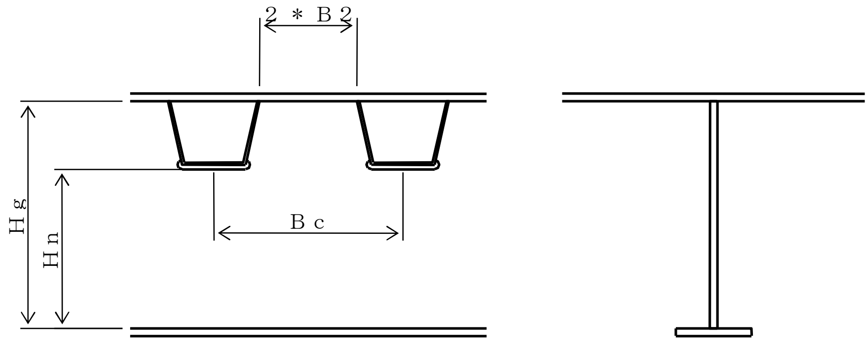
Combined stress

$\kappa = (-45 / 140)^2 + (26 / 80)^2 = 0.21 < 1.2$

Superimposing stress intensity acting on main girder and floor system

DECK (19) + (21) = 39 N/mm^2 < σa = 195 N/mm^2

Shear stress at defect of longitudinal rib



$\tau k = -509.2*10^3 / 19557 = -26\ N/mm^2 < \tau a = 80\ N/mm^2$

$\tau v = \tau k * Hg / Hn = -26 * 217.3 / 189.6 = -30\ N/mm^2 < \tau a$

(10) Cross beam over intermediate support Ｐ７[between Ｇ３－Ｇ４]：Representative CR3-033(P7)

Section forces and condition of the calculation

acting on main girder　M = -1014.3 kN·m　S = -356.1 kN

acting on floor system　M = -712.8 kN·m　S = -509.2 kN

Section force at joint　Mj= -1014.3 kN·m　Sj= -509.2 kN

Shearing stress at defect　Sk= -509.2 kN

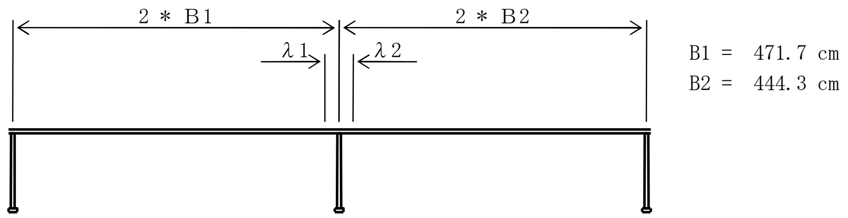
Distance between fixing points　L = 2.723 m

Equivalent span length (acting on main girder)

Li = 1.0 * Lc = 1.0 * 272.3 = 272.3 cm

Lc: main girder web interval

Effective width (acting on main girder)



B1/Li = 471.7 / 272.3 = 1.73

λ1 = 0.15 * Li = 0.15 * 272.3 = 40.8 cm

B2/Li = 444.3 / 272.3 = 1.63

λ2 = 0.15 * Li = 0.15 * 272.3 = 40.8 cm

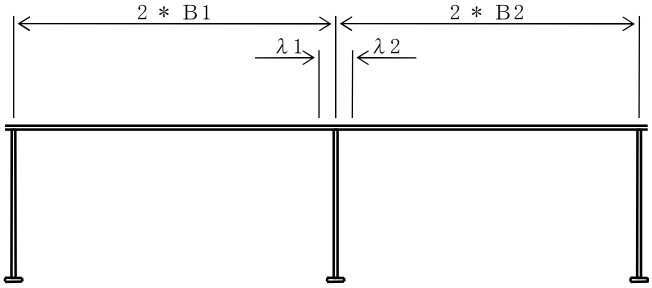
Sum of effective width　λ = λ1 + λ2 = 40.8 + 40.8 = 81.7 cm

Equivalent span length (acting on floor system)

Li = 0.6 * Lc = 0.6 * 272.3 = 163.4 cm

Lc: main girder web interval

Effective width (acting on floor system)



B1 = 235.9 cm
B2 = 222.2 cm

B1/Li = 235.9 / 163.4 = 1.44

λ1 = 0.15 * Li = 0.15 * 163.4 = 24.5 cm

B2/Li = 222.2 / 163.4 = 1.36

λ2 = 0.15 * Li = 0.15 * 163.4 = 24.5 cm

Sum of effective width λ = λ1 + λ2 = 24.5 + 24.5 = 49.0 cm

Section area and moment of inertia (acting on main girder)

			A(cm^2)	Y(cm)	AY(cm^3)	I(cm^4)
1-DECK	PL	817 * 16(SM400)	130.70	-109.45	-14306	1565743
1-WEB	PL	2173 * 9(SM400)	195.57	0.00	0	769556
1-LFLG	PL	250 * 10(SM400)	25.00	109.15	2729	297843
			351.27		-11577	2633142

E = -11577/ 351.27 = -32.96 cm

I = 2633142 - 351.27 * -32.96^2 = 2251610 cm^4

Yu = -77.29 cm , YL = 142.61 cm

Section area and moment of inertia (acting on floor system)

			A(cm^2)	Y(cm)	AY(cm^3)	I(cm^4)
1-DECK	PL	490 * 16(SM400)	78.42	-109.45	-8583	939446
1-WEB	PL	2173 * 9(SM400)	195.57	0.00	0	769556
1-LFLG	PL	250 * 10(SM400)	25.00	109.15	2729	297843
			298.99		-5855	2006845

E = -5855/ 298.99 = -19.58 cm

I = 2006845 - 298.99 * -19.58^2 = 1892206 cm^4

Yu = -90.67 cm , YL = 129.23 cm

＊acting on main girder

Allowable stress

・LFLG

Allowable stress due to lateral buckling

$Aw/Ac = 195.57 / 25.00 = 7.823 > 2$

$K*L/b = \sqrt{(3 + 195.57 / (2 * 25.00))} * 272.3 / 25.0 = 28.635 > 9$

$\sigma ba = 140 - 1.2*(28.635 - 9) = 116$ N/mm^2

Allowable stress due to local buckling

$\sigma cal = 140$ N/mm^2

Allowable stress $\sigma ca = 116$ N/mm^2

Bending stress

$\sigma u = -1014.3*10^6 * -772.9 / (2251610*10^4) = 35$ N/mm^2 $< \sigma ta = 140$ N/mm^2

$\sigma L = -1014.3*10^6 * 1426.1 / (2251610*10^4) = -64$ N/mm^2 $< \sigma ca = 116$ N/mm^2

Shear stress

$\tau = -356.1*10^3 / 19557 = 18$ N/mm^2 $< \tau a = 80$ N/mm^2

Combined stress

$\kappa = (-64 / 140)^2 + (18 / 80)^2 = 0.26 < 1.2$

＊acting on floor system

Bending stress

$\sigma u = -712.8*10^6 * -906.7 / (1892206*10^4) = 34$ N/mm^2 $< \sigma ta = 140$ N/mm^2

$\sigma L = -712.8*10^6 * 1292.3 / (1892206*10^4) = -49$ N/mm^2 $< \sigma ca = 116$ N/mm^2

Shear stress

$\tau = -509.2*10^3 / 19557 = 26$ N/mm^2 $< \tau a = 80$ N/mm^2

Combined stress

$\kappa = (-48 / 140)^2 + (26 / 80)^2 = 0.22 < 1.2$

＊For the joint

Bending stress

$\sigma u = -1014.3*10^6 * -772.9 / (2251610*10^4) = 35\ N/mm^2 < \sigma ta = 140\ N/mm^2$

$\sigma L = -1014.3*10^6 * 1426.1 / (2251610*10^4) = -64\ N/mm^2 < \sigma ca = 116\ N/mm^2$

Shear stress

$\tau = -509.2*10^3 / 19557 = 26\ N/mm^2 < \tau a = 80\ N/mm^2$

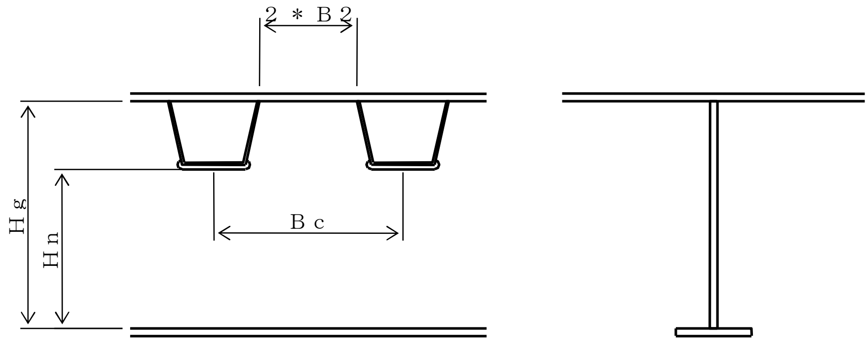
Combined stress

$\kappa = (-64 / 140)^2 + (26 / 80)^2 = 0.31 < 1.2$

Superimposing stress intensity acting on main girder and floor system

DECK $(35) + (34) = 69\ N/mm^2 < \sigma a = 195\ N/mm^2$

Shear stress at defect of longitudinal rib



$\tau k = -509.2*10^3 / 19557 = -26\ N/mm^2 < \tau a = 80\ N/mm^2$

$\tau v = \tau k * Hg / Hn = -26 * 217.3 / 189.6 = -30\ N/mm^2 < \tau a$

(11) Intermediate cross beam Ｃ１−Ｃ２４[between Ｇ１−Ｇ２] : Representative CR1-051(C23)

Section forces and condition of the calculation

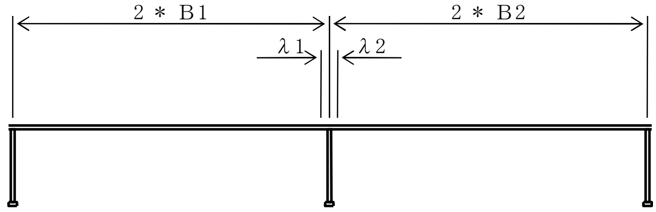
acting on main girder	M = -1291.0 kN·m	S = -602.6 kN
acting on floor system	M = -712.8 kN·m	S = -509.2 kN
Section force at joint	Mj= -1291.0 kN·m	Sj= -602.6 kN
Shearing stress at defect	Sk= -602.6 kN	
Distance between fixing points	L = 1.650 m	

Equivalent span length (acting on main girder)

Li = 1.0 ∗ Lc = 1.0 ∗ 165.0 = 165.0 cm

Lc: main girder web interval

Effective width (acting on main girder)



B1 = 470.7 cm
B2 = 472.9 cm

B1/Li = 470.7 / 165.0 = 2.85

λ1 = 0.15 ∗ Li = 0.15 ∗ 165.0 = 24.7 cm

B2/Li = 472.9 / 165.0 = 2.87

λ2 = 0.15 ∗ Li = 0.15 ∗ 165.0 = 24.7 cm

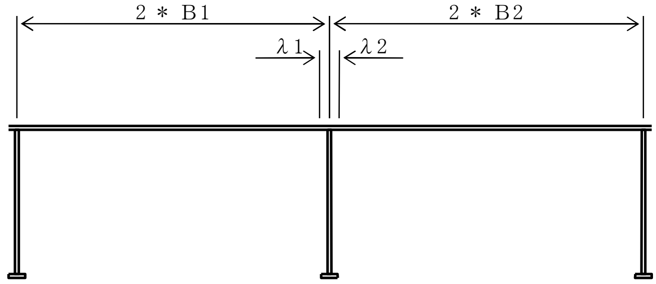
Sum of effective width λ = λ1 + λ2 = 24.7 + 24.7 = 49.5 cm

Equivalent span length (acting on floor system)

Li = 0.6 ∗ Lc = 0.6 ∗ 165.0 = 99.0 cm

Lc: main girder web interval

Effective width (acting on floor system)



B1/Li = 235.4 / 99.0 = 2.38

λ1 = 0.15 * Li = 0.15 * 99.0 = 14.8 cm

B2/Li = 236.5 / 99.0 = 2.39

λ2 = 0.15 * Li = 0.15 * 99.0 = 14.8 cm

Sum of effective width λ = λ1 + λ2 = 14.8 + 14.8 = 29.7 cm

Section area and moment of inertia (acting on main girder)

				$A (cm^2)$	Y (cm)	$AY (cm^3)$	$I (cm^4)$
1-DECK	PL	495 * 16	(SM400)	79.20	-109.44	-8668	948587
1-WEB	PL	2173 * 9	(SM400)	195.55	0.00	0	769344
1-LFLG	PL	250 * 10	(SM400)	25.00	109.14	2729	297788
				299.75		-5939	2015720

E = -5939/ 299.75 = -19.81 cm

I = 2015720 - 299.75 * -19.81^2 = 1898044 cm^4

Yu = -90.43 cm , YL = 129.45 cm

Section area and moment of inertia (acting on floor system)

				$A (cm^2)$	Y (cm)	$AY (cm^3)$	$I (cm^4)$
1-DECK	PL	297 * 16	(SM400)	47.52	-109.44	-5201	569152
1-WEB	PL	2173 * 9	(SM400)	195.55	0.00	0	769344
1-LFLG	PL	250 * 10	(SM400)	25.00	109.14	2729	297788
				268.07		-2472	1636285

E = -2472/ 268.07 = -9.22 cm

I = 1636285 - 268.07 * -9.22^2 = 1613488 cm^4

Yu = -101.02 cm , YL = 118.86 cm

＊acting on main girder

Allowable stress

・LFLG

Allowable stress due to lateral buckling

$Aw/Ac = 195.55 / 25.00 = 7.822 > 2$

$K*L/b = \sqrt{(3 + 195.55 / (2 * 25.00))} * 165.0 / 25.0 = 17.351 > 9$

$\sigma ba = 140 - 1.2*(17.351 - 9) = 130\ N/mm^2$

Allowable stress due to local buckling

$\sigma cal = 140\ N/mm^2$

Allowable stress $\sigma ca = 130\ N/mm^2$

Bending stress

$\sigma u = -1291.0*10^6 * -904.3 / (1898044*10^4) = 62\ N/mm^2 < \sigma ta = 140\ N/mm^2$

$\sigma L = -1291.0*10^6 * 1294.5 / (1898044*10^4) = -88\ N/mm^2 < \sigma ca = 130\ N/mm^2$

Shear stress

$\tau = -602.6*10^3 / 19555 = 31\ N/mm^2 < \tau a = 80\ N/mm^2$

Combined stress

$\kappa = (-87 / 140)^2 + (31 / 80)^2 = 0.54 < 1.2$

＊acting on floor system

Bending stress

$\sigma u = -712.8*10^6 * -1010.2 / (1613488*10^4) = 45\ N/mm^2 < \sigma ta = 140\ N/mm^2$

$\sigma L = -712.8*10^6 * 1188.6 / (1613488*10^4) = -53\ N/mm^2 < \sigma ca = 130\ N/mm^2$

Shear stress

$\tau = -509.2*10^3 / 19555 = 26\ N/mm^2 < \tau a = 80\ N/mm^2$

Combined stress

$\kappa = (-52 / 140)^2 + (26 / 80)^2 = 0.24 < 1.2$

＊For the joint

Bending stress

$\sigma u = -1291.0*10^6 * -904.3 / (1898044*10^4) = 62\ N/mm^2 < \sigma ta = 140\ N/mm^2$

$\sigma L = -1291.0*10^6 * 1294.5 / (1898044*10^4) = -88\ N/mm^2 < \sigma ca = 130\ N/mm^2$

Shear stress

$\tau = -602.6*10^3 / 19555 = 31\ N/mm^2 < \tau a = 80\ N/mm^2$

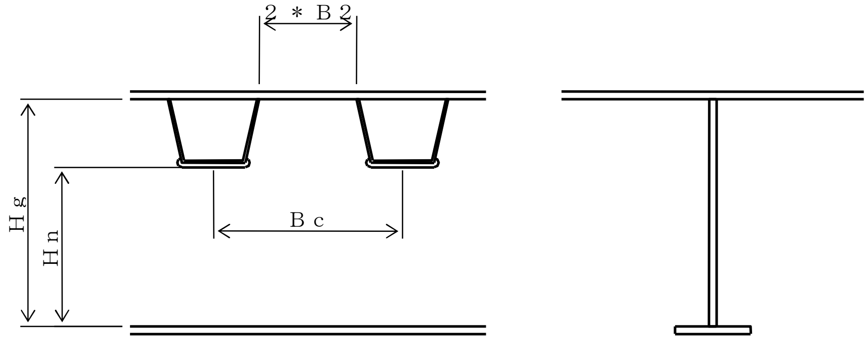
Combined stress

$\kappa = (-87 / 140)^2 + (31 / 80)^2 = 0.54 < 1.2$

Superimposing stress intensity acting on main girder and floor system

DECK (62) + (45) = 106 N/mm^2 < σa = 195 N/mm^2

Shear stress at defect of longitudinal rib



$\tau k = -602.6*10^3 / 19555 = -31\ N/mm^2 < \tau a = 80\ N/mm^2$

$\tau v = \tau k * Hg / Hn = -31 * 217.3 / 189.6 = -35\ N/mm^2 < \tau a$

(12) Intermediate cross beam Ｃ１－Ｃ２４[between Ｇ２－Ｇ３]：Representative CR2-025(C11)

Section forces and condition of the calculation

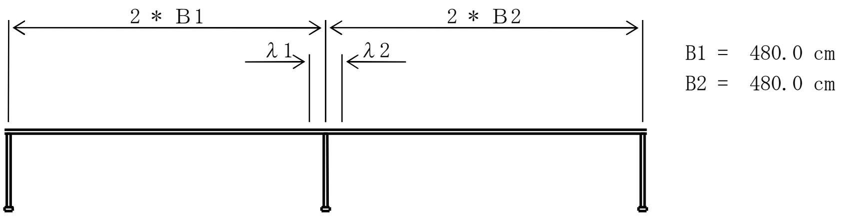
acting on main girder	M = -1654.1 kN·m	S = 262.0 kN
acting on floor system	M = -712.8 kN·m	S = -509.2 kN
Section force at joint	Mj= -1654.1 kN·m	Sj= -509.2 kN
Shearing stress at defect	Sk= -509.2 kN	
Distance between fixing points	L = 3.300 m	

Equivalent span length (acting on main girder)

Li = 1.0 * Lc = 1.0 * 330.0 = 330.0 cm

Lc: main girder web interval

Effective width (acting on main girder)



B1/Li = 480.0 / 330.0 = 1.45

λ1 = 0.15 * Li = 0.15 * 330.0 = 49.5 cm

B2/Li = 480.0 / 330.0 = 1.45

λ2 = 0.15 * Li = 0.15 * 330.0 = 49.5 cm

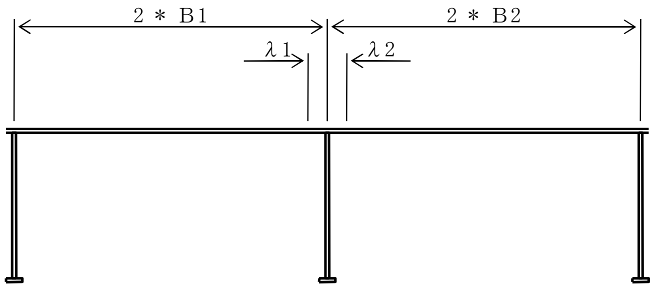
Sum of effective width λ = λ1 + λ2 = 49.5 + 49.5 = 99.0 cm

Equivalent span length (acting on floor system)

Li = 0.6 * Lc = 0.6 * 330.0 = 198.0 cm

Lc: main girder web interval

Effective width (acting on floor system)



B1 = 240.0 cm
B2 = 240.0 cm

B1/Li = 240.0 / 198.0 = 1.21

$\lambda 1$ = 0.15 * Li = 0.15 * 198.0 = 29.7 cm

B2/Li = 240.0 / 198.0 = 1.21

$\lambda 2$ = 0.15 * Li = 0.15 * 198.0 = 29.7 cm

Sum of effective width λ = $\lambda 1$ + $\lambda 2$ = 29.7 + 29.7 = 59.4 cm

Section area and moment of inertia (acting on main girder)

			$A(cm^2)$	$Y(cm)$	$AY(cm^3)$	$I(cm^4)$
1-DECK	PL	990 * 16(SM400)	158.40	-112.15	-17765	1992295
1-WEB	PL	2227 * 9(SM400)	200.43	0.00	0	828365
1-LFLG	PL	250 * 16(SM400)	40.00	112.15	4486	503105
			398.83		-13279	3323766

E = -13279/ 398.83 = -33.29 cm

I = 3323766 - 398.83 * -33.29^2 = 2881672 cm^4

Yu = -79.66 cm , YL = 146.24 cm

Section area and moment of inertia (acting on floor system)

			$A(cm^2)$	$Y(cm)$	$AY(cm^3)$	$I(cm^4)$
1-DECK	PL	594 * 16(SM400)	95.04	-112.15	-10659	1195377
1-WEB	PL	2227 * 9(SM400)	200.43	0.00	0	828365
1-LFLG	PL	250 * 16(SM400)	40.00	112.15	4486	503105
			335.47		-6173	2526847

E = -6173/ 335.47 = -18.40 cm

I = 2526847 - 335.47 * -18.40^2 = 2413268 cm^4

Yu = -94.55 cm , YL = 131.35 cm

＊acting on main girder

Allowable stress

・LFLG

Allowable stress due to lateral buckling

$Aw/Ac = 200.43 / 40.00 = 5.011 > 2$

$K*L/b = \sqrt{(3 + 200.43 / (2 * 40.00))} * 330.0 / 25.0 = 30.972 > 9$

$\sigma ba = 140 - 1.2*(30.972 - 9) = 114$ N/mm^2

Allowable stress due to local buckling

$\sigma cal = 140$ N/mm^2

Allowable stress $\sigma ca = 114$ N/mm^2

Bending stress

$\sigma u = -1654.1*10^6 * -796.6 / (2881672*10^4) = 46$ N/mm^2 $<$ $\sigma ta = 140$ N/mm^2

$\sigma L = -1654.1*10^6 * 1462.4 / (2881672*10^4) = -84$ N/mm^2 $<$ $\sigma ca = 114$ N/mm^2

Shear stress

$\tau = 262.0*10^3 / 20043 = 13$ N/mm^2 $<$ $\tau a = 80$ N/mm^2

Combined stress

$\kappa = (-83 / 140)^2 + (13 / 80)^2 = 0.38 < 1.2$

＊acting on floor system

Bending stress

$\sigma u = -712.8*10^6 * -945.5 / (2413268*10^4) = 28$ N/mm^2 $<$ $\sigma ta = 140$ N/mm^2

$\sigma L = -712.8*10^6 * 1313.5 / (2413268*10^4) = -39$ N/mm^2 $<$ $\sigma ca = 114$ N/mm^2

Shear stress

$\tau = -509.2*10^3 / 20043 = 25$ N/mm^2 $<$ $\tau a = 80$ N/mm^2

Combined stress

$\kappa = (-38 / 140)^2 + (25 / 80)^2 = 0.18 < 1.2$

＊For the joint

Bending stress

$\sigma u = -1654.1*10^6 * -796.6 / (2881672*10^4) = 46$ N/mm^2 < $\sigma ta = 140$ N/mm^2

$\sigma L = -1654.1*10^6 * 1462.4 / (2881672*10^4) = -84$ N/mm^2 < $\sigma ca = 114$ N/mm^2

Shear stress

$\tau = -509.2*10^3 / 20043 = 25$ N/mm^2 < $\tau a = 80$ N/mm^2

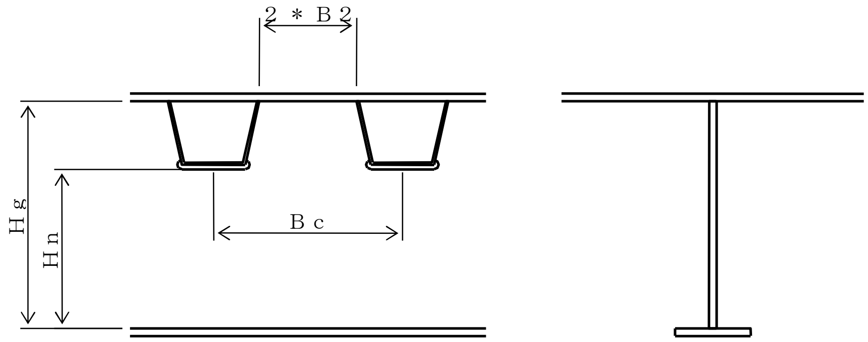
Combined stress

$\kappa = (-83 / 140)^2 + (25 / 80)^2 = 0.45 < 1.2$

Superimposing stress intensity acting on main girder and floor system

DECK (46) + (28) = 74 N/mm^2 < $\sigma a = 195$ N/mm^2

Shear stress at defect of longitudinal rib



$\tau k = -509.2*10^3 / 20043 = -25$ N/mm^2 < $\tau a = 80$ N/mm^2

$\tau v = \tau k * Hg / Hn = -25 * 222.7 / 195.0 = -29$ N/mm^2 < τa

(13) Intermediate cross beam Ｃ１－Ｃ１２[between Ｇ３－Ｇ４]：Representative CR3-025(C11)

Section forces and condition of the calculation

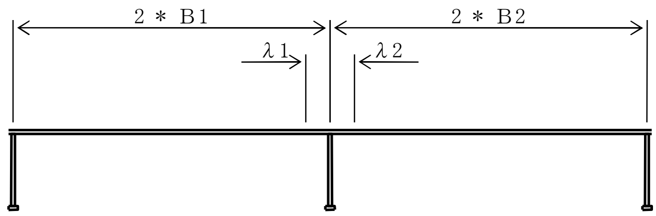
acting on main girder	M = -1609.3 kN·m	S = 368.7 kN
acting on floor system	M = -712.8 kN·m	S = -509.2 kN
Section force at joint	Mj= -1609.3 kN·m	Sj= -509.2 kN
Shearing stress at defect	Sk= -509.2 kN	
Distance between fixing points	L = 4.902 m	

Equivalent span length (acting on main girder)

Li = 1.0 * Lc = 1.0 * 490.2 = 490.2 cm

Lc: main girder web interval

Effective width (acting on main girder)



B1 = 478.4 cm
B2 = 478.5 cm

B1/Li = 478.4 / 490.2 = 0.98

λ1 = 0.15 * Li = 0.15 * 490.2 = 73.5 cm

B2/Li = 478.5 / 490.2 = 0.98

λ2 = 0.15 * Li = 0.15 * 490.2 = 73.5 cm

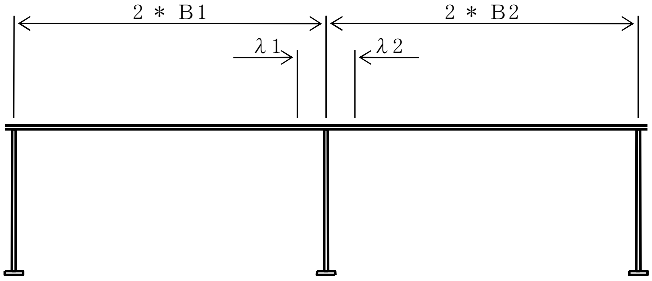
Sum of effective width λ = λ1 + λ2 = 73.5 + 73.5 = 147.1 cm

Equivalent span length (acting on floor system)

Li = 0.6 * Lc = 0.6 * 490.2 = 294.1 cm

Lc: main girder web interval

Effective width (acting on floor system)



B1/Li = 239.2 / 294.1 = 0.81

$\lambda 1$ = 0.15 * Li = 0.15 * 294.1 = 44.1 cm

B2/Li = 239.2 / 294.1 = 0.81

$\lambda 2$ = 0.15 * Li = 0.15 * 294.1 = 44.1 cm

Sum of effective width $\lambda = \lambda 1 + \lambda 2$ = 44.1 + 44.1 = 88.2 cm

Section area and moment of inertia (acting on main girder)

			A(cm^2)	Y(cm)	AY(cm^3)	I(cm^4)
1-DECK	PL	1471 * 16(SM400)	235.30	-109.45	-25753	2818682
1-WEB	PL	2173 * 9(SM400)	195.57	0.00	0	769556
1-LFLG	PL	280 * 16(SM400)	44.80	109.45	4903	536673
			475.67		-20850	4124911

E = -20850/ 475.67 = -43.83 cm

I = 4124911 - 475.67 * -43.83^2 = 3211006 cm^4

Yu = -66.42 cm , YL = 154.08 cm

Section area and moment of inertia (acting on floor system)

			A(cm^2)	Y(cm)	AY(cm^3)	I(cm^4)
1-DECK	PL	882 * 16(SM400)	141.18	-109.45	-15452	1691209
1-WEB	PL	2173 * 9(SM400)	195.57	0.00	0	769556
1-LFLG	PL	280 * 16(SM400)	44.80	109.45	4903	536673
			381.55		-10549	2997438

E = -10549/ 381.55 = -27.65 cm

I = 2997438 - 381.55 * -27.65^2 = 2705806 cm^4

Yu = -82.60 cm , YL = 137.90 cm

＊acting on main girder

Allowable stress

・LFLG

Allowable stress due to lateral buckling

$Aw/Ac = 195.57 / 44.80 = 4.365 > 2$

$K*L/b = \sqrt{(3 + 195.57 / (2 * 44.80))} * 490.2 / 28.0 = 39.856 > 9$

$\sigma ba = 140 - 1.2*(39.856 - 9) = 103$ N/mm^2

Allowable stress due to local buckling

$\sigma cal = 140$ N/mm^2

Allowable stress $\sigma ca = 103$ N/mm^2

Bending stress

$\sigma u = -1609.3*10^6 * -664.2 / (3211006*10^4) = 33$ N/mm^2 $< \sigma ta = 140$ N/mm^2

$\sigma L = -1609.3*10^6 * 1540.8 / (3211006*10^4) = -77$ N/mm^2 $< \sigma ca = 103$ N/mm^2

Shear stress

$\tau = 368.7*10^3 / 19557 = 19$ N/mm^2 $< \tau a = 80$ N/mm^2

Combined stress

$\kappa = (-76 / 140)^2 + (19 / 80)^2 = 0.35 < 1.2$

＊acting on floor system

Bending stress

$\sigma u = -712.8*10^6 * -826.0 / (2705806*10^4) = 22$ N/mm^2 $< \sigma ta = 140$ N/mm^2

$\sigma L = -712.8*10^6 * 1379.0 / (2705806*10^4) = -36$ N/mm^2 $< \sigma ca = 103$ N/mm^2

Shear stress

$\tau = -509.2*10^3 / 19557 = 26$ N/mm^2 $< \tau a = 80$ N/mm^2

Combined stress

$\kappa = (-36 / 140)^2 + (26 / 80)^2 = 0.17 < 1.2$

＊For the joint

Bending stress

$\sigma u = -1609.3*10^6 * -664.2 / (3211006*10^4) = 33\ N/mm^2 < \sigma ta = 140\ N/mm^2$

$\sigma L = -1609.3*10^6 * 1540.8 / (3211006*10^4) = -77\ N/mm^2 < \sigma ca = 103\ N/mm^2$

Shear stress

$\tau = -509.2*10^3 / 19557 = 26\ N/mm^2 < \tau a = 80\ N/mm^2$

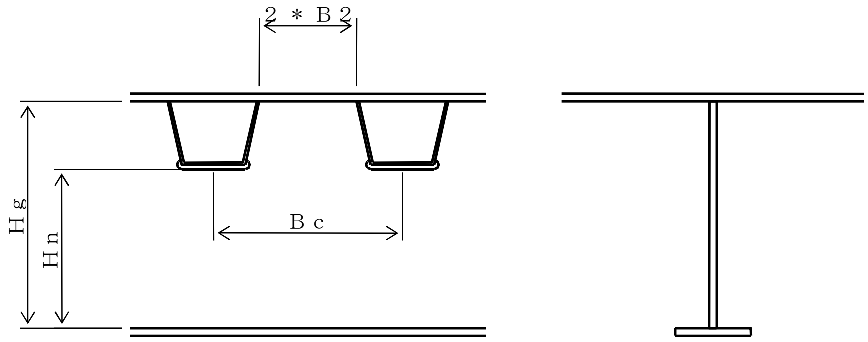
Combined stress

$\kappa = (-76 / 140)^2 + (26 / 80)^2 = 0.40 < 1.2$

Superimposing stress intensity acting on main girder and floor system

DECK (33) + (22) = 55 N/mm^2 < σa = 195 N/mm^2

Shear stress at defect of longitudinal rib



$\tau k = -509.2*10^3 / 19557 = -26\ N/mm^2 < \tau a = 80\ N/mm^2$

$\tau v = \tau k * Hg / Hn = -26 * 217.3 / 189.6 = -30\ N/mm^2 < \tau a$

(14) Intermediate cross beam Ｃ１３−Ｃ２４[between Ｇ３−Ｇ４] : Representative CR3-051(C23)

Section forces and condition of the calculation

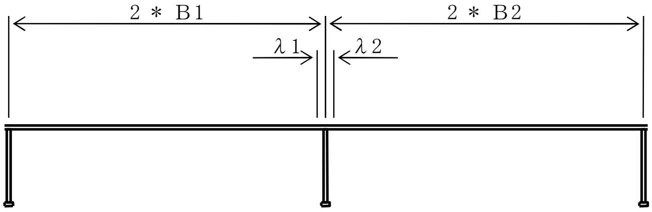
acting on main girder	M = -1242.4 kN·m	S = 584.8 kN
acting on floor system	M = -712.8 kN·m	S = -509.2 kN
Section force at joint	Mj= -1242.4 kN·m	Sj= 584.8 kN
Shearing stress at defect	Sk= 584.8 kN	
Distance between fixing points	L = 1.650 m	

Equivalent span length (acting on main girder)

Li = 1.0 * Lc = 1.0 * 165.0 = 165.0 cm

Lc: main girder web interval

Effective width (acting on main girder)



B1 = 469.5 cm
B2 = 471.5 cm

B1/Li = 469.5 / 165.0 = 2.85

λ1 = 0.15 * Li = 0.15 * 165.0 = 24.7 cm

B2/Li = 471.5 / 165.0 = 2.86

λ2 = 0.15 * Li = 0.15 * 165.0 = 24.7 cm

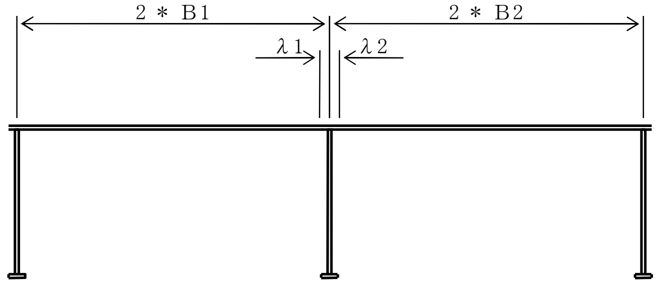
Sum of effective width λ = λ1 + λ2 = 24.7 + 24.7 = 49.5 cm

Equivalent span length (acting on floor system)

Li = 0.6 * Lc = 0.6 * 165.0 = 99.0 cm

Lc: main girder web interval

Effective width (acting on floor system)



B1 = 234.8 cm
B2 = 235.7 cm

B1/Li = 234.8 / 99.0 = 2.37

$\lambda 1$ = 0.15 * Li = 0.15 * 99.0 = 14.8 cm

B2/Li = 235.7 / 99.0 = 2.38

$\lambda 2$ = 0.15 * Li = 0.15 * 99.0 = 14.8 cm

Sum of effective width $\lambda = \lambda 1 + \lambda 2$ = 14.8 + 14.8 = 29.7 cm

Section area and moment of inertia (acting on main girder)

			A(cm^2)	Y(cm)	AY(cm^3)	I(cm^4)
1-DECK	PL	495 * 16(SM400)	79.20	-109.45	-8668	948674
1-WEB	PL	2173 * 9(SM400)	195.56	0.00	0	769450
1-LFLG	PL	250 * 10(SM400)	25.00	109.15	2729	297816
			299.76		-5939	2015940

E = -5939/ 299.76 = -19.81 cm

I = 2015940 - 299.76 * -19.81^2 = 1898257 cm^4

Yu = -90.43 cm , YL = 129.46 cm

Section area and moment of inertia (acting on floor system)

			A(cm^2)	Y(cm)	AY(cm^3)	I(cm^4)
1-DECK	PL	297 * 16(SM400)	47.52	-109.45	-5201	569204
1-WEB	PL	2173 * 9(SM400)	195.56	0.00	0	769450
1-LFLG	PL	250 * 10(SM400)	25.00	109.15	2729	297816
			268.08		-2472	1636470

E = -2472/ 268.08 = -9.22 cm

I = 1636470 - 268.08 * -9.22^2 = 1613672 cm^4

Yu = -101.02 cm , YL = 118.87 cm

＊acting on main girder

Allowable stress

・LFLG

Allowable stress due to lateral buckling

$Aw/Ac = 195.56 / 25.00 = 7.822 > 2$

$K*L/b = \sqrt{(3 + 195.56 / (2 * 25.00))} * 165.0 / 25.0 = 17.351 > 9$

$\sigma ba = 140 - 1.2*(17.351 - 9) = 130\ N/mm^2$

Allowable stress due to local buckling

$\sigma cal = 140\ N/mm^2$

Allowable stress $\sigma ca = 130\ N/mm^2$

Bending stress

$\sigma u = -1242.4*10^6 * -904.3 / (1898257*10^4) = 59\ N/mm^2 < \sigma ta = 140\ N/mm^2$

$\sigma L = -1242.4*10^6 * 1294.6 / (1898257*10^4) = -85\ N/mm^2 < \sigma ca = 130\ N/mm^2$

Shear stress

$\tau = 584.8*10^3 / 19556 = 30\ N/mm^2 < \tau a = 80\ N/mm^2$

Combined stress

$\kappa = (-84 / 140)^2 + (30 / 80)^2 = 0.50 < 1.2$

＊acting on floor system

Bending stress

$\sigma u = -712.8*10^6 * -1010.2 / (1613672*10^4) = 45\ N/mm^2 < \sigma ta = 140\ N/mm^2$

$\sigma L = -712.8*10^6 * 1188.7 / (1613672*10^4) = -53\ N/mm^2 < \sigma ca = 130\ N/mm^2$

Shear stress

$\tau = -509.2*10^3 / 19556 = 26\ N/mm^2 < \tau a = 80\ N/mm^2$

Combined stress

$\kappa = (-52 / 140)^2 + (26 / 80)^2 = 0.24 < 1.2$

＊For the joint

Bending stress

$\sigma u = -1242.4*10^6 * -904.3 / (1898257*10^4) = 59\ N/mm^2 < \sigma ta = 140\ N/mm^2$

$\sigma L = -1242.4*10^6 * 1294.6 / (1898257*10^4) = -85\ N/mm^2 < \sigma ca = 130\ N/mm^2$

Shear stress

$\tau = 584.8*10^3 / 19556 = 30\ N/mm^2 < \tau a = 80\ N/mm^2$

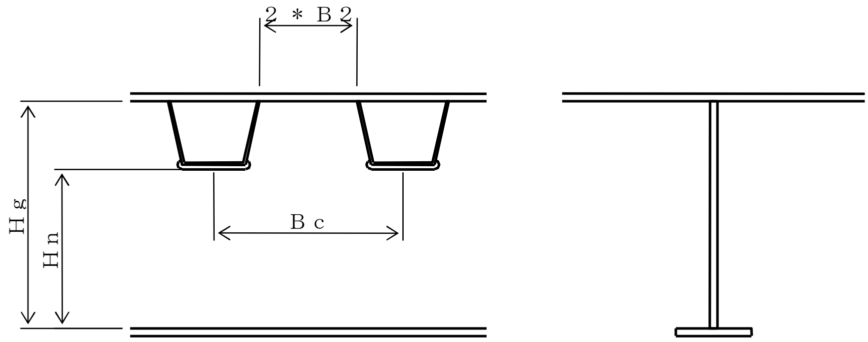
Combined stress

$\kappa = (-84 / 140)^2 + (30 / 80)^2 = 0.50 < 1.2$

Superimposing stress intensity acting on main girder and floor system

DECK $(59) + (45) = 104\ N/mm^2 < \sigma a = 195\ N/mm^2$

Shear stress at defect of longitudinal rib



$\tau k = 584.8*10^3 / 19556 = 30\ N/mm^2 < \tau a = 80\ N/mm^2$

$\tau v = \tau k * Hg / Hn = 30 * 217.3 / 189.6 = 34\ N/mm^2 < \tau a$

５．５．Calculation of erection joint

(1) End support beam Ｓ１ LFLG : Representative Model CR1-001(S1)

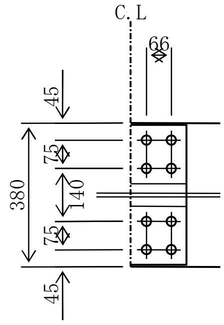
(a) Acting stress

σtmax = 76 N/mm^2 0.75σta = 0.75 ＊ 140 = 105 N/mm^2

(b) Section area of main plate

1-LFLG PL 380 ＊ 16 Ag = 60.8 cm^2 (SM400)

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 380 ＊ 16 A = 60.8

(60.8 - (4＊ 2.5)＊ 1.6) ＊ 1.1 = 49.3 ＜ 60.8 ∴An = 49.3 cm^2

σtn = σtmax ＊ Ag / An = 76 ＊ 60.8 / 49.3 = 94 N/mm^2

＜ σta = 140 N/mm^2

(e) Design axial force

Pt = 0.75σta ＊ An / 1.1 = 105 ＊ 4928 / 1.1 = 470400 N

＞ σtn ＊ An = 94 ＊ 4928 = 463065 N

(f) Required section area of the splice plates

AnR = An / 2 = 49.3 / 2 = 24.6 cm^2

(g) Required number of bolts

n = Pt / (108000 ＊ 1.00) = 470400 / 108000 = 4.4 pcs. (8 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 2 unites)

(h) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes	Ans(cm^2)
2-SPL PL	155 ＊ 11	(34.1 -	2＊(2＊2.5)＊ 1.1)＊1.1= 25.4＜ 34.1	∴ 25.4 ＞ AnR
1-SPL PL	370 ＊ 9	(33.3 -	(4＊2.5)＊ 0.9)＊1.1= 26.7＜ 33.3	∴ 26.7 ＞ AnR

(2) End support beam S 1 WEB : Representative Model CR1-001(S1)

(a) Section area of main plate (Web plate)

1-WEB PL 2173 * 9 A = 195.6 cm^2 (SM400)

(b) Design stress

σU = 67 N/mm^2 < σa * 0.75 = 140 * 0.75 = 105 N/mm^2

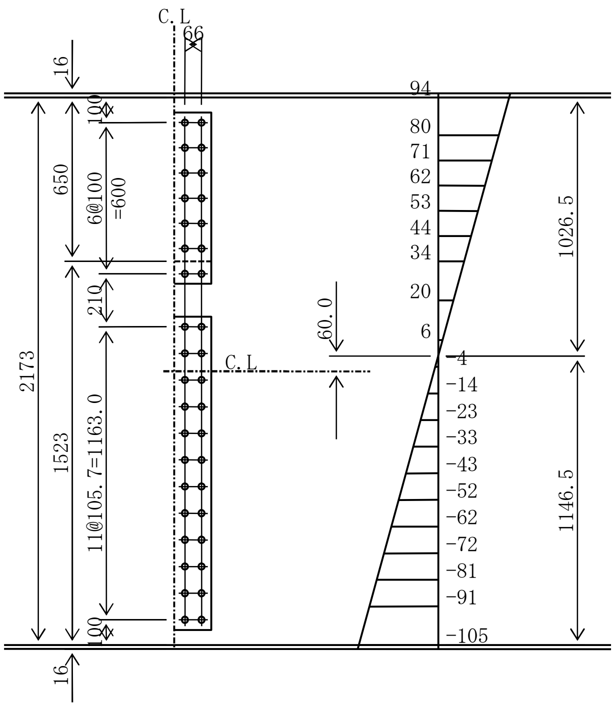
σL = -75 N/mm^2 < σa * 0.75 = 140 * 0.75 = 105 N/mm^2

σUn = 105 * 67 / 75 = 94 N/mm^2

σLn = 105 N/mm^2

τ = 47 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 19th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 9 * (91 + 105) / 2 = 134826 N

Required number of bolts (number of bolts to be used)

N1 = 134826 / (108000 * 1.00) = 1.2 pcs. (2 bolts will be used.)

Check of bolt at first row

Sharing width: b2 = 15.0 cm

Total force to be shared

P2 = 150 * 9 * (94 + 80) / 2 = 117637 N

Required number of bolts (number of bolts to be used)

N2 = 117637 / (108000 * 1.00) = 1.1 pcs. (2 bolts will be used.)

Check of shear force

ρs = τ * A / 38 = 47 * 19557 / 38 = 24050 N < ρa = 108000 N

Combined stress

$\rho c19$ = $\sqrt{((134826 / 2)^2 + 24050^2)}$ = 71575 N < ρa = 108000 N

$\rho c1$ = $\sqrt{((117637 / 2)^2 + 24050^2)}$ = 63545 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 2 unites)

(e) Check of splice plates

2-SPL PL 680 ＊ 9 As = 122.4 cm^2 (SS400)

2-SPL PL 1243 ＊ 9 As = 223.7 cm^2 (SS400)

Moment of inertia of splice plates Is = 1299453 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 776601 cm^4

Bending moment to be shared by the web

Mw = 105 ＊ 776601*10^4 / 1147 = 711*10^6 N・mm

Bending stress of splice plates

σsp = 711*10^6 / (1299453*10^4) ＊ 1087 = 59 N/mm^2 ＜ σa = 140 N/mm^2

(3) End support beam Ｓ２ LFLG : Representative Model CR1-055(S2)

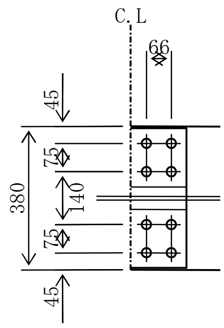
(a) Acting stress

σ tmax = 91 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2

(b) Section area of main plate

1-LFLG PL 380 * 16 Ag = 60.8 cm^2 (SM400)

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 380 * 16 A = 60.8

(60.8 - (4* 2.5)* 1.6) * 1.1 = 49.3 ＜ 60.8 ∴An = 49.3 cm^2

σ tn = σ tmax * Ag / An = 91 * 60.8 / 49.3 = 112 N/mm^2

＜ σ ta = 140 N/mm^2

(e) Design axial force

Pt = σ tn * An = 112 * 4928 = 554076 N

＞ 0.75 σ ta * An / 1.1 = 105 * 4928 / 1.1 = 470400 N

(f) Required section area of the splice plates

AnR = An / 2 = 49.3 / 2 = 24.6 cm^2

(g) Required number of bolts

n = Pt / (108000 * 1.00) = 554076 / 108000 = 5.1 pcs. (8 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 2 unites)

(h) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes	Ans(cm^2)
2-SPL PL	155 * 11	(34.1 -	2*(2*2.5)* 1.1)*1.1= 25.4＜ 34.1	∴ 25.4 ＞ AnR
1-SPL PL	370 * 9	(33.3 -	(4*2.5)* 0.9)*1.1= 26.7＜ 33.3	∴ 26.7 ＞ AnR

(4) End support beam S 2 WEB : Representative Model CR1-055(S2)

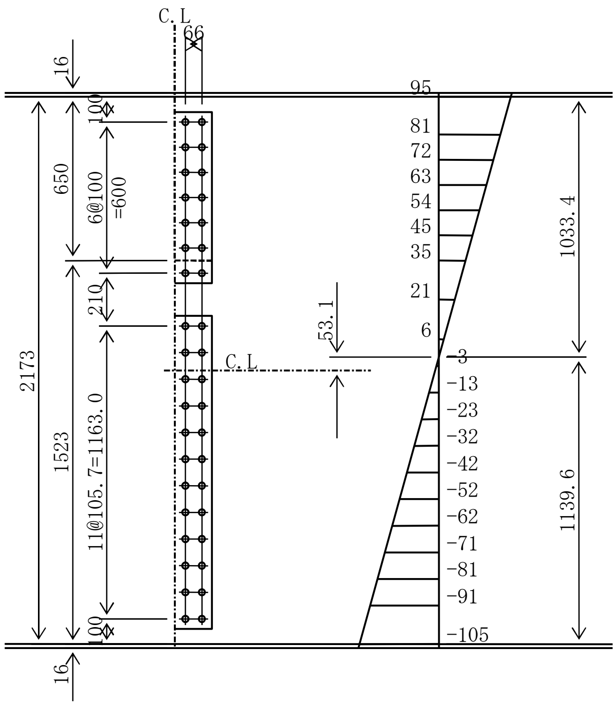
(a) Section area of main plate (Web plate)

1-WEB PL 2173 * 11 A = 239.0 cm^2 (SM400)

(b) Design stress

σU = 81 N/mm^2 < σa * 0.75 = 140 * 0.75 = 105 N/mm^2
σL = -90 N/mm^2 < σa * 0.75 = 140 * 0.75 = 105 N/mm^2
σUn = 105 * 81 / 90 = 95 N/mm^2
σLn = 105 N/mm^2
τ = 48 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 19th row
Sharing width: b1 = 15.3 cm
Total force to be shared
P1 = 153 * 11 * (91 + 105) / 2 = 164716 N
Required number of bolts (number of bolts to be used)
N1 = 164716 / (108000 * 1.00) = 1.5 pcs. (2 bolts will be used.)

Check of bolt at first row
Sharing width: b2 = 15.0 cm
Total force to be shared
P2 = 150 * 11 * (95 + 81) / 2 = 145693 N
Required number of bolts (number of bolts to be used)
N2 = 145693 / (108000 * 1.00) = 1.3 pcs. (2 bolts will be used.)

Check of shear force
$\rho s = \tau * A / 38 = 48 * 23903 / 38 = 30105$ N < ρa = 108000 N

Combined stress
$\rho c19 = \sqrt{((164716 / 2)^2 + 30105^2)} = 87688$ N < ρa = 108000 N
$\rho c1 = \sqrt{((145693 / 2)^2 + 30105^2)} = 78822$ N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 2 unites)

(e) Check of splice plates

2-SPL PL 680 ＊ 9 As = 122.4 cm^2 (SS400)

2-SPL PL 1243 ＊ 9 As = 223.7 cm^2 (SS400)

Moment of inertia of splice plates Is = 1295850 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 947317 cm^4

Bending moment to be shared by the web

$Mw = 105 * 947317 \times 10^4 / 1140 = 873 \times 10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 873 \times 10^6 / (1295850 \times 10^4) * 1080 = 73$ N/mm^2 ＜ $\sigma a = 140$ N/mm^2

(5) Intermediate support beam Ｐ６・Ｐ７［Ｇ１－Ｇ２］LFLG : Representative Model CR1-033(P7)

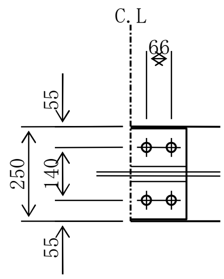
(a) Acting stress

σ tmax = 67 N/mm^2 0.75 σ ta = 0.75 ＊ 140 = 105 N/mm^2

(b) Section area of main plate

1-LFLG PL 250 ＊ 10 Ag = 25.0 cm^2 (SM400)

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 250 ＊ 10 A = 25.0

(25.0 - (2＊ 2.5)＊ 1.0) ＊ 1.1 = 22.0 ＜ 25.0 ∴An = 22.0 cm^2

σ tn = σ tmax ＊ Ag / An = 67 ＊ 25.0 / 22.0 = 77 N/mm^2

＜ σ ta = 140 N/mm^2

(e) Design axial force

Pt = 0.75 σ ta ＊ An / 1.1 = 105 ＊ 2200 / 1.1 = 210000 N

＞ σ tn ＊ An = 77 ＊ 2200 = 168320 N

(f) Required section area of the splice plates

AnR = An / 2 = 22.0 / 2 = 11.0 cm^2

(g) Required number of bolts

n = Pt / (108000 ＊ 1.00) = 210000 / 108000 = 1.9 pcs. (4 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 2 unites)

(h) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	100 ＊ 9	(18.0 -	2＊(1＊2.5)＊ 0.9)＊1.1= 14.9＜	18.0	∴ 14.9 ＞ AnR
1-SPL PL	240 ＊ 9	(21.6 -	(2＊2.5)＊ 0.9)＊1.1= 18.8＜	21.6	∴ 18.8 ＞ AnR

(6) Intermediate support beam Ｐ６・Ｐ７[Ｇ１-Ｇ２] WEB : Representative Model CR1-033(P7)

(a) Section area of main plate (Web plate)

1-WEB PL 2173 * 9 A = 195.6 cm^2 (SM400)

(b) Design stress

σU = 46 N/mm^2 < σa * 0.75 = 140 * 0.75 = 105 N/mm^2

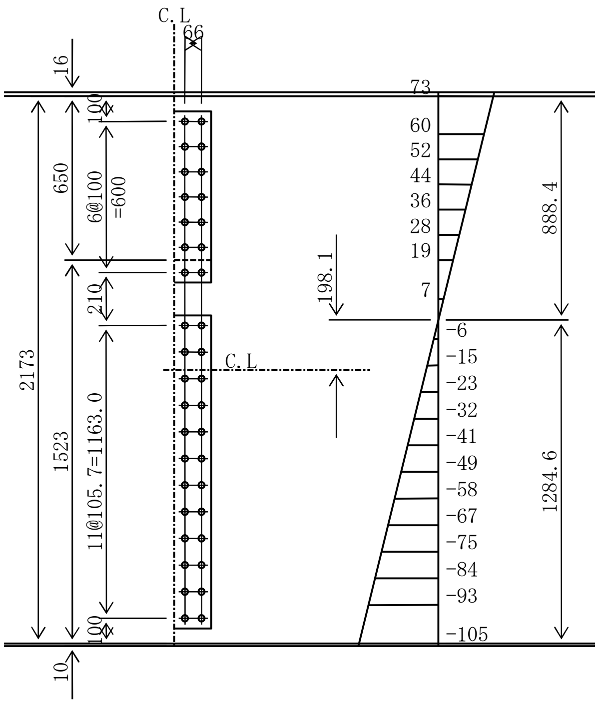
σL = -67 N/mm^2 < σa * 0.75 = 140 * 0.75 = 105 N/mm^2

σUn = 105 * 46 / 67 = 73 N/mm^2

σLn = 105 N/mm^2

τ = 26 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 19th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 9 * (93 + 105) / 2 = 135862 N

Required number of bolts (number of bolts to be used)

N1 = 135862 / (108000 * 1.00) = 1.3 pcs. (2 bolts will be used.)

Check of bolt at first row

Sharing width: b2 = 15.0 cm

Total force to be shared

P2 = 150 * 9 * (73 + 60) / 2 = 89747 N

Required number of bolts (number of bolts to be used)

N2 = 89747 / (108000 * 1.00) = 0.8 pcs. (2 bolts will be used.)

Check of shear force

ρs = τ * A / 38 = 26 * 19557 / 38 = 13400 N < ρa = 108000 N

Combined stress

$\rho c19$ = $\sqrt{((135862 / 2)^2 + 13400^2)}$ = 69240 N < ρa = 108000 N

$\rho c1$ = $\sqrt{((89747 / 2)^2 + 13400^2)}$ = 46832 N < ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 2 unites)

(e) Check of splice plates

2-SPL PL 680 * 9 As = 122.4 cm^2 (SS400)

2-SPL PL 1243 * 9 As = 223.7 cm^2 (SS400)

Moment of inertia of splice plates Is = 1441081 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 846340 cm^4

Bending moment to be shared by the web

Mw = 105 * 846340*10^4 / 1285 = 692*10^6 N・mm

Bending stress of splice plates

σsp = 692*10^6 / (1441081*10^4) * 1225 = 59 N/mm^2 ＜ σa = 140 N/mm^2

(7) Intermediate support beam Ｐ６・Ｐ７［Ｇ２−Ｇ３］LFLG : Representative Model CR2-017(P6)

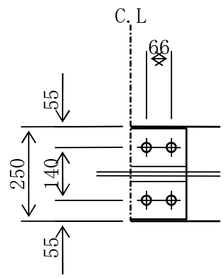
(a) Acting stress

σ tmax = 39 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2

(b) Section area of main plate

1-LFLG PL 250 * 16 Ag = 40.0 cm^2 (SM400)

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 250 * 16 A = 40.0

(40.0 - (2* 2.5)* 1.6) * 1.1 = 35.2 ＜ 40.0 ∴An = 35.2 cm^2

σ tn = σ tmax * Ag / An = 39 * 40.0 / 35.2 = 44 N/mm^2

＜ σ ta = 140 N/mm^2

(e) Design axial force

Pt = 0.75 σ ta * An / 1.1 = 105 * 3520 / 1.1 = 336000 N

＞ σ tn * An = 44 * 3520 = 155188 N

(f) Required section area of the splice plates

AnR = An / 2 = 35.2 / 2 = 17.6 cm^2

(g) Required number of bolts

n = Pt / (108000 * 1.00) = 336000 / 108000 = 3.1 pcs. (4 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 2 unites)

(h) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
2-SPL PL	100 * 11	(22.0 -	2*(1*2.5)* 1.1)*1.1=	18.2＜	22.0	∴ 18.2 ＞ AnR
1-SPL PL	240 * 9	(21.6 -	(2*2.5)* 0.9)*1.1=	18.8＜	21.6	∴ 18.8 ＞ AnR

(8) Intermediate support beam Ｐ６・Ｐ７［Ｇ２-Ｇ３］WEB : Representative Model CR2-017(P6)

(a) Section area of main plate (Web plate)

1-WEB PL 2227 * 9 A = 200.4 cm^2 (SM400)

(b) Design stress

σU = 27 N/mm^2 ＜ σa * 0.75 = 140 * 0.75 = 105 N/mm^2

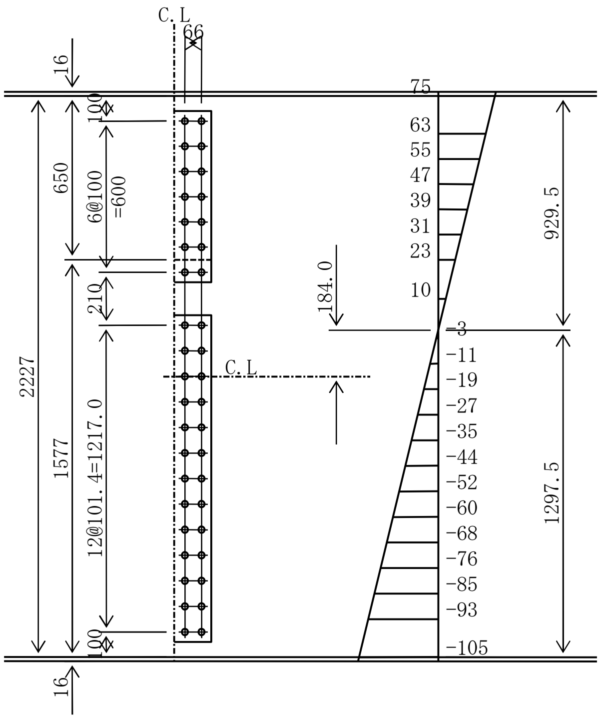
σL = -38 N/mm^2 ＜ σa * 0.75 = 140 * 0.75 = 105 N/mm^2

σUn = 105 * 27 / 38 = 75 N/mm^2

σLn = 105 N/mm^2

τ = 25 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 20th row

Sharing width: b1 = 15.1 cm

Total force to be shared

P1 = 151 * 9 * (93 + 105) / 2 = 134148 N

Required number of bolts (number of bolts to be used)

N1 = 134148 / (108000 * 1.00) = 1.2 pcs. (2 bolts will be used.)

Check of bolt at first row

Sharing width: b2 = 15.0 cm

Total force to be shared

P2 = 150 * 9 * (75 + 63) / 2 = 93352 N

Required number of bolts (number of bolts to be used)

N2 = 93352 / (108000 * 1.00) = 0.9 pcs. (2 bolts will be used.)

Check of shear force

$\rho s = \tau * A / 40$ = 25 * 20043 / 40 = 12730 N ＜ ρa = 108000 N

Combined stress

$\rho c20 = \sqrt{((134148 / 2)^2 + 12730^2)}$ = 68271 N ＜ ρa = 108000 N

$\rho c1 = \sqrt{((93352 / 2)^2 + 12730^2)}$ = 48381 N ＜ ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 2 unites)

(e) Check of splice plates

2-SPL PL 680 ＊ 9 As = 122.4 cm^2 (SS400)

2-SPL PL 1297 ＊ 9 As = 233.5 cm^2 (SS400)

Moment of inertia of splice plates Is = 1527543 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 896228 cm^4

Bending moment to be shared by the web

Mw = 105 ＊ $896228*10^4$ / 1298 = $725*10^6$ N･mm

Bending stress of splice plates

σsp = $725*10^6$ / ($1527543*10^4$) ＊ 1238 = 59 N/mm^2 ＜ σa = 140 N/mm^2

(9) Intermediate support beam Ｐ６［Ｇ３－Ｇ４］LFLG : Representative Model CR3-017(P6)

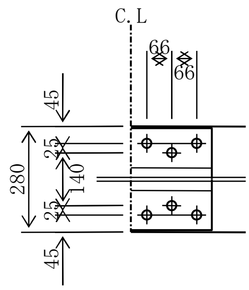
(a) Acting stress

σ tmax = 46 N/mm^2 0.75 σ ta = 0.75 ＊ 140 = 105 N/mm^2

(b) Section area of main plate

1-LFLG PL 280 ＊ 16 Ag = 44.8 cm^2 (SM400)

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 280 ＊ 16 A = 44.8

(44.8 - (2＊ 2.5)＊ 1.6) ＊ 1.1 = 40.5 ＜ 44.8 ∴An = 40.5 cm^2

σ tn = σ tmax ＊ Ag / An = 46 ＊ 44.8 / 40.5 = 50 N/mm^2

＜ σ ta = 140 N/mm^2

(e) Design axial force

Pt = 0.75 σ ta ＊ An / 1.1 = 105 ＊ 4048 / 1.1 = 386400 N

＞ σ tn ＊ An = 50 ＊ 4048 = 203867 N

(f) Required section area of the splice plates

AnR = An / 2 = 40.5 / 2 = 20.2 cm^2

(g) Required number of bolts

n = Pt / (108000 ＊ 1.00) = 386400 / 108000 = 3.6 pcs. (6 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(h) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes	Ans(cm^2)
2-SPL PL	105 ＊ 12	(25.2 -	2＊(1＊2.5)＊ 1.2)＊1.1= 21.1＜ 25.2	∴ 21.1 ＞ AnR
1-SPL PL	270 ＊ 9	(24.3 -	(2＊2.5)＊ 0.9)＊1.1= 21.8＜ 24.3	∴ 21.8 ＞ AnR

(10) Intermediate support beam Ｐ６[Ｇ３-Ｇ４] WEB : Representative Model CR3-017(P6)

(a) Section area of main plate (Web plate)

1-WEB PL 2173 * 9 A = 195.6 cm^2 (SM400)

(b) Design stress

σU = 18 N/mm^2 ＜ σa * 0.75 = 140 * 0.75 = 105 N/mm^2

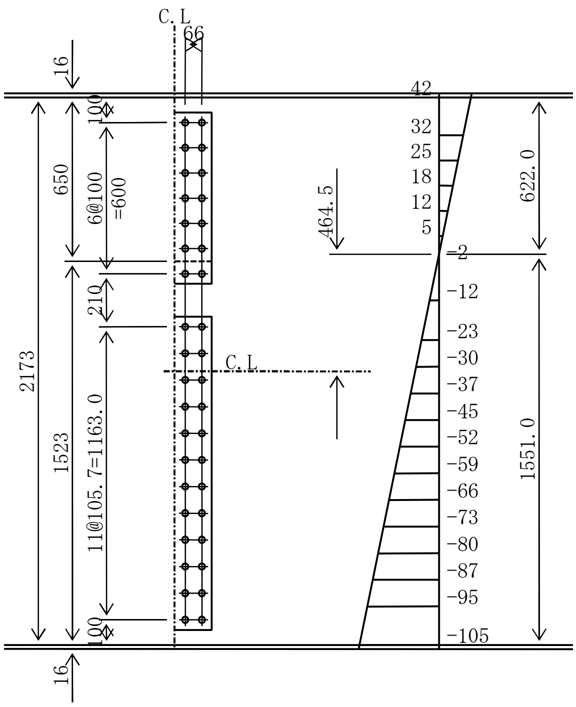
σL = -45 N/mm^2 ＜ σa * 0.75 = 140 * 0.75 = 105 N/mm^2

σUn = 105 * 18 / 45 = 42 N/mm^2

σLn = 105 N/mm^2

τ = 26 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 19th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 * 9 * (95 + 105) / 2 = 137337 N

Required number of bolts (number of bolts to be used)

N1 = 137337 / (108000 * 1.00) = 1.3 pcs. (2 bolts will be used.)

Check of bolt at first row

Sharing width: b2 = 15.0 cm

Total force to be shared

P2 = 150 * 9 * (42 + 32) / 2 = 49996 N

Required number of bolts (number of bolts to be used)

N2 = 49996 / (108000 * 1.00) = 0.5 pcs. (2 bolts will be used.)

Check of shear force

$\rho s = \tau * A / 38 = 26 * 19557 / 38 = 13400$ N ＜ ρa = 108000 N

Combined stress

$\rho c19 = \sqrt{((137337 / 2)^2 + 13400^2)} = 69964$ N ＜ ρa = 108000 N

$\rho c1 = \sqrt{((49996 / 2)^2 + 13400^2)} = 28363$ N ＜ ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 2 unites)

(e) Check of splice plates

2-SPL PL 680 * 9 As = 122.4 cm^2 (SS400)

2-SPL PL 1243 * 9 As = 223.7 cm^2 (SS400)

Moment of inertia of splice plates Is = 2086994 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 1191459 cm^4

Bending moment to be shared by the web

$Mw = 105 * 1191459*10^4 / 1551 = 807*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 807*10^6 / (2086994*10^4) * 1491 = 58$ N/mm^2 ＜ $\sigma a = 140$ N/mm^2

(11) Intermediate support beam Ｐ７[Ｇ３−Ｇ４] LFLG : Representative Model CR3-033(P7)

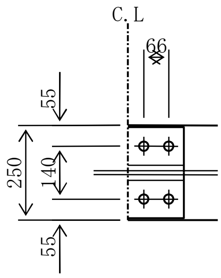
(a) Acting stress

σ tmax = 64 N/mm^2 0.75 σ ta = 0.75 ＊ 140 = 105 N/mm^2

(b) Section area of main plate

1-LFLG PL 250 ＊ 10 Ag = 25.0 cm^2 (SM400)

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 250 ＊ 10 A = 25.0

(25.0 - (2＊ 2.5)＊ 1.0) ＊ 1.1 = 22.0 ＜ 25.0 ∴An = 22.0 cm^2

σ tn = σ tmax ＊ Ag / An = 64 ＊ 25.0 / 22.0 = 73 N/mm^2

＜ σ ta = 140 N/mm^2

(e) Design axial force

Pt = 0.75 σ ta ＊ An / 1.1 = 105 ＊ 2200 / 1.1 = 210000 N

＞ σ tn ＊ An = 73 ＊ 2200 = 160603 N

(f) Required section area of the splice plates

AnR = An / 2 = 22.0 / 2 = 11.0 cm^2

(g) Required number of bolts

n = Pt / (108000 ＊ 1.00) = 210000 / 108000 = 1.9 pcs. (4 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 2 unites)

(h) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	100 ＊ 9	(18.0 -	2＊(1＊2.5)＊ 0.9)＊1.1=	14.9＜ 18.0	∴ 14.9 ＞ AnR
1-SPL PL	240 ＊ 9	(21.6 -	(2＊2.5)＊ 0.9)＊1.1=	18.8＜ 21.6	∴ 18.8 ＞ AnR

(12) Intermediate support beam Ｐ７[Ｇ３-Ｇ４] WEB : Representative Model CR3-033(P7)

(a) Section area of main plate (Web plate)

1-WEB PL 2173 ＊ 9 A = 195.6 cm^2 (SM400)

(b) Design stress

σU = 34 N/mm^2 ＜ σa ＊ 0.75 = 140 ＊ 0.75 = 105 N/mm^2

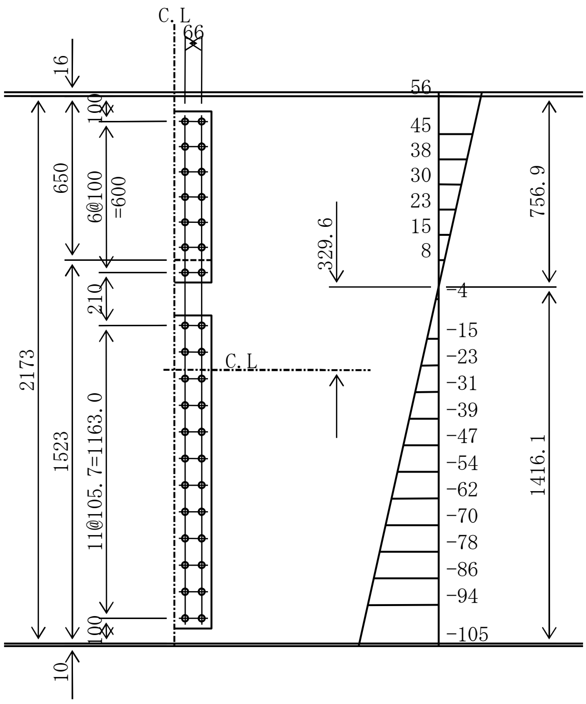
σL = -64 N/mm^2 ＜ σa ＊ 0.75 = 140 ＊ 0.75 = 105 N/mm^2

σUn = 105 ＊ 34 / 64 = 56 N/mm^2

σLn = 105 N/mm^2

τ = 26 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 19th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 ＊ 9 ＊ (94 + 105) / 2 = 136659 N

Required number of bolts (number of bolts to be used)

N1 = 136659 / (108000 ＊ 1.00) = 1.3 pcs. (2 bolts will be used.)

Check of bolt at first row

Sharing width: b2 = 15.0 cm

Total force to be shared

P2 = 150 ＊ 9 ＊ (56 + 45) / 2 = 68263 N

Required number of bolts (number of bolts to be used)

N2 = 68263 / (108000 ＊ 1.00) = 0.6 pcs. (2 bolts will be used.)

Check of shear force

ρs = τ ＊ A / 38 = 26 ＊ 19557 / 38 = 13400 N ＜ ρa = 108000 N

Combined stress

$\rho c19$ = $\sqrt{}$((136659 / 2$)^2$ + 13400^2) = 69631 N ＜ ρa = 108000 N

$\rho c1$ = $\sqrt{}$((68263 / 2$)^2$ + 13400^2) = 36668 N ＜ ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 2 unites)

(e) Check of splice plates

2-SPL PL 680 * 9 As = 122.4 cm^2 (SS400)
2-SPL PL 1243 * 9 As = 223.7 cm^2 (SS400)

Moment of inertia of splice plates Is = 1698448 cm^4 ＞ Iw
Moment of inertia of web plate Iw = 981970 cm^4

Bending moment to be shared by the web

Mw = 105 * 981970*10^4 / 1416 = 728*10^6 N·mm

Bending stress of splice plates

σsp = 728*10^6 / (1698448*10^4) * 1356 = 58 N/mm^2 ＜ σa = 140 N/mm^2

(13) Intermediate cross beam Ｃ１－Ｃ２４[Ｇ１－Ｇ２] LFLG : Representative Model CR1-051(C23)

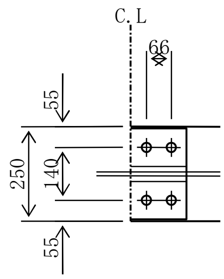
(a) Acting stress

σ tmax = 88 N/mm^2 0.75 σ ta = 0.75 ＊ 140 = 105 N/mm^2

(b) Section area of main plate

1-LFLG PL 250 ＊ 10 Ag = 25.0 cm^2 (SM400)

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 250 ＊ 10 A = 25.0

(25.0 - (2＊ 2.5)＊ 1.0) ＊ 1.1 = 22.0 ＜ 25.0 ∴An = 22.0 cm^2

σ tn = σ tmax ＊ Ag / An = 88 ＊ 25.0 / 22.0 = 100 N/mm^2

＜ σ ta = 140 N/mm^2

(e) Design axial force

Pt = σ tn ＊ An = 100 ＊ 2200 = 220128 N

＞ 0.75 σ ta ＊ An / 1.1 = 105 ＊ 2200 / 1.1 = 210000 N

(f) Required section area of the splice plates

AnR = An / 2 = 22.0 / 2 = 11.0 cm^2

(g) Required number of bolts

n = Pt / (108000 ＊ 1.00) = 220128 / 108000 = 2.0 pcs. (4 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 2 unites)

(h) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
2-SPL PL	100 ＊ 9	(18.0 -	2＊(1＊2.5)＊ 0.9)＊1.1=	14.9＜	18.0	∴ 14.9 ＞ AnR
1-SPL PL	240 ＊ 9	(21.6 -	(2＊2.5)＊ 0.9)＊1.1=	18.8＜	21.6	∴ 18.8 ＞ AnR

(14) Intermediate cross beam Ｃ１－Ｃ２４［Ｇ１－Ｇ２］WEB : Representative Model CR1-051(C23)

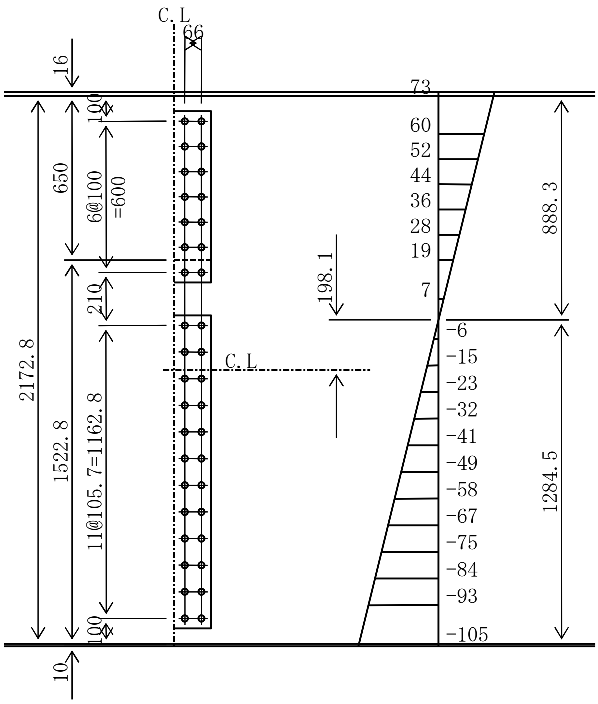
(a) Section area of main plate (Web plate)

1-WEB PL 2173 ＊ 9 A = 195.6 cm^2 (SM400)

(b) Design stress

σU = 60 N/mm^2 ＜ σa ＊ 0.75 = 140 ＊ 0.75 = 105 N/mm^2
σL = -87 N/mm^2 ＜ σa ＊ 0.75 = 140 ＊ 0.75 = 105 N/mm^2
σUn = 105 ＊ 60 / 87 = 73 N/mm^2
σLn = 105 N/mm^2
τ = 31 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 19th row
Sharing width: b1 = 15.3 cm
Total force to be shared
P1 = 153 ＊ 9 ＊ (93 + 105) / 2 = 135853 N
Required number of bolts (number of bolts to be used)
N1 = 135853 / (108000 ＊ 1.00) = 1.3 pcs. (2 bolts will be used.)

Check of bolt at first row
Sharing width: b2 = 15.0 cm
Total force to be shared
P2 = 150 ＊ 9 ＊ (73 + 60) / 2 = 89745 N
Required number of bolts (number of bolts to be used)
N2 = 89745 / (108000 ＊ 1.00) = 0.8 pcs. (2 bolts will be used.)

Check of shear force
ρs = τ ＊ A / 38 = 31 ＊ 19555 / 38 = 15858 N ＜ ρa = 108000 N

Combined stress
ρc19 = $\sqrt{}$((135853 / 2$)^2$ + 15858^2) = 69753 N ＜ ρa = 108000 N
ρc1 = $\sqrt{}$((89745 / 2$)^2$ + 15858^2) = 47592 N ＜ ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 2 unites)

(e) Check of splice plates

2-SPL PL 680 * 9 As = 122.4 cm^2 (SS400)
2-SPL PL 1243 * 9 As = 223.7 cm^2 (SS400)

Moment of inertia of splice plates Is = 1440675 cm^4 ＞ Iw
Moment of inertia of web plate Iw = 846111 cm^4

Bending moment to be shared by the web

Mw = 105 * 846111*10^4 / 1285 = 692*10^6 N·mm

Bending stress of splice plates

σsp = 692*10^6 / (1440675*10^4) * 1225 = 59 N/mm^2 ＜ σa = 140 N/mm^2

(15) Intermediate cross beam Ｃ１-Ｃ２４[Ｇ２-Ｇ３] LFLG : Representative Model CR2-025(C11)

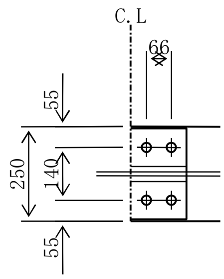
(a) Acting stress

σ tmax = 84 N/mm^2 0.75 σ ta = 0.75 * 140 = 105 N/mm^2

(b) Section area of main plate

1-LFLG PL 250 * 16 Ag = 40.0 cm^2 (SM400)

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 250 * 16 A = 40.0

(40.0 - (2* 2.5)* 1.6) * 1.1 = 35.2 ＜ 40.0 ∴An = 35.2 cm^2

σ tn = σ tmax * Ag / An = 84 * 40.0 / 35.2 = 95 N/mm^2

＜ σ ta = 140 N/mm^2

(e) Design axial force

Pt = 0.75 σ ta * An / 1.1 = 105 * 3520 / 1.1 = 336000 N

＞ σ tn * An = 95 * 3520 = 335780 N

(f) Required section area of the splice plates

AnR = An / 2 = 35.2 / 2 = 17.6 cm^2

(g) Required number of bolts

n = Pt / (108000 * 1.00) = 336000 / 108000 = 3.1 pcs. (4 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 2 unites)

(h) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
2-SPL PL	100 * 11	(22.0 -	2*(1*2.5)* 1.1)*1.1=	18.2＜	22.0	∴ 18.2 ＞ AnR
1-SPL PL	240 * 9	(21.6 -	(2*2.5)* 0.9)*1.1=	18.8＜	21.6	∴ 18.8 ＞ AnR

(16) Intermediate cross beam Ｃ１－Ｃ２４［Ｇ２－Ｇ３］WEB : Representative Model CR2-025(C11)

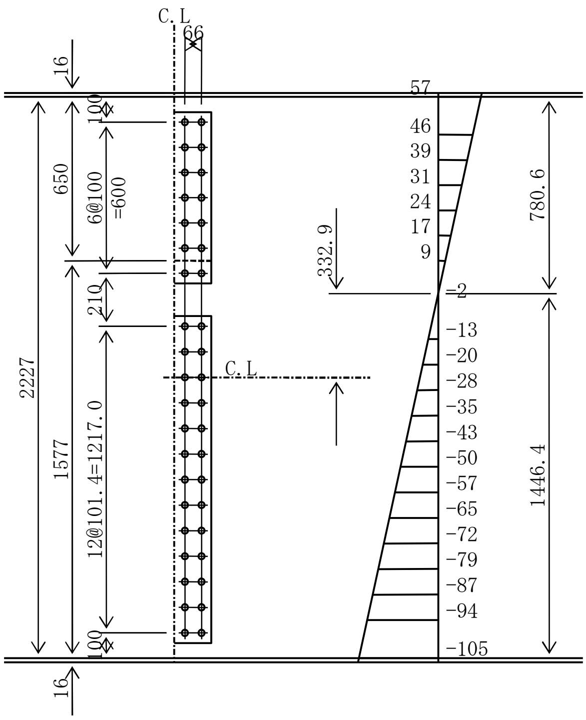
(a) Section area of main plate (Web plate)

1-WEB PL 2227 * 9 A = 200.4 cm^2 (SM400)

(b) Design stress

σU = 45 N/mm^2 ＜ σa * 0.75 = 140 * 0.75 = 105 N/mm^2
σL = -83 N/mm^2 ＜ σa * 0.75 = 140 * 0.75 = 105 N/mm^2
σUn = 105 * 45 / 83 = 57 N/mm^2
σLn = 105 N/mm^2
τ = 25 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 20th row
Sharing width: b1 = 15.1 cm
Total force to be shared
P1 = 151 * 9 * (94 + 105) / 2 = 135000 N
Required number of bolts (number of bolts to be used)
N1 = 135000 / (108000 * 1.00) = 1.2 pcs. (2 bolts will be used.)

Check of bolt at first row
Sharing width: b2 = 15.0 cm
Total force to be shared
P2 = 150 * 9 * (57 + 46) / 2 = 69144 N
Required number of bolts (number of bolts to be used)
N2 = 69144 / (108000 * 1.00) = 0.6 pcs. (2 bolts will be used.)

Check of shear force
ρs = τ * A / 40 = 25 * 20043 / 40 = 12730 N ＜ ρa = 108000 N

Combined stress
ρc20 = $\sqrt{((135000 / 2)^2 + 12730^2)}$ = 68690 N ＜ ρa = 108000 N
ρc1 = $\sqrt{((69144 / 2)^2 + 12730^2)}$ = 36841 N ＜ ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 2 unites)

(e) Check of splice plates

2-SPL PL 680 * 9 As = 122.4 cm^2 (SS400)

2-SPL PL 1297 * 9 As = 233.5 cm^2 (SS400)

Moment of inertia of splice plates Is = 1823026 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 1050541 cm^4

Bending moment to be shared by the web

$Mw = 105 * 1050541*10^4 / 1446 = 763*10^6$ N·mm

Bending stress of splice plates

$\sigma sp = 763*10^6 / (1823026*10^4) * 1386 = 58$ N/mm^2 ＜ $\sigma a = 140$ N/mm^2

(17) Intermediate cross beam Ｃ１－Ｃ１２［Ｇ３－Ｇ４］LFLG：Representative Model CR3-025(C11)

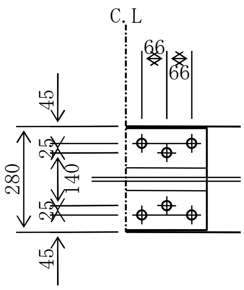
(a) Acting stress

σtmax = 77 N/mm^2 0.75σta = 0.75 ＊ 140 = 105 N/mm^2

(b) Section area of main plate

1-LFLG PL 280 ＊ 16 Ag = 44.8 cm^2 (SM400)

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 280 ＊ 16 A = 44.8

(44.8 - (2＊ 2.5)＊ 1.6) ＊ 1.1 = 40.5 ＜ 44.8 ∴An = 40.5 cm^2

σtn = σtmax ＊ Ag / An = 77 ＊ 44.8 / 40.5 = 85 N/mm^2

＜ σta = 140 N/mm^2

(e) Design axial force

Pt = 0.75σta ＊ An / 1.1 = 105 ＊ 4048 / 1.1 = 386400 N

＞ σtn ＊ An = 85 ＊ 4048 = 345964 N

(f) Required section area of the splice plates

AnR = An / 2 = 40.5 / 2 = 20.2 cm^2

(g) Required number of bolts

n = Pt / (108000 ＊ 1.00) = 386400 / 108000 = 3.6 pcs. (6 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 3 unites)

(h) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes		Ans(cm^2)
2-SPL PL	105 ＊ 12	(25.2 -	2＊(1＊2.5)＊ 1.2)＊1.1= 21.1＜	25.2	∴ 21.1 ＞ AnR
1-SPL PL	270 ＊ 9	(24.3 -	(2＊2.5)＊ 0.9)＊1.1= 21.8＜	24.3	∴ 21.8 ＞ AnR

(18) Intermediate cross beam Ｃ１－Ｃ１２[Ｇ３－Ｇ４] WEB : Representative Model CR3-025(C11)

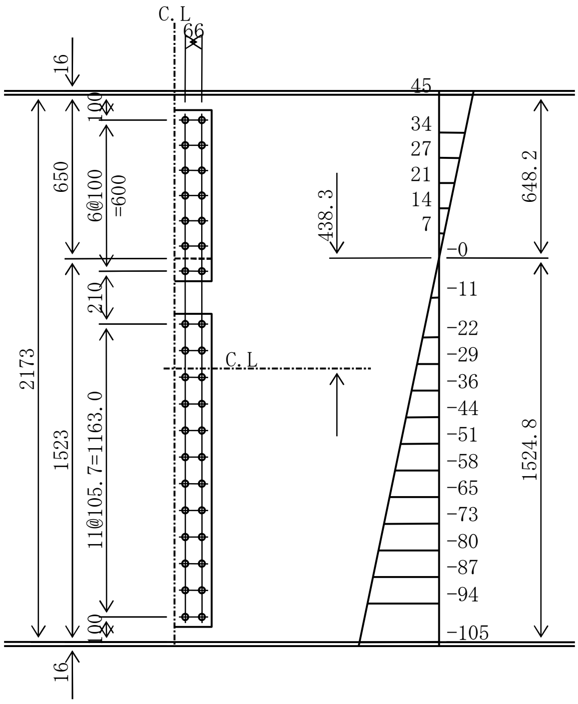
(a) Section area of main plate (Web plate)

1-WEB PL 2173 ＊ 9 A = 195.6 cm^2 (SM400)

(b) Design stress

σU = 32 N/mm^2 ＜ σa ＊ 0.75 = 140 ＊ 0.75 = 105 N/mm^2
σL = -76 N/mm^2 ＜ σa ＊ 0.75 = 140 ＊ 0.75 = 105 N/mm^2
σUn = 105 ＊ 32 / 76 = 45 N/mm^2
σLn = 105 N/mm^2
τ = 26 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 19th row

Sharing width: b1 = 15.3 cm

Total force to be shared

P1 = 153 ＊ 9 ＊ (94 + 105) / 2 = 137215 N

Required number of bolts (number of bolts to be used)

N1 = 137215 / (108000 ＊ 1.00) = 1.3 pcs. (2 bolts will be used.)

Check of bolt at first row

Sharing width: b2 = 15.0 cm

Total force to be shared

P2 = 150 ＊ 9 ＊ (45 + 34) / 2 = 53282 N

Required number of bolts (number of bolts to be used)

N2 = 53282 / (108000 ＊ 1.00) = 0.5 pcs. (2 bolts will be used.)

Check of shear force

$\rho s = \tau$ ＊ A / 38 = 26 ＊ 19557 / 38 = 13400 N ＜ ρa = 108000 N

Combined stress

$\rho c19 = \sqrt{((137215 / 2)^2 + 13400^2)}$ = 69904 N ＜ ρa = 108000 N
$\rho c1 = \sqrt{((53282 / 2)^2 + 13400^2)}$ = 29821 N ＜ ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.: Allowable friction forces with double surfaces:
ρa = 108000 N (inorganic zinc primer is applied.) Nmax = 2 unites)

(e) Check of splice plates

2-SPL PL 680 * 9 As = 122.4 cm^2 (SS400)

2-SPL PL 1243 * 9 As = 223.7 cm^2 (SS400)

Moment of inertia of splice plates Is = 2001882 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 1145315 cm^4

Bending moment to be shared by the web

Mw = 105 * 1145315*10^4 / 1525 = 789*10^6 N･mm

Bending stress of splice plates

σsp = 789*10^6 / (2001882*10^4) * 1465 = 58 N/mm^2 ＜ σa = 140 N/mm^2

(19) Intermediate cross beam Ｃ１３－Ｃ２４［Ｇ３－Ｇ４］LFLG：Representative Model CR3-051(C23)

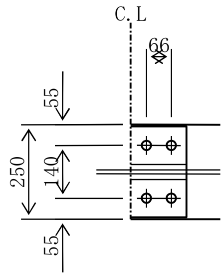
(a) Acting stress

σ tmax = 85 N/mm^2 0.75 σ ta = 0.75 ＊ 140 = 105 N/mm^2

(b) Section area of main plate

1-LFLG PL 250 ＊ 10 Ag = 25.0 cm^2 (SM400)

(c) Bolt arrangement



(d) Check of section of main plate

1- LFLG PL 250 ＊ 10 A = 25.0

(25.0 - (2＊ 2.5)＊ 1.0) ＊ 1.1 = 22.0 ＜ 25.0 ∴An = 22.0 cm^2

σ tn = σ tmax ＊ Ag / An = 85 ＊ 25.0 / 22.0 = 96 N/mm^2

＜ σ ta = 140 N/mm^2

(e) Design axial force

Pt = σ tn ＊ An = 96 ＊ 2200 = 211825 N

＞ 0.75 σ ta ＊ An / 1.1 = 105 ＊ 2200 / 1.1 = 210000 N

(f) Required section area of the splice plates

AnR = An / 2 = 22.0 / 2 = 11.0 cm^2

(g) Required number of bolts

n = Pt / (108000 ＊ 1.00) = 211825 / 108000 = 2.0 pcs. (4 bolts will be used.)

(High strength friction grip bolt, S10T, M22 will be used. Allowable friction forces with double surfaces:

ρ a = 108000 N (inorganic zinc primer is applied.) Nmax = 2 unites)

(h) Check of splice plates

	(SS400)	Ags(cm^2)	deduction of bolt holes			Ans(cm^2)
2-SPL PL	100 ＊ 9	(18.0 -	2＊(1＊2.5)＊ 0.9)＊1.1=	14.9＜	18.0	∴ 14.9 ＞ AnR
1-SPL PL	240 ＊ 9	(21.6 -	(2＊2.5)＊ 0.9)＊1.1=	18.8＜	21.6	∴ 18.8 ＞ AnR

(20) Intermediate cross beam Ｃ１３-Ｃ２４[Ｇ３-Ｇ４] WEB：Representative Model CR3-051(C23)

(a) Section area of main plate (Web plate)

1-WEB　PL　2173 ＊ 9　A = 195.6 cm^2　(SM400)

(b) Design stress

σU = 58 N/mm^2 ＜ σa ＊ 0.75 = 140 ＊ 0.75 = 105 N/mm^2

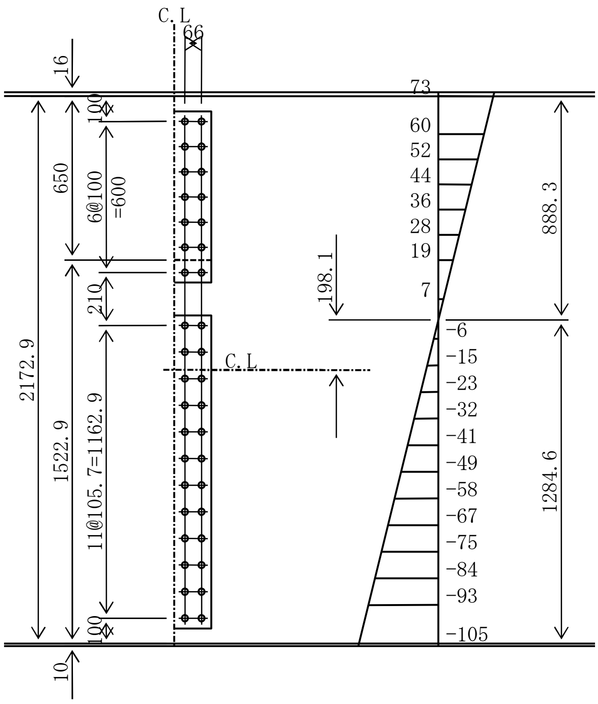
σL = -84 N/mm^2 ＜ σa ＊ 0.75 = 140 ＊ 0.75 = 105 N/mm^2

σUn = 105 ＊ 58 / 84 = 73 N/mm^2

σLn = 105 N/mm^2

τ = 30 N/mm^2

(c) Bolt arrangement and acting stress



(d) Check of bolt stress

Check of bolt at 19th row

Sharing width:　b1 = 15.3 cm

Total force to be shared

P1 = 153 ＊ 9 ＊ (93 + 105) / 2 = 135857 N

Required number of bolts (number of bolts to be used)

N1 = 135857 / (108000 ＊ 1.00) = 1.3 pcs.　(2 bolts will be used.)

Check of bolt at first row

Sharing width:　b2 = 15.0 cm

Total force to be shared

P2 = 150 ＊ 9 ＊ (73 + 60) / 2 = 89747 N

Required number of bolts (number of bolts to be used)

N2 = 89747 / (108000 ＊ 1.00) = 0.8 pcs.　(2 bolts will be used.)

Check of shear force

ρs = τ ＊ A / 38 = 30 ＊ 19556 / 38 = 15390 N ＜ ρa = 108000 N

Combined stress

$\rho c19$ = $\sqrt{}$((135857 / 2$)^2$ + 15390^2) = 69650 N ＜ ρa = 108000 N

$\rho c1$ = $\sqrt{}$((89747 / 2$)^2$ + 15390^2) = 47439 N ＜ ρa = 108000 N

(High strength friction grip bolt, S10T, M22 will be used.：Allowable friction forces with double surfaces:

ρa = 108000 N (inorganic zinc primer is applied.)　Nmax = 2 unites)

(e) Check of splice plates

2-SPL PL 680 * 9 As = 122.4 cm^2 (SS400)

2-SPL PL 1243 * 9 As = 223.7 cm^2 (SS400)

Moment of inertia of splice plates Is = 1440872 cm^4 ＞ Iw

Moment of inertia of web plate Iw = 846222 cm^4

Bending moment to be shared by the web

Mw = 105 * 846222*10^4 / 1285 = 692*10^6 N·mm

Bending stress of splice plates

σ sp = 692*10^6 / (1440872*10^4) * 1225 = 59 N/mm^2 ＜ σ a = 140 N/mm^2

５．６．Calculation of stiffener

（１）Description of the formula

Check of spacing of vertical stiffeners

It will be confirmed that K1 and K2 shall satisfy the below formula.

$K1 = a/b \leqq 1.5$

1) In case no horizontal stiffeners are used

$K2 = [b/(100*t)]^4 * [(\sigma/345)^2 + \{\tau/(77+58*(b/a)^2)\}^2] \leqq 1$: $(a/b > 1)$

$K2 = [b/(100*t)]^4 * [(\sigma/345)^2 + \{\tau/(58+77*(b/a)^2)\}^2] \leqq 1$: $(a/b \leqq 1)$

2) In case one rung of stiffener is used

$K2 = [b/(100*t)]^4 * [(\sigma/900)^2 + \{\tau/(120+58*(b/a)^2)\}^2] \leqq 1$: $(a/b > 0.80)$

$K2 = [b/(100*t)]^4 * [(\sigma/900)^2 + \{\tau/(90+77*(b/a)^2)\}^2] \leqq 1$: $(a/b \leqq 0.80)$

2) In case two rungs of stiffener are used

$K2 = [b/(100*t)]^4 * [(\sigma/3000)^2 + \{\tau/(187+58*(b/a)^2)\}^2] \leqq 1$: $(a/b > 0.64)$

$K2 = [b/(100*t)]^4 * [(\sigma/3000)^2 + \{\tau/(140+77*(b/a)^2)\}^2] \leqq 1$: $(a/b \leqq 0.64)$

Required stiffness of vertical stiffener

$Iv \cdot req = b * t^3 / 11 * \gamma v \cdot req$ $\qquad \gamma v \cdot req = 8.0 * (b/a)^2$

Minimum width：b/30 + 50 (mm)

Minimum thickness： 1/13 of width of the stiffener

Required stiffness of horizontal stiffener

$Ih \cdot req = b * t^3 / 11 * \gamma h \cdot req$ $\qquad \gamma h \cdot req = 30 * (a/b)$

Definition of the symbol

a：Spacing between vertical stiffeners

b：Width of web

t：Thickness of web

σ：Edge compressive stress of web

τ：Shear stress of web

＊ Vertical stiffener interval of calculating required stiffness of vertical stiffener uses max value that meet K1 and K2.

（２）Section of stiffeners

＊Section of vertical stiffeners

Section code：VStfNo = 1

1-PL 130 * 11

$Iv = 1.1 * 13.0^3 / 3 = 806\ cm^4 \geqq 390\ cm^4$

＊Section of horizontal stiffeners

Section code：HStfNo = 1

1-PL 110 * 9

$Ih = 0.9 * 11.0^3 / 3 = 399\ cm^4 \geqq 339\ cm^4$

Section code：HStfNo = 2

1-PL 120 * 10

$Ih = 1.0 * 12.0^3 / 3 = 576\ cm^4 \geqq 574\ cm^4$

Section code：HStfNo = 3

1-PL 140 * 11

$Ih = 1.1 * 14.0^3 / 3 = 1006\ cm^4 \geqq 998\ cm^4$

(３) Check of spacing and calculation of required stiffness

(ａ) Check of section and web thickness

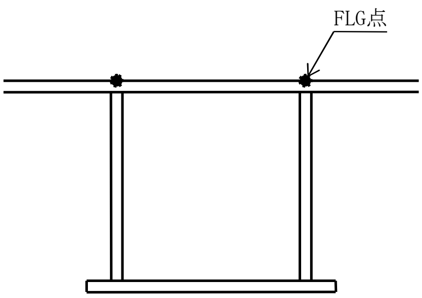
Cross Beam No,	Panel Length (mm)	Nos. of Stiff	Spacing of Stiffener (mm)	Rungs of Stiffeners	Stress σc (N/mm²)	τ	Web Grade	Web Height (mm)	Web Thk. (mm)	Rqd Thk. (mm)
CR1-001	1650	1	825	1	-75	47	SM400	2173	9	8.5
CR1-033	1650	0	1650	1	-67	25	SM400	2173	9	8.5
CR1-051	1650	1	825	1	-87	31	SM400	2173	9	8.5
CR1-055	1650	1	825	1	-90	48	SM400	2173	11	8.5
CR2-001	3300	1	1650	1	-45	34	SM400	2227	9	8.7
CR2-017	3300	1	1650	1	-38	25	SM400	2227	9	8.7
CR2-025	3300	1	1650	1	-83	13	SM400	2227	9	8.7
CR2-043	3301	1	1651	1	-83	13	SM400	2227	9	8.7
CR2-045	3598	1	1799	1	-83	13	SM400	2227	9	8.7
CR2-047	4070	1	2035	1	-83	13	SM400	2227	9	8.7
CR2-049	4543	1	2272	1	-83	13	SM400	2227	9	8.7
CR2-051	5015	1	2508	1	-83	13	SM400	2227	9	8.7
CR2-053	5446	1	2723	1	-83	13	SM400	2227	9	8.7
CR2-055	5500	1	2750	1	-39	28	SM400	2227	11	8.7
CR3-001	8206	4	1641	1	-42	34	SM400	2173	9	8.5
CR3-003	7731	2	2577	1	-76	19	SM400	2173	9	8.5
CR3-005	7252	2	2417	1	-76	19	SM400	2173	9	8.5
CR3-007	6817	2	2272	1	-76	19	SM400	2173	9	8.5
CR3-009	6427	1	3214	1	-76	19	SM400	2173	9	8.5
CR3-011	6081	1	3041	1	-76	19	SM400	2173	9	8.5
CR3-013	5779	1	2890	1	-76	19	SM400	2173	9	8.5
CR3-015	5522	1	2761	1	-76	19	SM400	2173	9	8.5
CR3-017	5313	1	2657	1	-36	26	SM400	2173	9	8.5
CR3-019	5145	1	2573	1	-76	19	SM400	2173	9	8.5
CR3-021	5018	1	2509	1	-76	19	SM400	2173	9	8.5
CR3-023	4937	1	2469	1	-76	19	SM400	2173	9	8.5
CR3-025	4902	1	2451	1	-76	19	SM400	2173	9	8.5
CR3-027	4793	1	2397	1	-76	19	SM400	2173	9	8.5
CR3-029	4099	1	2050	1	-76	19	SM400	2173	9	8.5
CR3-031	3406	1	1703	1	-84	30	SM400	2173	9	8.5
CR3-033	2723	1	1362	1	-48	26	SM400	2173	9	8.5
CR3-035	2081	1	1041	1	-84	30	SM400	2173	9	8.5
CR3-051	1650	1	825	1	-84	30	SM400	2173	9	8.5
CR3-055	1650	1	825	1	-106	53	SM400	2173	11	8.5

（b）Check of spacing and required stiffness

Cross Beam No.	a/b	Spacing Check	Maximum Spacing	γv·req	Iv·req (cm^4)	Iv	VStf No	γh·req	Ih·req (cm^4)	Ih	HStf No
CR1-001	0.38	0.43	1276	23.22	334	806	1	11.39	164	399	1
CR1-033	0.76	0.61	2561	0.00	0	0	0	22.78	328	399	1
CR1-051	0.38	0.40	1681	13.37	193	806	1	11.39	164	399	1
CR1-055	0.38	0.24	1812	11.51	303	806	1	11.39	299	399	1
CR2-001	0.74	0.91	1723	13.37	197	806	1	22.23	328	576	2
CR2-017	0.74	0.51	2735	5.30	78	806	1	22.23	328	576	2
CR2-025	0.74	0.44	3340	3.56	52	806	1	22.23	328	576	2
CR2-043	0.74	0.44	3340	3.56	52	806	1	22.23	328	576	2
CR2-045	0.81	0.46	3341	3.56	52	806	1	24.23	358	576	2
CR2-047	0.91	0.50	3341	3.56	52	806	1	27.41	405	576	2
CR2-049	1.02	0.52	3341	3.56	52	806	1	30.60	452	576	2
CR2-051	1.13	0.55	3341	3.56	52	806	1	33.78	499	576	2
CR2-053	1.22	0.57	3340	3.56	52	806	1	36.68	541	576	2
CR2-055	1.23	0.56	3340	3.56	96	806	1	37.05	998	1006	3
CR3-001	0.76	0.85	1785	11.86	171	806	1	22.66	326	399	1
CR3-003	1.19	0.71	3260	3.56	51	806	1	35.58	512	576	2
CR3-005	1.11	0.68	3260	3.56	51	806	1	33.37	481	576	2
CR3-007	1.05	0.65	3260	3.56	51	806	1	31.37	452	576	2
CR3-009	1.48	0.81	3260	3.56	51	806	1	44.36	639	1006	3
CR3-011	1.40	0.79	3260	3.56	51	806	1	41.98	605	1006	3
CR3-013	1.33	0.77	3260	3.56	51	806	1	39.89	574	576	2
CR3-015	1.27	0.75	3260	3.56	51	806	1	38.12	549	576	2
CR3-017	1.22	0.97	2763	4.95	71	806	1	36.68	528	576	2
CR3-019	1.18	0.71	3260	3.56	51	806	1	35.52	511	576	2
CR3-021	1.15	0.70	3260	3.56	51	806	1	34.64	499	576	2
CR3-023	1.14	0.69	3260	3.56	51	806	1	34.08	491	576	2
CR3-025	1.13	0.69	3260	3.56	51	806	1	33.84	487	576	2
CR3-027	1.10	0.68	3260	3.56	51	806	1	33.09	476	576	2
CR3-029	0.94	0.60	3260	3.56	51	806	1	28.29	407	576	2
CR3-031	0.78	0.96	1760	12.20	176	806	1	23.51	339	399	1
CR3-033	0.63	0.38	2634	5.44	78	806	1	18.80	271	399	1
CR3-035	0.48	0.46	1760	12.20	176	806	1	14.36	207	399	1
CR3-051	0.38	0.37	1760	12.19	176	806	1	11.39	164	399	1
CR3-055	0.38	0.32	1595	14.85	390	806	1	11.39	299	399	1

5．7．Check of biaxial stress

Calculation procedure of converted stress



Checking location is shown by the black dot in the sketch above.

Maximum value of checking result is output, based on checking of right & left sides of node point respectively, and of positive & negative stress respectively.

(1) Investigation results

Biaxial calculation formula

$$K = (\sigma x / \sigma a)^2 - (\sigma x / \sigma a) * (\sigma y / \sigma a) + (\sigma y / \sigma a)^2 + (\tau / \tau a)^2 \leqq 1.2$$

σx :normal stress of main girder(N/mm^2) τx :shear stress of main girder(N/mm^2)
σy :normal stress of cross beam(N/mm^2) τy :shear stress of cross beam(N/mm^2)
σa :allowable tensile stress of main girder(N/mm^2) τa :allowable shear stress of main girder or cross beam(N/mm^2)

Where, by checking location
FLG point $(\tau / \tau a) = (\tau x / \tau xa)$
WEB point $(\tau / \tau a) = \mathrm{Max}((\tau x/\tau xa), (\tau y/\mathrm{Max}(\tau xa, \tau ya)))$

1）Main girder　G1　Web name：LWEB(UFLG-side)

	Cross section No.	No.	Check P't	σx	σy	σa	τx	τy	τa	K
End.sup.	1	1	FLG	0	14	140	25	0	80	0.10
	2	1	FLG	-32	11	140	22	0	80	0.15
	3	2	FLG	-52	11	140	19	0	80	0.23
	4	2	FLG	-74	11	140	16	0	80	0.37
	5	3	FLG	-84	11	140	14	0	80	0.44
	6	3	FLG	-95	11	140	10	0	80	0.53
	7	4	FLG	-98	11	140	8	0	80	0.56
	8	5	FLG	-100	11	140	5	0	80	0.57
	9	5	FLG	-97	11	140	7	0	80	0.54
	10	6	FLG	-91	11	140	10	0	80	0.49
	11	6	FLG	-79	11	140	12	0	80	0.39
	12	7	FLG	-66	11	140	15	0	80	0.30
	13	7	FLG	-43	11	140	18	0	80	0.17
	14	9	FLG	-21	11	140	20	0	80	0.10
	15	10	FLG	31	0	140	22	0	80	0.13
	16	10	FLG	65	0	140	24	0	80	0.30
Int.sup.	17	11	FLG	102	0	210	25	0	120	0.28
	18	12	FLG	72	0	140	19	0	80	0.32
	19	12	FLG	47	0	140	17	0	80	0.15
	20	13	FLG	29	0	140	14	0	80	0.07
	21	14	FLG	17	0	140	12	0	80	0.04
	22	14	FLG	-20	11	140	9	0	80	0.05
	23	15	FLG	-25	11	140	8	0	80	0.06
	24	15	FLG	-29	11	140	6	0	80	0.07
	25	16	FLG	-26	11	140	8	0	80	0.07
	26	17	FLG	-21	11	140	9	0	80	0.05
	27	17	FLG	27	0	140	11	0	80	0.06
	28	18	FLG	41	0	140	13	0	80	0.11
	29	18	FLG	60	0	140	17	0	80	0.23
	30	19	FLG	80	0	210	19	0	120	0.17
	31	20	FLG	102	0	210	21	0	120	0.27
	32	20	FLG	138	0	210	24	0	120	0.47
Int.sup.	33	21	FLG	173	0	210	30	0	120	0.74
	34	22	FLG	128	0	210	30	0	120	0.44
	35	22	FLG	84	0	210	28	0	120	0.21
	36	23	FLG	47	0	140	27	0	80	0.23
	37	24	FLG	-14	11	140	26	0	80	0.13
	38	24	FLG	-51	11	140	23	0	80	0.25
	39	26	FLG	-78	11	140	20	0	80	0.42
	40	26	FLG	-103	11	140	17	0	80	0.65
	41	27	FLG	-121	11	210	15	0	120	0.38
	42	28	FLG	-134	11	210	11	0	120	0.45
	43	28	FLG	-145	11	210	12	0	120	0.53
	44	29	FLG	-152	11	210	10	0	120	0.57
	45	29	FLG	-156	11	210	7	0	120	0.60
	46	30	FLG	-157	11	210	6	0	120	0.60
	47	31	FLG	-154	11	210	8	0	120	0.58
	48	31	FLG	-147	11	210	9	0	120	0.53
	49	32	FLG	-138	11	210	12	0	120	0.48
	50	32	FLG	-124	11	210	14	0	120	0.40
	51	33	FLG	-110	11	210	17	0	120	0.33
	52	34	FLG	-94	11	140	19	0	80	0.56
	53	34	FLG	-69	11	140	22	0	80	0.36
	54	35	FLG	-40	11	140	26	0	80	0.22
End.sup.	55	35	FLG	0	14	140	29	0	80	0.14

２）Main girder　G1　Web name：RWEB(UFLG-side)

	Cross section No.	No.	Check P’t	σx	σy	σa	τx	τy	τa	K
End.sup.	1	1	FLG	0	-68	140	32	0	80	0.39
	3	2	FLG	-56	62	140	24	0	80	0.62
	5	3	FLG	-90	62	140	17	0	80	0.93
	7	4	FLG	-104	62	140	9	0	80	1.09
	9	5	FLG	-103	62	140	10	0	80	1.07
	11	6	FLG	-84	62	140	16	0	80	0.86
	13	7	FLG	-47	62	140	24	0	80	0.54
	15	10	FLG	33	-62	140	29	0	80	0.49
Int.sup.	17	11	FLG	108	-47	210	35	0	120	0.52
	19	12	FLG	50	-62	140	22	0	80	0.55
	21	14	FLG	19	-62	140	16	0	80	0.31
	23	15	FLG	-27	62	140	10	0	80	0.33
	25	16	FLG	-28	62	140	11	0	80	0.34
	27	17	FLG	29	-62	140	15	0	80	0.36
	29	18	FLG	64	-62	140	23	0	80	0.69
	31	20	FLG	108	-62	210	29	0	120	0.56
Int.sup.	33	21	FLG	181	-47	210	43	0	120	1.12
	35	22	FLG	89	-62	210	38	0	120	0.49
	37	24	FLG	-15	62	140	35	0	80	0.44
	39	26	FLG	-83	62	140	27	0	80	0.92
	41	27	FLG	-128	62	210	19	0	120	0.66
	43	28	FLG	-151	62	210	16	0	120	0.83
	45	29	FLG	-164	62	210	10	0	120	0.93
	47	31	FLG	-162	62	210	10	0	120	0.91
	49	32	FLG	-145	62	210	15	0	120	0.78
	51	33	FLG	-117	62	210	21	0	120	0.59
	53	34	FLG	-74	62	140	29	0	80	0.83
End.sup.	55	35	FLG	0	-83	140	38	0	80	0.57

３）Main girder　G2　Web name：LWEB(UFLG-side)

	Cross section No.	No.	Check P't	σx	σy	σa	τx	τy	τa	K
End.sup.	1	1	FLG	0	-68	140	29	0	80	0.37
	3	2	FLG	-54	62	140	25	0	80	0.60
	5	3	FLG	-82	62	140	16	0	80	0.83
	7	4	FLG	-98	62	140	10	0	80	1.00
	9	5	FLG	-96	62	140	9	0	80	0.98
	11	6	FLG	-78	62	140	16	0	80	0.79
	13	7	FLG	-46	62	140	24	0	80	0.54
	15	10	FLG	33	-62	140	28	0	80	0.47
Int.sup.	17	11	FLG	102	-47	210	32	0	120	0.46
	19	12	FLG	51	-62	140	21	0	80	0.56
	21	14	FLG	20	-62	140	17	0	80	0.32
	23	15	FLG	-30	62	140	11	0	80	0.35
	25	16	FLG	-31	62	140	10	0	80	0.35
	27	17	FLG	30	-62	140	15	0	80	0.37
	29	18	FLG	63	-62	140	21	0	80	0.67
	31	20	FLG	103	-62	210	26	0	120	0.52
Int.sup.	33	21	FLG	163	-47	210	38	0	120	0.93
	35	22	FLG	81	-62	210	35	0	120	0.44
	37	24	FLG	14	-62	140	33	0	80	0.41
	39	26	FLG	-75	62	140	26	0	80	0.82
	41	27	FLG	-124	62	210	21	0	120	0.64
	43	28	FLG	-153	62	210	15	0	120	0.85
	45	29	FLG	-166	62	210	10	0	120	0.95
	47	31	FLG	-156	62	210	9	0	120	0.86
	49	32	FLG	-141	62	210	13	0	120	0.75
	51	33	FLG	-108	62	210	26	0	120	0.55
	53	34	FLG	-58	62	140	33	0	80	0.72
End.sup.	55	35	FLG	0	-83	140	40	0	80	0.60

４）Main girder　 G2　 Web name：RWEB(UFLG-side)

	Cross section No.	No.	Check P't	σx	σy	σa	τx	τy	τa	K
End.sup.	1	1	FLG	0	-37	140	19	0	80	0.13
	3	2	FLG	-57	46	140	17	0	80	0.45
	5	3	FLG	-86	46	140	12	0	80	0.71
	7	4	FLG	-103	46	140	8	0	80	0.90
	9	5	FLG	-102	46	140	7	0	80	0.88
	11	6	FLG	-83	46	140	11	0	80	0.67
	13	7	FLG	-49	46	140	16	0	80	0.38
	15	10	FLG	35	-46	140	18	0	80	0.30
Int.sup.	17	11	FLG	108	-28	210	19	0	120	0.37
	19	12	FLG	54	-46	140	14	0	80	0.41
	21	14	FLG	21	-46	140	11	0	80	0.20
	23	15	FLG	-31	46	140	8	0	80	0.24
	25	16	FLG	-33	46	140	7	0	80	0.24
	27	17	FLG	32	-46	140	10	0	80	0.25
	29	18	FLG	67	-46	140	14	0	80	0.52
	31	20	FLG	108	-46	210	17	0	120	0.45
Int.sup.	33	21	FLG	171	-28	210	24	0	120	0.83
	35	22	FLG	85	-46	210	23	0	120	0.34
	37	24	FLG	14	-46	140	21	0	80	0.22
	39	26	FLG	-79	46	140	17	0	80	0.66
	41	27	FLG	-129	46	210	14	0	120	0.58
	43	28	FLG	-158	46	210	10	0	120	0.79
	45	29	FLG	-171	46	210	6	0	120	0.89
	47	31	FLG	-163	46	210	6	0	120	0.82
	49	32	FLG	-148	46	210	7	0	120	0.70
	51	33	FLG	-113	46	210	13	0	120	0.47
	53	34	FLG	-62	46	140	12	0	80	0.47
End.sup.	55	35	FLG	0	-26	140	14	0	80	0.07

5）Main girder　G3　Web name：LWEB(UFLG-side)

	Cross section No.	No.	Check P't	σx	σy	σa	τx	τy	τa	K
End.sup.	1	1	FLG	0	-37	140	27	0	80	0.18
	3	2	FLG	-46	46	140	21	0	80	0.39
	5	3	FLG	-73	46	140	16	0	80	0.59
	7	4	FLG	-86	46	140	9	0	80	0.70
	9	5	FLG	-85	46	140	9	0	80	0.69
	11	6	FLG	-72	46	140	14	0	80	0.57
	13	7	FLG	-43	46	140	19	0	80	0.36
	15	10	FLG	29	-46	140	23	0	80	0.30
Int.sup.	17	11	FLG	94	-28	210	25	0	120	0.32
	19	12	FLG	48	-46	140	18	0	80	0.39
	21	14	FLG	19	-46	140	14	0	80	0.20
	23	15	FLG	-28	46	140	10	0	80	0.23
	25	16	FLG	-29	46	140	8	0	80	0.23
	27	17	FLG	28	-46	140	12	0	80	0.23
	29	18	FLG	59	-46	140	16	0	80	0.47
	31	20	FLG	100	-46	210	19	0	120	0.40
Int.sup.	33	21	FLG	161	-28	210	27	0	120	0.76
	35	22	FLG	84	-46	210	24	0	120	0.34
	37	24	FLG	16	-46	140	21	0	80	0.23
	39	26	FLG	-78	46	140	18	0	80	0.65
	41	27	FLG	-127	46	210	14	0	120	0.56
	43	28	FLG	-157	46	210	10	0	120	0.78
	45	29	FLG	-167	46	210	10	0	120	0.86
	47	31	FLG	-159	46	210	10	0	120	0.80
	49	32	FLG	-145	46	210	13	0	120	0.69
	51	33	FLG	-111	46	210	14	0	120	0.45
	53	34	FLG	-63	46	140	13	0	80	0.48
End.sup.	55	35	FLG	0	-26	140	13	0	80	0.06

6）Main girder　G3　Web name：RWEB(UFLG-side)

	Cross section No.	No.	Check P't	σx	σy	σa	τx	τy	τa	K
End.sup.	1	1	FLG	0	-28	140	15	0	80	0.08
	3	2	FLG	-42	33	140	14	0	80	0.25
	5	3	FLG	-69	33	140	12	0	80	0.44
	7	4	FLG	-81	33	140	7	0	80	0.54
	9	5	FLG	-81	33	140	7	0	80	0.53
	11	6	FLG	-68	33	140	12	0	80	0.43
	13	7	FLG	-40	33	140	15	0	80	0.24
	15	10	FLG	27	-33	140	18	0	80	0.19
Int.sup.	17	11	FLG	89	-21	210	20	0	120	0.26
	19	12	FLG	46	-33	140	15	0	80	0.27
	21	14	FLG	18	-33	140	12	0	80	0.13
	23	15	FLG	-26	33	140	9	0	80	0.15
	25	16	FLG	-27	33	140	7	0	80	0.15
	27	17	FLG	26	-33	140	11	0	80	0.16
	29	18	FLG	56	-59	140	16	0	80	0.55
	31	20	FLG	96	-59	210	22	0	120	0.45
Int.sup.	33	21	FLG	155	-35	210	33	0	120	0.77
	35	22	FLG	80	-59	210	32	0	120	0.41
	37	24	FLG	15	-59	140	33	0	80	0.41
	39	26	FLG	-74	59	140	27	0	80	0.80
	41	27	FLG	-121	59	210	21	0	120	0.60
	43	28	FLG	-152	59	210	14	0	120	0.82
	45	29	FLG	-161	59	210	14	0	120	0.90
	47	31	FLG	-153	59	210	13	0	120	0.83
	49	32	FLG	-139	59	210	20	0	120	0.73
	51	33	FLG	-105	59	210	27	0	120	0.52
	53	34	FLG	-59	59	140	32	0	80	0.69
End.sup.	55	35	FLG	0	-81	140	39	0	80	0.56

7）Main girder　G4　Web name：LWEB(UFLG-side)

	Cross section No.	No.	Check P't	σx	σy	σa	τx	τy	τa	K
End.sup.	1	1	FLG	0	-28	140	12	0	80	0.06
	3	2	FLG	-47	33	140	14	0	80	0.28
	5	3	FLG	-75	33	140	12	0	80	0.49
	7	4	FLG	-88	33	140	6	0	80	0.60
	9	5	FLG	-89	33	140	6	0	80	0.62
	11	6	FLG	-74	33	140	11	0	80	0.48
	13	7	FLG	-43	33	140	14	0	80	0.26
	15	10	FLG	28	-33	140	17	0	80	0.19
Int.sup.	17	11	FLG	98	-21	210	20	0	120	0.30
	19	12	FLG	45	-33	140	15	0	80	0.27
	21	14	FLG	16	-33	140	12	0	80	0.12
	23	15	FLG	-26	33	140	8	0	80	0.14
	25	16	FLG	-27	33	140	7	0	80	0.15
	27	17	FLG	24	-33	140	9	0	80	0.14
	29	18	FLG	55	-59	140	15	0	80	0.54
	31	20	FLG	96	-59	210	21	0	120	0.45
Int.sup.	33	21	FLG	171	-35	210	33	0	120	0.90
	35	22	FLG	89	-59	210	33	0	120	0.45
	37	24	FLG	17	-59	140	36	0	80	0.45
	39	26	FLG	-78	59	140	27	0	80	0.84
	41	27	FLG	-122	59	210	19	0	120	0.61
	43	28	FLG	-146	59	210	15	0	120	0.77
	45	29	FLG	-160	59	210	14	0	120	0.88
	47	31	FLG	-159	59	210	14	0	120	0.88
	49	32	FLG	-143	59	210	19	0	120	0.76
	51	33	FLG	-115	59	210	24	0	120	0.57
	53	34	FLG	-72	59	140	28	0	80	0.78
End.sup.	55	35	FLG	0	-81	140	37	0	80	0.54

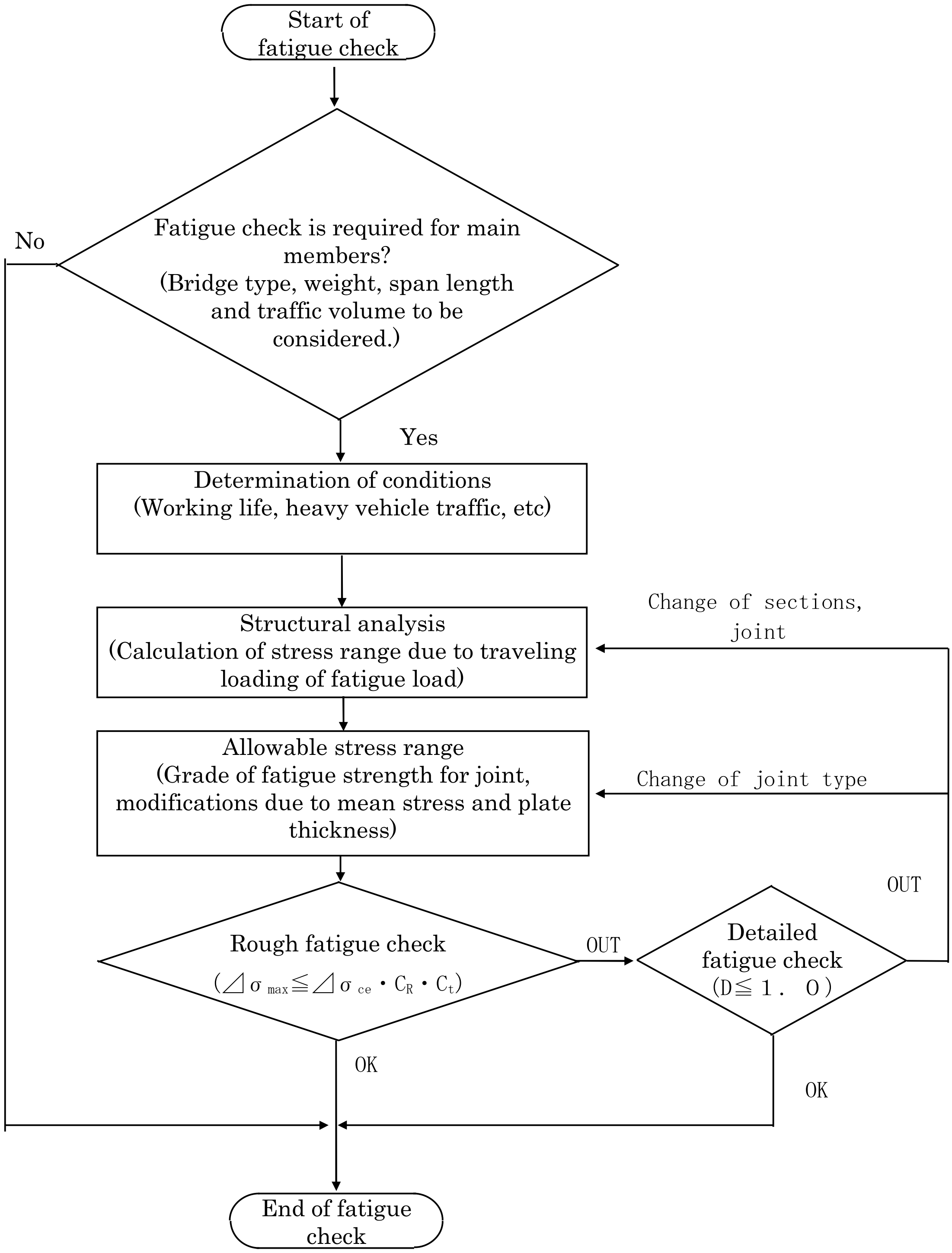
８）Main girder　G4　Web name：RWEB(UFLG-side)

	Cross section No.	No.	Check P't	σx	σy	σa	τx	τy	τa	K
End.sup.	1	1	FLG	0	14	140	33	0	80	0.18
	2	1	FLG	-26	11	140	29	0	80	0.19
	3	2	FLG	-44	11	140	26	0	80	0.24
	4	2	FLG	-61	11	140	22	0	80	0.31
	5	3	FLG	-70	11	140	19	0	80	0.35
	6	3	FLG	-79	11	140	14	0	80	0.40
	7	4	FLG	-83	11	140	9	0	80	0.41
	8	5	FLG	-84	11	140	8	0	80	0.42
	9	5	FLG	-84	11	140	10	0	80	0.43
	10	6	FLG	-79	11	140	12	0	80	0.39
	11	6	FLG	-69	11	140	16	0	80	0.33
	12	7	FLG	-58	11	140	20	0	80	0.28
	13	7	FLG	-40	11	140	23	0	80	0.19
	14	9	FLG	-21	11	140	27	0	80	0.15
	15	10	FLG	26	0	140	29	0	80	0.17
	16	10	FLG	58	0	140	32	0	80	0.34
Int.sup.	17	11	FLG	92	0	210	32	0	120	0.27
	18	12	FLG	66	0	140	26	0	80	0.33
	19	12	FLG	42	0	140	22	0	80	0.17
	20	13	FLG	27	0	140	20	0	80	0.10
	21	14	FLG	-7	11	140	17	0	80	0.06
	22	14	FLG	-18	11	140	13	0	80	0.06
	23	15	FLG	-24	11	140	10	0	80	0.06
	24	15	FLG	-27	11	140	7	0	80	0.06
	25	16	FLG	-25	11	140	10	0	80	0.07
	26	17	FLG	-20	11	140	10	0	80	0.06
	27	17	FLG	22	0	140	14	0	80	0.06
	28	18	FLG	34	0	140	17	0	80	0.10
	29	18	FLG	51	0	140	21	0	80	0.20
	30	19	FLG	73	0	210	22	0	120	0.15
	31	20	FLG	92	0	210	24	0	120	0.23
	32	20	FLG	130	0	210	25	0	120	0.42
Int.sup.	33	21	FLG	164	0	210	30	0	120	0.67
	34	22	FLG	123	0	210	29	0	120	0.40
	35	22	FLG	85	0	210	26	0	120	0.21
	36	23	FLG	50	0	140	29	0	80	0.26
	37	24	FLG	-10	11	140	27	0	80	0.13
	38	24	FLG	-47	11	140	24	0	80	0.23
	39	26	FLG	-74	11	140	21	0	80	0.39
	40	26	FLG	-98	11	140	16	0	80	0.59
	41	27	FLG	-115	11	210	14	0	120	0.35
	42	28	FLG	-128	11	210	11	0	120	0.42
	43	28	FLG	-139	11	210	11	0	120	0.49
	44	29	FLG	-147	11	210	12	0	120	0.54
	45	29	FLG	-152	11	210	11	0	120	0.57
	46	30	FLG	-153	11	210	9	0	120	0.58
	47	31	FLG	-151	11	210	12	0	120	0.56
	48	31	FLG	-144	11	210	13	0	120	0.52
	49	32	FLG	-135	11	210	15	0	120	0.47
	50	32	FLG	-122	11	210	17	0	120	0.39
	51	33	FLG	-108	11	210	19	0	120	0.32
	52	34	FLG	-92	11	140	19	0	80	0.54
	53	34	FLG	-67	11	140	22	0	80	0.34
	54	35	FLG	-40	11	140	25	0	80	0.21
End.sup.	55	35	FLG	0	14	140	28	0	80	0.13

§６　Fatigue design

６－１　Flow chart for fatigue check

Fatigue check shall be carried out according to following flow chart.



６－２ Judgement of necessity for fatigue check for main members

- Bridge type 3-span continuous box-girder bridge with steel deck ---OK
- Joint type D,E,F,G ---NG
- Grade of Steel to be used SM490Y,SM570 ---NG
- Span length 75.185 m Minimum span length along center line on main girder) ---NG
- $ADTT_{SLi}$ 1672 vehicles ---NG

Therefore, fatigue check shall be carried out.

6－3 Conditions for fatigue check

（1）Design working life, live loads

・Design working life: 100 years

・Heavy traffic : $ADTT_{SLi}$ = 1672 vehicles (par lane par day)

・Live load for fatigue design ＝ (T-load) ＊ （1＋i_f）

T load：200 kN

i_f : Impact factor $i_f = 10 / (50 + L)$ L: Span length for calc. for impact factor (m)

・Modification factor for live load

Modification factor for live load $\gamma_T = \gamma_{T1} * \gamma_{T2}$

(Factor to be applied for stress range calc.)

γ_{T1} ：Modification factor for T-load

γ_{T1} = Log L_{B1} +1.50 (Provided, $2.00 \leqq \gamma_{T1} \leqq 3.00$)

L_{B1} : Basic line length for calculation of simultaneous loading coefficient (m)

※γ_{T1}：To round off the decimal point third place

γ_{T2} ：Simultaneous loading factor

Simultaneous loading factor for member with non-alternate influence line γ_{T2}

	$L_{B2} \leqq 50m$	$50m < L_{B2}$
$ADTT_{SLi} \leqq 2000$	1.0	1.0
$2000 < ADTT_{SLi}$	1.0	1.1

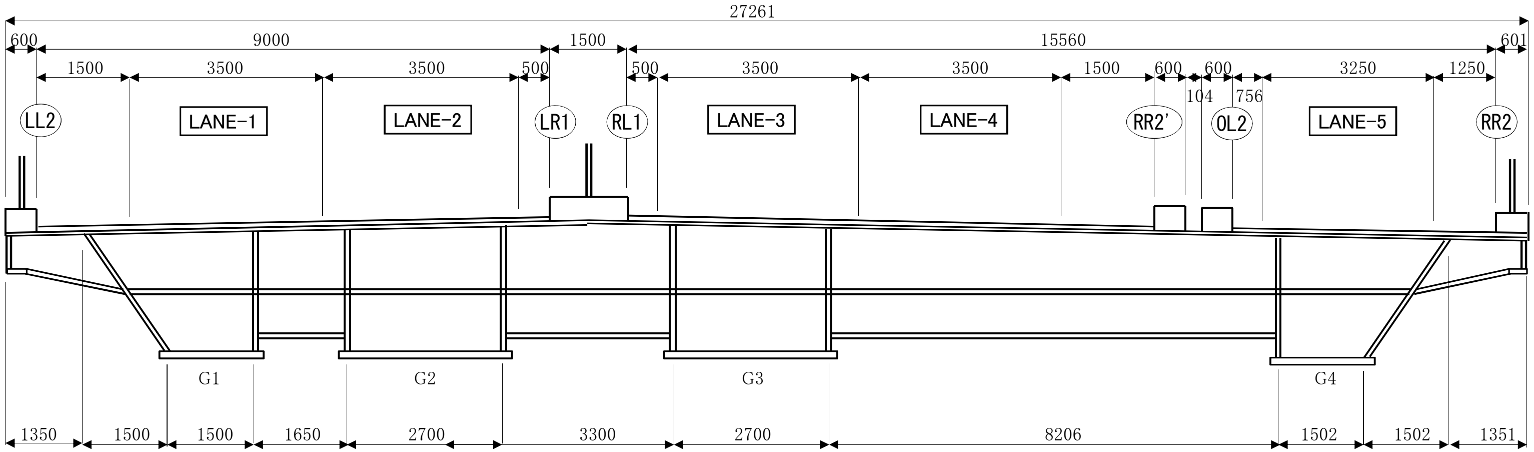
L_{B2} ：Basic line length for calculation of simultaneous loading factor (m)

$ADTT_{SLi}$：Heavy vehicle traffic volume (par lane par day)

■ Location of load　(typical section)

Traffic volume of oversized vehicles 1,672 vehicles per day

<S1 support >



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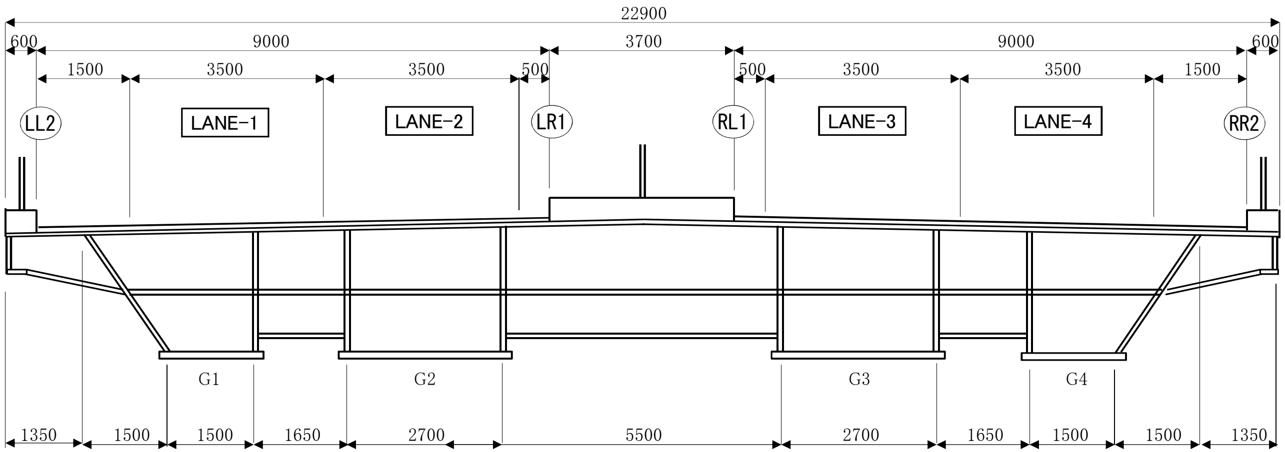


（２）Equation for calculating stress(typical)

$$\sigma = \frac{Rc}{Ri} * \left[\frac{N}{A} + \frac{Mx * (y*Iy+x*Ixy) + My * (x*Ix+y*Ixy)}{Ix*Iy-Ixy^2} \right] * \gamma a$$

where

σ　：Acting stress

Rc　：Radius of curvature at neutral axis

Ri　：Radius of curvature at checking point

N　：Axial force

Mx　：Bending moment in-plane

My　：Bending moment out-of-plane

A　：Area

Ix　：Moment of inertia about x-axis

Iy　：Moment of inertia about y-axis

Ixy ：Product of inertia

x　：Distance on x-axis from neutral axis to checking point

y　：Distance on y-axis from neutral axis to checking point

γａ：Structural analysis factor

γａ = 0.8

for I-girder and box girder with RC deck (except minimalized girder bridge)

γａ = 1.0　for other types

γａ = 0.5　for floor of steel bridge with concrete deck

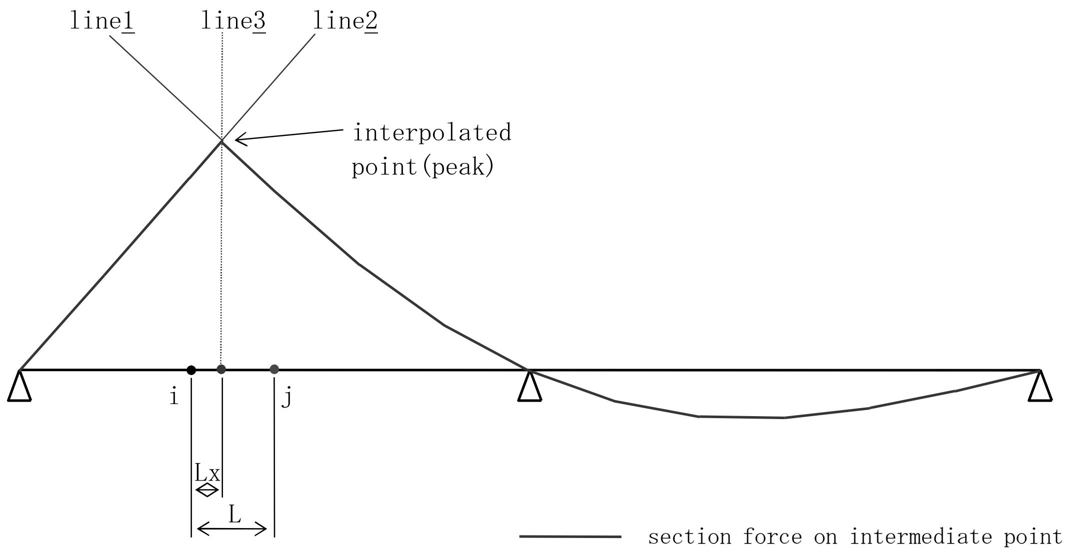
(３) Interpolation method for section force on intermediate point

Section force on intermediate point to be calculated from values of ij ends based on interpolation method

Interpolation method for calc. of peak in-pane bending moment is as follows:-

1. Section force peaks of member ij at ends to be picked up from influence line
2. Line 1 to be defined based on variations of “line 1i”, ”line 1j” and distance ratio Lx/L
3. Line 2 to be defined based on variations of “line 2i”, ”line 2j” and distance ratio Lx/L
4. Define “intersection 1” from “line 1” and ”line 3”
5. Define “intersection 2” from “line 2” and ”line 3”
6. Calculate interpolated point (peak) from “intersection 1”, “intersection 2” and distance ratio Lx/L

interpolated point (peak) = intersection２ + (intersection１ - intersection２) ＊ Lx / L



Lx: Distance between end i and interpolated point of member

L : Member length Section force at i end of member

Other section forces, except the peak value, to be calculated by linear interpolation using values on ij ends.

6－4 Fatigue design of main girder

6－4－1 Locations and grades for checking of fatigue strength of welding joints

No.	Description of checking point	Grade	*	Type of joint
1	Upper flange and v. stiffener	E	Yes	Cross joint
2	Upper flange and transverse rib web	E	Yes	Cross joint
3	Upper flange and diaphragm	E	Yes	Cross joint
4	Upper flange and longitudinal rib	D	No	
5	Lower flange and v. stiffener	E	Yes	Cross joint
6	Lower flange and transverse rib web	E	Yes	Cross joint
7	Lower flange and diaphragm	E	Yes	Cross joint
8	Lower flange and longitudinal rib	D	No	
9	Sole plate (bridge axis)	G	Yes	
10	Longitudinal rib and transverse rib of upper flange	E	Yes	Cross joint
11	Longitudinal rib and diagram of upper flange	E	Yes	Cross joint
12	Longitudinal rib and transverse rib of lower flange	E	Yes	Cross joint
13	Longitudinal rib and diagram of lower flange	E	Yes	Cross joint
14	Web plate and upper flange	D	No	
15	Web plate and lower flange	D	No	
16	Web(upper) of main girder and vertical stiffener	E	Yes	Cross joint
17	Web(lower) of main girder and vertical stiffener	E	Yes	Cross joint
18	Horizontal stiffener on web(upper)	G	Yes	
19	Horizontal stiffener on web(lower)	G	Yes	
20	Main girder web and cross beam lower flange	G	Yes	
21	Main girder web and cross beam web level crown	E	Yes	Cross joint
22	Main girder web and cross beam web soffit	E	Yes	Cross joint
23	Main girder web and bracket web level crown	E	Yes	Cross joint
24	Main girder web and bracket web soffit	E	Yes	Cross joint

No.	Description of checking point	Grade	*	Type of joint
25	Main girder web and bracket lower flange	G	Yes	
26	Main girder web and transverse rib flange (upper side)	G	Yes	
27	Main girder web and transverse rib flange (down side)	G	Yes	
28	Main girder web and transverse rib web (upper side)	E	Yes	Cross joint
29	Main girder web and transverse rib web (down side)	E	Yes	Cross joint
30	Main girder web and diagram (upper side)	E	Yes	Cross joint
31	Main girder web and diagram (down side)	E	Yes	Cross joint

* Mods due to THK (or Modifications due to plate thickness)

６－４－２　Detailed calculation

(1) Representative point No.1

Girder No.=G4,　Node No.=4026, main girder web and transverse rib flange(down side), Grade G

(a)Property of section

Unit(m, m^2, m^4)

Rc	Ri	A	Ix	Iy	Ixy	x	y
-1989.742	-1989.031	--------	0.293836	--------	--------	---	1.6049

(b)Section forces and stresses

Factor for calculation of stress　γa = 1.0

Unit(kN·m、N/mm^2)

	Lane 1		Lane 2		Lane 3		Lane 4		Lane 5	
Cross	Mx	σ	Mx	σ	Mx	σ	Mx	σ	Mx	σ
1	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
2	-17.4	0	-17.3	0	-17.1	0	-17.1	0	-17.1	0
3	-34.4	0	-34.2	0	-33.8	0	-33.7	0	-33.5	0
4	-50.7	0	-50.5	0	-50.0	0	-49.7	0	-49.3	0
5	-65.8	0	-65.4	0	-64.8	0	-64.5	0	-63.9	0
6	-79.2	0	-78.8	0	-78.2	0	-77.7	0	-77.0	0
7	-90.7	0	-90.3	0	-89.6	0	-89.1	0	-88.4	0
8	-99.9	-1	-99.6	-1	-98.9	-1	-98.4	-1	-97.6	-1
9	-106.4	-1	-106.2	-1	-105.6	-1	-105.1	-1	-104.3	-1
10	-109.8	-1	-109.7	-1	-109.3	-1	-108.9	-1	-108.2	-1
11	-109.7	-1	-109.7	-1	-109.6	-1	-109.3	-1	-108.8	-1
12	-105.3	-1	-105.6	-1	-105.8	-1	-105.6	-1	-105.4	-1
13	-95.9	-1	-96.3	-1	-96.9	-1	-97.0	-1	-97.2	-1
14	-80.8	0	-81.3	0	-82.3	0	-82.7	0	-83.3	0
15	-59.7	0	-60.3	0	-61.4	0	-61.8	0	-62.3	0
16	-32.8	0	-33.4	0	-34.2	0	-34.4	0	-34.6	0
17	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
18	38.8	0	40.6	0	42.5	0	42.9	0	43.2	0
19	81.9	0	87.7	0	93.8	1	94.9	1	95.7	1
20	128.1	1	141.5	1	156.9	1	160.0	1	162.5	1
21	173.3	1	200.0	1	232.9	1	240.9	1	247.8	1
22	213.4	1	260.5	1	322.9	2	341.0	2	357.2	2
23	244.4	1	316.9	2	426.1	2	465.2	3	502.3	3
24	263.1	1	362.5	2	536.2	3	618.4	3	700.7	4
25	270.5	1	390.6	2	628.1	3	802.0	4	987.6	5
26	268.2	1	396.1	2	676.7	4	1016.3	6	1396.0	8
27	256.6	1	377.6	2	617.8	3	792.4	4	973.0	5
28	235.5	1	335.9	2	514.1	3	598.7	3	672.6	4
29	203.1	1	276.5	2	390.4	2	432.6	2	463.7	3
30	159.5	1	206.8	1	272.7	1	294.3	2	307.8	2
31	108.4	1	134.0	1	167.9	1	178.7	1	184.5	1
32	54.6	0	64.7	0	78.1	0	82.2	0	84.0	0

	Lane 1		Lane 2		Lane 3		Lane 4		Lane 5	
Cross	Mx	σ	Mx	σ	Mx	σ	Mx	σ	Mx	σ
33	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
34	-49.5	0	-54.9	0	-63.4	0	-68.3	0	-69.8	0
35	-96.1	-1	-104.4	-1	-118.3	-1	-126.2	-1	-128.0	-1
36	-140.0	-1	-149.9	-1	-167.0	-1	-177.0	-1	-178.4	-1
37	-176.7	-1	-187.3	-1	-205.7	-1	-216.1	-1	-217.2	-1
38	-205.6	-1	-216.3	-1	-234.8	-1	-245.5	-1	-245.5	-1
39	-226.7	-1	-237.2	-1	-255.1	-1	-265.3	-1	-265.3	-1
40	-240.8	-1	-250.7	-1	-267.6	-1	-277.3	-2	-277.3	-2
41	-248.7	-1	-257.8	-1	-273.6	-1	-282.7	-2	-282.7	-2
42	-251.1	-1	-259.6	-1	-274.1	-1	-282.5	-2	-282.5	-2
43	-248.8	-1	-256.5	-1	-269.9	-1	-277.6	-2	-277.6	-2
44	-242.4	-1	-249.4	-1	-261.7	-1	-268.9	-1	-268.9	-1
45	-232.2	-1	-238.5	-1	-249.9	-1	-256.5	-1	-256.5	-1
46	-218.6	-1	-224.1	-1	-234.8	-1	-240.8	-1	-240.8	-1
47	-202.0	-1	-206.8	-1	-216.6	-1	-222.0	-1	-222.0	-1
48	-182.9	-1	-186.9	-1	-195.8	-1	-200.6	-1	-200.6	-1
49	-161.4	-1	-164.8	-1	-172.6	-1	-176.8	-1	-176.8	-1
50	-137.9	-1	-140.6	-1	-147.3	-1	-150.9	-1	-150.9	-1
51	-112.7	-1	-114.7	-1	-120.3	-1	-123.2	-1	-123.2	-1
52	-86.1	0	-87.4	0	-91.7	-1	-93.9	-1	-93.9	-1
53	-57.9	0	-58.8	0	-61.6	0	-63.0	0	-63.0	0
54	-28.8	0	-29.5	0	-31.1	0	-31.8	0	-31.8	0
55	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0

Live load modification factor $\gamma_T = \gamma_{T1} * \gamma_{T2}$

Lane i	L_{B1}(m)	Log L_{B1}+1.50	γ_{T1}	L_{B2}(m)	γ_{T2}	γ_T
1	76.749	3.39	3.00	---	1.00	3.00
2	76.615	3.38	3.00	---	1.00	3.00
3	76.385	3.38	3.00	---	1.00	3.00
4	76.251	3.38	3.00	---	1.00	3.00
5	76.205	3.38	3.00	---	1.00	3.00

(c)Calculation for stress range

・Stress range

Equation $\Delta\sigma_{i,j} = |\sigma_{i,k1} - \sigma_{i,k2}| * \gamma_{T(i)}$

Where, $\Delta\sigma_{i,j}$: Stress range

'i' means lane number and 'j' means number of stress range.

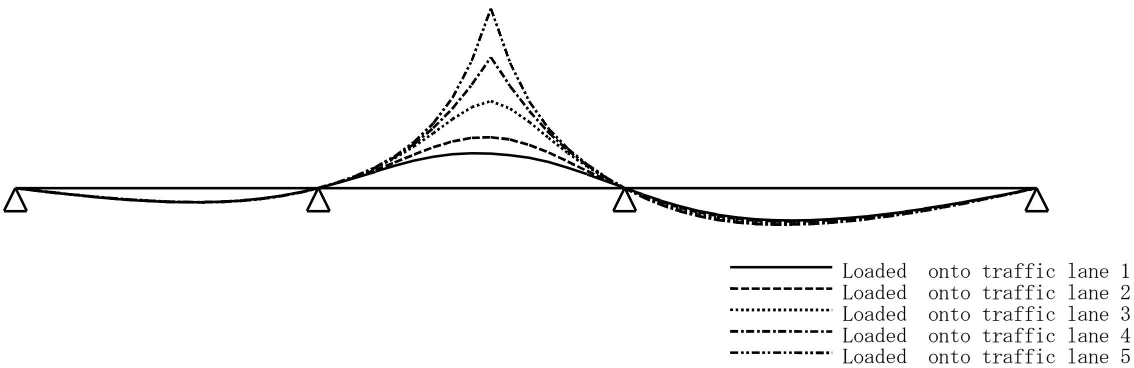
$\sigma_{i,k1}$: Maximum stress

'i' means lane number and 'k1' means section number of loading.

$\sigma_{i,k2}$: Minimum stress

'i' means lane number and 'k2' means section number of loading.

$\gamma_{T(i)}$: Correction factor of live load. 'i' means lane number



$\Delta\sigma_{1,1} = |\sigma_{1,25} - \sigma_{1,42}| * \gamma_{T(1)} = |(1) - (-1)| * 3.00 = 9\ N/mm^2$

$\Delta\sigma_{1,2} = |\sigma_{1,2} - \sigma_{1,10}| * \gamma_{T(1)} = |(0) - (-1)| * 3.00 = 2\ N/mm^2$

$\Delta\sigma_{2,1} = |\sigma_{2,26} - \sigma_{2,42}| * \gamma_{T(2)} = |(2) - (-1)| * 3.00 = 11\ N/mm^2$

$\Delta\sigma_{2,2} = |\sigma_{2,2} - \sigma_{2,11}| * \gamma_{T(2)} = |(0) - (-1)| * 3.00 = 2\ N/mm^2$

$\Delta\sigma_{3,1} = |\sigma_{3,26} - \sigma_{3,42}| * \gamma_{T(3)} = |(4) - (-1)| * 3.00 = 16\ N/mm^2$

$\Delta\sigma_{3,2} = |\sigma_{3,2} - \sigma_{3,11}| * \gamma_{T(3)} = |(0) - (-1)| * 3.00 = 2\ N/mm^2$

$\Delta\sigma_{4,1} = |\sigma_{4,26} - \sigma_{4,41}| * \gamma_{T(4)} = |(6) - (-2)| * 3.00 = 21\ N/mm^2$

$\Delta\sigma_{4,2} = |\sigma_{4,2} - \sigma_{4,11}| * \gamma_{T(4)} = |(0) - (-1)| * 3.00 = 2\ N/mm^2$

$\Delta\sigma_{5,1} = |\sigma_{5,26} - \sigma_{5,41}| * \gamma_{T(5)} = |(8) - (-2)| * 3.00 = 28\ N/mm^2$

$\Delta\sigma_{5,2} = |\sigma_{5,2} - \sigma_{5,11}| * \gamma_{T(5)} = |(0) - (-1)| * 3.00 = 2\ N/mm^2$

Maximum stress range $\Delta\sigma_{max} = \Delta\sigma_{5,1} = 28\ N/mm^2$

(d)Modification factor

・Modification factor for mean stress C_R

Unit(kN·m、N/mm^2)

Case of section force	Mx	σ	γ_T	$\sigma * \gamma_T$
Dead load	120.9	1	---	---
T-load Max.	1396.0	8	3.00	23
T-load Min.	-282.7	-2	3.00	-5

Dead load + T-load max σ_{max} = (1) + (23) = 24 N/mm^2

Dead load + T-load min σ_{min} = (1) + (-5) = -4 N/mm^2

Stress ratio R = σmin / σmax = -4 / 24 = -0.17 (-1.00<R<1.00)

∴C_R = 1.00

・Modification factor for thickness of plate C_t

Thickness of main plate 15mm Additional thickness 10mm

∴C_t = 1.00 (Thickness of main plate =15mm ≦ 25mm)

(e)Check based on cut-off stress range for sinusoidal stress (Rough fatigue check)

・Before finishing (Fatigue strength grade G)

Cut-off stress range for sinusoidal stress

$\Delta\sigma_{ce}$ = 32 N/mm^2

Max stress range

$\Delta\sigma_{max}$ = 28 N/mm^2 ≦ $\Delta\sigma_{ce} * C_R * C_t$ = 32 * 1.00 * 1.00 = 32 OK

6－4－3 Detailed fatigue check

Fatigue check of main girder (1)

girder	panel point	checking point-1		checking point-2		checking point-3		checking point-4		checking point-5		checking point-6		checking point-7	
		top flange and trans.stiff		top flg and trans rib web		top flg and diaphragm		top flg and longit rib		bottom flg and trans.stiff		bottom flg and trans rib web		bottom flg and diaphragm	
		E grade		E grade		E grade		D grade		E grade		E grade		E grade	
		Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
	1001	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------
	1002	6<81	-------	6<81	-------	6<81	-------	6<109	-------	14<62	-------	14<62	-------	14<62	-------
	1003	8<81	-------	8<81	-------	8<81	-------	8<109	-------	16<62	-------	16<62	-------	16<62	-------
	1004	11<81	-------	11<81	-------	11<81	-------	11<109	-------	22<62	-------	22<62	-------	22<62	-------
	1005	11<81	-------	11<81	-------	11<81	-------	11<109	-------	19<61	-------	19<62	-------	19<62	-------
	1006	13<81	-------	13<81	-------	13<81	-------	13<109	-------	22<61	-------	22<62	-------	22<62	-------
	1007	13<81	-------	13<81	-------	13<81	-------	13<109	-------	20<59	-------	20<62	-------	20<62	-------
	1008	14<81	-------	14<81	-------	14<81	-------	14<109	-------	22<59	-------	22<62	-------	22<62	-------
	1009	13<81	-------	13<81	-------	13<81	-------	13<109	-------	21<59	-------	21<62	-------	21<62	-------
	1010	14<81	-------	14<81	-------	14<81	-------	14<109	-------	23<61	-------	23<62	-------	23<62	-------
	1011	12<81	-------	12<81	-------	12<81	-------	12<109	-------	21<61	-------	21<62	-------	21<62	-------
	1012	13<81	-------	13<81	-------	13<81	-------	13<109	-------	27<62	-------	27<62	-------	27<62	-------
	1013	11<81	-------	11<81	-------	11<81	-------	11<109	-------	20<62	-------	20<62	-------	20<62	-------
	1014	11<81	-------	11<81	-------	11<81	-------	11<109	-------	24<62	-------	24<62	-------	24<62	-------
	1015	8<62	-------	8<62	-------	8<62	-------	8<84	-------	17<81	-------	17<81	-------	17<81	-------
	1016	8<62	-------	8<62	-------	8<62	-------	8<84	-------	17<81	-------	17<81	-------	17<81	-------
	1017	8<62	-------	8<62	-------	8<62	-------	8<84	-------	14<81	-------	14<81	-------	14<81	-------
	1018	9<62	-------	9<62	-------	9<62	-------	9<84	-------	17<81	-------	17<81	-------	17<81	-------
	1019	9<62	-------	9<62	-------	9<62	-------	9<84	-------	18<81	-------	18<81	-------	18<81	-------
	1020	11<62	-------	11<62	-------	11<62	-------	11<84	-------	25<81	-------	25<81	-------	25<81	-------
	1021	11<62	-------	11<62	-------	11<62	-------	11<84	-------	23<74	-------	23<74	-------	23<74	-------
G1	1022	12<79	-------	12<79	-------	12<79	-------	12<107	-------	27<62	-------	27<62	-------	27<62	-------
	1023	12<81	-------	12<81	-------	12<81	-------	12<109	-------	26<62	-------	26<62	-------	26<62	-------
	1024	13<81	-------	13<81	-------	13<81	-------	13<109	-------	28<62	-------	28<62	-------	28<62	-------
	1025	12<81	-------	12<81	-------	12<81	-------	12<109	-------	27<62	-------	27<62	-------	27<62	-------
	1026	14<71	-------	14<71	-------	14<71	-------	14<96	-------	29<62	-------	29<62	-------	29<62	-------
	1027	13<62	-------	13<62	-------	13<62	-------	13<84	-------	28<81	-------	28<81	-------	28<81	-------
	1028	13<62	-------	13<62	-------	13<62	-------	13<84	-------	28<81	-------	28<81	-------	28<81	-------
	1029	12<62	-------	12<62	-------	12<62	-------	12<84	-------	26<81	-------	26<81	-------	26<81	-------
	1030	12<62	-------	12<62	-------	12<62	-------	12<84	-------	20<81	-------	20<81	-------	20<81	-------
	1031	10<62	-------	10<62	-------	10<62	-------	10<84	-------	12<71	-------	12<81	-------	12<81	-------
	1032	10<62	-------	10<62	-------	10<62	-------	10<84	-------	12<71	-------	12<81	-------	12<81	-------
	1033	9<62	-------	9<62	-------	9<62	-------	9<84	-------	9<67	-------	9<81	-------	9<67	-------
	1034	9<62	-------	9<62	-------	9<62	-------	9<84	-------	11<73	-------	11<81	-------	11<81	-------
	1035	7<62	-------	7<62	-------	7<62	-------	7<84	-------	9<73	-------	9<81	-------	9<81	-------
	1036	10<62	-------	10<62	-------	10<62	-------	10<84	-------	17<81	-------	17<81	-------	17<81	-------
	1037	10<66	-------	10<66	-------	10<66	-------	10<90	-------	21<62	-------	21<62	-------	21<62	-------
	1038	13<81	-------	13<81	-------	13<81	-------	13<109	-------	27<62	-------	27<62	-------	27<62	-------
	1039	12<81	-------	12<81	-------	12<81	-------	12<109	-------	19<60	-------	19<62	-------	19<62	-------
	1040	13<81	-------	13<81	-------	13<81	-------	13<109	-------	21<60	-------	21<62	-------	21<62	-------
	1041	13<81	-------	13<81	-------	13<81	-------	13<109	-------	20<58	-------	20<62	-------	20<62	-------
	1042	14<81	-------	14<81	-------	14<81	-------	14<109	-------	18<55	-------	18<62	-------	18<62	-------
	1043	13<81	-------	13<81	-------	13<81	-------	13<109	-------	18<55	-------	18<62	-------	18<62	-------
	1044	14<81	-------	14<81	-------	14<81	-------	14<109	-------	18<54	-------	18<62	-------	18<62	-------

Fatigue check of main girder (2)

girder	panel point	checking point-8		checking point-9		checking point-10		checking point-11		checking point-12		checking point-13		checking point-14		checking point-15	
		bottom flg and longit rib		sole plate(橋軸)		top flg longit rib and trans rib		top flg longit rib and diaphragm		bottom flgのlongit rib and trans rib		bottom flg longit rib and diaphragm		web plate and top flg		web plate and bottom flg	
		D grade		G grade		E grade		E grade		E grade		E grade		D grade		D grade	
		Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
G1	1001	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------
	1002	14<84	-------	*****	*******	6<81	-------	6<81	-------	14<62	-------	14<62	-------	6<109	-------	14<84	-------
	1003	16<84	-------	*****	*******	8<81	-------	8<81	-------	16<62	-------	16<62	-------	8<109	-------	16<84	-------
	1004	22<84	-------	*****	*******	11<81	-------	11<81	-------	22<62	-------	22<62	-------	11<109	-------	22<84	-------
	1005	19<84	-------	*****	*******	11<81	-------	11<81	-------	19<62	-------	19<62	-------	11<109	-------	19<84	-------
	1006	22<84	-------	*****	*******	13<81	-------	13<81	-------	22<62	-------	22<62	-------	13<109	-------	22<84	-------
	1007	20<84	-------	*****	*******	13<81	-------	13<81	-------	20<62	-------	20<62	-------	13<109	-------	20<84	-------
	1008	22<84	-------	*****	*******	14<81	-------	14<81	-------	22<62	-------	22<62	-------	14<109	-------	22<84	-------
	1009	21<84	-------	*****	*******	13<81	-------	13<81	-------	21<62	-------	21<62	-------	13<109	-------	21<84	-------
	1010	23<84	-------	*****	*******	14<81	-------	14<81	-------	23<62	-------	23<62	-------	14<109	-------	23<84	-------
	1011	21<84	-------	*****	*******	12<81	-------	12<81	-------	21<62	-------	21<62	-------	12<109	-------	21<84	-------
	1012	27<84	-------	*****	*******	13<81	-------	13<81	-------	27<62	-------	27<62	-------	13<109	-------	27<84	-------
	1013	20<84	-------	*****	*******	11<81	-------	11<81	-------	20<62	-------	20<62	-------	11<109	-------	20<84	-------
	1014	24<84	-------	*****	*******	11<81	-------	11<81	-------	24<62	-------	24<62	-------	11<109	-------	24<84	-------
	1015	17<109	-------	*****	*******	8<62	-------	8<62	-------	17<81	-------	17<81	-------	8<84	-------	17<109	-------
	1016	17<109	-------	*****	*******	8<62	-------	8<62	-------	17<81	-------	17<81	-------	8<84	-------	17<109	-------
	1017	14<109	-------	14<42	-------	8<62	-------	8<62	-------	14<81	-------	14<81	-------	8<84	-------	14<109	-------
	1018	17<109	-------	*****	*******	9<62	-------	9<62	-------	17<81	-------	17<81	-------	9<84	-------	17<109	-------
	1019	18<109	-------	*****	*******	9<62	-------	9<62	-------	18<81	-------	18<81	-------	9<84	-------	18<109	-------
	1020	25<109	-------	*****	*******	11<62	-------	11<62	-------	25<81	-------	25<81	-------	11<84	-------	25<109	-------
	1021	23<100	-------	*****	*******	11<62	-------	11<62	-------	23<74	-------	23<74	-------	11<84	-------	23<100	-------
	1022	27<84	-------	*****	*******	12<79	-------	12<79	-------	27<62	-------	27<62	-------	12<107	-------	27<84	-------
	1023	26<84	-------	*****	*******	12<81	-------	12<81	-------	26<62	-------	26<62	-------	12<109	-------	26<84	-------
	1024	28<84	-------	*****	*******	13<81	-------	13<81	-------	28<62	-------	28<62	-------	13<109	-------	28<84	-------
	1025	27<84	-------	*****	*******	12<81	-------	12<81	-------	27<62	-------	27<62	-------	12<109	-------	27<84	-------
	1026	29<84	-------	*****	*******	14<71	-------	14<71	-------	29<62	-------	29<62	-------	14<96	-------	29<84	-------
	1027	28<109	-------	*****	*******	13<62	-------	13<62	-------	28<81	-------	28<81	-------	13<84	-------	28<109	-------
	1028	28<109	-------	*****	*******	13<62	-------	13<62	-------	28<81	-------	28<81	-------	13<84	-------	28<109	-------
	1029	26<109	-------	*****	*******	12<62	-------	12<62	-------	26<81	-------	26<81	-------	12<84	-------	26<109	-------
	1030	20<109	-------	*****	*******	12<62	-------	12<62	-------	20<81	-------	20<81	-------	12<84	-------	20<109	-------
	1031	12<109	-------	*****	*******	10<62	-------	10<62	-------	12<81	-------	12<81	-------	10<84	-------	12<109	-------
	1032	12<109	-------	*****	*******	10<62	-------	10<62	-------	12<81	-------	12<81	-------	10<84	-------	12<109	-------
	1033	9<109	-------	10<35	-------	9<62	-------	9<62	-------	9<81	-------	9<81	-------	9<84	-------	9<109	-------
	1034	11<109	-------	*****	*******	9<62	-------	9<62	-------	11<81	-------	11<81	-------	9<84	-------	11<109	-------
	1035	9<109	-------	*****	*******	7<62	-------	7<62	-------	9<81	-------	9<81	-------	7<84	-------	9<109	-------
	1036	17<109	-------	*****	*******	10<62	-------	10<62	-------	17<81	-------	17<81	-------	10<84	-------	17<109	-------
	1037	21<84	-------	*****	*******	10<66	-------	10<66	-------	21<62	-------	21<62	-------	10<90	-------	21<84	-------
	1038	27<84	-------	*****	*******	13<81	-------	13<81	-------	27<62	-------	27<62	-------	13<109	-------	27<84	-------
	1039	19<84	-------	*****	*******	12<81	-------	12<81	-------	19<62	-------	19<62	-------	12<109	-------	19<84	-------
	1040	21<84	-------	*****	*******	13<81	-------	13<81	-------	21<62	-------	21<62	-------	13<109	-------	21<84	-------
	1041	20<84	-------	*****	*******	13<81	-------	13<81	-------	20<62	-------	20<62	-------	13<109	-------	20<84	-------
	1042	18<84	-------	*****	*******	14<81	-------	14<81	-------	18<62	-------	18<62	-------	14<109	-------	18<84	-------
	1043	18<84	-------	*****	*******	13<81	-------	13<81	-------	18<62	-------	18<62	-------	13<109	-------	18<84	-------
	1044	18<84	-------	*****	*******	14<81	-------	14<81	-------	18<62	-------	18<62	-------	14<109	-------	18<84	-------

Fatigue check of main girder (3)

girder	panel point	checking point-16		checking point-17		checking point-18		checking point-19		checking point-20		checking point-21		checking point-22		checking point-23	
		web (upper) of main girder and trans. stiff		web (lower) of main girder and trans. stiff		horizontal stiff on web (upper)		Horizontal stiff on web (lower)		Main girder web and cross beam bottom flg		main girder web and cross beam web (upper)		main girder web and cross beam web (lower)		main girder web and bracket web (upper)	
		E grade		E grade		G grade		G grade		G grade		E grade		E grade		E grade	
		Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
	1001	-----	-------	-----	-------	-----	-------	*****	*******	-----	-------	-----	-------	-----	-------	-----	-------
	1002	6<81	-------	14<62	-------	2<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	5<81	-------
	1003	8<81	-------	16<62	-------	3<42	-------	*****	*******	12<32	-------	8<81	-------	12<62	-------	7<81	-------
	1004	11<81	-------	22<62	-------	4<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	10<81	-------
	1005	11<81	-------	19<62	-------	5<42	-------	*****	*******	13<32	-------	11<81	-------	13<62	-------	11<81	-------
	1006	13<81	-------	22<62	-------	6<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	12<81	-------
	1007	13<81	-------	20<62	-------	6<42	-------	*****	*******	14<32	-------	13<81	-------	14<62	-------	12<81	-------
	1008	14<81	-------	22<62	-------	7<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	13<81	-------
	1009	13<81	-------	21<62	-------	6<42	-------	*****	*******	15<32	-------	13<81	-------	15<62	-------	12<81	-------
	1010	14<81	-------	23<62	-------	6<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	13<81	-------
	1011	12<81	-------	21<62	-------	6<42	-------	*****	*******	15<32	-------	12<81	-------	15<62	-------	12<81	-------
	1012	13<81	-------	27<62	-------	5<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	12<81	-------
	1013	11<81	-------	20<62	-------	5<42	-------	*****	*******	14<32	-------	11<81	-------	14<62	-------	10<81	-------
	1014	11<81	-------	24<62	-------	4<42	-------	17<32	-------	*****	*******	*****	*******	*****	*******	10<81	-------
	1015	8<62	-------	17<81	-------	*****	*******	12<42	-------	13<42	-------	8<62	-------	13<81	-------	8<62	-------
	1016	8<62	-------	17<81	-------	*****	*******	12<42	-------	*****	*******	*****	*******	*****	*******	8<62	-------
	1017	8<62	-------	14<81	-------	*****	*******	9<42	-------	10<42	-------	8<62	-------	10<81	-------	7<62	-------
	1018	9<62	-------	17<81	-------	*****	*******	12<42	-------	*****	*******	*****	*******	*****	*******	8<62	-------
	1019	9<62	-------	18<81	-------	*****	*******	12<42	-------	13<42	-------	9<62	-------	13<81	-------	8<62	-------
	1020	11<62	-------	25<81	-------	4<32	-------	18<42	-------	*****	*******	*****	*******	*****	*******	10<62	-------
	1021	11<62	-------	23<74	-------	4<32	-------	17<38	-------	17<38	-------	11<62	-------	17<74	-------	10<62	-------
G1	1022	12<79	-------	27<62	-------	5<41	-------	19<32	-------	*****	*******	*****	*******	*****	*******	11<79	-------
	1023	12<81	-------	26<62	-------	4<42	-------	18<32	-------	19<32	-------	12<81	-------	19<62	-------	11<81	-------
	1024	13<81	-------	28<62	-------	5<42	-------	20<32	-------	*****	*******	*****	*******	*****	*******	12<81	-------
	1025	12<81	-------	27<62	-------	5<42	-------	19<32	-------	20<32	-------	12<81	-------	20<62	-------	12<81	-------
	1026	14<71	-------	29<62	-------	5<36	-------	21<32	-------	*****	*******	*****	*******	*****	*******	13<71	-------
	1027	13<62	-------	28<81	-------	5<32	-------	20<42	-------	20<42	-------	13<62	-------	20<81	-------	12<62	-------
	1028	13<62	-------	28<81	-------	5<32	-------	20<42	-------	*****	*******	*****	*******	*****	*******	12<62	-------
	1029	12<62	-------	26<81	-------	*****	*******	18<42	-------	19<42	-------	12<62	-------	19<81	-------	12<62	-------
	1030	12<62	-------	20<81	-------	*****	*******	14<42	-------	*****	*******	*****	*******	*****	*******	11<62	-------
	1031	10<62	-------	12<81	-------	*****	*******	8<42	-------	8<42	-------	10<62	-------	8<81	-------	10<62	-------
	1032	10<62	-------	12<81	-------	*****	*******	8<42	-------	*****	*******	*****	*******	*****	*******	10<62	-------
	1033	9<62	-------	9<81	-------	*****	*******	6<42	-------	6<42	-------	9<62	-------	6<81	-------	9<62	-------
	1034	9<62	-------	11<81	-------	*****	*******	7<42	-------	*****	*******	*****	*******	*****	*******	8<62	-------
	1035	7<62	-------	9<81	-------	*****	*******	6<42	-------	6<42	-------	7<62	-------	6<81	-------	7<62	-------
	1036	10<62	-------	17<81	-------	*****	*******	12<42	-------	*****	*******	*****	*******	*****	*******	9<62	-------
	1037	10<66	-------	21<62	-------	4<34	-------	15<32	-------	15<32	-------	10<66	-------	15<62	-------	10<66	-------
	1038	13<81	-------	27<62	-------	5<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	12<81	-------
	1039	12<81	-------	19<62	-------	6<42	-------	*****	*******	14<32	-------	12<81	-------	14<62	-------	11<81	-------
	1040	13<81	-------	21<62	-------	6<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	13<81	-------
	1041	13<81	-------	20<62	-------	7<42	-------	*****	*******	14<32	-------	13<81	-------	14<62	-------	12<81	-------
	1042	14<81	-------	18<62	-------	7<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	13<81	-------
	1043	13<81	-------	18<62	-------	7<42	-------	*****	*******	12<32	-------	13<81	-------	12<62	-------	13<81	-------
	1044	14<81	-------	18<62	-------	8<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	14<81	-------

Fatigue check of main girder (4)

girder	panel point	checking point-24		checking point-25		checking point-26		checking point-27		checking point-28		checking point-29		checking point-30		checking point-31	
		main girder web and bracket web (lower)		main girder web and bracket bottom flg		main girder web and trans rib flange (upper)		main girder web and trans rib flange (lower)		main girder web and trans rib web (upper)		main girder web and trans rib web (lower)		main girder web and diaphragm (upper)		main girder web and diaphragm (lower)	
		E grade		G grade		G grade		G grade		E grade		E grade		E grade		E grade	
		Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
G1	1001	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------
	1002	2<81	-------	2<42	-------	0<32	-------	11<32	-------	6<81	-------	14<62	-------	6<81	-------	14<62	-------
	1003	4<81	-------	4<42	-------	1<42	-------	12<32	-------	8<81	-------	16<62	-------	8<81	-------	16<62	-------
	1004	5<81	-------	5<42	-------	1<42	-------	17<32	-------	11<81	-------	22<62	-------	11<81	-------	22<62	-------
	1005	6<81	-------	6<42	-------	2<42	-------	14<32	-------	11<81	-------	19<62	-------	11<81	-------	19<62	-------
	1006	7<81	-------	7<42	-------	3<42	-------	17<32	-------	13<81	-------	22<62	-------	13<81	-------	22<62	-------
	1007	7<81	-------	7<42	-------	3<42	-------	15<32	-------	13<81	-------	20<62	-------	13<81	-------	20<62	-------
	1008	8<81	-------	8<42	-------	3<42	-------	17<32	-------	14<81	-------	22<62	-------	14<81	-------	22<62	-------
	1009	7<81	-------	7<42	-------	3<42	-------	16<32	-------	13<81	-------	21<62	-------	13<81	-------	21<62	-------
	1010	7<81	-------	7<42	-------	3<42	-------	18<32	-------	14<81	-------	23<62	-------	14<81	-------	23<62	-------
	1011	7<81	-------	7<42	-------	3<42	-------	16<32	-------	12<81	-------	21<62	-------	12<81	-------	21<62	-------
	1012	6<81	-------	6<42	-------	1<42	-------	21<32	-------	13<81	-------	27<62	-------	13<81	-------	27<62	-------
	1013	5<81	-------	5<42	-------	2<42	-------	15<32	-------	11<81	-------	20<62	-------	11<81	-------	20<62	-------
	1014	5<81	-------	5<42	-------	0<42	-------	19<32	-------	11<81	-------	24<62	-------	11<81	-------	24<62	-------
	1015	4<62	-------	4<32	-------	1<32	-------	14<42	-------	8<62	-------	17<81	-------	8<62	-------	17<81	-------
	1016	4<62	-------	4<32	-------	1<32	-------	13<42	-------	8<62	-------	17<81	-------	8<62	-------	17<81	-------
	1017	4<62	-------	4<32	-------	2<32	-------	10<42	-------	8<62	-------	14<81	-------	8<62	-------	14<81	-------
	1018	4<62	-------	4<32	-------	1<32	-------	14<42	-------	9<62	-------	17<81	-------	9<62	-------	17<81	-------
	1019	4<62	-------	4<32	-------	1<32	-------	14<42	-------	9<62	-------	18<81	-------	9<62	-------	18<81	-------
	1020	5<62	-------	5<32	-------	0<32	-------	19<42	-------	11<62	-------	25<81	-------	11<62	-------	25<81	-------
	1021	5<62	-------	5<32	-------	1<32	-------	18<38	-------	11<62	-------	23<74	-------	11<62	-------	23<74	-------
	1022	6<79	-------	5<41	-------	1<41	-------	21<32	-------	12<79	-------	27<62	-------	12<79	-------	27<62	-------
	1023	5<81	-------	5<42	-------	1<42	-------	20<32	-------	12<81	-------	26<62	-------	12<81	-------	26<62	-------
	1024	6<81	-------	6<42	-------	1<42	-------	22<32	-------	13<81	-------	28<62	-------	13<81	-------	28<62	-------
	1025	6<81	-------	6<42	-------	1<42	-------	21<32	-------	12<81	-------	27<62	-------	12<81	-------	27<62	-------
	1026	6<71	-------	6<36	-------	1<36	-------	23<32	-------	14<71	-------	29<62	-------	14<71	-------	29<62	-------
	1027	6<62	-------	6<32	-------	1<32	-------	22<42	-------	13<62	-------	28<81	-------	13<62	-------	28<81	-------
	1028	6<62	-------	6<32	-------	1<32	-------	22<42	-------	13<62	-------	28<81	-------	13<62	-------	28<81	-------
	1029	6<62	-------	6<32	-------	1<32	-------	20<42	-------	12<62	-------	26<81	-------	12<62	-------	26<81	-------
	1030	7<62	-------	6<32	-------	3<32	-------	16<42	-------	12<62	-------	20<81	-------	12<62	-------	20<81	-------
	1031	6<62	-------	6<32	-------	4<32	-------	9<42	-------	10<62	-------	12<81	-------	10<62	-------	12<81	-------
	1032	6<62	-------	6<32	-------	4<32	-------	9<42	-------	10<62	-------	12<81	-------	10<62	-------	12<81	-------
	1033	6<62	-------	6<32	-------	4<32	-------	7<42	-------	9<62	-------	9<81	-------	9<62	-------	9<81	-------
	1034	5<62	-------	5<32	-------	3<32	-------	8<42	-------	9<62	-------	11<81	-------	9<62	-------	11<81	-------
	1035	4<62	-------	4<32	-------	2<32	-------	7<42	-------	7<62	-------	9<81	-------	7<62	-------	9<81	-------
	1036	5<62	-------	5<32	-------	2<32	-------	13<42	-------	10<62	-------	17<81	-------	10<62	-------	17<81	-------
	1037	5<66	-------	5<34	-------	1<34	-------	16<32	-------	10<66	-------	21<62	-------	10<66	-------	21<62	-------
	1038	6<81	-------	6<42	-------	1<42	-------	21<32	-------	13<81	-------	27<62	-------	13<81	-------	27<62	-------
	1039	7<81	-------	7<42	-------	3<42	-------	15<32	-------	12<81	-------	19<62	-------	12<81	-------	19<62	-------
	1040	7<81	-------	7<42	-------	3<42	-------	16<32	-------	13<81	-------	21<62	-------	13<81	-------	21<62	-------
	1041	7<81	-------	7<42	-------	3<42	-------	15<32	-------	13<81	-------	20<62	-------	13<81	-------	20<62	-------
	1042	8<81	-------	8<42	-------	4<42	-------	14<32	-------	14<81	-------	18<62	-------	14<81	-------	18<62	-------
	1043	8<81	-------	8<42	-------	4<42	-------	13<32	-------	13<81	-------	18<62	-------	13<81	-------	18<62	-------
	1044	9<81	-------	9<42	-------	5<42	-------	13<32	-------	14<81	-------	18<62	-------	14<81	-------	18<62	-------

Fatigue check of main girder (5)

girder	panel point	checking point-1		checking point-2		checking point-3		checking point-4		checking point-5		checking point-6		checking point-7	
		top flange and trans.stiff		top flg and trans rib web		top flg and diaphragm		top flg and longit rib		bottom flg and trans.stiff		bottom flg and trans rib web		bottom flg and diaphragm	
		E grade		E grade		E grade		D grade		E grade		E grade		E grade	
		Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
	1045	14<81	-------	14<81	-------	14<81	-------	14<109	-------	17<54	-------	17<62	-------	17<62	-------
	1046	14<81	-------	14<81	-------	14<81	-------	14<109	-------	18<54	-------	18<62	-------	18<62	-------
	1047	13<81	-------	13<81	-------	13<81	-------	13<109	-------	17<54	-------	17<62	-------	17<62	-------
	1048	14<81	-------	14<81	-------	14<81	-------	14<109	-------	17<54	-------	17<62	-------	17<62	-------
	1049	12<81	-------	12<81	-------	12<81	-------	12<109	-------	17<56	-------	17<62	-------	17<62	-------
	1050	12<81	-------	12<81	-------	12<81	-------	12<109	-------	17<56	-------	17<62	-------	17<62	-------
	1051	11<81	-------	11<81	-------	11<81	-------	11<109	-------	17<61	-------	17<62	-------	17<62	-------
	1052	10<81	-------	10<81	-------	10<81	-------	10<109	-------	18<62	-------	18<62	-------	18<62	-------
	1053	8<81	-------	8<81	-------	8<81	-------	8<109	-------	14<62	-------	14<62	-------	14<62	-------
	1054	6<81	-------	6<81	-------	6<81	-------	6<109	-------	13<62	-------	13<62	-------	13<62	-------
	1055	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------
	J-1	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-2	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-3	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-4	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-5	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-6	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-7	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-8	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-9	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-10	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
G1	J-11	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-12	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-13	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-14	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-15	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-16	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-17	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-18	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-19	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-20	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-21	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-22	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-23	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-24	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-25	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-26	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-27	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-28	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-29	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-30	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-31	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-32	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******

Fatigue check of main girder (6)

girder	panel point	checking point-8		checking point-9		checking point-10		checking point-11		checking point-12		checking point-13		checking point-14		checking point-15	
		bottom flg and longit rib		sole plate(橋軸)		top flg longit rib and trans rib		top flg longit rib and diaphragm		bottom flgのlongit rib and trans rib		bottom flg longit rib and diaphragm		web plate and top flg		web plate and bottom flg	
		D grade		G grade		E grade		E grade		E grade		E grade		D grade		D grade	
		Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
	1045	17<84	-------	*****	*******	14<81	-------	14<81	-------	17<62	-------	17<62	-------	14<109	-------	17<84	-------
	1046	18<84	-------	*****	*******	14<81	-------	14<81	-------	18<62	-------	18<62	-------	14<109	-------	18<84	-------
	1047	17<84	-------	*****	*******	13<81	-------	13<81	-------	17<62	-------	17<62	-------	13<109	-------	17<84	-------
	1048	17<84	-------	*****	*******	14<81	-------	14<81	-------	17<62	-------	17<62	-------	14<109	-------	17<84	-------
	1049	17<84	-------	*****	*******	12<81	-------	12<81	-------	17<62	-------	17<62	-------	12<109	-------	17<84	-------
	1050	17<84	-------	*****	*******	12<81	-------	12<81	-------	17<62	-------	17<62	-------	12<109	-------	17<84	-------
	1051	17<84	-------	*****	*******	11<81	-------	11<81	-------	17<62	-------	17<62	-------	11<109	-------	17<84	-------
	1052	18<84	-------	*****	*******	10<81	-------	10<81	-------	18<62	-------	18<62	-------	10<109	-------	18<84	-------
	1053	14<84	-------	*****	*******	8<81	-------	8<81	-------	14<62	-------	14<62	-------	8<109	-------	14<84	-------
	1054	13<84	-------	*****	*******	6<81	-------	6<81	-------	13<62	-------	13<62	-------	6<109	-------	13<84	-------
	1055	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------
	J-1	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	8<109	-------	19<84	-------
	J-2	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	11<109	-------	23<84	-------
	J-3	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	13<109	-------	22<84	-------
	J-4	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	14<109	-------	22<84	-------
	J-5	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	14<109	-------	23<84	-------
	J-6	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	13<109	-------	27<84	-------
	J-7	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	11<109	-------	24<84	-------
	J-8	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	9<84	-------	19<109	-------
	J-9	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	7<84	-------	15<109	-------
	J-10	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	8<84	-------	16<109	-------
G1	J-11	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	9<84	-------	20<109	-------
	J-12	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	11<84	-------	23<108	-------
	J-13	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	12<109	-------	26<84	-------
	J-14	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	13<109	-------	27<84	-------
	J-15	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	13<98	-------	29<84	-------
	J-16	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	13<84	-------	28<109	-------
	J-17	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	13<84	-------	26<109	-------
	J-18	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	11<84	-------	19<109	-------
	J-19	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	10<84	-------	11<109	-------
	J-20	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	8<84	-------	10<109	-------
	J-21	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	8<84	-------	14<109	-------
	J-22	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	10<84	-------	21<109	-------
	J-23	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	13<109	-------	27<84	-------
	J-24	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	13<109	-------	21<84	-------
	J-25	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	14<109	-------	21<84	-------
	J-26	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	14<109	-------	19<84	-------
	J-27	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	14<109	-------	18<84	-------
	J-28	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	14<109	-------	17<84	-------
	J-29	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	13<109	-------	18<84	-------
	J-30	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	12<109	-------	20<84	-------
	J-31	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	10<109	-------	18<84	-------
	J-32	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	7<109	-------	16<84	-------

Fatigue check of main girder (7)

girder	panel point	checking point-16		checking point-17		checking point-18		checking point-19		checking point-20		checking point-21		checking point-22		checking point-23	
		web (upper) of main girder and trans. stiff		web (lower) of main girder and trans. stiff		horizontal stiff on web (upper)		Horizontal stiff on web (lower)		Main girder web and cross beam bottom flg		main girder web and cross beam web (upper)		main girder web and cross beam web (lower)		main girder web and bracket web (upper)	
		E grade		E grade		G grade		G grade		G grade		E grade		E grade		E grade	
		Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
G1	1045	14<81	-------	17<62	-------	7<42	-------	*****	*******	12<32	-------	14<81	-------	12<62	-------	13<81	-------
	1046	14<81	-------	18<62	-------	8<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	14<81	-------
	1047	13<81	-------	17<62	-------	7<42	-------	*****	*******	12<32	-------	13<81	-------	11<62	-------	13<81	-------
	1048	14<81	-------	17<62	-------	7<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	13<81	-------
	1049	12<81	-------	17<62	-------	6<42	-------	*****	*******	12<32	-------	12<81	-------	12<62	-------	12<81	-------
	1050	12<81	-------	17<62	-------	6<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	11<81	-------
	1051	11<81	-------	17<62	-------	5<42	-------	*****	*******	12<32	-------	11<81	-------	12<62	-------	10<81	-------
	1052	10<81	-------	18<62	-------	5<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	10<81	-------
	1053	8<81	-------	14<62	-------	3<42	-------	*****	*******	10<32	-------	8<81	-------	10<62	-------	7<81	-------
	1054	6<81	-------	13<62	-------	2<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	5<81	-------
	1055	-----	-------	-----	-------	-----	-------	*****	*******	-----	-------	-----	-------	-----	-------	-----	-------
	J-1	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-2	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-3	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-4	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-5	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-6	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-7	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-8	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-9	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-10	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-11	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-12	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-13	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-14	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-15	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-16	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-17	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-18	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-19	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-20	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-21	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-22	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-23	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-24	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-25	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-26	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-27	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-28	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-29	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-30	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-31	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-32	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******

Fatigue check of main girder (8)

girder	panel point	checking point-24		checking point-25		checking point-26		checking point-27		checking point-28		checking point-29		checking point-30		checking point-31	
		main girder web and bracket web (lower)		main girder web and bracket bottom flg		main girder web and trans rib flange (upper)		main girder web and trans rib flange (lower)		main girder web and trans rib web (upper)		main girder web and trans rib web (lower)		main girder web and diaphragm (upper)		main girder web and diaphragm (lower)	
		E grade		G grade		G grade		G grade		E grade		E grade		E grade		E grade	
		Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
G1	1045	8<81	-------	8<42	-------	5<42	-------	13<32	-------	14<81	-------	17<62	-------	14<81	-------	17<62	-------
	1046	9<81	-------	9<42	-------	5<42	-------	13<32	-------	14<81	-------	18<62	-------	14<81	-------	18<62	-------
	1047	8<81	-------	8<42	-------	4<42	-------	13<32	-------	13<81	-------	17<62	-------	13<81	-------	17<62	-------
	1048	8<81	-------	8<42	-------	4<42	-------	13<32	-------	14<81	-------	17<62	-------	14<81	-------	17<62	-------
	1049	7<81	-------	7<42	-------	4<42	-------	13<32	-------	12<81	-------	17<62	-------	12<81	-------	17<62	-------
	1050	7<81	-------	7<42	-------	4<42	-------	12<32	-------	12<81	-------	17<62	-------	12<81	-------	17<62	-------
	1051	6<81	-------	6<42	-------	2<42	-------	13<32	-------	11<81	-------	17<62	-------	11<81	-------	17<62	-------
	1052	5<81	-------	5<42	-------	2<42	-------	14<32	-------	10<81	-------	18<62	-------	10<81	-------	18<62	-------
	1053	4<81	-------	4<42	-------	1<42	-------	10<32	-------	8<81	-------	14<62	-------	8<81	-------	14<62	-------
	1054	2<81	-------	2<42	-------	-----	-------	10<32	-------	6<81	-------	13<62	-------	6<81	-------	13<62	-------
	1055	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------
	J-1	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-2	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-3	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-4	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-5	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-6	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-7	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-8	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-9	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-10	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-11	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-12	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-13	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-14	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-15	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-16	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-17	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-18	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-19	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-20	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-21	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-22	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-23	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-24	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-25	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-26	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-27	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-28	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-29	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-30	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-31	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-32	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******

Fatigue check of main girder (9)

girder	panel point	checking point-1		checking point-2		checking point-3		checking point-4		checking point-5		checking point-6		checking point-7	
		top flange and trans.stiff		top flg and trans rib web		top flg and diaphragm		top flg and longit rib		bottom flg and trans.stiff		bottom flg and trans rib web		bottom flg and diaphragm	
		E grade		E grade		E grade		D grade		E grade		E grade		E grade	
		Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
G2	2001	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------
	2002	5<81	-------	5<81	-------	5<81	-------	5<109	-------	11<62	-------	11<62	-------	11<62	-------
	2003	6<81	-------	6<81	-------	6<81	-------	6<109	-------	12<62	-------	12<62	-------	12<62	-------
	2004	9<81	-------	9<81	-------	9<81	-------	9<109	-------	18<62	-------	18<62	-------	18<62	-------
	2005	8<81	-------	8<81	-------	8<81	-------	8<109	-------	14<62	-------	14<62	-------	14<62	-------
	2006	11<81	-------	11<81	-------	11<81	-------	11<109	-------	18<62	-------	18<62	-------	18<62	-------
	2007	10<81	-------	10<81	-------	10<81	-------	10<109	-------	16<62	-------	16<62	-------	16<62	-------
	2008	11<81	-------	11<81	-------	11<81	-------	11<109	-------	19<62	-------	19<62	-------	19<62	-------
	2009	10<81	-------	10<81	-------	10<81	-------	10<109	-------	17<62	-------	17<62	-------	17<62	-------
	2010	11<81	-------	11<81	-------	11<81	-------	11<109	-------	19<62	-------	19<62	-------	19<62	-------
	2011	10<81	-------	10<81	-------	10<81	-------	10<109	-------	16<62	-------	16<62	-------	16<62	-------
	2012	11<81	-------	11<81	-------	11<81	-------	11<109	-------	22<62	-------	22<62	-------	22<62	-------
	2013	9<81	-------	9<81	-------	9<81	-------	9<109	-------	16<62	-------	16<62	-------	16<62	-------
	2014	9<81	-------	9<81	-------	9<81	-------	9<109	-------	17<62	-------	17<62	-------	17<62	-------
	2015	7<62	-------	7<62	-------	7<62	-------	7<84	-------	12<81	-------	12<81	-------	12<81	-------
	2016	7<62	-------	7<62	-------	7<62	-------	7<84	-------	12<81	-------	12<81	-------	12<81	-------
	2017	7<62	-------	7<62	-------	7<62	-------	7<84	-------	11<81	-------	11<81	-------	11<81	-------
	2018	7<62	-------	7<62	-------	7<62	-------	7<84	-------	13<81	-------	13<81	-------	13<81	-------
	2019	7<62	-------	7<62	-------	7<62	-------	7<84	-------	13<81	-------	13<81	-------	13<81	-------
	2020	10<62	-------	10<62	-------	10<62	-------	10<84	-------	18<81	-------	18<81	-------	18<81	-------
	2021	9<62	-------	9<62	-------	9<62	-------	9<84	-------	17<81	-------	17<81	-------	17<81	-------
	2022	11<76	-------	11<76	-------	11<76	-------	11<103	-------	20<62	-------	20<62	-------	20<62	-------
	2023	10<81	-------	10<81	-------	10<81	-------	10<109	-------	18<62	-------	18<62	-------	18<62	-------
	2024	11<81	-------	11<81	-------	11<81	-------	11<109	-------	21<62	-------	21<62	-------	21<62	-------
	2025	11<81	-------	11<81	-------	11<81	-------	11<109	-------	20<62	-------	20<62	-------	20<62	-------
	2026	12<67	-------	12<67	-------	12<67	-------	12<91	-------	22<62	-------	22<62	-------	22<62	-------
	2027	11<62	-------	11<62	-------	11<62	-------	11<84	-------	20<81	-------	20<81	-------	20<81	-------
	2028	12<62	-------	12<62	-------	12<62	-------	12<84	-------	22<81	-------	22<81	-------	22<81	-------
	2029	10<62	-------	10<62	-------	10<62	-------	10<84	-------	18<81	-------	18<81	-------	18<81	-------
	2030	11<62	-------	11<62	-------	11<62	-------	11<84	-------	17<81	-------	17<81	-------	17<81	-------
	2031	8<62	-------	8<62	-------	8<62	-------	8<84	-------	11<81	-------	11<81	-------	11<81	-------
	2032	8<62	-------	8<62	-------	8<62	-------	8<84	-------	11<81	-------	11<81	-------	11<81	-------
	2033	7<62	-------	7<62	-------	7<62	-------	7<84	-------	8<79	-------	8<81	-------	8<79	-------
	2034	7<62	-------	7<62	-------	7<62	-------	7<84	-------	9<81	-------	9<81	-------	9<81	-------
	2035	5<62	-------	5<62	-------	5<62	-------	5<84	-------	7<81	-------	7<81	-------	7<81	-------
	2036	8<62	-------	8<62	-------	8<62	-------	8<84	-------	15<81	-------	15<81	-------	15<81	-------
	2037	8<62	-------	8<62	-------	8<62	-------	8<84	-------	14<63	-------	14<63	-------	14<63	-------
	2038	10<81	-------	10<81	-------	10<81	-------	10<109	-------	21<62	-------	21<62	-------	21<62	-------
	2039	10<81	-------	10<81	-------	10<81	-------	10<109	-------	16<62	-------	16<62	-------	16<62	-------
	2040	12<81	-------	12<81	-------	12<81	-------	12<109	-------	19<62	-------	19<62	-------	19<62	-------
	2041	11<81	-------	11<81	-------	11<81	-------	11<109	-------	14<61	-------	14<62	-------	14<62	-------
	2042	13<81	-------	13<81	-------	13<81	-------	13<109	-------	13<57	-------	13<62	-------	13<62	-------
	2043	12<81	-------	12<81	-------	12<81	-------	12<109	-------	13<57	-------	13<62	-------	13<62	-------
	2044	13<81	-------	13<81	-------	13<81	-------	13<109	-------	14<56	-------	14<62	-------	14<62	-------

Fatigue check of main girder (10)

girder	panel point	checking point-8		checking point-9		checking point-10		checking point-11		checking point-12		checking point-13		checking point-14		checking point-15	
		bottom flg and longit rib		sole plate(橋軸)		top flg longit rib and trans rib		top flg longit rib and diaphragm		bottom flgのlongit rib and trans rib		bottom flg longit rib and diaphragm		web plate and top flg		web plate and bottom flg	
		D grade		G grade		E grade		E grade		E grade		E grade		D grade		D grade	
		Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
G2	2001	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------
	2002	11<84	-------	*****	*******	5<81	-------	5<81	-------	11<62	-------	11<62	-------	5<109	-------	11<84	-------
	2003	12<84	-------	*****	*******	6<81	-------	6<81	-------	12<62	-------	12<62	-------	6<109	-------	12<84	-------
	2004	18<84	-------	*****	*******	9<81	-------	9<81	-------	18<62	-------	18<62	-------	9<109	-------	18<84	-------
	2005	14<84	-------	*****	*******	8<81	-------	8<81	-------	14<62	-------	14<62	-------	8<109	-------	14<84	-------
	2006	18<84	-------	*****	*******	11<81	-------	11<81	-------	18<62	-------	18<62	-------	11<109	-------	18<84	-------
	2007	16<84	-------	*****	*******	10<81	-------	10<81	-------	16<62	-------	16<62	-------	10<109	-------	16<84	-------
	2008	19<84	-------	*****	*******	11<81	-------	11<81	-------	19<62	-------	19<62	-------	11<109	-------	19<84	-------
	2009	17<84	-------	*****	*******	10<81	-------	10<81	-------	17<62	-------	17<62	-------	10<109	-------	17<84	-------
	2010	19<84	-------	*****	*******	11<81	-------	11<81	-------	19<62	-------	19<62	-------	11<109	-------	19<84	-------
	2011	16<84	-------	*****	*******	10<81	-------	10<81	-------	16<62	-------	16<62	-------	10<109	-------	16<84	-------
	2012	22<84	-------	*****	*******	11<81	-------	11<81	-------	22<62	-------	22<62	-------	11<109	-------	22<84	-------
	2013	16<84	-------	*****	*******	9<81	-------	9<81	-------	16<62	-------	16<62	-------	9<109	-------	16<84	-------
	2014	17<84	-------	*****	*******	9<81	-------	9<81	-------	17<62	-------	17<62	-------	9<109	-------	17<84	-------
	2015	12<109	-------	*****	*******	7<62	-------	7<62	-------	12<81	-------	12<81	-------	7<84	-------	12<109	-------
	2016	12<109	-------	*****	*******	7<62	-------	7<62	-------	12<81	-------	12<81	-------	7<84	-------	12<109	-------
	2017	11<109	-------	11<42	-------	7<62	-------	7<62	-------	11<81	-------	11<81	-------	7<84	-------	11<109	-------
	2018	13<109	-------	*****	*******	7<62	-------	7<62	-------	13<81	-------	13<81	-------	7<84	-------	13<109	-------
	2019	13<109	-------	*****	*******	7<62	-------	7<62	-------	13<81	-------	13<81	-------	7<84	-------	13<109	-------
	2020	18<109	-------	*****	*******	10<62	-------	10<62	-------	18<81	-------	18<81	-------	10<84	-------	18<109	-------
	2021	17<109	-------	*****	*******	9<62	-------	9<62	-------	17<81	-------	17<81	-------	9<84	-------	17<109	-------
	2022	20<84	-------	*****	*******	11<76	-------	11<76	-------	20<62	-------	20<62	-------	11<103	-------	20<84	-------
	2023	18<84	-------	*****	*******	10<81	-------	10<81	-------	18<62	-------	18<62	-------	10<109	-------	18<84	-------
	2024	21<84	-------	*****	*******	11<81	-------	11<81	-------	21<62	-------	21<62	-------	11<109	-------	21<84	-------
	2025	20<84	-------	*****	*******	11<81	-------	11<81	-------	20<62	-------	20<62	-------	11<109	-------	20<84	-------
	2026	22<84	-------	*****	*******	12<67	-------	12<67	-------	22<62	-------	22<62	-------	12<91	-------	22<84	-------
	2027	20<109	-------	*****	*******	11<62	-------	11<62	-------	20<81	-------	20<81	-------	11<84	-------	20<109	-------
	2028	22<109	-------	*****	*******	12<62	-------	12<62	-------	22<81	-------	22<81	-------	12<84	-------	22<109	-------
	2029	18<109	-------	*****	*******	10<62	-------	10<62	-------	18<81	-------	18<81	-------	10<84	-------	18<109	-------
	2030	17<109	-------	*****	*******	11<62	-------	11<62	-------	17<81	-------	17<81	-------	11<84	-------	17<109	-------
	2031	11<109	-------	*****	*******	8<62	-------	8<62	-------	11<81	-------	11<81	-------	8<84	-------	11<109	-------
	2032	11<109	-------	*****	*******	8<62	-------	8<62	-------	11<81	-------	11<81	-------	8<84	-------	11<109	-------
	2033	8<109	-------	8<41	-------	7<62	-------	7<62	-------	8<81	-------	8<81	-------	7<84	-------	8<109	-------
	2034	9<109	-------	*****	*******	7<62	-------	7<62	-------	9<81	-------	9<81	-------	7<84	-------	9<109	-------
	2035	7<109	-------	*****	*******	5<62	-------	5<62	-------	7<81	-------	7<81	-------	5<84	-------	7<109	-------
	2036	15<109	-------	*****	*******	8<62	-------	8<62	-------	15<81	-------	15<81	-------	8<84	-------	15<109	-------
	2037	14<85	-------	*****	*******	8<62	-------	8<62	-------	14<63	-------	14<63	-------	8<84	-------	14<85	-------
	2038	21<84	-------	*****	*******	10<81	-------	10<81	-------	21<62	-------	21<62	-------	10<109	-------	21<84	-------
	2039	16<84	-------	*****	*******	10<81	-------	10<81	-------	16<62	-------	16<62	-------	10<109	-------	16<84	-------
	2040	19<84	-------	*****	*******	12<81	-------	12<81	-------	19<62	-------	19<62	-------	12<109	-------	19<84	-------
	2041	14<84	-------	*****	*******	11<81	-------	11<81	-------	14<62	-------	14<62	-------	11<109	-------	14<84	-------
	2042	13<84	-------	*****	*******	13<81	-------	13<81	-------	13<62	-------	13<62	-------	13<109	-------	13<84	-------
	2043	13<84	-------	*****	*******	12<81	-------	12<81	-------	13<62	-------	13<62	-------	12<109	-------	13<84	-------
	2044	14<84	-------	*****	*******	13<81	-------	13<81	-------	14<62	-------	14<62	-------	13<109	-------	14<84	-------

Fatigue check of main girder (11)

girder	panel point	checking point-16		checking point-17		checking point-18		checking point-19		checking point-20		checking point-21		checking point-22		checking point-23	
		web (upper) of main girder and trans. stiff		web (lower) of main girder and trans. stiff		horizontal stiff on web (upper)		Horizontal stiff on web (lower)		Main girder web and cross beam bottom flg		main girder web and cross beam web (upper)		main girder web and cross beam web (lower)		main girder web and bracket web (upper)	
		E grade		E grade		G grade		G grade		G grade		E grade		E grade		E grade	
		Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
G2	2001	-----	-------	-----	-------	-----	-------	*****	*******	-----	-------	-----	-------	-----	-------	*****	*******
	2002	5<81	-------	11<62	-------	2<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	2003	6<81	-------	12<62	-------	2<42	-------	*****	*******	9<32	-------	6<81	-------	9<62	-------	*****	*******
	2004	9<81	-------	18<62	-------	3<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	2005	8<81	-------	14<62	-------	4<42	-------	*****	*******	10<32	-------	8<81	-------	10<62	-------	*****	*******
	2006	11<81	-------	18<62	-------	5<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	2007	10<81	-------	16<62	-------	5<42	-------	*****	*******	12<32	-------	10<81	-------	12<62	-------	*****	*******
	2008	11<81	-------	19<62	-------	5<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	2009	10<81	-------	17<62	-------	5<42	-------	*****	*******	12<32	-------	10<81	-------	12<62	-------	*****	*******
	2010	11<81	-------	19<62	-------	5<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	2011	10<81	-------	16<62	-------	4<42	-------	*****	*******	12<32	-------	10<81	-------	11<62	-------	*****	*******
	2012	11<81	-------	22<62	-------	4<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	2013	9<81	-------	16<62	-------	4<42	-------	*****	*******	11<32	-------	9<81	-------	11<62	-------	*****	*******
	2014	9<81	-------	17<62	-------	4<42	-------	12<32	-------	*****	*******	*****	*******	*****	*******	*****	*******
	2015	7<62	-------	12<81	-------	*****	*******	8<42	-------	9<42	-------	7<62	-------	9<81	-------	*****	*******
	2016	7<62	-------	12<81	-------	*****	*******	8<42	-------	*****	*******	*****	*******	*****	*******	*****	*******
	2017	7<62	-------	11<81	-------	*****	*******	7<42	-------	8<42	-------	7<62	-------	8<81	-------	*****	*******
	2018	7<62	-------	13<81	-------	*****	*******	9<42	-------	*****	*******	*****	*******	*****	*******	*****	*******
	2019	7<62	-------	13<81	-------	*****	*******	9<42	-------	9<42	-------	7<62	-------	9<81	-------	*****	*******
	2020	10<62	-------	18<81	-------	4<32	-------	12<42	-------	*****	*******	*****	*******	*****	*******	*****	*******
	2021	9<62	-------	17<81	-------	4<32	-------	12<42	-------	12<42	-------	9<62	-------	12<81	-------	*****	*******
	2022	11<76	-------	20<62	-------	5<39	-------	14<32	-------	*****	*******	*****	*******	*****	*******	*****	*******
	2023	10<81	-------	18<62	-------	5<42	-------	13<32	-------	13<32	-------	10<81	-------	13<62	-------	*****	*******
	2024	11<81	-------	21<62	-------	5<42	-------	14<32	-------	*****	*******	*****	*******	*****	*******	*****	*******
	2025	11<81	-------	20<62	-------	5<42	-------	14<32	-------	14<32	-------	11<81	-------	14<62	-------	*****	*******
	2026	12<67	-------	22<62	-------	5<35	-------	16<32	-------	*****	*******	*****	*******	*****	*******	*****	*******
	2027	11<62	-------	20<81	-------	5<32	-------	14<42	-------	15<42	-------	11<62	-------	15<81	-------	*****	*******
	2028	12<62	-------	22<81	-------	5<32	-------	15<42	-------	*****	*******	*****	*******	*****	*******	*****	*******
	2029	10<62	-------	18<81	-------	*****	*******	13<42	-------	13<42	-------	10<62	-------	13<81	-------	*****	*******
	2030	11<62	-------	17<81	-------	*****	*******	12<42	-------	*****	*******	*****	*******	*****	*******	*****	*******
	2031	8<62	-------	11<81	-------	*****	*******	7<42	-------	7<42	-------	8<62	-------	7<81	-------	*****	*******
	2032	8<62	-------	11<81	-------	*****	*******	7<42	-------	*****	*******	*****	*******	*****	*******	*****	*******
	2033	7<62	-------	8<81	-------	*****	*******	5<42	-------	5<42	-------	7<62	-------	5<81	-------	*****	*******
	2034	7<62	-------	9<81	-------	*****	*******	6<42	-------	*****	*******	*****	*******	*****	*******	*****	*******
	2035	5<62	-------	7<81	-------	*****	*******	5<42	-------	5<42	-------	5<62	-------	5<81	-------	*****	*******
	2036	8<62	-------	15<81	-------	*****	*******	10<42	-------	*****	*******	*****	*******	*****	*******	*****	*******
	2037	8<62	-------	14<63	-------	4<32	-------	10<32	-------	10<32	-------	8<62	-------	10<63	-------	*****	*******
	2038	10<81	-------	21<62	-------	4<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	2039	10<81	-------	16<62	-------	5<42	-------	*****	*******	11<32	-------	10<81	-------	11<62	-------	*****	*******
	2040	12<81	-------	19<62	-------	6<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	2041	11<81	-------	14<62	-------	6<42	-------	*****	*******	9<32	-------	11<81	-------	9<62	-------	*****	*******
	2042	13<81	-------	13<62	-------	8<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	2043	12<81	-------	13<62	-------	7<42	-------	*****	*******	8<32	-------	12<81	-------	8<62	-------	*****	*******
	2044	13<81	-------	14<62	-------	8<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******

Fatigue check of main girder (12)

girder	panel point	checking point-24 main girder web and bracket web (lower) E grade		checking point-25 main girder web and bracket bottom flg G grade		checking point-26 main girder web and trans rib flange (upper) G grade		checking point-27 main girder web and trans rib flange (lower) G grade		checking point-28 main girder web and trans rib web (upper) E grade		checking point-29 main girder web and trans rib web (lower) E grade		checking point-30 main girder web and diaphragm (upper) E grade		checking point-31 main girder web and diaphragm (lower) E grade	
		Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
G2	2001	*****	*******	*****	*******	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------
	2002	*****	*******	*****	*******	1<42	-------	8<32	-------	5<81	-------	11<62	-------	5<81	-------	11<62	-------
	2003	*****	*******	*****	*******	1<42	-------	9<32	-------	6<81	-------	12<62	-------	6<81	-------	12<62	-------
	2004	*****	*******	*****	*******	1<42	-------	14<32	-------	9<81	-------	18<62	-------	9<81	-------	18<62	-------
	2005	*****	*******	*****	*******	2<42	-------	11<32	-------	8<81	-------	14<62	-------	8<81	-------	14<62	-------
	2006	*****	*******	*****	*******	2<42	-------	13<32	-------	11<81	-------	18<62	-------	11<81	-------	18<62	-------
	2007	*****	*******	*****	*******	2<42	-------	12<32	-------	10<81	-------	16<62	-------	10<81	-------	16<62	-------
	2008	*****	*******	*****	*******	2<42	-------	14<32	-------	11<81	-------	19<62	-------	11<81	-------	19<62	-------
	2009	*****	*******	*****	*******	2<42	-------	13<32	-------	10<81	-------	17<62	-------	10<81	-------	17<62	-------
	2010	*****	*******	*****	*******	2<42	-------	14<32	-------	11<81	-------	19<62	-------	11<81	-------	19<62	-------
	2011	*****	*******	*****	*******	2<42	-------	12<32	-------	10<81	-------	16<62	-------	10<81	-------	16<62	-------
	2012	*****	*******	*****	*******	1<42	-------	17<32	-------	11<81	-------	22<62	-------	11<81	-------	22<62	-------
	2013	*****	*******	*****	*******	2<42	-------	12<32	-------	9<81	-------	16<62	-------	9<81	-------	16<62	-------
	2014	*****	*******	*****	*******	1<42	-------	13<32	-------	9<81	-------	17<62	-------	9<81	-------	17<62	-------
	2015	*****	*******	*****	*******	1<32	-------	9<42	-------	7<62	-------	12<81	-------	7<62	-------	12<81	-------
	2016	*****	*******	*****	*******	1<32	-------	9<42	-------	7<62	-------	12<81	-------	7<62	-------	12<81	-------
	2017	*****	*******	*****	*******	2<32	-------	8<42	-------	7<62	-------	11<81	-------	7<62	-------	11<81	-------
	2018	*****	*******	*****	*******	1<32	-------	10<42	-------	7<62	-------	13<81	-------	7<62	-------	13<81	-------
	2019	*****	*******	*****	*******	1<32	-------	10<42	-------	7<62	-------	13<81	-------	7<62	-------	13<81	-------
	2020	*****	*******	*****	*******	2<32	-------	14<42	-------	10<62	-------	18<81	-------	10<62	-------	18<81	-------
	2021	*****	*******	*****	*******	2<32	-------	13<42	-------	9<62	-------	17<81	-------	9<62	-------	17<81	-------
	2022	*****	*******	*****	*******	2<39	-------	15<32	-------	11<76	-------	20<62	-------	11<76	-------	20<62	-------
	2023	*****	*******	*****	*******	2<42	-------	14<32	-------	10<81	-------	18<62	-------	10<81	-------	18<62	-------
	2024	*****	*******	*****	*******	2<42	-------	16<32	-------	11<81	-------	21<62	-------	11<81	-------	21<62	-------
	2025	*****	*******	*****	*******	2<42	-------	15<32	-------	11<81	-------	20<62	-------	11<81	-------	20<62	-------
	2026	*****	*******	*****	*******	2<35	-------	17<32	-------	12<67	-------	22<62	-------	12<67	-------	22<62	-------
	2027	*****	*******	*****	*******	2<32	-------	16<42	-------	11<62	-------	20<81	-------	11<62	-------	20<81	-------
	2028	*****	*******	*****	*******	2<32	-------	17<42	-------	12<62	-------	22<81	-------	12<62	-------	22<81	-------
	2029	*****	*******	*****	*******	2<32	-------	14<42	-------	10<62	-------	18<81	-------	10<62	-------	18<81	-------
	2030	*****	*******	*****	*******	2<32	-------	13<42	-------	11<62	-------	17<81	-------	11<62	-------	17<81	-------
	2031	*****	*******	*****	*******	3<32	-------	8<42	-------	8<62	-------	11<81	-------	8<62	-------	11<81	-------
	2032	*****	*******	*****	*******	3<32	-------	8<42	-------	8<62	-------	11<81	-------	8<62	-------	11<81	-------
	2033	*****	*******	*****	*******	3<32	-------	6<42	-------	7<62	-------	8<81	-------	7<62	-------	8<81	-------
	2034	*****	*******	*****	*******	2<32	-------	7<42	-------	7<62	-------	9<81	-------	7<62	-------	9<81	-------
	2035	*****	*******	*****	*******	2<32	-------	5<42	-------	5<62	-------	7<81	-------	5<62	-------	7<81	-------
	2036	*****	*******	*****	*******	1<32	-------	11<42	-------	8<62	-------	15<81	-------	8<62	-------	15<81	-------
	2037	*****	*******	*****	*******	1<32	-------	11<32	-------	8<62	-------	14<63	-------	8<62	-------	14<63	-------
	2038	*****	*******	*****	*******	1<42	-------	16<32	-------	10<81	-------	21<62	-------	10<81	-------	21<62	-------
	2039	*****	*******	*****	*******	2<42	-------	12<32	-------	10<81	-------	16<62	-------	10<81	-------	16<62	-------
	2040	*****	*******	*****	*******	3<42	-------	15<32	-------	12<81	-------	19<62	-------	12<81	-------	19<62	-------
	2041	*****	*******	*****	*******	4<42	-------	10<32	-------	11<81	-------	14<62	-------	11<81	-------	14<62	-------
	2042	*****	*******	*****	*******	5<42	-------	9<32	-------	13<81	-------	13<62	-------	13<81	-------	13<62	-------
	2043	*****	*******	*****	*******	5<42	-------	9<32	-------	12<81	-------	13<62	-------	12<81	-------	13<62	-------
	2044	*****	*******	*****	*******	5<42	-------	10<32	-------	13<81	-------	14<62	-------	13<81	-------	14<62	-------

Fatigue check of main girder (13)

girder	panel point	checking point-1		checking point-2		checking point-3		checking point-4		checking point-5		checking point-6		checking point-7	
		top flange and trans.stiff		top flg and trans rib web		top flg and diaphragm		top flg and longit rib		bottom flg and trans.stiff		bottom flg and trans rib web		bottom flg and diaphragm	
		E grade		E grade		E grade		D grade		E grade		E grade		E grade	
		Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
G2	2045	12<81	-------	12<81	-------	12<81	-------	12<109	-------	13<56	-------	13<62	-------	13<62	-------
	2046	13<81	-------	13<81	-------	13<81	-------	13<109	-------	14<56	-------	14<62	-------	14<62	-------
	2047	12<81	-------	12<81	-------	12<81	-------	12<109	-------	13<56	-------	13<62	-------	13<62	-------
	2048	12<81	-------	12<81	-------	12<81	-------	12<109	-------	13<56	-------	13<62	-------	13<62	-------
	2049	10<81	-------	10<81	-------	10<81	-------	10<109	-------	12<57	-------	12<62	-------	12<62	-------
	2050	10<81	-------	10<81	-------	10<81	-------	10<109	-------	12<57	-------	12<62	-------	12<62	-------
	2051	9<81	-------	9<81	-------	9<81	-------	9<109	-------	12<60	-------	12<62	-------	12<62	-------
	2052	8<81	-------	8<81	-------	8<81	-------	8<109	-------	15<62	-------	15<62	-------	15<62	-------
	2053	5<81	-------	5<81	-------	5<81	-------	5<109	-------	10<62	-------	10<62	-------	10<62	-------
	2054	4<81	-------	4<81	-------	4<81	-------	4<109	-------	11<62	-------	11<62	-------	11<62	-------
	2055	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------
	J-1	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-2	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-3	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-4	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-5	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-6	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-7	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-8	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-9	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-10	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-11	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-12	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-13	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-14	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-15	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-16	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-17	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-18	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-19	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-20	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-21	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-22	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-23	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-24	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-25	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-26	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-27	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-28	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-29	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-30	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-31	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-32	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******

Fatigue check of main girder (14)

girder	panel point	checking point-8		checking point-9		checking point-10		checking point-11		checking point-12		checking point-13		checking point-14		checking point-15	
		bottom flg and longit rib		sole plate(橋軸)		top flg longit rib and trans rib		top flg longit rib and diaphragm		bottom flgのlongit rib and trans rib		bottom flg longit rib and diaphragm		web plate and top flg		web plate and bottom flg	
		D grade		G grade		E grade		E grade		E grade		E grade		D grade		D grade	
		Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
G2	2045	13<84	-------	*****	*******	12<81	-------	12<81	-------	13<62	-------	13<62	-------	12<109	-------	13<84	-------
	2046	14<84	-------	*****	*******	13<81	-------	13<81	-------	14<62	-------	14<62	-------	13<109	-------	14<84	-------
	2047	13<84	-------	*****	*******	12<81	-------	12<81	-------	13<62	-------	13<62	-------	12<109	-------	13<84	-------
	2048	13<84	-------	*****	*******	12<81	-------	12<81	-------	13<62	-------	13<62	-------	12<109	-------	13<84	-------
	2049	12<84	-------	*****	*******	10<81	-------	10<81	-------	12<62	-------	12<62	-------	10<109	-------	12<84	-------
	2050	12<84	-------	*****	*******	10<81	-------	10<81	-------	12<62	-------	12<62	-------	10<109	-------	12<84	-------
	2051	12<84	-------	*****	*******	9<81	-------	9<81	-------	12<62	-------	12<62	-------	9<109	-------	12<84	-------
	2052	15<84	-------	*****	*******	8<81	-------	8<81	-------	15<62	-------	15<62	-------	8<109	-------	15<84	-------
	2053	10<84	-------	*****	*******	5<81	-------	5<81	-------	10<62	-------	10<62	-------	5<109	-------	10<84	-------
	2054	11<84	-------	*****	*******	4<81	-------	4<81	-------	11<62	-------	11<62	-------	4<109	-------	11<84	-------
	2055	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------
	J-1	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	6<109	-------	12<84	-------
	J-2	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	9<109	-------	18<84	-------
	J-3	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	10<109	-------	17<84	-------
	J-4	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	11<109	-------	18<84	-------
	J-5	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	11<109	-------	18<84	-------
	J-6	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	10<109	-------	21<84	-------
	J-7	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	9<109	-------	16<84	-------
	J-8	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	7<84	-------	13<109	-------
	J-9	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	6<84	-------	10<109	-------
	J-10	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	6<84	-------	11<109	-------
	J-11	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	8<84	-------	14<109	-------
	J-12	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	9<84	-------	16<109	-------
	J-13	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	10<109	-------	19<84	-------
	J-14	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	11<109	-------	21<84	-------
	J-15	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	12<94	-------	22<84	-------
	J-16	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	12<84	-------	21<109	-------
	J-17	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	10<84	-------	19<109	-------
	J-18	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	9<84	-------	14<109	-------
	J-19	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	7<84	-------	10<109	-------
	J-20	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	6<84	-------	9<109	-------
	J-21	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	6<84	-------	10<109	-------
	J-22	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	8<84	-------	14<109	-------
	J-23	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	10<109	-------	20<84	-------
	J-24	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	12<109	-------	19<84	-------
	J-25	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	13<109	-------	16<84	-------
	J-26	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	13<109	-------	14<84	-------
	J-27	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	13<109	-------	13<84	-------
	J-28	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	12<109	-------	13<84	-------
	J-29	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	12<109	-------	13<84	-------
	J-30	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	10<109	-------	14<84	-------
	J-31	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	8<109	-------	16<84	-------
	J-32	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	5<109	-------	13<84	-------

Fatigue check of main girder (15)

girder	panel point	checking point-16		checking point-17		checking point-18		checking point-19		checking point-20		checking point-21		checking point-22		checking point-23	
		web (upper) of main girder and trans. stiff		web (lower) of main girder and trans. stiff		horizontal stiff on web (upper)		Horizontal stiff on web (lower)		Main girder web and cross beam bottom flg		main girder web and cross beam web (upper)		main girder web and cross beam web (lower)		main girder web and bracket web (upper)	
		E grade		E grade		G grade		G grade		G grade		E grade		E grade		E grade	
		Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
G2	2045	12<81	-------	13<62	-------	7<42	-------	*****	*******	8<32	-------	12<81	-------	8<62	-------	*****	*******
	2046	13<81	-------	14<62	-------	8<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	2047	12<81	-------	13<62	-------	7<42	-------	*****	*******	8<32	-------	12<81	-------	8<62	-------	*****	*******
	2048	12<81	-------	13<62	-------	7<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	2049	10<81	-------	12<62	-------	6<42	-------	*****	*******	8<32	-------	10<81	-------	8<62	-------	*****	*******
	2050	10<81	-------	12<62	-------	6<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	2051	9<81	-------	12<62	-------	4<42	-------	*****	*******	8<32	-------	9<81	-------	8<62	-------	*****	*******
	2052	8<81	-------	15<62	-------	3<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	2053	5<81	-------	10<62	-------	2<42	-------	*****	*******	8<32	-------	5<81	-------	7<62	-------	*****	*******
	2054	4<81	-------	11<62	-------	1<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	2055	-----	-------	-----	-------	-----	-------	*****	*******	-----	-------	-----	-------	-----	-------	*****	*******
	J-1	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-2	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-3	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-4	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-5	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-6	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-7	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-8	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-9	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-10	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-11	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-12	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-13	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-14	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-15	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-16	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-17	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-18	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-19	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-20	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-21	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-22	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-23	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-24	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-25	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-26	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-27	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-28	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-29	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-30	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-31	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-32	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******

Fatigue check of main girder (16)

girder	panel point	checking point-24		checking point-25		checking point-26		checking point-27		checking point-28		checking point-29		checking point-30		checking point-31	
		main girder web and bracket web (lower)		main girder web and bracket bottom flg		main girder web and trans rib flange (upper)		main girder web and trans rib flange (lower)		main girder web and trans rib web (upper)		main girder web and trans rib web (lower)		main girder web and diaphragm (upper)		main girder web and diaphragm (lower)	
		E grade		G grade		G grade		G grade		E grade		E grade		E grade		E grade	
		Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
G2	2045	*****	*******	*****	*******	5<42	-------	9<32	-------	12<81	-------	13<62	-------	12<81	-------	13<62	-------
	2046	*****	*******	*****	*******	5<42	-------	10<32	-------	13<81	-------	14<62	-------	13<81	-------	14<62	-------
	2047	*****	*******	*****	*******	5<42	-------	9<32	-------	12<81	-------	13<62	-------	12<81	-------	13<62	-------
	2048	*****	*******	*****	*******	5<42	-------	9<32	-------	12<81	-------	13<62	-------	12<81	-------	13<62	-------
	2049	*****	*******	*****	*******	3<42	-------	9<32	-------	10<81	-------	12<62	-------	10<81	-------	12<62	-------
	2050	*****	*******	*****	*******	3<42	-------	9<32	-------	10<81	-------	12<62	-------	10<81	-------	12<62	-------
	2051	*****	*******	*****	*******	2<42	-------	9<32	-------	9<81	-------	12<62	-------	9<81	-------	12<62	-------
	2052	*****	*******	*****	*******	1<42	-------	12<32	-------	8<81	-------	15<62	-------	8<81	-------	15<62	-------
	2053	*****	*******	*****	*******	1<42	-------	8<32	-------	5<81	-------	10<62	-------	5<81	-------	10<62	-------
	2054	*****	*******	*****	*******	0<32	-------	9<32	-------	4<81	-------	11<62	-------	4<81	-------	11<62	-------
	2055	*****	*******	*****	*******	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------
	J-1	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-2	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-3	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-4	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-5	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-6	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-7	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-8	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-9	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-10	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-11	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-12	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-13	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-14	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-15	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-16	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-17	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-18	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-19	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-20	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-21	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-22	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-23	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-24	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-25	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-26	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-27	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-28	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-29	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-30	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-31	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-32	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******

Fatigue check of main girder (17)

girder	panel point	checking point-1		checking point-2		checking point-3		checking point-4		checking point-5		checking point-6		checking point-7	
		top flange and trans.stiff		top flg and trans rib web		top flg and diaphragm		top flg and longit rib		bottom flg and trans.stiff		bottom flg and trans rib web		bottom flg and diaphragm	
		E grade		E grade		E grade		D grade		E grade		E grade		E grade	
		Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
G3	3001	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------
	3002	4<81	-------	4<81	-------	4<81	-------	4<109	-------	12<62	-------	12<62	-------	12<62	-------
	3003	5<81	-------	5<81	-------	5<81	-------	5<109	-------	13<62	-------	13<62	-------	13<62	-------
	3004	7<81	-------	7<81	-------	7<81	-------	7<109	-------	17<62	-------	17<62	-------	17<62	-------
	3005	7<81	-------	7<81	-------	7<81	-------	7<109	-------	15<62	-------	15<62	-------	15<62	-------
	3006	8<81	-------	8<81	-------	8<81	-------	8<109	-------	18<62	-------	18<62	-------	18<62	-------
	3007	8<81	-------	8<81	-------	8<81	-------	8<109	-------	16<62	-------	16<62	-------	16<62	-------
	3008	9<81	-------	9<81	-------	9<81	-------	9<109	-------	18<62	-------	18<62	-------	18<62	-------
	3009	8<81	-------	8<81	-------	8<81	-------	8<109	-------	16<62	-------	16<62	-------	16<62	-------
	3010	9<81	-------	9<81	-------	9<81	-------	9<109	-------	19<62	-------	19<62	-------	19<62	-------
	3011	8<81	-------	8<81	-------	8<81	-------	8<109	-------	16<62	-------	16<62	-------	16<62	-------
	3012	9<81	-------	9<81	-------	9<81	-------	9<109	-------	21<62	-------	21<62	-------	21<62	-------
	3013	7<81	-------	7<81	-------	7<81	-------	7<109	-------	15<62	-------	15<62	-------	15<62	-------
	3014	8<81	-------	8<81	-------	8<81	-------	8<109	-------	18<62	-------	18<62	-------	18<62	-------
	3015	6<62	-------	6<62	-------	6<62	-------	6<84	-------	12<81	-------	12<81	-------	12<81	-------
	3016	6<62	-------	6<62	-------	6<62	-------	6<84	-------	12<81	-------	12<81	-------	12<81	-------
	3017	5<62	-------	5<62	-------	5<62	-------	5<84	-------	9<81	-------	9<81	-------	9<81	-------
	3018	6<62	-------	6<62	-------	6<62	-------	6<84	-------	12<81	-------	12<81	-------	12<81	-------
	3019	6<62	-------	6<62	-------	6<62	-------	6<84	-------	13<81	-------	13<81	-------	13<81	-------
	3020	8<62	-------	8<62	-------	8<62	-------	8<84	-------	18<81	-------	18<81	-------	18<81	-------
	3021	8<62	-------	8<62	-------	8<62	-------	8<84	-------	17<81	-------	17<81	-------	17<81	-------
	3022	9<76	-------	9<76	-------	9<76	-------	9<103	-------	20<62	-------	20<62	-------	20<62	-------
	3023	8<81	-------	8<81	-------	8<81	-------	8<109	-------	19<62	-------	19<62	-------	19<62	-------
	3024	10<81	-------	10<81	-------	10<81	-------	10<109	-------	21<62	-------	21<62	-------	21<62	-------
	3025	9<81	-------	9<81	-------	9<81	-------	9<109	-------	20<62	-------	20<62	-------	20<62	-------
	3026	10<68	-------	10<68	-------	10<68	-------	10<93	-------	23<62	-------	23<62	-------	23<62	-------
	3027	10<62	-------	10<62	-------	10<62	-------	10<84	-------	21<81	-------	21<81	-------	21<81	-------
	3028	11<62	-------	11<62	-------	11<62	-------	11<84	-------	22<81	-------	22<81	-------	22<81	-------
	3029	9<62	-------	9<62	-------	9<62	-------	9<84	-------	20<81	-------	20<81	-------	20<81	-------
	3030	10<62	-------	10<62	-------	10<62	-------	10<84	-------	18<81	-------	18<81	-------	18<81	-------
	3031	8<62	-------	8<62	-------	8<62	-------	8<84	-------	11<81	-------	11<81	-------	11<81	-------
	3032	8<62	-------	8<62	-------	8<62	-------	8<84	-------	11<81	-------	11<81	-------	11<81	-------
	3033	6<62	-------	6<62	-------	6<62	-------	6<84	-------	7<78	-------	7<81	-------	7<78	-------
	3034	7<62	-------	7<62	-------	7<62	-------	7<84	-------	9<81	-------	9<81	-------	9<81	-------
	3035	5<62	-------	5<62	-------	5<62	-------	5<84	-------	7<81	-------	7<81	-------	7<81	-------
	3036	8<62	-------	8<62	-------	8<62	-------	8<84	-------	14<81	-------	14<81	-------	14<81	-------
	3037	8<62	-------	8<62	-------	8<62	-------	8<84	-------	15<69	-------	15<69	-------	15<69	-------
	3038	10<81	-------	10<81	-------	10<81	-------	10<109	-------	21<62	-------	21<62	-------	21<62	-------
	3039	9<81	-------	9<81	-------	9<81	-------	9<109	-------	16<62	-------	16<62	-------	16<62	-------
	3040	12<81	-------	12<81	-------	12<81	-------	12<109	-------	20<62	-------	20<62	-------	20<62	-------
	3041	11<81	-------	11<81	-------	11<81	-------	11<109	-------	14<62	-------	14<62	-------	14<62	-------
	3042	13<81	-------	13<81	-------	13<81	-------	13<109	-------	14<58	-------	14<62	-------	14<62	-------
	3043	12<81	-------	12<81	-------	12<81	-------	12<109	-------	13<58	-------	13<62	-------	13<62	-------
	3044	13<81	-------	13<81	-------	13<81	-------	13<109	-------	14<57	-------	14<62	-------	14<62	-------

Fatigue check of main girder (18)

girder	panel point	checking point-8		checking point-9		checking point-10		checking point-11		checking point-12		checking point-13		checking point-14		checking point-15	
		bottom flg and longit rib		sole plate(橋軸)		top flg longit rib and trans rib		top flg longit rib and diaphragm		bottom flgのlongit rib and trans rib		bottom flg longit rib and diaphragm		web plate and top flg		web plate and bottom flg	
		D grade		G grade		E grade		E grade		E grade		E grade		D grade		D grade	
		Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
G3	3001	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------
	3002	12<84	-------	*****	*******	4<81	-------	4<81	-------	12<62	-------	12<62	-------	4<109	-------	12<84	-------
	3003	13<84	-------	*****	*******	5<81	-------	5<81	-------	13<62	-------	13<62	-------	5<109	-------	13<84	-------
	3004	17<84	-------	*****	*******	7<81	-------	7<81	-------	17<62	-------	17<62	-------	7<109	-------	17<84	-------
	3005	15<84	-------	*****	*******	7<81	-------	7<81	-------	15<62	-------	15<62	-------	7<109	-------	15<84	-------
	3006	18<84	-------	*****	*******	8<81	-------	8<81	-------	18<62	-------	18<62	-------	8<109	-------	18<84	-------
	3007	16<84	-------	*****	*******	8<81	-------	8<81	-------	16<62	-------	16<62	-------	8<109	-------	16<84	-------
	3008	18<84	-------	*****	*******	9<81	-------	9<81	-------	18<62	-------	18<62	-------	9<109	-------	18<84	-------
	3009	16<84	-------	*****	*******	8<81	-------	8<81	-------	16<62	-------	16<62	-------	8<109	-------	16<84	-------
	3010	19<84	-------	*****	*******	9<81	-------	9<81	-------	19<62	-------	19<62	-------	9<109	-------	19<84	-------
	3011	16<84	-------	*****	*******	8<81	-------	8<81	-------	16<62	-------	16<62	-------	8<109	-------	16<84	-------
	3012	21<84	-------	*****	*******	9<81	-------	9<81	-------	21<62	-------	21<62	-------	9<109	-------	21<84	-------
	3013	15<84	-------	*****	*******	7<81	-------	7<81	-------	15<62	-------	15<62	-------	7<109	-------	15<84	-------
	3014	18<84	-------	*****	*******	8<81	-------	8<81	-------	18<62	-------	18<62	-------	8<109	-------	18<84	-------
	3015	12<109	-------	*****	*******	6<62	-------	6<62	-------	12<81	-------	12<81	-------	6<84	-------	12<109	-------
	3016	12<109	-------	*****	*******	6<62	-------	6<62	-------	12<81	-------	12<81	-------	6<84	-------	12<109	-------
	3017	9<109	-------	9<42	-------	5<62	-------	5<62	-------	9<81	-------	9<81	-------	5<84	-------	9<109	-------
	3018	12<109	-------	*****	*******	6<62	-------	6<62	-------	12<81	-------	12<81	-------	6<84	-------	12<109	-------
	3019	13<109	-------	*****	*******	6<62	-------	6<62	-------	13<81	-------	13<81	-------	6<84	-------	13<109	-------
	3020	18<109	-------	*****	*******	8<62	-------	8<62	-------	18<81	-------	18<81	-------	8<84	-------	18<109	-------
	3021	17<109	-------	*****	*******	8<62	-------	8<62	-------	17<81	-------	17<81	-------	8<84	-------	17<109	-------
	3022	20<84	-------	*****	*******	9<76	-------	9<76	-------	20<62	-------	20<62	-------	9<103	-------	20<84	-------
	3023	19<84	-------	*****	*******	8<81	-------	8<81	-------	19<62	-------	19<62	-------	8<109	-------	19<84	-------
	3024	21<84	-------	*****	*******	10<81	-------	10<81	-------	21<62	-------	21<62	-------	10<109	-------	21<84	-------
	3025	20<84	-------	*****	*******	9<81	-------	9<81	-------	20<62	-------	20<62	-------	9<109	-------	20<84	-------
	3026	23<84	-------	*****	*******	10<68	-------	10<68	-------	23<62	-------	23<62	-------	10<93	-------	23<84	-------
	3027	21<109	-------	*****	*******	10<62	-------	10<62	-------	21<81	-------	21<81	-------	10<84	-------	21<109	-------
	3028	22<109	-------	*****	*******	11<62	-------	11<62	-------	22<81	-------	22<81	-------	11<84	-------	22<109	-------
	3029	20<109	-------	*****	*******	9<62	-------	9<62	-------	20<81	-------	20<81	-------	9<84	-------	20<109	-------
	3030	18<109	-------	*****	*******	10<62	-------	10<62	-------	18<81	-------	18<81	-------	10<84	-------	18<109	-------
	3031	11<109	-------	*****	*******	8<62	-------	8<62	-------	11<81	-------	11<81	-------	8<84	-------	11<109	-------
	3032	11<109	-------	*****	*******	8<62	-------	8<62	-------	11<81	-------	11<81	-------	8<84	-------	11<109	-------
	3033	7<109	-------	8<40	-------	6<62	-------	6<62	-------	7<81	-------	7<81	-------	6<84	-------	7<109	-------
	3034	9<109	-------	*****	*******	7<62	-------	7<62	-------	9<81	-------	9<81	-------	7<84	-------	9<109	-------
	3035	7<109	-------	*****	*******	5<62	-------	5<62	-------	7<81	-------	7<81	-------	5<84	-------	7<109	-------
	3036	14<109	-------	*****	*******	8<62	-------	8<62	-------	14<81	-------	14<81	-------	8<84	-------	14<109	-------
	3037	15<93	-------	*****	*******	8<62	-------	8<62	-------	15<69	-------	15<69	-------	8<84	-------	15<93	-------
	3038	21<84	-------	*****	*******	10<81	-------	10<81	-------	21<62	-------	21<62	-------	10<109	-------	21<84	-------
	3039	16<84	-------	*****	*******	9<81	-------	9<81	-------	16<62	-------	16<62	-------	9<109	-------	16<84	-------
	3040	20<84	-------	*****	*******	12<81	-------	12<81	-------	20<62	-------	20<62	-------	12<109	-------	20<84	-------
	3041	14<84	-------	*****	*******	11<81	-------	11<81	-------	14<62	-------	14<62	-------	11<109	-------	14<84	-------
	3042	14<84	-------	*****	*******	13<81	-------	13<81	-------	14<62	-------	14<62	-------	13<109	-------	14<84	-------
	3043	13<84	-------	*****	*******	12<81	-------	12<81	-------	13<62	-------	13<62	-------	12<109	-------	13<84	-------
	3044	14<84	-------	*****	*******	13<81	-------	13<81	-------	14<62	-------	14<62	-------	13<109	-------	14<84	-------

Fatigue check of main girder (19)

girder	panel point	checking point-16		checking point-17		checking point-18		checking point-19		checking point-20		checking point-21		checking point-22		checking point-23	
		web (upper) of main girder and trans. stiff		web (lower) of main girder and trans. stiff		horizontal stiff on web (upper)		Horizontal stiff on web (lower)		Main girder web and cross beam bottom flg		main girder web and cross beam web (upper)		main girder web and cross beam web (lower)		main girder web and bracket web (upper)	
		E grade		E grade		G grade		G grade		G grade		E grade		E grade		E grade	
		Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
G3	3001	-----	-------	-----	-------	-----	-------	*****	*******	-----	-------	-----	-------	-----	-------	*****	*******
	3002	4<81	-------	12<62	-------	1<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	3003	5<81	-------	13<62	-------	1<42	-------	*****	*******	10<32	-------	5<81	-------	10<62	-------	*****	*******
	3004	7<81	-------	17<62	-------	2<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	3005	7<81	-------	15<62	-------	2<42	-------	*****	*******	11<32	-------	7<81	-------	11<62	-------	*****	*******
	3006	8<81	-------	18<62	-------	3<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	3007	8<81	-------	16<62	-------	3<42	-------	*****	*******	12<32	-------	8<81	-------	12<62	-------	*****	*******
	3008	9<81	-------	18<62	-------	4<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	3009	8<81	-------	16<62	-------	3<42	-------	*****	*******	12<32	-------	8<81	-------	12<62	-------	*****	*******
	3010	9<81	-------	19<62	-------	3<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	3011	8<81	-------	16<62	-------	3<42	-------	*****	*******	12<32	-------	8<81	-------	12<62	-------	*****	*******
	3012	9<81	-------	21<62	-------	3<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	3013	7<81	-------	15<62	-------	3<42	-------	*****	*******	11<32	-------	7<81	-------	11<62	-------	*****	*******
	3014	8<81	-------	18<62	-------	3<42	-------	13<32	-------	*****	*******	*****	*******	*****	*******	*****	*******
	3015	6<62	-------	12<81	-------	*****	*******	9<42	-------	9<42	-------	6<62	-------	9<81	-------	*****	*******
	3016	6<62	-------	12<81	-------	*****	*******	9<42	-------	*****	*******	*****	*******	*****	*******	*****	*******
	3017	5<62	-------	9<81	-------	*****	*******	6<42	-------	6<42	-------	5<62	-------	6<81	-------	*****	*******
	3018	6<62	-------	12<81	-------	*****	*******	9<42	-------	*****	*******	*****	*******	*****	*******	*****	*******
	3019	6<62	-------	13<81	-------	*****	*******	9<42	-------	9<42	-------	6<62	-------	9<81	-------	*****	*******
	3020	8<62	-------	18<81	-------	3<32	-------	13<42	-------	*****	*******	*****	*******	*****	*******	*****	*******
	3021	8<62	-------	17<81	-------	3<32	-------	12<42	-------	13<42	-------	8<62	-------	12<81	-------	*****	*******
	3022	9<76	-------	20<62	-------	3<39	-------	14<32	-------	*****	*******	*****	*******	*****	*******	*****	*******
	3023	8<81	-------	19<62	-------	3<42	-------	13<32	-------	14<32	-------	8<81	-------	14<62	-------	*****	*******
	3024	10<81	-------	21<62	-------	3<42	-------	15<32	-------	*****	*******	*****	*******	*****	*******	*****	*******
	3025	9<81	-------	20<62	-------	3<42	-------	15<32	-------	15<32	-------	9<81	-------	15<62	-------	*****	*******
	3026	10<68	-------	23<62	-------	4<35	-------	16<32	-------	*****	*******	*****	*******	*****	*******	*****	*******
	3027	10<62	-------	21<81	-------	4<32	-------	15<42	-------	15<42	-------	10<62	-------	15<81	-------	*****	*******
	3028	11<62	-------	22<81	-------	4<32	-------	16<42	-------	*****	*******	*****	*******	*****	*******	*****	*******
	3029	9<62	-------	20<81	-------	*****	*******	14<42	-------	14<42	-------	9<62	-------	14<81	-------	*****	*******
	3030	10<62	-------	18<81	-------	*****	*******	13<42	-------	*****	*******	*****	*******	*****	*******	*****	*******
	3031	8<62	-------	11<81	-------	*****	*******	7<42	-------	8<42	-------	8<62	-------	7<81	-------	*****	*******
	3032	8<62	-------	11<81	-------	*****	*******	7<42	-------	*****	*******	*****	*******	*****	*******	*****	*******
	3033	6<62	-------	7<81	-------	*****	*******	5<42	-------	5<42	-------	6<62	-------	5<81	-------	*****	*******
	3034	7<62	-------	9<81	-------	*****	*******	6<42	-------	*****	*******	*****	*******	*****	*******	*****	*******
	3035	5<62	-------	7<81	-------	*****	*******	5<42	-------	5<42	-------	5<62	-------	5<81	-------	*****	*******
	3036	8<62	-------	14<81	-------	*****	*******	10<42	-------	*****	*******	*****	*******	*****	*******	*****	*******
	3037	8<62	-------	15<69	-------	3<32	-------	10<35	-------	11<35	-------	8<62	-------	11<69	-------	*****	*******
	3038	10<81	-------	21<62	-------	4<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	3039	9<81	-------	16<62	-------	4<42	-------	*****	*******	11<32	-------	9<81	-------	11<62	-------	*****	*******
	3040	12<81	-------	20<62	-------	5<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	3041	11<81	-------	14<62	-------	6<42	-------	*****	*******	10<32	-------	11<81	-------	9<62	-------	*****	*******
	3042	13<81	-------	14<62	-------	7<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	3043	12<81	-------	13<62	-------	7<42	-------	*****	*******	9<32	-------	12<81	-------	9<62	-------	*****	*******
	3044	13<81	-------	14<62	-------	8<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******

Fatigue check of main girder (20)

girder	panel point	checking point-24		checking point-25		checking point-26		checking point-27		checking point-28		checking point-29		checking point-30		checking point-31	
		main girder web and bracket web (lower)		main girder web and bracket bottom flg		main girder web and trans rib flange (upper)		main girder web and trans rib flange (lower)		main girder web and trans rib web (upper)		main girder web and trans rib web (lower)		main girder web and diaphragm (upper)		main girder web and diaphragm (lower)	
		E grade		G grade		G grade		G grade		E grade		E grade		E grade		E grade	
		Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
	3001	*****	*******	*****	*******	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------
	3002	*****	*******	*****	*******	1<32	-------	10<32	-------	4<81	-------	12<62	-------	4<81	-------	12<62	-------
	3003	*****	*******	*****	*******	1<32	-------	10<32	-------	5<81	-------	13<62	-------	5<81	-------	13<62	-------
	3004	*****	*******	*****	*******	1<32	-------	14<32	-------	7<81	-------	17<62	-------	7<81	-------	17<62	-------
	3005	*****	*******	*****	*******	1<42	-------	11<32	-------	7<81	-------	15<62	-------	7<81	-------	15<62	-------
	3006	*****	*******	*****	*******	1<42	-------	14<32	-------	8<81	-------	18<62	-------	8<81	-------	18<62	-------
	3007	*****	*******	*****	*******	1<42	-------	12<32	-------	8<81	-------	16<62	-------	8<81	-------	16<62	-------
	3008	*****	*******	*****	*******	1<42	-------	14<32	-------	9<81	-------	18<62	-------	9<81	-------	18<62	-------
	3009	*****	*******	*****	*******	1<42	-------	13<32	-------	8<81	-------	16<62	-------	8<81	-------	16<62	-------
	3010	*****	*******	*****	*******	1<42	-------	15<32	-------	9<81	-------	19<62	-------	9<81	-------	19<62	-------
	3011	*****	*******	*****	*******	1<42	-------	13<32	-------	8<81	-------	16<62	-------	8<81	-------	16<62	-------
	3012	*****	*******	*****	*******	1<32	-------	17<32	-------	9<81	-------	21<62	-------	9<81	-------	21<62	-------
	3013	*****	*******	*****	*******	0<42	-------	12<32	-------	7<81	-------	15<62	-------	7<81	-------	15<62	-------
	3014	*****	*******	*****	*******	-----	-------	14<32	-------	8<81	-------	18<62	-------	8<81	-------	18<62	-------
	3015	*****	*******	*****	*******	-----	-------	10<42	-------	6<62	-------	12<81	-------	6<62	-------	12<81	-------
	3016	*****	*******	*****	*******	0<32	-------	10<42	-------	6<62	-------	12<81	-------	6<62	-------	12<81	-------
	3017	*****	*******	*****	*******	1<32	-------	7<42	-------	5<62	-------	9<81	-------	5<62	-------	9<81	-------
	3018	*****	*******	*****	*******	1<32	-------	10<42	-------	6<62	-------	12<81	-------	6<62	-------	12<81	-------
	3019	*****	*******	*****	*******	0<32	-------	10<42	-------	6<62	-------	13<81	-------	6<62	-------	13<81	-------
	3020	*****	*******	*****	*******	-----	-------	14<42	-------	8<62	-------	18<81	-------	8<62	-------	18<81	-------
	3021	*****	*******	*****	*******	0<32	-------	13<42	-------	8<62	-------	17<81	-------	8<62	-------	17<81	-------
G3	3022	*****	*******	*****	*******	0<39	-------	16<32	-------	9<76	-------	20<62	-------	9<76	-------	20<62	-------
	3023	*****	*******	*****	*******	0<42	-------	15<32	-------	8<81	-------	19<62	-------	8<81	-------	19<62	-------
	3024	*****	*******	*****	*******	0<42	-------	17<32	-------	10<81	-------	21<62	-------	10<81	-------	21<62	-------
	3025	*****	*******	*****	*******	0<42	-------	16<32	-------	9<81	-------	20<62	-------	9<81	-------	20<62	-------
	3026	*****	*******	*****	*******	0<35	-------	18<32	-------	10<68	-------	23<62	-------	10<68	-------	23<62	-------
	3027	*****	*******	*****	*******	1<32	-------	16<42	-------	10<62	-------	21<81	-------	10<62	-------	21<81	-------
	3028	*****	*******	*****	*******	1<32	-------	18<42	-------	11<62	-------	22<81	-------	11<62	-------	22<81	-------
	3029	*****	*******	*****	*******	1<32	-------	15<42	-------	9<62	-------	20<81	-------	9<62	-------	20<81	-------
	3030	*****	*******	*****	*******	1<32	-------	14<42	-------	10<62	-------	18<81	-------	10<62	-------	18<81	-------
	3031	*****	*******	*****	*******	2<32	-------	8<42	-------	8<62	-------	11<81	-------	8<62	-------	11<81	-------
	3032	*****	*******	*****	*******	2<32	-------	8<42	-------	8<62	-------	11<81	-------	8<62	-------	11<81	-------
	3033	*****	*******	*****	*******	2<32	-------	5<42	-------	6<62	-------	7<81	-------	6<62	-------	7<81	-------
	3034	*****	*******	*****	*******	2<32	-------	7<42	-------	7<62	-------	9<81	-------	7<62	-------	9<81	-------
	3035	*****	*******	*****	*******	2<32	-------	5<42	-------	5<62	-------	7<81	-------	5<62	-------	7<81	-------
	3036	*****	*******	*****	*******	2<32	-------	11<42	-------	8<62	-------	14<81	-------	8<62	-------	14<81	-------
	3037	*****	*******	*****	*******	1<32	-------	11<35	-------	8<62	-------	15<69	-------	8<62	-------	15<69	-------
	3038	*****	*******	*****	*******	1<42	-------	17<32	-------	10<81	-------	21<62	-------	10<81	-------	21<62	-------
	3039	*****	*******	*****	*******	2<42	-------	12<32	-------	9<81	-------	16<62	-------	9<81	-------	16<62	-------
	3040	*****	*******	*****	*******	3<42	-------	15<32	-------	12<81	-------	20<62	-------	12<81	-------	20<62	-------
	3041	*****	*******	*****	*******	4<42	-------	10<32	-------	11<81	-------	14<62	-------	11<81	-------	14<62	-------
	3042	*****	*******	*****	*******	5<42	-------	10<32	-------	13<81	-------	14<62	-------	13<81	-------	14<62	-------
	3043	*****	*******	*****	*******	5<42	-------	9<32	-------	12<81	-------	13<62	-------	12<81	-------	13<62	-------
	3044	*****	*******	*****	*******	5<42	-------	10<32	-------	13<81	-------	14<62	-------	13<81	-------	14<62	-------

Fatigue check of main girder (21)

girder	panel point	checking point-1		checking point-2		checking point-3		checking point-4		checking point-5		checking point-6		checking point-7	
		top flange and trans.stiff		top flg and trans rib web		top flg and diaphragm		top flg and longit rib		bottom flg and trans.stiff		bottom flg and trans rib web		bottom flg and diaphragm	
		E grade		E grade		E grade		D grade		E grade		E grade		E grade	
		Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
G3	3045	12<81	-------	12<81	-------	12<81	-------	12<109	-------	13<57	-------	13<62	-------	13<62	-------
	3046	13<81	-------	13<81	-------	13<81	-------	13<109	-------	14<57	-------	14<62	-------	14<62	-------
	3047	11<81	-------	11<81	-------	11<81	-------	11<109	-------	13<57	-------	13<62	-------	13<62	-------
	3048	12<81	-------	12<81	-------	12<81	-------	12<109	-------	13<57	-------	13<62	-------	13<62	-------
	3049	10<81	-------	10<81	-------	10<81	-------	10<109	-------	12<57	-------	12<62	-------	12<62	-------
	3050	10<81	-------	10<81	-------	10<81	-------	10<109	-------	12<57	-------	12<62	-------	12<62	-------
	3051	8<81	-------	8<81	-------	8<81	-------	8<109	-------	12<61	-------	12<62	-------	12<62	-------
	3052	8<81	-------	8<81	-------	8<81	-------	8<109	-------	16<62	-------	16<62	-------	16<62	-------
	3053	5<81	-------	5<81	-------	5<81	-------	5<109	-------	10<62	-------	10<62	-------	10<62	-------
	3054	4<81	-------	4<81	-------	4<81	-------	4<109	-------	11<62	-------	11<62	-------	11<62	-------
	3055	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------
	J-1	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-2	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-3	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-4	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-5	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-6	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-7	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-8	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-9	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-10	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-11	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-12	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-13	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-14	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-15	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-16	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-17	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-18	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-19	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-20	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-21	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-22	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-23	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-24	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-25	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-26	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-27	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-28	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-29	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-30	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-31	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-32	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******

Fatigue check of main girder (22)

girder	panel point	checking point-8		checking point-9		checking point-10		checking point-11		checking point-12		checking point-13		checking point-14		checking point-15	
		bottom flg and longit rib		sole plate(橋軸)		top flg longit rib and trans rib		top flg longit rib and diaphragm		bottom flgのlongit rib and trans rib		bottom flg longit rib and diaphragm		web plate and top flg		web plate and bottom flg	
		D grade		G grade		E grade		E grade		E grade		E grade		D grade		D grade	
		Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
G3	3045	13<84	-------	*****	*******	12<81	-------	12<81	-------	13<62	-------	13<62	-------	12<109	-------	13<84	-------
	3046	14<84	-------	*****	*******	13<81	-------	13<81	-------	14<62	-------	14<62	-------	13<109	-------	14<84	-------
	3047	13<84	-------	*****	*******	11<81	-------	11<81	-------	13<62	-------	13<62	-------	11<109	-------	13<84	-------
	3048	13<84	-------	*****	*******	12<81	-------	12<81	-------	13<62	-------	13<62	-------	12<109	-------	13<84	-------
	3049	12<84	-------	*****	*******	10<81	-------	10<81	-------	12<62	-------	12<62	-------	10<109	-------	12<84	-------
	3050	12<84	-------	*****	*******	10<81	-------	10<81	-------	12<62	-------	12<62	-------	10<109	-------	12<84	-------
	3051	12<84	-------	*****	*******	8<81	-------	8<81	-------	12<62	-------	12<62	-------	8<109	-------	12<84	-------
	3052	16<84	-------	*****	*******	8<81	-------	8<81	-------	16<62	-------	16<62	-------	8<109	-------	16<84	-------
	3053	10<84	-------	*****	*******	5<81	-------	5<81	-------	10<62	-------	10<62	-------	5<109	-------	10<84	-------
	3054	11<84	-------	*****	*******	4<81	-------	4<81	-------	11<62	-------	11<62	-------	4<109	-------	11<84	-------
	3055	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------
	J-1	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	5<109	-------	14<84	-------
	J-2	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	7<109	-------	18<84	-------
	J-3	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	8<109	-------	18<84	-------
	J-4	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	9<109	-------	18<84	-------
	J-5	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	9<109	-------	18<84	-------
	J-6	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	9<109	-------	21<84	-------
	J-7	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	7<109	-------	17<84	-------
	J-8	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	6<84	-------	14<109	-------
	J-9	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	5<84	-------	10<109	-------
	J-10	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	5<84	-------	10<109	-------
	J-11	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	6<84	-------	14<109	-------
	J-12	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	8<84	-------	17<109	-------
	J-13	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	9<109	-------	19<84	-------
	J-14	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	10<109	-------	21<84	-------
	J-15	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	10<96	-------	23<84	-------
	J-16	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	10<84	-------	21<109	-------
	J-17	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	9<84	-------	20<109	-------
	J-18	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	8<84	-------	15<109	-------
	J-19	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	7<84	-------	10<109	-------
	J-20	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	6<84	-------	8<109	-------
	J-21	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	5<84	-------	10<109	-------
	J-22	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	8<84	-------	15<109	-------
	J-23	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	10<109	-------	21<84	-------
	J-24	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	12<109	-------	20<84	-------
	J-25	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	13<109	-------	16<84	-------
	J-26	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	13<109	-------	14<84	-------
	J-27	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	12<109	-------	13<84	-------
	J-28	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	12<109	-------	13<84	-------
	J-29	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	11<109	-------	13<84	-------
	J-30	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	10<109	-------	14<84	-------
	J-31	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	8<109	-------	16<84	-------
	J-32	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	5<109	-------	12<84	-------

Fatigue check of main girder (23)

girder	panel point	checking point-16		checking point-17		checking point-18		checking point-19		checking point-20		checking point-21		checking point-22		checking point-23	
		web (upper) of main girder and trans. stiff		web (lower) of main girder and trans. stiff		horizontal stiff on web (upper)		Horizontal stiff on web (lower)		Main girder web and cross beam bottom flg		main girder web and cross beam web (upper)		main girder web and cross beam web (lower)		main girder web and bracket web (upper)	
		E grade		E grade		G grade		G grade		G grade		E grade		E grade		E grade	
		Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
G3	3045	12<81	-------	13<62	-------	7<42	-------	*****	*******	8<32	-------	12<81	-------	8<62	-------	*****	*******
	3046	13<81	-------	14<62	-------	8<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	3047	11<81	-------	13<62	-------	7<42	-------	*****	*******	8<32	-------	11<81	-------	8<62	-------	*****	*******
	3048	12<81	-------	13<62	-------	7<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	3049	10<81	-------	12<62	-------	6<42	-------	*****	*******	8<32	-------	10<81	-------	8<62	-------	*****	*******
	3050	10<81	-------	12<62	-------	6<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	3051	8<81	-------	12<62	-------	4<42	-------	*****	*******	8<32	-------	8<81	-------	8<62	-------	*****	*******
	3052	8<81	-------	16<62	-------	3<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	3053	5<81	-------	10<62	-------	2<42	-------	*****	*******	8<32	-------	5<81	-------	8<62	-------	*****	*******
	3054	4<81	-------	11<62	-------	1<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	3055	-----	-------	-----	-------	-----	-------	*****	*******	-----	-------	-----	-------	-----	-------	*****	*******
	J-1	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-2	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-3	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-4	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-5	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-6	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-7	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-8	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-9	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-10	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-11	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-12	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-13	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-14	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-15	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-16	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-17	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-18	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-19	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-20	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-21	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-22	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-23	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-24	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-25	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-26	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-27	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-28	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-29	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-30	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-31	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-32	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******

Fatigue check of main girder (24)

girder	panel point	checking point-24		checking point-25		checking point-26		checking point-27		checking point-28		checking point-29		checking point-30		checking point-31	
		main girder web and bracket web (lower)		main girder web and bracket bottom flg		main girder web and trans rib flange (upper)		main girder web and trans rib flange (lower)		main girder web and trans rib web (upper)		main girder web and trans rib web (lower)		main girder web and diaphragm (upper)		main girder web and diaphragm (lower)	
		E grade		G grade		G grade		G grade		E grade		E grade		E grade		E grade	
		Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
G3	3045	*****	*******	*****	*******	5<42	-------	9<32	-------	12<81	-------	13<62	-------	12<81	-------	13<62	-------
	3046	*****	*******	*****	*******	5<42	-------	10<32	-------	13<81	-------	14<62	-------	13<81	-------	14<62	-------
	3047	*****	*******	*****	*******	4<42	-------	9<32	-------	11<81	-------	13<62	-------	11<81	-------	13<62	-------
	3048	*****	*******	*****	*******	4<42	-------	10<32	-------	12<81	-------	13<62	-------	12<81	-------	13<62	-------
	3049	*****	*******	*****	*******	4<42	-------	9<32	-------	10<81	-------	12<62	-------	10<81	-------	12<62	-------
	3050	*****	*******	*****	*******	3<42	-------	9<32	-------	10<81	-------	12<62	-------	10<81	-------	12<62	-------
	3051	*****	*******	*****	*******	2<42	-------	9<32	-------	8<81	-------	12<62	-------	8<81	-------	12<62	-------
	3052	*****	*******	*****	*******	1<42	-------	12<32	-------	8<81	-------	16<62	-------	8<81	-------	16<62	-------
	3053	*****	*******	*****	*******	1<42	-------	8<32	-------	5<81	-------	10<62	-------	5<81	-------	10<62	-------
	3054	*****	*******	*****	*******	0<32	-------	8<32	-------	4<81	-------	11<62	-------	4<81	-------	11<62	-------
	3055	*****	*******	*****	*******	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------
	J-1	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-2	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-3	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-4	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-5	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-6	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-7	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-8	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-9	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-10	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-11	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-12	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-13	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-14	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-15	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-16	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-17	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-18	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-19	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-20	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-21	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-22	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-23	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-24	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-25	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-26	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-27	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-28	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-29	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-30	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-31	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-32	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******

Fatigue check of main girder (25)

girder	panel point	checking point-1		checking point-2		checking point-3		checking point-4		checking point-5		checking point-6		checking point-7	
		top flange and trans.stiff		top flg and trans rib web		top flg and diaphragm		top flg and longit rib		bottom flg and trans.stiff		bottom flg and trans rib web		bottom flg and diaphragm	
		E grade		E grade		E grade		D grade		E grade		E grade		E grade	
		Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
G4	4001	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------
	4002	5<81	-------	5<81	-------	5<81	-------	5<109	-------	17<62	-------	17<62	-------	17<62	-------
	4003	8<81	-------	8<81	-------	8<81	-------	8<109	-------	18<60	-------	18<62	-------	18<62	-------
	4004	10<81	-------	10<81	-------	10<81	-------	10<109	-------	24<60	-------	24<62	-------	24<62	-------
	4005	11<81	-------	11<81	-------	11<81	-------	11<109	-------	21<55	-------	21<62	-------	21<62	-------
	4006	12<81	-------	12<81	-------	12<81	-------	12<109	-------	23<55	-------	23<62	-------	23<62	-------
	4007	12<81	-------	12<81	-------	12<81	-------	12<109	-------	22<54	-------	22<62	-------	22<62	-------
	4008	12<81	-------	12<81	-------	12<81	-------	12<109	-------	23<54	-------	23<62	-------	23<62	-------
	4009	12<81	-------	12<81	-------	12<81	-------	12<109	-------	22<54	-------	22<62	-------	22<62	-------
	4010	13<81	-------	13<81	-------	13<81	-------	13<109	-------	24<55	-------	24<62	-------	24<62	-------
	4011	12<81	-------	12<81	-------	12<81	-------	12<109	-------	22<55	-------	22<62	-------	22<62	-------
	4012	12<81	-------	12<81	-------	12<81	-------	12<109	-------	27<61	-------	27<62	-------	27<62	-------
	4013	10<81	-------	10<81	-------	10<81	-------	10<109	-------	21<61	-------	21<62	-------	21<62	-------
	4014	10<81	-------	10<81	-------	10<81	-------	10<109	-------	29<62	-------	29<62	-------	29<62	-------
	4015	8<62	-------	8<62	-------	8<62	-------	8<84	-------	21<81	-------	21<81	-------	21<81	-------
	4016	8<62	-------	8<62	-------	8<62	-------	8<84	-------	19<81	-------	19<81	-------	19<81	-------
	4017	8<62	-------	8<62	-------	8<62	-------	8<84	-------	14<81	-------	14<81	-------	14<81	-------
	4018	8<62	-------	8<62	-------	8<62	-------	8<84	-------	18<81	-------	18<81	-------	18<81	-------
	4019	8<62	-------	8<62	-------	8<62	-------	8<84	-------	19<81	-------	19<81	-------	19<81	-------
	4020	10<62	-------	10<62	-------	10<62	-------	10<84	-------	29<81	-------	29<81	-------	29<81	-------
	4021	10<62	-------	10<62	-------	10<62	-------	10<84	-------	28<72	-------	28<72	-------	28<72	-------
	4022	12<79	-------	12<79	-------	12<79	-------	12<107	-------	31<62	-------	31<62	-------	31<62	-------
	4023	11<81	-------	11<81	-------	11<81	-------	11<109	-------	31<62	-------	31<62	-------	31<62	-------
	4024	12<81	-------	12<81	-------	12<81	-------	12<109	-------	32<62	-------	32<62	-------	32<62	-------
	4025	12<81	-------	12<81	-------	12<81	-------	12<109	-------	32<62	-------	32<62	-------	32<62	-------
	4026	12<74	-------	12<74	-------	12<74	-------	12<100	-------	34<62	-------	34<62	-------	34<62	-------
	4027	12<62	-------	12<62	-------	12<62	-------	12<84	-------	33<76	-------	33<76	-------	33<76	-------
	4028	12<62	-------	12<62	-------	12<62	-------	12<84	-------	32<81	-------	32<81	-------	32<81	-------
	4029	11<62	-------	11<62	-------	11<62	-------	11<84	-------	29<81	-------	29<81	-------	29<81	-------
	4030	11<62	-------	11<62	-------	11<62	-------	11<84	-------	21<81	-------	21<81	-------	21<81	-------
	4031	9<62	-------	9<62	-------	9<62	-------	9<84	-------	13<70	-------	13<81	-------	13<81	-------
	4032	9<62	-------	9<62	-------	9<62	-------	9<84	-------	12<70	-------	12<81	-------	12<81	-------
	4033	8<62	-------	8<62	-------	8<62	-------	8<84	-------	9<66	-------	9<81	-------	9<66	-------
	4034	8<62	-------	8<62	-------	8<62	-------	8<84	-------	11<71	-------	11<81	-------	11<81	-------
	4035	8<62	-------	8<62	-------	8<62	-------	8<84	-------	10<71	-------	10<81	-------	10<81	-------
	4036	10<62	-------	10<62	-------	10<62	-------	10<84	-------	17<81	-------	17<81	-------	17<81	-------
	4037	11<62	-------	11<62	-------	11<62	-------	11<84	-------	22<67	-------	22<67	-------	22<67	-------
	4038	12<81	-------	12<81	-------	12<81	-------	12<109	-------	27<62	-------	27<62	-------	27<62	-------
	4039	12<81	-------	12<81	-------	12<81	-------	12<109	-------	20<61	-------	20<62	-------	20<62	-------
	4040	13<81	-------	13<81	-------	13<81	-------	13<109	-------	22<61	-------	22<62	-------	22<62	-------
	4041	13<81	-------	13<81	-------	13<81	-------	13<109	-------	20<60	-------	20<62	-------	20<62	-------
	4042	13<81	-------	13<81	-------	13<81	-------	13<109	-------	18<56	-------	18<62	-------	18<62	-------
	4043	13<81	-------	13<81	-------	13<81	-------	13<109	-------	18<56	-------	18<62	-------	18<62	-------
	4044	14<81	-------	14<81	-------	14<81	-------	14<109	-------	18<54	-------	18<62	-------	18<62	-------

Fatigue check of main girder (26)

girder	panel point	checking point-8		checking point-9		checking point-10		checking point-11		checking point-12		checking point-13		checking point-14		checking point-15	
		bottom flg and longit rib		sole plate(橋軸)		top flg longit rib and trans rib		top flg longit rib and diaphragm		bottom flgのlongit rib and trans rib		bottom flg longit rib and diaphragm		web plate and top flg		web plate and bottom flg	
		D grade		G grade		E grade		E grade		E grade		E grade		D grade		D grade	
		Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
	4001	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------
	4002	17<84	-------	*****	*******	5<81	-------	5<81	-------	17<62	-------	17<62	-------	5<109	-------	17<84	-------
	4003	18<84	-------	*****	*******	8<81	-------	8<81	-------	18<62	-------	18<62	-------	8<109	-------	18<84	-------
	4004	24<84	-------	*****	*******	10<81	-------	10<81	-------	24<62	-------	24<62	-------	10<109	-------	24<84	-------
	4005	21<84	-------	*****	*******	11<81	-------	11<81	-------	21<62	-------	21<62	-------	11<109	-------	21<84	-------
	4006	23<84	-------	*****	*******	12<81	-------	12<81	-------	23<62	-------	23<62	-------	12<109	-------	23<84	-------
	4007	22<84	-------	*****	*******	12<81	-------	12<81	-------	22<62	-------	22<62	-------	12<109	-------	22<84	-------
	4008	23<84	-------	*****	*******	12<81	-------	12<81	-------	23<62	-------	23<62	-------	12<109	-------	23<84	-------
	4009	22<84	-------	*****	*******	12<81	-------	12<81	-------	22<62	-------	22<62	-------	12<109	-------	22<84	-------
	4010	24<84	-------	*****	*******	13<81	-------	13<81	-------	24<62	-------	24<62	-------	13<109	-------	24<84	-------
	4011	22<84	-------	*****	*******	12<81	-------	12<81	-------	22<62	-------	22<62	-------	12<109	-------	22<84	-------
	4012	27<84	-------	*****	*******	12<81	-------	12<81	-------	27<62	-------	27<62	-------	12<109	-------	27<84	-------
	4013	21<84	-------	*****	*******	10<81	-------	10<81	-------	21<62	-------	21<62	-------	10<109	-------	21<84	-------
	4014	29<84	-------	*****	*******	10<81	-------	10<81	-------	29<62	-------	29<62	-------	10<109	-------	29<84	-------
	4015	21<109	-------	*****	*******	8<62	-------	8<62	-------	21<81	-------	21<81	-------	8<84	-------	21<109	-------
	4016	19<109	-------	*****	*******	8<62	-------	8<62	-------	19<81	-------	19<81	-------	8<84	-------	19<109	-------
	4017	14<109	-------	14<42	-------	8<62	-------	8<62	-------	14<81	-------	14<81	-------	8<84	-------	14<109	-------
	4018	18<109	-------	*****	*******	8<62	-------	8<62	-------	18<81	-------	18<81	-------	8<84	-------	18<109	-------
	4019	19<109	-------	*****	*******	8<62	-------	8<62	-------	19<81	-------	19<81	-------	8<84	-------	19<109	-------
	4020	29<109	-------	*****	*******	10<62	-------	10<62	-------	29<81	-------	29<81	-------	10<84	-------	29<109	-------
	4021	28<97	-------	*****	*******	10<62	-------	10<62	-------	28<72	-------	28<72	-------	10<84	-------	28<97	-------
	4022	31<84	-------	*****	*******	12<79	-------	12<79	-------	31<62	-------	31<62	-------	12<107	-------	31<84	-------
G4	4023	31<84	-------	*****	*******	11<81	-------	11<81	-------	31<62	-------	31<62	-------	11<109	-------	31<84	-------
	4024	32<84	-------	*****	*******	12<81	-------	12<81	-------	32<62	-------	32<62	-------	12<109	-------	32<84	-------
	4025	32<84	-------	*****	*******	12<81	-------	12<81	-------	32<62	-------	32<62	-------	12<109	-------	32<84	-------
	4026	34<84	-------	*****	*******	12<74	-------	12<74	-------	34<62	-------	34<62	-------	12<100	-------	34<84	-------
	4027	33<102	-------	*****	*******	12<62	-------	12<62	-------	33<76	-------	33<76	-------	12<84	-------	33<102	-------
	4028	32<109	-------	*****	*******	12<62	-------	12<62	-------	32<81	-------	32<81	-------	12<84	-------	32<109	-------
	4029	29<109	-------	*****	*******	11<62	-------	11<62	-------	29<81	-------	29<81	-------	11<84	-------	29<109	-------
	4030	21<109	-------	*****	*******	11<62	-------	11<62	-------	21<81	-------	21<81	-------	11<84	-------	21<109	-------
	4031	13<109	-------	*****	*******	9<62	-------	9<62	-------	13<81	-------	13<81	-------	9<84	-------	13<109	-------
	4032	12<109	-------	*****	*******	9<62	-------	9<62	-------	12<81	-------	12<81	-------	9<84	-------	12<109	-------
	4033	9<109	-------	9<34	-------	8<62	-------	8<62	-------	9<81	-------	9<81	-------	8<84	-------	9<109	-------
	4034	11<109	-------	*****	*******	8<62	-------	8<62	-------	11<81	-------	11<81	-------	8<84	-------	11<109	-------
	4035	10<109	-------	*****	*******	8<62	-------	8<62	-------	10<81	-------	10<81	-------	8<84	-------	10<109	-------
	4036	17<109	-------	*****	*******	10<62	-------	10<62	-------	17<81	-------	17<81	-------	10<84	-------	17<109	-------
	4037	22<91	-------	*****	*******	11<62	-------	11<62	-------	22<67	-------	22<67	-------	11<84	-------	22<91	-------
	4038	27<84	-------	*****	*******	12<81	-------	12<81	-------	27<62	-------	27<62	-------	12<109	-------	27<84	-------
	4039	20<84	-------	*****	*******	12<81	-------	12<81	-------	20<62	-------	20<62	-------	12<109	-------	20<84	-------
	4040	22<84	-------	*****	*******	13<81	-------	13<81	-------	22<62	-------	22<62	-------	13<109	-------	22<84	-------
	4041	20<84	-------	*****	*******	13<81	-------	13<81	-------	20<62	-------	20<62	-------	13<109	-------	20<84	-------
	4042	18<84	-------	*****	*******	13<81	-------	13<81	-------	18<62	-------	18<62	-------	13<109	-------	18<84	-------
	4043	18<84	-------	*****	*******	13<81	-------	13<81	-------	18<62	-------	18<62	-------	13<109	-------	18<84	-------
	4044	18<84	-------	*****	*******	14<81	-------	14<81	-------	18<62	-------	18<62	-------	14<109	-------	18<84	-------

Fatigue check of main girder (27)

girder	panel point	checking point-16		checking point-17		checking point-18		checking point-19		checking point-20		checking point-21		checking point-22		checking point-23	
		web (upper) of main girder and trans. stiff		web (lower) of main girder and trans. stiff		horizontal stiff on web (upper)		Horizontal stiff on web (lower)		Main girder web and cross beam bottom flg		main girder web and cross beam web (upper)		main girder web and cross beam web (lower)		main girder web and bracket web (upper)	
		E grade		E grade		G grade		G grade		G grade		E grade		E grade		E grade	
		Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
G4	4001	-----	-------	-----	-------	-----	-------	*****	*******	-----	-------	-----	-------	-----	-------	-----	-------
	4002	5<81	-------	17<62	-------	1<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	4<81	-------
	4003	8<81	-------	18<62	-------	2<42	-------	*****	*******	14<32	-------	8<81	-------	13<62	-------	7<81	-------
	4004	10<81	-------	24<62	-------	3<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	9<81	-------
	4005	11<81	-------	21<62	-------	4<42	-------	*****	*******	15<32	-------	11<81	-------	15<62	-------	10<81	-------
	4006	12<81	-------	23<62	-------	5<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	11<81	-------
	4007	12<81	-------	22<62	-------	5<42	-------	*****	*******	16<32	-------	12<81	-------	16<62	-------	11<81	-------
	4008	12<81	-------	23<62	-------	5<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	12<81	-------
	4009	12<81	-------	22<62	-------	6<42	-------	*****	*******	16<32	-------	12<81	-------	16<62	-------	12<81	-------
	4010	13<81	-------	24<62	-------	5<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	12<81	-------
	4011	12<81	-------	22<62	-------	5<42	-------	*****	*******	16<32	-------	12<81	-------	16<62	-------	11<81	-------
	4012	12<81	-------	27<62	-------	4<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	11<81	-------
	4013	10<81	-------	21<62	-------	4<42	-------	*****	*******	15<32	-------	10<81	-------	15<62	-------	9<81	-------
	4014	10<81	-------	29<62	-------	2<42	-------	21<32	-------	*****	*******	*****	*******	*****	*******	9<81	-------
	4015	8<62	-------	21<81	-------	*****	*******	15<42	-------	15<42	-------	8<62	-------	15<81	-------	8<62	-------
	4016	8<62	-------	19<81	-------	*****	*******	14<42	-------	*****	*******	*****	*******	*****	*******	7<62	-------
	4017	8<62	-------	14<81	-------	*****	*******	10<42	-------	10<42	-------	8<62	-------	10<81	-------	7<62	-------
	4018	8<62	-------	18<81	-------	*****	*******	13<42	-------	*****	*******	*****	*******	*****	*******	8<62	-------
	4019	8<62	-------	19<81	-------	*****	*******	13<42	-------	14<42	-------	8<62	-------	14<81	-------	8<62	-------
	4020	10<62	-------	29<81	-------	2<32	-------	22<42	-------	*****	*******	*****	*******	*****	*******	10<62	-------
	4021	10<62	-------	28<72	-------	2<32	-------	21<37	-------	21<37	-------	10<62	-------	21<72	-------	9<62	-------
	4022	12<79	-------	31<62	-------	3<41	-------	23<32	-------	*****	*******	*****	*******	*****	*******	11<79	-------
	4023	11<81	-------	31<62	-------	3<42	-------	22<32	-------	23<32	-------	11<81	-------	23<62	-------	10<81	-------
	4024	12<81	-------	32<62	-------	3<42	-------	24<32	-------	*****	*******	*****	*******	*****	*******	11<81	-------
	4025	12<81	-------	32<62	-------	3<42	-------	24<32	-------	24<32	-------	12<81	-------	24<62	-------	11<81	-------
	4026	12<74	-------	34<62	-------	3<38	-------	25<32	-------	*****	*******	*****	*******	*****	*******	11<74	-------
	4027	12<62	-------	33<76	-------	3<32	-------	24<39	-------	25<39	-------	12<62	-------	25<76	-------	11<62	-------
	4028	12<62	-------	32<81	-------	3<32	-------	23<42	-------	*****	*******	*****	*******	*****	*******	11<62	-------
	4029	11<62	-------	29<81	-------	*****	*******	21<42	-------	22<42	-------	11<62	-------	22<81	-------	11<62	-------
	4030	11<62	-------	21<81	-------	*****	*******	15<42	-------	*****	*******	*****	*******	*****	*******	10<62	-------
	4031	9<62	-------	13<81	-------	*****	*******	8<42	-------	9<42	-------	9<62	-------	9<81	-------	9<62	-------
	4032	9<62	-------	12<81	-------	*****	*******	8<42	-------	*****	*******	*****	*******	*****	*******	9<62	-------
	4033	8<62	-------	9<81	-------	*****	*******	6<42	-------	6<42	-------	8<62	-------	6<81	-------	8<62	-------
	4034	8<62	-------	11<81	-------	*****	*******	7<42	-------	*****	*******	*****	*******	*****	*******	8<62	-------
	4035	8<62	-------	10<81	-------	*****	*******	6<42	-------	6<42	-------	8<62	-------	6<81	-------	7<62	-------
	4036	10<62	-------	17<81	-------	*****	*******	12<42	-------	*****	*******	*****	*******	*****	*******	10<62	-------
	4037	11<62	-------	22<67	-------	4<32	-------	16<35	-------	16<35	-------	11<62	-------	16<67	-------	10<62	-------
	4038	12<81	-------	27<62	-------	4<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	12<81	-------
	4039	12<81	-------	20<62	-------	6<42	-------	*****	*******	14<32	-------	12<81	-------	14<62	-------	11<81	-------
	4040	13<81	-------	22<62	-------	6<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	12<81	-------
	4041	13<81	-------	20<62	-------	6<42	-------	*****	*******	14<32	-------	13<81	-------	14<62	-------	12<81	-------
	4042	13<81	-------	18<62	-------	7<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	13<81	-------
	4043	13<81	-------	18<62	-------	7<42	-------	*****	*******	12<32	-------	13<81	-------	12<62	-------	12<81	-------
	4044	14<81	-------	18<62	-------	7<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	13<81	-------

Fatigue check of main girder (28)

girder	panel point	checking point-24		checking point-25		checking point-26		checking point-27		checking point-28		checking point-29		checking point-30		checking point-31	
		main girder web and bracket web (lower)		main girder web and bracket bottom flg		main girder web and trans rib flange (upper)		main girder web and trans rib flange (lower)		main girder web and trans rib web (upper)		main girder web and trans rib web (lower)		main girder web and diaphragm (upper)		main girder web and diaphragm (lower)	
		E grade		G grade		G grade		G grade		E grade		E grade		E grade		E grade	
		Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
G4	4001	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------
	4002	1<81	-------	1<42	-------	2<32	-------	13<32	-------	5<81	-------	17<62	-------	5<81	-------	17<62	-------
	4003	3<81	-------	3<42	-------	0<32	-------	14<32	-------	8<81	-------	18<62	-------	8<81	-------	18<62	-------
	4004	4<81	-------	4<42	-------	0<32	-------	19<32	-------	10<81	-------	24<62	-------	10<81	-------	24<62	-------
	4005	5<81	-------	5<42	-------	1<42	-------	16<32	-------	11<81	-------	21<62	-------	11<81	-------	21<62	-------
	4006	6<81	-------	6<42	-------	2<42	-------	18<32	-------	12<81	-------	23<62	-------	12<81	-------	23<62	-------
	4007	6<81	-------	6<42	-------	2<42	-------	17<32	-------	12<81	-------	22<62	-------	12<81	-------	22<62	-------
	4008	7<81	-------	6<42	-------	2<42	-------	17<32	-------	12<81	-------	23<62	-------	12<81	-------	23<62	-------
	4009	7<81	-------	6<42	-------	2<42	-------	17<32	-------	12<81	-------	22<62	-------	12<81	-------	22<62	-------
	4010	6<81	-------	6<42	-------	2<42	-------	18<32	-------	13<81	-------	24<62	-------	13<81	-------	24<62	-------
	4011	6<81	-------	6<42	-------	2<42	-------	17<32	-------	12<81	-------	22<62	-------	12<81	-------	22<62	-------
	4012	5<81	-------	5<42	-------	0<42	-------	21<32	-------	12<81	-------	27<62	-------	12<81	-------	27<62	-------
	4013	5<81	-------	5<42	-------	1<42	-------	16<32	-------	10<81	-------	21<62	-------	10<81	-------	21<62	-------
	4014	4<81	-------	3<42	-------	2<32	-------	23<32	-------	10<81	-------	29<62	-------	10<81	-------	29<62	-------
	4015	3<62	-------	3<32	-------	1<42	-------	16<42	-------	8<62	-------	21<81	-------	8<62	-------	21<81	-------
	4016	3<62	-------	3<32	-------	-----	-------	15<42	-------	8<62	-------	19<81	-------	8<62	-------	19<81	-------
	4017	4<62	-------	4<32	-------	1<32	-------	11<42	-------	8<62	-------	14<81	-------	8<62	-------	14<81	-------
	4018	4<62	-------	4<32	-------	-----	-------	14<42	-------	8<62	-------	18<81	-------	8<62	-------	18<81	-------
	4019	4<62	-------	4<32	-------	-----	-------	15<42	-------	8<62	-------	19<81	-------	8<62	-------	19<81	-------
	4020	4<62	-------	3<32	-------	2<42	-------	24<42	-------	10<62	-------	29<81	-------	10<62	-------	29<81	-------
	4021	4<62	-------	3<32	-------	2<37	-------	23<37	-------	10<62	-------	28<72	-------	10<62	-------	28<72	-------
	4022	4<79	-------	4<41	-------	2<32	-------	25<32	-------	12<79	-------	31<62	-------	12<79	-------	31<62	-------
	4023	4<81	-------	4<42	-------	1<32	-------	24<32	-------	11<81	-------	31<62	-------	11<81	-------	31<62	-------
	4024	4<81	-------	4<42	-------	2<32	-------	26<32	-------	12<81	-------	32<62	-------	12<81	-------	32<62	-------
	4025	4<81	-------	4<42	-------	2<32	-------	26<32	-------	12<81	-------	32<62	-------	12<81	-------	32<62	-------
	4026	4<74	-------	4<38	-------	2<32	-------	28<32	-------	12<74	-------	34<62	-------	12<74	-------	34<62	-------
	4027	4<62	-------	4<32	-------	2<39	-------	26<39	-------	12<62	-------	33<76	-------	12<62	-------	33<76	-------
	4028	4<62	-------	4<32	-------	2<42	-------	25<42	-------	12<62	-------	32<81	-------	12<62	-------	32<81	-------
	4029	4<62	-------	4<32	-------	1<42	-------	23<42	-------	11<62	-------	29<81	-------	11<62	-------	29<81	-------
	4030	5<62	-------	5<32	-------	2<32	-------	16<42	-------	11<62	-------	21<81	-------	11<62	-------	21<81	-------
	4031	5<62	-------	5<32	-------	3<32	-------	9<42	-------	9<62	-------	13<81	-------	9<62	-------	13<81	-------
	4032	6<62	-------	6<32	-------	3<32	-------	9<42	-------	9<62	-------	12<81	-------	9<62	-------	12<81	-------
	4033	5<62	-------	5<32	-------	3<32	-------	6<42	-------	8<62	-------	9<81	-------	8<62	-------	9<81	-------
	4034	5<62	-------	5<32	-------	3<32	-------	8<42	-------	8<62	-------	11<81	-------	8<62	-------	11<81	-------
	4035	5<62	-------	5<32	-------	3<32	-------	7<42	-------	8<62	-------	10<81	-------	8<62	-------	10<81	-------
	4036	6<62	-------	5<32	-------	2<32	-------	13<42	-------	10<62	-------	17<81	-------	10<62	-------	17<81	-------
	4037	5<62	-------	5<32	-------	1<32	-------	17<35	-------	11<62	-------	22<67	-------	11<62	-------	22<67	-------
	4038	6<81	-------	5<42	-------	1<42	-------	22<32	-------	12<81	-------	27<62	-------	12<81	-------	27<62	-------
	4039	6<81	-------	6<42	-------	3<42	-------	15<32	-------	12<81	-------	20<62	-------	12<81	-------	20<62	-------
	4040	7<81	-------	7<42	-------	3<42	-------	17<32	-------	13<81	-------	22<62	-------	13<81	-------	22<62	-------
	4041	7<81	-------	7<42	-------	3<42	-------	15<32	-------	13<81	-------	20<62	-------	13<81	-------	20<62	-------
	4042	8<81	-------	8<42	-------	4<42	-------	14<32	-------	13<81	-------	18<62	-------	13<81	-------	18<62	-------
	4043	8<81	-------	8<42	-------	4<42	-------	13<32	-------	13<81	-------	18<62	-------	13<81	-------	18<62	-------
	4044	8<81	-------	8<42	-------	4<42	-------	13<32	-------	14<81	-------	18<62	-------	14<81	-------	18<62	-------

Fatigue check of main girder (29)

girder	panel point	checking point-1		checking point-2		checking point-3		checking point-4		checking point-5		checking point-6		checking point-7	
		top flange and trans.stiff		top flg and trans rib web		top flg and diaphragm		top flg and longit rib		bottom flg and trans.stiff		bottom flg and trans rib web		bottom flg and diaphragm	
		E grade		E grade		E grade		D grade		E grade		E grade		E grade	
		Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
	4045	13<81	-------	13<81	-------	13<81	-------	13<109	-------	18<54	-------	18<62	-------	18<62	-------
	4046	14<81	-------	14<81	-------	14<81	-------	14<109	-------	18<54	-------	18<62	-------	18<62	-------
	4047	13<81	-------	13<81	-------	13<81	-------	13<109	-------	17<54	-------	17<62	-------	17<62	-------
	4048	13<81	-------	13<81	-------	13<81	-------	13<109	-------	17<54	-------	17<62	-------	17<62	-------
	4049	12<81	-------	12<81	-------	12<81	-------	12<109	-------	17<57	-------	17<62	-------	17<62	-------
	4050	12<81	-------	12<81	-------	12<81	-------	12<109	-------	17<57	-------	17<62	-------	17<62	-------
	4051	11<81	-------	11<81	-------	11<81	-------	11<109	-------	17<61	-------	17<62	-------	17<62	-------
	4052	10<81	-------	10<81	-------	10<81	-------	10<109	-------	18<62	-------	18<62	-------	18<62	-------
	4053	7<81	-------	7<81	-------	7<81	-------	7<109	-------	14<62	-------	14<62	-------	14<62	-------
	4054	6<81	-------	6<81	-------	6<81	-------	6<109	-------	13<62	-------	13<62	-------	13<62	-------
	4055	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------
	J-1	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-2	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-3	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-4	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-5	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-6	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-7	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-8	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-9	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-10	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
G4	J-11	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-12	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-13	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-14	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-15	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-16	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-17	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-18	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-19	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-20	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-21	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-22	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-23	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-24	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-25	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-26	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-27	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-28	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-29	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-30	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-31	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-32	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******

Fatigue check of main girder (30)

girder	panel point	checking point-8		checking point-9		checking point-10		checking point-11		checking point-12		checking point-13		checking point-14		checking point-15	
		bottom flg and longit rib		sole plate(橋軸)		top flg longit rib and trans rib		top flg longit rib and diaphragm		bottom flgのlongit rib and trans rib		bottom flg longit rib and diaphragm		web plate and top flg		web plate and bottom flg	
		D grade		G grade		E grade		E grade		E grade		E grade		D grade		D grade	
		Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
G4	4045	18<84	-------	*****	*******	13<81	-------	13<81	-------	18<62	-------	18<62	-------	13<109	-------	18<84	-------
	4046	18<84	-------	*****	*******	14<81	-------	14<81	-------	18<62	-------	18<62	-------	14<109	-------	18<84	-------
	4047	17<84	-------	*****	*******	13<81	-------	13<81	-------	17<62	-------	17<62	-------	13<109	-------	17<84	-------
	4048	17<84	-------	*****	*******	13<81	-------	13<81	-------	17<62	-------	17<62	-------	13<109	-------	17<84	-------
	4049	17<84	-------	*****	*******	12<81	-------	12<81	-------	17<62	-------	17<62	-------	12<109	-------	17<84	-------
	4050	17<84	-------	*****	*******	12<81	-------	12<81	-------	17<62	-------	17<62	-------	12<109	-------	17<84	-------
	4051	17<84	-------	*****	*******	11<81	-------	11<81	-------	17<62	-------	17<62	-------	11<109	-------	17<84	-------
	4052	18<84	-------	*****	*******	10<81	-------	10<81	-------	18<62	-------	18<62	-------	10<109	-------	18<84	-------
	4053	14<84	-------	*****	*******	7<81	-------	7<81	-------	14<62	-------	14<62	-------	7<109	-------	14<84	-------
	4054	13<84	-------	*****	*******	6<81	-------	6<81	-------	13<62	-------	13<62	-------	6<109	-------	13<84	-------
	4055	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------
	J-1	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	7<109	-------	23<84	-------
	J-2	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	10<109	-------	25<84	-------
	J-3	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	12<109	-------	23<84	-------
	J-4	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	12<109	-------	22<84	-------
	J-5	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	12<109	-------	24<84	-------
	J-6	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	12<109	-------	28<84	-------
	J-7	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	11<109	-------	30<84	-------
	J-8	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	9<84	-------	24<109	-------
	J-9	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	7<84	-------	17<109	-------
	J-10	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	8<84	-------	17<109	-------
	J-11	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	9<84	-------	25<109	-------
	J-12	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	10<84	-------	28<105	-------
	J-13	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	11<109	-------	31<84	-------
	J-14	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	12<109	-------	32<84	-------
	J-15	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	13<103	-------	34<84	-------
	J-16	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	12<84	-------	33<109	-------
	J-17	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	11<84	-------	29<109	-------
	J-18	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	10<84	-------	18<109	-------
	J-19	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	8<84	-------	11<109	-------
	J-20	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	8<84	-------	10<109	-------
	J-21	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	9<84	-------	15<109	-------
	J-22	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	11<84	-------	22<109	-------
	J-23	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	13<109	-------	28<84	-------
	J-24	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	13<109	-------	22<84	-------
	J-25	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	14<109	-------	22<84	-------
	J-26	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	14<109	-------	19<84	-------
	J-27	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	14<109	-------	18<84	-------
	J-28	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	13<109	-------	17<84	-------
	J-29	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	13<109	-------	19<84	-------
	J-30	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	12<109	-------	20<84	-------
	J-31	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	10<109	-------	18<84	-------
	J-32	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	7<109	-------	16<84	-------

Fatigue check of main girder (31)

girder	panel point	checking point-16		checking point-17		checking point-18		checking point-19		checking point-20		checking point-21		checking point-22		checking point-23	
		web (upper) of main girder and trans. stiff		web (lower) of main girder and trans. stiff		horizontal stiff on web (upper)		Horizontal stiff on web (lower)		Main girder web and cross beam bottom flg		main girder web and cross beam web (upper)		main girder web and cross beam web (lower)		main girder web and bracket web (upper)	
		E grade		E grade		G grade		G grade		G grade		E grade		E grade		E grade	
		Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
G4	4045	13<81	-------	18<62	-------	7<42	-------	*****	*******	12<32	-------	13<81	-------	12<62	-------	13<81	-------
	4046	14<81	-------	18<62	-------	8<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	13<81	-------
	4047	13<81	-------	17<62	-------	7<42	-------	*****	*******	12<32	-------	13<81	-------	12<62	-------	13<81	-------
	4048	13<81	-------	17<62	-------	7<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	13<81	-------
	4049	12<81	-------	17<62	-------	6<42	-------	*****	*******	12<32	-------	12<81	-------	12<62	-------	12<81	-------
	4050	12<81	-------	17<62	-------	6<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	11<81	-------
	4051	11<81	-------	17<62	-------	5<42	-------	*****	*******	12<32	-------	11<81	-------	12<62	-------	10<81	-------
	4052	10<81	-------	18<62	-------	4<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	10<81	-------
	4053	7<81	-------	14<62	-------	3<42	-------	*****	*******	10<32	-------	7<81	-------	10<62	-------	7<81	-------
	4054	6<81	-------	13<62	-------	2<42	-------	*****	*******	*****	*******	*****	*******	*****	*******	5<81	-------
	4055	-----	-------	-----	-------	-----	-------	*****	*******	-----	-------	-----	-------	-----	-------	-----	-------
	J-1	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-2	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-3	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-4	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-5	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-6	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-7	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-8	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-9	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-10	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-11	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-12	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-13	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-14	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-15	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-16	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-17	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-18	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-19	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-20	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-21	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-22	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-23	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-24	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-25	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-26	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-27	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-28	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-29	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-30	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-31	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-32	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******

Fatigue check of main girder (32)

girder	panel point	checking point-24		checking point-25		checking point-26		checking point-27		checking point-28		checking point-29		checking point-30		checking point-31	
		main girder web and bracket web (lower)		main girder web and bracket bottom flg		main girder web and trans rib flange (upper)		main girder web and trans rib flange (lower)		main girder web and trans rib web (upper)		main girder web and trans rib web (lower)		main girder web and diaphragm (upper)		main girder web and diaphragm (lower)	
		E grade		G grade		G grade		G grade		E grade		E grade		E grade		E grade	
		Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
G4	4045	8<81	-------	8<42	-------	4<42	-------	13<32	-------	13<81	-------	18<62	-------	13<81	-------	18<62	-------
	4046	9<81	-------	8<42	-------	5<42	-------	14<32	-------	14<81	-------	18<62	-------	14<81	-------	18<62	-------
	4047	8<81	-------	8<42	-------	4<42	-------	13<32	-------	13<81	-------	17<62	-------	13<81	-------	17<62	-------
	4048	8<81	-------	8<42	-------	4<42	-------	13<32	-------	13<81	-------	17<62	-------	13<81	-------	17<62	-------
	4049	7<81	-------	7<42	-------	3<42	-------	13<32	-------	12<81	-------	17<62	-------	12<81	-------	17<62	-------
	4050	7<81	-------	7<42	-------	3<42	-------	13<32	-------	12<81	-------	17<62	-------	12<81	-------	17<62	-------
	4051	6<81	-------	5<42	-------	2<42	-------	13<32	-------	11<81	-------	17<62	-------	11<81	-------	17<62	-------
	4052	5<81	-------	5<42	-------	2<42	-------	14<32	-------	10<81	-------	18<62	-------	10<81	-------	18<62	-------
	4053	4<81	-------	4<42	-------	1<42	-------	11<32	-------	7<81	-------	14<62	-------	7<81	-------	14<62	-------
	4054	2<81	-------	2<42	-------	-----	-------	10<32	-------	6<81	-------	13<62	-------	6<81	-------	13<62	-------
	4055	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------	-----	-------
	J-1	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-2	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-3	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-4	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-5	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-6	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-7	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-8	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-9	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-10	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-11	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-12	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-13	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-14	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-15	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-16	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-17	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-18	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-19	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-20	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-21	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-22	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-23	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-24	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-25	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-26	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-27	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-28	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-29	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-30	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-31	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******
	J-32	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******	*****	*******

６－５　Fatigue design of cross beam

６－５－１　Locations and grades for checking of fatigue strength of welding joints

No.	Description of checking point	Grade	*	Type of joint
1	Top flange and transverse stiffener	E	Yes	Cross joint
2	Bottom flange and transverse stiffener	E	Yes	Cross joint
3	Bottom flange and main girder web	E	Yes	Cross joint
4	cross beam web and top flange	D	No	
5	cross beam web and bottom flange	D	No	
6	cross beam web(upper) and main girder web	E	Yes	Cross joint
7	cross beam web(lower) and main girder web	E	Yes	Cross joint
8	cross beam web(upper) and transverse stiffener	E	Yes	Cross joint
9	cross beam web(lower) and transverse stiffener	E	Yes	Cross joint
10	cross beam horizontal stiffener(upper)	G	Yes	
11	cross beam horizontal stiffener(lower)	G	Yes	

＊ Mods due to THK (or Modifications due to plate thickness)

６－５－２　Detailed calculation

(1) Representative point No.1

Girder No.=Cross beam, Node point=CR1-031(j-end), cross beam horiz stiffner(lower側), Grade G

(a)Property of section

Unit(m,m^2,m^4)

Rc	Ri	A	Ix	Iy	Ixy	x	y
-----	-----	--------	0.018980	--------	--------	---	0.8545

(b)Section forces and stresses

Factor for calculation of stress γa = 1.0

Unit(kN･m、N/mm^2)

	Lane 1		Lane 2		Lane 3		Lane 4		Lane 5	
Cross	Mx	σ	Mx	σ	Mx	σ	Mx	σ	Mx	σ
1	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
2	-0.3	0	-0.3	0	-0.2	0	-0.1	0	0.0	0
3	-0.6	0	-0.5	0	-0.3	0	-0.2	0	0.1	0
4	-0.9	0	-0.7	0	-0.4	0	-0.2	0	0.1	0
5	-1.2	0	-1.0	0	-0.6	0	-0.3	0	0.1	0
6	-1.5	0	-1.2	0	-0.7	0	-0.4	0	0.1	0
7	-1.7	0	-1.4	0	-0.8	0	-0.4	0	0.2	0
8	-1.9	0	-1.5	0	-0.8	0	-0.4	0	0.2	0
9	-2.1	0	-1.6	0	-0.9	0	-0.4	0	0.3	0
10	-2.2	0	-1.7	0	-0.9	0	-0.4	0	0.3	0
11	-2.3	0	-1.8	0	-0.9	0	-0.3	0	0.4	0
12	-2.3	0	-1.8	0	-0.8	0	-0.2	0	0.5	0
13	-2.2	0	-1.7	0	-0.7	0	-0.2	0	0.6	0
14	-1.9	0	-1.5	0	-0.6	0	-0.1	0	0.6	0
15	-1.5	0	-1.1	0	-0.4	0	0.0	0	0.5	0
16	-0.9	0	-0.7	0	-0.2	0	0.1	0	0.4	0
17	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
18	1.3	0	0.9	0	0.2	0	-0.2	0	-0.6	0
19	2.9	0	2.0	0	0.4	0	-0.5	0	-1.4	0
20	4.8	0	3.2	0	0.6	0	-0.8	0	-2.4	0
21	7.0	0	4.7	0	0.9	0	-1.2	0	-3.4	0
22	9.4	0	6.2	0	1.1	0	-1.7	0	-4.5	0
23	12.0	1	8.0	0	1.3	0	-2.1	0	-5.7	0
24	14.8	1	10.0	0	1.7	0	-2.6	0	-7.1	0
25	17.1	1	12.7	1	2.5	0	-3.2	0	-9.0	0
26	18.8	1	15.9	1	5.0	0	-3.3	0	-12.2	-1
27	20.4	1	15.4	1	13.5	1	-1.2	0	-18.2	-1
28	18.4	1	15.4	1	28.9	1	2.4	0	-26.7	-1
29	-7.1	0	58.2	3	35.6	2	-3.2	0	-36.8	-2
30	-59.4	-3	159.6	7	22.1	1	-21.4	-1	-45.1	-2
31	-83.2	-4	204.4	9	5.8	0	-30.2	-1	-41.0	-2

	Lane 1		Lane 2		Lane 3		Lane 4		Lane 5	
Cross	Mx	σ	Mx	σ	Mx	σ	Mx	σ	Mx	σ
32	-47.5	-2	113.9	5	1.7	0	-16.4	-1	-20.2	-1
33	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
34	17.1	1	-31.7	-1	-7.7	0	2.8	0	5.8	0
35	15.6	1	-16.9	-1	-15.9	-1	-2.2	0	1.3	0
36	12.4	1	-4.2	0	-16.4	-1	-7.6	0	-6.2	0
37	10.9	0	-0.4	0	-12.2	-1	-12.1	-1	-12.0	-1
38	9.9	0	1.1	0	-9.8	0	-14.4	-1	-14.4	-1
39	9.2	0	1.9	0	-9.1	0	-14.8	-1	-14.8	-1
40	8.6	0	2.1	0	-8.7	0	-14.6	-1	-14.6	-1
41	8.1	0	2.0	0	-8.2	0	-14.0	-1	-14.0	-1
42	7.5	0	1.8	0	-7.7	0	-13.3	-1	-13.3	-1
43	6.9	0	1.7	0	-7.3	0	-12.4	-1	-12.4	-1
44	6.3	0	1.5	0	-6.9	0	-11.7	-1	-11.7	-1
45	5.7	0	1.4	0	-6.5	0	-10.9	0	-10.9	0
46	5.2	0	1.3	0	-6.1	0	-10.1	0	-10.1	0
47	4.7	0	1.2	0	-5.6	0	-9.2	0	-9.2	0
48	4.2	0	1.1	0	-5.1	0	-8.2	0	-8.2	0
49	3.7	0	1.0	0	-4.5	0	-7.2	0	-7.2	0
50	3.2	0	0.9	0	-3.9	0	-6.2	0	-6.2	0
51	2.6	0	0.8	0	-3.2	0	-5.0	0	-5.0	0
52	2.0	0	0.6	0	-2.5	0	-3.9	0	-3.9	0
53	1.4	0	0.5	0	-1.7	0	-2.6	0	-2.6	0
54	0.7	0	0.2	0	-0.8	0	-1.3	0	-1.3	0
55	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0

Live load modification factor $\gamma_T = \gamma_{T1} * \gamma_{T2}$

Lane i	L_{B1}(m)	Log L_{B1}+1.50	γ_{T1}	L_{B2}(m)	γ_{T2}	γ_T
1	20.453	2.81	2.81	---	1.00	2.81
2	76.615	3.38	3.00	---	1.00	3.00
3	76.385	3.38	3.00	---	1.00	3.00
4	21.669	2.84	2.84	---	1.00	2.84
5	76.205	3.38	3.00	---	1.00	3.00

(c)Calculation for stress range

・Stress range

Equation $\Delta\sigma_{i,j} = |\sigma_{i,k1} - \sigma_{i,k2}| * \gamma_{T(i)}$

Where, $\Delta\sigma_{i,j}$: Stress range

'i' means lane number and 'j' means number of stress range.

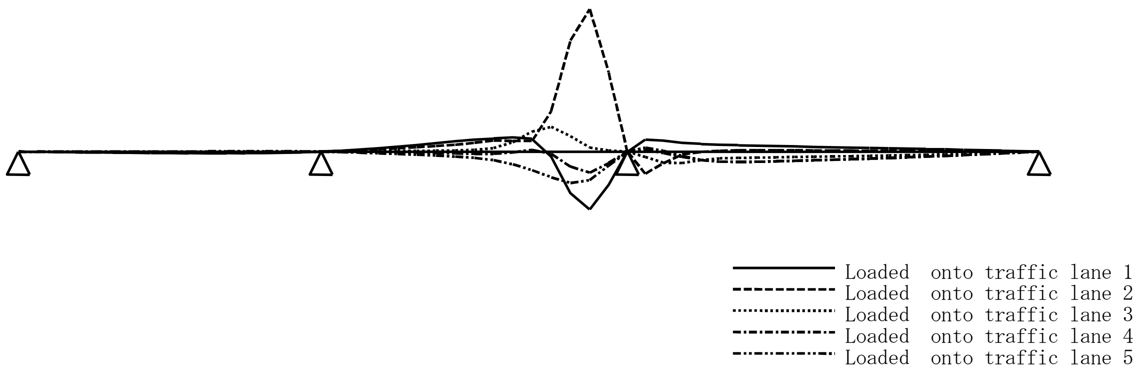
$\sigma_{i,k1}$: Maximum stress

'i' means lane number and 'k1' means section number of loading.

$\sigma_{i,k2}$: Minimum stress

'i' means lane number and 'k2' means section number of loading.

$\gamma_{T(i)}$: Correction factor of live load. 'i' means lane number



$\Delta\sigma_{1,1} = |\sigma_{1,27} - \sigma_{1,31}| * \gamma_{T(1)} = |(1) - (-4)| * 2.81 = 13\ N/mm^2$

$\Delta\sigma_{1,2} = |\sigma_{1,34} - \sigma_{1,12}| * \gamma_{T(1)} = |(1) - (0)| * 2.81 = 2\ N/mm^2$

$\Delta\sigma_{2,1} = |\sigma_{2,31} - \sigma_{2,34}| * \gamma_{T(2)} = |(9) - (-1)| * 3.00 = 32\ N/mm^2$

$\Delta\sigma_{2,2} = |\sigma_{2,26} - \sigma_{2,28}| * \gamma_{T(2)} = |(1) - (1)| * 3.00 = 0\ N/mm^2$

$\Delta\sigma_{3,1} = |\sigma_{3,29} - \sigma_{3,36}| * \gamma_{T(3)} = |(2) - (-1)| * 3.00 = 7\ N/mm^2$

$\Delta\sigma_{4,1} = |\sigma_{4,34} - \sigma_{4,31}| * \gamma_{T(4)} = |(0) - (-1)| * 2.84 = 4\ N/mm^2$

$\Delta\sigma_{4,2} = |\sigma_{4,28} - \sigma_{4,39}| * \gamma_{T(4)} = |(0) - (-1)| * 2.84 = 2\ N/mm^2$

$\Delta\sigma_{4,3} = |\sigma_{4,23} - \sigma_{4,26}| * \gamma_{T(4)} = |(0) - (0)| * 2.84 = 0\ N/mm^2$

$\Delta\sigma_{5,1} = |\sigma_{5,34} - \sigma_{5,30}| * \gamma_{T(5)} = |(0) - (-2)| * 3.00 = 7\ N/mm^2$

$\Delta\sigma_{5,2} = |\sigma_{5,54} - \sigma_{5,39}| * \gamma_{T(5)} = |(0) - (-1)| * 3.00 = 2\ N/mm^2$

Maximum stress range $\Delta\sigma_{max} = \Delta\sigma_{2,1} = 32\ N/mm^2$

(d)Modification factor

・Modification factor for mean stress C_R

Unit(kN·m、N/mm^2)

Case of section force	Mx	σ	γ_T	$\sigma * \gamma_T$
Dead load	-156.8	-7	---	---
T-load Max.	204.4	9	3.00	28
T-load Min.	-83.2	-4	2.81	-11

Dead load + T-load max σ_{max} = (-7) + (28) = 21 N/mm^2

Dead load + T-load min σ_{min} = (-7) + (-11) = -18 N/mm^2

Stress ratio R = σmin / σmax = -18 / 21 = -0.86 (-1.00<R<1.00)

∴C_R = 1.00

・Modification factor for thickness of plate C_t

Thickness of main plate 9mm Additional thickness 9mm

∴C_t = 1.00 (Thickness of main plate =9mm ≦ 25mm)

(e)Check based on cut-off stress range for sinusoidal stress (Rough fatigue check)

・Before finishing (Fatigue strength grade G)

Cut-off stress range for sinusoidal stress

$\Delta\sigma_{ce}$ = 32 N/mm^2

Max stress range

$\Delta\sigma_{max}$ = 32 N/mm^2 ≦ $\Delta\sigma_{ce} * C_R * C_t$ = 32 * 1.00 * 1.00 = 32 OK

2) Representative point No.2

Girder No.=Cross beam, Node point=CR3-035(i-end), cross beam horiz stiffner(lower側), Grade G

(a)Property of section

Unit(m, m^2, m^4)

Rc	Ri	A	Ix	Iy	Ixy	x	y
-----	-----	--------	0.018983	--------	--------	---	0.8545

(b)Section forces and stresses

Factor for calculation of stress γa = 1.0

Unit(kN･m、N/mm^2)

	Lane 1		Lane 2		Lane 3		Lane 4		Lane 5	
Cross	Mx	σ	Mx	σ	Mx	σ	Mx	σ	Mx	σ
1	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
2	0.5	0	0.4	0	0.1	0	0.0	0	-0.2	0
3	1.0	0	0.7	0	0.3	0	0.0	0	-0.5	0
4	1.4	0	1.1	0	0.4	0	0.0	0	-0.7	0
5	1.9	0	1.4	0	0.5	0	0.0	0	-0.9	0
6	2.3	0	1.7	0	0.6	0	-0.1	0	-1.1	0
7	2.7	0	2.0	0	0.7	0	-0.1	0	-1.3	0
8	3.0	0	2.2	0	0.7	0	-0.2	0	-1.5	0
9	3.3	0	2.4	0	0.7	0	-0.3	0	-1.7	0
10	3.6	0	2.5	0	0.7	0	-0.4	0	-1.9	0
11	3.7	0	2.6	0	0.7	0	-0.5	0	-2.0	0
12	3.7	0	2.6	0	0.6	0	-0.6	0	-2.2	0
13	3.6	0	2.5	0	0.5	0	-0.7	0	-2.2	0
14	3.3	0	2.2	0	0.4	0	-0.7	0	-2.1	0
15	2.6	0	1.8	0	0.2	0	-0.7	0	-1.8	0
16	1.6	0	1.1	0	0.1	0	-0.5	0	-1.1	0
17	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
18	-2.3	0	-1.5	0	0.0	0	0.8	0	1.8	0
19	-5.2	0	-3.2	0	0.1	0	2.0	0	4.0	0
20	-8.5	0	-5.3	0	0.2	0	3.3	0	6.8	0
21	-12.1	-1	-7.5	0	0.4	0	4.9	0	9.8	0
22	-15.8	-1	-9.7	0	0.6	0	6.6	0	13.0	1
23	-19.5	-1	-12.0	-1	0.9	0	8.4	0	16.3	1
24	-23.1	-1	-14.2	-1	1.2	0	10.3	0	19.7	1
25	-26.4	-1	-16.4	-1	1.3	0	12.1	1	23.2	1
26	-29.1	-1	-18.5	-1	1.1	0	13.7	1	27.0	1
27	-30.5	-1	-20.6	-1	0.0	0	15.1	1	30.7	1
28	-29.9	-1	-22.8	-1	-3.1	0	15.7	1	33.7	2
29	-25.5	-1	-25.8	-1	-9.4	0	15.5	1	37.3	2
30	-16.7	-1	-28.5	-1	-20.2	-1	13.9	1	41.1	2
31	-5.5	0	-24.9	-1	-35.4	-2	9.9	0	42.3	2

	Lane 1		Lane 2		Lane 3		Lane 4		Lane 5	
Cross	Mx	σ	Mx	σ	Mx	σ	Mx	σ	Mx	σ
32	3.8	0	-12.0	-1	-44.6	-2	4.3	0	34.9	2
33	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
34	-21.4	-1	3.1	0	110.7	5	-15.5	-1	-65.9	-3
35	-41.8	-2	5.8	0	198.1	9	-38.4	-2	-105.7	-5
36	-39.5	-2	16.9	1	158.2	7	-33.2	-1	-64.4	-3
37	-23.6	-1	24.7	1	60.5	3	6.3	0	-0.8	0
38	-13.2	-1	17.1	1	18.3	1	26.6	1	26.6	1
39	-9.5	0	4.8	0	16.9	1	27.6	1	27.6	1
40	-8.8	0	-0.3	0	17.4	1	25.9	1	25.9	1
41	-9.3	0	-0.7	0	15.4	1	24.1	1	24.1	1
42	-9.5	0	-0.9	0	13.7	1	22.2	1	22.2	1
43	-9.3	0	-1.3	0	12.3	1	20.3	1	20.3	1
44	-8.9	0	-1.6	0	11.2	1	18.5	1	18.5	1
45	-8.6	0	-1.9	0	10.2	0	16.9	1	16.9	1
46	-8.1	0	-2.1	0	9.2	0	15.3	1	15.3	1
47	-7.6	0	-2.2	0	8.3	0	13.7	1	13.7	1
48	-7.0	0	-2.2	0	7.3	0	12.1	1	12.1	1
49	-6.3	0	-2.2	0	6.4	0	10.5	0	10.5	0
50	-5.5	0	-2.0	0	5.4	0	8.9	0	8.9	0
51	-4.6	0	-1.8	0	4.4	0	7.2	0	7.2	0
52	-3.6	0	-1.4	0	3.3	0	5.5	0	5.5	0
53	-2.5	0	-1.0	0	2.2	0	3.7	0	3.7	0
54	-1.2	0	-0.5	0	1.1	0	1.8	0	1.8	0
55	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0

Live load modification factor $\gamma_T = \gamma_{T1} * \gamma_{T2}$

Lane i	L_{B1}(m)	Log L_{B1}+1.50	γ_{T1}	L_{B2}(m)	γ_{T2}	γ_T
1	103.142	3.51	3.00	---	1.00	3.00
2	76.615	3.38	3.00	---	1.00	3.00
3	102.651	3.51	3.00	---	1.00	3.00
4	17.506	2.74	2.74	---	1.00	2.74
5	18.407	2.76	2.76	---	1.00	2.76

(c)Calculation for stress range

・Stress range

Equation $\Delta\sigma_{i,j} = |\sigma_{i,k1} - \sigma_{i,k2}| * \gamma_{T(i)}$

Where, $\Delta\sigma_{i,j}$: Stress range

'i' means lane number and 'j' means number of stress range.

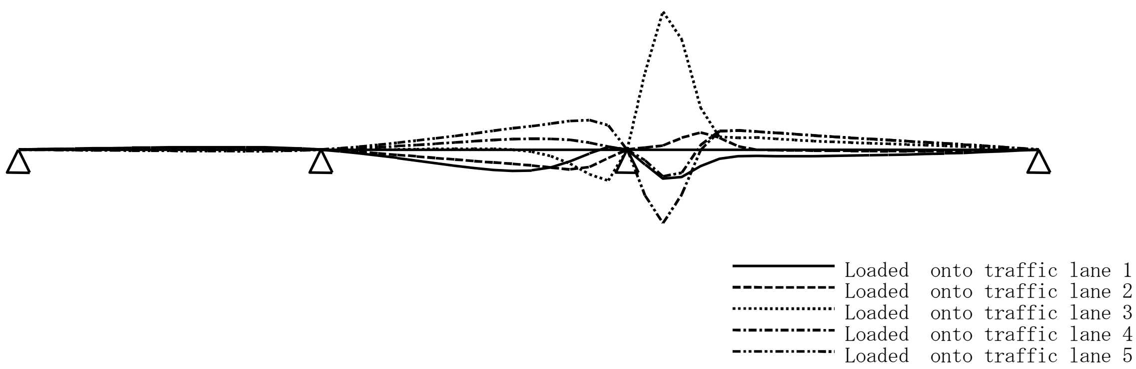
$\sigma_{i,k1}$: Maximum stress

'i' means lane number and 'k1' means section number of loading.

$\sigma_{i,k2}$: Minimum stress

'i' means lane number and 'k2' means section number of loading.

$\gamma_{T(i)}$: Correction factor of live load. 'i' means lane number



$\Delta\sigma_{1,1} = |\sigma_{1,32} - \sigma_{1,35}| * \gamma_{T(1)} = |(0) - (-2)| * 3.00 = 6$ N/mm^2

$\Delta\sigma_{1,2} = |\sigma_{1,12} - \sigma_{1,27}| * \gamma_{T(1)} = |(0) - (-1)| * 3.00 = 5$ N/mm^2

$\Delta\sigma_{1,3} = |\sigma_{1,40} - \sigma_{1,42}| * \gamma_{T(1)} = |(0) - (0)| * 3.00 = 0$ N/mm^2

$\Delta\sigma_{2,1} = |\sigma_{2,37} - \sigma_{2,30}| * \gamma_{T(2)} = |(1) - (-1)| * 3.00 = 7$ N/mm^2

$\Delta\sigma_{2,2} = |\sigma_{2,12} - \sigma_{2,8}| * \gamma_{T(2)} = |(0) - (0)| * 3.00 = 0$ N/mm^2

$\Delta\sigma_{3,1} = |\sigma_{3,35} - \sigma_{3,32}| * \gamma_{T(3)} = |(9) - (-2)| * 3.00 = 33$ N/mm^2

$\Delta\sigma_{3,2} = |\sigma_{3,40} - \sigma_{3,39}| * \gamma_{T(3)} = |(1) - (1)| * 3.00 = 0$ N/mm^2

$\Delta\sigma_{4,1} = |\sigma_{4,39} - \sigma_{4,35}| * \gamma_{T(4)} = |(1) - (-2)| * 2.74 = 8$ N/mm^2

$\Delta\sigma_{4,2} = |\sigma_{4,28} - \sigma_{4,19}| * \gamma_{T(4)} = |(1) - (0)| * 2.74 = 2$ N/mm^2

$\Delta\sigma_{5,1} = |\sigma_{5,31} - \sigma_{5,35}| * \gamma_{T(5)} = |(2) - (-5)| * 2.76 = 18$ N/mm^2

$\Delta\sigma_{5,2} = |\sigma_{5,39} - \sigma_{5,54}| * \gamma_{T(5)} = |(1) - (0)| * 2.76 = 3$ N/mm^2

Maximum stress range $\Delta\sigma_{max} = \Delta\sigma_{3,1} = 33$ N/mm^2

(d)Modification factor

・Modification factor for mean stress C_R

Unit(kN·m、N/mm²)

Case of section force	Mx	σ	γ_T	$\sigma * \gamma_T$
Dead load	213.4	10	---	---
T-load Max.	198.1	9	3.00	27
T-load Min.	-105.7	-5	2.76	-13

Dead load + T-load max σ_{max} = (10) + (27) = 36 N/mm²

Dead load + T-load min σ_{min} = (10) + (-13) = -4 N/mm²

Stress ratio R = σmin / σmax = -4 / 36 = -0.10 (-1.00<R<1.00)

∴C_R = 1.00

・Modification factor for thickness of plate C_t

Thickness of main plate 9mm Additional thickness 9mm

∴C_t = 1.00 (Thickness of main plate =9mm ≦ 25mm)

(e)Check based on cut-off stress range for sinusoidal stress (Rough fatigue check)

・Before finishing (Fatigue strength grade G)

Cut-off stress range for sinusoidal stress

$\Delta\sigma_{ce}$ = 32 N/mm²

Max stress range

$\Delta\sigma_{max}$ = 33 N/mm² ＞ $\Delta\sigma_{ce} * C_R * C_t$ = 32 * 1.00 * 1.00 = 32 NG

(f) Check of accumulative damages (Detailed check)

Accumulative damages $D = \Sigma D_{i,j}$

Where

D :Accumulative damages

i :Lane No.

j :Stress range No.

$D_{i,j}$:Damage level at lane i and stress range j

$D_{i,j} = nt_i / N_{i,j}$

Where

nt_i:Frequency of stress range level $\Delta\sigma_{i,j}$

$nt_i = NT_i * 365 *$ Design working life (years)

Where

NT_i : Frequency of fatigue design load

$NT_i = ADTT_{SLi} * \gamma_n$

Where

$ADTT_{SLi}$: Heavy traffic density (vehicle /par day/ par lane)

γ_n : Modification factor for frequency (= 0.03)

$N_{i,j}$:Limit of repetitions of stress loading for stress range level $\Delta\sigma_{i,j}$

$N_{i,j} = 2 * 10^6 * (\Delta\sigma_f * C_R * C_t)^m / \Delta\sigma_{i,j}^m$

($N_{i,j} = \infty$ in case of $\Delta\sigma_{i,j} \leqq \Delta\sigma_{ve} * C_R * C_t$)

Where

$\Delta\sigma_f$: $2*10^6$ cycles basic allowable stress range for normal stress

$\Delta\sigma_{i,j}$: Stress range

m : Exponent shows incline of fatigue curve; In case of joint under normal stress m=3

$\Delta\sigma_{ve}$: Cut off stress range for variable stress range

・Before finishing (Fatigue strength Grade G)

NT_i = $ADTT_{SLi}$ * γ_n = 1672 * 0.03 = 50

nt_i = NT_i * 365 * Design working life (year) = 50 * 365 * 100 = 1.83E+6

$\Delta\sigma_f$ = 50 N/mm^2 $\Delta\sigma_f * C_R * C_t$ = 50 * 1.00 * 1.00 = 50 N/mm^2

$\Delta\sigma_{ve}$ = 15 N/mm^2 $\Delta\sigma_{ve} * C_R * C_t$ = 15 * 1.00 * 1.00 = 15 N/mm^2

m = 3 (In case of joint under normal stress)

$N_{i,j} = 2 * 10^6 * (\Delta\sigma_f * C_R * C_t)^m / \Delta\sigma_{i,j}^m$

$N_{1,1} = \infty$ ($\sigma_{1,1} = 6 \leqq \Delta\sigma_{ve} * C_R * C_t = 15$)

$N_{1,2} = \infty$ ($\sigma_{1,2} = 5 \leqq \Delta\sigma_{ve} * C_R * C_t = 15$)

$N_{1,3} = \infty$ ($\sigma_{1,3} = 0 \leqq \Delta\sigma_{ve} * C_R * C_t = 15$)

$N_{2,1} = \infty$ ($\sigma_{2,1} = 7 \leqq \Delta\sigma_{ve} * C_R * C_t = 15$)

$N_{2,2} = \infty$ ($\sigma_{2,2} = 0 \leqq \Delta\sigma_{ve} * C_R * C_t = 15$)

$N_{3,1} = 2 * 10^6 * 50^3 / 33^3 = 7.10E+6$

$N_{3,2} = \infty$ ($\sigma_{3,2} = 0 \leqq \Delta\sigma_{ve} * C_R * C_t = 15$)

$N_{4,1} = \infty$ ($\sigma_{4,1} = 8 \leqq \Delta\sigma_{ve} * C_R * C_t = 15$)

$N_{4,2} = \infty$ ($\sigma_{4,2} = 2 \leqq \Delta\sigma_{ve} * C_R * C_t = 15$)

$N_{5,1} = 2 * 10^6 * 50^3 / 18^3 = 4.02E+7$

$N_{5,2} = \infty$ ($\sigma_{5,2} = 3 \leqq \Delta\sigma_{ve} * C_R * C_t = 15$)

Accumulative damages D = 0.30 ≦ 1.0 OK

Lane i	Stress range j	$\Delta\sigma_{i,j}$	nt_i	$N_{i,j}$	$D_{i,j}$(=$nt_i/N_{i,j}$)
1	1	6	1.83E+6	∞	0.00
1	2	5	1.83E+6	∞	0.00
1	3	0	1.83E+6	∞	0.00
2	1	7	1.83E+6	∞	0.00
2	2	0	1.83E+6	∞	0.00
3	1	33	1.83E+6	7.10E+6	0.26
3	2	0	1.83E+6	∞	0.00
4	1	8	1.83E+6	∞	0.00
4	2	2	1.83E+6	∞	0.00
5	1	18	1.83E+6	4.02E+7	0.05
5	2	3	1.83E+6	∞	0.00
					Total D = 0.30

6－5－3　Detailed fatigue check

Fatigue check of cross beam(1)

girder	panel point		panel point	checking point -1		checking point -2		checking point -3		checking point -4		checking point -5		checking point -6	
				top flg and trans stiff		bott flg and and trans siff		bott flange and main girder web		cross beam web and top flg		cross beam web and bott flg		cross beam web(上) and main girder web	
				E grade		E grade		E grade		D grade		D grade		E grade	
				Rough fatigue	Detailed fatigue check D = Σ Dij	Rough fatigue	Detailed fatigue check D = Σ Dij	Rough fatigue	Detailed fatigue check D = Σ Dij	Rough fatigue	Detailed fatigue check D = Σ Dij	Rough fatigue	Detailed fatigue check D = Σ Dij	Rough fatigue	Detailed fatigue check D = Σ Dij
Cross beam	CR1-001	I	201001	26<62	-------	29<81	-------	30<81	-------	26<84	-------	29<109	-------	26<62	-------
		J	102001	21<81	-------	24<62	-------	24<62	-------	21<109	-------	24<84	-------	21<81	-------
	CR2-001	I	202001	7<62	-------	11<76	-------	11<76	-------	7<84	-------	11<103	-------	7<62	-------
		J	103001	11<73	-------	18<62	-------	18<62	-------	11<99	-------	18<84	-------	11<73	-------
	CR3-001	I	203001	6<62	-------	14<81	-------	14<81	-------	6<84	-------	14<109	-------	6<62	-------
		J	104001	9<81	-------	23<62	-------	23<62	-------	9<109	-------	23<84	-------	9<81	-------
	CR1-003	I	201003	15<79	-------	21<62	-------	22<62	-------	15<107	-------	21<84	-------	15<79	-------
		J	102003	29<62	-------	42<77	-------	43<77	-------	29<84	-------	42<104	-------	29<62	-------
	CR2-003	I	202003	19<62	-------	35<66	-------	36<66	-------	19<84	-------	35<90	-------	19<62	-------
		J	103003	19<62	-------	36<62	-------	36<62	-------	19<85	-------	36<84	-------	19<62	-------
	CR3-003	I	203003	12<62	-------	28<65	-------	28<65	-------	12<84	-------	28<88	-------	12<62	-------
		J	104003	6<81	-------	14<62	-------	14<62	-------	6<109	-------	14<84	-------	6<81	-------
	CR1-005	I	201005	17<65	-------	24<62	-------	25<62	-------	17<89	-------	24<84	-------	17<65	-------
		J	102005	32<67	-------	46<62	-------	47<62	-------	32<91	-------	46<84	-------	32<67	-------
	CR2-005	I	202005	22<67	-------	40<62	-------	40<62	-------	22<90	-------	40<84	-------	22<67	-------
		J	103005	23<67	-------	42<62	-------	43<62	-------	23<91	-------	42<84	-------	23<67	-------
	CR3-005	I	203005	15<67	-------	35<62	-------	36<62	-------	15<91	-------	35<84	-------	15<67	-------
		J	104005	8<70	-------	19<62	-------	19<62	-------	8<95	-------	19<84	-------	8<70	-------
	CR1-007	I	201007	18<72	-------	26<62	-------	26<62	-------	18<98	-------	26<84	-------	18<72	-------
		J	102007	33<62	-------	48<63	-------	48<63	-------	33<84	-------	48<85	-------	33<62	-------
	CR2-007	I	202007	23<65	-------	43<62	-------	44<62	-------	23<88	-------	43<84	-------	23<65	-------
		J	103007	23<67	-------	42<62	-------	42<62	-------	23<91	-------	42<84	-------	23<67	-------
	CR3-007	I	203007	15<68	-------	35<62	-------	36<62	-------	15<92	-------	35<84	-------	15<68	-------
		J	104007	9<66	-------	21<62	-------	21<62	-------	9<90	-------	21<84	-------	9<66	-------
	CR1-009	I	201009	18<69	-------	26<62	-------	27<62	-------	18<94	-------	26<84	-------	18<69	-------
		J	102009	33<62	-------	48<62	-------	48<62	-------	33<85	-------	48<84	-------	33<62	-------
	CR2-009	I	202009	23<65	-------	43<62	-------	44<62	-------	23<88	-------	43<84	-------	23<65	-------
		J	103009	22<65	-------	42<62	-------	42<62	-------	22<88	-------	42<84	-------	22<65	-------
	CR3-009	I	203009	15<66	-------	36<62	-------	36<62	-------	15<89	-------	36<84	-------	15<66	-------
		J	104009	9<66	-------	21<62	-------	21<62	-------	9<89	-------	21<84	-------	9<66	-------
	CR1-011	I	201011	18<64	-------	26<62	-------	27<62	-------	18<87	-------	26<84	-------	18<64	-------
		J	102011	32<62	-------	47<63	-------	47<63	-------	32<84	-------	47<85	-------	32<62	-------
	CR2-011	I	202011	23<62	-------	42<63	-------	43<63	-------	23<84	-------	42<85	-------	23<62	-------
		J	103011	23<64	-------	43<62	-------	44<62	-------	23<86	-------	43<84	-------	23<64	-------
	CR3-011	I	203011	16<62	-------	37<62	-------	37<62	-------	16<85	-------	37<84	-------	16<62	-------
		J	104011	9<66	-------	21<62	-------	21<62	-------	9<89	-------	21<84	-------	9<66	-------
	CR1-013	I	201013	17<74	-------	25<62	-------	25<62	-------	17<100	-------	25<84	-------	17<74	-------
		J	102013	30<62	-------	44<81	-------	45<81	-------	30<84	-------	44<109	-------	30<62	-------
	CR2-013	I	202013	21<62	-------	40<76	-------	40<76	-------	21<84	-------	40<103	-------	21<62	-------
		J	103013	23<62	-------	42<66	-------	43<66	-------	23<84	-------	42<90	-------	23<62	-------
	CR3-013	I	203013	15<62	-------	35<73	-------	36<73	-------	15<84	-------	35<98	-------	15<62	-------
		J	104013	10<81	-------	22<62	-------	23<62	-------	10<109	-------	22<84	-------	10<81	-------

Fatigue check of cross beam(2)

girder	panel point		panel point	checking point -7		checking point -8		checking point -9		checking point -10		checking point -11	
				cross beam web(下) and main girder web		cross beam web(上) and trans stiff		cross beam web(下) and trans stiff		cross beam horiz stiff (上側)		cross beam horiz stiff (下側)	
				E grade		E grade		E grade		G grade		G grade	
				Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
Cross beam	CR1-001	I	201001	29<81	-------	26<62	-------	29<81	-------	15<32	-------	18<42	-------
		J	102001	24<62	-------	21<81	-------	24<62	-------	12<42	-------	15<32	-------
	CR2-001	I	202001	11<76	-------	7<62	-------	11<76	-------	4<32	-------	8<39	-------
		J	103001	18<62	-------	11<73	-------	18<62	-------	6<38	-------	12<32	-------
	CR3-001	I	203001	14<81	-------	6<62	-------	14<81	-------	2<32	-------	10<42	-------
		J	104001	23<62	-------	9<81	-------	23<62	-------	3<42	-------	17<32	-------
	CR1-003	I	201003	21<62	-------	15<79	-------	21<62	-------	7<41	-------	14<32	-------
		J	102003	42<77	-------	29<62	-------	42<77	-------	15<32	-------	28<40	-------
	CR2-003	I	202003	35<66	-------	19<62	-------	35<66	-------	8<32	-------	25<34	-------
		J	103003	36<62	-------	19<62	-------	36<62	-------	8<32	-------	25<32	-------
	CR3-003	I	203003	28<65	-------	12<62	-------	28<65	-------	4<32	-------	20<33	-------
		J	104003	14<62	-------	6<81	-------	14<62	-------	2<42	-------	10<32	-------
	CR1-005	I	201005	24<62	-------	17<65	-------	24<62	-------	9<34	-------	16<32	-------
		J	102005	46<62	-------	32<67	-------	46<62	-------	16<35	-------	31<32	-------
	CR2-005	I	202005	40<62	-------	22<67	-------	40<62	-------	9<34	-------	28<32	-------
		J	103005	42<62	-------	23<67	-------	42<62	-------	10<35	-------	29<32	-------
	CR3-005	I	203005	35<62	-------	15<67	-------	35<62	-------	5<35	-------	25<32	-------
		J	104005	19<62	-------	8<70	-------	19<62	-------	3<36	-------	13<32	-------
	CR1-007	I	201007	26<62	-------	18<72	-------	26<62	-------	9<37	-------	17<32	-------
		J	102007	48<63	-------	33<62	-------	48<63	-------	17<32	-------	31<32	-------
	CR2-007	I	202007	43<62	-------	23<65	-------	43<62	-------	10<33	-------	30<32	-------
		J	103007	42<62	-------	23<67	-------	42<62	-------	10<35	-------	29<32	-------
	CR3-007	I	203007	35<62	-------	15<68	-------	35<62	-------	5<35	-------	25<32	-------
		J	104007	21<62	-------	9<66	-------	21<62	-------	3<34	-------	14<32	-------
	CR1-009	I	201009	26<62	-------	18<69	-------	26<62	-------	9<36	-------	18<32	-------
		J	102009	48<62	-------	33<62	-------	48<62	-------	17<32	-------	32<32	-------
	CR2-009	I	202009	43<62	-------	23<65	-------	43<62	-------	10<34	-------	30<32	-------
		J	103009	42<62	-------	22<65	-------	42<62	-------	10<33	-------	29<32	-------
	CR3-009	I	203009	36<62	-------	15<66	-------	36<62	-------	5<34	-------	26<32	-------
		J	104009	21<62	-------	9<66	-------	21<62	-------	3<34	-------	15<32	-------
	CR1-011	I	201011	26<62	-------	18<64	-------	26<62	-------	9<33	-------	18<32	-------
		J	102011	47<63	-------	32<62	-------	47<63	-------	17<32	-------	31<33	-------
	CR2-011	I	202011	42<63	-------	23<62	-------	42<63	-------	10<32	-------	29<33	-------
		J	103011	43<62	-------	23<64	-------	43<62	-------	10<33	-------	30<32	-------
	CR3-011	I	203011	37<62	-------	16<62	-------	37<62	-------	5<32	-------	26<32	-------
		J	104011	21<62	-------	9<66	-------	21<62	-------	3<34	-------	15<32	-------
	CR1-013	I	201013	25<62	-------	17<74	-------	25<62	-------	9<38	-------	17<32	-------
		J	102013	44<81	-------	30<62	-------	44<81	-------	16<32	-------	29<42	-------
	CR2-013	I	202013	40<76	-------	21<62	-------	40<76	-------	9<32	-------	28<39	-------
		J	103013	42<66	-------	23<62	-------	42<66	-------	10<32	-------	29<34	-------
	CR3-013	I	203013	35<73	-------	15<62	-------	35<73	-------	5<32	-------	25<37	-------
		J	104013	22<62	-------	10<81	-------	22<62	-------	3<42	-------	16<32	-------

Fatigue check of cross beam(3)

girder	panel point		panel point	checking point -1		checking point -2		checking point -3		checking point -4		checking point -5		checking point -6	
				top flg and trans stiff		bott flg and and trans siff		bott flange and main girder web		cross beam web and top flg		cross beam web and bott flg		cross beam web(上) and main girder web	
				E grade		E grade		E grade		D grade		D grade		E grade	
				Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
Cross beam	CR1-015	I	201015	17<62	-------	24<62	-------	25<62	-------	17<85	-------	24<84	-------	17<62	-------
		J	102015	29<62	-------	42<67	-------	43<67	-------	29<84	-------	42<91	-------	29<62	-------
	CR2-015	I	202015	19<62	-------	35<67	-------	36<67	-------	19<84	-------	35<91	-------	19<62	-------
		J	103015	20<64	-------	38<62	-------	38<62	-------	20<86	-------	38<84	-------	20<64	-------
	CR3-015	I	203015	13<62	-------	31<66	-------	31<66	-------	13<84	-------	31<89	-------	13<62	-------
		J	104015	9<62	-------	22<66	-------	22<66	-------	9<84	-------	22<89	-------	9<62	-------
	CR1-017	I	201017	*****	*******	*****	*******	18<70	-------	12<84	-------	17<95	-------	12<62	-------
		J	102017	*****	*******	*****	*******	14<62	-------	10<94	-------	14<84	-------	10<69	-------
	CR2-017	I	202017	3<62	-------	4<71	-------	4<71	-------	3<84	-------	4<96	-------	3<62	-------
		J	103017	4<72	-------	6<62	-------	6<62	-------	4<97	-------	6<84	-------	4<72	-------
	CR3-017	I	203017	3<66	-------	8<62	-------	8<62	-------	3<90	-------	8<84	-------	3<66	-------
		J	104017	5<62	-------	13<72	-------	13<72	-------	5<84	-------	13<98	-------	5<62	-------
	CR1-019	I	201019	17<62	-------	25<62	-------	25<62	-------	17<84	-------	25<84	-------	17<62	-------
		J	102019	32<66	-------	46<62	-------	46<62	-------	32<89	-------	46<84	-------	32<66	-------
	CR2-019	I	202019	20<66	-------	37<62	-------	37<62	-------	20<89	-------	37<84	-------	20<66	-------
		J	103019	21<73	-------	39<62	-------	39<62	-------	21<98	-------	39<84	-------	21<73	-------
	CR3-019	I	203019	14<71	-------	33<62	-------	33<62	-------	14<96	-------	33<84	-------	14<71	-------
		J	104019	9<62	-------	22<71	-------	22<71	-------	9<84	-------	22<96	-------	9<62	-------
	CR1-021	I	201021	18<70	-------	26<62	-------	26<62	-------	18<95	-------	26<84	-------	18<70	-------
		J	102021	29<62	-------	42<71	-------	43<71	-------	29<84	-------	42<96	-------	29<62	-------
	CR2-021	I	202021	21<62	-------	39<66	-------	39<66	-------	21<84	-------	39<90	-------	21<62	-------
		J	103021	22<62	-------	41<62	-------	42<62	-------	22<84	-------	41<85	-------	22<62	-------
	CR3-021	I	203021	15<62	-------	36<64	-------	37<64	-------	15<84	-------	36<87	-------	15<62	-------
		J	104021	10<67	-------	24<62	-------	24<62	-------	10<91	-------	24<84	-------	10<67	-------
	CR1-023	I	201023	18<66	-------	26<62	-------	27<62	-------	18<90	-------	26<84	-------	18<66	-------
		J	102023	29<62	-------	42<76	-------	42<76	-------	29<84	-------	42<102	-------	29<62	-------
	CR2-023	I	202023	21<62	-------	39<71	-------	39<71	-------	21<84	-------	39<97	-------	21<62	-------
		J	103023	22<62	-------	40<69	-------	41<69	-------	22<84	-------	40<94	-------	22<62	-------
	CR3-023	I	203023	16<62	-------	37<75	-------	37<75	-------	16<84	-------	37<101	-------	16<62	-------
		J	104023	10<74	-------	24<62	-------	24<62	-------	10<101	-------	24<84	-------	10<74	-------
	CR1-025	I	201025	18<65	-------	26<62	-------	26<62	-------	18<88	-------	26<84	-------	18<65	-------
		J	102025	29<62	-------	42<76	-------	42<76	-------	29<84	-------	42<104	-------	29<62	-------
	CR2-025	I	202025	20<62	-------	38<73	-------	39<73	-------	20<84	-------	38<99	-------	20<62	-------
		J	103025	21<62	-------	40<68	-------	40<68	-------	21<84	-------	40<93	-------	21<62	-------
	CR3-025	I	203025	16<62	-------	38<75	-------	38<75	-------	16<84	-------	38<102	-------	16<62	-------
		J	104025	9<74	-------	21<62	-------	22<62	-------	9<101	-------	21<84	-------	9<74	-------
	CR1-027	I	201027	18<62	-------	26<63	-------	27<63	-------	18<84	-------	26<85	-------	18<62	-------
		J	102027	29<62	-------	42<66	-------	43<66	-------	29<84	-------	42<89	-------	29<62	-------
	CR2-027	I	202027	20<62	-------	37<67	-------	38<67	-------	20<84	-------	37<91	-------	20<62	-------
		J	103027	21<64	-------	40<62	-------	40<62	-------	21<86	-------	40<84	-------	21<64	-------
	CR3-027	I	203027	17<62	-------	39<66	-------	39<66	-------	17<84	-------	39<89	-------	17<62	-------
		J	104027	7<66	-------	16<62	-------	16<62	-------	7<89	-------	16<84	-------	7<66	-------

Fatigue check of cross beam(4)

girder	panel point		panel point	checking point -7		checking point -8		checking point -9		checking point -10		checking point -11	
				cross beam web(下) and main girder web		cross beam web(上) and trans stiff		cross beam web(下) and trans stiff		cross beam horiz stiff (上側)		cross beam horiz stiff (下側)	
				E grade		E grade		E grade		G grade		G grade	
				Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
Cross beam	CR1-015	I	201015	24<62	-------	17<62	-------	24<62	-------	9<32	-------	16<32	-------
		J	102015	42<67	-------	29<62	-------	42<67	-------	15<32	-------	28<35	-------
	CR2-015	I	202015	35<67	-------	19<62	-------	35<67	-------	8<32	-------	25<35	-------
		J	103015	38<62	-------	20<64	-------	38<62	-------	9<33	-------	26<32	-------
	CR3-015	I	203015	31<66	-------	13<62	-------	31<66	-------	4<32	-------	22<34	-------
		J	104015	22<66	-------	9<62	-------	22<66	-------	3<32	-------	16<34	-------
	CR1-017	I	201017	17<70	-------	*****	*******	*****	*******	6<32	-------	12<36	-------
		J	102017	14<62	-------	*****	*******	*****	*******	5<36	-------	10<32	-------
	CR2-017	I	202017	4<71	-------	3<62	-------	4<71	-------	1<32	-------	3<36	-------
		J	103017	6<62	-------	4<72	-------	6<62	-------	2<37	-------	4<32	-------
	CR3-017	I	203017	8<62	-------	3<66	-------	8<62	-------	1<34	-------	6<32	-------
		J	104017	13<72	-------	5<62	-------	13<72	-------	2<32	-------	9<37	-------
	CR1-019	I	201019	25<62	-------	17<62	-------	25<62	-------	9<32	-------	17<32	-------
		J	102019	46<62	-------	32<66	-------	46<62	-------	16<34	-------	30<32	-------
	CR2-019	I	202019	37<62	-------	20<66	-------	37<62	-------	9<34	-------	26<32	-------
		J	103019	39<62	-------	21<73	-------	39<62	-------	9<37	-------	27<32	-------
	CR3-019	I	203019	33<62	-------	14<71	-------	33<62	-------	5<37	-------	24<32	-------
		J	104019	22<71	-------	9<62	-------	22<71	-------	3<32	-------	16<36	-------
	CR1-021	I	201021	26<62	-------	18<70	-------	26<62	-------	9<36	-------	17<32	-------
		J	102021	42<71	-------	29<62	-------	42<71	-------	15<32	-------	28<36	-------
	CR2-021	I	202021	39<66	-------	21<62	-------	39<66	-------	9<32	-------	27<34	-------
		J	103021	41<62	-------	22<62	-------	41<62	-------	10<32	-------	29<32	-------
	CR3-021	I	203021	36<64	-------	15<62	-------	36<64	-------	5<32	-------	26<33	-------
		J	104021	24<62	-------	10<67	-------	24<62	-------	3<34	-------	17<32	-------
	CR1-023	I	201023	26<62	-------	18<66	-------	26<62	-------	9<34	-------	17<32	-------
		J	102023	42<76	-------	29<62	-------	42<76	-------	15<32	-------	28<39	-------
	CR2-023	I	202023	39<71	-------	21<62	-------	39<71	-------	9<32	-------	27<37	-------
		J	103023	40<69	-------	22<62	-------	40<69	-------	10<32	-------	28<36	-------
	CR3-023	I	203023	37<75	-------	16<62	-------	37<75	-------	5<32	-------	27<38	-------
		J	104023	24<62	-------	10<74	-------	24<62	-------	3<38	-------	17<32	-------
	CR1-025	I	201025	26<62	-------	18<65	-------	26<62	-------	9<34	-------	17<32	-------
		J	102025	42<76	-------	29<62	-------	42<76	-------	15<32	-------	28<39	-------
	CR2-025	I	202025	38<73	-------	20<62	-------	38<73	-------	9<32	-------	26<38	-------
		J	103025	40<68	-------	21<62	-------	40<68	-------	9<32	-------	28<35	-------
	CR3-025	I	203025	38<75	-------	16<62	-------	38<75	-------	5<32	-------	27<39	-------
		J	104025	21<62	-------	9<74	-------	21<62	-------	3<38	-------	15<32	-------
	CR1-027	I	201027	26<63	-------	18<62	-------	26<63	-------	9<32	-------	18<32	-------
		J	102027	42<66	-------	29<62	-------	42<66	-------	15<32	-------	28<34	-------
	CR2-027	I	202027	37<67	-------	20<62	-------	37<67	-------	9<32	-------	26<35	-------
		J	103027	40<62	-------	21<64	-------	40<62	-------	9<33	-------	28<32	-------
	CR3-027	I	203027	39<66	-------	17<62	-------	39<66	-------	6<32	-------	28<34	-------
		J	104027	16<62	-------	7<66	-------	16<62	-------	2<34	-------	11<32	-------

Fatigue check of cross beam(5)

girder	panel point		panel point	checking point -1		checking point -2		checking point -3		checking point -4		checking point -5		checking point -6	
				top flg and trans stiff		bott flg and and trans siff		bott flange and main girder web		cross beam web and top flg		cross beam web and bott flg		cross beam web(上) and main girder web	
				E grade		E grade		E grade		D grade		D grade		E grade	
				Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
	CR1-029	I	201029	18<62	-------	26<69	-------	26<69	-------	18<84	-------	26<94	-------	18<62	-------
		J	102029	30<70	-------	44<62	-------	45<62	-------	30<95	-------	44<84	-------	30<70	-------
	CR2-029	I	202029	21<63	-------	38<62	-------	39<62	-------	21<85	-------	38<84	-------	21<63	-------
		J	103029	20<72	-------	38<62	-------	38<62	-------	20<98	-------	38<84	-------	20<72	-------
	CR3-029	I	203029	29<66	-------	42<62	-------	42<62	-------	29<90	-------	42<84	-------	29<66	-------
		J	104029	20<62	-------	29<70	-------	30<70	-------	20<84	-------	29<95	-------	20<62	-------
	CR1-031	I	201031	16<62	-------	23<62	-------	23<62	-------	16<84	-------	23<84	-------	16<62	-------
		J	102031	33<63	-------	48<62	-------	49<62	-------	33<86	-------	48<84	-------	33<63	-------
	CR2-031	I	202031	20<62	-------	37<64	-------	37<64	-------	20<84	-------	37<87	-------	20<62	-------
		J	103031	19<69	-------	36<62	-------	36<62	-------	19<94	-------	36<84	-------	19<69	-------
	CR3-031	I	203031	31<62	-------	44<64	-------	45<64	-------	31<84	-------	44<87	-------	31<62	-------
		J	104031	16<62	-------	24<63	-------	24<63	-------	16<84	-------	24<85	-------	16<62	-------
	CR1-033	I	201033	*****	*******	*****	*******	17<66	-------	11<84	-------	17<90	-------	11<62	-------
		J	102033	*****	*******	*****	*******	15<62	-------	10<92	-------	14<84	-------	10<68	-------
	CR2-033	I	202033	2<62	-------	3<71	-------	3<71	-------	2<84	-------	3<96	-------	2<62	-------
		J	103033	3<71	-------	4<62	-------	4<62	-------	3<97	-------	4<84	-------	3<71	-------
	CR3-033	I	203033	7<62	-------	14<64	-------	14<64	-------	7<84	-------	14<87	-------	7<62	-------
		J	104033	11<62	-------	20<64	-------	20<64	-------	11<84	-------	20<87	-------	11<62	-------
	CR1-035	I	201035	15<81	-------	21<62	-------	22<62	-------	15<109	-------	21<84	-------	15<81	-------
		J	102035	33<70	-------	48<62	-------	48<62	-------	33<95	-------	48<84	-------	33<70	-------
Cross beam	CR2-035	I	202035	20<79	-------	37<62	-------	37<62	-------	20<107	-------	37<84	-------	20<79	-------
		J	103035	20<66	-------	37<62	-------	37<62	-------	20<89	-------	37<84	-------	20<66	-------
	CR3-035	I	203035	34<77	-------	49<62	-------	50<62	-------	34<104	-------	49<84	-------	34<77	-------
		J	104035	20<62	-------	29<75	-------	29<75	-------	20<84	-------	29<102	-------	20<62	-------
	CR1-037	I	201037	18<81	-------	26<62	-------	26<62	-------	18<109	-------	26<84	-------	18<81	-------
		J	102037	29<62	-------	42<62	-------	43<62	-------	29<84	-------	42<84	-------	29<62	-------
	CR2-037	I	202037	20<70	-------	37<62	-------	38<62	-------	20<95	-------	37<84	-------	20<70	-------
		J	103037	21<62	-------	38<67	-------	39<67	-------	21<84	-------	38<91	-------	21<62	-------
	CR3-037	I	203037	31<62	-------	45<64	-------	46<64	-------	31<84	-------	45<86	-------	31<62	-------
		J	104037	25<62	-------	36<70	-------	37<70	-------	25<84	-------	36<95	-------	25<62	-------
	CR1-039	I	201039	16<64	-------	23<62	-------	23<62	-------	16<86	-------	23<84	-------	16<64	-------
		J	102039	32<75	-------	46<62	-------	47<62	-------	32<101	-------	46<84	-------	32<75	-------
	CR2-039	I	202039	21<72	-------	39<62	-------	39<62	-------	21<98	-------	39<84	-------	21<72	-------
		J	103039	21<65	-------	39<62	-------	40<62	-------	21<88	-------	39<84	-------	21<65	-------
	CR3-039	I	203039	32<74	-------	47<62	-------	47<62	-------	32<100	-------	47<84	-------	32<74	-------
		J	104039	17<62	-------	24<68	-------	25<68	-------	17<84	-------	24<93	-------	17<62	-------
	CR1-041	I	201041	17<69	-------	25<62	-------	26<62	-------	17<94	-------	25<84	-------	17<69	-------
		J	102041	28<62	-------	41<62	-------	42<62	-------	28<84	-------	41<84	-------	28<62	-------
	CR2-041	I	202041	19<65	-------	36<62	-------	36<62	-------	19<88	-------	36<84	-------	19<65	-------
		J	103041	19<62	-------	36<63	-------	36<63	-------	19<84	-------	36<86	-------	19<62	-------
	CR3-041	I	203041	28<62	-------	41<67	-------	41<67	-------	28<84	-------	41<90	-------	28<62	-------
		J	104041	19<73	-------	27<62	-------	28<62	-------	19<98	-------	27<84	-------	19<73	-------

Fatigue check of cross beam(6)

girder	panel point		panel point	checking point -7		checking point -8		checking point -9		checking point -10		checking point -11	
				cross beam web(下) and main girder web		cross beam web(上) and trans stiff		cross beam web(下) and trans stiff		cross beam horiz stiff (上側)		cross beam horiz stiff (下側)	
				E grade		E grade		E grade		G grade		G grade	
				Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
	CR1-029	I	201029	26<69	-------	18<62	-------	26<69	-------	9<32	-------	17<36	-------
		J	102029	44<62	-------	30<70	-------	44<62	-------	16<36	-------	29<32	-------
	CR2-029	I	202029	38<62	-------	21<63	-------	38<62	-------	9<32	-------	27<32	-------
		J	103029	38<62	-------	20<72	-------	38<62	-------	9<37	-------	26<32	-------
	CR3-029	I	203029	42<62	-------	29<66	-------	42<62	-------	15<34	-------	28<32	-------
		J	104029	29<70	-------	20<62	-------	29<70	-------	10<32	-------	19<36	-------
	CR1-031	I	201031	23<62	-------	16<62	-------	23<62	-------	8<32	-------	15<32	-------
		J	102031	48<62	-------	33<63	-------	48<62	-------	17<33	-------	32<32	-------
	CR2-031	I	202031	37<64	-------	20<62	-------	37<64	-------	9<32	-------	26<33	-------
		J	103031	36<62	-------	19<69	-------	36<62	-------	8<36	-------	25<32	-------
	CR3-031	I	203031	44<64	-------	31<62	-------	44<64	-------	16<32	-------	29<33	-------
		J	104031	24<63	-------	16<62	-------	24<63	-------	8<32	-------	16<32	-------
	CR1-033	I	201033	17<66	-------	*****	*******	*****	*******	6<32	-------	11<34	-------
		J	102033	14<62	-------	*****	*******	*****	*******	5<35	-------	10<32	-------
	CR2-033	I	202033	3<71	-------	2<62	-------	3<71	-------	1<32	-------	2<37	-------
		J	103033	4<62	-------	3<71	-------	4<62	-------	1<37	-------	3<32	-------
	CR3-033	I	203033	14<64	-------	7<62	-------	14<64	-------	3<32	-------	10<33	-------
		J	104033	20<64	-------	11<62	-------	20<64	-------	5<32	-------	14<33	-------
	CR1-035	I	201035	21<62	-------	15<81	-------	21<62	-------	8<42	-------	14<32	-------
		J	102035	48<62	-------	33<70	-------	48<62	-------	17<36	-------	32<32	-------
Cross beam	CR2-035	I	202035	37<62	-------	20<79	-------	37<62	-------	9<41	-------	25<32	-------
		J	103035	37<62	-------	20<66	-------	37<62	-------	9<34	-------	26<32	-------
	CR3-035	I	203035	49<62	-------	34<77	-------	49<62	-------	18<40	-------	33>32	0.3
		J	104035	29<75	-------	20<62	-------	29<75	-------	10<32	-------	19<39	-------
	CR1-037	I	201037	26<62	-------	18<81	-------	26<62	-------	9<42	-------	17<32	-------
		J	102037	42<62	-------	29<62	-------	42<62	-------	15<32	-------	28<32	-------
	CR2-037	I	202037	37<62	-------	20<70	-------	37<62	-------	9<36	-------	26<32	-------
		J	103037	38<67	-------	21<62	-------	38<67	-------	9<32	-------	27<35	-------
	CR3-037	I	203037	45<64	-------	31<62	-------	45<64	-------	16<32	-------	30<33	-------
		J	104037	36<70	-------	25<62	-------	36<70	-------	13<32	-------	24<36	-------
	CR1-039	I	201039	23<62	-------	16<64	-------	23<62	-------	8<33	-------	15<32	-------
		J	102039	46<62	-------	32<75	-------	46<62	-------	16<39	-------	31<32	-------
	CR2-039	I	202039	39<62	-------	21<72	-------	39<62	-------	9<37	-------	27<32	-------
		J	103039	39<62	-------	21<65	-------	39<62	-------	9<34	-------	27<32	-------
	CR3-039	I	203039	47<62	-------	32<74	-------	47<62	-------	17<38	-------	31<32	-------
		J	104039	24<68	-------	17<62	-------	24<68	-------	9<32	-------	16<35	-------
	CR1-041	I	201041	25<62	-------	17<69	-------	25<62	-------	9<36	-------	17<32	-------
		J	102041	41<62	-------	28<62	-------	41<62	-------	14<32	-------	27<32	-------
	CR2-041	I	202041	36<62	-------	19<65	-------	36<62	-------	8<34	-------	25<32	-------
		J	103041	36<63	-------	19<62	-------	36<63	-------	8<32	-------	25<33	-------
	CR3-041	I	203041	41<67	-------	28<62	-------	41<67	-------	15<32	-------	27<34	-------
		J	104041	27<62	-------	19<73	-------	27<62	-------	10<37	-------	18<32	-------

Fatigue check of cross beam(7)

girder	panel point		panel point	checking point -1		checking point -2		checking point -3		checking point -4		checking point -5		checking point -6	
				top flg and trans stiff		bott flg and and trans siff		bott flange and main girder web		cross beam web and top flg		cross beam web and bott flg		cross beam web(上) and main girder web	
				E grade		E grade		E grade		D grade		D grade		E grade	
				Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
Cross beam	CR1-043	I	201043	18<74	-------	26<62	-------	26<62	-------	18<101	-------	26<84	-------	18<74	-------
		J	102043	27<62	-------	39<70	-------	40<70	-------	27<84	-------	39<94	-------	27<62	-------
	CR2-043	I	202043	19<62	-------	35<64	-------	35<64	-------	19<84	-------	35<86	-------	19<62	-------
		J	103043	21<81	-------	40<62	-------	40<62	-------	21<109	-------	40<84	-------	21<81	-------
	CR3-043	I	203043	28<64	-------	40<62	-------	41<62	-------	28<87	-------	40<84	-------	28<64	-------
		J	104043	21<81	-------	30<62	-------	31<62	-------	21<109	-------	30<84	-------	21<81	-------
	CR1-045	I	201045	18<81	-------	26<62	-------	27<62	-------	18<109	-------	26<84	-------	18<81	-------
		J	102045	27<62	-------	39<62	-------	39<62	-------	27<84	-------	39<84	-------	27<62	-------
	CR2-045	I	202045	19<71	-------	36<62	-------	36<62	-------	19<97	-------	36<84	-------	19<71	-------
		J	103045	19<65	-------	36<62	-------	36<62	-------	19<88	-------	36<84	-------	19<65	-------
	CR3-045	I	203045	27<62	-------	39<62	-------	40<62	-------	27<84	-------	39<85	-------	27<62	-------
		J	104045	18<75	-------	26<62	-------	27<62	-------	18<102	-------	26<84	-------	18<75	-------
	CR1-047	I	201047	17<66	-------	25<62	-------	25<62	-------	17<90	-------	25<84	-------	17<66	-------
		J	102047	26<62	-------	38<66	-------	38<66	-------	26<84	-------	38<89	-------	26<62	-------
	CR2-047	I	202047	18<62	-------	33<64	-------	34<64	-------	18<84	-------	33<87	-------	18<62	-------
		J	103047	18<62	-------	34<65	-------	34<65	-------	18<84	-------	34<88	-------	18<62	-------
	CR3-047	I	203047	26<62	-------	38<64	-------	39<64	-------	26<84	-------	38<87	-------	26<62	-------
		J	104047	17<63	-------	25<62	-------	25<62	-------	17<85	-------	25<84	-------	17<63	-------
	CR1-049	I	201049	17<72	-------	25<62	-------	25<62	-------	17<97	-------	25<84	-------	17<72	-------
		J	102049	25<62	-------	36<81	-------	37<81	-------	25<84	-------	36<109	-------	25<62	-------
	CR2-049	I	202049	17<62	-------	32<73	-------	32<73	-------	17<84	-------	32<99	-------	17<62	-------
		J	103049	17<62	-------	32<77	-------	32<77	-------	17<84	-------	32<104	-------	17<62	-------
	CR3-049	I	203049	25<62	-------	37<81	-------	37<81	-------	25<84	-------	37<109	-------	25<62	-------
		J	104049	18<70	-------	25<62	-------	26<62	-------	18<95	-------	25<84	-------	18<70	-------
	CR1-051	I	201051	17<81	-------	25<62	-------	25<62	-------	17<109	-------	25<84	-------	17<81	-------
		J	102051	25<62	-------	36<81	-------	36<81	-------	25<84	-------	36<109	-------	25<62	-------
	CR2-051	I	202051	16<62	-------	30<81	-------	31<81	-------	16<84	-------	30<109	-------	16<62	-------
		J	103051	17<62	-------	31<77	-------	31<77	-------	17<84	-------	31<105	-------	17<62	-------
	CR3-051	I	203051	25<62	-------	36<81	-------	36<81	-------	25<84	-------	36<109	-------	25<62	-------
		J	104051	18<81	-------	25<62	-------	26<62	-------	18<109	-------	25<84	-------	18<81	-------
	CR1-053	I	201053	13<62	-------	19<81	-------	19<81	-------	13<84	-------	19<109	-------	13<62	-------
		J	102053	27<72	-------	39<62	-------	40<62	-------	27<98	-------	39<84	-------	27<72	-------
	CR2-053	I	202053	15<62	-------	28<66	-------	28<66	-------	15<84	-------	28<89	-------	15<62	-------
		J	103053	15<64	-------	28<62	-------	29<62	-------	15<87	-------	28<84	-------	15<64	-------
	CR3-053	I	203053	28<74	-------	40<62	-------	41<62	-------	28<101	-------	40<84	-------	28<74	-------
		J	104053	14<62	-------	20<80	-------	20<80	-------	14<84	-------	20<108	-------	14<62	-------
	CR1-055	I	201055	25<62	-------	27<80	-------	28<80	-------	25<84	-------	27<108	-------	25<62	-------
		J	102055	27<79	-------	30<62	-------	30<62	-------	27<107	-------	30<84	-------	27<79	-------
	CR2-055	I	202055	2<62	-------	3<75	-------	3<75	-------	2<84	-------	3<101	-------	2<62	-------
		J	103055	2<73	-------	3<62	-------	3<62	-------	2<99	-------	3<84	-------	2<73	-------
	CR3-055	I	203055	26<62	-------	29<73	-------	29<73	-------	26<84	-------	29<98	-------	26<62	-------
		J	104055	24<73	-------	27<62	-------	27<62	-------	24<99	-------	27<84	-------	24<73	-------

Fatigue check of cross beam(8)

girder	panel point		panel point	checking point -7		checking point -8		checking point -9		checking point -10		checking point -11	
				cross beam web(下) and main girder web		cross beam web(上) and trans stiff		cross beam web(下) and trans stiff		cross beam horiz stiff (上側)		cross beam horiz stiff (下側)	
				E grade		E grade		E grade		G grade		G grade	
				Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j	Rough fatigue	Detailed fatigue check D = Σ Di,j
Cross beam	CR1-043	I	201043	26<62	-------	18<74	-------	26<62	-------	9<38	-------	17<32	-------
		J	102043	39<70	-------	27<62	-------	39<70	-------	14<32	-------	26<36	-------
	CR2-043	I	202043	35<64	-------	19<62	-------	35<64	-------	8<32	-------	24<33	-------
		J	103043	40<62	-------	21<81	-------	40<62	-------	9<42	-------	28<32	-------
	CR3-043	I	203043	40<62	-------	28<64	-------	40<62	-------	14<33	-------	27<32	-------
		J	104043	30<62	-------	21<81	-------	30<62	-------	11<42	-------	20<32	-------
	CR1-045	I	201045	26<62	-------	18<81	-------	26<62	-------	9<42	-------	17<32	-------
		J	102045	39<62	-------	27<62	-------	39<62	-------	14<32	-------	26<32	-------
	CR2-045	I	202045	36<62	-------	19<71	-------	36<62	-------	8<37	-------	25<32	-------
		J	103045	36<62	-------	19<65	-------	36<62	-------	8<33	-------	25<32	-------
	CR3-045	I	203045	39<62	-------	27<62	-------	39<62	-------	14<32	-------	26<32	-------
		J	104045	26<62	-------	18<75	-------	26<62	-------	9<39	-------	17<32	-------
	CR1-047	I	201047	25<62	-------	17<66	-------	25<62	-------	9<34	-------	16<32	-------
		J	102047	38<66	-------	26<62	-------	38<66	-------	13<32	-------	25<34	-------
	CR2-047	I	202047	33<64	-------	18<62	-------	33<64	-------	8<32	-------	23<33	-------
		J	103047	34<65	-------	18<62	-------	34<65	-------	8<32	-------	23<34	-------
	CR3-047	I	203047	38<64	-------	26<62	-------	38<64	-------	14<32	-------	25<33	-------
		J	104047	25<62	-------	17<63	-------	25<62	-------	9<32	-------	16<32	-------
	CR1-049	I	201049	25<62	-------	17<72	-------	25<62	-------	9<37	-------	17<32	-------
		J	102049	36<81	-------	25<62	-------	36<81	-------	13<32	-------	24<42	-------
	CR2-049	I	202049	32<73	-------	17<62	-------	32<73	-------	7<32	-------	22<38	-------
		J	103049	32<77	-------	17<62	-------	32<77	-------	7<32	-------	22<40	-------
	CR3-049	I	203049	37<81	-------	25<62	-------	37<81	-------	13<32	-------	24<42	-------
		J	104049	25<62	-------	18<70	-------	25<62	-------	9<36	-------	17<32	-------
	CR1-051	I	201051	25<62	-------	17<81	-------	25<62	-------	9<42	-------	17<32	-------
		J	102051	36<81	-------	25<62	-------	36<81	-------	13<32	-------	24<42	-------
	CR2-051	I	202051	30<81	-------	16<62	-------	30<81	-------	7<32	-------	21<42	-------
		J	103051	31<77	-------	17<62	-------	31<77	-------	7<32	-------	21<40	-------
	CR3-051	I	203051	36<81	-------	25<62	-------	36<81	-------	13<32	-------	24<42	-------
		J	104051	25<62	-------	18<81	-------	25<62	-------	9<42	-------	17<32	-------
	CR1-053	I	201053	19<81	-------	13<62	-------	19<81	-------	7<32	-------	13<42	-------
		J	102053	39<62	-------	27<72	-------	39<62	-------	14<37	-------	26<32	-------
	CR2-053	I	202053	28<66	-------	15<62	-------	28<66	-------	6<32	-------	19<34	-------
		J	103053	28<62	-------	15<64	-------	28<62	-------	7<33	-------	20<32	-------
	CR3-053	I	203053	40<62	-------	28<74	-------	40<62	-------	14<38	-------	27<32	-------
		J	104053	20<80	-------	14<62	-------	20<80	-------	7<32	-------	13<41	-------
	CR1-055	I	201055	27<80	-------	25<62	-------	27<80	-------	14<32	-------	17<41	-------
		J	102055	30<62	-------	27<79	-------	30<62	-------	16<41	-------	19<32	-------
	CR2-055	I	202055	3<75	-------	2<62	-------	3<75	-------	1<32	-------	2<39	-------
		J	103055	3<62	-------	2<73	-------	3<62	-------	1<38	-------	2<32	-------
	CR3-055	I	203055	29<73	-------	26<62	-------	29<73	-------	15<32	-------	18<37	-------
		J	104055	27<62	-------	24<73	-------	27<62	-------	14<38	-------	17<32	-------

7. 1. Calculations of catch basin intervals

Calculations on intervals of drainage basin (possible width for flow = L: 1.5m, R: 1.25m)

Maximum basin interval upon installation of drainage basin

Section	unit distance	C.L level estimated	longitudinal slope	transverse slope	width of flow B	depth of shoulder h	cross section of flow A	length of wetted perimeter S	hydraulic radius R	roughness coefficient	average flow velocity V	allowance ratio	allowable flow volume Q	width of road water catchment W	runoff coefficient	rainfall intensity	per road unit length	falling rate	Maximum drainage basin interval
	(m)	(m)	(%)	(%)	(m)	(m)	(m2)	(m)	(m)		(m/s)	α	(l/sec)	(m)	C	I[mm/h]	amount of flow q(l/sec/m)	γ	Ls (m)
P5 L			2.09	2.00	1.500	0.0300	0.0225	1.53029997	0.0147	0.0130	0.6676	0.8	12.016	10.35	0.900	149.000	0.386	0.90	28.1
P5 R			2.09	2.00	1.250	0.0250	0.0156	1.275249975	0.0123	0.0130	0.5912	0.8	7.390	16.95	0.900	149.000	0.632	0.90	10.5

Section	unit distance	C.L level estimated	longitudinal slope	transverse slope	width of flow B	depth of shoulder h	cross section of flow A	length of wetted perimeter P	hydraulic radius R	roughness coefficient	average flow velocity V	allowance ratio	allowable flow volume Q	width of road water catchment W	runoff coefficient	rainfall intensity	per road unit length	falling rate	Maximum drainage basin interval
	(m)	(m)	(%)	(%)	(m)	(m)	(m2)	(m)	(m)		(m/s)	α	(l/sec)	(m)	C	I[mm/h]	amount of flow q(l/sec/m)	γ	Ls (m)
P6 L			1.52	2.00	1.500	0.0300	0.0225	1.53029997	0.0147	0.0130	0.5697	0.8	10.255	10.35	0.900	149.000	0.386	0.90	23.9
P6 R			1.52	2.00	1.250	0.0250	0.0156	1.275249975	0.0123	0.0130	0.5045	0.8	6.307	14.01	0.900	149.000	0.522	0.90	10.9

Section	unit distance	C.L level estimated	longitudinal slope	transverse slope	width of flow B	depth of shoulder h	cross section of flow A	length of wetted perimeter P	hydraulic radius R	roughness coefficient	average flow velocity V	allowance ratio	allowable flow volume Q	width of road water catchment W	runoff coefficient	rainfall intensity	per road unit length	falling rate	Maximum drainage basin interval
	(m)	(m)	(%)	(%)	(m)	(m)	(m2)	(m)	(m)		(m/s)	α	(l/sec)	(m)	C	I[mm/h]	amount of flow q(l/sec/m)	γ	Ls (m)
P7 L			0.96	2.00	1.500	0.0300	0.0225	1.53029997	0.0147	0.0130	0.4512	0.8	8.121	10.35	0.900	149.000	0.386	0.90	19.0
P7 R			0.96	2.00	1.400	0.0280	0.0196	1.428279972	0.0137	0.0130	0.4309	0.8	6.756	11.43	0.900	149.000	0.426	0.90	14.3

Section	unit distance	C.L level estimated	longitudinal slope	transverse slope	width of flow B	depth of shoulder h	cross section of flow A	length of wetted perimeter P	hydraulic radius R	roughness coefficient	average flow velocity V	allowance ratio	allowable flow volume Q	width of road water catchment W	runoff coefficient	rainfall intensity	per road unit length	falling rate	Maximum drainage basin interval
	(m)	(m)	longitudinal slope	(%)	(m)	(m)	(m2)	(m)	(m)		(m/s)	α	(l/sec)	(m)	C	I[mm/h]	amount of flow q(l/sec/m)	γ	Ls (m)
P10 L			0.28	2.00	1.500	0.0300	0.0225	1.53029997	0.0147	0.0130	0.2443	0.8	4.397	11.45	0.900	149.000	0.427	0.90	9.3
P10 R			0.28	2.00	1.500	0.0300	0.0225	1.53029997	0.0147	0.0130	0.2443	0.8	4.397	11.45	0.900	149.000	0.427	0.90	9.3

7. 2. Design of expansion apparatus

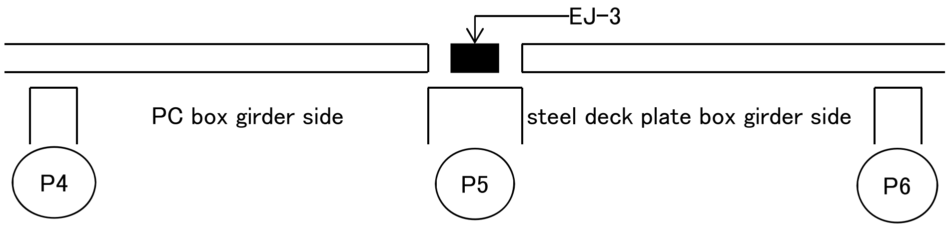
(1) EJ-4 (P5, main line) expansion apparatus

1. Design conditions

		(left girder)	(right
・	bridge type	PC girder	steel deck plate girder
・	range of temperature	5 ℃ ～ 45 ℃	0 ℃ ～ 50 ℃
・	load	(72.5KN per 1 rear wheel)	
・	expansion apparatus calculation equation	Japan Road Association『 Specifications for highway bridges・expositions 4. 2 Expansion apparatus 』	

2. Degree of expansion

2－1. Normal condition



(left girder)

Degree of expansion due to thermal change	ΔLt ＝				＝	80	mm
allowable expansion	ΔIy ＝	0.2	×	80	＝	16	mm

(right

Degree of expansion due to thermal change	ΔLt ＝					＝	82	mm
allowable expansion	ΔLy ＝	0.2	×	82		＝	16	mm
				total	ΔLj	＝	194	mm

2－2. Seismic

(bridge axial ΔLq ＝ ± 207 ＋ ± 15 ＝ 444 mm

3. Selection format

3－1. Displacement

ΔLj ＝ 194.4 mm ＜ ΔLq ＝ 444 mm determine by seismic performance

444 mm ≦ 480 mm

Maurer Swivel joint use ES－480(Designed maximum expansion 480mm)

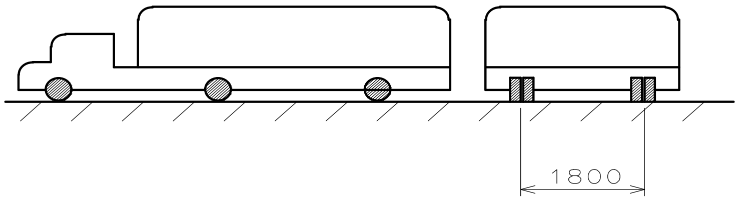
3－2. Expansion gap between girders

350 mm ≦ 700 mm

Maurer Swivel joint use ES－480(Neutral maximum expansion gap 700mm)

LOAD

at 325 KN load



total load	W	=	325	〔KN〕
front wheel loac (per 1 wheel	W'	=	17.5	〔KN〕
rear wheel load (per 1 wheel	W''	=	72.5	〔KN〕
ground contact length of whee	a	=	250	〔mm〕
Width of wheel orbicular zone	b	=	510	〔mm〕

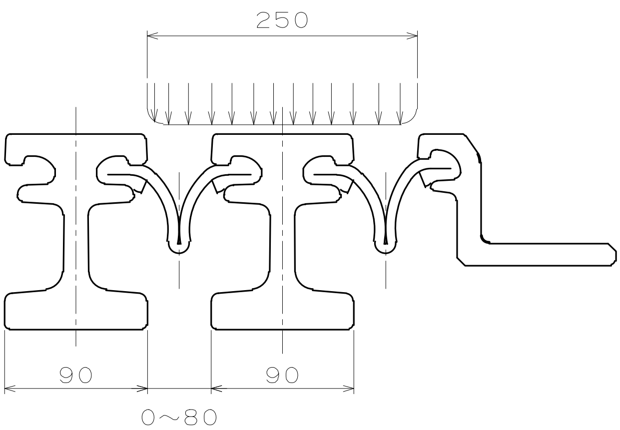
Middle beam (E N standard S355J2 + N)

Mechanical nature of middle beam

material	mechanical nature		
	yield point N／mm 2	tension N／mm 2	expansion %
S355J2+N	over 355	470 ～ 630	over 22

Wheel load transmitted to 1 middle beam reaches maximum value

at maximum expansion shown below.



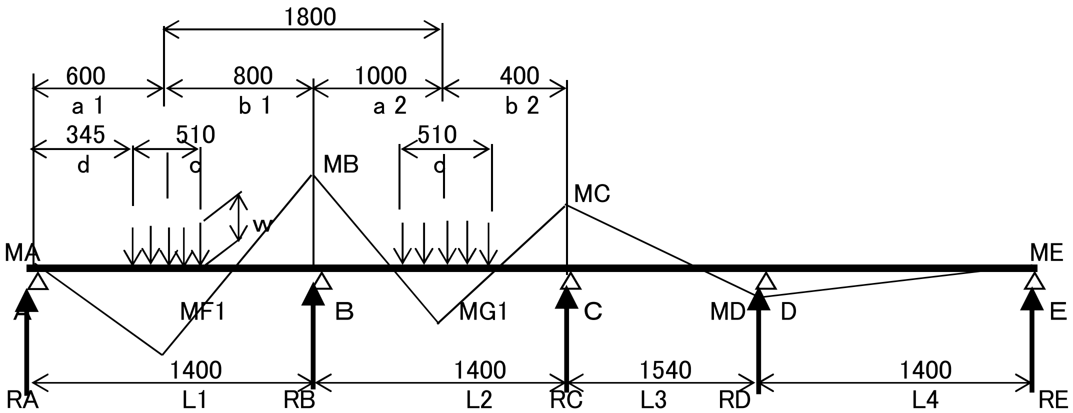
Maximum load transmitted to middle beam

Maximum load P which is transmitted to 1 middle beam

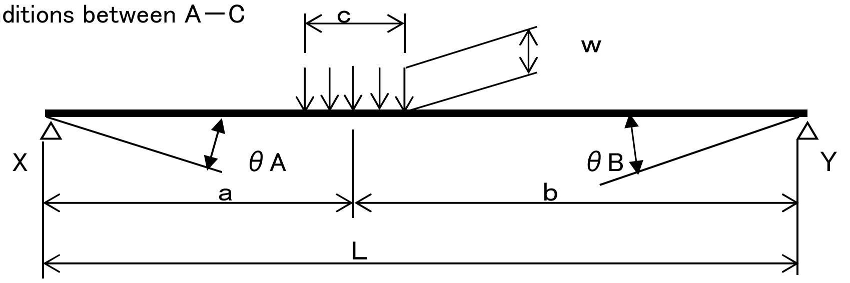
P = 72.5 〔KN〕

Bending moment of middle beam

Consider a 4 span continuous beam as a middle beam support condition and calculate bending moment using wheel load conditions as described below.
(a is a continuous bridge, load at L1 −0.425, position of approximate value of maximum moment)



Loading conditions between A－C



Calculate load terms of conjugated beam using the following equations.

X ＝ＥＩ θA＝ w･b･c･[4･a･(L＋b)－c2] ／ 24 ／ L

Y ＝ＥＩ θB＝ w･a･c･[4･b･(L＋a)－c2] ／ 24 ／ L

Calculation of load terms

P ＝ 72.5 〔KN〕

w ＝ 72.5 / 510 ＝ 0.15 〔KN ／mm〕

Y (between B−A) ＝w ・ a 1･c ･〔4 ・ b 1 ・ (L_1＋a 1)－c^2] ／ 24 ／ L_1

= 0.15 x 600 x 510 x [4 x 800 x (1400 + 600) − 510^2] ／24／1400

= 8387600 〔KN ･mm2〕

X (betweenB−C) ＝w ・ b 2 ・ c ･[4 ・ a 2 ･(L_2＋b 2)－c^2] ／ 24 ／ L_2

= 0.15 x 400 x 510 x [4 x 1000 x (1400 + 400) − 510^2] ／24／1400

= 6320300 〔KN ･mm2〕

Y (between C−B) ＝w ・ a 2 ・ c ・ 〔 4 ・ b 2 ･(L_2＋a 2)－c^2] ／24 ／ L_2

= 0.15 x 1000 x 510 x [4 x 400 x (1400 + 1000) − 510^2] ／24／1400

= 8150700 〔KN ･mm2〕

X (between C−D) ＝ Y (between D−C) = X (between D−E) = 0

Use the equation of three moments.

However, MA ＝ ME ＝ 0

2・(L1＋L2)・MB＋(L2)・MC ＝ −6 ・(Y (B−A) ＋ X (B−C))

2 x (1400 + 1400) x MB + 1400 x MC = −6 x (8387600 + 6320300)

5600 x MB + 1400 x MC = −88247400 〔KN ・mm〕

(L2)・MB＋2・(L2＋L3)・MC＋L3・MD ＝ −6 ・(Y (C−B) ＋ X (C−D))

1400 x MB + 2 (1400 + 1540) x MC + 1540 x MD = −6 (8150700 + 0)

1400 x MB + 5880 x MC + 1540 x MD = −48904200 〔KN ・mm〕

(L3)・MC＋2・(L3＋L4)・MD ＝ −6 ・(Y (D−C) ＋ X (D−E))

1540 x MC + 2 x (1540 + 1400) x MD = −6 x (0 + 0)

1540 x MC + 5880 x MD = 0 〔KN ・mm〕

MB、MC、MD can be calculated using the above 3 equations.

MB＝ −14449.507 = −14450 〔KN ・mm〕

MC＝ −5235.829 = −5236 〔KN ・mm〕

MD＝ 1371.288547 = 1372 〔KN ・mm〕

Calculate each support reaction

RA＝RA' ＋MB／L1 RA' = w ・ c ・ b 1 / L1

= 0.15 x 510 x 800 / 1400 + (−14450 / 1400)

= 33.39 (KN)

RB ＝ RB' ＋(−MB)／L1＋(MC−MB)／L2 RB' ＝ w ・ c ・ a 1 / L1 + w ・ c ・ b 2 / L2

= 0.15 x 510 x 600 / 1400 + 0.15 x 510 x 400 / 1400

− (−14450 / 1400) + (−5236 − (−14450)) / 1400

= 71.55 (KN)

RC ＝ RC' ＋(MB−MC)／L2＋(MD−MC)／L3 RC' ＝ w ・ c ・ a 2 / L2

= 0.15 x 510 x 1000 / 1400 + (−14450 − (−5236)) / 1400

+ (1372 − (−5236)) / 1540

= 52.35 (KN)

RD ＝ (MC−MD)／L3＋(ME−MD)／L4

= (−5236 − 1372) / 1540 + (−1372) / 1400

= −5.27 (KN)

RE ＝ MD ／ L4

= 1372 / 1400

= 0.98 (KN)

$RA+RB+RC+RD+RE = 2(P) = 2 \times 100 = 200$ (KN)

$33.39 + 71.55 + 52.35 + -5.27 + 0.98 = 153$ (KN)

Maximum bending momnet over span A–B

Over span A – B, Shearing force at wheel load : Vx_1

$Vx1 = RA - w \cdot (X-d)$

$= 33.39 - 0.15 \times (X - 345)$

Calculate X, when $Vx_1 = 0$

$X1 = 567.6$ (mm)

Bending moment at loading area of wheel load over span A – B : MF_1

$MF1 = RA \cdot X1 - 1/2 \cdot w \cdot (X1-d)2$

$= 33.39 \times 567.6 - 0.5 \times 0.15 \times (567.6 - 345)\hat{}2$

$= 15240$ 〔KN・mm〕

Maximum bending moment over span B –C

Over span B—C , Shearing force at wheel load : Vx_2

$Vx2 = RA + RB - P - w \cdot (X - a\,1 - 1500)$

$= 33.39 + 71.55 - 72.5 - 0.15 \times (X - 600 - 1500)$

Calculate X, when $Vx_2 = 0$

$X2 = 2316.30$ (mm)

Bending moment at loading area of wheel load over span B –C : MG_1

$MG1 = RA \cdot X2 + RB \cdot (X2 - L1) - P \cdot (X2 - a\,1)$

$-1/2 \cdot w \cdot (X2 - a\,1 - 1500)\hat{}2$

$= 33.39 \times 2316.3 + 71.55 \times (2316.3 - 1400) - 72.5 \times (2316.3 - 600)$

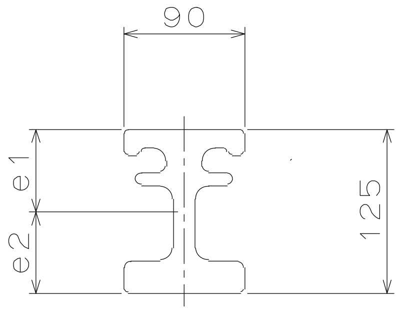
$- 0.5 \times 0.15 \times (2316.3 - 600 - 1500)\hat{}2$

$= 14970$ 〔KN・mm〕

Maximum bending moment between span A—E

$Mmax = 15240$ 〔KN・mm〕

Middle beam bending stress intensity : σ_1



a =	90 mm
b =	125 mm
A =	5904 mm2
e1 =	63 mm
e2 =	62 mm
I =	11552000 mm4
A2=	1875 mm2 (web cross section)

Impact coefficient : i

i = 0.4

Maximum bending moment M between A－D

Mmax= 15240 〔KN・mm〕

Bending stress intensity : σ_1

$\sigma 1 =$ Mmax x (1+i) x e1 x 1000 ／ I

= 15240 x (1 + 0.4) x 63 x 1000 ／ 11552000

= 116.4 N／mm2 ＜ σba = 210 N／mm2 (S355J2 + N)

σba = σy / 1.7
= 355 / 1.7
≒ 210 N／mm2

Shearing stress intensity : τ_1

$\tau 1 =$ Rmax x (1 + i) x 1000 / A2

= 72.5 x (1 + 0.4) x 1000 / 1875

= 54.1 N／mm2 ＜ τa = 120 N／mm2 (S355J2 + N)

τa = σy／$\sqrt{3}$／1.7
= 355／$\sqrt{3}$／1.7
≒ 120 N／mm2

Compound stress intensity : U

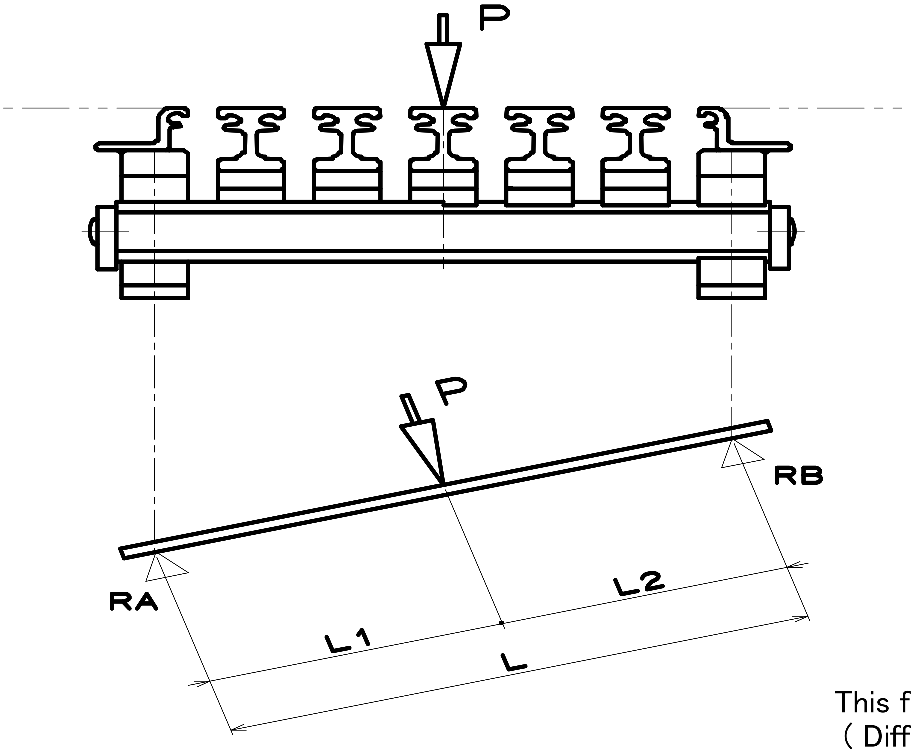
U = (σ1 / σba)^2 + (τ1 / τa)^2

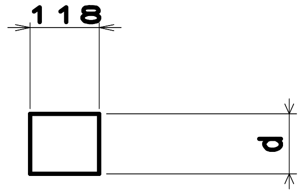
= (116.4 / 210)^2 + (54.1 / 120)^2

= 0.51 ＜ 1.2

Support Beam(SM490A)

Calculate support beam using a simple beam in which the supporting point is at location where bearing is at maximum expansion.





This figure shows images of load.
(Differs from calculation of cell numbers)

Maximum load acting on support beam	P =	72.5	KN
Maximum support interval	L =	1087	mm
Location of load	L1 =	543.5	mm
Location of load	L2 =	543.5	mm
Height of support beam	d =	115	mm

Impact coefficient I

I = 0.4

Bending moment M 1

M 1 = P x L1 x L2 / L

= 72.5 x 543.5 x 543.5 / 1087 = 19800 KN・mm

Section modulus Z 1

Z 1 = 1/6 x d^2 x 118

= 1 / 6 x 115^2 x 118 = 260100 mm3

Bending stress intensity $\sigma 1$

$\sigma 1 = M1 \times (1 + I) \times 1000 / Z1$

$= 19800 \times (1 + 0.4) \times 1000 / 260100$

$= 106.6 \ N/mm2 < 167 \ N/mm2$

Shearing stress intensity $\tau 1$

$\tau 1 = P \times (1 + I) \times 1000 / (d \times H)$

$= 72.5 \times (1 + 0.4) \times 1000 / (115 \times 118)$

$= 7.5 \ N/mm2 < 98 \ N/mm2$

Compound stress intensity : U

$U = (\sigma 1 / \sigma ba)^2 + (\tau 1 / \tau a)^2$

$= (106.6 / 167)^2 + (7.5 / 98)^2$

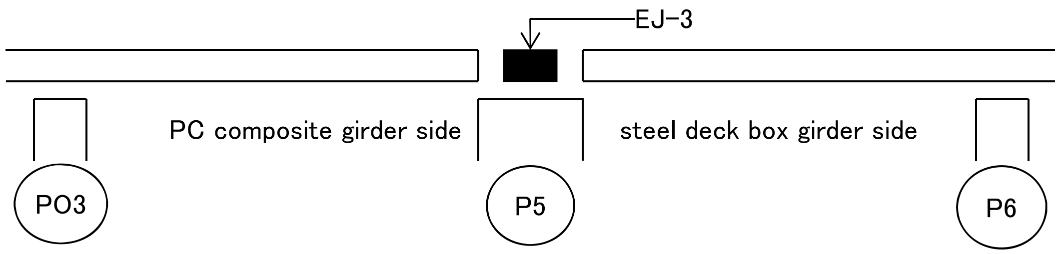
$= 0.413 < 1.2$

（2）EJ-4 (P5,ramp）expansion apparatus

1．Design Conditions

	(left girder)	(Right girder)
・ Bridge category	PC girder	Steel deck girder
・ range of temperature	5 ℃ ～ 45 ℃	0 ℃ ～ 50 ℃
・ Load	(72.5KN per 1 rear wheel)	
・ Formula for computation of expansion apparatus	Japan Road Association『 Specifications for highway bridges・expositions 4．2 Expansion apparatus 』	

2．Amount of expansi
2－1．Under constant obs



(left girder）

temperature change according to amount of expansion	ΔLt =				=	47 mm
allowable expansion (minimum 10mm)	Δly =	0.2	×	47	= 9 ＜ 10 =	10 mm

(right

temperature change according to amount of expansion	ΔLt =				=	82 mm
allowable expansion	ΔLy =	0.2	×	82	=	16 mm
				total	ΔLj =	155 mm

2－2．Coseismic

(bridge axial ΔLq = ± 207 ＋ ± 15 = 444 mm

3．Formula selection
3－1．Displacement

ΔLj = 155.4 mm ＜ ΔLq = 444 mm determine by seismic performance

444 mm ≦ 480 mm

Maurer Swivel Joint **Use ES-480 type（Design maximum amount of expansion 480mm)**

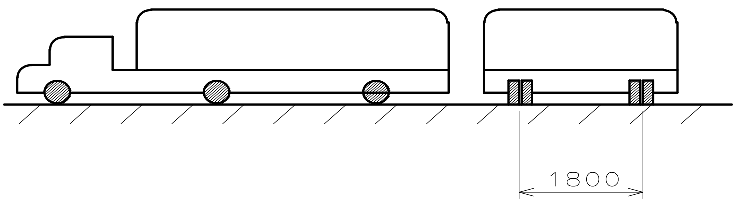
3－2．Expansion gap of girder

250 mm ≦ 700 mm

Maurer Swivel Joint **Use ES-480 type（Neutral mode maximum expansion gap of girder 700mm)**

LOAD

325 KN :as the case of given load



17.5kN 72.5kN 72.5kN

17.5kN 72.5kN 72.5kN

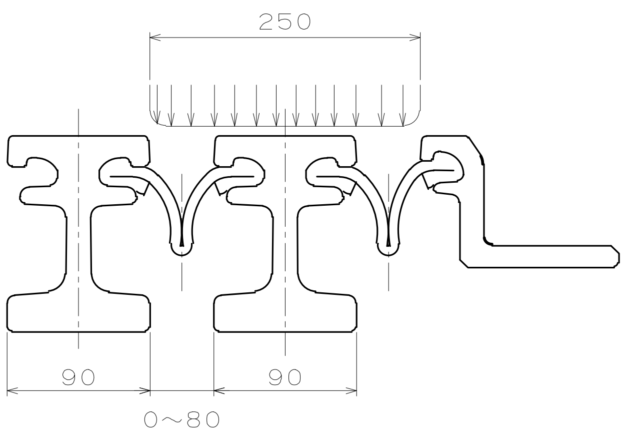
Total weight	W	=	325	〔KN〕
Front wheel load (per wheel	W'	=	17.5	〔KN〕
Rear wheel load (per wheel)	W''	=	72.5	〔KN〕
Ground contact length of wheel	a	=	250	〔mm〕
Width of wheel orbicular zone	b	=	510	〔mm〕

Middle beam （ E N Standard S355J2 + N ）

Mechanical properties of middle beam

material	Mechanical property		
	yeilding point N／mm 2	Tensile strength N／mm 2	expansion %
S355J2+N	355以上	470 ～ 630	over 22

Will reach maximum wheel load transmitting to 1 middle beam at maximum expansion as described below.



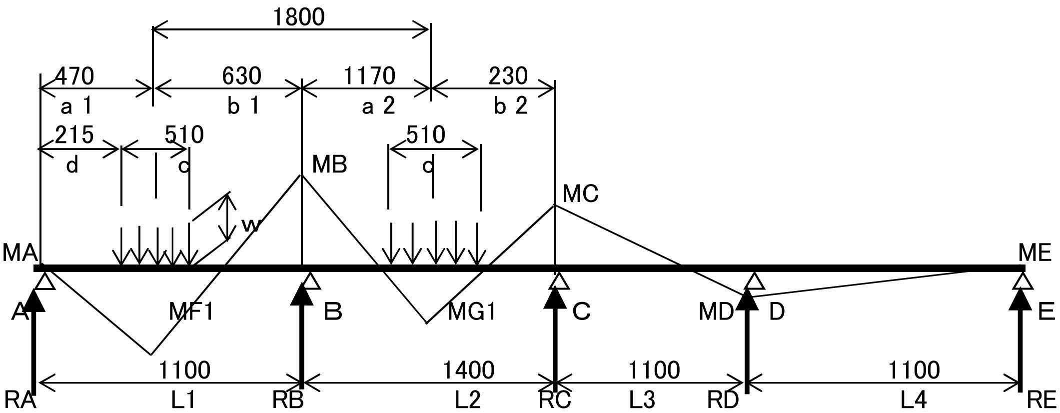
Maximum load transmitting to middle beam

Maximum load transmitting to 1 middle beam P

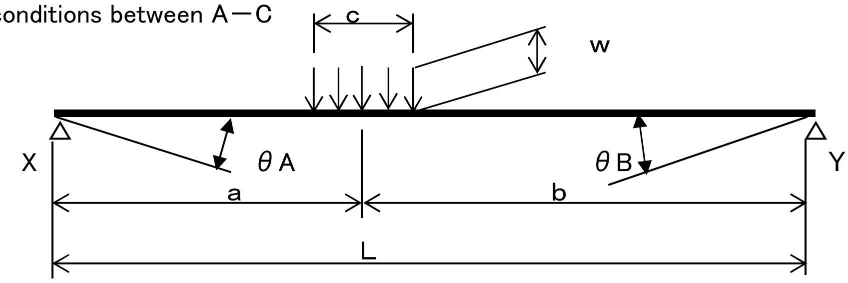
P ＝ 72.5 〔KN〕

Bending moment of middle beam

Consider a 4 span continuous beam as a middle beam support condition and calculate bending moment using wheel load conditions as described below.
(a is a continuous bridge, load at L1 −0.425, position of approximate value of maximum moment)



Loading conditions between A−C



Load terms of conjugate beam can be calculated using the following equations:

X = E I θA = w·b·c·[4·a·(L+b)−c2] ／ 24 ／ L

Y = E I θB = w·a·c·[4·b·(L+a)−c2] ／ 24 ／ L

Calculations of load terms

P = 72.5 〔KN〕

w = 72.5 / 510 = 0.15 〔KN ／mm〕

Y (between B−A) =w ・ a 1·c ·〔4 ・ b 1 ・ (L_1+a 1)−c^2] ／ 24 ／ L_1

= 0.15 x 470 x 510 x [4 x 630 x (1100 + 470) − 510^2] ／24／1100

= 5034200 〔KN ·mm2〕

X (between B−C) =w ・ b 2 ・ c ·〔 4 ・ a 2 ·(L_2+b 2)−c^2] ／ 24 ／ L_2

= 0.15 x 230 x 510 x [4 x 1170 x (1400 + 230) − 510^2] ／24／1400

= 3858500 〔KN ·mm2〕

Y (between C−B) =w ・ a 2 ・ c ・ 〔 4 ・ b 2 ·(L_2+a 2)−c^2] ／24 ／ L_2

= 0.15 x 1170 x 510 x [4 x 230 x (1400 + 1170) − 510^2] ／24／1400

= 5605600 〔KN ·mm2〕

X (between C−D) = Y (between D−C) = X (between D−E) = 0

Use the equation of three moments.

However, MA ＝ M 0

2･(L1＋L2)･MB＋(L2)･MC ＝ −6 ･(Y (B−A) ＋ X (B−C))

2 x (1100 + 1400) x MB + 1400 x MC = −6 x (5034200 + 3858500)

5000 x MB + 1400 x MC = −53356200 〔KN ･mm〕

(L2)･MB＋2･(L2＋L3)･MC＋L3･MD ＝ −6 ･(Y (C−B) ＋ X (C−D))

1400 x MB + 2 (1400 + 1100) x MC + 1100 x MD = −6 (5605600 + 0)

1400 x MB + 5000 x MC + 1100 x MD = −33633600 〔KN ･mm〕

(L3)･MC＋2･(L3＋L4)･MD ＝ −6 ･(Y (D−C) ＋ X (D−E))

1100 x MC + 2 x (1100 + 1100) x MD = −6 x (0 + 0)

1100 x MC + 4400 x MD = 0 〔KN ･mm〕

MB、MC、MD can be calculated using the above 3 equations.

MB＝ −9463.23586 = −9464 〔KN ･mm〕

MC＝ −4314.30048 = −4315 〔KN ･mm〕

MD＝ 1078.575121 = 1079 〔KN ･mm〕

Calculate each support reaction

RA＝RA' ＋MB／L1 RA' = w ・ c ・ b 1 / L1

= 0.15 x 510 x 630 / 1100 + (−9464 / 1100)

= 35.21 (KN)

RB ＝ RB' ＋(－MB)／L1＋(MC－MB)／L2 RB' ＝ w ・ c ・ a 1 / L1 + w ・ c ・ b 2 / L2

= 0.15 x 510 x 470 / 1100 + 0.15 x 510 x 230 / 1400

− (−9464 / 1100) + (−4315 − (−9464)) / 1400

= 57.53 (KN)

RC ＝ RC' ＋(MB－MC)／L2＋(MD－MC)／L3 RC' ＝ w ・ c ・ a 2 / L2

= 0.15 x 510 x 1170 / 1400 + (−9464 − (−4315)) / 1400

+ (1079 − (−4315)) / 1100

= 65.16 (KN)

RD ＝ (MC－MD)／L3＋(ME－MD)／L4

= (−4315 − 1079) / 1100 + (−1079) / 1100

= −5.88 (KN)

RE ＝ MD ／ L4

= 1079 / 1100

= 0.98 (KN)

$RA + RB + RC + RD + RE = 2(P) = 2 \times 100 = 200$ (KN)

$35.21 + 57.53 + 65.16 + -5.88 + 0.98 = 153$ (KN)

Maximum bending momnet over span A-B

Over span A − B, Shearing force at wheel load : Vx_1

$Vx1 = RA - w \cdot (X - d)$

$= 35.21 - 0.15 \times (X - 215)$

Calculate X, when $Vx_1 = 0$

$X1 = 449.7$ (mm)

Bending moment at loading area of wheel load over span A - B : MF_1

$MF1 = RA \cdot X1 - 1/2 \cdot w \cdot (X1 - d)2$

$= 35.21 \times 449.7 - 0.5 \times 0.15 \times (449.7 - 215)\hat{}2$

$= 11710$ 〔KN・mm〕

Maximum bending moment over span B -C

Over span B−C , Shearing force at wheel load : Vx_2

$Vx2 = RA + RB - P - w \cdot (X - a\,1 - 1500)$

$= 35.21 + 57.53 - 72.5 - 0.15 \times (X - 470 - 1500)$

Calculate X, when $Vx_2 = 0$

$X2 = 2104.90$ (mm)

Bending moment at loading area of wheel load over span B −C : MG_1

$MG1 = RA \cdot X2 + RB \cdot (X2 - L1) - P \cdot (X2 - a\,1)$

$-1/2 \cdot w \cdot (X2 - a\,1 - 1500)\hat{}2$

$= 35.21 \times 2104.9 + 57.53 \times (2104.9 - 1100) - 72.5 \times (2104.9 - 470)$

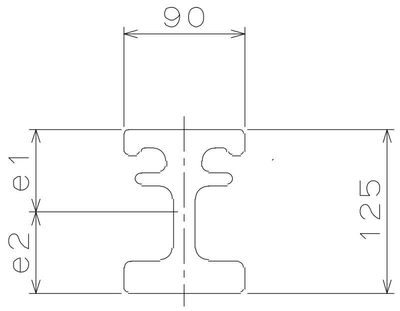
$- 0.5 \times 0.15 \times (2104.9 - 470 - 1500)\hat{}2$

$= 12040$ 〔KN・mm〕

Maximum bending moment between span A−E

$Mmax = 12040$ 〔KN・mm〕

Middle beam bending stress intensity : σ_1



a =	90	mm
b =	125	mm
A =	5904	mm2
e1 =	63	mm
e2 =	62	mm
I =	11552000	mm4
A2=	1875	mm2 (web cross section)

Impact coefficient : i

i = 0.4

Maximum bending moment M between A－D

Mmax= 12040 〔KN・mm〕

Bending stress intensity : σ_1

$\sigma 1 =$ Mmax x (1＋i) x e1 x 1000 ／ I

= 12040 x (1 + 0.4) x 63 x 1000 ／ 11552000

= 91.9 N／mm2 ＜ σba = 210 N／mm2 (S355J2 + N)

σba = σy / 1.7
= 355 / 1.7
≒ 210 N／mm2

Shearing stress intensity : τ_1

$\tau 1 =$ Rmax x (1 + i) x 1000 / A2

= 72.5 x (1 + 0.4) x 1000 / 1875

= 54.1 N／mm2 ＜ τ a = 120 N／mm2 (S355J2 + N)

τ a = σy／$\sqrt{3}$／1.7
= 355／$\sqrt{3}$／1.7
≒ 120 N／mm2

Compound stress intensity : U

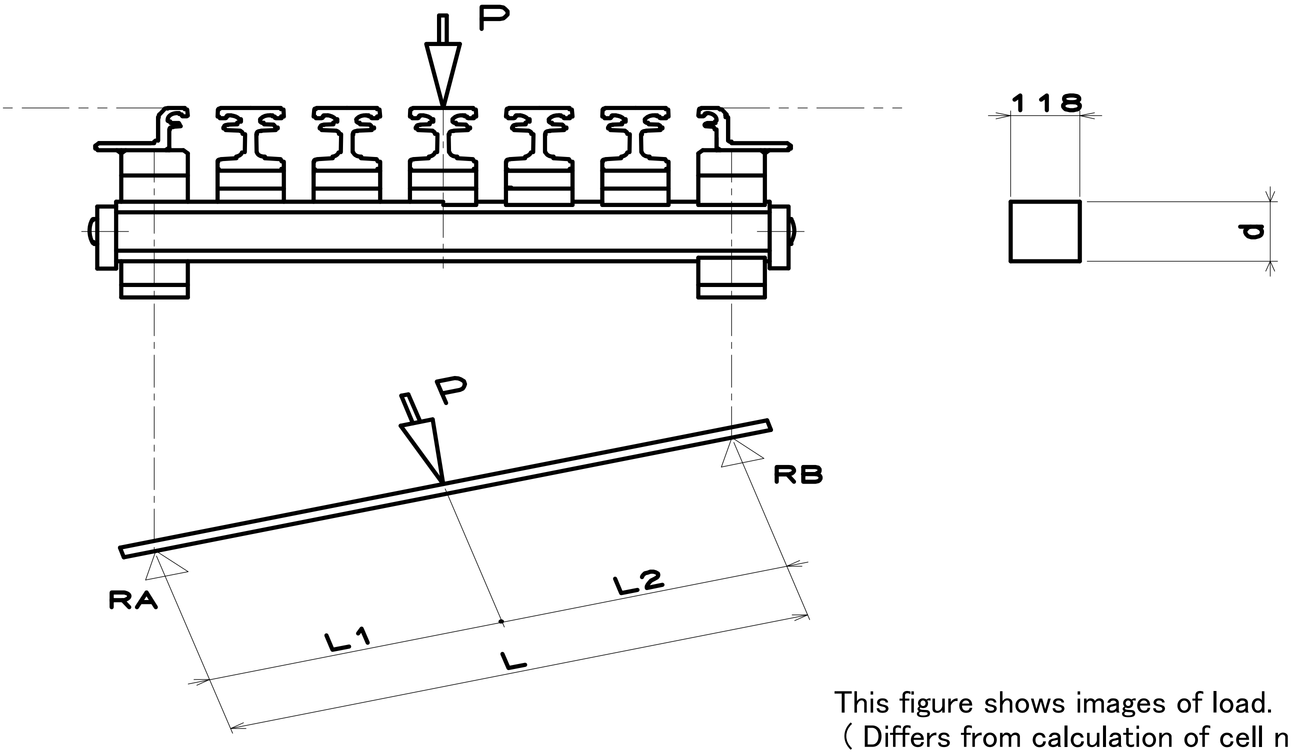
U = (σ1 / σba)^2 + (τ1 / τa)^2

= (91.9 / 210)^2 + (54.1 / 120)^2

= 0.395 ＜ 1.2

Support Beam(SM490A)

Calculate support beam using a simple beam in which the supporting point is at location where bearing is at maximum expansion.



This figure shows images of load.
(Differs from calculation of cell numbers)

Maximum load acting on support beam	P =	72.5	KN
Maximum support interval	L =	1087	mm
Location of load	L1 =	543.5	mm
Location of load	L2 =	543.5	mm
Height of support beam	d =	115	mm

Impact coefficient I

I = 0.4

Bending moment M 1

M 1 = P x L1 x L2 / L

= 72.5 x 543.5 x 543.5 / 1087 = 19800 KN・mm

Section modulus Z 1

Z 1 = 1/6 x d^2 x 118

= 1 / 6 x 115^2 x 118 = 260100 mm3

Bending stress intensity $\sigma 1$

$\sigma 1 = M 1 \times (1 + I) \times 1000 / Z 1$

$= 19800 \times (1 + 0.4) \times 1000 / 260100$

$= 106.6$ N /mm2 < 167 N /mm2

Shearing stress intensity $\tau 1$

$\tau 1 = P \times (1 + I) \times 1000 / (d \times H)$

$= 72.5 \times (1 + 0.4) \times 1000 / (115 \times 118)$

$= 7.5$ N /mm2 < 98 N /mm2

Compound stress intensity : U

$U = (\sigma 1 / \sigma ba)^2 + (\tau 1 / \tau a)^2$

$= (106.6 / 167)^2 + (7.5 / 98)^2$

$= 0.413$ < 1.2

7．３．Design of bearing support

7．３．１．Design of Rubber Bearing

１．Design conditions

Type of super structure　steel
Type of sub structure　Concrete sub- structure
Area Classify　A1 Area　Cz= 1.0　CⅠz= 1.2　CⅡz= 1.0
Design Thermal variation　± 50℃

Specification　Specification of highway bridge design, book V March 2012
Bridge bearing manual (April 2004)
Published by Japan Road Association

	Span length	No. Bearing	Bearing condition		Ground Type	
	L (m)	N (pcs)	Longitudinal	Transverse	Longitudinal	Transverse
P5	---	4	E	F	TypeⅢ	TypeⅢ
P6	75.6	4	E	F	TypeⅢ	TypeⅢ
P7	76.5	4	E	F	TypeⅢ	TypeⅢ
P10	102.8	4	E	F	TypeⅢ	TypeⅢ

・Reaction forces

	Max. Reaction	For Rotation	For Stress Amplitude		Dead Load		Max. Live load
	R_{max1} (kN)	R_{max2} (kN)	R_{max}' (kN)	R_{min}' (kN)	ΣR_d (kN/pier)	R_{dmax} (kN)	R_{lmax} (kN)
P5	3400	2100	3200	1300	7200	2100	1400
P6	7000	5000	7000	4400	16700	4800	-
P7	8400	6200	8000	5100	21400	6000	-
P10	4100	3200	3500	1200	9000	2500	1700

・An intemized reaction forces

	Dead load				
	G1 (kN)	G2 (kN)	G3 (kN)	G4 (kN)	合計 (kN)
P5	1865.95	1383.54	1895.07	2050.19	7194.75
P6	3959.85	3793.75	4129.43	4773.19	16656.22
P7	5628.25	4836.14	4946.09	5950.77	21361.25
P10	2422.48	2135.37	2483.85	1955.17	8996.87

	Maximum live load				Minimum live load			
	G1 (kN)	G2 (kN)	G3 (kN)	G4 (kN)	G1 (kN)	G2 (kN)	G3 (kN)	G4 (kN)
P5	1320.97	733.18	891.82	1284.67	-466.74	-144.11	-75.10	-120.84
P6	1947.85	1278.07	1409.40	2185.38	-484.27	-239.35	-221.33	-332.39
P7	2278.57	1443.70	1473.67	2364.77	-483.95	-142.76	-134.14	-352.79
P10	1601.57	1101.39	1169.66	1531.31	-602.69	-441.99	-402.09	-675.79

	Maximum reaction				Minimum reaction			
	G1 (kN)	G2 (kN)	G3 (kN)	G4 (kN)	G1 (kN)	G2 (kN)	G3 (kN)	G4 (kN)
P5	3186.92	2116.72	2786.89	3334.86	1399.21	1239.43	1819.97	1929.35
P6	5907.70	5071.82	5538.83	6958.57	3475.58	3554.40	3908.10	4440.80
P7	7906.82	6279.84	6419.76	8315.54	5144.30	4693.38	4811.95	5597.98
P10	4024.05	3236.76	3653.51	3486.48	1819.79	1693.38	2081.76	1279.38

	Live load rotation angle			
	G1 (m・rad)	G2 (m・rad)	G3 (m・rad)	G4 (m・rad)
P5	3.25	3.21	3.18	3.26
P6	2.56	2.55	2.54	2.58
P7	3.53	3.49	3.45	3.41
P10	5.34	5.28	5.23	5.23

・Movement

	Bridge longitudinal direction	
	Ordinary (mm)	Seismic L1 (mm)
P5	80.0	310.0
P6	28.0	180.0
P7	10.0	170.0
P10	88.0	286.0

・Design Horizontal reaction

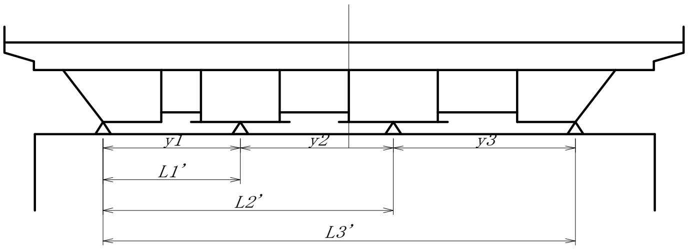
	Bridge longitudinal direction		Bridge Trans Direction
	Ordinary (kN/pier)	Seismic L1 (kN/pier)	Seismic L1 (kN/pier)
P5	1253	5800	2000
P6	537	4700	4900
P7	402	4400	6900
P10	1389	5300	2500

Analysis results

	Seismic L1	
	Longitudinal (kN)	Transverse (kN)
P5	5727	1977
P6	4588	4892
P7	4343	6894
P10	5271	2500

・Calculation of vertical reaction

a) Position equilibrium of super- structure



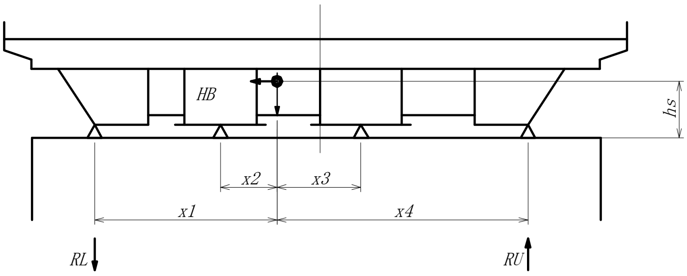
Calculation Results

	Bearing n	y1 (mm)	y2 (mm)	y3 (mm)	L_1' (mm)	L_2' (mm)	L_3' (mm)
P5	4	4177	6000	10734	4177	10177	20911
P6	4	4177	6000	7840	4177	10177	18017
P7	4	4177	6000	5254	4177	10177	15431
P10	4	4177	8200	4177	4177	12377	16554

	Deadload reactions(For calculation of RL)				Deadload reactions(For calculation of RU)			
	R_{d1} (kN)	R_{d2} (kN)	R_{d3} (kN)	R_{d4} (kN)	R_{d1} (kN)	R_{d2} (kN)	R_{d3} (kN)	R_{d4} (kN)
P5	1900	1400	1900	2100	1800	1300	1800	2000
P6	4000	3800	4200	4800	3900	3700	4100	4700
P7	5700	4900	5000	6000	5600	4800	4900	5900
P10	2500	2200	2500	2000	2400	2100	2400	1900

b) Calculation of vertical reaction in seismic condition (RL, RU)

EHEQ position equilibrium



Base on section 15. 2 (3) of Highway Bridge Specification

$R_L = R_d + \sqrt{(R_{VEQ}^2 + R_{HEQ}max^2)}$

$R_U = R_d - \sqrt{(R_{VEQ}^2 + R_{HEQ}max^2)}$

$R_{VEQ} = R_d \times k_V$

(1)Vertical force due to reaction in bridge longitudinal direction

$R_L = R_d + R_{VEQ}$

$R_U = R_d - R_{VEQ}$

(2)Vertical force due to reaction in bridge transversal direction

$H_B \times h_S = \Sigma (R_{HEQi} \times x_i)$

$\Sigma R_{HEQi} = 0$

$R_{HEQi} = K \times x_i$

・ x_i distance from centroid to bearing position

・Distance xi in transversal direction from equilibrium position of RHEQi to bearing position

$x_1 = \Sigma L_i' / n$, $x_2 = x_1 - y_1$, …, $x_n = x_{n-1} - y_{n-1}$

・Proportionality coefficient K

$K = H_B \times h_S / \Sigma x_i^2$

※Round up hs = h + h1 + 250 +40, per 100mm unit

	Heiget of girder h (mm)	Height of support h_1 (mm)	Inertial force position h_S (mm)	$\Sigma L_i'$	Σx_i^2	Ground Type Longitudinal	Ground Type Transverse	Ground type modify Factor cz	Ground type modify Factor cⅠz	Ground type modify Factor cⅡz
P5	2700	534	3600	35265	247383523	TypeⅢ	TypeⅢ	1.0	1.2	1.0
P6	2700	484	3500	32371	183660537	TypeⅢ	TypeⅢ	1.0	1.2	1.0
P7	2700	509	3500	29785	137347863	TypeⅢ	TypeⅢ	1.0	1.2	1.0
P10	2700	527	3600	33108	170637458	TypeⅢ	TypeⅢ	1.0	1.2	1.0

	x_1 (mm)	x_2 (mm)	x_3 (mm)	x_4 (mm)
P5	8816.25	4639.25	-1360.75	-12094.75
P6	8092.75	3915.75	-2084.25	-9924.25
P7	7446.25	3269.25	-2730.75	-7984.75
P10	8277	4100	-4100	-8277

・Calculation results (Seismic L1)

	Longitudinal	Transverse		
	Vertical seismic coefficient k_V	Horizontal force H_B(kN)	Vertical seismic coefficient k_V	Proportionality coefficient K
P5	0.12	2000	0.12	0.02910
P6	0.12	4900	0.12	0.09338
P7	0.12	6900	0.12	0.17583
P10	0.12	2500	0.12	0.05274

RL	R_{VEQ1} (kN)	R_{VEQ2} (kN)	R_{VEQ3} (kN)	R_{VEQ4} (kN)
P5	228	168	228	252
P6	480	456	504	576
P7	684	588	600	720
P10	300	264	300	240

Ru	R_{VEQ1} (kN)	R_{VEQ2} (kN)	R_{VEQ3} (kN)	R_{VEQ4} (kN)
P5	216	156	216	240
P6	468	444	492	564
P7	672	576	588	708
P10	288	252	288	228

	R_{HEQ1} (kN)	R_{HEQ2} (kN)	R_{HEQ3} (kN)	R_{HEQ4} (kN)	R_{HEQ}max (kN)
P5	257	135	-40	-352	352
P6	756	366	-195	-927	927
P7	1309	575	-480	-1404	1404
P10	437	216	-216	-437	437

Bridge longitudinal direction

	R_{L1} (kN)	R_{L2} (kN)	R_{L3} (kN)	R_{L4} (kN)
P5	2128	1568	2128	2352
P6	4480	4256	4704	5376
P7	6384	5488	5600	6720
P10	2800	2464	2800	2240

	R_{U1} (kN)	R_{U2} (kN)	R_{U3} (kN)	R_{U4} (kN)
P5	1584	1144	1584	1760
P6	3432	3256	3608	4136
P7	4928	4224	4312	5192
P10	2112	1848	2112	1672

Bridge transverse direction

	R_{L1} (kN)	R_{L2} (kN)	R_{L3} (kN)	R_{L4} (kN)
P5	2319	1790	2319	2533
P6	5044	4833	5255	5891
P7	7262	6422	6527	7578
P10	3030	2711	3030	2499

	R_{U1} (kN)	R_{U2} (kN)	R_{U3} (kN)	R_{U4} (kN)
P5	1387	915	1387	1574
P6	2862	2672	3051	3615
P7	4043	3282	3378	4328
P10	1877	1596	1877	1407

Summary

	Longitudinal		Transverse	
	R_L (kN)	R_U (kN)	R_L (kN)	R_U (kN)
P5	2352	1144	2533	915
P6	5376	3256	5891	2672
P7	6720	4224	7578	3282
P10	2800	1672	3030	1407

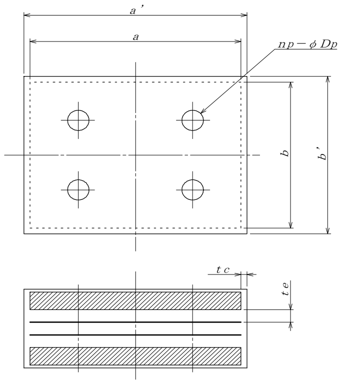
・Table of allowable value

Allowable value used in design of rubber bearing shall be listed as below

Maximum compressive stress	$S_1 < 8$		$\sigma_{maxa} =$ 8.0 N/mm^2
	$8 \leqq S_1 < 12$		$\sigma_{maxa} = S_1$ N/mm^2
	$12 \leqq S_1$		$\sigma_{maxa} =$ 12.0 N/mm^2
Stress amplitude	$S_1 \leqq 8$		$\sigma_{maxa} =$ 5.0 N/mm^2
	$S_1 > 8$		$\sigma_{maxa} = 5.0 + 0.375(S_1 - 8.0)$ N/mm^2 however not larger than 6.5 N/mm^2
Shear deformation	Ordinary condition		$\gamma_{sa} =$ 70 %
	Wind condition		$\gamma_{wa} =$ 150 %
	Seismic Condition	Level 1	$\gamma_{ea} =$ 150 %
		Level 2	$\gamma_{ea} =$ 250 %
Local shear strain	Ordinary condition		$\gamma_{ta} = \gamma_u / f_a$: $f_a = 1.5$
Elongation at break γu	NR	G6	600 %
		G8	550 %
		G10	550 %
		G12	500 %
		G14	450 %
	HDR HDR-S	G8	650 %
		G10	600 %
		G12	550 %
Tensile stress	Wind Condition	G6	$\sigma_{ta} =$ 0.9 N/mm^2
		G8	$\sigma_{ta} =$ 1.2 N/mm^2
		G10以上	$\sigma_{ta} =$ 1.5 N/mm^2
	Seismic COndition	G6	$\sigma_{ta} =$ 1.2 N/mm^2
		G8	$\sigma_{ta} =$ 1.6 N/mm^2
		G10以上	$\sigma_{ta} =$ 2.0 N/mm^2

1）Properties of rubber bearing part

・Physical and Geometrical properties of rubber bearing



- a' : Length of rubber bearing in longitudinal direction (mm)
- b' : Width of rubber bearing in transversal direction (mm)
- t_c : Thickness of rubber covering layers (mm)
- a : Effective length (Length of steel plate) of rubber bearing (mm)
- b : Effective width (width of steel plate) of rubber bearing (mm)
- t_e : Thickness of a rubber layer (mm)
- n : Number of rubber layers
- Σt_e : Total thickness of rubber layers ($= t_e \times n$)
- D_P : Diameter of lead plug (mm)
- n_P : Number of lead plug
- A_e : Area of rubber bearing excluding the side surface covering rubber (mm2) ($= a \cdot b - \pi/4 \cdot D_P^2 \cdot n_P$)

	Type of rubber	Shape of bearing	Elastic Shear Modulus G_e (N/mm^2)	Fracture deformation γ_u (%)	Dimensions of bearing: Long. Dim a' (mm)	Dimensions of bearing: Trans. Dim b' (mm)	Dimensions of bearing: Side surface rubber t_c (mm)
P5	NR	□	1.2	500%	970	970	10
P6	NR	□	1.2	500%	920	920	10
P7	NR	□	1.2	500%	920	920	10
P10	NR	□	1.2	500%	920	970	10

	Effective dimensions: Long. Dim a (mm)	Effective dimensions: Trans. Dim b (mm)	Design thickness of rubber layers: Thickness of 1 layer t_e (mm)	Design thickness of rubber layers: No. layers n	Design thickness of rubber layers: Total thickness Σt_e (mm)	Lead plug: Diameter D_P (mm)	Lead plug: Number n_P	Surface area of bearing A_e (mm^2)
P5	950	950	39	6	234	0	0	902500
P6	900	900	19	8	152	0	0	810000
P7	900	900	19	8	152	0	0	810000
P10	900	950	37	6	222	0	0	855000

・Characteristics of rubber bearing

1^{st} shape factor

In case of rectangular bearing

In case of $0.5 \leqq b/a \leqq 2.0$

$$S_1 = \frac{A_e}{2 \cdot (a+b) \cdot t_e}$$

In case of circular bearing

$$S_1 = \frac{A_e}{\pi \cdot D \cdot t_e}$$

In case of $0.5 < b/a$, $b/a > 2.0$

$$S_1 = \frac{\min(a, b)}{2 \cdot t_e}$$

2^{nd} shape factor

$$S_2 = \frac{\min(a, b) \text{ or } D}{\Sigma t_e}$$

Young Modulus (Ralated in Design handbook of bridge bearing)

$$E = \alpha \cdot \beta \cdot S_1 \cdot G_e$$

Where, α : Factor depends on type of rubber

NR	35
HDR, HDR-S, SPR	45

β : Factor depends on plane shape of bearing

Rectangular ($0.5 \leqq b/a \leqq 2$)	1.00
Rectangular ($0.5 > b/a$, $b/a > 2$)	0.50
Circular	0.75

Young Modulus (Based on theory of Hatori Takei)

Rectangular ($0.5 \leqq b/a \leqq 2$) $E' = (3 + 2/3 \cdot \pi^2 \cdot S_1^2) \cdot G_e$

Rectangular ($0.5 > b/a$, $b/a > 2$) $E' = (4 + 1/3 \cdot \pi^2 \cdot S_1^2) \cdot G_e$

Circular $E' = (3 + 1/2 \cdot \pi^2 \cdot S_1^2) \cdot G_e$

Vertical Rigidity

$$K_v = \frac{E \text{ or } E' \times A_e}{\Sigma t_e}$$

Where, A_e : Area of Inner steel plate(mm2)

a, b, D : Plane dimensions of steel plate (mm)

t_e : Thickness of a rubber layer (mm)

Σt_e : Total thickness of rubber layers (mm)

G_e : Shear stiffness of rubber (N/mm^2)

Where, In case of $S1 \geqq 5.0$ Use the value of E, If $S1 < 5.0$
Use the value E' for design and calculation.

	Long.dim a (mm)	Trans.dim b (mm)	1 layer thickness t_e (mm)	Total thickness Σt_e (mm)	Bearing Area A_e (mm^2)
P5	950	950	39	234	902500
P6	900	900	19	152	810000
P7	900	900	19	152	810000
P10	900	950	37	222	855000

	1^{st} shape factor S_1	2^{nd} shape factor S_2	Shear Stiffness G_e (N/mm^2)	Modify factors		Young Modulus E (N/mm^2)	Young Modulus E' (N/mm^2)	Vertical stiffness K_v (N/mm)
				α	β			
P5	6.09	4.06	1.20	35	1.00	255.8	296.4	986460
P6	11.84	5.92	1.20	35	1.00	497.4	1110.9	2650450
P7	11.84	5.92	1.20	35	1.00	497.4	1110.9	2650450
P10	6.25	4.05	1.20	35	1.00	262.3	311.6	1010241

2）Calculation of ordinary movement

・Shear stiffness (Rubber shoe for disperse of horizontal load)

$K_B = G(\gamma) \cdot A_e / \Sigma t_e$

$G(\gamma)$：Equivalent of shear modulus　(＝G_e)

ここに,　A_e：Effective area (area of steel plate) (mm2)
Σt_e：Total thickness of elastic rubber layers (mm)

Movement of Ordinary　(ΔL1)

Amount of movement of bearing
ΔL1 is the result of analysis

	Bearing movement ΔL1 (mm)	Shear strain γ
P5	80.0	34.2%
P6	28.0	18.4%
P7	10.0	6.6%
P10	88.0	39.6%

	Number of bearings N (pcs／pier)	Equivalent of shear modulus G(γ) (N/mm^2)	Shear stiffness 1 bearing K_B (N/mm)	Shear stiffness on 1 pier $N \cdot K_B$ (N/mm)
P5	4	1.200	4628	18513
P6	4	1.200	6395	25579
P7	4	1.200	6395	25579
P10	4	1.200	4622	18486

2．Checking in ordinary condition

（1）Effects due to vertical force

1）Maximum stress due to vertical reaction

$$\sigma_{max} = \frac{R_{max1}}{A_{cn}} \leqq \sigma_{maxa}$$

Where,
σ_{max} : Maximum compressive stress due to vertical reaction (N/mm^2)
R_{max1} : Maximum vertical reaction (kN)
A_{cn} : Effective area(mm^2) (＝$Ae - \Delta L1 \cdot b$)
σ_{maxa} : Allowable value (N/mm^2)

	Calculation condition					Results of calculation		
	Maximum reaction R_{max1} (kN)	Area of steel plate A_e (mm^2)	Bearing dimensions b (mm)	Amount of movement $\Delta L1$ (mm)	Effective Area A_{cn} (mm^2)	Calculated result σ_{max} (N/mm^2)	Allowable Value $\leqq \sigma_{maxa}$ (N/mm^2)	Conclusions
P5	3400	902500	950	80.0	826500	4.11	8.00	OK
P6	7000	810000	900	28.0	784800	8.92	11.84	OK
P7	8400	810000	900	10.0	801000	10.49	11.84	OK
P10	4100	855000	950	88.0	771400	5.32	8.00	OK

2）Stress amplitude

$$\varDelta\sigma = \sigma_{max}' - \sigma_{min}' \leqq \varDelta\sigma_a$$

Where,
$\varDelta\sigma$: Stress amplitude (N/mm^2)
σ_{max}' : Maximum compressive stress used in calculation of stress amplitude (N/mm^2) (＝R_{max}' / A_{cn})
σ_{min}' : Minimum compressive stress used in calculation of stress amplitude (N/mm^2) (＝R_{min}' / A_e)
$\varDelta\sigma_a$: Allowable value (N/mm^2)

Calculation results

	Maximum compressive stress						Minimum compressive stress		
	Max. reaction R_{max}' (kN)	Surface area A_e (mm^2)	Bearing dimensions b (mm)	Design movement $\Delta L1$ (mm)	Effective area A_{cn} (mm^2)	Calculated results σ_{max}' (N/mm^2)	Minimum reaction R_{min}' (kN)	Surface area A_e (mm^2)	Allowable value σ_{min}' (N/mm^2)
P5	3200	902500	950	80.0	826500	3.87	1300	902500	1.44
P6	7000	810000	900	28.0	784800	8.92	4400	810000	5.43
P7	8000	810000	900	10.0	801000	9.99	5100	810000	6.30
P10	3500	855000	950	88.0	771400	4.54	1200	855000	1.40

Calculation results

	Calculated result $\varDelta\sigma$ (N/mm^2)	Allowable value $\leqq\varDelta\sigma$ (N/mm^2)	Conclusions
P5	2.43	5.00	OK
P6	3.49	6.44	OK
P7	3.69	6.44	OK
P10	3.13	5.00	OK

3) Buckling stability

・Ordinary condition

$$\sigma_{max} \leqq \sigma_{cra}$$

Where, σ_{max} : Maximum compressive stress (N/mm^2)

σ_{cra} : Allowable value of compressive stress When considering buckling stability (N/mm^2) $(=G_e \cdot S_1 \cdot S_2 / f_{cr})$

f_{cr}

Ordinary	Seismic
2.5	1.5

Calculation results

	Shear modulus G_e (N/mm^2)	1st Shape factor S_1 −	2nd Shape factor S_2 −	factor Ordinary f_{cr} −	Allowable value Ordinary σ_{cra} (N/mm^2)
P5	1.2	6.09	4.06	2.5	11.87
P6	1.2	11.84	5.92	2.5	33.66
P7	1.2	11.84	5.92	2.5	33.66
P10	1.2	6.25	4.05	2.5	12.15

Calculation results

	Calculated result σ_{max} (N/mm^2)	Allowable value $\leqq \sigma_{cra}$ (N/mm^2)	Conclusions
P5	4.11	11.87	OK
P6	8.92	33.66	OK
P7	10.49	33.66	OK
P10	5.32	12.15	OK

4) Deflection of ends bearing

$$\delta_{cl} = k \cdot R_{lmax} / K_v \quad \leqq \sigma_{cla}$$

Where, k : Load factor for live load

R_{lmax} : Maximum live load at ends bearing (kN)

K_v : Vertical rigidity (N/mm)

σ_{cla} : Allowable value (mm) (=1.000)

	Calculation condition			Results of calculation		
	Maximum live load R_{lmax} (kN)	Load factor for live load k	Vertical stiffness K_v (N/mm)	Calculated results δ_{cl} (mm)	Allowable value $\leqq \delta_{cla}$ (mm)	Conclusions
P5	1400	1/2	986460	0.710	1.000	OK
P6	−	1/2	2650450	−	−	−
P7	−	1/2	2650450	−	−	−
P10	1700	1/2	1010241	0.841	1.000	OK

（2）Displacement checking

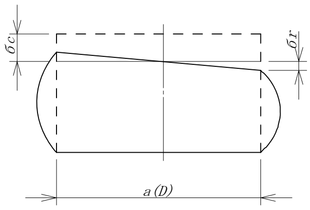
1）Checking of shear deformation

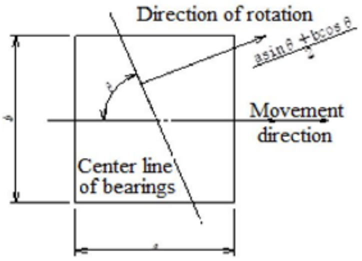
$$\gamma_s = \frac{\triangle L1}{\Sigma t_e} \leqq \gamma_{sa}$$

Where,
γ_s : Shear deformation in ordinary condition (%)
$\triangle L1$: Movement in ordinary condition (mm)
Σt_e : Total thickness of rubber layers (mm)
γ_{sa} : Allowable value (%)

	Calculating condition		Calculated results		
	Design movement $\triangle L1$ (mm)	Total thickness Σt_e (mm)	Calculated result γ_s (%)	Allowable Value $\leqq \gamma_{sa}$ (%)	Conclusions
P5	80.0	234	34.2%	70.0%	OK
P6	28.0	152	18.4%	70.0%	OK
P7	10.0	152	6.6%	70.0%	OK
P10	88.0	222	39.6%	70.0%	OK

2）Checking of rotation capacity





計算式

$\delta_r \leqq \delta_c / f_v$

Where, δ_r : Movement of ends bearings due to rotation of girders (mm)

In case of rectangular shape : $\delta_r = (a \cdot \sin\theta + b \cdot \cos\theta)/2 \times \Sigma\alpha_e$

In case of circle shape : $\delta_r = D/2 \times \Sigma\alpha_e$

a : Effective length of bearing (mm)
b : Effective width of bearing (mm)
D : Effective diameter of bearing in case of circle (mm)
θ : Skew angle (deg)
(＝The angle of bearing center line and movement direction)
$\Sigma\alpha e$: Rotation angle of girder due to live load (rad)

δ_c : Compressive deflection due to vertical force (mm) $(= R_{max2} / K_v)$

R_{max2} : Vertical reaction used in calculation of rotation (kN)

K_v : Vertical stiffness (kN/mm)

f_v : Coefficient of precision and variability of vertical stiffness (＝1.3)

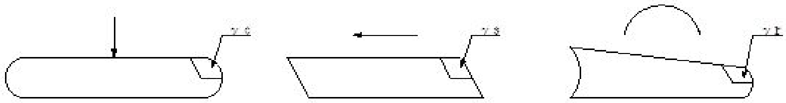
Calculating condition

	Compressive movement			Rotation angle				
	Maximum reaction R_{max2} (kN)	Vertical Stiffness K_v (N/mm)	Calculated value δ_c (mm)	Bearing length a (mm)	Bearing width b (mm)	Live load rotation angle $\Sigma\alpha_e$ (rad)	Skew angle θ (deg)	Calculated value δ_r (mm)
P5	2100	986460	2.129	950	950	1/305	87.2	1.631
P6	5000	2650450	1.886	900	900	1/385	88.9	1.191
P7	6200	2650450	2.339	900	900	1/280	85.8	1.720
P10	3200	1010241	3.168	900	950	1/185	90.0	2.433

Calculation results

	Compressive deflection $\delta_c/1.3$ (mm)	Deflection due to rotation $\geqq \delta_r$ (mm)	Conclusions
P5	1.638	1.631	OK
P6	1.451	1.191	OK
P7	1.799	1.720	OK
P10	2.437	2.433	OK

(3) Checking of local strain



(a) Local shear strain due to vertical load

(b) Local shear strain due to horizontal force

(c) Local shear strain due to rotation

Checking formula

$\gamma_t \leqq \gamma_{ta}$

ここに　　γ_t : Local shear strain (%)

$= \gamma_c + \gamma_s + \gamma_r$

γ_c : Local shear stain due to vertical force (%)

In case of rectangular shape : $\gamma_c = 8.5 \cdot S_1 \cdot R_{max1} / E \cdot A_{cn}$

In case of circle shape : $\gamma_c = 6.0 \cdot S_1 \cdot R_{max1} / E \cdot A_{cn}$

γ_s : Shear strain in ordinary condition (%)

γ_r : Local shear strain due to rotation of girder (%)

In case of rectangular shape : $\gamma_r = 2 \cdot (1 + a/b)^2 \cdot S_1^2 \cdot \alpha_e$

In case of circle shape : $\gamma_r = 6.0 \cdot S_1^2 \cdot \alpha_e$

γ_{ta} : Allowable value of local shear strain (= $\gamma u/fa$) (%)

S_1 : 1st shape factor

R_{max1} : Maximum reaction (kN)

E : Young modulus of rubber bearing (N/mm^2)

A_{cn} : Effective area considered movement in ordinary condition (mm^2)

a : Effective length of bearing (mm)

b : Effective width of bearing (mm)

α_e : Rotation angle of 1 rubber layer (rad)

Calculating condition

	Local shear strain due to vertical reaction				
	1st shape factor S_1 -	Maximum reaction R_{max1} (kN)	Young modulus E (N/mm^2)	Effective area A_{cn} (mm^2)	Calculated value γ_c (%)
P5	6.09	3400	296.4	826500	71.8%
P6	11.84	7000	1110.9	784800	80.8%
P7	11.84	8400	1110.9	801000	95.0%
P10	6.25	4100	311.6	771400	90.6%

	Local shear strain due to rotation angle				
	Bearing length a (mm)	Bearing width b (mm)	Live load rotation angle $\Sigma\alpha_e$ (rad)	1st shape factor S_1 -	Calculated value γ_r (%)
P5	950	950	1/305	6.09	16.2%
P6	900	900	1/385	11.84	36.4%
P7	900	900	1/280	11.84	50.1%
P10	900	950	1/185	6.25	26.7%

Calculated results

	Local shear strain					Conclusions
	Due to vertical force γ_c (%)	Due to shear γ_s (%)	Due to rotation γ_r (%)	Total γ_t (%)	Allowable Value $\leqq \gamma_{ta}$ (%)	
P5	71.8%	34.2%	16.2%	122.2%	333.3%	OK
P6	80.8%	18.4%	36.4%	135.7%	333.3%	OK
P7	95.0%	6.6%	50.1%	151.7%	333.3%	OK
P10	90.6%	39.6%	26.7%	156.8%	333.3%	OK

３．Checking in seismic condition

１）Calculation of movement in seismic condition

・Shear stiffness

$K_B = G(\gamma) \cdot A_e / \Sigma t_e$

$G(\gamma)$：Equivalent of shear modulus （$=G_e$）

ここに, A_e：Surface area of bearing(mm^2)
Σt_e：Total thickness of elastic rubber layers (mm)

・Design movement of bearing

u_B is the result of analysis

・shear deformation

$\gamma = u_B / \Sigma t_e \times 100$ 　　ここに, Σt_e：Total thickness of rubber layers(mm)

a) Bridge longitudinal direction in seismic level I

Calculated results

Calculation of stiffness

	Number of bearings N (pcs/pier)	Equivalent of shear modulus G(γ) (N/mm²)	Shear stiffness 1 bearing K_B (N/mm)	Shear stiffness on 1 pier ΣK_B (N/mm)
P5	4	1.200	4628	18513
P6	4	1.200	6395	25579
P7	4	1.200	6395	25579
P10	4	1.200	4622	18486

Calculation of displacement

	Design deformation u_B (mm)	Effective value γ (%)
P5	310.0	132.5%
P6	180.0	118.4%
P7	170.0	111.8%
P10	286.0	128.8%

2) Checking of shear deformation

$$\gamma_{se} = \frac{u_B}{\Sigma t_e} \leqq \gamma_{sea}$$

Where, γ_{se} : Shear deformation in seismic condition (%)
u_B : Movement in seismic condition(mm)
Σt_e : Total thickness of rubber layers (mm)
γ_{sea} : Allowable value (%) (Seismic L1 : 150%)

Bridge longitudinal direction in seismic level I

	Calculating condition		Calculated results		
	Design movement u_B (mm)	Total thickness Σt_e (mm)	Calculated result γ_{se} (%)	Allowable Value $\leqq \gamma_{sea}$ (%)	Conclusions
P5	310.0	234	132.5%	150.0%	OK
P6	180.0	152	118.4%	150.0%	OK
P7	170.0	152	111.8%	150.0%	OK
P10	286.0	222	128.8%	150.0%	OK

3) Effects due to vertical force

a) Buckling stability

$$\sigma_{ce} = \frac{R_L}{A_{ce}} \leqq \sigma_{cra}$$

Where, σ_{ce}: Maximum compressive stress in seismic condition (N/mm^2)
R_L: Vertical force in seismic condition (N/mm^2)
A_{ce}: Effective area in seismic condition (mm^2)
Bridge longitudinal direction $(=A_e - u_{B1} \cdot b)$
Bridge transversal direction $(=A_e - u_{B2} \cdot a)$
σ_{cra}: Allowable value of compressive stress when considering buckling (N/mm^2)
$(=G_e \cdot S_1 \cdot S_2 / f_{cr})$

Calculation of allowable value

	Elastic shear modulus G_e (N/mm^2)	1st shape factor S_1 −	2nd shape factor S_2 −	Factor Seismic f_{cr} −	Allowable Seismic σ_{cra} (N/mm^2)
P5	1.2	6.09	4.06	1.5	19.78
P6	1.2	11.84	5.92	1.5	56.09
P7	1.2	11.84	5.92	1.5	56.09
P10	1.2	6.25	4.05	1.5	20.26

・Bridge longitudinal direction in seismic level I

	Calculation condition					Calculation results		
	Vertical force in seismic cond. R_L (kN)	Plane area of bearing A_e (mm^2)	Design movement u_{B1} (mm)	Bearing dimensions b (mm)	Effective area A_{ce} (mm^2)	Calculated value σ_{ce} (N/mm^2)	Allowable value $\leqq \sigma_{cra}$ (N/mm^2)	Conclusions
P5	2352	902500	310.0	950	608000	3.87	19.78	OK
P6	5376	810000	180.0	900	648000	8.30	56.09	OK
P7	6720	810000	170.0	900	657000	10.23	56.09	OK
P10	2800	855000	286.0	950	583300	4.80	20.26	OK

・Bridge transversal direction in seismic level I

	Calculation condition					Calculation results		
	Vertical force in seismic cond. R_L (kN)	Plane area of bearing A_e (mm^2)	Design movement u_{B2} (mm)	Bearing dimensions a (mm)	Effective area A_{ce} (mm^2)	Calculated value σ_{ce} (N/mm^2)	Allowable value $\leqq \sigma_{cra}$ (N/mm^2)	Conclusions
P5	2533	902500	0.0	950	902500	2.81	19.78	OK
P6	5891	810000	0.0	900	810000	7.27	56.09	OK
P7	7578	810000	0.0	900	810000	9.36	56.09	OK
P10	3030	855000	0.0	900	855000	3.54	20.26	OK

b) Checking of tensile stress

Uplift force in seismic condition

$$\sigma_{te} = \frac{R_U}{A_{ce}} \leqq \sigma_{ta}$$

Where, σ_{te} : Tensile stress in seismic condition (N/mm^2)
R_U : Vertical force in seismic condition
(= Uplift force in seismic condition) (kN)
A_{ce} : Effective area in seismic condition(mm^2)
In bridge transversal direction ($= A_e - u_{B2} \cdot a$)
σ_{ta} : Allowable value(N/mm^2)

For the case of uplift force ($0.1R_d$)

$$\sigma_{te} = \frac{0.1R_d}{A_e} \leqq \sigma_{ta}$$

Where, σ_{te} : Tensile stress due to uplift force (N/mm^2)
A_e : Effective area(mm^2)
σ_{ta} : Allowable value (N/mm^2)

・Bridge transversal direction in seismic level I

	Calculation condition					Calculation results		
	Vertical force in seismic cond. R_U (kN)	Plane area of bearing A_e (mm^2)	Design movement u_{B2} (mm)	Bearing dimensions a (mm)	Effective area A_{ce} (mm^2)	Calculated value σ_{te} (N/mm^2)	Allowable value $\leqq \sigma_{ta}$ (N/mm^2)	Conclusions
P5	915	902500	0.0	950	902500	0.00	2.00	OK
P6	2672	810000	0.0	900	810000	0.00	2.00	OK
P7	3282	810000	0.0	900	810000	0.00	2.00	OK
P10	1407	855000	0.0	900	855000	0.00	2.00	OK

・Uplift force acting in seismic level 1

	Calculation condition		Calculation results		
	Uplift force $0.1R_d$ (kN)	Plane area of bearing A_e (mm^2)	Calculated value σ_{te} (N/mm^2)	Allowable value $\leqq \sigma_{ta}$ (N/mm^2)	Conclusions
P5	-210	902500	0.23	2.00	OK
P6	-480	810000	0.59	2.00	OK
P7	-600	810000	0.74	2.00	OK
P10	-250	855000	0.29	2.00	OK

７．３．２. Design of steel component rubber bearing

１. Design Condition

Level 1

	Seismic force in bridge longitudinal direction			Seismic force in bridge transversal direction			Uplift force
	RL1 (kN/bearing)	RU1 (kN/bearing)	Rh1 (kN/bearing)	RL2 (kN/bearing)	RU2 (kN/bearing)	Rh2 (kN/bearing)	RU (kN/bearing)
P5	2352	1144	1500	2533	915	600	210
P6	5376	3256	1200	5891	2672	1500	480
P7	6720	4224	1100	7578	3282	2000	600
P10	2800	1672	1400	3030	1407	700	250

	displacement level 1	
	ΔLe1 mm	ΔLe2 mm
P5	310	0
P6	180	0
P7	170	0
P10	286	0

	no. of bearing support	death load			horizontal force	
		ΣR_D kN	R_D kN	ratio γ	Longitudinal dimensions (kN/pier)	Transversal dimensions (kN/pier)
P5	4	7200	2100	0.2917	5800	2000
P6	4	16700	4800	0.2874	4700	4900
P7	4	21400	6000	0.2804	4400	6900
P10	4	9000	2500	0.2778	5300	2500

Where,

R_D	Dead load reaction
RL1	Vertical force when considering bridge longitudinal seismic
RU1	Uplift force when considering bridge longitudinal seismic
Rh1e	Longitudinal force due to longitudinal seismic
RL2	Vertical force due to transversal seismic
RU2	Uplift force when considering bridge transversal seismic
Rh2e	Longitudinal force due to transversal seismic
RU	Uplift force in seismic level I　　　-0.1・Rd
ΔLe1	Movement in bridge longitudinal direction due to seismic
ΔLe2	Movement in bridge transversal direction due to seismic
V	min(RU1,RU2,RU)

2．Allowable stress of steel materials

※Data related in section 3.5.3 of bridge bearing manual (April 2004) published by Japan Road Association

2．1　Allowable stress of steel materials

Stresses / Materials		Thickness of steel component mm	Flexural stress σa N/mm^2	Shear stress τa N/mm^2	Compressive stress σba N/mm^2
Rolled steel	SS400, SM400	Equal or less than 40	140	80	210
		Above 40	125	75	190
	SM490A	Equal or less than 40	185	105	280
		40＜ t ≦100	175	100	260
		100＜ t ≦160	170	95	255
		160＜ t ≦200	165	90	250
Cast steel	SCW410N	Equal or less than 150	140	80	210
		Above 150	126	72	189
	SCW480N	Equal or less than 150	170	100	250
		Above 150	153	90	225
Carbon steel	S35CN		190	110	280
	S45CN		210	120	310

2．2　Allowable stress of anchor bolts

Shear stress of anchor bolt τa (N/mm^2)

	SS400	S35CN	S45CN	SD295A SD295B	SD345
Seismic	80	110	110	105	115

Tensile stress of anchor bolt σta (N/mm^2)

	SS400	S35CN	S45CN	SD295A SD295B	SD345
Seismic	140	190	210	180	200

Adhensive stress of anchor bolt τo (N/mm^2)

	Standard strength of concrete						
	21	24	27	30	40	50	60
Rounded shape	0.70	0.80	0.85	0.90	1.00	1.00	1.00
Deformed shape	1.40	1.60	1.70	1.80	2.00	2.00	2.00

2．3　Allowable stress of bolt

		4.8(4.6) N/mm^2	8.8 N/mm^2	10.9 N/mm^2	12.9 N/mm^2
Tensile stress	σta	140	360	470	470
Shear stress	τa	90	200	270	270
Compressive strength	σba	210	540	700	700
Tensile strength		－	830	1040	－

2．4　Surcharges coefficient of allowable stress

Main load combination except for live load and impact+ Effects in seismic condition (EQ)

	Level 1
Concrete component	1.5
Steel component	1.5

3. Material of bearing components

3. 1 Inner steel plate of rubber bearing

$\sigma s = fc \cdot \sigma c \cdot te / ts$

fc : Coefficient of tensile stress (In case of laminar rubber bearing, $fc = 2$)
σc : Compressive stress
te : Thickness of a rubber layer (mm)
ts : Thickness a inner steel plate (mm)

Calculated results (Ordinary condition)

	Coefficient f c	Compressive stress σ c (N/mm^2)	Thickness rubber layer t e (mm)	Thickness inner steel plate t s (mm)	Material inner steel plate	Tensile stress σ s (N/mm^2)	Allowable stress σ sa (N/mm^2)
P5	2	4.11	39	6.0	SS400	53.5	140.0
P6	2	8.92	19	4.5	SS400	75.3	140.0
P7	2	10.49	19	4.5	SS400	88.6	140.0
P10	2	5.32	37	6.0	SS400	65.6	140.0

Calculated results (Seismic level 1)

	Coefficient f c	Maximum compressive stress σ c (N/mm^2)	Tensile stress σ se (N/mm^2)	Allowable stress σ sa (N/mm^2)
P5	2	3.87	50.3	210.0
P6	2	8.30	70.1	210.0
P7	2	10.23	86.4	210.0
P10	2	4.80	59.2	210.0

3. 2 Rubber shoe upper and lower steel plate

(a) remaining thickness of shear key built-in unit

$$\tau = \frac{D \cdot Vp}{4 \cdot t} \leqq \tau a$$

maximum allowable compressive stress of rubber bearing

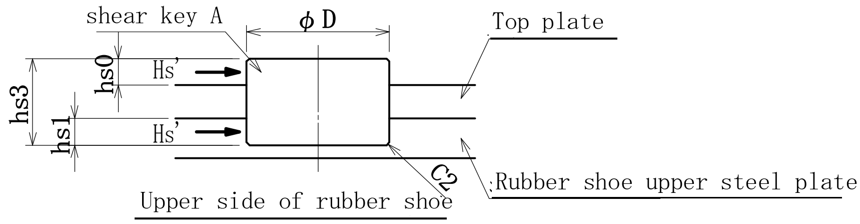
	allowable value
S1<8	8 N/mm^2
8≦S1<12	S1 N/mm^2
12≦S1	12 N/mm^2

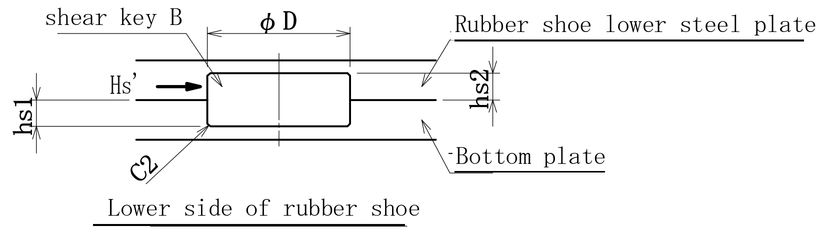
Where,
τ : Shearing stress around shear key built-in unit (N/mm^2)
D : diameter of shear key built-in unit(mm)
Vp : Stress within rubber bearing main unit that emerges to shear key built-in unit(N/mm2)
Note: use standard maximum allowable compreseive stress(σmax) at rubber shoe
t : remaining thickness of shear key built-in unit(mm)
S1 : Primary shape coefficient of rubber bearing

Calculation results

	D mm	Vp N/mm^2	t mm	S1 mm	τ N/mm^2	τ a N/mm^2
P5	251	8.0	20	6.09	25.1	100
P6	251	11.8	25	11.84	29.8	100
P7	251	11.8	25	11.84	29.8	100
P10	251	8.0	20	6.25	25.1	100

4．Shear key





Design horizontal force①
Horizontal force at time of shear deformation, rubber total thickness 150%
$H = 1.5 \cdot Ks \cdot \Sigma te$
In this case, surcharge coefficient shall be 1.5.

Design horizontal force ②
Maximum design horizontal reaction
$Hs' = \max(Rh1, Rh2)$
※When fixed right angle to bridge axis, design horizontal force H of hs1, hs2 is considered Rh1.
In this case, surcharge coefficient shall be 1.5.

(a) Compressive stress

$$\sigma bi = \frac{H, Hs'}{D \cdot (hsi - 2)} \leqq \sigma ba$$

(b) Shear stress

$$\tau = \frac{4 \cdot (H, Hs')}{\pi \cdot D^2} \leqq \tau a$$

Calculation results

	bearing support spring Ks kN/mm	total thickness Σte mm	sole(assumed) material	sole(assumed) thickness (mm)	shear key material
P5	4.628	234	equal of SM400	45	SM490A
P6	6.395	152	equal of SM400	45	SM490A
P7	6.395	152	equal of SM400	45	SM490A
P10	4.622	222	equal of SM400	45	SM490A

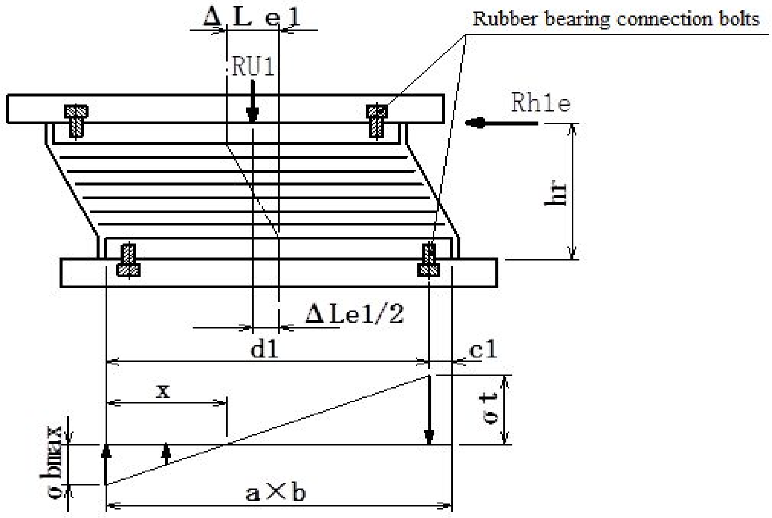
	D mm	hs0 mm	hs1 mm	hs2 mm	hs3 mm
P5	250	30	25	24	115
P6	250	30	20	19	110
P7	250	35	20	19	120
P10	250	30	25	24	115

	design horizontal force ①					
	H kN	σb1 N/mm²	σb2 N/mm²	σba N/mm²	τ N/mm²	τa N/mm²
P5	1625	282.7	295.5	382.5	33.2	142.5
P6	1458	324.0	343.1	382.5	29.8	142.5
P7	1458	324.0	343.1	382.5	29.8	142.5
P10	1539	267.7	279.9	382.5	31.4	142.5

	design horizontal force ②								
	Rh1e kN	Rh2e kN	σb0 N/mm²	σba N/mm²	σb1 N/mm²	σb2 N/mm²	σba N/mm²	τ N/mm²	τa N/mm²
P5	1700	680	242.9	285.0	295.7	309.1	382.5	34.7	142.5
P6	1360	1700	242.9	285.0	302.3	320.0	382.5	34.7	142.5
P7	1247	2267	274.8	285.0	277.1	293.4	382.5	46.2	142.5
P10	1587	793	226.7	285.0	276.0	288.5	382.5	32.4	142.5

5．Connection bolts of rubber bearing

5． 1　Stress checking in case of longitudinal seismic



(1) Tesile stress due to combination of RU1＋Rh1
With the same horizontal force, the smaller the value of vertical force, the more critical the value of tensile force.
Therefore, load case of RU1＋Rh1 in combination shall be selected for checking (Compressive area : a×b).

Eccentric E

$$\Delta Le1/2 + \frac{Rh1 \cdot hr}{RU1}$$

Case of compression

case−1 : $0 < E \leqq Eo = a / 6$
case−2 : $Eo < E \leqq Eo' = a / 6 + c1 / 3$
case−3 : $Eo' < E,\ E < 0$

Dimensions

	Longitudinal dimensions a mm	Transversal dimensions b mm	c1 mm	hr mm
P5	950	950	55	354
P6	900	900	50	274
P7	900	900	50	274
P10	900	950	50	342

Level 1

	RU1 kN	Rh1 kN	ΔLe1 mm	Eo mm	Eo' mm	E mm	case
P5	1144	1500	310.0	158.3	176.7	619.2	case-3
P6	3256	1200	180.0	150.0	166.7	191.0	case-3
P7	4224	1100	170.0	150.0	166.7	156.4	case-2
P10	1672	1400	286.0	150.0	166.7	429.4	case-3

Case－1：Trapezoidal shape of stress distribution
In this case, there is no tensile force in bolts, calculations concerning could be neglected
Case－2：Triangle shape of stress distribution but no tension in bolts
In this case, there is no tensile force in bolts, calculations concerning could be neglected
Case－3：Triangle shape of stress distribution, there in tension in bolts
Calculations based on explanation of single rebar concrete section under compression to calculate tensile force in bolts. And, it could be calculated in only 1 column of the outer row.

Nominal diameter of bolt : d_B
Root diameter of bolt : do
Number of effective bolts : $m1$
Area of root diameter : As (1 bolt)
Define $l = a/2 - E$.

By solving the following equation to obtain position x of neutral axis
Ratio of young's modulus : n

$$f(x) = x^3 - 3 \cdot l \cdot x^2 + \frac{6 \cdot n \cdot m1 \cdot As}{b} \cdot (d1 - l) \cdot (x - d1) = 0$$

Maximum compressive stress of contacting surfaces

$$\sigma bmax = \frac{2 \cdot RU1 \cdot x}{b \cdot x^2 - 2 \cdot n \cdot m1 \cdot As \cdot (d1 - x)}$$

Tensile stress of rubber bearing connection bolts

$$\sigma t = \sigma bmax \cdot n \cdot \frac{d1 - x}{x} \leqq \sigma ta$$

Dimensions

	Class of bolt	d_B	do mm	m1 pcs	As mm^2/bolt	d1 mm	n
P5	10.9	24	20.752	5	338.2	895	1
P6	10.9	24	20.752	5	338.2	850	1
P7	10.9	24	20.752	5	338.2	850	1
P10	10.9	24	20.752	5	338.2	850	1

Level 1

	l mm	x mm	σbmax N/mm^2	σt N/mm^2	σta N/mm^2
P5	-144.2	124.0	23.6	147.1	705.0
P6	259.0	777.8	9.3	0.9	705.0
P7	293.6	－	－	－	705.0
P10	20.6	202.2	18.4	59.2	705.0

(2) Shear stress due to Rh1
Total number of bolts : Σm

$$\tau = \frac{4 \cdot Rh1}{\pi \cdot do^2 \cdot \Sigma m} \leqq \tau a$$

(3) Stress combination

$$U = (\sigma t / \sigma ta)^2 + (\tau / \tau a)^2 \leqq Ua = 1.2$$

(4) Tension due to V

$$\sigma t = \frac{4 \cdot V}{\pi \cdot do^2 \cdot \Sigma m} \leqq \sigma ta$$

Dimensions and design forces

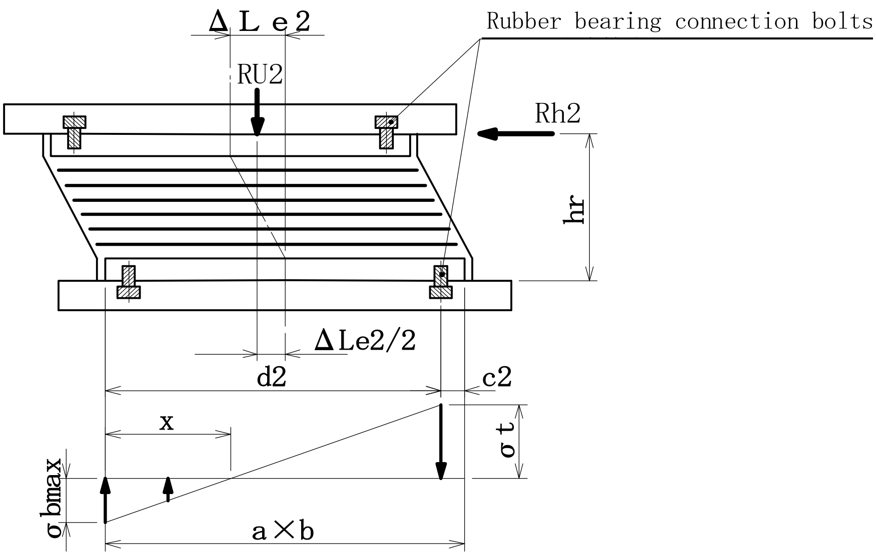
	Class of bolt	d_B	do mm	Σm bolts
P5	10.9	24	20.752	16
P6	10.9	24	20.752	16
P7	10.9	24	20.752	16
P10	10.9	24	20.752	16

Level 1

	RU1 case					
	Rh1 kN	σt N/mm^2	σta N/mm^2	τ N/mm^2	τa N/mm^2	U
P5	1500	147.1	705.0	277.2	405.0	0.52
P6	1200	0.9	705.0	221.8	405.0	0.30
P7	1100	—	705.0	203.3	405.0	—
P10	1400	59.2	705.0	258.8	405.0	0.42

	V	V case	
	kN	σt N/mm^2	σta N/mm^2
P5	210	38.9	705.0
P6	480	88.7	705.0
P7	600	110.9	705.0
P10	250	46.2	705.0

5．2　Stress checking in case of transversal seismic



※Consider horizontal force Rh2 as 0, due to being subject to a separate fixing device.

(1) Tensile stress in case of RU2＋Rh2 in combination

With the same horizontal force, the smaller the value of vertical force, the more critical the value of tensile force.
Therefore, load case of RU2＋Rh2 in combination shall be selected for checking (Compressive area : a×b).

Eccentric E

$$\Delta Le2/2+\frac{Rh2\cdot hr}{RU2}$$

Case of compression

case－1 : 0 ＜ E ≦ Eo ＝ b ／ 6
case－2 : Eo ＜ E ≦ Eo' ＝ b ／ 6 ＋ c2 ／ 3
case－3 : Eo' ＜ E, E ＜ 0

Dimensions

	Longitudinal dimensions a mm	Transversal dimensions b mm	c2 mm	hr mm
P5	950	950	55	354
P6	900	900	50	274
P7	900	900	50	274
P10	900	950	55	342

Level 1

	RU2 kN	Rh2 kN	ΔLe2 mm	Eo mm	Eo' mm	E mm	case
P5	915	0	－	－	－	－	－
P6	2672	0	－	－	－	－	－
P7	3282	0	－	－	－	－	－
P10	1407	0	－	－	－	－	－

Case－1：Trapezoidal shape of stress distribution
In this case, there is no tensile force in bolts, calculations concerning could be neglected
Case－2：Triangle shape of stress distribution but no tension in bolts
In this case, there is no tensile force in bolts, calculations concerning could be neglected
Case－3：Triangle shape of stress distribution, there in tension in bolts
Calculations based on explanation of single rebar concrete section under compression to calculate tensile force in bolts. And, it could be calculated in only 1 column of the outer row.

Nominal diameter of bolt : d_B
Root diameter of bolt : do
Number of effective bolts : m1
Area of root diameter : As (1 bolt)
Define l ＝b／2－E.

By solving the following equation to obtain position x of neutral axis
Ratio of young's modulus : n

$$f(x) = x^3 - 3 \cdot l \cdot x^2 + \frac{6 \cdot n \cdot m2 \cdot As}{a} \cdot (d2 - l) \cdot (x - d2) = 0$$

Maximum compressive stress of contacting surfaces

$$\sigma bmax = \frac{2 \cdot RU2 \cdot x}{a \cdot x^2 - 2 \cdot n \cdot m2 \cdot As \cdot (d2 - x)}$$

Tensile stress of rubber bearing connection bolts

$$\sigma t = \sigma bmax \cdot n \cdot \frac{d2 - x}{x} \leqq \sigma ta$$

Dimensions

	Class of bolt	d_B	do mm	m2 bolts	As mm^2/bolt	d2 mm	n
P5	10.9	24	20.752	5	338.2	895	1
P6	10.9	24	20.752	5	338.2	850	1
P7	10.9	24	20.752	5	338.2	850	1
P10	10.9	24	20.752	5	338.2	895	1

Level 1

	l mm	x mm	σbmax N/mm^2	σt N/mm^2	σta N/mm^2
P5	－	－	－	－	－
P6	－	－	－	－	－
P7	－	－	－	－	－
P10	－	－	－	－	－

(2) Shear stress due to Rh2
Total number of bolts : Σm

$$\tau = \frac{4 \cdot Rh2}{\pi \cdot do^2 \cdot \Sigma m} \leqq \tau a$$

(3) Stress combination

$$U = (\sigma t / \sigma ta)^2 + (\tau / \tau a)^2 \leqq Ua = 1.2$$

Dimensions and design forces

	Class of bolt	d_B	do mm	Σm bolts
P5	10.9	24	20.752	16
P6	10.9	24	20.752	16
P7	10.9	24	20.752	16
P10	10.9	24	20.752	16

Level 1

	RU2 case					
	Rh2 kN	σt N/mm²	σta N/mm²	τ N/mm²	τa N/mm²	U
P5	0	—	—	—	—	—
P6	0	—	—	—	—	—
P7	0	—	—	—	—	—
P10	0	—	—	—	—	—

5．3 Checking embedded length of the bolt (L_B)

(1) Necessity screw length of the bolt L_B1(mm)

$$L_B1 = \frac{f \cdot (d_B - k2 \cdot p)}{3} \cdot \frac{\sigma(B)t}{\tau(B)a} + 2 \cdot p$$

(2) Necessity screw length of connecting components L_B2(mm)

$$L_B2 = \frac{2 \cdot f \cdot (d_B - k2 \cdot p)^2}{7 \cdot d_B} \cdot \frac{\sigma(B)t}{\tau(N)a} + 2 \cdot p$$

Where,
- f : Safety factor (recommended $f = 1.05$)
- d_B : Bolt diameter (Nominal diameter)(mm)
- p : Screw pitch
- $k2$: Factor for determined inner diameter of screw in connecting components (k2=1.082532)
- $\sigma(B)t$: Maximum shear stress of bolt(N/mm^2)
- $\tau(B)a$: Shear stress of bolts(N/mm^2)
- $\tau(N)a$: Allowable shear stress of crew component(N/mm^2)

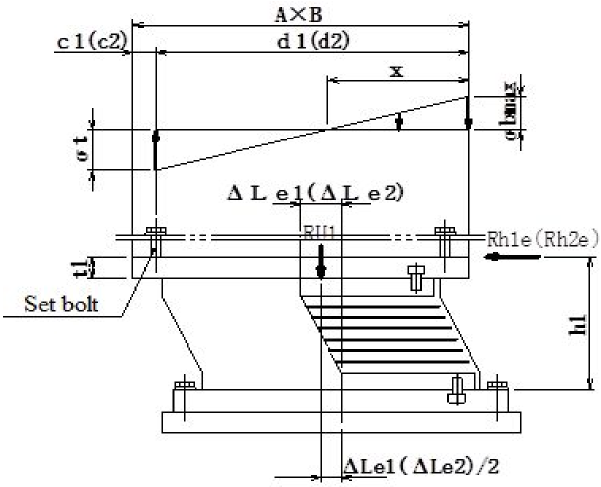
Dimensions

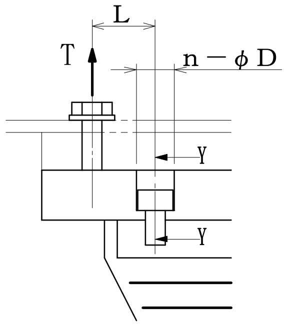
	f	d_B mm	p	k2
P5	1.05	24	3	1.082532
P6	1.05	24	3	1.082532
P7	1.05	24	3	1.082532
P10	1.05	24	3	1.082532

Level 1

	$\sigma(B)t$ N/mm^2	$\tau(B)a$ N/mm^2	$\tau(N)a$ N/mm^2	L_B1 mm	L_B2 mm	L_B mm
P5	147.1	405.0	150.0	8.6	11.3	26.0
P6	88.7	405.0	150.0	7.6	9.2	26.0
P7	110.9	405.0	150.0	8.0	10.0	26.0
P10	59.2	405.0	150.0	7.1	8.1	26.0

6． Set bolts





6．1 Stress checking in case of longitudinal seismic

(1) Tensile stress in case of RU1＋Rh1 in combination
With the same horizontal force, the smaller the value of vertical force, the more critical the value of tensile force.
Therefore, load case of RU1＋Rh1 in combination shall be selected for checking (Compressive area：A×B).

Eccentric E

$$\Delta Le1/2 + \frac{Rh1 \cdot h1}{RU1}$$

Case of compression
case－1：$0 < E \leqq Eo = A / 6$
case－2：$Eo < E \leqq Eo' = A / 6 + c1 / 3$
case－3：$Eo' < E,\ E < 0$

Dimensions

	Longitudinal dimensions A mm	Transversal dimensions B mm	c1 mm	h1 mm
P5	1020	1130	150	414
P6	970	1100	155	334
P7	970	1100	155	339
P10	970	1130	155	402

Level 1

	RU1 kN	Rh1 kN	ΔLe1 mm	Eo mm	Eo' mm	E mm	case
P5	1144	1500	310.0	170.0	220.0	697.8	case-3
P6	3256	1200	180.0	161.7	213.3	213.1	case-2
P7	4224	1100	170.0	161.7	213.3	173.3	case-2
P10	1672	1400	286.0	161.7	213.3	479.6	case-3

Case－1：Trapezoidal shape of stress distribution
In this case, there is no tensile force in bolts, calculations concerning could be neglected
Case－2：Triangle shape of stress distribution but no tension in bolts
In this case, there is no tensile force in bolts, calculations concerning could be neglected
Case－3：Triangle shape of stress distribution, there in tension in bolts
Calculations based on explanation of single rebar concrete section under compression to calculate tensile force in bolts. And, it could be calculated in only 1 column of the outer row.

Nominal diameter of bolt : d_B
Root diameter of bolt : do
Number of effective bolts : m1
Area of root diameter : As (1 bolt)
Define l ＝A／2－E.

By solving the following equation to obtain position x of neutral axis
Ratio of young's modulus : n

$$f(x) = x^3 - 3 \cdot l \cdot x^2 + \frac{6 \cdot n \cdot m1 \cdot As}{B} \cdot (d1 - l) \cdot (x - d1) = 0$$

Maximum compressive stress of contacting surfaces

$$\sigma bmax = \frac{2 \cdot RU1 \cdot x}{B \cdot x^2 - 2 \cdot n \cdot m1 \cdot As \cdot (d1 - x)}$$

Tensile stress of rubber bearing set bolts

$$\sigma t = \sigma bmax \cdot n \cdot \frac{d1 - x}{x} \leqq \sigma ta$$

Dimensions

	Class of bolt	d_B	do mm	m1 bolts	As mm^2/bolt	d mm	n
P5	8.8	36	31.670	2	787.7	870	1
P6	8.8	36	31.670	2	787.7	815	1
P7	8.8	39	34.670	2	944.1	815	1
P10	8.8	36	31.670	2	787.7	815	1

Level 1

	l mm	x mm	σbmax N/mm^2	σt N/mm^2	σta N/mm^2
P5	-187.8	101.2	25.3	192.3	540.0
P6	271.9	－	－	－	540.0
P7	311.7	－	－	－	540.0
P10	5.4	169.1	18.7	71.4	540.0

(2) Shear stress due to Rh1
Total number of bolts : Σm

$$\tau = \frac{4 \cdot Rh1}{\pi \cdot do^2 \cdot \Sigma m} \leqq \tau a$$

(3) Stress combination

$$U = (\sigma t / \sigma ta)^2 + (\tau / \tau a)^2 \leqq Ua = 1.2$$

(4) Tension due to V

$$\sigma t = \frac{4 \cdot V}{\pi \cdot do^2 \cdot \Sigma m} \leqq \sigma ta$$

Dimensions and design forces

	Class of bolt	d_B	do mm	Σm bolts
P5	8.8	36	31.67	8
P6	8.8	36	31.67	8
P7	8.8	39	34.67	8
P10	8.8	36	31.67	8

Level 1

	RU1 case					
	Rh1 kN	σt N/mm^2	σta N/mm^2	τ N/mm^2	τa N/mm^2	U
P5	1500	192.3	540.0	238.1	300.0	0.76
P6	1200	—	540.0	190.5	300.0	—
P7	1100	—	540.0	145.7	300.0	—
P10	1400	71.4	540.0	222.2	300.0	0.57

	V	V case	
	kN	σt N/mm^2	σta N/mm^2
P5	210	33.4	540.0
P6	480	76.2	540.0
P7	600	79.5	540.0
P10	250	39.7	540.0

6．2　Stress checking in case of transversal seismic

(1) Tensile stress in case of RU2＋Rh2 in combination
With the same horizontal force, the smaller the value of vertical force, the more critical the value of tensile force.
Therefore, load case of RU2＋Rh2 in combination shall be selected for checking (Compressive area：A×B).

Eccentric E

$$\Delta Le2/2 + \frac{Rh2 \cdot h1}{RU2}$$

Case of compression
case－1：0 ＜ E ≦ Eo ＝ B ／ 6
case－2：Eo ＜ E ≦ Eo’ ＝ B ／ 6 ＋ c2 ／ 3
case－3：Eo’ ＜ E, E ＜ 0

Dimensions

	Longitudinal dimensions A mm	Transversal dimensions B mm	c2 mm	h1 mm
P5	1020	1130	105	32.5
P6	970	1100	55	32.5
P7	970	1100	60	35.0
P10	970	1130	105	32.5

※ When fixed to the side block, working height h will be the distance from the upper surface of the upper shoe to the center of the bearing pressure surface of the side block.

Level 1

	RU2 kN	Rh2 kN	ΔLe2 mm	Eo mm	Eo’ mm	E mm	case
P5	915	600	0.0	188.3	223.3	21.3	case-1
P6	2672	1500	0.0	183.3	201.7	18.2	case-1
P7	3282	2000	0.0	183.3	203.3	21.3	case-1
P10	1407	700	0.0	188.3	223.3	16.2	case-1

Case－1：Trapezoidal shape of stress distribution
In this case, there is no tensile force in bolts, calculations concerning could be neglected
Case－2：Triangle shape of stress distribution but no tension in bolts
In this case, there is no tensile force in bolts, calculations concerning could be neglected
Case－3：Triangle shape of stress distribution, there in tension in bolts
Calculations based on explanation of single rebar concrete section under compression to calculate tensile force in bolts. And, it could be calculated in only 1 column of the outer row.

Nominal diameter of bolt : dB
Root diameter of bolt : do
Number of effective bolts : m1
Area of root diameter：As (1 bolt)
Define l ＝B／2－E.

By solving the following equation to obtain position x of neutral axis
Ratio of young's modulus：n

$$f(x) = x^3 - 3 \cdot l \cdot x^2 + \frac{6 \cdot n \cdot m2 \cdot As}{A} \cdot (d2 - l) \cdot (x - d2) = 0$$

Maximum compressive stress of contacting surfaces

$$\sigma bmax = \frac{2 \cdot RU2 \cdot x}{A \cdot x^2 - 2 \cdot n \cdot m2 \cdot As \cdot (d2 - x)}$$

Tensile stress of rubber bearing set bolts

$$\sigma t = \sigma bmax \cdot n \cdot \frac{d2 - x}{x} \leqq \sigma ta$$

Calculated results

	Class of bolt	d_B	do mm	m2 bolts	As mm^2/bolt	d2 mm	n
P5	8.8	36	31.670	4	787.7	1025	1
P6	8.8	36	31.670	4	787.7	1045	1
P7	8.8	39	34.670	4	944.1	1040	1
P10	8.8	36	31.670	4	787.7	1025	1

Level 1

	l mm	x mm	σbmax N/mm^2	σt N/mm^2	σta N/mm^2
P5	543.7	－	－	－	－
P6	531.8	－	－	－	－
P7	528.7	－	－	－	－
P10	548.8	－	－	－	－

(2) Shear stress due to Rh2
Total number of bolts : Σm

$$\tau = \frac{4 \cdot Rh2}{\pi \cdot do^2 \cdot \Sigma m} \leqq \tau a$$

(3) Stress combination

$$U = (\sigma t / \sigma ta)^2 + (\tau / \tau a)^2 \leqq Ua = 1.2$$

Dimensions and design forces

	Class of bolt	d_B	do mm	Σm 本
P5	8.8	36	31.670	8
P6	8.8	36	31.670	8
P7	8.8	39	34.670	8
P10	8.8	36	31.670	8

Level 1

	RU2時					
	Rh2 kN	σt N/mm²	σta N/mm²	τ N/mm²	τa N/mm²	U
P5	600	－	－	95.3	300.0	－
P6	1500	－	－	238.1	300.0	－
P7	2000	－	－	264.9	300.0	－
P10	700	－	－	111.1	300.0	－

6．3　Checking embedded length of the bolt (L_B)

(1) Necessity screw length of the bolt　L_B1(mm)

$$L_B 1 = \frac{f \cdot (d_B - k2 \cdot p)}{3} \cdot \frac{\sigma(B)t}{\tau(B)a} + 2 \cdot p$$

(2) Necessity screw length of connecting components　L_B2(mm)

$$L_B 2 = \frac{2 \cdot f \cdot (d_B - k2 \cdot p)^2}{7 \cdot d_B} \cdot \frac{\sigma(B)t}{\tau(N)a} + 2 \cdot p$$

Where,
- f : Safety factor (recommended　f =1.05)
- d_B : Bolt diameter (Nominal diameter)(mm)
- p : Screw pitch
- k2 : Factor for determined inner diameter of screw in connecting components (k2=1.082532)
- σ(B)t : Maximum shear stress of bolt(N/mm^2)
- τ(B)a : Shear stress of bolts(N/mm^2)
- τ(N)a : Allowable shear stress of crew component(N/mm^2)

Dimensions

	f	d_B mm	p	k2
P5	1.05	36	4.0	1.082532
P6	1.05	36	4.0	1.082532
P7	1.05	39	4.0	1.082532
P10	1.05	36	4.0	1.082532

Level 1

	σ(B)t N/mm^2	τ(B)a N/mm^2	τ(N)a N/mm^2	L_B1 mm	L_B2 mm
P5	192.3	300.0	150.0	15.1	18.7
P6	76.2	300.0	150.0	10.8	12.2
P7	79.5	300.0	150.0	11.2	12.9
P10	71.4	300.0	150.0	10.6	12.0

7． Top plate

7．1 Stress checking in case of longitudinal seismic

(1) Checking flexural moment of rubber bearing connection bolt counter bore section

Tensile force

$T = To \cdot m1$

To : Maximum tensile force on surrounding surface of the set bolt
(Maximum tensile force in case of seismic horizontal force and uplift force acting)

$To = Max(T1、TV)$

$T1 = \sigma t \cdot As$

$TV = V / \Sigma m$

m1 : Number of bolts used in calculation

Flexural moment

$M = T \cdot L$

L : Distance from a connection bolt to a set bolt

Flexural stress

$$\sigma = \frac{6 \cdot M}{B' \cdot t1^2} \leqq \sigma a$$

B' : Dimensions of bearing deducting diameter of connection bolts

$B' = B - n \cdot \phi D$

B : Dimensions of bearing
n : Number of connection bolts used in calculation
ϕD : Countersunk diameter of connection bolts

t1 : Thickness of upper bearing plate

(2) Shear stress at section of connection bolt counter bore

$$\tau = \frac{T}{B' \cdot t1} \leqq \tau a$$

(3) Stress combination checking of the connection bolt counter bore section

$$U = (\sigma / \sigma a)^2 + (\tau / \tau a)^2 \leqq Ua = 1.2$$

Calculated result
Level 1

	T1 N	TV N	To N	m1 bolts	T N	L mm	M kN·mm
P5	151475	26250	151475	2	302950	60	18177
P6	−	60000	60000	2	120000	70	8400
P7	−	75000	75000	2	150000	70	10500
P10	56242	31250	56242	2	112484	70	7874

	B mm	n bolts	φD mm	B' mm	t1 mm
P5	1130	5	39	935	60
P6	1100	5	39	905	60
P7	1100	5	39	905	65
P10	1130	5	39	935	60

	Top plate material	σ N/mm^2	σa N/mm^2	τ N/mm^2	τa N/mm^2	U
P5	SM490A	32.5	262.5	5.5	150.0	0.02
P6	SM490A	15.5	262.5	2.3	150.0	0.01
P7	SM490A	16.5	262.5	2.6	150.0	0.01
P10	SM490A	14.1	262.5	2.1	150.0	0.01

7．2 Stress checking in case of transversal seismic

(1) Checking flexural moment of rubber bearing connection bolt counter bore section

Tensile force

$T = To \cdot m2$

To : Maximum tensile force on surrounding surface of the set bolt
(Maximum tensile force in case of seismic horizontal force and uplift force acting)
$To = Max(T2、TV)$
$T2 = \sigma t \cdot As$
$TV = V / \Sigma m$

m2 : Number of bolts used in calculation

Flexural moment

$M = T \cdot L$

L : Distance from a connection bolt to a set bolt

Flexural stress

$$\sigma = \frac{6 \cdot M}{A' \cdot t^2} \leqq \sigma a$$

A' : Dimensions of bearing deducting diameter of connection bolts
$A' = A - n \cdot \phi D$
A : Dimensions of bearing
n : Number of connection bolts used in calculation
ϕD : Countersunk diameter of connection bolts

t : Thickness of upper bearing plate

(2) Shear stress at section of connection bolt counter bore

$$\tau = \frac{T}{A' \cdot t} \leqq \tau a$$

(3) Stress combination checking of the connection bolt counter bore section

$$U = (\sigma / \sigma a)^2 + (\tau / \tau a)^2 \leqq Ua = 1.2$$

Calculated result

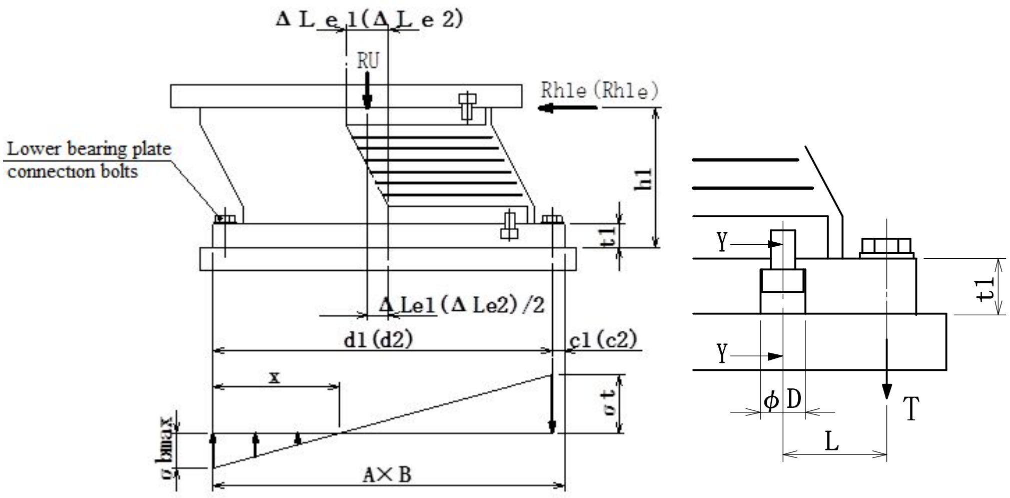
Level 1

	T2 N	TV N	To N	m2 bolts	T N	L mm	M kN·mm
P5	－	26250	26250	4	105000	40	4200
P6	－	60000	60000	4	240000	95	22800
P7	－	75000	75000	4	300000	90	27000
P10	－	31250	31250	4	125000	40	5000

	A mm	n bolts	ϕD mm	A' mm	t mm
P5	1020	5	39	825	60
P6	970	5	39	775	60
P7	970	5	39	775	65
P10	970	5	39	775	60

	Top plate material	σ N/mm^2	σa N/mm^2	τ N/mm^2	τa N/mm^2	U
P5	SM490A	8.5	262.5	2.2	150.0	0.01
P6	SM490A	49.1	262.5	5.2	150.0	0.04
P7	SM490A	49.5	262.5	6.0	150.0	0.04
P10	SM490A	10.8	262.5	2.7	150.0	0.01

8． Connection bolts of lower bearing plate



8．1 Stress checking in case of longitudinal seismic

(1) Tensile stress in case of RU1＋Rh1 in combination
With the same horizontal force, the smaller the value of vertical force, the more critical the value of tensile force.
Therefore, load case of RU1＋Rh1 in combination shall be selected for checking (Compressive area：A×B).

Eccentric E

$$\Delta Le1/2 + \frac{Rh1 \cdot h1}{RU1}$$

Case of compression
case－1：0 ＜ E ≦ Eo ＝ A ／ 6
case－2：Eo ＜ E ≦ Eo’ ＝ A ／ 6 ＋ c1 ／ 3
case－3：Eo’ ＜ E, E ＜ 0

Dimensions

	Longitudinal dimensions A mm	Transversal dimensions B mm	c1 mm	h1 mm
P5	1130	1130	40	394
P6	1100	1100	40	314
P7	1100	1100	40	314
P10	1080	1130	40	382

Level 1

	RU1 kN	Rh1 kN	ΔLe1 mm	Eo mm	Eo’ mm	E mm	case
P5	1144	1500	310	188.3	201.7	671.6	case-3
P6	3256	1200	180	183.3	196.7	205.7	case-3
P7	4224	1100	170	183.3	196.7	166.8	case-1
P10	1672	1400	286	180.0	193.3	462.9	case-3

Case－1：Trapezoidal shape of stress distribution
In this case, there is no tensile force in bolts, calculations concerning could be neglected
Case－2：Triangle shape of stress distribution but no tension in bolts
In this case, there is no tensile force in bolts, calculations concerning could be neglected
Case－3：Triangle shape of stress distribution, there in tension in bolts
Calculations based on explanation of single rebar concrete section under compression to calculate tensile force in bolts. And, it could be calculated in only 1 column of the outer row.

Nominal diameter of bolt : d_B
Root diameter of bolt : do
Number of effective bolts : m1
Area of root diameter : As (1 bolt)
Define l ＝A／2－E.

By solving the following equation to obtain position x of neutral axis
Ratio of young's modulus : n

$$f(x) = x^3 - 3 \cdot l \cdot x^2 + \frac{6 \cdot n \cdot m1 \cdot As}{B} \cdot (d1 - l) \cdot (x - d1) = 0$$

Maximum compressive stress of contacting surfaces

$$\sigma bmax = \frac{2 \cdot RU1 \cdot x}{B \cdot x^2 - 2 \cdot n \cdot m1 \cdot As \cdot (d1 - x)}$$

Tensile stress of rubber bearing base plate connection bolts

$$\sigma t = \sigma bmax \cdot n \cdot \frac{d1 - x}{x} \leqq \sigma ta$$

Dimensions

	Class of bolt	d_B	do mm	m1 bolts	As mm^2/bolt	d1 mm	n
P5	8.8	24	20.752	6	338.2	1090	1
P6	8.8	24	20.752	4	338.2	1060	1
P7	8.8	24	20.752	4	338.2	1060	1
P10	8.8	24	20.752	6	338.2	1040	1

Level 1

	l mm	x mm	σbmax N/mm^2	σt N/mm^2	σta N/mm^2
P5	-106.6	158.5	14.7	86.7	540.0
P6	344.3	1033.0	5.7	0.2	540.0
P7	383.2	－	－	－	540.0
P10	77.1	310.1	9.8	23.1	540.0

(2) Shear stress due to Rh1
Total number of bolts : Σm

$$\tau = \frac{4 \cdot Rh1}{\pi \cdot do^2 \cdot \Sigma m} \leqq \tau a$$

(3) Stress combination

$$U = (\sigma t / \sigma ta)^2 + (\tau / \tau a)^2 \leqq Ua = 1.2$$

(4) Tension due to V

$$\sigma t = \frac{4 \cdot V}{\pi \cdot do^2 \cdot \Sigma m} \leqq \sigma ta$$

Dimensions and design forces

	Class of bolt	d_B	do mm	Σm bolts
P5	8.8	24	20.752	20
P6	8.8	24	20.752	12
P7	8.8	24	20.752	12
P10	8.8	24	20.752	20

Level 1

	RU1 case					
	Rh1 kN	σt N/mm^2	σta N/mm^2	τ N/mm^2	τa N/mm^2	U
P5	1500	86.7	540.0	221.8	300.0	0.58
P6	1200	0.2	540.0	295.7	300.0	0.98
P7	1100	—	540.0	271.1	300.0	—
P10	1400	23.1	540.0	207.0	300.0	0.48

	V	V case	
	kN	σt N/mm^2	σta N/mm^2
P5	210	31.1	540.0
P6	480	118.3	540.0
P7	600	147.9	540.0
P10	250	37.0	540.0

8．2　Stress checking in case of transversal seismic

※Consider horizontal force　Rh2 as 0, due to being subject to a separate fixing device.

(1) Tensile stress in case of RU2＋Rh2 in combination
With the same horizontal force, the smaller the value of vertical force, the more critical the value of tensile force.
Therefore, load case of RU2＋Rh2 in combination shall be selected for checking (Compressive area：A×B).

Eccentric E

$$\Delta Le2/2+\frac{Rh2\cdot h1}{RU2}$$

Case of compression
case－1：0 ＜ E ≦ Eo ＝ B／6
case－2：Eo ＜ E ≦ Eo' ＝ B／6 ＋ c2／3
case－3：Eo' ＜ E,　E ＜ 0

Dimensions

	Longitudinal dimensions A mm	Transversal dimensions B mm	c2 mm	h1 mm
P5	1130	1130	40	394
P6	1100	1100	40	314
P7	1100	1100	40	314
P10	1130	1080	40	382

Level 1

	RU2 kN	Rh2 kN	ΔLe2 mm	Eo mm	Eo' mm	E mm	case
P5	915	0	－	－	－	－	－
P6	2672	0	－	－	－	－	－
P7	3282	0	－	－	－	－	－
P10	1407	0	－	－	－	－	－

Case－1：Trapezoidal shape of stress distribution
In this case, there is no tensile force in bolts, calculations concerning could be neglected
Case－2：Triangle shape of stress distribution but no tension in bolts
In this case, there is no tensile force in bolts, calculations concerning could be neglected
Case－3：Triangle shape of stress distribution, there in tension in bolts
Calculations based on explanation of single rebar concrete section under compression to calculate tensile force in bolts. And, it could be calculated in only 1 column of the outer row.

Nominal diameter of bolt : dB
Root diameter of bolt : do
Number of effective bolts : m1
Area of root diameter：As (1 bolt)
Define l ＝B／2－E.

By solving the following equation to obtain position x of neutral axis
Ratio of young's modulus：n

$$f(x) = x^3 - 3 \cdot l \cdot x^2 + \frac{6 \cdot n \cdot m2 \cdot As}{a} \cdot (d2 - l) \cdot (x - d2) = 0$$

Maximum compressive stress of contacting surfaces

$$\sigma bmax = \frac{2 \cdot RU2 \cdot x}{a \cdot x^2 - 2 \cdot n \cdot m2 \cdot As \cdot (d2 - x)}$$

Tensile stress of rubber bearing base plate connection bolts

$$\sigma t = \sigma bmax \cdot n \cdot \frac{d2 - x}{x} \leqq \sigma ta$$

Dimensions

	Class of bolt	d_B	do mm	m2 bolts	As mm^2/bolt	d2 mm	n
P5	8.8	24	20.752	6	338.2	1090	1
P6	8.8	24	20.752	4	338.2	1060	1
P7	8.8	24	20.752	4	338.2	1060	1
P10	8.8	24	20.752	6	338.2	1090	1

Level 1

	l mm	x mm	σbmax N/mm^2	σt N/mm^2	σta N/mm^2
P5	－	－	－	－	540.0
P6	－	－	－	－	540.0
P7	－	－	－	－	540.0
P10	－	－	－	－	540.0

(2) Shear stress due to Rh2
Total number of bolts : Σm

$$\tau = \frac{4 \cdot Rh2}{\pi \cdot do^2 \cdot \Sigma m} \leqq \tau a$$

(3) Stress combination

$$U = (\sigma t / \sigma ta)^2 + (\tau / \tau a)^2 \leqq Ua = 1.2$$

Dimensions

	Class of bolt	d_B	do mm	Σm bolts
P5	8.8	24	20.752	20
P6	8.8	24	20.752	12
P7	8.8	24	20.752	12
P10	8.8	24	20.752	20

Level 1

	RU2 case					
	Rh2 kN	σt N/mm²	σta N/mm²	τ N/mm²	τa N/mm²	U
P5	0	−	540.0	−	300.0	−
P6	0	−	540.0	−	300.0	−
P7	0	−	540.0	−	300.0	−
P10	0	−	540.0	−	300.0	−

8．3　Checking embedded length of the bolt (L_B)

(1) Necessity screw length of the bolt　L_B1(mm)

$$L_B1 = \frac{f \cdot (d_B - k2 \cdot p)}{3} \cdot \frac{\sigma(B)t}{\tau(B)a} + 2 \cdot p$$

(2) Necessity screw length of connecting components　L_B2(mm)

$$L_B2 = \frac{2 \cdot f \cdot (d_B - k2 \cdot p)^2}{7 \cdot d_B} \cdot \frac{\sigma(B)t}{\tau(N)a} + 2 \cdot p$$

Where,
- f : Safety factor (recommended　f ＝1.05)
- d_B : Bolt diameter (Nominal diameter)(mm)
- p : Screw pitch
- k2 : Factor for determined inner diameter of screw in connecting components (k2=1.082532)
- σ(B)t : Maximum shear stress of bolt(N/mm^2)
- τ(B)a : Shear stress of bolts(N/mm^2)
- τ(N)a : Allowable shear stress of crew component(N/mm^2)

Dimensions

	f	d_B mm	p	k2
P5	1.05	24	3.0	1.082532
P6	1.05	24	3.0	1.082532
P7	1.05	24	3.0	1.082532
P10	1.05	24	3.0	1.082532

Calculated result

Level 1

	σ(B)t N/mm^2	τ(B)a N/mm^2	τ(N)a N/mm^2	L_B1 mm	L_B2 mm	L_B mm
P5	86.7	300.0	157.5	8.1	9.1	20.5
P6	118.3	300.0	157.5	8.9	10.5	20.5
P7	147.9	300.0	157.5	9.6	11.6	20.5
P10	37.0	300.0	157.5	6.9	7.3	20.5

9. Bottom plate

9. 1 Stress checking in case of longitudinal seismic

(1) Checking flexural moment of rubber bearing connection bolt counter bore section

Tensile force

$T = To \cdot m1$

To : Maximum tensile force on surrounding surface of the set bolt
(Maximum tensile force in case of seismic horizontal force and uplift force acting)

$To = Max(T1, TV)$

$T1 = \sigma t \cdot As$ Total tensile force of 1 bolt due to load combination

$TV = V / \Sigma m$ Tensile force of 1 bolt due to uplift force

m1 : Number of bolts used in calculation

Flexural moment

$M = T \cdot L$

L : Distance from a connection bolt to a set bolt

Flexural stress

$$\sigma = \frac{6 \cdot M}{B' \cdot t1^2} \leqq \sigma a$$

B' : Dimensions of bearing deducting diameter of connection bolts

$B' = B - n \cdot \phi D$

B : Dimensions of bearing

n : Number of connection bolts used in calculation

ϕD : Countersunk diameter of connection bolts

t1 : Thickness of upper bearing plate

(2) Shear stress at section of connection bolt counter bore

$$\tau = \frac{T}{B' \cdot t1} \leqq \tau a$$

(3) Stress combination checking of the connection bolt counter bore section

$$U = (\sigma / \sigma a)^2 + (\tau / \tau a)^2 \leqq Ua = 1.2$$

Calculated result

Level 1

	T1 N	TV N	To N	m1 bolts	T N	L mm	M kN·mm
P5	29322	10500	29322	6	175932	105	18473
P6	68	40000	40000	4	160000	110	17600
P7	—	50000	50000	4	200000	110	22000
P10	7812	12500	12500	6	75000	100	7500

	B mm	n bolts	ϕD mm	B' mm	t1 mm
P5	1130	5	39	935	40
P6	1100	5	39	905	40
P7	1100	5	39	905	40
P10	1130	5	39	935	40

	Bottom plate material	σ N/mm^2	σa N/mm^2	τ N/mm^2	τa N/mm^2	U
P5	SM490A	74.1	277.5	4.8	157.5	0.08
P6	SM490A	73.0	277.5	4.5	157.5	0.08
P7	SM490A	91.2	277.5	5.6	157.5	0.11
P10	SM490A	30.1	277.5	2.1	157.5	0.02

9．2 Stress checking in case of transversal seismic

(1) Checking flexural moment of rubber bearing connection bolt counter bore section

Tensile force

$T = To \cdot m2$

To : Maximum tensile force on surrounding surface of the set bolt
(Maximum tensile force in case of seismic horizontal force and uplift force acting)

$To = Max(T2、TV)$

$T2 = \sigma t \cdot As$ Total tensile force of 1 bolt due to load combination

$TV = V / \Sigma m$ Tensile force of 1 bolt due to uplift force

$m2$: Number of bolts used in calculation

Flexural moment

$M = T \cdot L$

L : Distance from a connection bolt to a set bolt

Flexural stress

$$\sigma = \frac{6 \cdot M}{A' \cdot t1^2} \leqq \sigma a$$

A' : Dimensions of bearing deducting diameter of connection bolts

$A' = A - n \cdot \phi D$

A : Dimensions of bearing

n : Number of connection bolts used in calculation

ϕD : Countersunk diameter of connection bolts

$t1$: Thickness of upper bearing plate

(2) Shear stress at section of connection bolt counter bore

$$\tau = \frac{T}{A' \cdot t1} \leqq \tau a$$

(3) Stress combination checking of the connection bolt counter bore section

$$U = (\sigma / \sigma a)^2 + (\tau / \tau a)^2 \leqq Ua = 1.2$$

Calculated result

Level 1

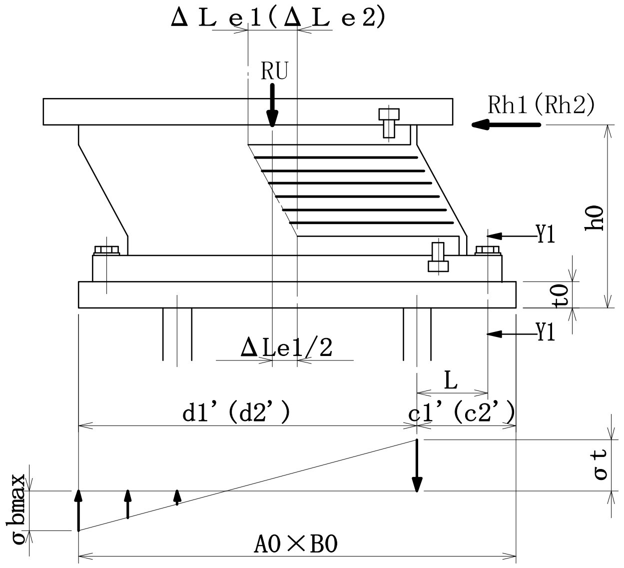
	T2 N	TV N	To N	m2 bolts	T N	L mm	M kN·mm
P5	－	10500	10500	6	63000	105	6615
P6	－	40000	40000	4	160000	110	17600
P7	－	50000	50000	4	200000	110	22000
P10	－	12500	12500	6	75000	105	7875

	A mm	n bolts	ϕD mm	A' mm	t1 mm
P5	1130	5	39	935	40
P6	1100	5	39	905	40
P7	1100	5	39	905	40
P10	1080	5	39	885	40

	Bottom plate material	σ N/mm^2	σa N/mm^2	τ N/mm^2	τa N/mm^2	U
P5	SM490A	26.6	277.5	1.7	157.5	0.01
P6	SM490A	73.0	277.5	4.5	157.5	0.08
P7	SM490A	91.2	277.5	5.6	157.5	0.11
P10	SM490A	33.4	277.5	2.2	157.5	0.02

１０． Anchor bolt

１０．１ Stress checking in case of longitudinal seismic



(1) Tensile stress in case of RU1＋Rh1 in combination
With the same horizontal force, the smaller the value of vertical force, the more critical the value of tensile force.
Therefore, load case of RU1＋Rh1 in combination shall be selected for checking (Compressive area：A0×B0).

Eccentric E

$$\Delta Le1/2 + \frac{Rh1 \cdot h0}{RU1}$$

Case of compression

case－1：0 ＜ E ≦ Eo ＝ A0／ 6
case－2：Eo ＜ E ≦ Eo' ＝ A0 ／ 6 ＋ c1' ／ 3
case－3：Eo' ＜ E, E ＜ 0

Dimensions

	Longitudinal dimensions A0 mm	Transversal dimensions B0 mm	c1' mm	h0 mm
P5	1150	1600	105	474
P6	1130	1690	105	424
P7	1160	1730	120	444
P10	1100	1800	105	467

Level 1

	RU1 kN	Rh1 kN	ΔLe1 mm	Eo mm	Eo' mm	E mm	case
P5	1144	1500	310	192	227	777	case-3
P6	3256	1200	180	188	223	246	case-3
P7	4224	1100	170	193	233	201	case-2
P10	1672	1400	286	183	218	534	case-3

Case－1：Trapezoidal shape of stress distribution

$$\begin{matrix}\sigma bmax\\ \sigma bmin\end{matrix} = RU1/(A0\cdot B0) \pm (Rh1\cdot h0 + RU1\cdot \Delta Le1/2)/(1/6\cdot A0^2\cdot B0) \leqq \sigma ba$$

Case－2：Triangle shape of stress distribution but no tension in bolts

$$\sigma bmax = 2\cdot RU1/(3\cdot B0\cdot (A0/2 - E)) \leqq \sigma ba$$

$$x = 3\cdot (A0/2 - E)$$

Case－3：Triangle shape of stress distribution, there in tension in bolts
Calculations based on explanation of single rebar concrete section under compression to calculate tensile force in bolts. And, it could be calculated in only 1 column of the outer row.

Root diameter of bolt　　　：do
Number of effective bolts　：$m1$
Area of root diameter：As (1 bolt)
Define $l = A0/2 - E$

By solving the following equation to obtain position x of neutral axis
Ratio of young's modulus：n

$$f(x) = x^3 - 3\cdot l\cdot x^2 + \frac{6\cdot n\cdot m1\cdot As}{B0}\cdot(d1' - l)\cdot(x - d1') = 0$$

Maximum compressive stress of contacting surfaces

$$\sigma bmax = \frac{2\cdot RU1\cdot x}{B0\cdot x^2 - 2\cdot n\cdot m1\cdot As\cdot(d1' - x)}$$

Dimensions

	do mm	m1 bolts	As mm^2/bolt	d1' mm	n
P5	57.505	2	2597	1045	15
P6	57.505	2	2597	1025	15
P7	65.505	2	3370	1040	15
P10	57.505	2	2597	995	15

Level 1

	l mm	x mm	σ bmax N/mm^2	σ ba N/mm^2
P5	-201.5	452.1	4.4	13.5
P6	318.7	968.0	4.0	13.5
P7	379.4	－	4.3	13.5
P10	16.0	513.2	4.3	13.5

Stress in anchor bolt

Bolt diameter : da
Total number of bolts : Σm
Embedded length : La
Root diameter : do
Effective diameter of bolts for shear force : dm

Tensile stress (Calculation of case-1,2 could be neglected due to no tensile force)

$$\sigma t = \sigma bmax \cdot n \cdot \frac{d1' - x}{x} \leqq \sigma ta$$

(2) Shear stress due to Rh1

$$\tau = \frac{4 \cdot Rh1}{\pi \cdot dm^2 \cdot \Sigma m} \leqq \tau a$$

(3) Stress combination

$$U = (\sigma t' / \sigma ta)^2 + (\tau / \tau a)^2 \leqq Ua = 1.2$$

$$\sigma t' = \sigma t \times (do / dm)^2$$

(4) Concrete adhesive checking

Checking tensile force as the result of RHeq1 and RU acting in combination

$$\tau o1 = \frac{\sigma t \cdot As}{\pi \cdot da \cdot La} \leqq \tau oa$$

Checking case of uplift force

$$\tau o2 = \frac{V}{\pi \cdot da \cdot La \cdot \Sigma m} \leqq \tau oa$$

Dimensions

	Type	Class of bolt	da	dm	do mm	Σm bolts	La mm
P5	Fixed by nut	SS400	65	65	57.505	4	650
P6	Fixed by nut	SS400	65	65	57.505	4	650
P7	Fixed by nut	SS400	75	75	65.505	4	750
P10	Fixed by nut	SS400	65	65	57.505	4	650

Level 1

	Rh1 kN	σt N/mm^2	σta N/mm^2	τ N/mm^2	τa N/mm^2	U
P5	1500	86.8	210.0	113.1	120.0	1.00
P6	1200	3.6	210.0	90.5	120.0	0.57
P7	1100	—	210.0	62.3	120.0	—
P10	1400	60.6	210.0	105.5	120.0	0.83

	τo1 N/mm^2	τo2 N/mm^2	τoa N/mm^2
P5	1.70	0.40	2.70
P6	0.08	0.91	1.35
P7	—	0.85	1.35
P10	1.19	0.48	1.35

１０．２ Stress checking in case of transversal seismic

※When fixing to the side block, implement investigation refering to section １２．２（4）.

(1) Tensile stress in case of RU2＋Rh2 in combination
With the same horizontal force, the smaller the value of vertical force, the more critical the value of tensile force.
Therefore, load case of RU2＋Rh2 in combination shall be selected for checking (Compressive area：A0×B0).

Eccentric E

$$\Delta Le2/2 + \frac{Rh2 \cdot h0}{RU2}$$

Case of compression

case－1：$0 < E \leqq Eo = B0/6$
case－2：$Eo < E \leqq Eo' = B0/6 + c2'/3$
case－3：$Eo' < E,\ E < 0$

Dimensions

	Longitudinal dimensions A0 mm	Transversal dimensions B0 mm	c2' mm	h0 mm
P5	－	－	－	－
P6	－	－	－	－
P7	－	－	－	－
P10	－	－	－	－

Level 1

	RU2 kN	Rh2 kN	ΔLe2 mm	Eo mm	Eo' mm	E mm	case
P5	－	－	－	－	－	－	－
P6	－	－	－	－	－	－	－
P7	－	－	－	－	－	－	－
P10	－	－	－	－	－	－	－

Case－1：Trapezoidal shape of stress distribution

$$\begin{matrix}\sigma_{bmax} \\ \sigma_{bmin}\end{matrix} = RU2 / (A0 \cdot B0) \pm Rh2 \cdot h0 / (1/6 \cdot B0^2 \cdot A0) \leqq \sigma_{ba}$$

Case－2：Triangle shape of stress distribution but no tension in bolts

$$\sigma_{bmax} = 2 \cdot RU2 / (3 \cdot A0 \cdot (B0/2 - E)) \leqq \sigma_{ba}$$

$$x = 3 \cdot (B0/2 - E)$$

Case－3：Triangle shape of stress distribution, there in tension in bolts

Calculations based on explanation of single rebar concrete section under compression to calculate tensile force in bolts. And, it could be calculated in only 1 column of the outer row.

Root diameter of bolt　　　: do
Number of effective bolts　: m2
Area of root diameter : As (1 bolt)
Define $l = B0/2 - E$.

By solving the following equation to obtain position x of neutral axis
Ratio of young's modulus : n

$$f(x) = x^3 - 3 \cdot l \cdot x^2 + \frac{6 \cdot n \cdot m2 \cdot As}{A0} \cdot (d2' - l) \cdot (x - d2') = 0$$

Maximum compressive stress of contacting surfaces

$$\sigma_{bmax} = \frac{2 \cdot RU2 \cdot x}{A0 \cdot x^2 - 2 \cdot n \cdot m2 \cdot As \cdot (d2' - x)}$$

Dimensions

	do mm	m2 bolts	As mm^2/bolt	d2' mm	n
P5	－	2	2597	－	－
P6	－	2	2597	－	－
P7	－	2	3370	－	－
P10	－	2	2597	－	－

Stress in anchor bolt

Bolt diameter : d_a
Total number of bolts : Σm
Embedded length : L_a
Root diameter : d_o
Effective diameter of bolts for shear force : d_m

Tensile stress (Calculation of case-1,2 could be neglected due to no tensile force)

$$\sigma t = \sigma_{bmax} \cdot n \cdot \frac{d2' - x}{x} \leqq \sigma ta$$

(2) Shear stress due to Rh2

$$\tau = \frac{4 \cdot Rh2}{\pi \cdot dm^2 \cdot \Sigma m} \leqq \tau a$$

(3) Stress combination

$$U = (\sigma t' / \sigma ta)^2 + (\tau / \tau a)^2 \leqq Ua = 1.2$$

$$\sigma t' = \sigma t \times (do / dm)^2$$

(4) Concrete adhesive checking

Checking tensile force as the result of RHeq2 andRU acting in combination

$$\tau o = \frac{\sigma t \cdot As}{\pi \cdot da \cdot La} \leqq \tau oa$$

Dimensions

	Class of bolt	da	d o mm	Σm bolts	L a mm
P5	SS400	−	−	−	−
P6	SS400	−	−	−	−
P7	SS400	−	−	−	−
P10	SS400	−	−	−	−

Level 1

	Rh2 kN	σ t N/mm^2	σ ta N/mm^2	τ N/mm^2	τ a N/mm^2	U	τ o N/mm^2	τ oa N/mm^2
P5	−	−	−	−	−	−	−	−
P6	−	−	−	−	−	−	−	−
P7	−	−	−	−	−	−	−	−
P10	−	−	−	−	−	−	−	−

１０．３ Checking embedded length of the bolt (L_B)

(1) Necessity screw length of the bolt L_B1(mm)

$$L_B1 = \frac{f \cdot (d_B - k2 \cdot p)}{3} \cdot \frac{\sigma(B)t}{\tau(B)a} + 2 \cdot p$$

(2) Necessity screw length of connecting components L_B2(mm)

$$L_B2 = \frac{2 \cdot f \cdot (d_B - k2 \cdot p)^2}{7 \cdot d_B} \cdot \frac{\sigma(B)t}{\tau(N)a} + 2 \cdot p$$

Where,
- f : Safety factor (recommended f =1.05)
- d_B : Bolt diameter (Nominal diameter)(mm)
- p : Screw pitch
- k2 : Factor for determined inner diameter of screw in connecting components (k2=1.082532)
- σ(B)t : Maximum shear stress of bolt(N/mm^2)
- τ(B)a : Shear stress of bolts(N/mm^2)
- τ(N)a : Allowable shear stress of crew component(N/mm^2)

Dimensions

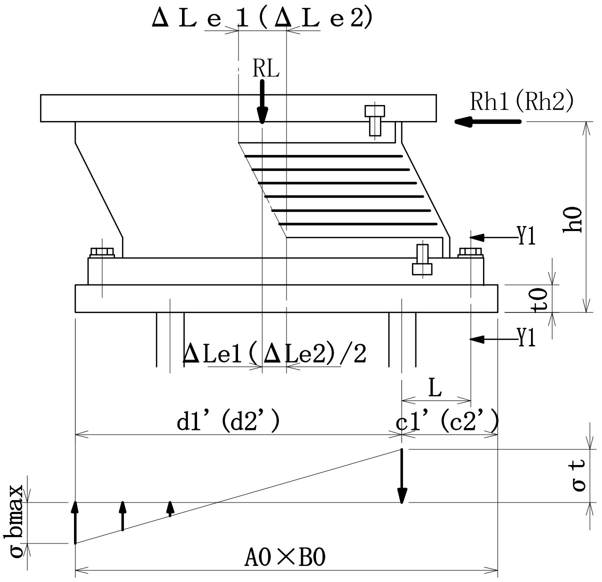
	f	d_B mm	p	k2
P5	1.05	64	6	1.082532
P6	1.05	64	6	1.082532
P7	1.05	72	6	1.082532
P10	1.05	64	6	1.082532

Level 1

	σ(B)t N/mm^2	τ(B)a N/mm^2	τ(N)a N/mm^2	L_B1 mm	L_B2 mm	L_B mm
P5	86.8	120	150	-	-	-
P6	46.3	120	142.5	-	-	-
P7	44.6	120	142.5	-	-	-
P10	60.6	120	150	-	-	-

1 1． Checking of mortar concrete

1 1． 1 Stress checking in case of longitudinal seismic



(1) Tensile stress in case of RU1＋Rh1 in combination
With the same horizontal force, the smaller the value of vertical force, the more critical the value of tensile force.
Therefore, load case of RU1＋Rh1 in combination shall be selected for checking (Compressive area：A0×B0).

Eccentric E

$$\Delta Le1/2 + \frac{Rh1 \cdot h0}{RL1}$$

Cases of compression
case－1：0 ＜ E ≦ Eo ＝ A0／ 6
case－2：Eo ＜ E ≦ Eo' ＝ A0 ／ 6 ＋ c1' ／ 3
case－3：Eo' ＜ E， E ＜ 0

Dimensions

	Longitudinal dimensions A0 mm	Transversal dimensions B0 mm	c1' mm	h0 mm
P5	1150	1600	105	474
P6	1130	1690	105	424
P7	1160	1730	120	444
P10	1100	1800	105	467

Level 1

	RL1 kN	Rh1 kN	ΔLe1 mm	Eo mm	Eo' mm	E mm	case
P5	2352	1500	310	191.7	226.7	457.3	case-3
P6	5376	1200	180	188.3	223.3	184.6	case-1
P7	6720	1100	170	193.3	233.3	157.7	case-1
P10	2800	1400	286	183.3	218.3	376.5	case-3

Case－1 : Trapezoidal shape of stress distribution

$$\begin{matrix}\sigma bmax \\ \sigma bmin\end{matrix} = RL1/(A0\cdot B0) \pm (Rh1\cdot h0 + RL1\cdot \Delta Le1/2)/(1/6\cdot A0^2\cdot B0) \leqq \sigma ba$$

Case－2 : Triangle shape of stress distribution but no tension in bolts

$$\sigma bmax = 2\cdot RL1/(3\cdot B0\cdot (A0/2 - E)) \leqq \sigma ba$$

$$x = 3\cdot (A0/2 - E)$$

Case－3 : Triangle shape of stress distribution, there in tension in bolts

Calculations based on explanation of single rebar concrete section under compression to calculate tensile force in bolts. And, it could be calculated in only 1 column of the outer row.

Root diameter of bolt : do
Number of effective bolts : m1
Area of root diameter : As (1 bolt)
Define l ＝A0／2－E

By solving the following equation to obtain position x of neutral axis
Ratio of young's modulus : n

$$f(x) = x^3 - 3\cdot l\cdot x^2 + \frac{6\cdot n\cdot m1\cdot As}{B0}\cdot (d1' - l)\cdot (x - d1') = 0$$

Maximum compressive stress of contacting surfaces

$$\sigma bmax = \frac{2\cdot RL1\cdot x}{B0\cdot x^2 - 2\cdot n\cdot m1\cdot As\cdot (d1' - x)}$$

Dimensions

	do mm	m1 bolts	As mm^2/bolt	d1' mm	n
P5	57.505	2	2597.2	1045	15
P6	57.505	2	2597.2	1025	15
P7	65.505	2	3370.1	1040	15
P10	57.505	2	2597.2	995	15

Level 1

	l mm	x mm	σ bmax N/mm^2	σ ba N/mm^2
P5	117.7	632.5	5.2	13.5
P6	380.4	－	5.6	13.5
P7	422.3	－	6.1	13.5
P10	173.5	672.6	4.9	13.5

１１．２　Stress checking in case of transversal seismic

※When fixing to the side block, implement investigation refering to section １２．２（4）.

(1) Tensile stress in case of RU2＋Rh2 in combination

With the same horizontal force, the smaller the value of vertical force, the more critical the value of tensile force.
Therefore, load case of RU2＋Rh2 in combination shall be selected for checking (Compressive area：A0×B0).

Eccentric Ｅ

$$\Delta Le2/2 + \frac{Rh2 \cdot h0}{RL2}$$

Case of compression

case－1：$0 < E \leqq Eo = B0/6$
case－2：$Eo < E \leqq Eo' = B0/6 + c2'/3$
case－3：$Eo' < E,\ E < 0$

Dimensions

	Longitudinal dimensions A0 mm	Transversal dimensions B0 mm	c 2' mm	h 0 mm
P5	－	－	－	－
P6	－	－	－	－
P7	－	－	－	－
P10	－	－	－	－

Level 1

	RL2 kN	Rh2 kN	ΔLe2 mm	Eo mm	Eo' mm	E mm	case
P5	－	－	－	－	－	－	－
P6	－	－	－	－	－	－	－
P7	－	－	－	－	－	－	－
P10	－	－	－	－	－	－	－

Case－1 : Trapezoidal shape of stress distribution

$$\begin{matrix}\sigma bmax \\ \sigma bmin\end{matrix} = RL2 / (A0 \cdot B0) \pm (Rh2 \cdot h0 + RL1 \cdot \Delta Le2/2) / (1/6 \cdot B0^2 \cdot A0) \leqq \sigma ba$$

Case－2 : Triangle shape of stress distribution but no tension in bolts

$$\sigma bmax = 2 \cdot RL2 / (3 \cdot A0 \cdot (B0/2 - E)) \leqq \sigma ba$$

$$x = 3 \cdot (B0/2 - E)$$

Case－3 : Triangle shape of stress distribution, there in tension in bolts
Calculations based on explanation of single rebar concrete section under compression to calculate tensile force in bolts. And, it could be calculated in only 1 column of the outer row.

Root diameter of bolt : do
Number of effective bolts : $m1$
Area of root diameter : As (1 bolt)
Define $l = B0/2 - E$

By solving the following equation to obtain position x of neutral axis
Ratio of young's modulus : n

$$f(x) = x^3 - 3 \cdot l \cdot x^2 + \frac{6 \cdot n \cdot m2 \cdot As}{A0} \cdot (d2' - l) \cdot (x - d2') = 0$$

Maximum compressive stress of contacting surfaces

$$\sigma bmax = \frac{2 \cdot RL2 \cdot x}{A0 \cdot x^2 - 2 \cdot n \cdot m2 \cdot As \cdot (d2' - x)}$$

Dimensions

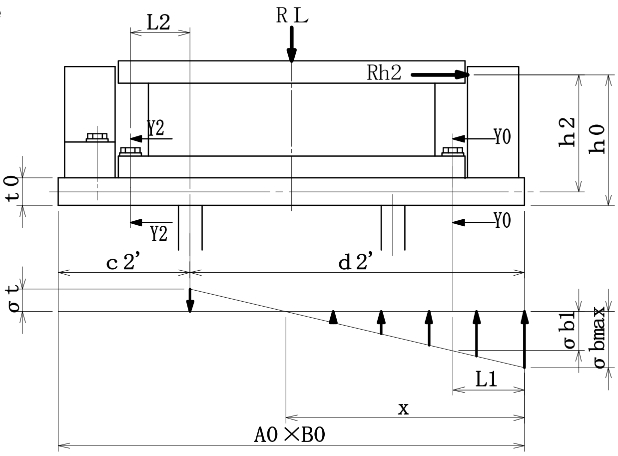
	do mm	m2 bolts	As mm2/bolt	d2' mm	n
P5	－	2	2597.2	－	－
P6	－	2	2597.2	－	－
P7	－	2	3370.1	－	－
P10	－	2	2597.2	－	－

Level 1

	l mm	x mm	σ bmax N/mm2	σ ba N/mm^2
P5	－	－	－	－
P6	－	－	－	－
P7	－	－	－	－
P10	－	－	－	－

11. 3 Stress in transversal direction in case of using side blocks

RL case



(1) Compressive stress

Eccentric E　　　E = Rh2・h0／RL

Case of compression　　　case−1 : 0 < E ≦ Eo = B0／6
case−2 : Eo < E ≦ Eo' = B0／6 + c2'／3
case−3 : Eo' < E, E < 0

Calculated results

	A0 mm	B0 mm	c2' mm	h0 mm
P5	1150	1600	105	501.5
P6	1130	1690	120	451.5
P7	1160	1730	140	474.0
P10	1100	1800	105	494.5

Level 1

	RL2 kN	Rh2 kN	Eo mm	Eo' mm	E mm	case
P5	2533	600	266.7	301.7	118.8	case-1
P6	5891	1500	281.7	321.7	115.0	case-1
P7	7578	2000	288.3	335.0	125.1	case-1
P10	3030	700	300.0	335.0	114.2	case-1

Case－1 : Trapezoidal shape of stress distribution

$$\begin{matrix}\sigma_{bmax}\\ \sigma_{bmin}\end{matrix} = RL/(A0 \cdot B0) \pm Rh \cdot h0/(1/6 \cdot B0^2 \cdot A0) \leqq \sigma_{ba}$$

Case－2 : Triangle shape of stress distribution but no tension in bolts

$$\sigma_{bmax} = 2 \cdot RL/(3 \cdot A0 \cdot (B0/2 - E)) \leqq \sigma_{ba}$$

$$x = 3 \cdot (B0/2 - E)$$

Case－3 : Triangle shape of stress distribution, there in tension in bolts

Calculations based on explanation of single rebar concrete section under compression to calculate tensile force in bolts. And, it could be calculated in only 1 column of the outer row.

Root diameter of bolt : do
Number of effective bolts : $m1$
Area of root diameter : As (1 bolt)
Define $l = B0/2 - E$

By solving the following equation to obtain position x of neutral axis
Ratio of young's modulus : n

$$f(x) = x^3 - 3 \cdot l \cdot x^2 + \frac{6 \cdot n \cdot m2 \cdot As}{A0} \cdot (d2' - l) \cdot (x - d2') = 0$$

Maximum compressive stress of contacting surfaces

$$\sigma_{bmax} = \frac{2 \cdot RL \cdot x}{A0 \cdot x^2 - 2 \cdot n \cdot m2 \cdot As \cdot (d2' - x)}$$

Level 1

	l mm	do mm	m2 bolts	As mm²/bolt	d2' mm	n	x mm	σbmax N/mm²	σba N/mm²
P5	681.2	57.505	2	2597.2	1495	15	－	2.0	13.5
P6	730.0	57.505	2	2597.2	1570	15	－	4.3	13.5
P7	739.9	65.505	2	3370.1	1590	15	－	5.4	13.5
P10	785.8	57.505	2	2597.2	1695	15	－	2.1	13.5

１２． Base plate

１２． 1 Stress checking in case of longitudinal seismic

(1) Checking flexural moment of rubber bearing connection bolt counter bore section

Tensile force

$T = To \cdot m1$

To : Maximum tensile force on surrounding surface of the set bolt
(Maximum tensile force in case of seismic horizontal force and uplift force acting)

$To = Max(T1, TV)$

$T1 = \sigma t \cdot As$

$TV = V / \Sigma m$

m1 : Number of anchor bolts used in calculation

Flexural moment

$M = T \cdot L$

L : Distance from a connection bolt to an anchor bolt

Flexural stress

$$\sigma t = \frac{6 \cdot M}{B0' \cdot t0^2} \leqq \sigma ta$$

B0' : Dimensions of bearing deducting diameter of connection bolts

$B0' = B0 - m1' \cdot \phi$

m1' : Number of bolt in outer column in transversal direction

ϕ : Root diameter of a connection bolt

t0 : Thickness of base plate

(2) Shear stress at section of bolt hole

$$\tau t = \frac{T}{B0' \cdot t0} \leqq \tau ta$$

(3) Stress combination checking of the bolt hole

$$U = (\sigma t / \sigma ta)^2 + (\tau t / \tau ta)^2 \leqq Ua = 1.2$$

Level 1

	T1 N	TV N	To N	m1' bolts	T N	L mm	M kN·mm
P5	225437	52500	225437	2	450874	55	24798
P6	9350	120000	120000	2	240000	50	12000
P7	－	150000	150000	2	300000	50	15000
P10	157390	62500	157390	2	314780	55	17313

	t0 mm	B0 mm	m1' bolts	φ mm	B0' mm
P5	80	1600	6	24	1456
P6	110	1690	4	24	1594
P7	130	1730	4	24	1634
P10	85	1800	6	24	1656

	Base plate material	σt N/mm^2	σta N/mm^2	σt N/mm^2	σta N/mm^2	U
P5	SM490A	16.0	262.5	3.9	150.0	0.01
P6	SM490A	3.8	255.0	1.4	142.5	0.01
P7	SM490A	3.3	255.0	1.5	142.5	0.01
P10	SM490A	8.7	262.5	2.3	150.0	0.01

１２．２　Stress in transversal direction in case of using side blocks

(1) Checking flexural moment of rubber bearing connection bolt counter bore section

Tensile force

$T = To \cdot m2$

To : Maximum tensile force on surrounding surface of the set bolt
(Maximum tensile force in case of seismic horizontal force and uplift force acting)

$To = Max(T2, TV)$

$T2 = \sigma t \cdot As$

$TV = V / \Sigma m$

m 2 : Number of anchor bolts used in calculation

Flexural moment

$M = T \cdot L$

L : Distance from a connection bolt to an anchor bolt

Flexural stress

$$\sigma t = \frac{6 \cdot M}{A0' \cdot t0^2} \leqq \sigma ta$$

A0' : Dimensions of bearing deducting diameter of connection bolts

$A0' = A0 - m2' \cdot \phi$

m2' : Number of bolt in outer column in transversal direction

ϕ : Root diameter of a connection bolt

t0 : Thickness of base plate

(2) Shear stress at section of bolt hole

$$\tau t = \frac{T}{A0' \cdot t0} \leqq \tau ta$$

(3) Stress combination checking of the bolt hole

$$U = (\sigma t / \sigma ta)^2 + (\tau t / \tau ta)^2 \leqq Ua = 1.2$$

Level 1

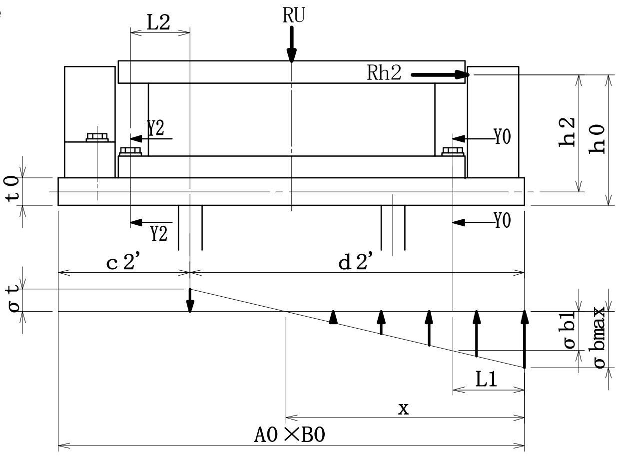
	T2 N	TV N	To N	m2' bolts	T N	L mm	M kN・mm
P5	－	－	－	－	－	－	－
P6	－	－	－	－	－	－	－
P7	－	－	－	－	－	－	－
P10	－	－	－	－	－	－	－

	t0 mm	A0 mm	m2' bolts	ϕ mm	A0' mm
P5	－	－	－	－	－
P6	－	－	－	－	－
P7	－	－	－	－	－
P10	－	－	－	－	－

	Base plate material	σt N/mm^2	σta N/mm^2	σt N/mm^2	σta N/mm^2	U
P5	－	－	－	－	－	－
P6	－	－	－	－	－	－
P7	－	－	－	－	－	－
P10	－	－	－	－	－	－

(4) Stress in transversal direction in case of using side blocks

RU case



(a) Compressive stress

Eccentric E　　　E = Rh2・h0／RU

Case of compression　　case－1 : 0 ＜ E ≦ Eo ＝ B0／ 6
case－2 : Eo ＜ E ≦ Eo' ＝ B0 ／ 6 ＋ c2' ／ 3
case－3 : Eo' ＜ E,　E ＜ 0

Calculated results

	A0 mm	B0 mm	c2' mm	h0 mm
P5	1150	1600	105	501.5
P6	1130	1690	120	451.5
P7	1160	1730	140	474.0
P10	1100	1800	105	494.5

Level 1

	RU2 kN	Rh2 kN	Eo mm	Eo' mm	E mm	case
P5	915	600	266.7	301.7	328.9	case-3
P6	2672	1500	281.7	321.7	253.5	case-1
P7	3282	2000	288.3	335.0	288.8	case-2
P10	1407	700	300.0	335.0	246.0	case-1

Case－1 : Trapezoidal shape of stress distribution

$$\left.\begin{matrix}\sigma bmax \\ \sigma bmin\end{matrix}\right. = RU/(A0 \cdot B0) \pm Rh2 \cdot h0/(1/6 \cdot B0^2 \cdot A0) \leqq \sigma ba$$

Case－2 : Triangle shape of stress distribution but no tension in bolts

$$\sigma bmax = 2 \cdot RU/(3 \cdot A0a \cdot (B0/2 - E)) \leqq \sigma ba$$

$$x = 3 \cdot (B0/2 - E)$$

Case－3 : Triangle shape of stress distribution, there in tension in bolts
Calculations based on explanation of single rebar concrete section under compression to calculate tensile force in bolts. And, it could be calculated in only 1 column of the outer row.

Root diameter of bolt : do
Number of effective bolts : m1
Area of root diameter : As (1 bolt)
Define l =B0／2－E

By solving the following equation to obtain position x of neutral axis
Ratio of young's modulus : n

$$f(x) = x^3 - 3 \cdot l \cdot x^2 + \frac{6 \cdot n \cdot m2 \cdot As}{A0} \cdot (d2' - l) \cdot (x - d2') = 0$$

Maximum compressive stress of contacting surfaces

$$\sigma bmax = \frac{2 \cdot RU \cdot x}{A0 \cdot x^2 - 2 \cdot n \cdot m2 \cdot As \cdot (d2' - x)}$$

Level 1

	l mm	do mm	m2 bolts	As mm^2/bolt	d2' mm	n	x mm	σ bmax N/mm^2	σ ba N/mm^2
P5	471.1	57.505	2	2597.2	1495	15	1427.2	1.1	13.5
P6	591.5	57.505	2	2597.2	1570	15	－	2.7	13.5
P7	576.2	65.505	2	3370.1	1590	15	1728.6	3.3	13.5
P10	654.0	57.505	2	2597.2	1695	15	－	1.3	13.5

(b) Stresses of anchor bolt

Bolt diameter : da
Total number of bolts : Σm
Embedded length : La
Root diameter : do
Effective diameter of bolts for shear force : dm

Tensile force

$$\sigma t = \sigma bmax \cdot n \cdot \frac{d2' - x}{x} \leqq \sigma ta$$

Shear stress due to Rh2

$$\tau = \frac{4 \cdot Rh2}{\pi \cdot dm^2 \cdot \Sigma m} \leqq \tau a$$

Stress combination

$$U = (\sigma t' / \sigma ta)^2 + (\tau / \tau a)^2 \leqq Ua = 1.2$$

$$\sigma t' = \sigma t \times (do / dm)^2$$

Concrete cohesive stress

$$\tau o = \frac{\sigma t \cdot As}{\pi \cdot da \cdot La} \leqq \tau oa$$

Dimensions and horizontal forces

	Type	Class of bolt	da	dm	do mm	Σm bolts	La mm
P5	Fixed by nut	SS400	65	65	57.505	4	650
P6	Fixed by nut	SS400	65	65	57.505	4	650
P7	Fixed by nut	SS400	75	75	65.505	4	750
P10	Fixed by nut	SS400	65	65	57.505	4	650

Level 1

	Rh2 kN	σt N/mm2	σta N/mm2	τ N/mm2	τa N/mm2	U	τo N/mm2	τoa N/mm²
P5	600	0.8	210.0	45.3	120.0	0.15	0.02	2.70
P6	1500	—	—	113.1	120.0	—	—	—
P7	2000	—	—	113.2	120.0	—	—	—
P10	700	—	—	52.8	120.0	—	—	—

(c) Stresses in section Y0－Y0

Flexural moment

In case of $x \geqq L1$

$M = Rh2 \cdot h2 - (2 \cdot \sigma bmax + \sigma b1) \cdot L1^2 \cdot A0/6$

case-1 : $\sigma b1 = (\sigma bmax - \sigma bmin) / B0 \times (B0 - L1) + \sigma bmin$

case-2,3 : $\sigma b1 = \sigma bmax / x \times (x - L1)$

In case of $x < L$

$M = Rh2 \cdot h2 - (\sigma bmax \cdot (3 \cdot L1 - x) \cdot x) \cdot A0/6$

In case of $\sigma bmax < 0$

$M = Rh2 \cdot h2$

Tensile bending stress

When position of the outer column of the anchor bolt is set inside the position of connection bolts

$\sigma t = 6 \cdot M / (A0' \cdot t0^2) + Rh2 / (A0' \cdot t0) \quad \leqq \sigma ta$

A0' : Dimensions of base plate neglected holes of connection bolts

$A0' = A0 - m2' \cdot \phi$

m2' : Number of connection bolts of the outer column in transversal direction

ϕ : Root diameter of bottom plate connection bolts

Level 1

	Base plate material	Rh2 kN	h2 mm	σbmax N/mm²	σbmin N/mm²	σb1 N/mm²	L1 mm	M kN・mm
P5	SM490A	600	461.5	1.1	－	0.9	275	231385
P6	SM490A	1500	396.5	2.7	0.1	2.2	335	435884
P7	SM490A	2000	409.0	3.3	－	2.6	355	595133
P10	SM490A	700	452.0	1.3	0.1	1.0	375	223930

	t0 mm	B0 mm	m2' bolts	φ mm	A0' mm	A0 mm	σt N/mm²	σta N/mm²
P5	80	1600	6	24	1006	1150	223.1	262.5
P6	110	1690	4	24	1034	1130	222.3	255.0
P7	130	1730	4	24	1064	1160	213.1	255.0
P10	85	1800	6	24	956	1100	203.2	262.5

(d) Stresses in cross section Y 2 − Y 2

Tensile force

$T = To \cdot m2$

To : Maximum tensile force on surrounding surface of the set bolt

(Maximum tensile force in case of seismic horizontal force and uplift force acting)

$To = Max(T2、TV)$

$T2 = \sigma t \cdot As$

$TV = V\ (V')/\Sigma m$

m2 : Number of anchor bolts used in calculation

Flexural moment

$M = T \cdot L2$

Flexural stress

$$\sigma = \frac{6 \cdot M}{A0' \cdot t0^2} \leqq \sigma a$$

Shear stress

$$\tau = \frac{T}{A0' \cdot t0} \leqq \tau a$$

Stresses combination

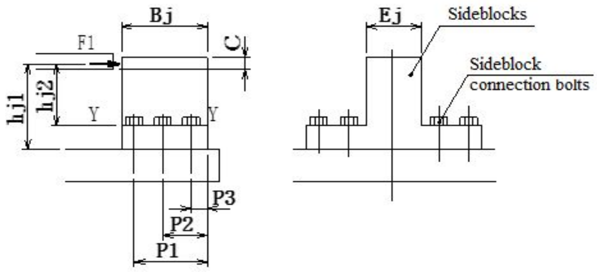
$$U = (\sigma / \sigma a)^2 + (\tau / \tau a)^2 \leqq Ua = 1.2$$

Level 1

	T2 N	TV N	T0 N	m2 bolts	T N	L2 mm	M kN·mm
P5	2078	52500	52500	2	105000	170	17850
P6	−	120000	120000	2	240000	215	51600
P7	−	150000	150000	2	300000	215	64500
P10	−	62500	62500	2	125000	270	33750

	A0' mm	t0 mm	σ N/mm2	σa N/mm2	τ N/mm2	τa N/mm2	U
P5	1006	80	16.7	262.5	1.4	150.0	0.01
P6	1034	110	24.8	255.0	2.2	142.5	0.01
P7	1064	130	21.6	255.0	2.2	142.5	0.01
P10	956	85	29.4	262.5	1.6	150.0	0.02

13. Side blocks



13. 1 Checking stresses of side block connection bolts

Nominal diameter of bolt : dB
Root diameter of bolt : do
Total number of bolts : Σm
Number of bolts in 1 column : mj
Number of columns : n
Root diameter area : As (For 1 bolt)

$As = \pi/4 \cdot do^2$

(1) Tensile stress

Tensile force : T

$$T = \frac{Rh2 \cdot h1 \cdot P1}{(P1^2 + P2^2 + P3^2) \cdot m}$$

$$\sigma t = \frac{T}{As} \leqq \sigma ta$$

(2) Shear stress

$$\tau = \frac{Rh2}{\Sigma m \cdot As} \leqq \tau a$$

(3) Stress combination

$$U = (\sigma t / \sigma ta)^2 + (\tau / \tau a)^2 \leqq Ua = 1.2$$

Dimensions and properties of bolts

	Design condition	Class of bolt	d_B	do mm	Σm bolts	m bolts	n columns	As mm^2
P5	FIX	8.8	36	31.670	8	4	2	787.7
P6	FIX	8.8	45	40.129	8	4	2	1264.8
P7	FIX	8.8	48	42.587	8	4	2	1424.4
P10	FIX	8.8	36	31.670	8	4	2	787.7

	h1 mm	P1 mm	P2 mm	P3 mm
P5	421.5	165	55	0
P6	341.5	210	75	0
P7	344.0	225	80	0
P10	409.5	165	55	0

Calculated results

	Rh2 kN	T N	σt N/mm2	σta N/mm^2	τ N/mm^2	τa N/mm^2	U
P5	600	344864	437.9	540.0	95.3	300.0	0.76
P6	1500	540837	427.7	540.0	148.3	300.0	0.87
P7	2000	678650	476.5	540.0	175.6	300.0	1.12
P10	700	390886	496.3	540.0	111.1	300.0	0.98

１３．２ Checking stress of side blocks

(1) Compressive stress

$$\sigma b = \frac{Rh2}{C \cdot E} \leqq \sigma ba$$

(2) Flexural stress in Y－Y cross section

$$\sigma = \frac{6 \cdot Rh2 \cdot h2}{B^2 \cdot E} \leqq \sigma a$$

(3) Shear stress in Y－Y cross section

$$\tau = \frac{Rh2}{B \cdot E} \leqq \tau a$$

(4) Stress combination in Y－Y cross section

$$U = (\sigma / \sigma a)^2 + (\tau / \tau a)^2 \qquad \leqq Ua = 1.2$$

Dimensions

	Side blocks material	B mm	E mm	C mm	h2 mm	Rh2 kN
P5	SM490A or SCW480N	220	130	55	311.5	600
P6	SM490A or SCW480N	280	170	55	201.5	1500
P7	SM490A or SCW480N	300	150	60	224.0	2000
P10	SM490A or SCW480N	220	130	55	299.5	700

Calculated results

	σb N/mm^2	σba N/mm^2	σ N/mm^2	σa N/mm^2	τ N/mm^2	τa N/mm^2	U
P5	84.0	375.0	178.3	247.5	21.0	135.0	0.55
P6	160.5	337.5	136.1	229.5	31.6	135.0	0.41
P7	222.3	375.0	199.2	247.5	44.5	135.0	0.76
P10	98.0	375.0	200.0	247.5	24.5	135.0	0.69

13. 3 Checking embedded length of the bolt (L_B)

(1) Necessity screw length of the bolt L_B1(mm)

$$L_B1 = \frac{f \cdot (d_B - k2 \cdot p)}{3} \cdot \frac{\sigma(B)t}{\tau(B)a} + 2 \cdot p$$

(2) Necessity screw length of connecting components L_B2(mm)

$$L_B2 = \frac{2 \cdot f \cdot (d_B - k2 \cdot p)^2}{7 \cdot d_B} \cdot \frac{\sigma(B)t}{\tau(N)a} + 2 \cdot p$$

Where,
- f : Safety factor (recommended $f = 1.05$)
- d_B : Bolt diameter (Nominal diameter)(mm)
- p : Screw pitch
- $k2$: Factor for determined inner diameter of screw in connecting components (k2=1.082532)
- $\sigma(B)t$: Maximum shear stress of bolt(N/mm^2)
- $\tau(B)a$: Shear stress of bolts(N/mm^2)
- $\tau(N)a$: Allowable shear stress of crew component(N/mm^2)

Dimensions

	f	d_B mm	p	k2	$\sigma(B)t$ N/mm^2	$\tau(B)a$ N/mm^2	$\tau(N)a$ N/mm^2
P5	1.05	36	4	1.082532	437.9	300	170
P6	1.05	45	4.5	1.082532	427.7	300	161.5
P7	1.05	48	5	1.082532	476.5	300	161.5
P10	1.05	36	4	1.082532	496.3	300	170

Calculated result

	L_B1 mm	L_B2 mm	L_B mm
P5	24.2	29.5	64.0
P6	29.0	37.4	73.0
P7	33.7	43.4	82.0
P10	26.3	32.4	64.0