REPUBLIC OF THE UNION OF MYANMAR
MINISTRY OF CONSTRUCTION
DEPARTMENT OF BRIDGE

DETAILED DESIGN STUDY ON THE BAGO RIVER BRIDGE CONSTRUCTION PROJECT

FINAL REPORT ATTACHMENTS

VOLUME II DESIGN REPORT
Part IV PC Box Girder Bridge & On-ramp Bridge

DECEMBER 2017

JAPAN INTERNATIONAL COOPERATION AGENCY

NIPPON KOEI CO., LTD.,
ORIENTAL CONSULTANTS GLOBAL CO., LTD.,
METROPOLITAN EXPRESSWAY COMPANY LIMITED,
CHODAI CO., LTD.
NIPPON ENGINEERING CONSULTANTS CO., LTD.

REPUBLIC OF THE UNION OF MYANMAR
MINISTRY OF CONSTRUCTION
DEPARTMENT OF BRIDGE

DETAILED DESIGN STUDY ON THE BAGO RIVER BRIDGE CONSTRUCTION PROJECT

FINAL REPORT ATTACHMENTS

VOLUME II DESIGN REPORT
Part IV PC Box Girder Bridge & On-ramp Bridge

DECEMBER 2017

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

NIPPON KOEI CO., LTD.
ORIENTAL CONSULTANTS GLOBAL CO., LTD.
METROPOLITAN EXPRESSWAY COMPANY LIMITED.
CHODAI CO., LTD.
NIPPON ENGINEERING CONSULTANTS CO., LTD.

PC BOX GIRDER BRIDGE
(A1~P5)

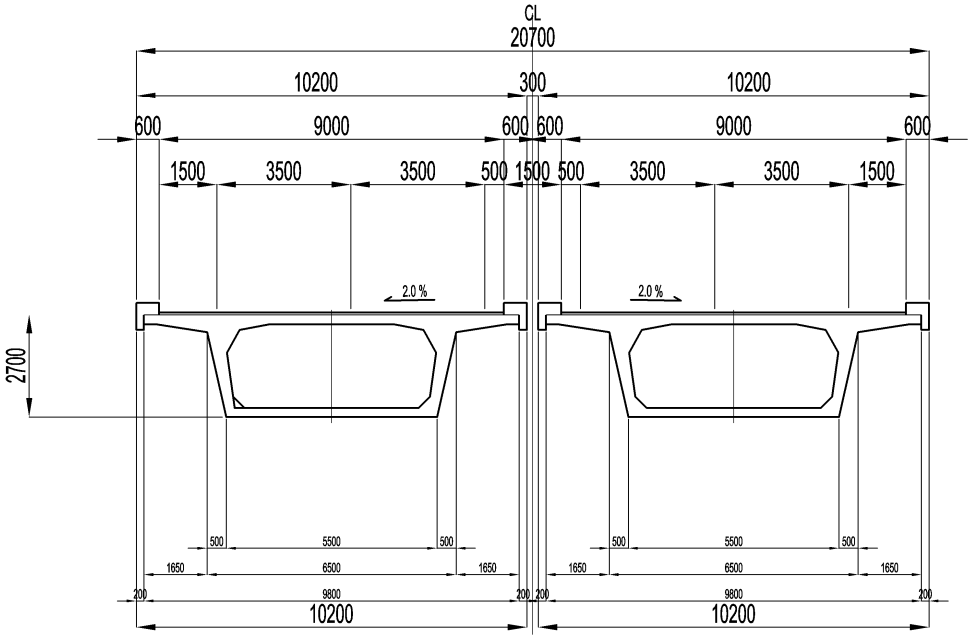
SUPERSTRUCTURE

CONTENTS

CHAPTER 1. GENERAL

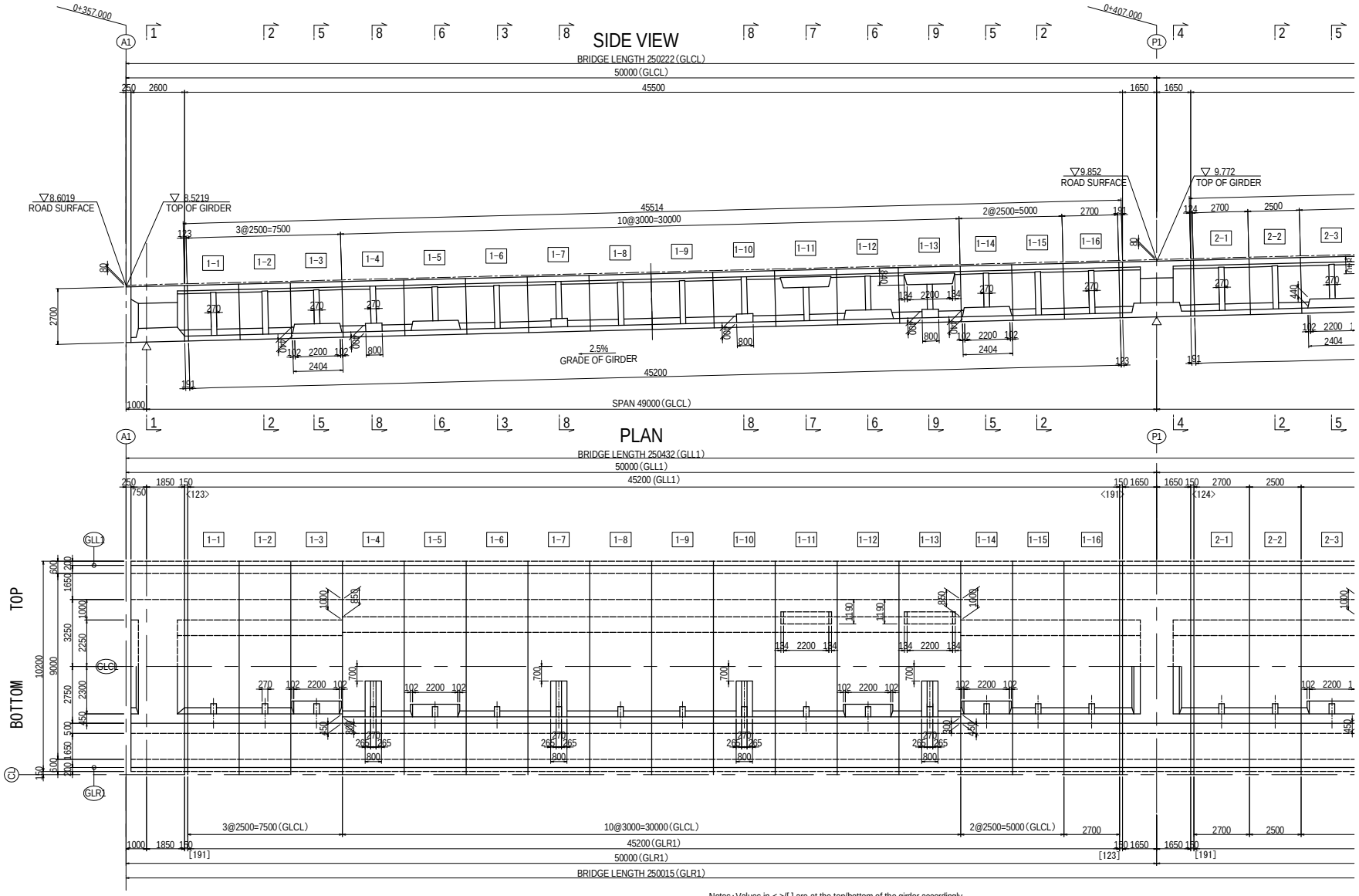
1-1 GENERAL CONDITION

PROJECT	:	CONSTRUCTION OF BAGO RIVER BRIDGE
BRIDGE	:	PC BOX BRIDGE (Thanlin side)
STURUCTURE TYPE	:	5 SPAN CONTINUOUS PC BOX GIRDER PRECAST SEGMENT
BRIDGE LENGTH	:	250 m (5 x 50m)
WIDTH COMPOSITION	:	LEFT 0.600 + 1.500 + 2 x 3.500 + 0.500 + 0.600 RIGHT 0.600 + 0.500 + 2 x 3.500 + 1.500 + 0.600
LIVE LOAD	:	HL-93 (AASHTO)
DESIGN STANDARD	:	Specifications for highway bridges, JAPAN AASHTO LRFD Bridge Design Specifications



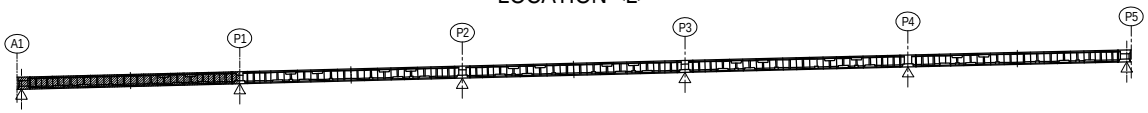
GENERAL VIEW OF SUPERSTRUCTURE A1-P5 <L> (1)

S=1:200



Notes: Values in < >/[ ] are at the top/bottom of the girder accordingly.

LOCATION <L>

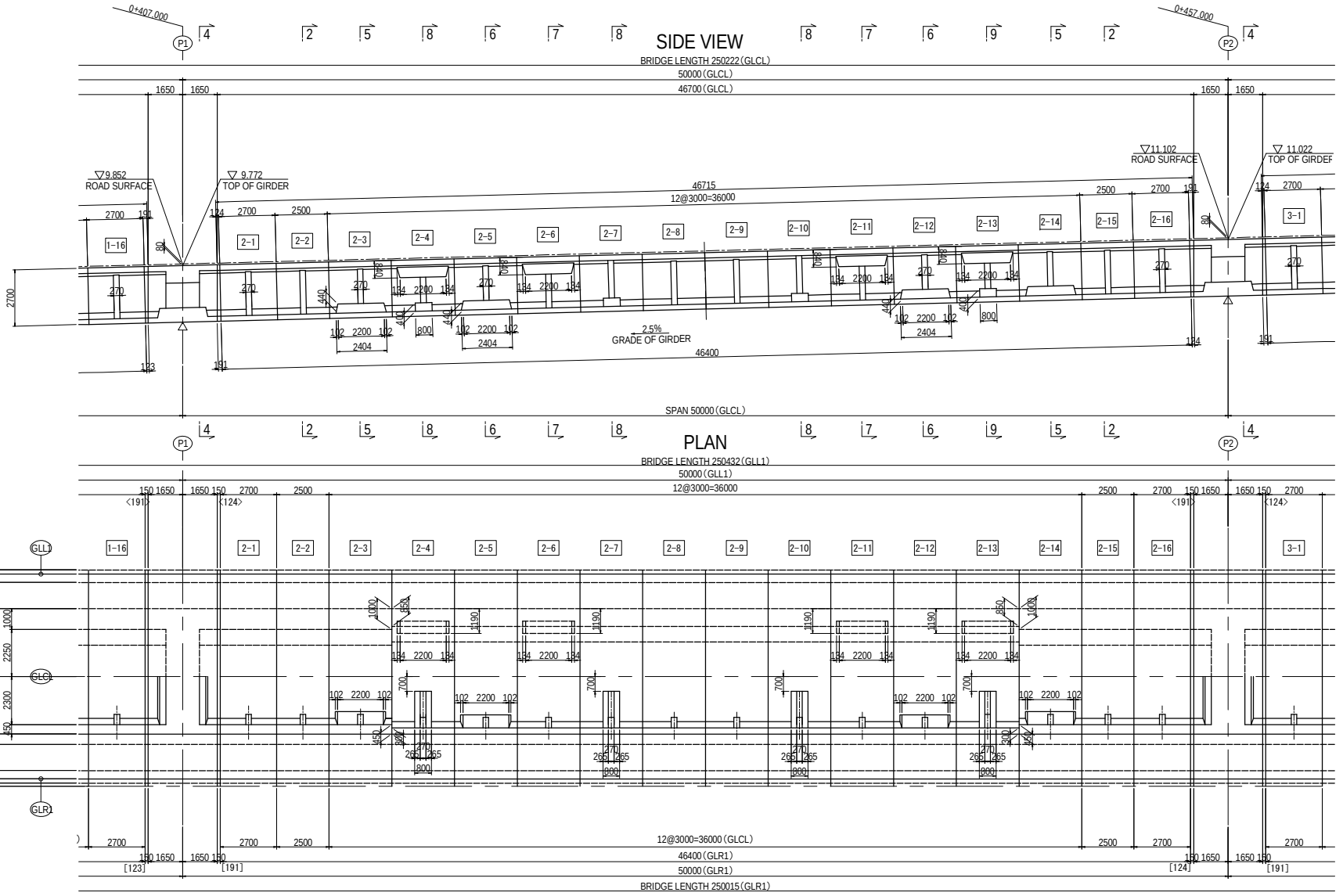


PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.	DRAWING TITLE: GENERAL VIEW OF SUPERSTRUCTURE A1-P5 <L> (1)	PACKAGE: 1
				DWG No.: P1-PB-1001	

	NAME	SIGNATURE	DATE
PREPARED BY	M. OHYAMA		
CHECKED BY	T. HAYAKAWA		
APPROVED BY	Y. SANO		

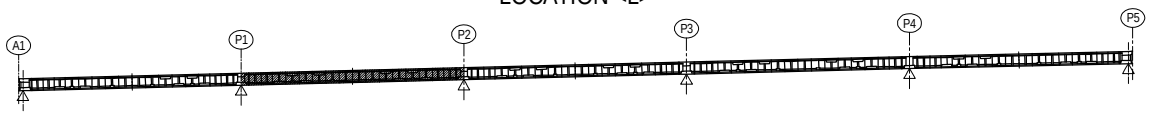
GENERAL VIEW OF SUPERSTRUCTURE A1-P5 <L> (2)

S=1:200



Notes : Values in < >/[ ] are at the top/bottom of the girder accordingly.

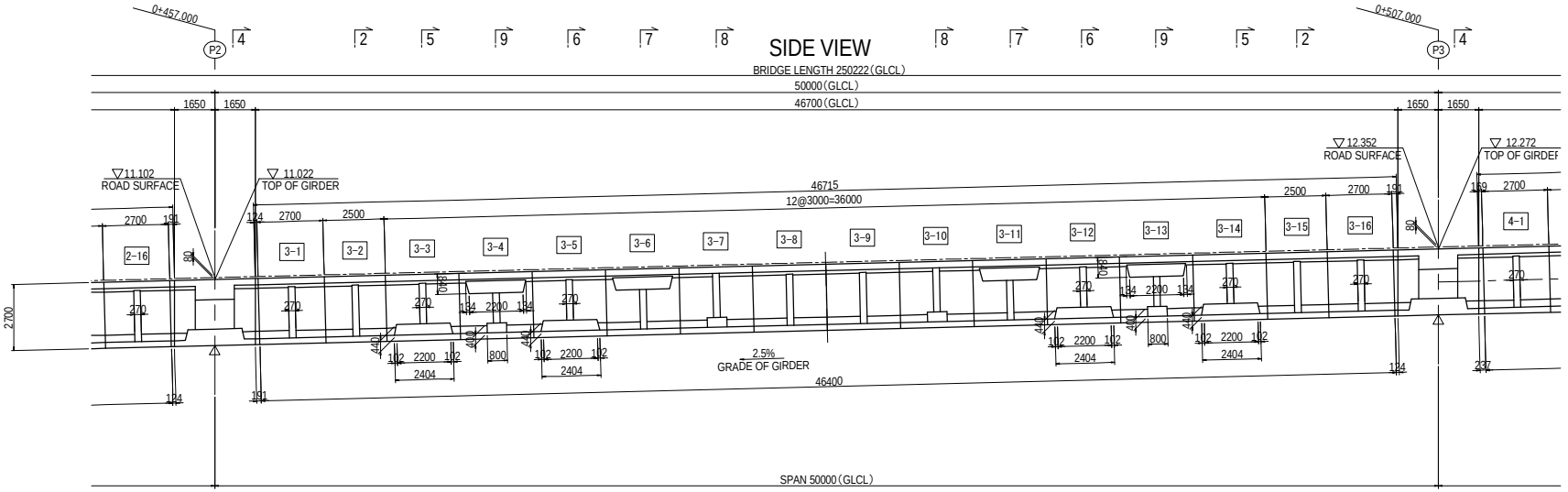
LOCATION <L>

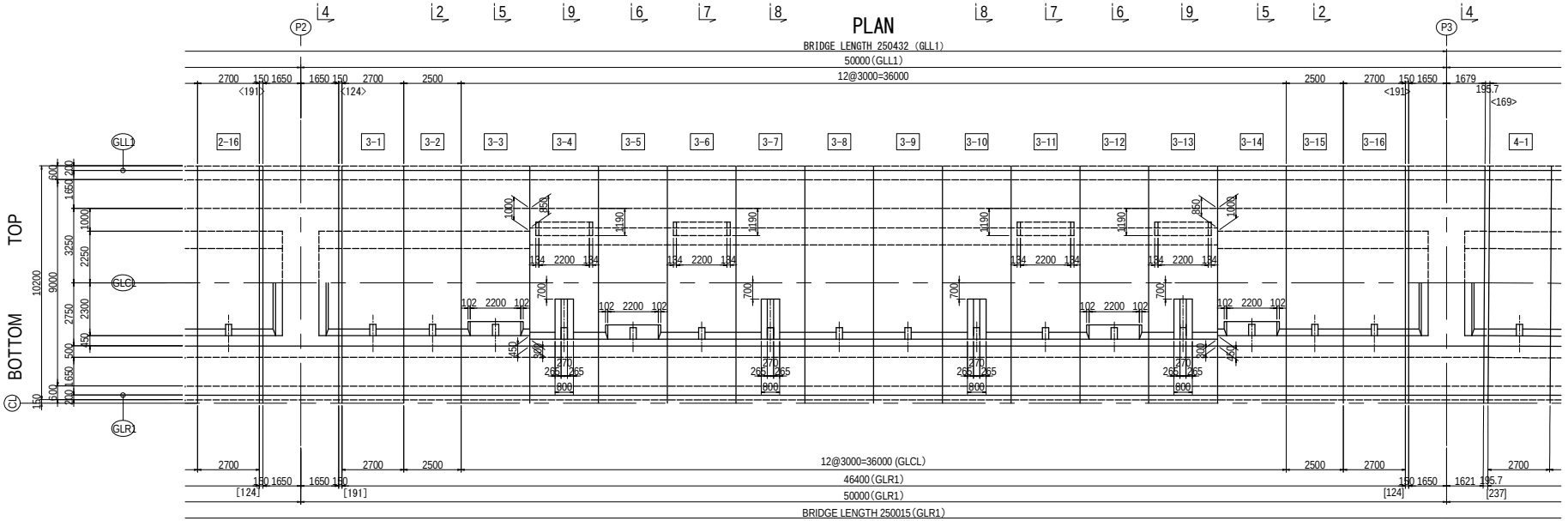


PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.		
				NAME / SIGNATURE / DATE	DRAWING TITLE / PACKAGE
				PREPARED BY: M. OHYAMA	GENERAL VIEW OF SUPERSTRUCTURE A1-P5 <L> (2) / 1
				CHECKED BY: T. HAYAKAWA	DWG No.
				APPROVED BY: Y. SANO	P1-PB-1002

GENERAL VIEW OF SUPERSTRUCTURE A1-P5 <L> (3)

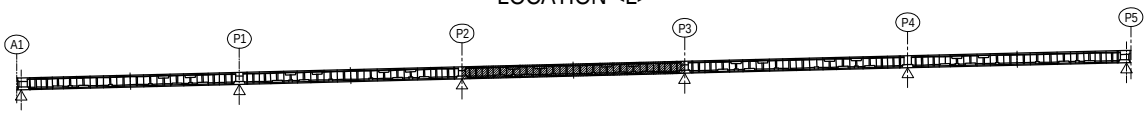
S=1:200





Notes : Values in < >/[ ] are at the top/bottom of the girder accordingly.

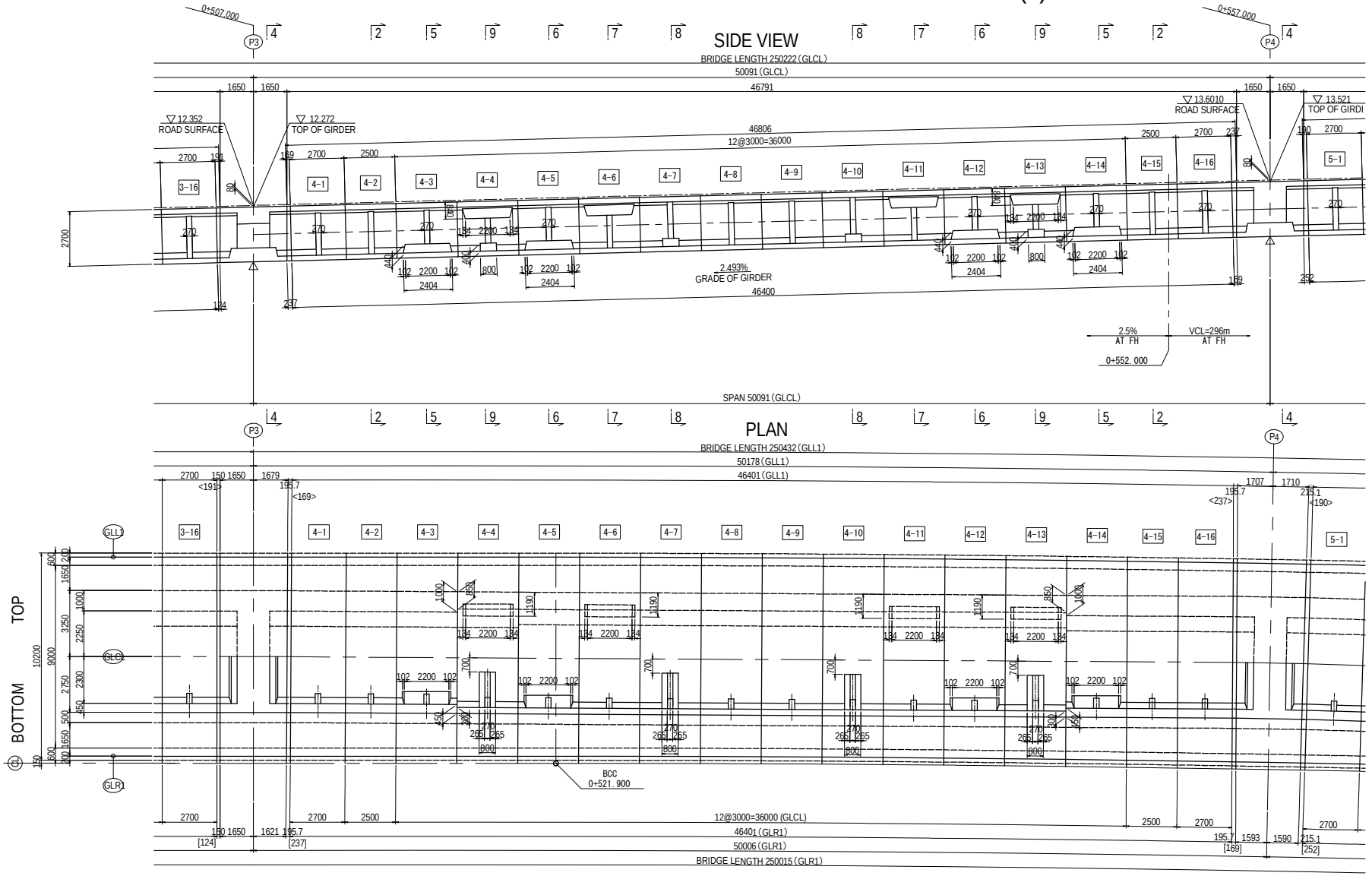
LOCATION <L>



PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR, MINISTRY OF CONSTRUCTION, DEPARTMENT OF BRIDGE	JICA STUDY TEAM: 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: M. OHYAMA	GENERAL VIEW OF SUPERSTRUCTURE A1-P5 <L> (3) / 1
				CHECKED BY: T. HAYAKAWA	DWG No.
				APPROVED BY: Y. SANO	P1-PB-1003

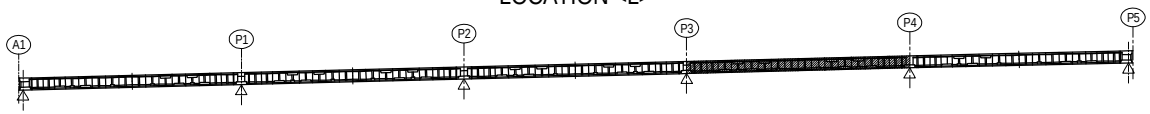
GENERAL VIEW OF SUPERSTRUCTURE A1-P5 <L>(4)

S=1:200



Notes : Values in < >/[ ] are at the top/bottom of the girder accordingly.

LOCATION <L>

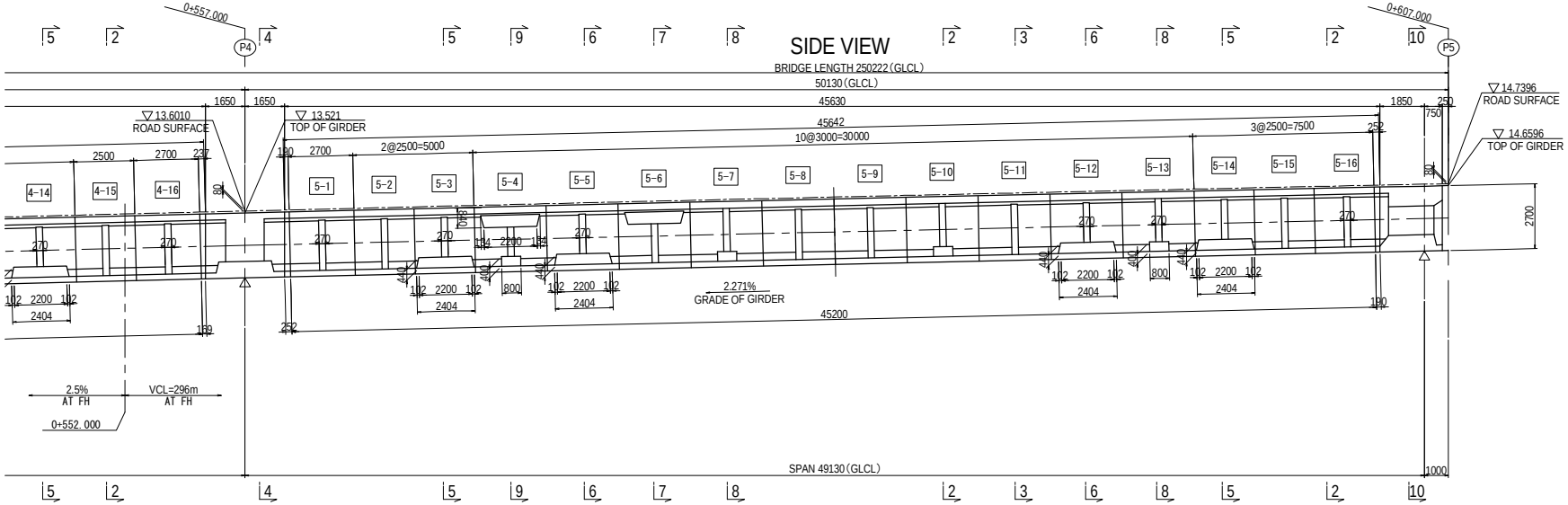


PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.		
	NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
PREPARED BY	M. OHYAMA			GENERAL VIEW OF SUPERSTRUCTURE A1-P5 <L> (4)	1
CHECKED BY	T. HAYAKAWA				DWG No.
APPROVED BY	Y. SANO				P1-PB-1004

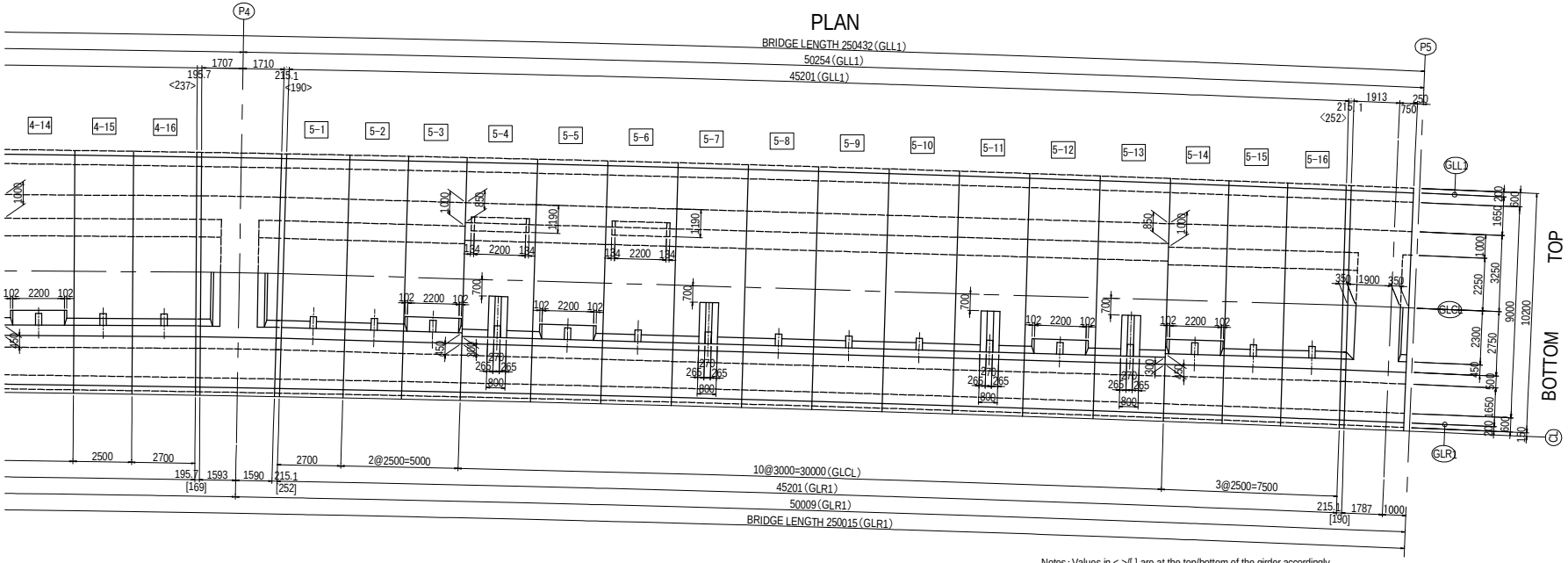
GENERAL VIEW OF SUPERSTRUCTURE A1-P5 <L>(5)

S=1:200

SIDE VIEW

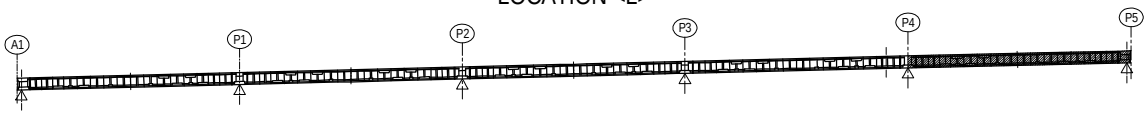


PLAN



Notes : Values in < >/[ ] are at the top/bottom of the girder accordingly.

LOCATION <L>



PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.	DRAWING TITLE: GENERAL VIEW OF SUPERSTRUCTURE A1-P5 <L> (5)	PACKAGE: 1

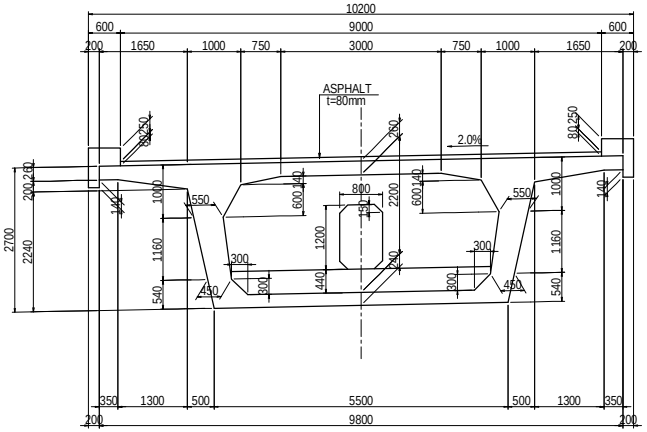
	NAME	SIGNATURE	DATE
PREPARED BY	M. OHYAMA		
CHECKED BY	T. HAYAKAWA		
APPROVED BY	Y. SANO		

DWG No. P1-PB-1005

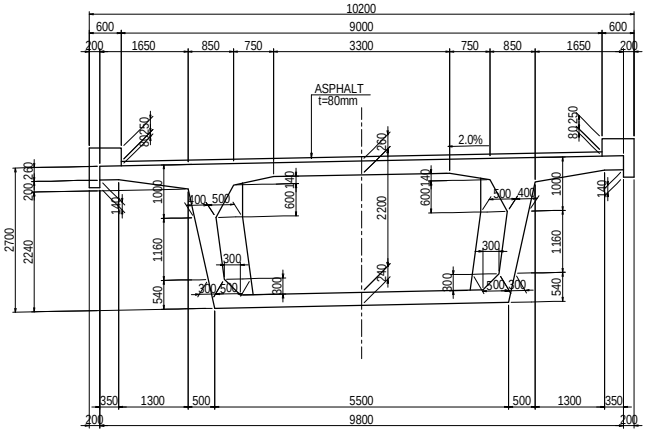
GENERAL VIEW OF SUPERSTRUCTURE A1-P5 <L>（6）

CROSS SECTIONS S=1:100

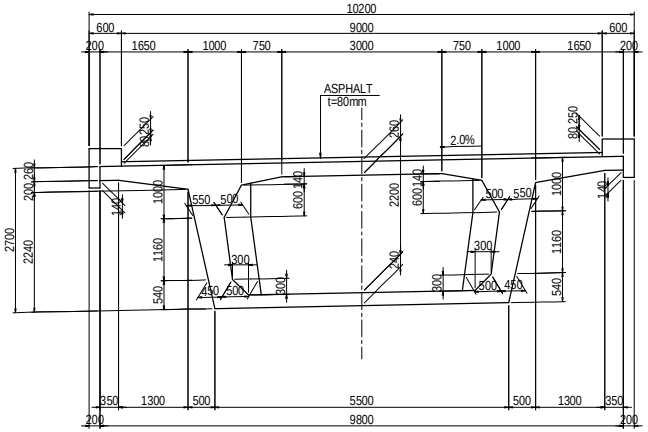
AT A1(1-1)



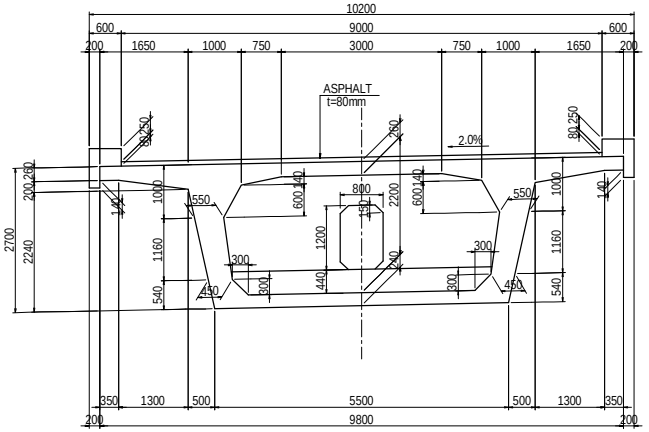
AT RIBS(3-3)



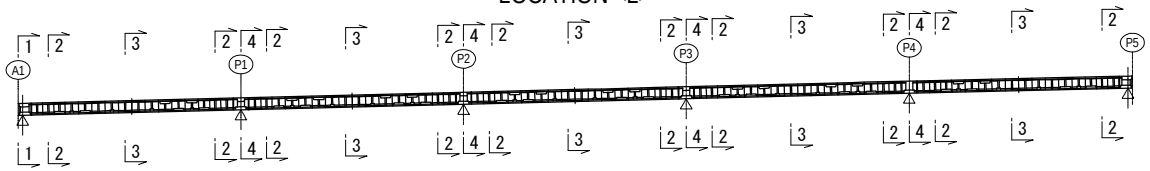
AT RIBS(2-2)



AT PIERS(4-4)



LOCATION <L>



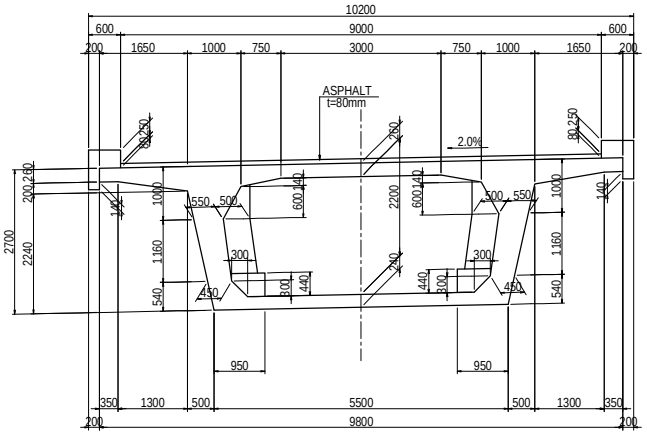
note : Cantilever length of ※ mark
Sections are changed by curvature.

PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: 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	M. OHYAMA			GENERAL VIEW OF SUPERSTRUCTURE A1-P5 <L> (6)	1
CHECKED BY	T. HAYAKAWA				DWG No.
APPROVED BY	Y. SANO				P01-PB-1006

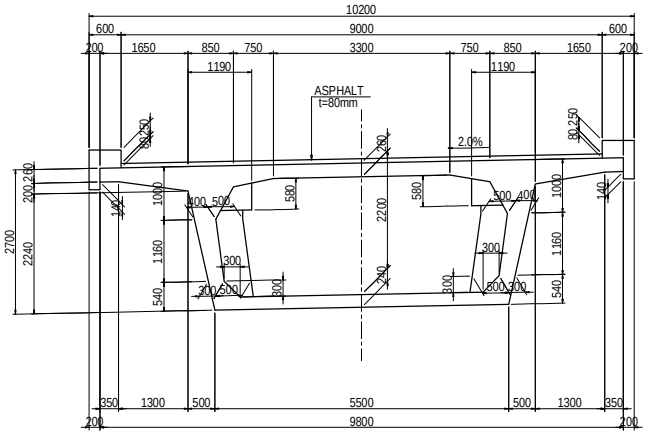
GENERAL VIEW OF SUPERSTRUCTURE A1-P5 <L>(7)

CROSS SECTIONS S=1:100

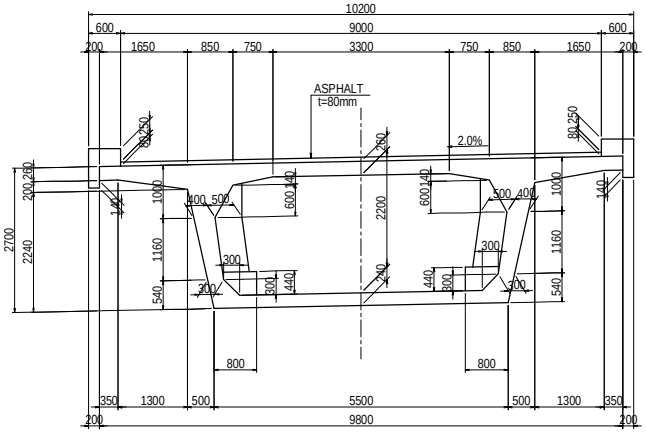
AT RIBS(5-5)



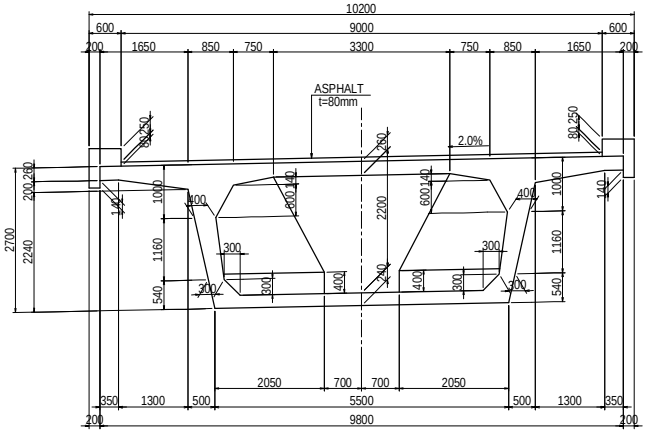
AT RIBS(7-7)



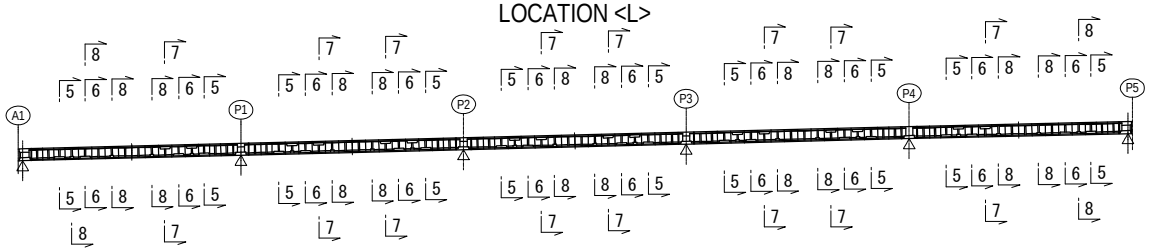
AT RIBS(6-6)



AT DEVIATOR(8-8)



LOCATION <L>



note : Cantilever length of ※ mark
Sections are changed by curvature.

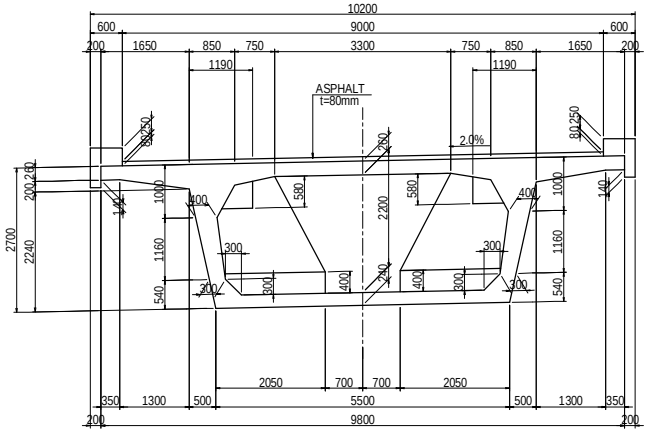
PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN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

NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
			GENERAL VIEW OF SUPERSTRUCTURE A1-P5 <L> (7)	1
				DWG No. P01-PB-1007

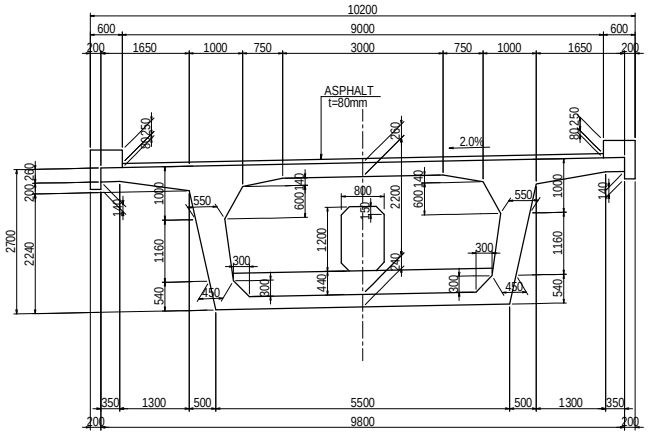
GENERAL VIEW OF SUPERSTRUCTURE A1-P5 <L> (8)

CROSS SECTIONS S=1:100

AT DEVIATOR(9-9)

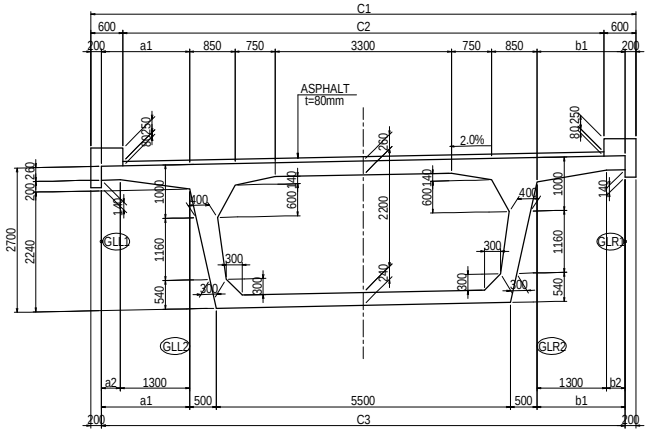


AT P5(10-10)



CROSS SECTIONS S=1:100

STANDARD SECTION



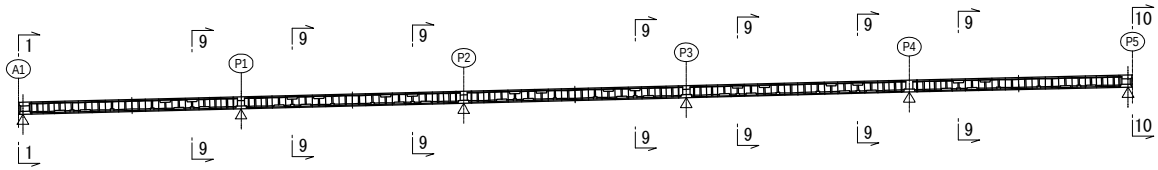
MEMBER DIMENSIONS

(UNIT:mm)

	A1	~	P3	L0301	L0302	L0303	L0304	L0305	L0306	BCC	L0307	L0308	L0309	L0310	L0311	L0312	L0313	L0314	L0315	L0316	L0317	L0318	L0319
a1	1650	⟷	1650	1650	1651	1667	1682	1700	1718	1729	1736	1750	1759	1764	1765	1761	1752	1739	1722	1700	1678	1652	1649
a2	350	⟷	350	350	351	367	382	400	418	429	436	450	459	464	465	461	452	439	422	400	378	352	349
b1	1650	⟷	1650	1650	1649	1633	1618	1600	1582	1571	1564	1550	1541	1536	1535	1539	1548	1561	1578	1600	1622	1649	1651
b2	350	⟷	350	350	349	333	318	300	282	271	264	250	241	236	235	239	248	261	278	300	322	349	351
C1	10200	⟷	10200	←																→	10200	10201	10201
C2	9000	⟷	9000	←																→	9000	9001	9001
C3	9800	⟷	9800	←																→	9800	9801	9801

	P4	L0401	L0402	L0403	L0404	L0405	L0406	L0407	L0408	L0409	L0410	L0411	L0412	L0413	L0414	L0415	L0416	L0417	L0418	L0419	P5S1	P5
a1	1650	1649	1651	1680	1703	1723	1743	1759	1770	1776	1778	1776	1769	1758	1742	1722	1702	1678	1650	1648	1650	1650
a2	350	349	351	380	403	423	443	459	470	476	478	476	469	458	442	422	402	378	350	348	350	350
b1	1650	1651	1650	1621	1598	1577	1557	1541	1530	1524	1522	1524	1531	1542	1558	1578	1599	1622	1651	1652	1650	1650
b2	350	351	350	321	298	277	257	241	230	224	222	224	231	242	258	278	299	322	351	352	350	350
C1	10200	10201	10201	10201	10200	←										→	10200	10201	10201	10201	10200	10200
C2	9000	9001	9001	9001	9000	←										→	9000	9001	9001	9001	9000	9000
C3	9800	9801	9801	9801	9800	←										→	9800	9801	9801	9801	9800	9800

LOCATION <L>



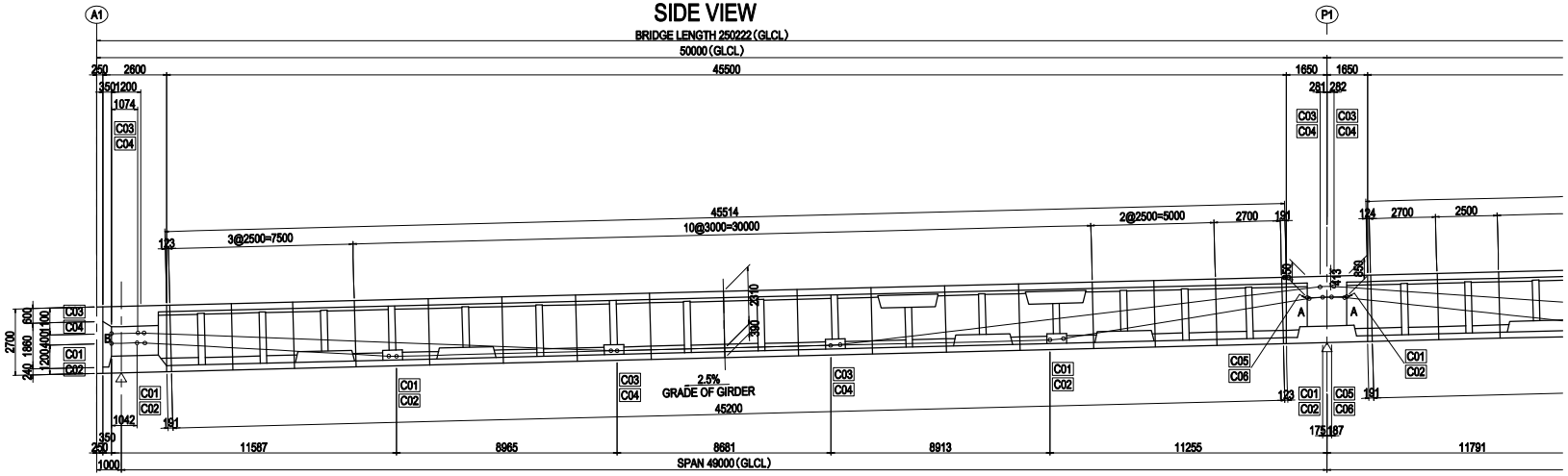
note : Cantilever length of ※ mark
Sections are changed by curvature.

PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: 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: GENERAL VIEW OF SUPERSTRUCTURE A1-P5 <L> (8)	PACKAGE: 1
				PREPARED BY	M. OHYAMA				DWG No.: P1-PB-1008
				CHECKED BY	T. HAYAKAWA				
				APPROVED BY	Y. SANO				

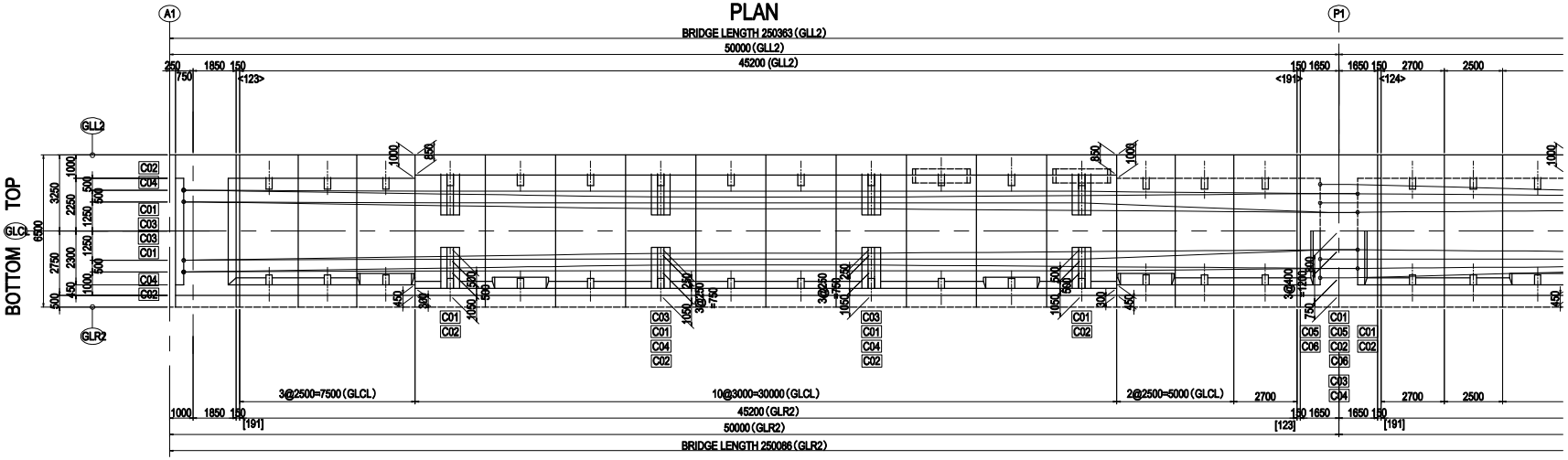
DETAIL OF PRESTERSSING A1-P5 <L> (1) [EXTERNAL TENDON]

S=1:200

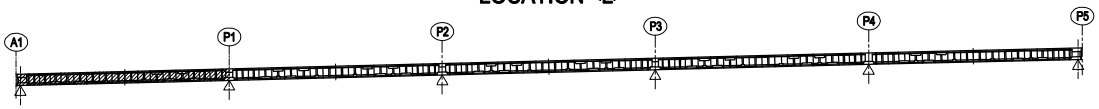
SIDE VIEW



PLAN



LOCATION <L>



Notes
-Values in < > / [ ] are at the top/bottom of the girder accordingly.
-Reinforcement for tendon anchorage such as grid rebar shall be arranged sufficiently.
-Jacking force = 1250 N/mm2
-A:Tension
-B:Fixed

PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.	DRAWING TITLE: DETAIL OF PRESTRESSING A1-P5 <L> (1) [EXTERNAL TENDON]	PACKAGE: 1

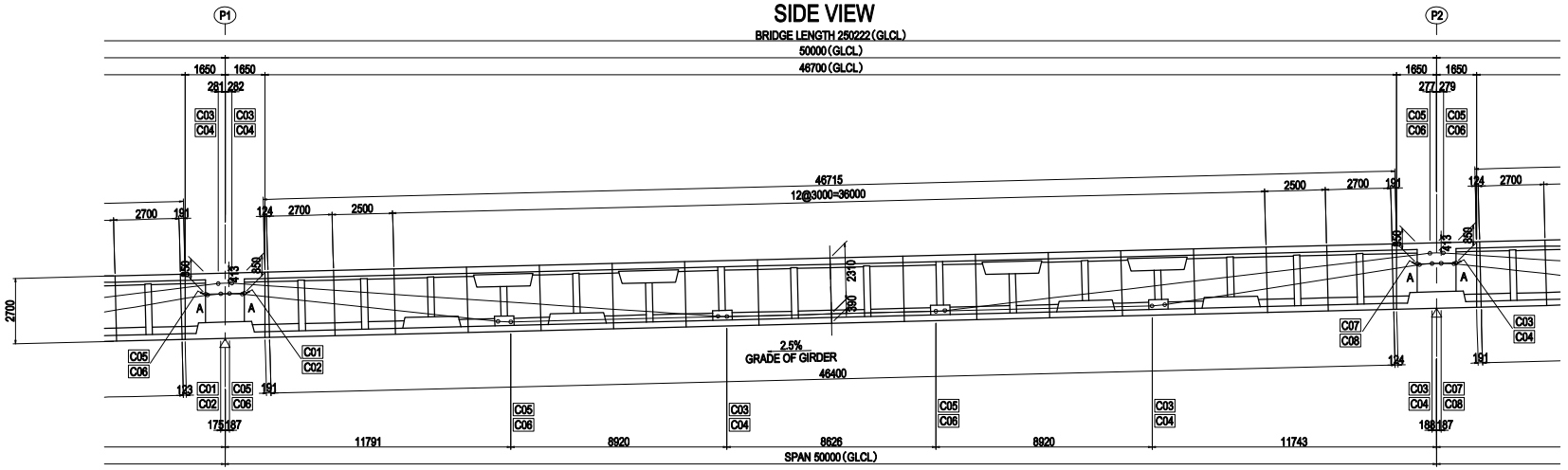
	NAME	SIGNATURE	DATE
PREPARED BY	M. OHYAMA		15 Jun.2017
CHECKED BY	T. HAYAKAWA		20 Jun.2017
APPROVED BY	Y. SANO		21 Jun.2017

DWG No. P1-PB-1101

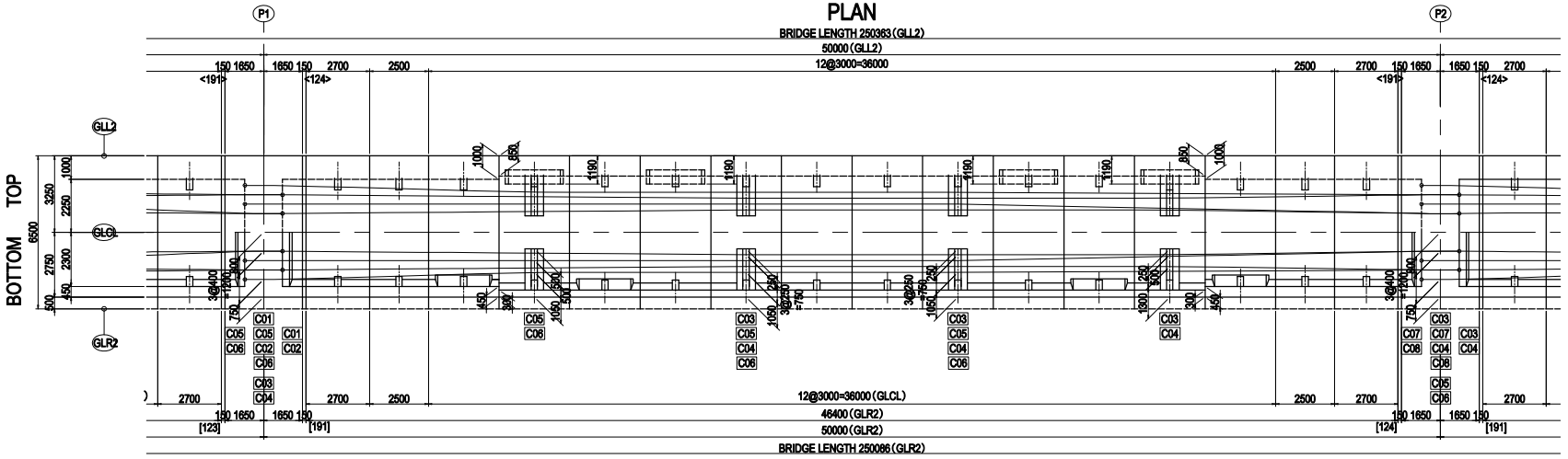
DETAIL OF PRESTERSSING A1-P5 <L> (2) [EXTERNAL TENDON]

S=1:200

SIDE VIEW

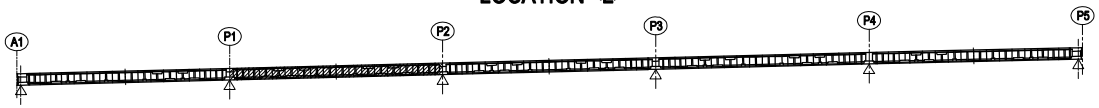


PLAN



Notes : Values in < >/[ ] are at the top/bottom of the girder accordingly.

LOCATION <L>



Notes
-Values in < > / [ ] are at the top/bottom of the girder accordingly.
-Reinforcement for tendon anchorage such as grid rebar shall be arranged sufficiently.
-Jacking force = 1250 N/mm2
-A:Tension
-B:Fixed

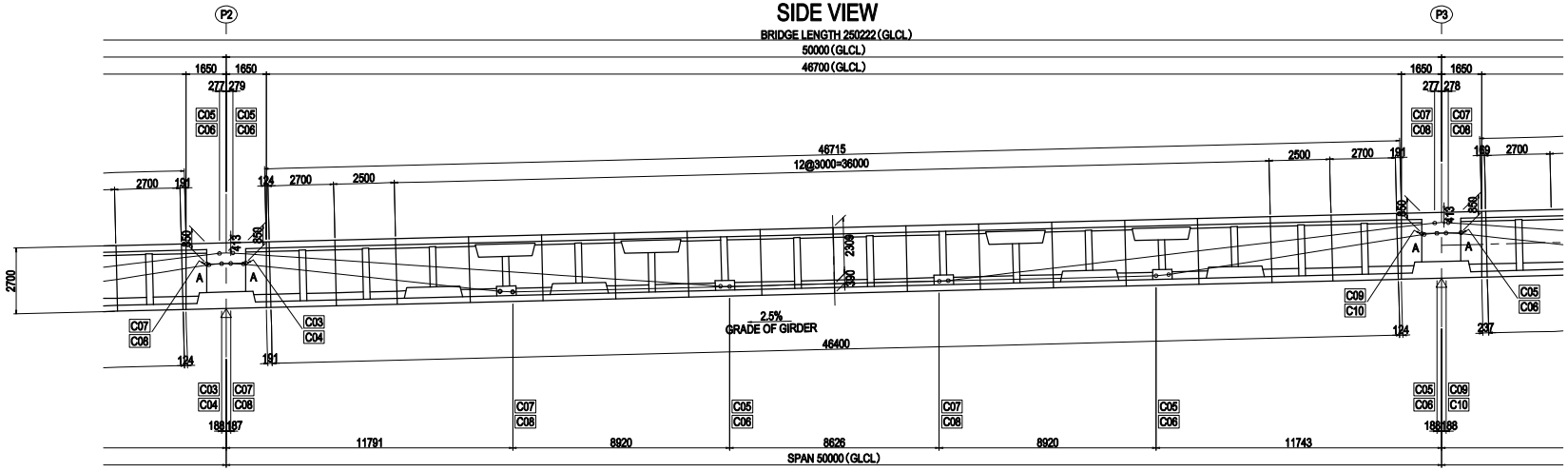
PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.		
				PREPARED BY: M. OHYAMA	15 Jun.2017
				CHECKED BY: T. HAYAKAWA	20 Jun.2017
				APPROVED BY: Y. SANO	21 Jun.2017

NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
			DETAIL OF PRESTRESSINGA1-P5 <L> (2) [EXTERNAL TENDON]	1
				DWG No.
				P1-PB-1102

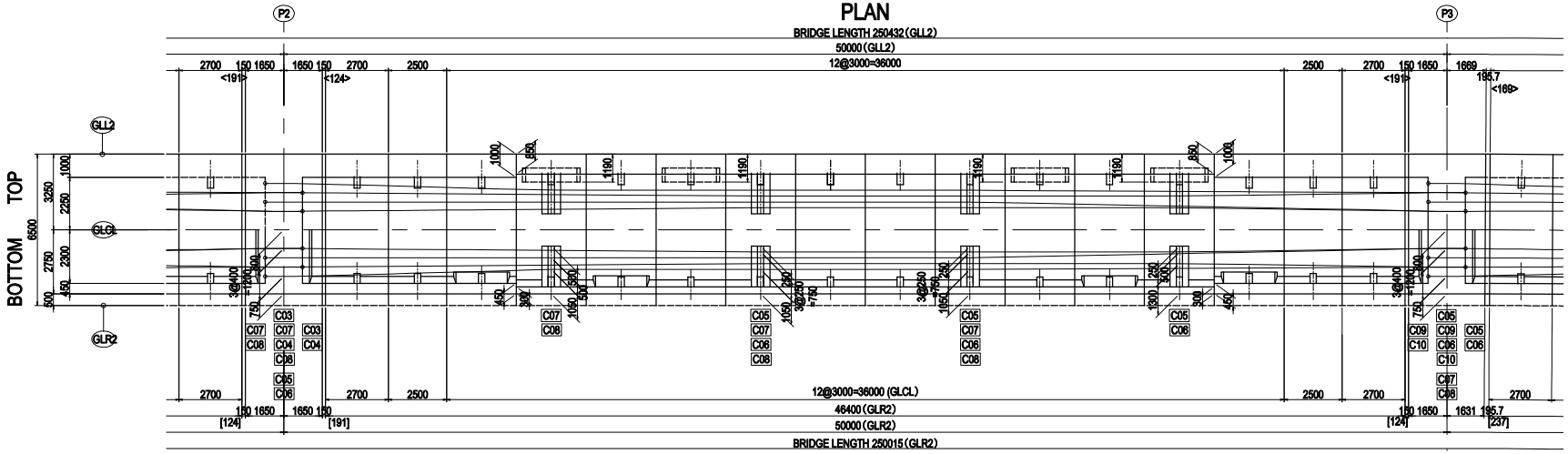
DETAIL OF PRESTERSSING A1-P5 <L> (3) [EXTERNAL TENDON]

S=1:200

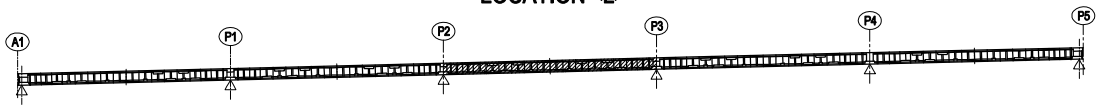
SIDE VIEW



PLAN



LOCATION <L>



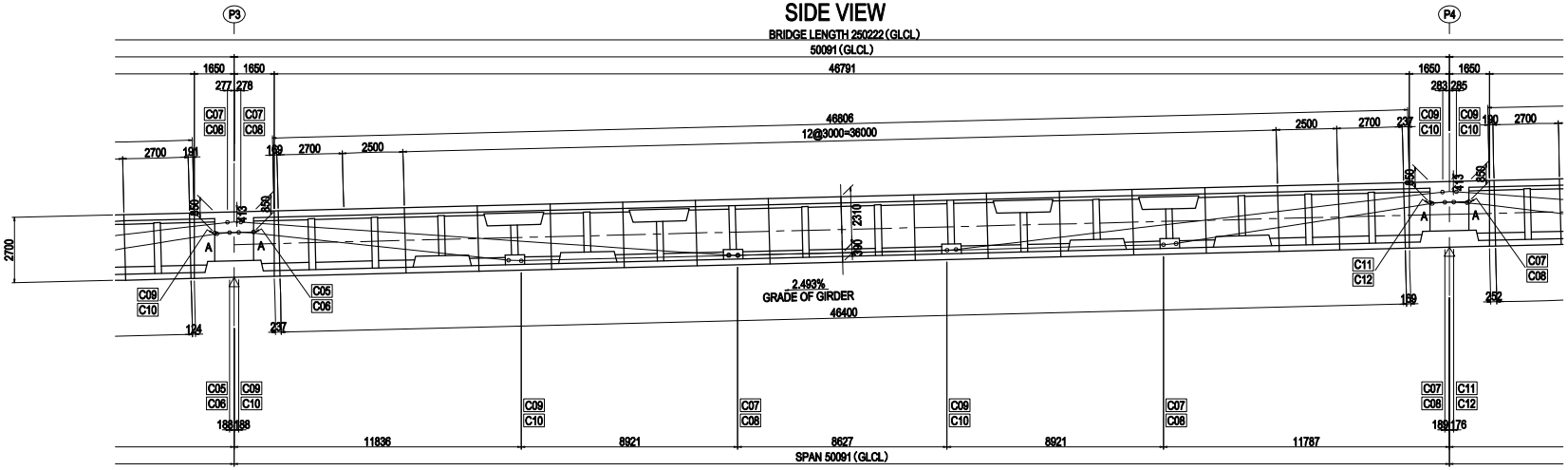
Notes
-Values in < > / [ ] are at the top/bottom of the girder accordingly.
-Reinforcement for tendon anchorage such as grid rebar shall be arranged sufficiently.
-Jacking force = 1250 N/mm2
-A:Tension
-B:Fixed

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	M. OHYAMA		15 Jun.2017	DETAIL OF PRESTRESSING A1-P5 <L> (3) EXTERNAL TENDON	1
				CHECKED BY	T. HAYAKAWA		20 Jun.2017		DWG No.
				APPROVED BY	Y. SANO		21 Jun.2017		P1-PB-1103

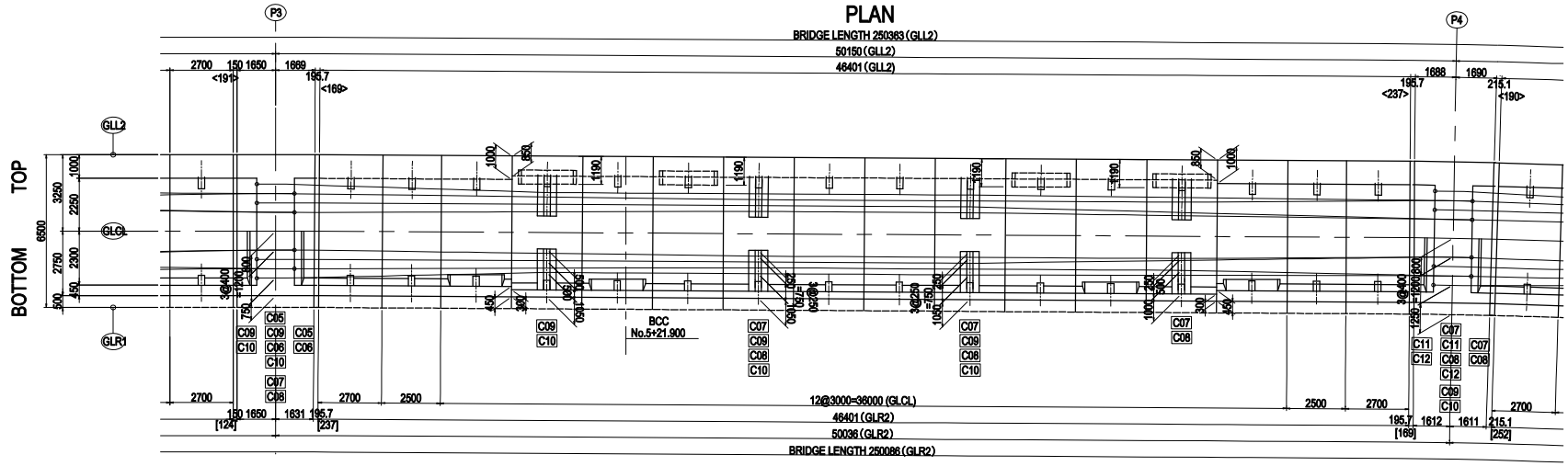
DETAIL OF PRESTERSSING A1-P5 <L> (4) [EXTERNAL TENDON]

S=1:200

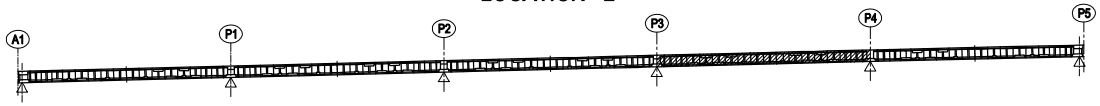
SIDE VIEW



PLAN



LOCATION <L>



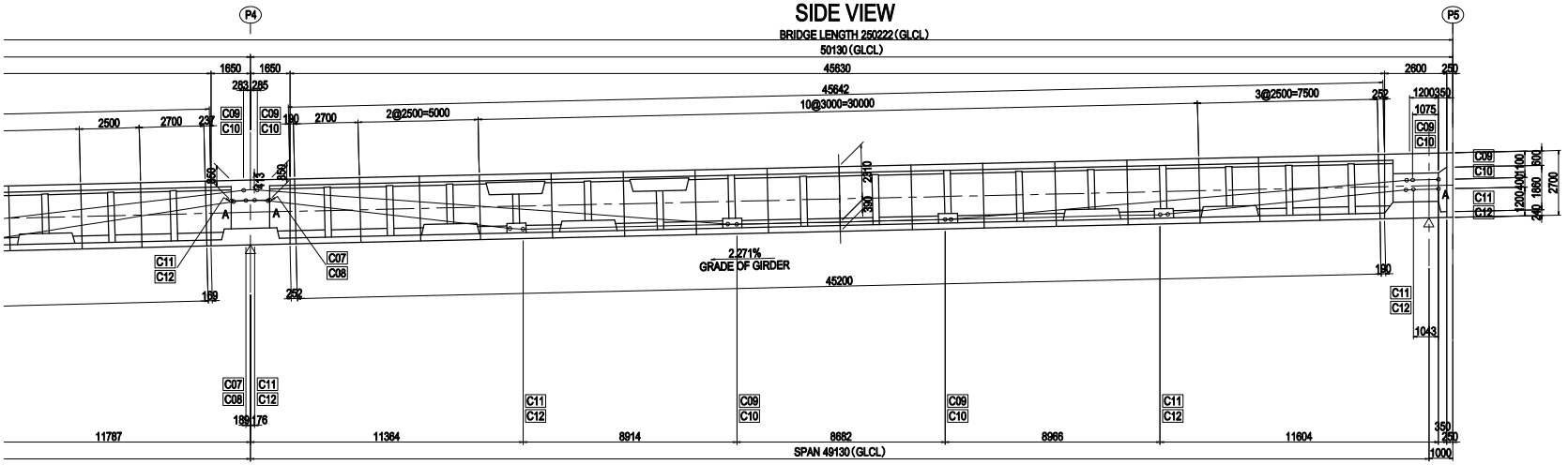
Notes
-Values in < > / [ ] are at the top/bottom of the girder accordingly.
-Reinforcement for tendon anchorage such as grid rebar shall be arranged sufficiently.
-Jacking force = 1250 N/mm2
-A:Tension
-B:Fixed

PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: 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	M. OHYAMA / 15 Jun.2017	DETAIL OF PRESTRESSING A1-P5 <L> (4) [EXTERNAL TENDON] / 1
			CHECKED BY	T. HAYAKAWA / 20 Jun.2017	DWG No.
			APPROVED BY	Y. SANO / 21 Jun.2017	P1-PB-1104

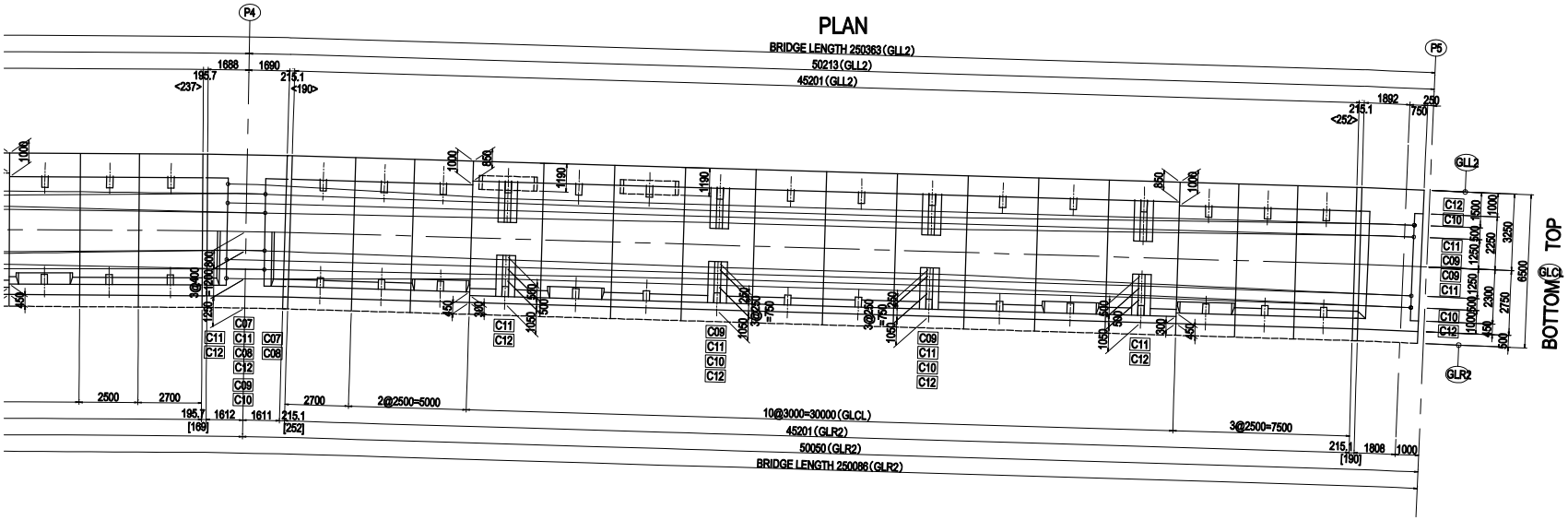
DETAIL OF PRESTERSSING A1-P5 <L> (5) [EXTERNAL TENDON]

S=1:200

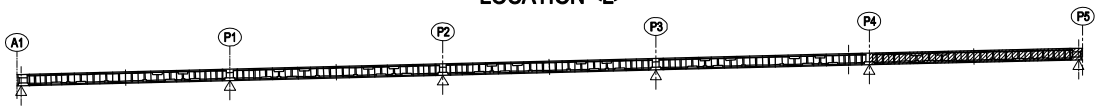
SIDE VIEW



PLAN



LOCATION <L>



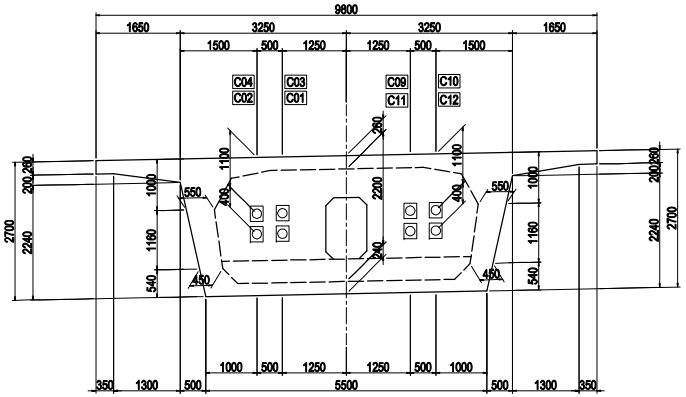
Notes
-Values in < > / [ ] are at the top/bottom of the girder accordingly.
-Reinforcement for tendon anchorage such as grid rebar shall be arranged sufficiently.
-Jacking force = 1250 N/mm2
-A:Tension
-B:Fixed

PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: 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	M. OHYAMA / 15 Jun.2017	DETAIL OF PRESTRESSING A1-P5 <L> (5) [EXTERNAL TENDON]
			CHECKED BY	T. HAYAKAWA / 20 Jun.2017	PACKAGE: 1
			APPROVED BY	Y. SANO / 21 Jun.2017	DWG No.: P1-PB-1105

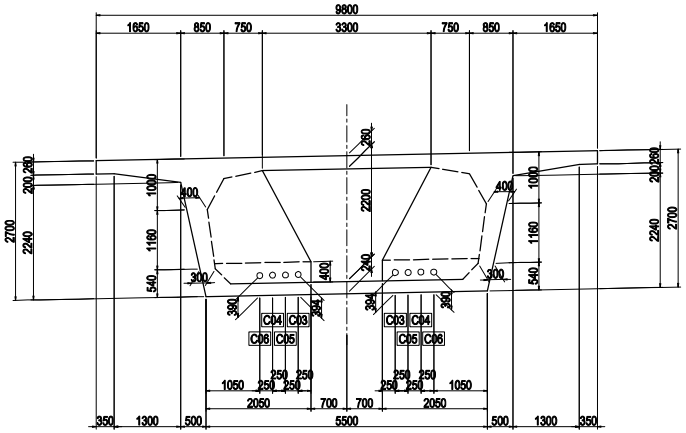
DETAIL OF PRESTRESSING A1-P5 <L> (6) [EXTERNAL TENDON] S=1:100

CROSS SECTIONS

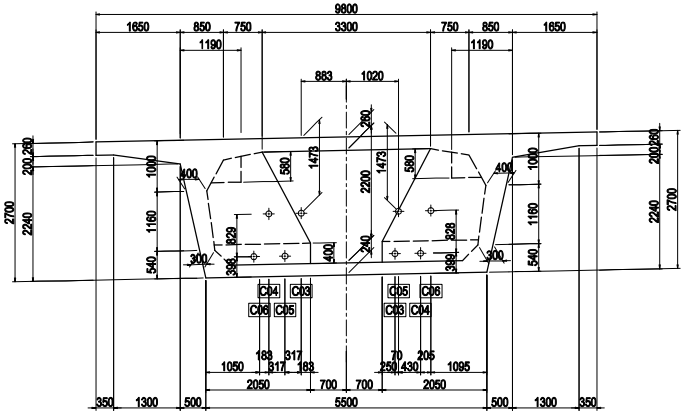
1 - 1 8 - 8



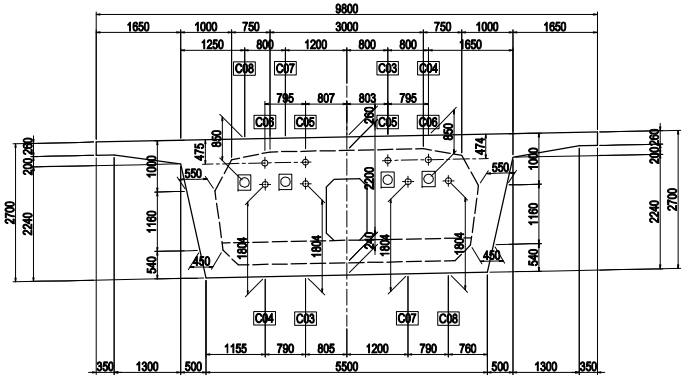
3 - 3 4 - 4



2 - 2 5 - 5

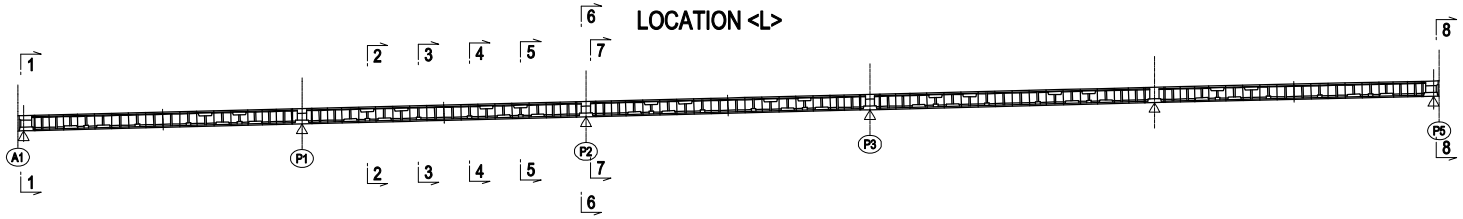


6 - 6 7 - 7



NOTES: In case of the deviator interferes the cable, a hole or notch for cable passing is should be arranged in the deviator, and the hole and notch should be reinforced properly.

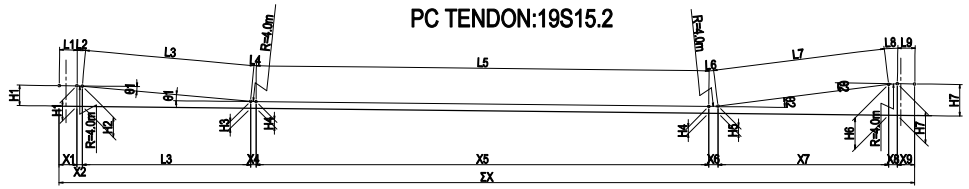
LOCATION <L>



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	M. OHYAMA		15 Jun.2017	DETAIL OF PRESTRESSING A1-P5 <L> (6) [EXTERNAL TENDON]	1
				CHECKED BY	T. HAYAKAWA		20 Jun.2017		DWG No.
				APPROVED BY	Y. SANO		21 Jun.2017		P1-PB-1108

DETAIL OF PRESTRESSING A1-P5 <L> (7) [EXTERNAL TENDON] S=1:300

PC TENDON:19S15.2



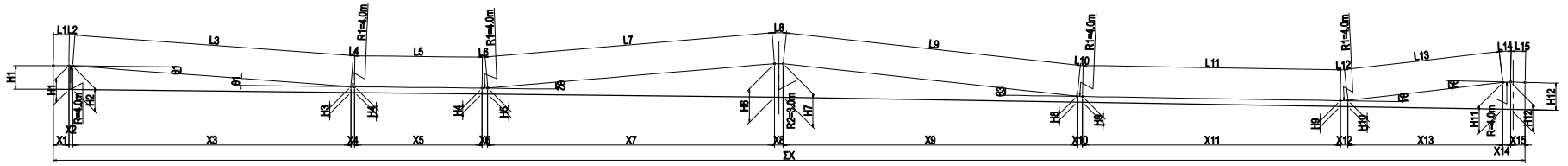
PC TENDON:19S15.2 (mm)

CABLE NUMBER	H1	H2	H3	H4	H5	H6	H7	X1	X2	X3	X4	X5	X6	X7	X8	X9	ΣX
C01	1200	1187	403	390	428	1812	1850	1042	317	9912	316	26558	546	9988	546	975	50200
C02	1200	1187	403	390	428	1812	1850	1042	317	9912	316	26558	546	9988	546	975	50200
C11	1850	1813	427	390	402	1188	1200	1042	314	9934	314	26562	546	10096	546	976	50330
C12	1850	1813	427	390	402	1188	1200	1042	314	9934	314	26562	546	10096	546	976	50330

(mm)

CABLE NUMBER	θ1	θ2	R	L1	L2	L3	L4	L5	L6	L7	L8	L9	TOTAL LENGTH	NUMBER
C01	4.53417°	7.86194°	4000	1042	317	9926	317	26567	549	10121	549	976	50364	2
C02	4.53417°	7.86194°	4000	1042	317	9926	317	26567	549	10121	549	976	50364	2
C11	4.50944°	7.83306°	4000	1043	315	9985	315	26569	547	10162	547	977	50460	2
C12	4.50944°	7.83306°	4000	1043	315	9985	315	26569	547	10162	547	977	50460	2

PC TENDON:19S15.2



PC TENDON:19S15.2 (mm)

CABLE NUMBER	H1	H2	H3	H4	H5	H6	H7	H8	H9	H10	H11	H12	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	ΣX
C03	1600	1592	398	390	408	2273	2274	407	390	424	1816	1850	1074	252	18974	252	8681	379	19508	563	20058	371	17546	522	10511	522	987	100200
C04	1600	1592	398	390	408	2273	2274	407	390	424	1816	1850	1074	252	18974	252	8681	379	19508	563	20058	371	17546	522	10511	522	987	100200
C05	1850	1816	424	390	407	2274	2274	407	390	424	1816	1850	987	525	10555	525	17546	370	20016	556	20061	371	17546	522	10511	522	987	101600
C06	1850	1816	424	390	407	2274	2274	407	390	424	1816	1850	987	525	10555	525	17546	370	20016	556	20061	371	17546	522	10511	522	987	101600
C07	1850	1816	424	390	407	2274	2274	407	390	424	1816	1850	987	524	10555	525	17546	370	20016	556	20107	371	17547	520	10559	520	988	101691
C08	1850	1816	424	390	407	2274	2274	407	390	424	1816	1850	987	524	10555	525	17546	370	20016	556	20107	371	17547	520	10559	520	988	101691
C09	1850	1816	424	390	407	2274	2273	408	390	398	1592	1600	988	523	10603	522	17547	369	20056	568	19614	379	8682	250	18995	250	1075	100421
C10	1850	1816	424	390	407	2274	2273	408	390	398	1592	1600	988	523	10603	522	17547	369	20056	568	19614	379	8682	250	18995	250	1075	100421

(mm)

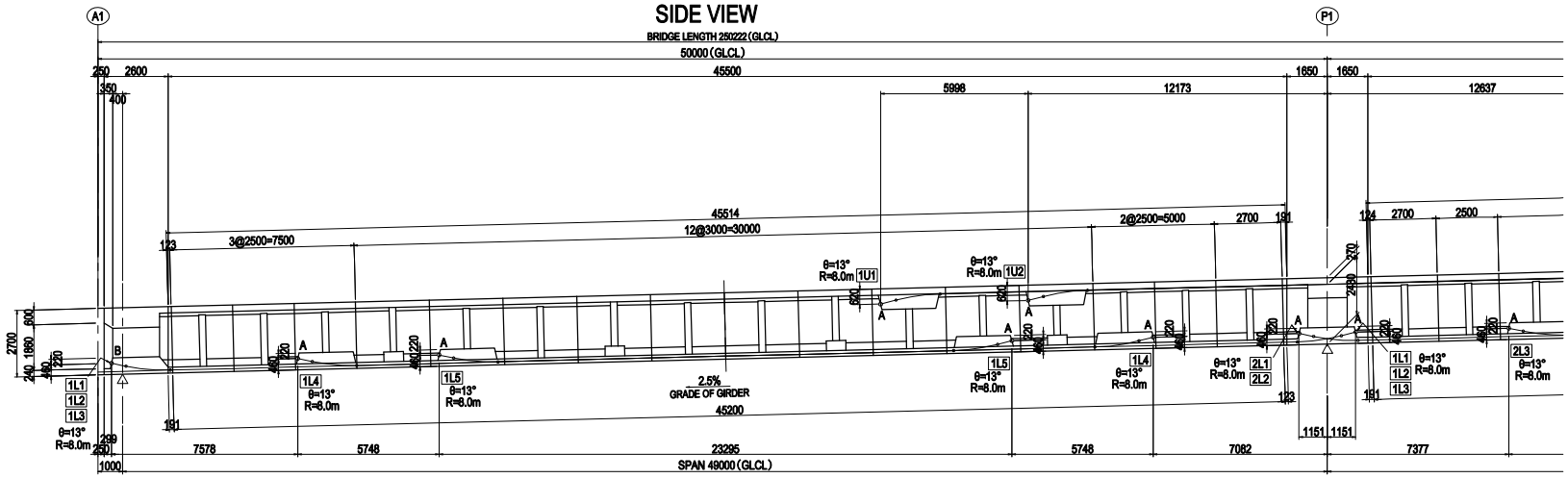
CABLE NUMBER	θ1	θ2	θ3	θ4	R1	R2	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	TOTAL LENGTH	NUMBER
C03	3.60472°	5.443062°	5.325282°	7.51083°	4000	3000	1074	252	18987	252	8684	380	19649	564	20104	372	17551	524	10641	524	988	100546	2
C04	3.60472°	5.443062°	5.325282°	7.51083°	4000	3000	1074	252	18987	252	8684	380	19649	564	20104	372	17551	524	10641	524	988	100546	2
C05	7.5275°	5.31306°	5.325282°	7.51083°	4000	3000	987	525	10615	526	17551	371	20155	557	20108	372	17551	524	10641	524	988	101995	2
C06	7.5275°	5.31306°	5.325282°	7.51083°	4000	3000	987	525	10615	526	17551	371	20155	557	20108	372	17551	524	10641	524	988	101995	2
C07	7.5275°	5.31306°	5.31361°	7.48028°	4000	3000	987	525	10615	526	17551	371	20155	557	20154	371	17553	522	10688	522	989	102086	2
C08	7.5275°	5.31306°	5.31361°	7.48028°	4000	3000	987	525	10615	526	17551	371	20155	557	20154	371	17553	522	10688	522	989	102086	2
C09	7.49694°	5.30139°	5.44028°	3.59083°	4000	3000	988	523	10662	523	17553	370	20195	569	19665	380	8685	275	19040	251	1075	100754	2
C10	7.49694°	5.30139°	5.44028°	3.59083°	4000	3000	988	523	10662	523	17553	370	20195	569	19665	380	8685	275	19040	251	1075	100754	2

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	M. OHYAMA		15 Jun.2017	DETAIL OF PRESTRESSING A1-P5 <L> (7) [EXTERNAL TENDON]	1
				CHECKED BY	T. HAYAKAWA		20 Jun.2017		DWG No.
				APPROVED BY	Y. SANO		21 Jun.2017		P1-PB-1107

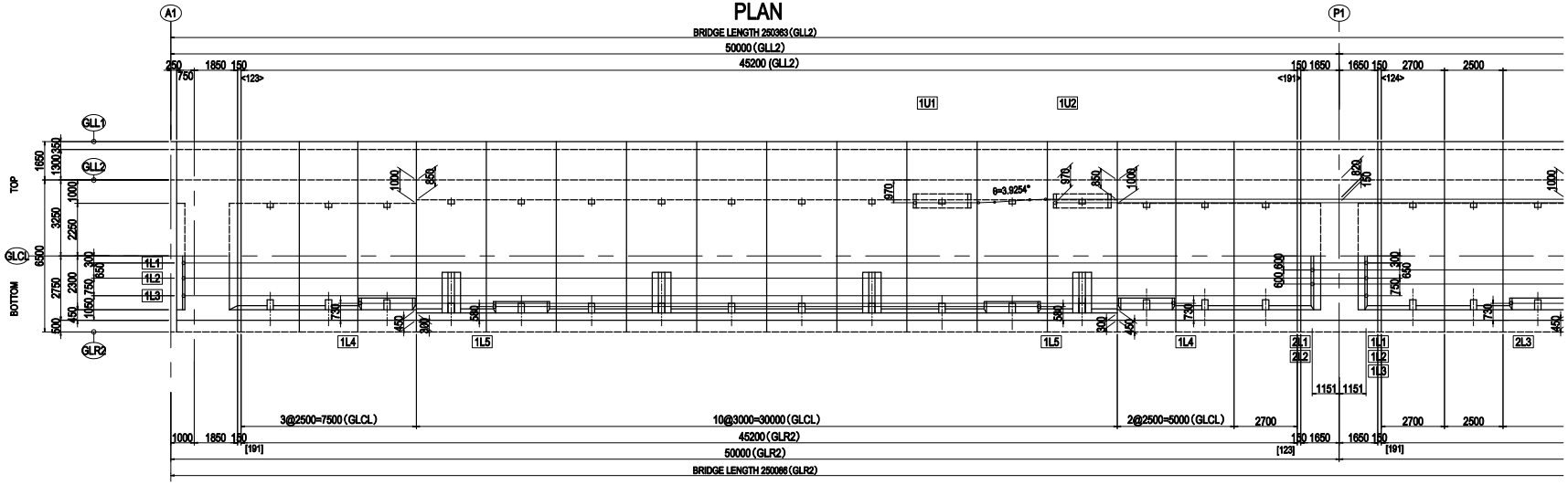
DETAIL OF PRESTRESSING A1-P5 <L> (8) [INTERNAL TENDON]

S=1:200

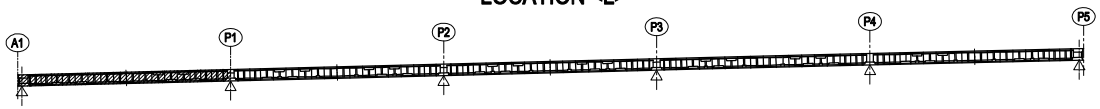
SIDE VIEW



PLAN



LOCATION <L>



Notes
-Values in < > / [ ] are at the top/bottom of the girder accordingly.
-Reinforcement for tendon anchorage such as grid rebar shall be arranged sufficiently.
-Bending radius of PC tendon in Plan is 10m.
-Jacking force = 1350 N/mm2
-A:Tension
-B:Fixed

PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.	DRAWING TITLE: DETAIL OF PRESTRESSING A1-P5 <L> (8) [INTERNAL TENDON]	PACKAGE: 1

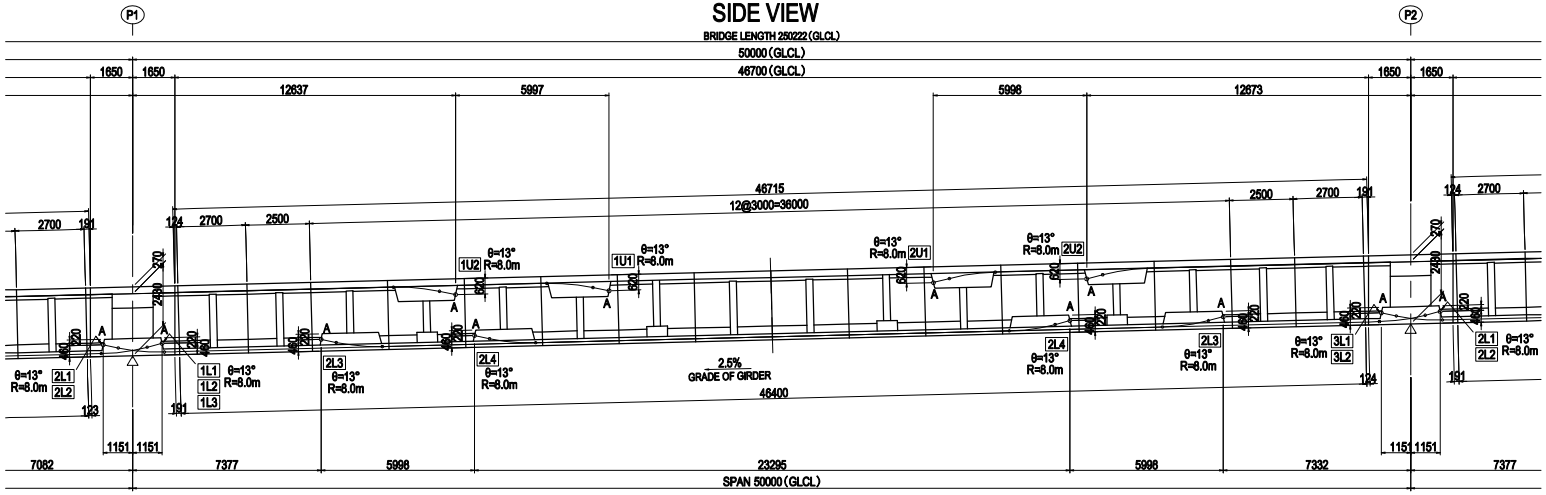
	NAME	SIGNATURE	DATE
PREPARED BY	M. OHYAMA		15 Jun.2017
CHECKED BY	T. HAYAKAWA		20 Jun.2017
APPROVED BY	Y. SANO		21 Jun.2017

DWG No. P1-PB-1108

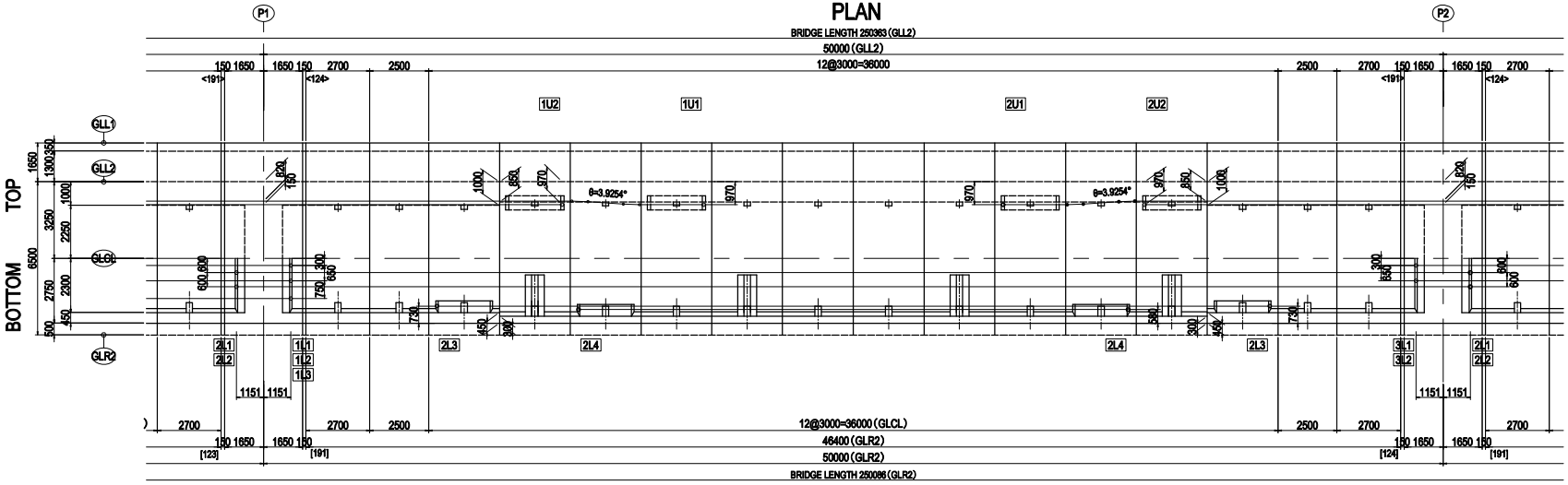
DETAIL OF PRESTRESSING A1-P5 <L> (9) [INTERNAL TENDON]

S=1:200

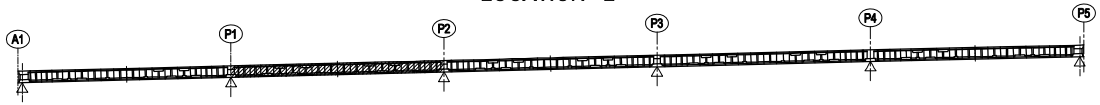
SIDE VIEW



PLAN



LOCATION <L>



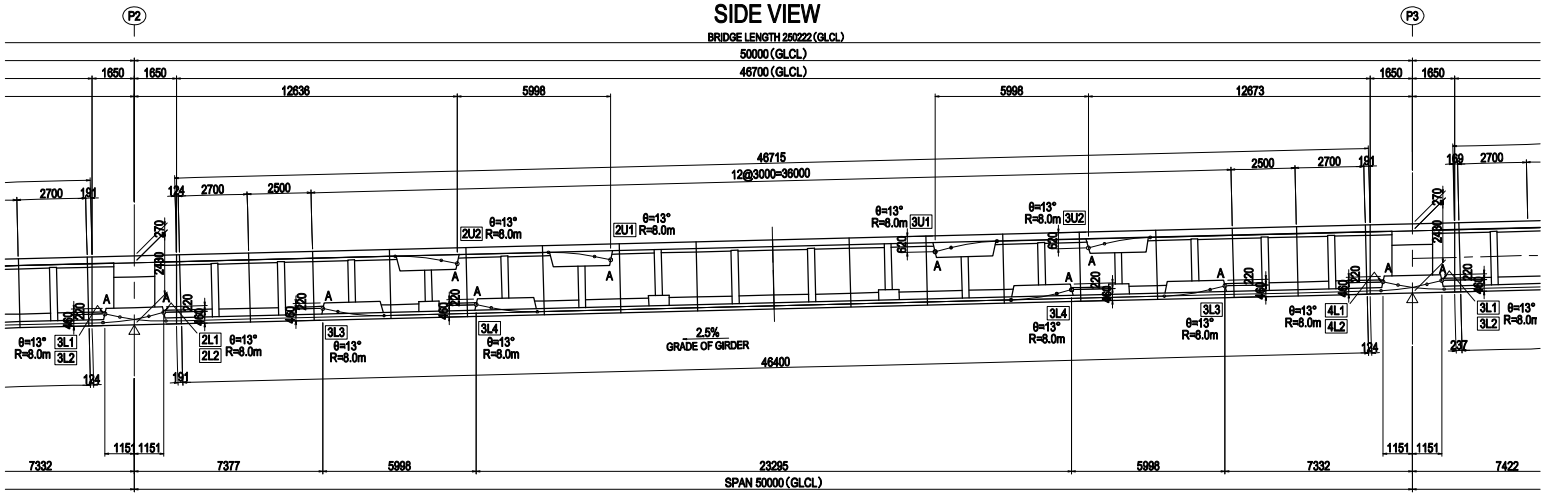
Notes
-Values in < > / [ ] are at the top/bottom of the girder accordingly.
-Reinforcement for tendon anchorage such as grid rebar shall be arranged sufficiently.
-Bending radius of PC tendon in Plan is 10m.
-Jacking force = 1350 N/mm2
-A:Tension
-B:Fixed

PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: 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	M. OHYAMA	15 Jun.2017
			CHECKED BY	T. HAYAKAWA	20 Jun.2017
			APPROVED BY	Y. SANO	21 Jun.2017
					DETAIL OF PRESTRESSING A1-P5 <L> (9) [INTERNAL TENDON]
					PACKAGE: 1
					DWG No.: P1-PB-1109

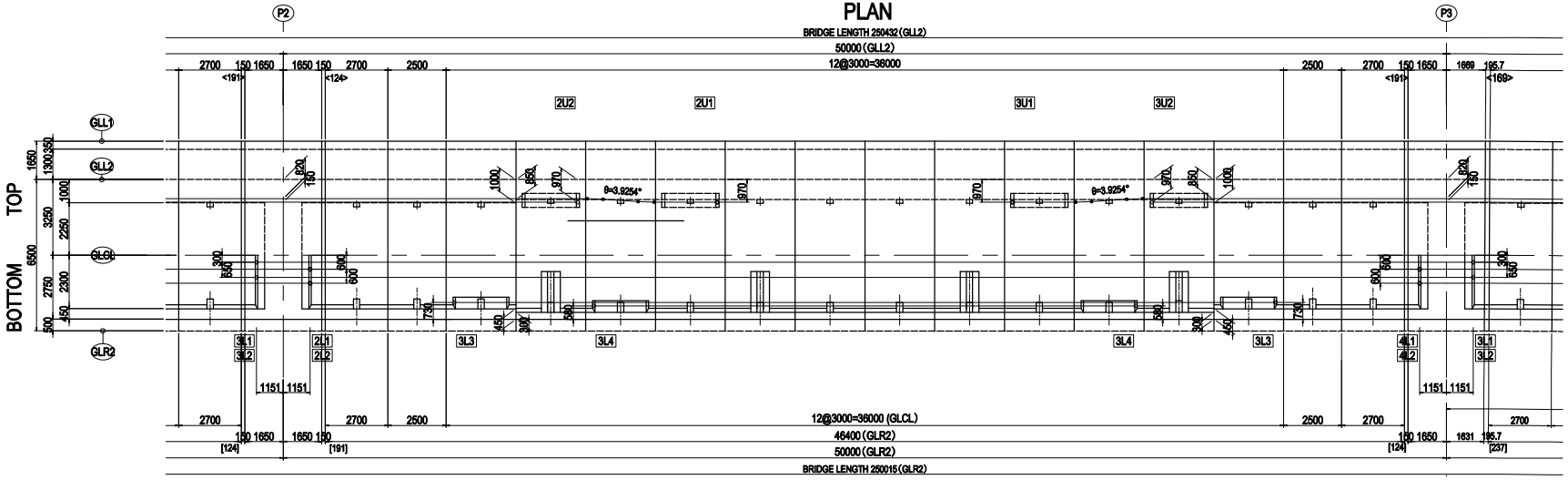
DETAIL OF PRESTRESSING A1-P5 <L> (10) [INTERNAL TENDON]

S=1:200

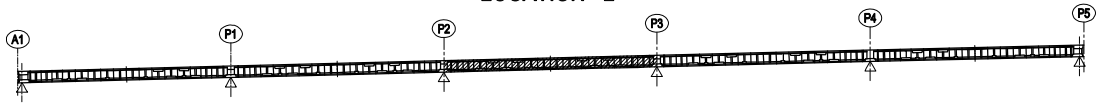
SIDE VIEW



PLAN



LOCATION <L>



Notes
-Values in < > / [ ] are at the top/bottom of the girder accordingly.
-Reinforcement for tendon anchorage such as grid rebar shall be arranged sufficiently.
-Bending radios of PC tendon in Plan is 10m.
-Jacking force = 1350 N/mm2
-A:Tension
-B:Fixed

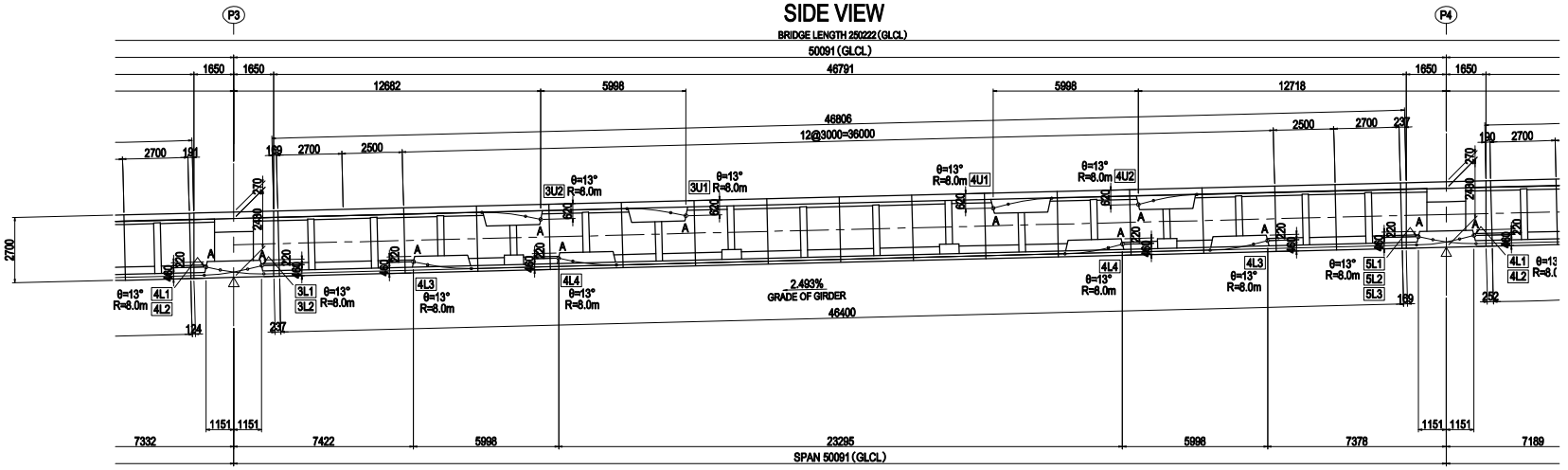
PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.	DRAWING TITLE: DETAIL OF PRESTRESSING A1-P5 <L> (10) [INTERNAL TENDON]	PACKAGE: 1

	NAME	SIGNATURE	DATE
PREPARED BY	M. OHYAMA		15 Jun.2017
CHECKED BY	T. HAYAKAWA		20 Jun.2017
APPROVED BY	Y. SANO		21 Jun.2017

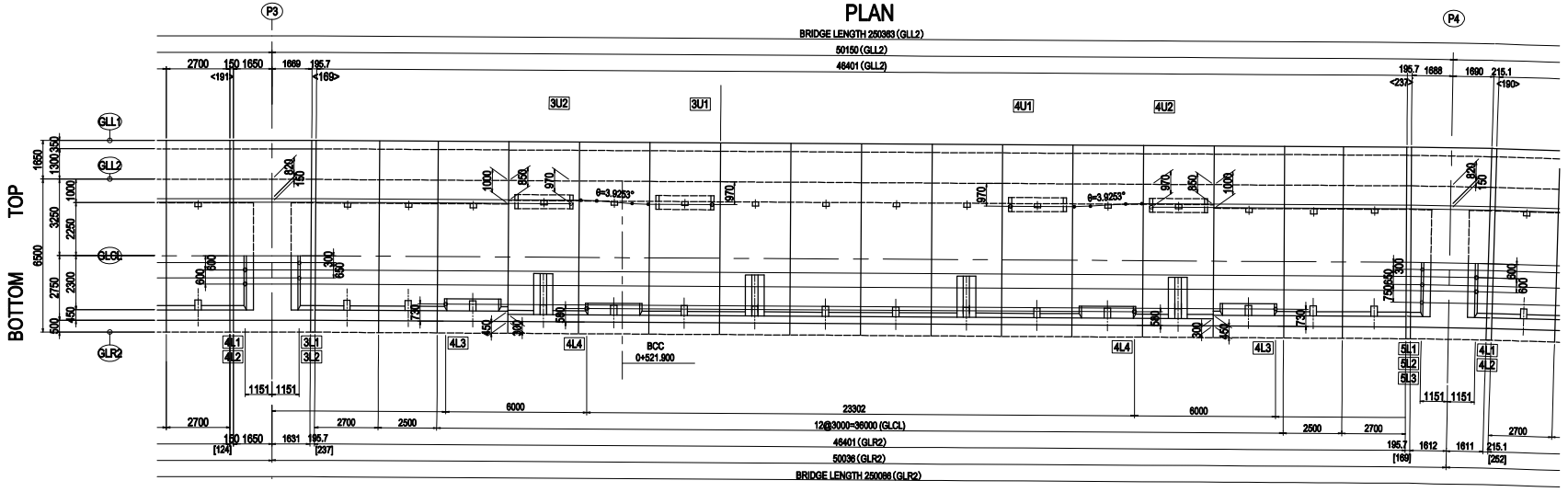
DWG No. P1-PB-1110

DETAIL OF PRESTRESSING A1-P5 <L> (11) [INTERNAL TENDON] S=1:200

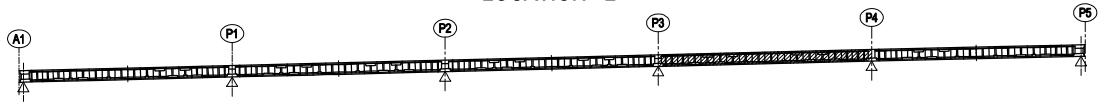
SIDE VIEW



PLAN



LOCATION <L>



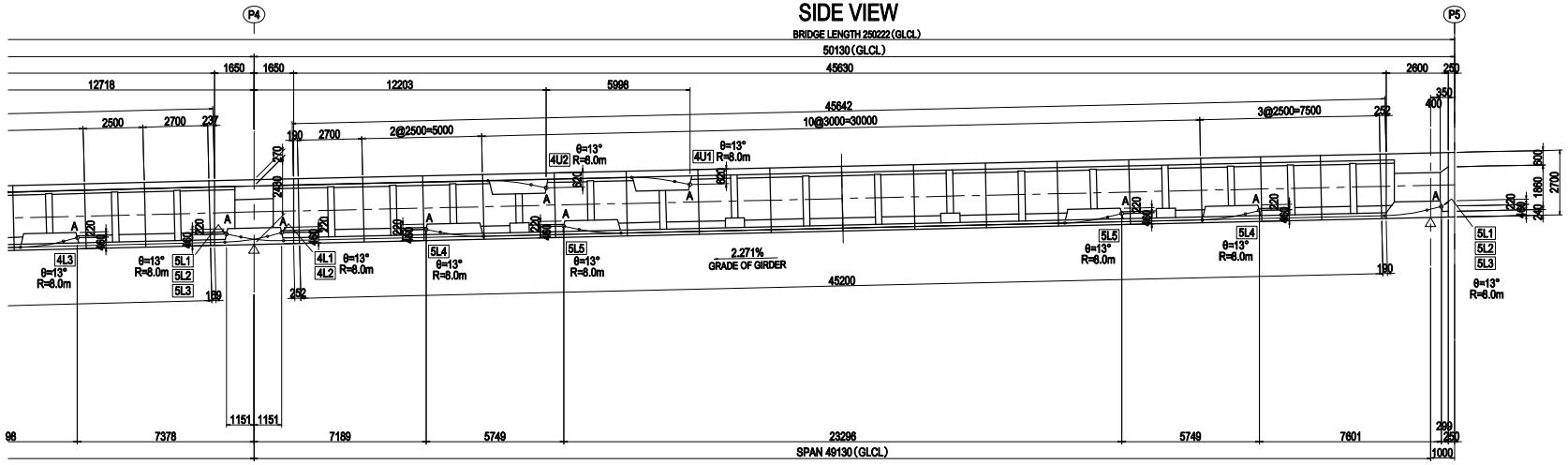
Notes
-Values in < > / [ ] are at the top/bottom of the girder accordingly.
-Reinforcement for tendon anchorage such as grid rebar shall be arranged sufficiently.
-Bending radios of PC tendon in Plan is 10m.
-Jacking force = 1350 N/mm2
-A:Tension
-B:Fixed

PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: 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	M. OHYAMA / 15 Jun.2017	DETAIL OF PRESTRESSING A1-P5 <L> (11) [INTERNAL TENDON]
			CHECKED BY	T. HAYAKAWA / 20 Jun.2017	PACKAGE: 1
			APPROVED BY	Y. SANO / 21 Jun.2017	DWG No.: P1-PB-1111

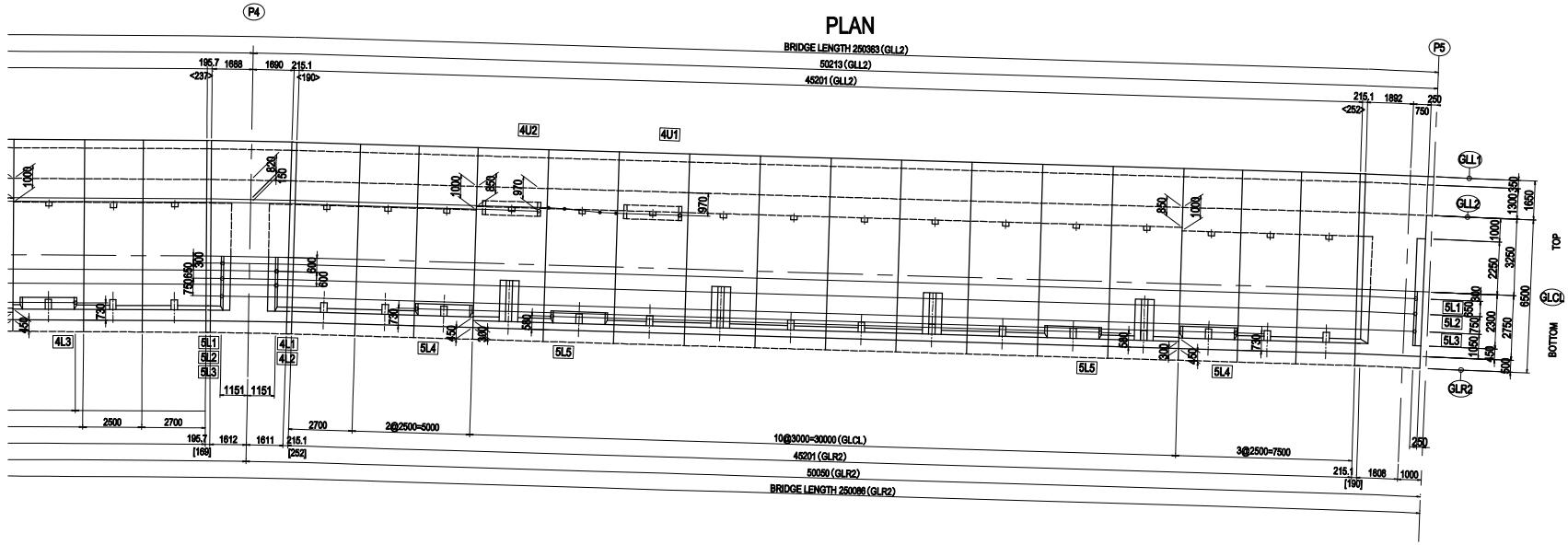
DETAIL OF PRESTRESSING A1-P5 <L> (12) [INTERNAL TENDON]

S=1:200

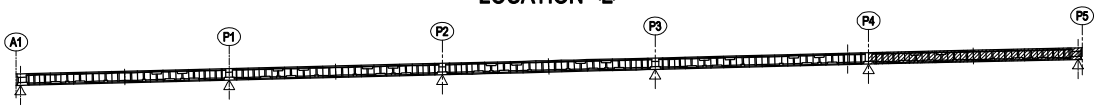
SIDE VIEW



PLAN



LOCATION <L>



Notes
-Values in < > / [ ] are at the top/bottom of the girder accordingly.
-Reinforcement for tendon anchorage such as grid rebar shall be arranged sufficiently.
-Bending radios of PC tendon in Plan is 10m.
-Jacking force = 1350 N/mm2
-A:Tension
-B:Fixed

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

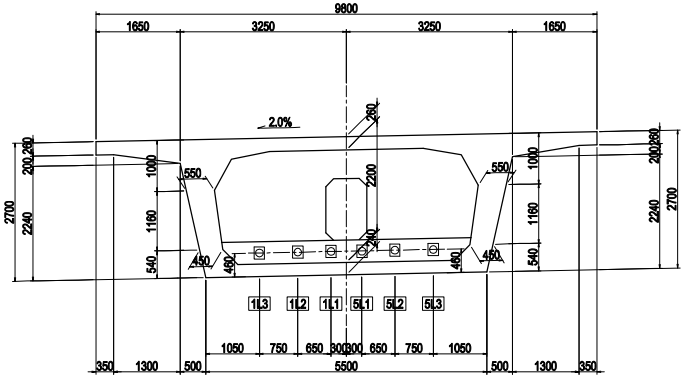
	NAME	SIGNATURE	DATE
PREPARED BY	M. OHYAMA		15 Jun.2017
CHECKED BY	T. HAYAKAWA		20 Jun.2017
APPROVED BY	Y. SANO		21 Jun.2017

DRAWING TITLE	PACKAGE
DETAIL OF PRESTRESSING A1-P5 <L> (12) [INTERNAL TENDON]	1
	DWG No.
	P1-PB-1112

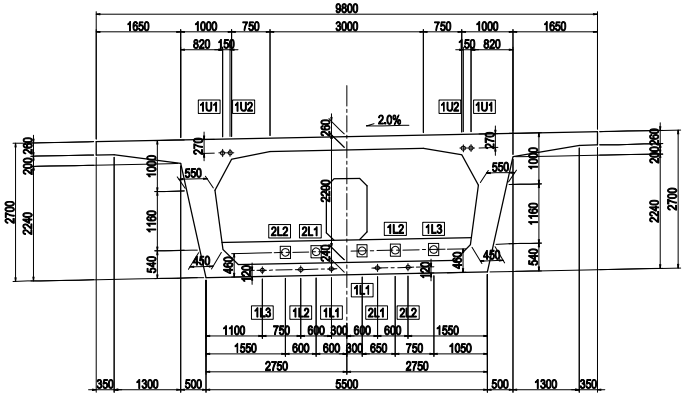
DETAIL OF PRESTERSSING A1-P5 <L> (13) [INTERNAL TENDON] S=1:100

CROSS SECTIONS S=1:100

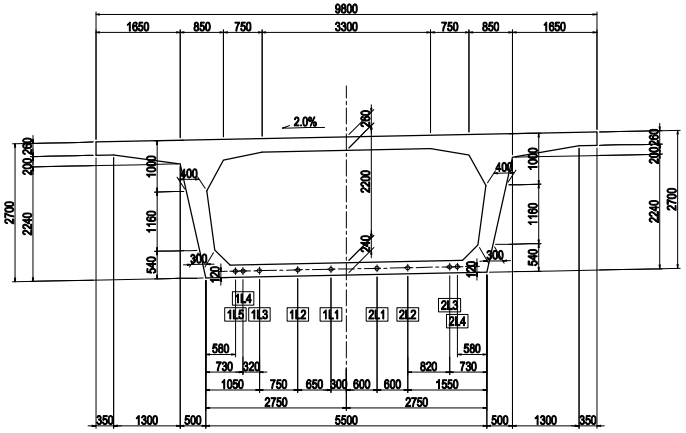
1 - 1 8 - 8



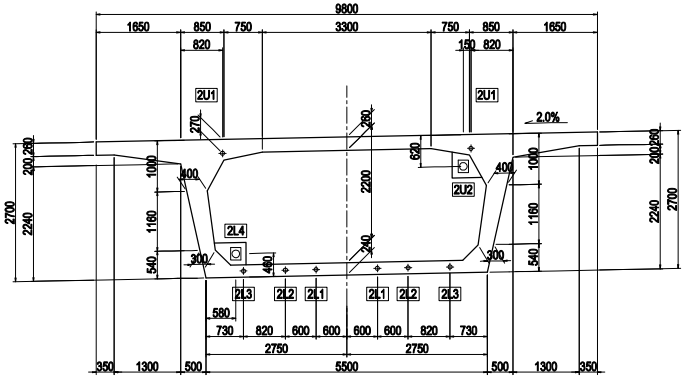
3 - 3 4 - 4



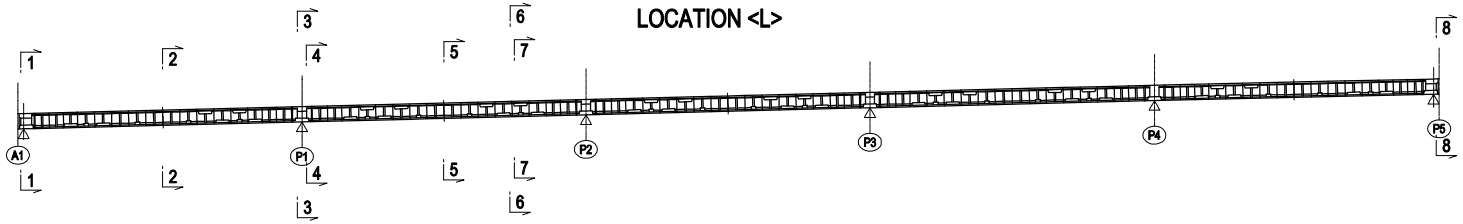
2 - 2 5 - 5



6 - 6 7 - 7



LOCATION <L>



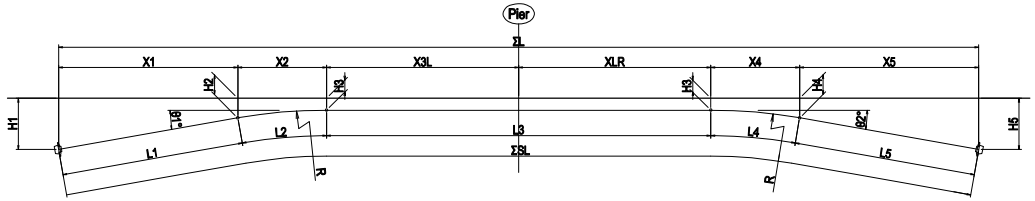
PROJECT NAME	FINANCED BY	COUNTERPART	JICA STUDY TEAM		NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	JAPAN INTERNATIONAL COOPERATION AGENCY	REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.	PREPARED BY	M. OHYAMA		15 Jun.2017	DETAIL OF PRESTRESSING A1-P5 <L> (13) [INTERNAL TENDON]	1
				CHECKED BY	T. HAYAKAWA		20 Jun.2017		DWG No.
				APPROVED BY	Y. SANO		21 Jun.2017		P1-PB-1113

DETAIL OF PRESTRESSING A1-P5 <L> (14) [INTERNAL TENDON]

S=1:100

UPPER SLAB CABLE

PC TENDON:12S15.2

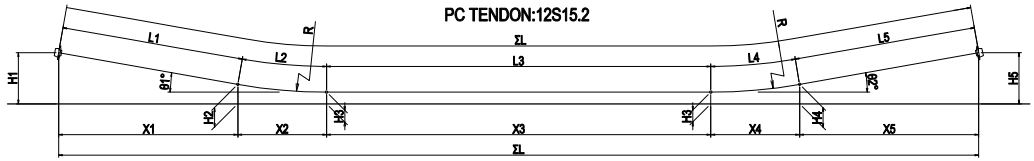


PC TENDON:12S15.2 (mm)

CABLE NUMBER	NUMBER	θ1	θ2	R	H1	H2	H3	H4	H5	X1	X2	X3L	X3R	X4	X5	ΣX	L1	L2	L3	L4	L5	TOTAL LENGTH
1U1	2	13°	13°	8000	620	475	270	475	620	624	1794	15754	16201	1802	631	36806	644	1815	31963	1815	644	36881
1U2	2	13°	13°	8000	620	475	270	475	620	624	1794	9755	10202	1804	631	24810	644	1815	19964	1815	644	24882
2U1	2	13°	13°	8000	620	475	270	475	620	624	1794	16254	16200	1804	631	37306	644	1815	32463	1815	644	37381
2U2	2	13°	13°	8000	620	475	270	475	620	624	1794	10255	10201	1804	631	25304	644	1815	20463	1815	644	25381
3U1	2	13°	13°	8000	620	475	270	475	620	624	1794	16254	16245	1804	631	37351	644	1815	32509	1815	644	37427
3U2	2	13°	13°	8000	620	475	270	475	620	624	1794	10255	10247	1804	631	25355	644	1815	20509	1815	644	25427
4U1	2	13°	13°	8000	620	475	270	475	620	624	1794	16299	15767	1804	631	36917	644	1815	32074	1815	644	36993
4U2	2	13°	13°	8000	620	475	270	475	620	624	1794	10301	9768	1804	631	24921	644	1815	20074	1815	644	24993

LOWER SLAB CABLE

PC TENDON:12S15.2



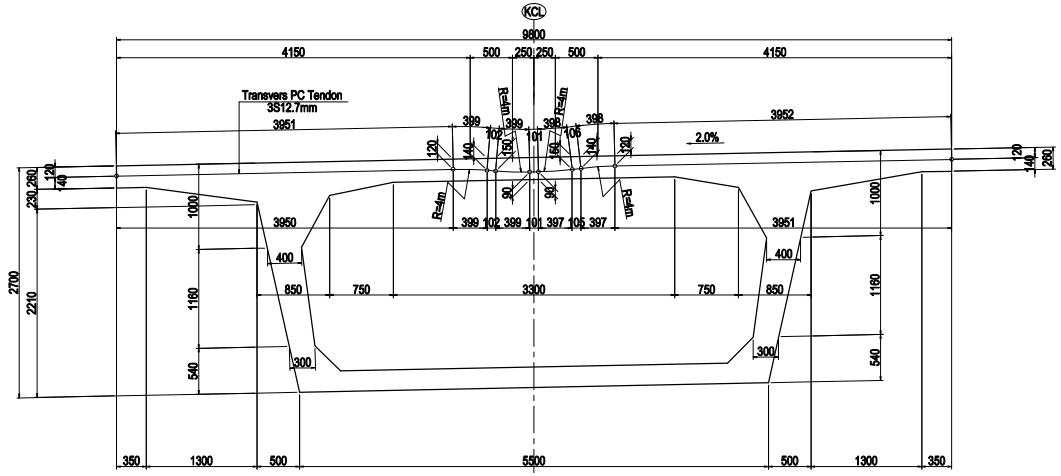
PC TENDON:12S15.2 (mm)

CABLE NUMBER	NUMBER	θ1	θ2	R	H1	H2	H3	H4	H5	X1	X2	X3	X4	X5	ΣX	L1	L2	L3	L4	L5	TOTAL LENGTH
1L1	2	13°	13°	8000	460	325	120	325	460	588	1804	45836	1793	581	50602	600	1815	45850	1815	600	50680
1L2	2	13°	13°	8000	460	325	120	325	460	588	1804	45836	1793	581	50602	600	1815	45850	1815	600	50680
1L3	2	13°	13°	8000	460	325	120	325	460	588	1804	45836	1793	581	50602	600	1815	45850	1815	600	50680
1L4	2	13°	13°	8000	460	325	120	325	460	587	1804	30025	1794	581	34864	599	1815	30035	1815	599	34864
1L5	2	13°	13°	8000	460	325	120	325	460	587	1804	18529	1794	581	23295	599	1815	18535	1815	599	23364
2L1	2	13°	13°	8000	460	325	120	325	460	588	1804	47536	1793	581	52302	600	1815	47551	1815	600	52381
2L2	2	13°	13°	8000	460	325	120	325	460	588	1804	47536	1793	581	52302	600	1815	47551	1815	600	52381
2L3	2	13°	13°	8000	460	325	120	325	460	587	1804	30525	1794	581	35291	599	1815	30535	1815	599	35364
2L4	2	13°	13°	8000	460	325	120	325	460	587	1804	18529	1794	581	23295	599	1815	18535	1815	599	23364
3L1	2	13°	13°	8000	460	325	120	325	460	588	1804	47536	1793	581	52302	600	1815	47551	1815	600	52381
3L2	2	13°	13°	8000	460	325	120	325	460	588	1804	47536	1793	581	52302	600	1815	47551	1815	600	52381
3L3	2	13°	13°	8000	460	325	120	325	460	587	1804	30525	1794	581	35291	599	1815	30535	1815	599	35364
3L4	2	13°	13°	8000	460	325	120	325	460	587	1804	18529	1794	581	23295	599	1815	18535	1815	599	23364
4L1	2	13°	13°	8000	460	325	120	322	460	588	1803	47633	1777	593	52393	600	1814	47648	1797	612	52471
4L2	2	13°	13°	8000	460	325	120	322	460	588	1803	47633	1777	593	52393	600	1814	47648	1797	612	52471
4L3	2	13°	13°	8000	460	325	120	325	460	587	1804	30525	1794	581	35291	599	1815	30535	1815	599	35364
4L4	2	13°	13°	8000	460	325	120	325	460	587	1804	18529	1794	581	23295	599	1815	18535	1815	599	23364
5L1	2	13°	13°	8000	460	322	120	325	460	599	1786	45971	1794	581	50732	612	1797	45983	1815	600	50807
5L2	2	13°	13°	8000	460	322	120	325	460	599	1786	45971	1794	581	50732	612	1797	45983	1815	600	50807
5L3	2	13°	13°	8000	460	322	120	325	460	599	1786	45971	1794	581	50732	612	1797	45983	1815	600	50807
5L4	2	13°	13°	8000	460	325	120	325	460	587	1804	30027	1794	581	34793	600	1815	30034	1815	600	34864
5L5	2	13°	13°	8000	460	325	120	325	460	587	1804	18530	1794	581	23296	600	1815	18534	1815	600	23364

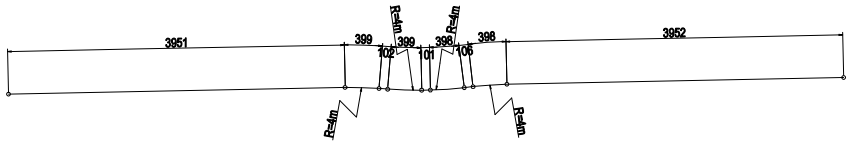
PROJECT NAME	FINANCED BY	COUNTERPART	JICA STUDY TEAM		NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	JAPAN INTERNATIONAL COOPERATION AGENCY	REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.	PREPARED BY	M. OHYAMA		15 Jun.2017	DETAIL OF PRESTRESSING A1-P5 <L> (14) [INTERNAL TENDON]	1
				CHECKED BY	T. HAYAKAWA		20 Jun.2017		DWG No.
				APPROVED BY	Y. SANO		21 Jun.2017		P1-PB-1114

DETAIL OF PRESTRESSING A1-P5 <L> (15) [SLAB]

CROSS SECTIONS S=1:60



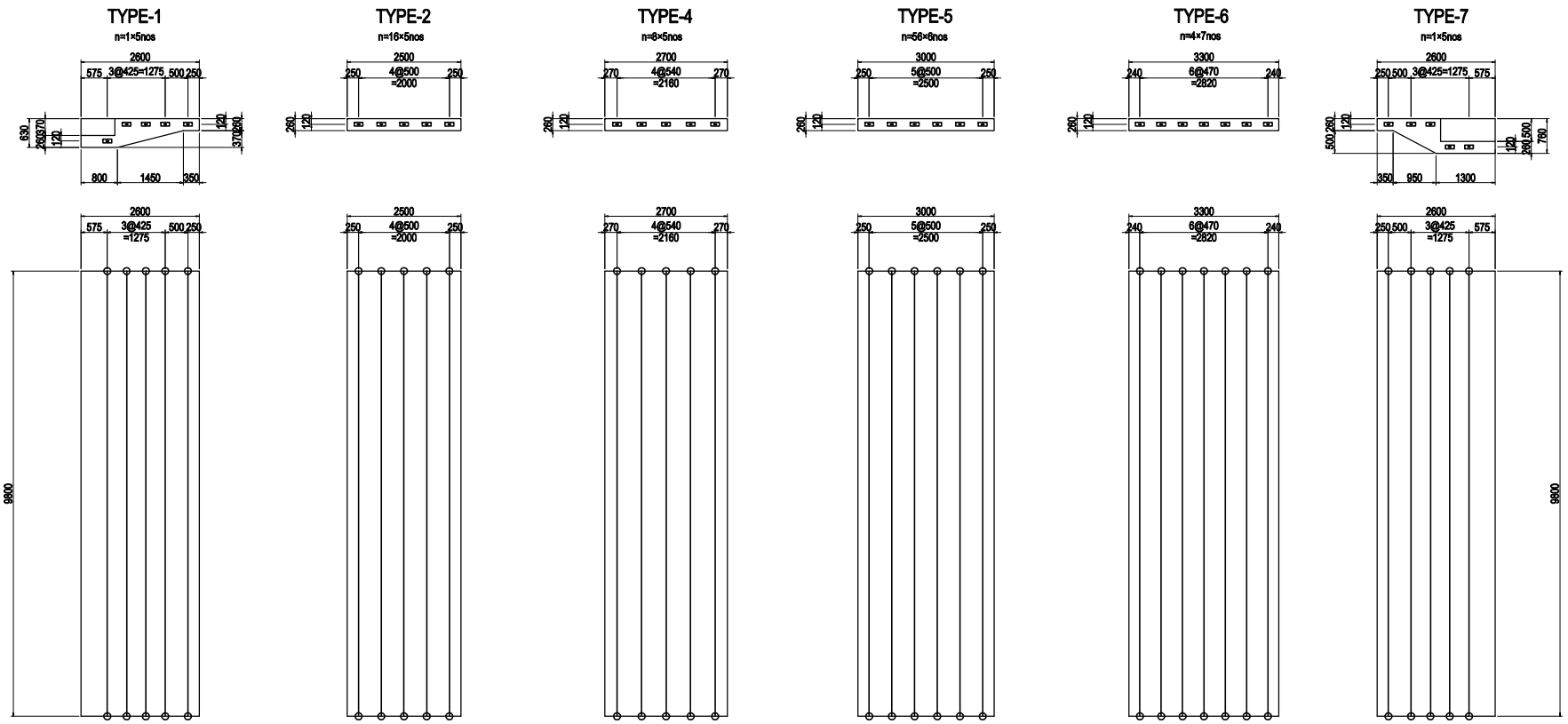
TRANSVERSAL CABLE



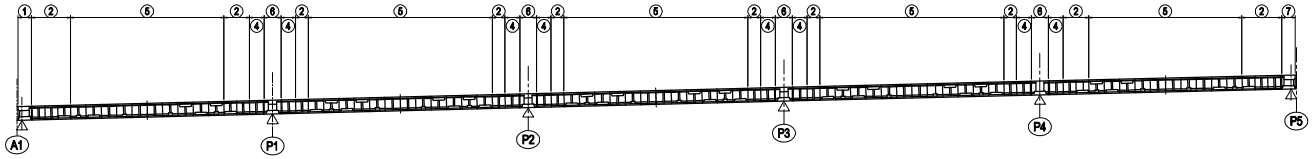
(S1) 3S12.7 L=9806mm
n=494 nos

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	M. OHYAMA		15 Jun.2017	DETAIL OF PRESTRESSING A1-P5 <L> (15) [SLAB]	1
				CHECKED BY	T. HAYAKAWA		20 Jun.2017		DWG No.
				APPROVED BY	Y. SANO		21 Jun.2017		P1-PB-1115

DETAIL OF PRESTRESSING A1-P5 <L> (16) [SLAB] S=1:100



LOCATION <L>



Notes
-Alternating tension from one side.
-Reinforcement for tendon anchorage such as grid rebar shall be arranged sufficiently.
-Jacking force = 1300N/mm2

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.

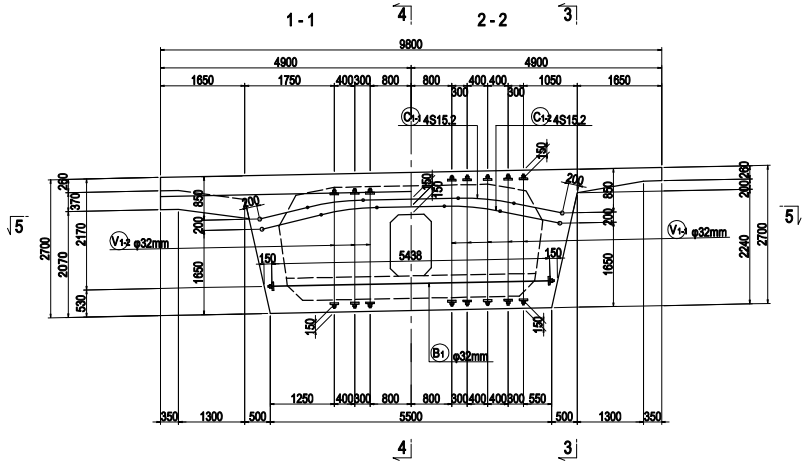
	NAME	SIGNATURE	DATE
PREPARED BY	M. OHYAMA		15 Jun.2017
CHECKED BY	T. HAYAKAWA		20 Jun.2017
APPROVED BY	Y. SANO		21 Jun.2017

DRAWING TITLE	PACKAGE
DETAIL OF PRESTRESSING A1-P5 <L> (16) [SLAB]	1
	DWG No.
	P1-PB-1116

DETAIL OF PRESTRESSING A1-P5 <L> (17) [END CROSSBEAM]

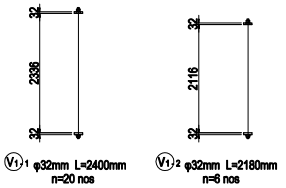
S=1:100

CROSS SECTIONS

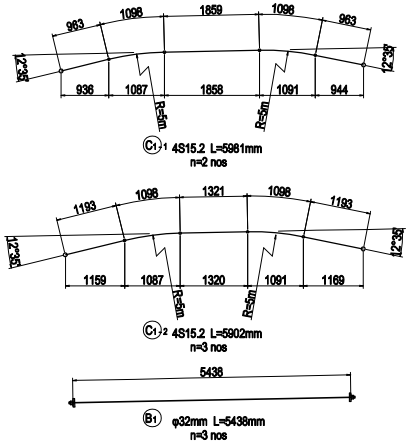


DETAIL DIMENSION OF TENDON

VERTICAL CABLE



TRANSVERSAL CABLE



LOCATION <L>

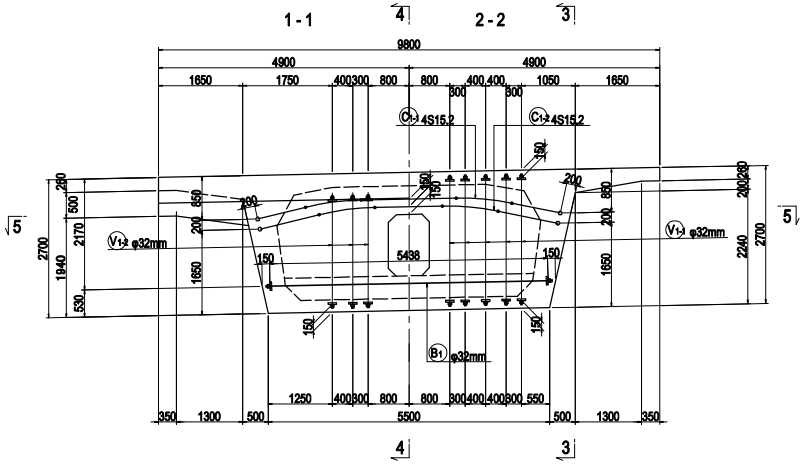
Notes
-Transverse tendon shall be tensioned from one side alternately.
-Vertical tendon shall be tensioned at top.
-Reinforcement for tendon anchorage such as grid rebar shall be arranged sufficiently.
-Jacking force = 1300N/mm2(4S15.2)
-Jacking force = 800N/mm2(PT bar)

PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: 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: M. OHYAMA — 15 Jun.2017	DETAIL OF PRESTRESSING A1-P5 <L> (17) [END CROSSBEAM] — 1
				CHECKED BY: T. HAYAKAWA — 20 Jun.2017	DWG No.
				APPROVED BY: Y. SANO — 21 Jun.2017	P1-PB-1117

DETAIL OF PRESTRESSING A1-P5 <L> (18) [END CROSSBEAM]

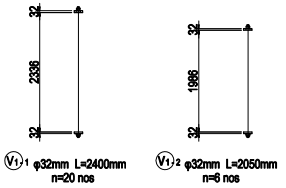
S=1:100

CROSS SECTIONS

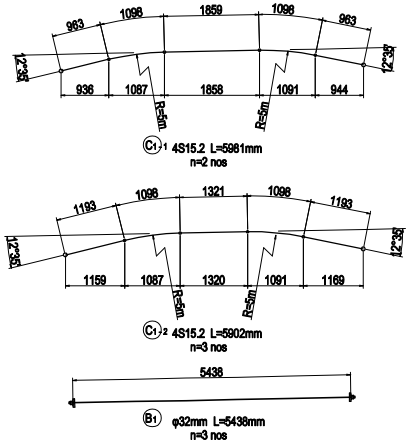


DETAIL DIMENSION OF TENDON

VERTICAL CABLE



TRANSVERSAL CABLE



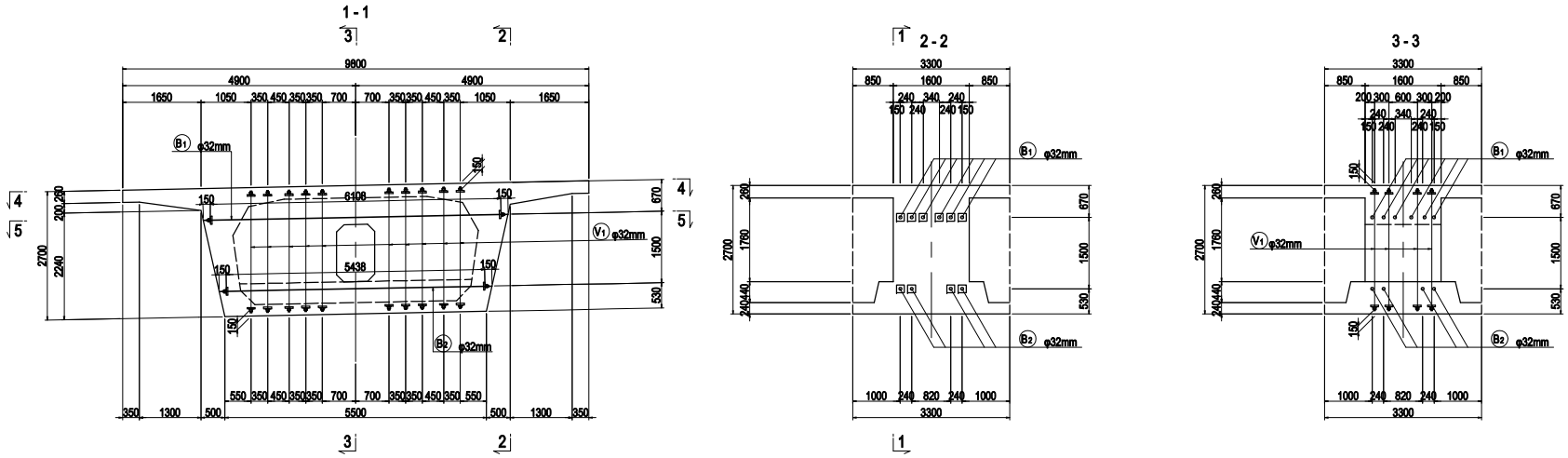
LOCATION <L>

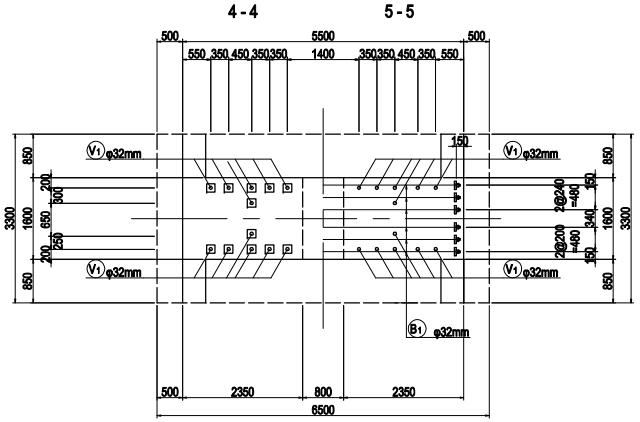
Notes
-Transverse tendon shall be tensioned from one side alternately.
-Vertical tendon shall be tensioned at top.
-Reinforcement for tendon anchorage such as grid rebar shall be arranged sufficiently.
-Jacking force = 1300N/mm2(4S15.2)
-Jacking force = 800N/mm2(PT bar)

PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: 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	M. OHYAMA		15 Jun.2017	DETAIL OF PRESTRESSING A1-P5 <L> (18) [END CROSSBEAM]	1
CHECKED BY	T. HAYAKAWA		20 Jun.2017		DWG No.
APPROVED BY	Y. SANO		21 Jun.2017		P1-PB-1118

DETAIL OF PRESTRESSING A1-P5 <L> (19) [INTERMEDIATE CROSSBEAM]

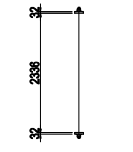
S=1:100



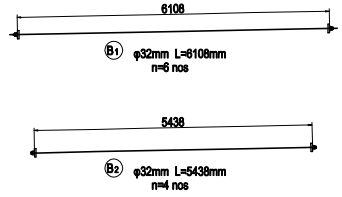


DETAIL DIMENSION OF TENDON

VERTICAL CABLE



TRANSVERSAL CABLE



Notes
-Transverse tendon shall be tensioned from one side alternately.
-Vertical tendon shall be tensioned at top.
-Reinforcement for tendon anchorage such as grid rebar shall be arranged sufficiently.
-Jacking force = 800N/mm2(PT bar)

LOCATION <L>

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

	NAME	SIGNATURE	DATE
PREPARED BY	M. OHYAMA		15 Jun.2017
CHECKED BY	T. HAYAKAWA		20 Jun.2017
APPROVED BY	Y. SANO		21 Jun.2017

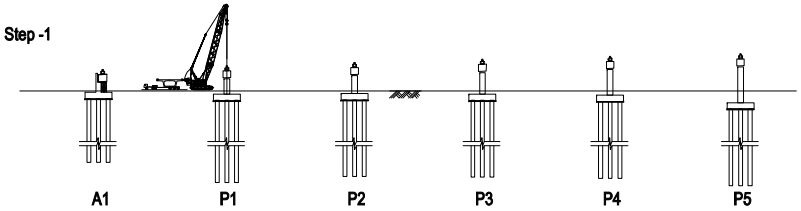
DRAWING TITLE	PACKAGE
DETAIL OF PRESTRESSING A1-P5 <L> (19) [INTERMEDIATE CROSSBEAM]	1
	DWG No. P1-PB-1119

CONSTRUCTION SEQUENCE OF CONTINUOUS PC BOX GIRDER

S=1:2000

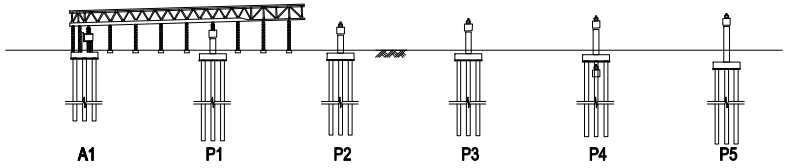
FOR REFERENCE

Step -1



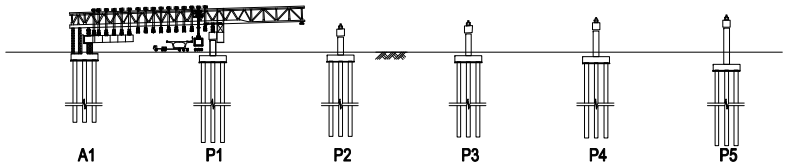
- In advance of segment erection, bearing shoes are set on abutment and piers. Pier head segments are erected by 200t crawler crane and fixed by PC bars.

Step -2



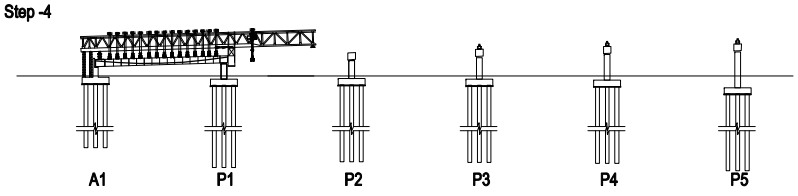
- For assembling of erection girder, temporary bent are installed. The erection girder and erection apparatus are set in designated position and girder support fixed on the pier head segment.

Step -3



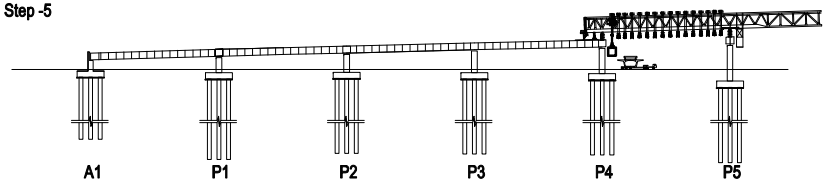
- Pre-cast segments are transported by trailer under the erection girder and lifted by electric hoist and moved the setting position. The segment transfers the load to temporary hanging beam and adjusts the slope and gradient by jack.

Step -4



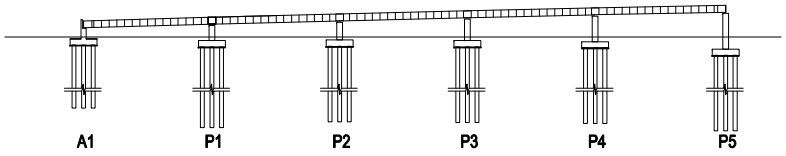
- After all segment are suspended at the designed position, epoxy adhesive applies to the segment which is pulling and connected by PC bars. Mortal is placed in wet joints at both sides. Permanent inner tendons for span are installed and tensioned by hydraulic jack.

Step -5



- After completion of one span erection sequence, erection girder advances to next span and erects segments in the same procedure up to Pier 5.

Step -6



- Demolition of erection girder and then completion.

PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: 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 CHECKED BY: T. H[illegible]WA APPROVED BY: [illegible]0006	CONSTRUCTION SEQUENCE OF CONTINUOUS PC BOX GIRDER

CHAPTER 2. DESIGN CONDITIONS

2-1 LOAD CONDITION

(1) SELF WEIGHT

REINFORCED CONCRETE		:	24.5 kN/m3
PRESTRESSED CONCRETE		:	24.5 kN/m3
PLAIN CONCRETE		:	23.0 kN/m3
ASPHALT CONCRETE		:	22.5 kN/m3
STEEL		:	77.0 kN/m3

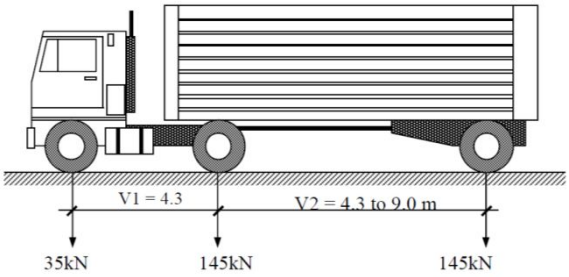
(2) SUPER IMPOSED LOAD

PAVEMENT (t = 80mm)		:	1.80 kN/m2
OVERLAY		:	0.70 kN/m2
CURB		:	24.5 kN/m3
RAILINGS	Side	:	0.70 kN/m
	Center	:	0.60 kN/m
WATER LINE		:	3.00 kN/m / 1bridge

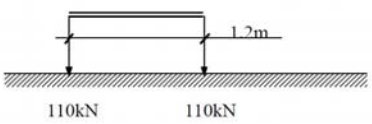
(3) LIVE LOAD

LIVE LOAD is according to AASHTO LRFD Bridge Design Specifications.
IMPACT is according to Specifications for highway bridges, JAPAN.

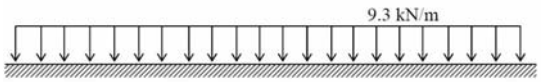
(TRUCK)



(TANDEM)



(LANE)



Design lane width = 3.0 m
Number of design lane = 9.0 m / 3.0 m = 3 Lanes / 1 bridge

Number of Loaded Lanes	Multiple Presence Factors, *m*
1	1.20
2	1.00
3	0.85
>3	0.65

(4) TEMPERATURE

FOR STRUCTURE	:	+ 10℃ ~ + 40℃ (25℃ ± 15℃)
FOR BEARING AND EXPANSION	:	+ 5℃ ~ + 45℃ (25℃ ± 20℃)

(5) CREEP AND SHRINKAGE

According to Specifications for highway bridges, JAPAN.

RELATIVE HUMIDITY	:	74.6 %

(6) SEISMIC

Design seismic coefficient

kh1	=	0.30 (for seismic performance 1)
kh2	= 1.5 x kh1 = 1.5 x 0.30 =	0.45 (for seismic performance 2)

2-2 MATERIALS

(1) CONCRETE

Specified compressive strength	50.0	N/mm2
Young's modulus	3.30E+04	N/mm2
Shear modulus	1.43E+04	N/mm2
Coefficient of thermal expansion	1.00E-05	/℃

(2) REINFORCEMENT

Reinforcement type	SD345	
Yeild strength	345.0	N/mm2
Young's modulus	2.00E+05	N/mm2

(3) PRESTRESSING TENDON

(External cable for longitudinal)

Tendon type	SWPR7BL, 19S15.2, Low relaxation	
Tensile strength	1850.0	N/mm2
Yeild strength	1600.0	N/mm2
Young's modulus	2.00E+05	N/mm2

(Internal cable for longitudinal)

Tendon type	SWPR7BL, 12S15.2, Low relaxation	
Tensile strength	1850.0	N/mm2
Yeild strength	1600.0	N/mm2
Young's modulus	2.00E+05	N/mm2

(Cable strand for upper slab, transverse)

Tendon type	SWPR7BL, 3S12.7, Low relaxation	
Tensile strength	1850.0	N/mm2
Yeild strength	1600.0	N/mm2
Young's modulus	2.00E+05	N/mm2

(Cable strand for crossbeam)

Tendon type	SWPR7BL, 4S15.2, Low relaxation	
Tensile strength	1850.0	N/mm2
Yeild strength	1600.0	N/mm2
Young's modulus	2.00E+05	N/mm2

(PT Bar for crossbeam)

Tendon type	SBPR930/1080, ϕ 32	
Tensile strength	1080.0	N/mm2
Yeild strength	930.0	N/mm2
Young's modulus	2.00E+05	N/mm2

2-3 ALLOWABLE STRESS

(1) CONCRETE

Table 3.2.2 Allowable compressive stress (N/mm^2) for prestressed concrete structure

Stress type			Design standard strength of concrete 30	40	50	60
Immediately after prestressing	Bending compressive stress	1) Rectangular section	15.0	19.0	21.0	23.0
		2) T-shaped or box-shaped section	14.0	18.0	20.0	22.0
	3) Axial compressive stress		11.0	14.5	16.0	17.0
Others	Bending compressive stress	4) Rectangular section	12.0	15.0	17.0	19.0
		5) T-shaped or box-shaped section	11.0	14.0	16.0	18.0
	6) Axial compressive stress		8.5	11.0	13.5	15.0

Table 3.2.3 Allowable tensile stress (N/mm^2) for prestressed concrete structure

Stress type			Design standard strength of concrete 30	40	50	60
Bending tensile stress	1) Immediately after prestressing		1.2	1.5	1.8	2.0
	2) Principal loads other than live load and impact		0	0	0	0
	Principal loads and special loads corresponding to "principal load"	3) Floor slab	0	0	0	0
		4) Segment joint of precast segment bridges	0	0	0	0
		5) Other cases	1.2	1.5	1.8	2.0
6) Axial tensile stress			0	0	0	0

Table 3.2.5 Allowable diagonal tensile stress (N/mm^2) for prestressed concrete structure

Stress type		Design standard strength of concrete 30	40	50	60
Principal loads other than live load and impact	1) Case where shear force alone or torsional moment alone is to be considered	0.8	1.0	1.2	1.3
	2) Case where both shear force and torsional moment are to be considered	1.1	1.3	1.5	1.6
Combination of loads not considering collision load or the effects of earthquakes	3) Case where shear force alone or torsional moment alone is to be considered	1.7	2.0	2.3	2.5
	4) Case where both shear force and torsional moment are to be considered	2.2	2.5	2.8	3.0

(2) REINFORCEMENT

Table 3.3.1 Allowable stress (N/mm^2) of reinforcement

Stress and member type \ Reinforcement type			SR235	SD295A SD295B	SD345
Tensile stress	1) Principal loads other than live load and impact		80	100	100
	2) Reference value of allowable stress to be used when collision load or the effects of earthquakes are not considered in the combination of loads	General members	140	180	180
		Floor slab and slab bridges with a span of 10 m or less	140	140	140
	3) Reference value of allowable stress to be used when collision load or the effects of earthquakes are considered in the combination of loads		140	180	200
	4) Reference value of allowable stress to be used when calculating the lap joint length or bond length of reinforcement		140	180	200
5) Compressive stress			140	180	200

(3) PRESTRESSING TENDON

Table C. 3.4.1 Allowable tensile stress (N/mm^2) of PC tendon

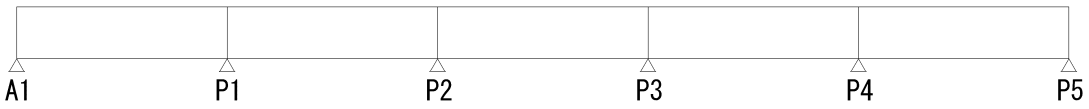
PC tendon type \ Allowable tensile stress			During prestressing	Immediately after prestressing	Under design load
Steel wire	SWPR1AN SWPR1AL SWPD1N SWPD1L	5 mm	1260	1120	960
		7 mm	1170	1050	900
		8 mm	1125	1015	870
		9 mm	1080	980	840
	SWPR1BN SWPR1BL	5 mm	1350	1190	1020
		7 mm	1260	1120	960
		8 mm	1215	1085	930
Steel strand	SWPR2N SWPR2L	2.9 mm (2-strand wire)	1530	1365	1170
	SWPR7AN (7-strand wire) SWPR7AL (7-strand wire)		1305	1190	1020
	SWPR7BN (7-strand wire) SWPR7BL (7-strand wire)		1440	1295	1110
	SWPR19N SWPR19L (19-strand wire)	17.8 mm	1440	1295	1110
		19.3 mm	1440	1295	1110
		20.3 mm	1440	1260	1080
		21.8 mm	1440	1260	1080
		28.6 mm	1350	1260	1080
Steel bar	Round bar Type A	2 SBPR785/1030	706	667	588
	Round bar Type B	1 SBPR930/1080	837	756	648
		2 SBPR930/1180	837	790	697

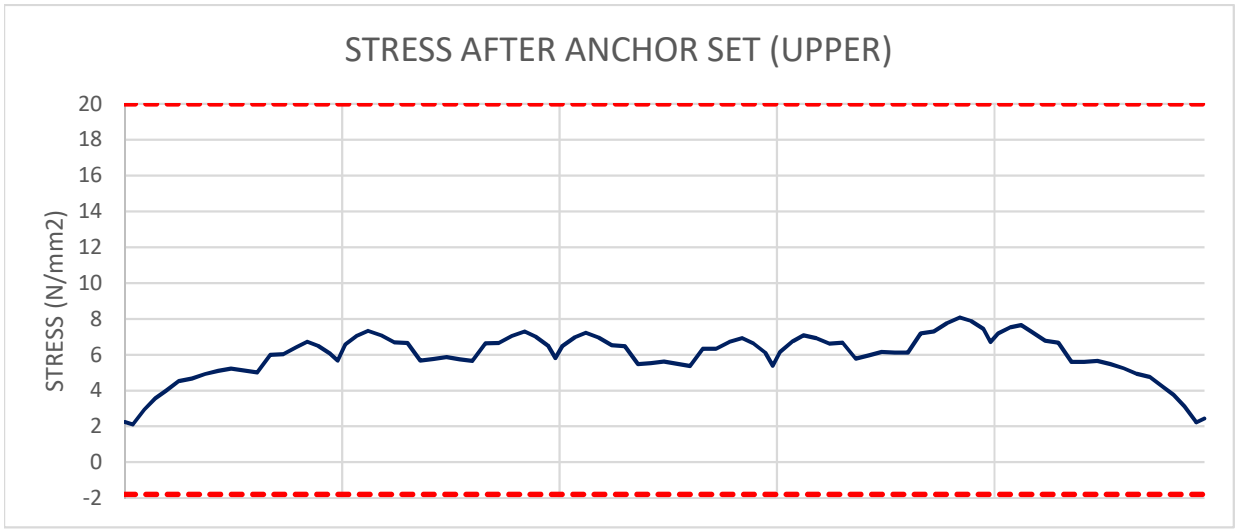
CHAPTER 3. SUMMARY OF DESIGN RESULT

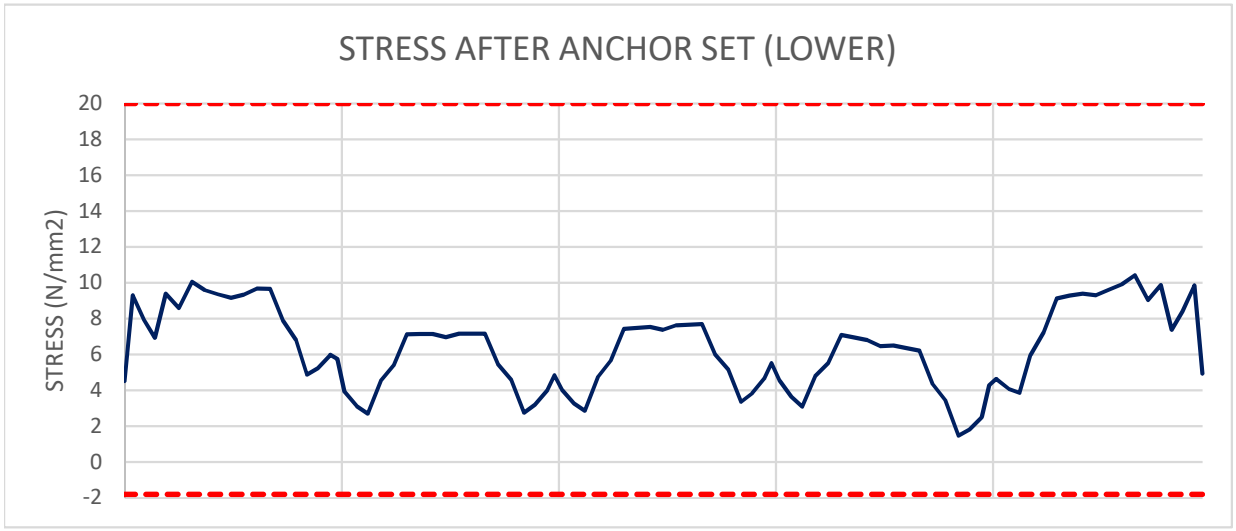
3-1 DESIGN RESULT OF LOGITUDINAL DIRECTION

(1) BENDING MOMENT

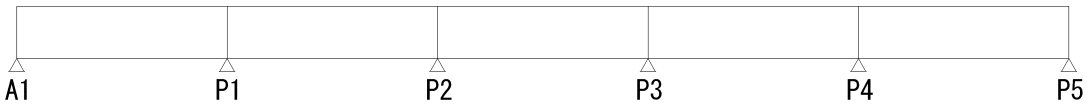
(STRESS AFTER ANCHOR SET)

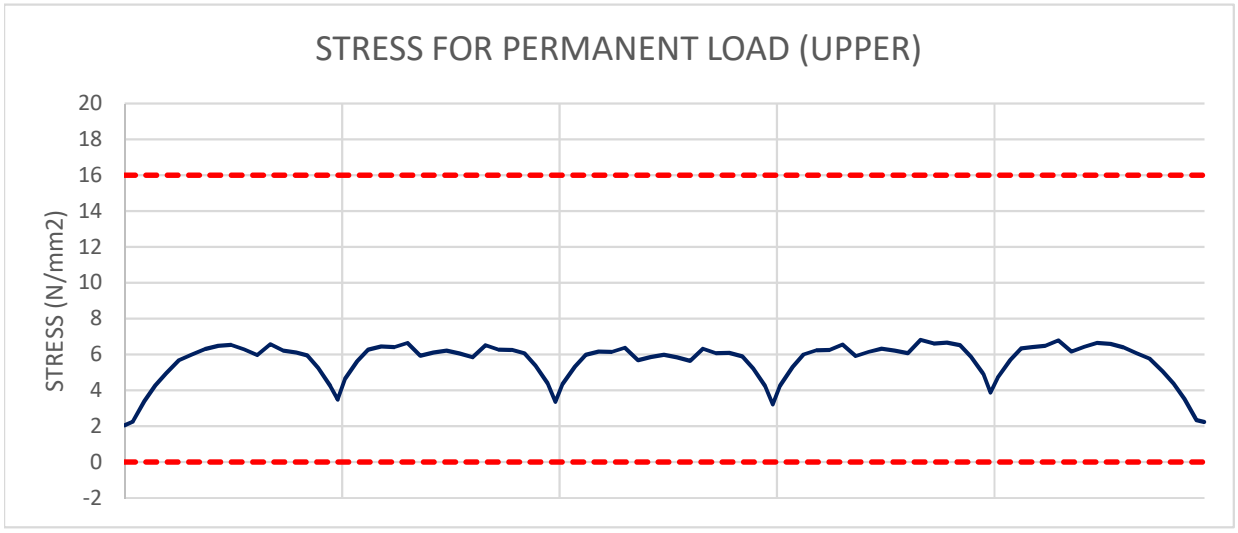


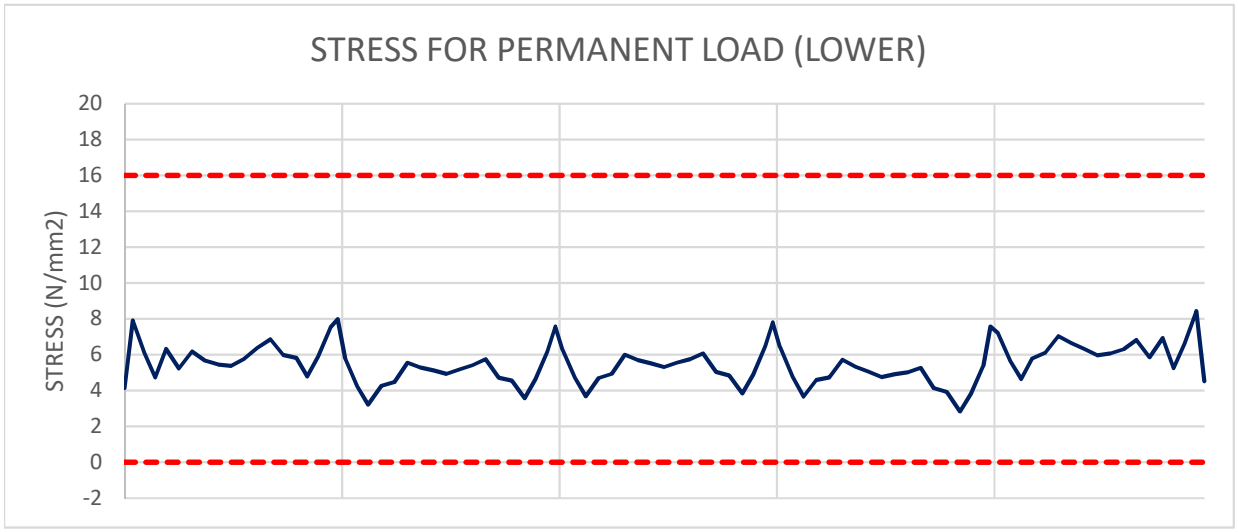




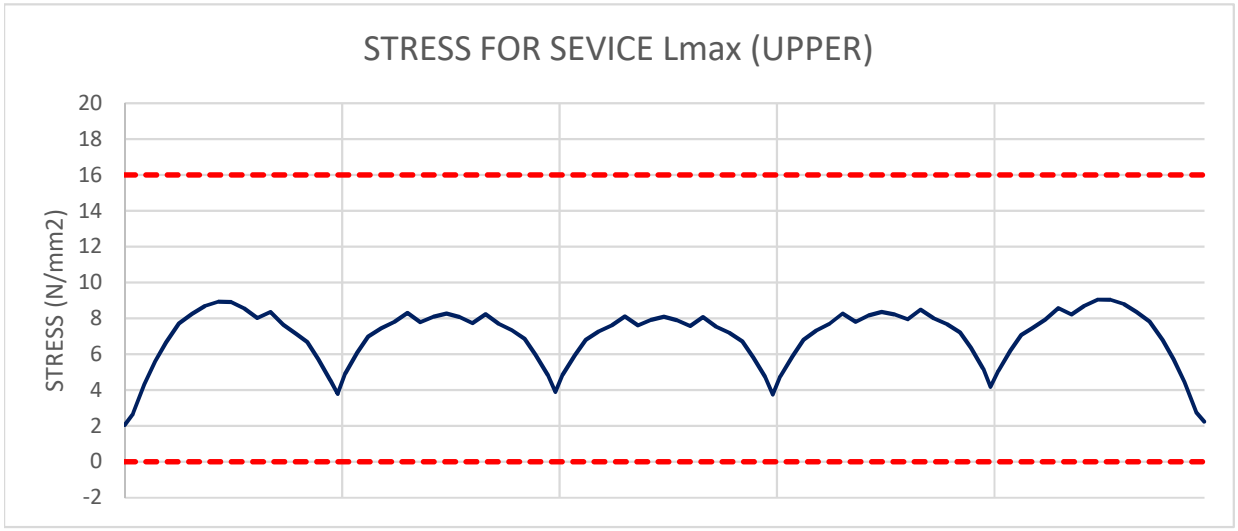
(STRESS FOR PERMANENT LOAD)

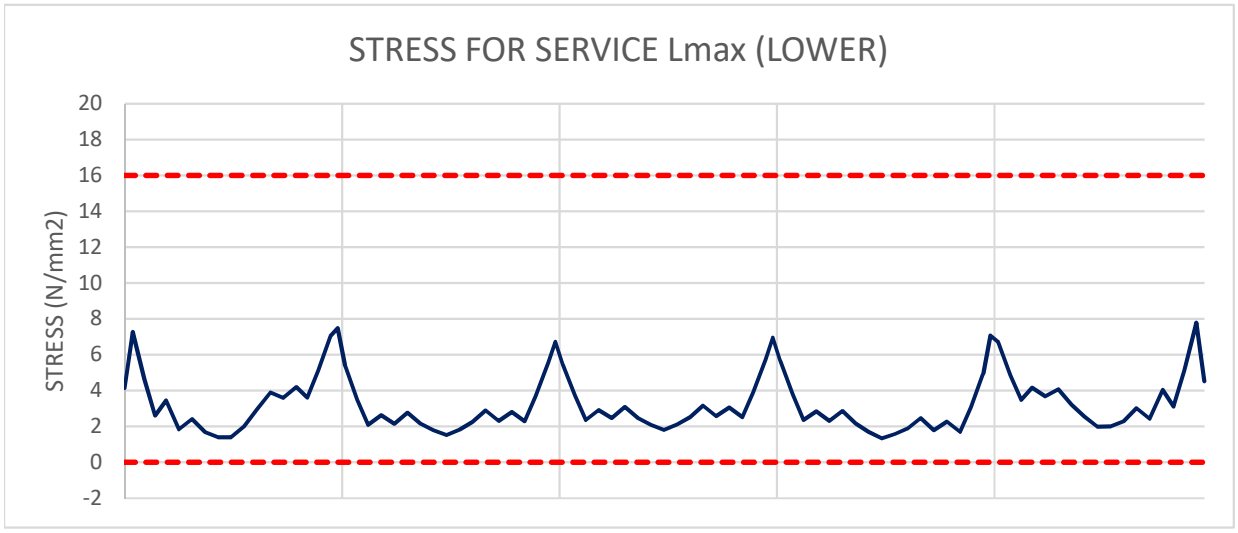




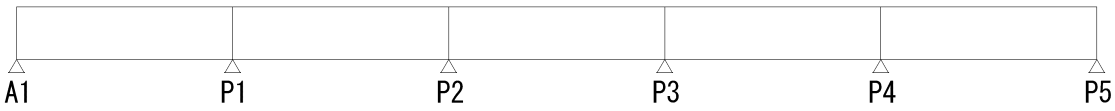


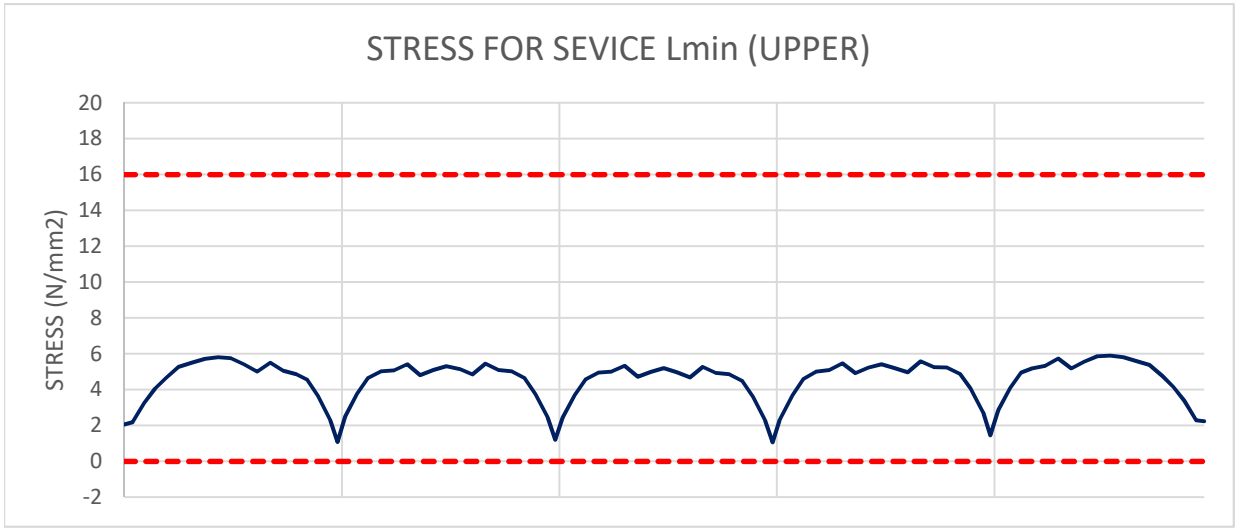
(STRESS FOR SERVICE Lmax)

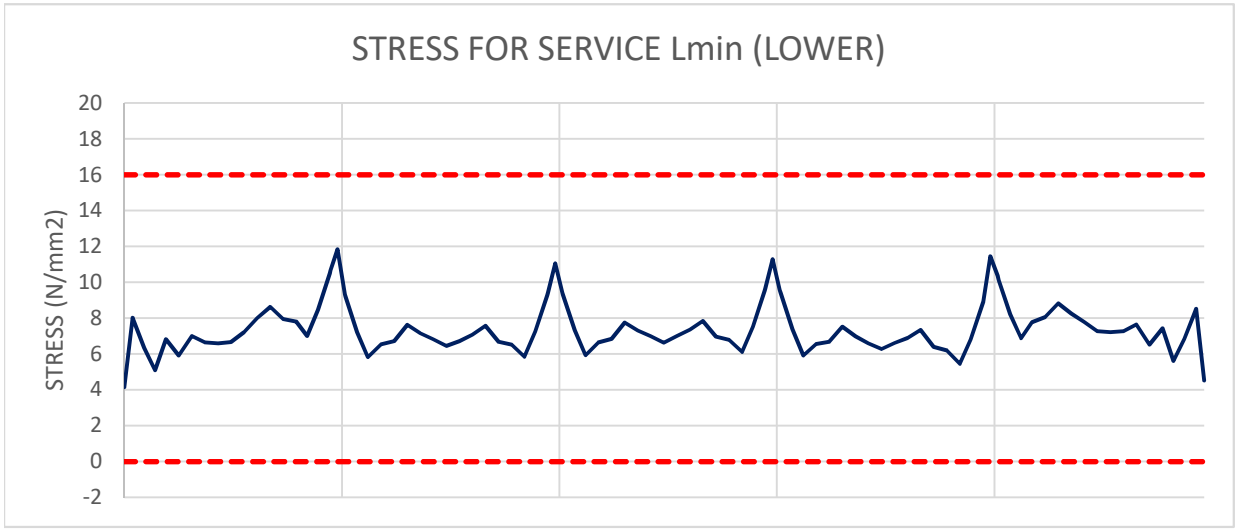




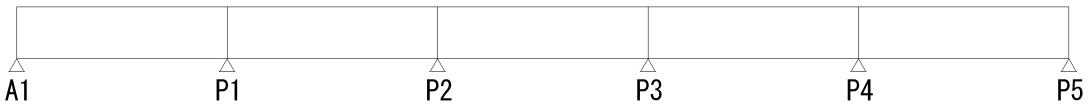
(STRESS FOR SERVICE Lmin)

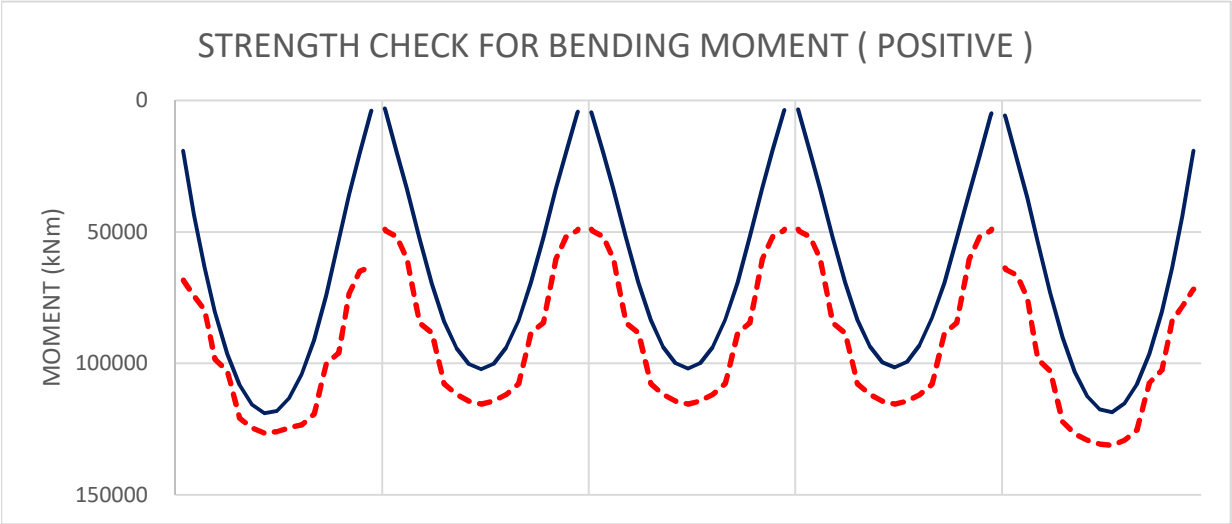


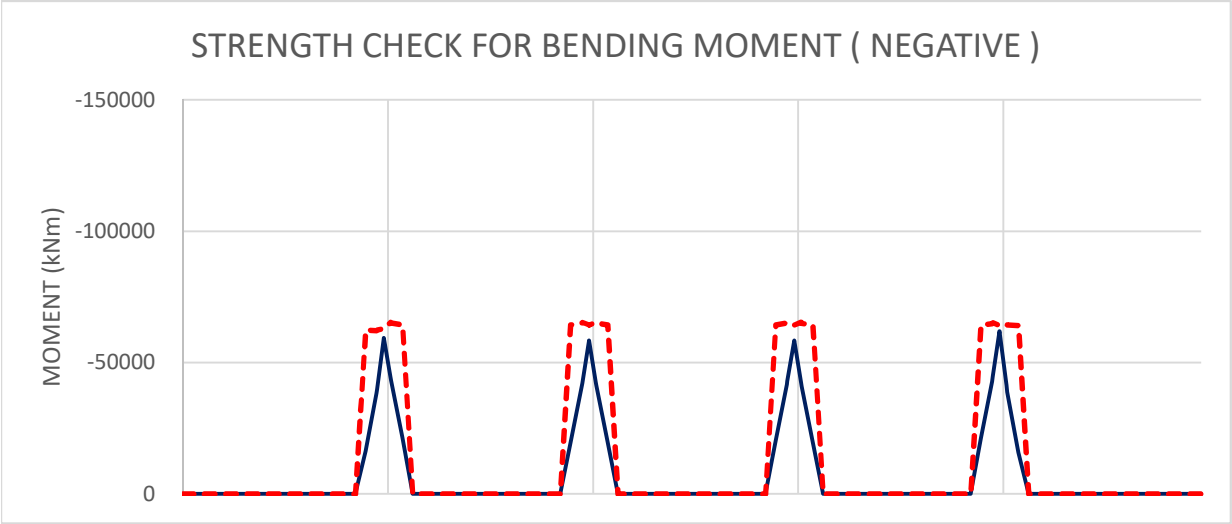




(STRENGTH CHECK)

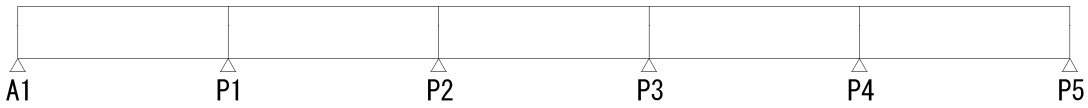


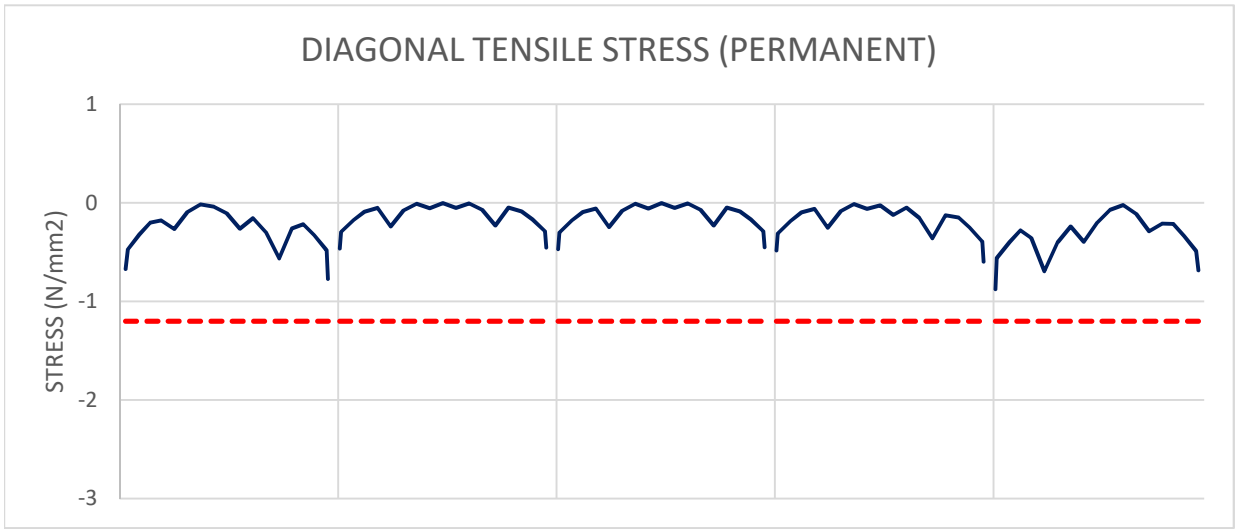


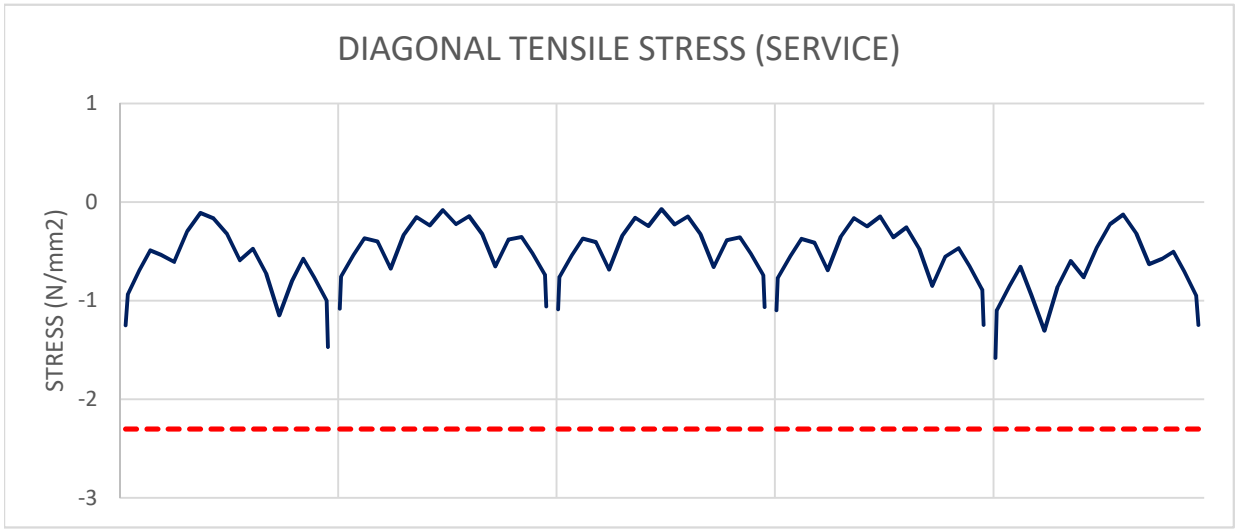


(2) SHEAR FORCE

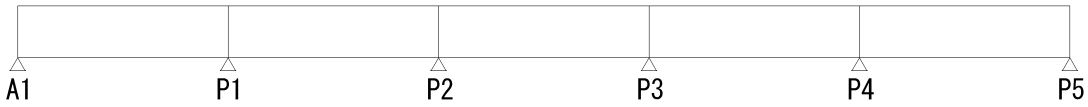
(DIAGONAL TENSILE STRESS)

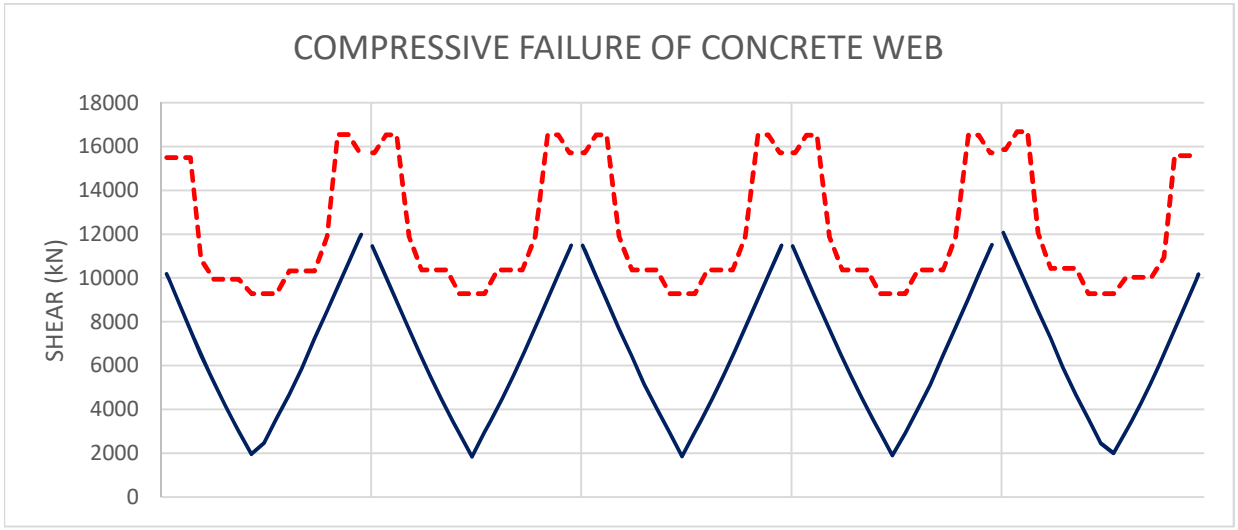




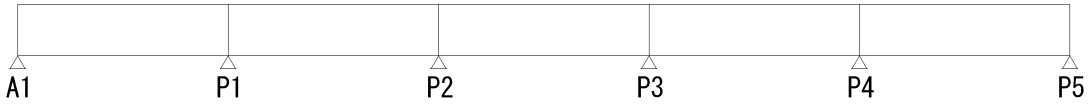


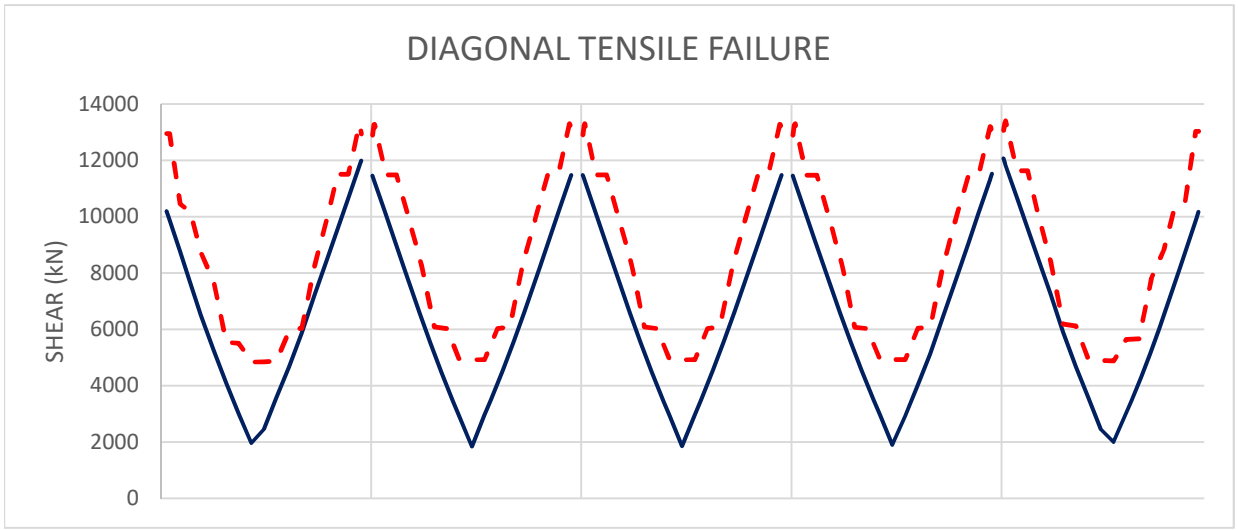
(COMPRESSIVE FAILURE OF CONCRETE WEB)





(DIAGONAL TENSILE FAILURE)





3-2 DESIGN RESULT OF TRANSVERSE DIRECTION

(1) WEB THICKNESS = 300-400 mm

UPPER SLAB							
	Item			unit	Catilever	Middle slab support	Middle slab center
	Arrangement of PC tendon			-	3S12.7 ctc 500mm		
	Anchor set	Fiber stress	Upper	N/mm2	3.17	3.09	0.64
			Lower	N/mm2	-0.33	0.19	4.77
		Allowable stress		N/mm2	≧ - 1.80	≧ - 1.80	≧ - 1.80
	Permanent load	Fiber stress	Upper	N/mm2	2.48	2.58	0.74
			Lower	N/mm2	0.13	0.44	4.19
		Allowable stress		N/mm2	≧ 0.00	≧ 0.00	≧ 0.00
	Service	Fiber stress	Upper	N/mm2	1.09	0.29	4.47
			Lower	N/mm2	1.52	2.73	0.46
		Allowable stress		N/mm2	≧ 0.00	≧ 0.00	≧ 0.00
	Strength	Bending moment		kNm	-154.60	-178.04	113.20
		Resistance		kNm	334.24	273.10	161.01
		Ratio		-	2.16	1.53	1.42
WEB AND LOWER SLAB							
	Item			unit	Web	Lower slab support	Lower slab center
	Arrangement of rebar for transverse design			-	D19ctc250	D13ctc125	D13ctc125
	Permanent load	Design force M		kNm	-11.43	-11.00	7.91
		Stress	Concrete	N/mm2	1.3	1.9	1.4
			Rebar	N/mm2	43.5	61.2	44.1
		Allowable stress (rebar)		N/mm2	100.0	100.0	100.0
	Service	Design force M		kNm	54.95	-17.61	9.93
		Stress	Concrete	N/mm2	3.0	3.1	1.8
			Rebar	N/mm2	130.8	98.0	55.3
		Allowable stress (rebar)		N/mm2	180.0	180.0	180.0
	Strength	Bending moment		kNm	127.95	-31.22	15.95
		Resistance		kNm	156.51	67.98	67.98
		Ratio		-	1.22	2.18	4.26

(2) WEB THICKNESS = 450-550 mm

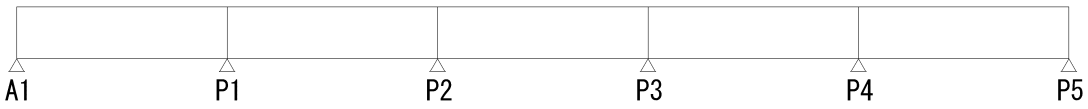
UPPER SLAB							
Item				unit	Catilever	Middle slab support	Middle slab center
Arrangement of PC tendon				-	3S12.7 ctc 500mm		
Anchor set	Fiber stress		Upper	N/mm2	3.17	3.15	0.58
			Lower	N/mm2	-0.33	0.13	4.82
	Allowable stress			N/mm2	≧ - 1.80	≧ - 1.80	≧ - 1.80
Permanent load	Fiber stress		Upper	N/mm2	2.48	2.67	0.68
			Lower	N/mm2	0.13	0.35	4.24
	Allowable stress			N/mm2	≧ 0.00	≧ 0.00	≧ 0.00
Service	Fiber stress		Upper	N/mm2	1.09	0.49	4.18
			Lower	N/mm2	1.52	2.52	0.74
	Allowable stress			N/mm2	≧ 0.00	≧ 0.00	≧ 0.00
Strength	Bending moment			kNm	-154.60	-167.46	109.75
	Resistance			kNm	334.24	273.10	161.01
	Ratio			-	2.16	1.63	1.47

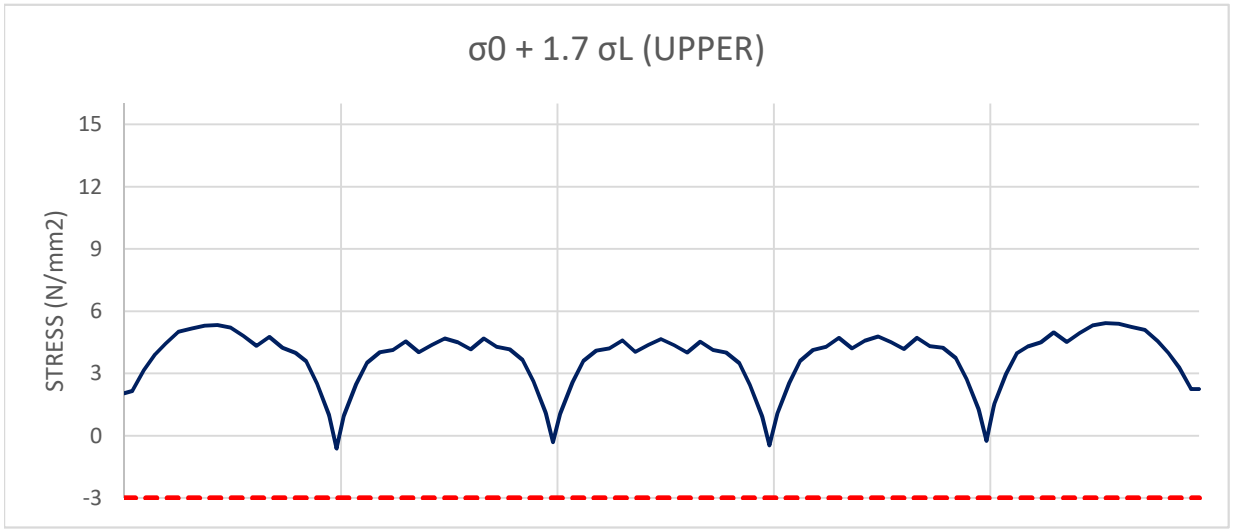
WEB AND LOWER SLAB						
Item			unit	Web	Lower slab support	Lower slab center
Arrangement of rebar for transverse design			-	D16ctc250	D13ctc125	D13ctc125
Permanent load	Design force M		kNm	-11.42	-9.88	6.87
	Stress	Concrete	N/mm2	0.6	1.7	1.2
		Rebar	N/mm2	26.7	55.0	38.3
	Allowable stress (rebar)		N/mm2	100.0	100.0	100.0
Service	Design force M		kNm	52.97	-16.39	7.67
	Stress	Concrete	N/mm2	1.7	2.9	1.4
		Rebar	N/mm2	90.4	91.3	42.7
	Allowable stress (rebar)		N/mm2	180.0	180.0	180.0
Strength	Bending moment		kNm	125.87	-29.58	11.98
	Resistance		kNm	150.40	67.98	67.98
	Ratio		-	1.19	2.30	5.67

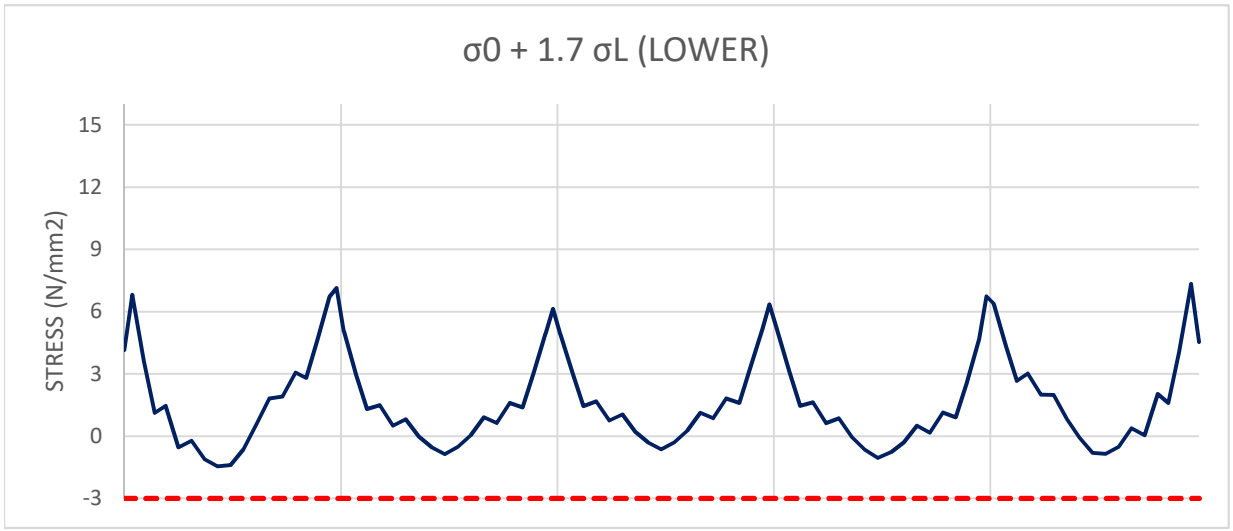
3-3 DESIGN RESULT OF JOINT FOR PRECAST SEGMENT

(1) BENDING MOMENT

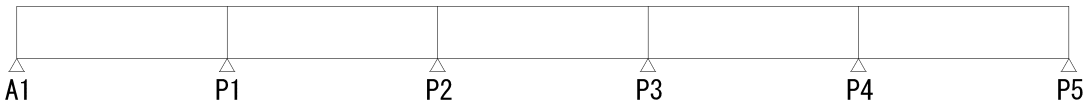
(Stress check for girder)

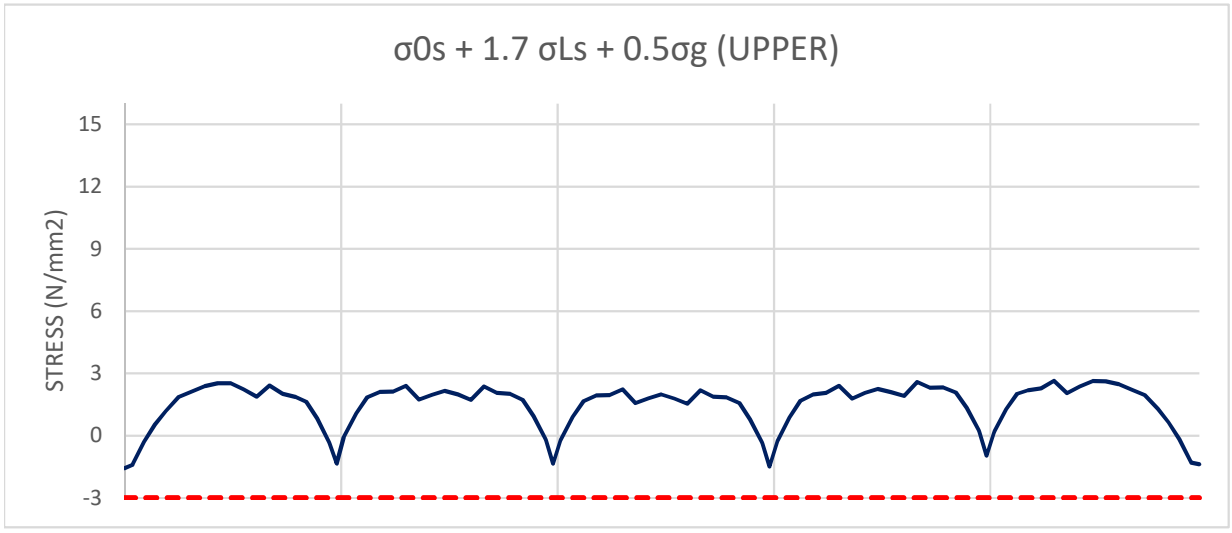


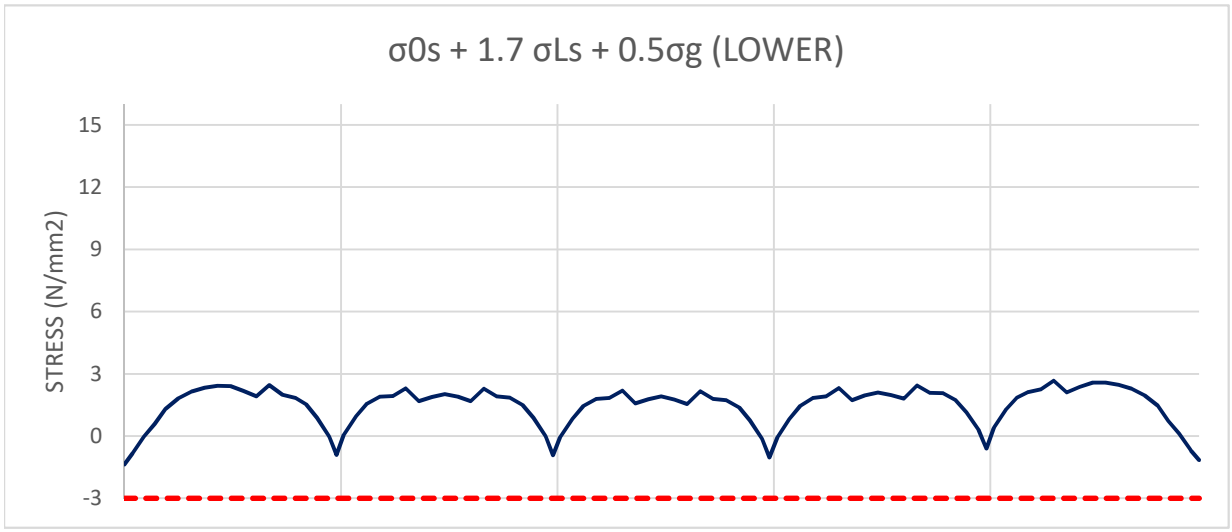




(Stress check for slab)

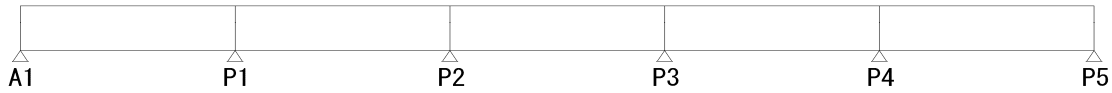


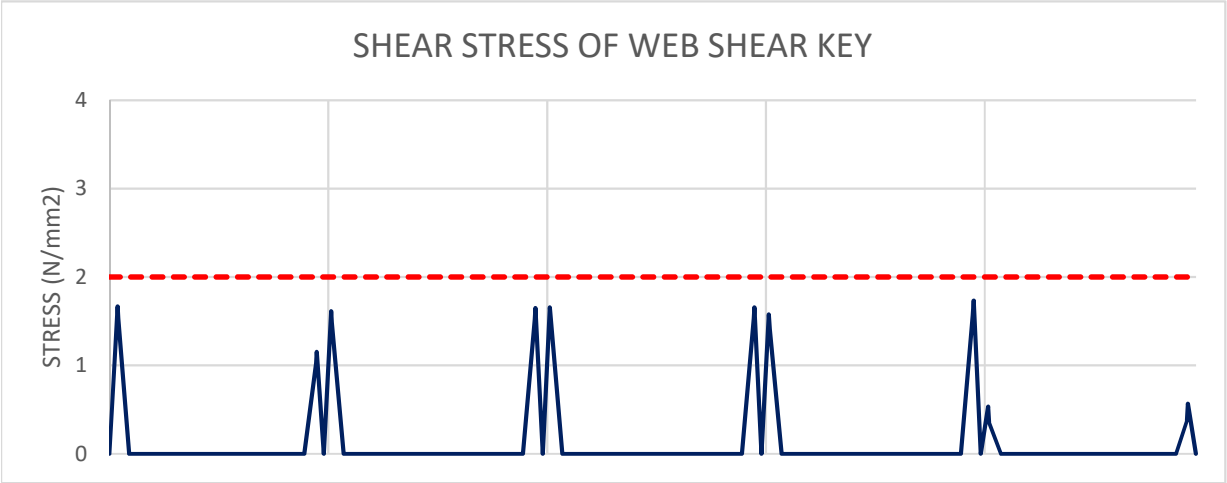




(2) SHEAR FORCE

(Stress check of web shear key)





(Stress check of slab key)

	Cantilever		On Span	
	Convex key	Concave key	Convex key	Concave key
Shear Force	46.0	46.0	56.3	56.3
Shear Stress	0.59	0.50	0.58	0.49
Alowable Shear Stress	0.65	0.65	0.65	0.65

3-4 DESIGN RESULT OF CROSSBEAM

FOR BENDING MOMENT						
	Item			unit	End Crossbeam	Intermediate Crossbeam
	Permanent load	Fiber stress	Upper	N/mm2	0.07	0.10
			Lower	N/mm2	0.50	1.26
		Allowable stress		N/mm2	≧ 0.00	≧ 0.00
	Service	Fiber stress	Upper	N/mm2	-0.06	-0.27
			Lower	N/mm2	0.63	1.59
		Allowable stress		N/mm2	≧ -1.80	≧ -1.80
	Strength	Bending moment		kNm	4601.75	10011.06
		Resistance		kNm	6218.07	12924.90
		Ratio		-	1.35	1.29
FOR SHEAR FORCE						
	Item			unit	End Crossbeam	Intermediate Crossbeam
	Service	Design force S		kN	149.46	200.94
		Shear stress		N/mm2	0.03	0.05
		Allowable shear stress		N/mm2	0.65	0.65
	Strength (Ultimate)	Design force S		kN	254.08	341.60
		Shear stress		N/mm2	0.05	0.08
		Allowable shear stress		N/mm2	0.65	0.65

3-5 SUPPORT REACTION

(kN)

			A1	P1	P2	P3	P4	P5
VERTICAL								
	DEAD LOAD / 1 BRIDGE							
		Self Weight	4372.6	9387.5	9142.7	8939.0	9687.4	4256.8
		Prestress (in)	148.5	-125.7	-72.3	234.1	-493.2	308.8
		Prestress (out)	314.3	-310.9	-40.1	166.0	-540.6	411.3
		Superimposed	821.0	2310.0	2014.0	2015.6	2315.8	823.2
		Prestress loss	0.5	-89.5	127.6	-76.7	127.6	-89.6
		TOTAL	5656.9	11171.4	11171.9	11278.0	11097.0	5710.5
	LIVE LOAD							
		Lmax (/ 1Br) *1)	1338.8	2787.2	2738.8	2739.6	2790.0	1340.0
		Lmax (/ 1Bearing) *2)	1124.6	2331.0	2289.5	2291.7	2332.9	1125.3
HORIZONTAL								
	SERVICE (Longitudinal) / 1 PIER							
		Temperature	293.1	352.0	153.6	153.6	352.0	342.0
		Shrinkage	293.1	384.0	153.6	153.6	384.0	342.0
		Creep	524.6	640.0	268.8	268.8	640.0	612.0
		Elastic	324.0	416.0	192.0	192.0	416.0	306.0
	SEISMIC / 1 PIER							
		Longitudinal (kh = 0.3)	3010.0	6230.0	7460.0	7430.0	6180.0	3500.0
		Transverse (kh = 0.3)	2640.0	7360.0	6660.0	6660.0	7600.0	2640.0

*1) Without Impact for design of foundation and column.

*2) With Impact for design of pierhead.

PC BOX GIRDER BRIDGE
(P20~A2)

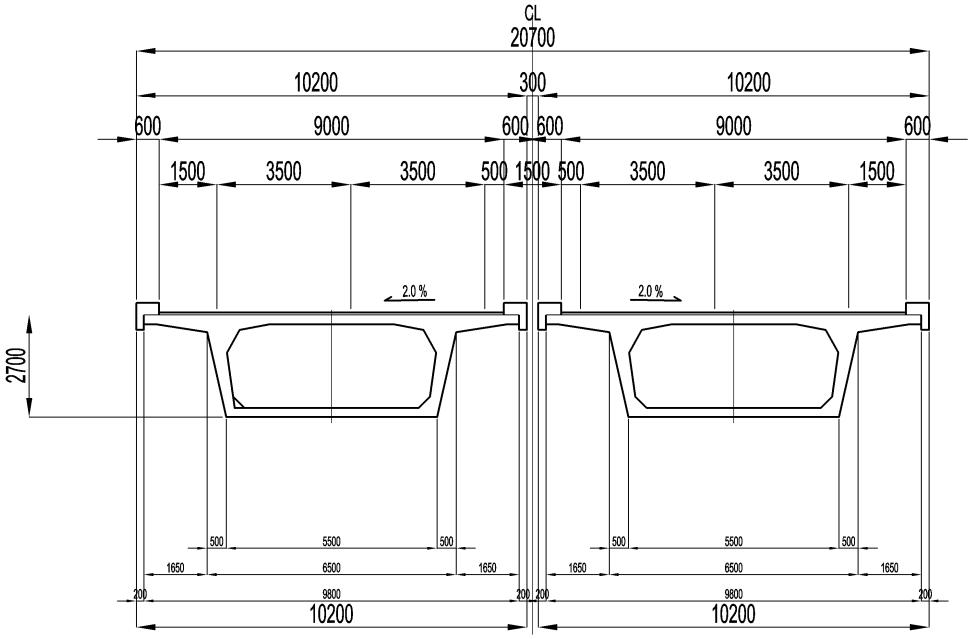
SUPERSTRUCTURE

CONTENTS

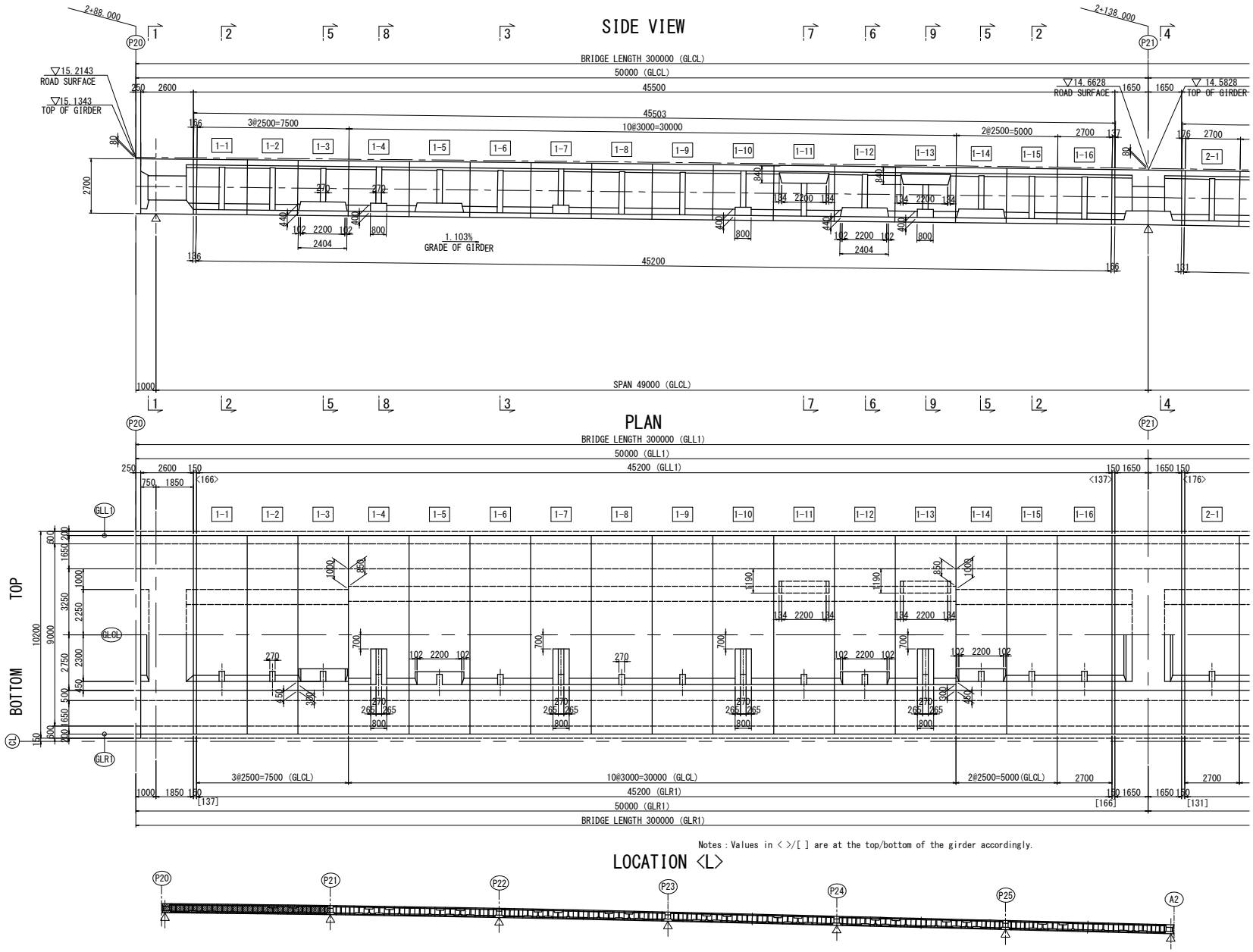
CHAPTER 1. GENERAL

1-1 GENERAL CONDITION

PROJECT	:	CONSTRUCTION OF BAGO RIVER BRIDGE
BRIDGE	:	PC BOX BRIDGE (Yangon side)
STURUCTURE TYPE	:	6 SPAN CONTINUOUS PC BOX GIRDER PRECAST SEGMENT
BRIDGE LENGTH	:	300 m (6 x 50m)
WIDTH COMPOSITION	:	LEFT 0.600 + 1.500 + 2 x 3.500 + 0.500 + 0.600 RIGHT 0.600 + 0.500 + 2 x 3.500 + 1.500 + 0.600
LIVE LOAD	:	HL-93 (AASHTO)
DESIGN STANDARD	:	Specifications for highway bridges, JAPAN AASHTO LRFD Bridge Design Specifications



P20-A2 <L> STRUCTURAL OUTLINE OF GIRDER (1) S=1:200

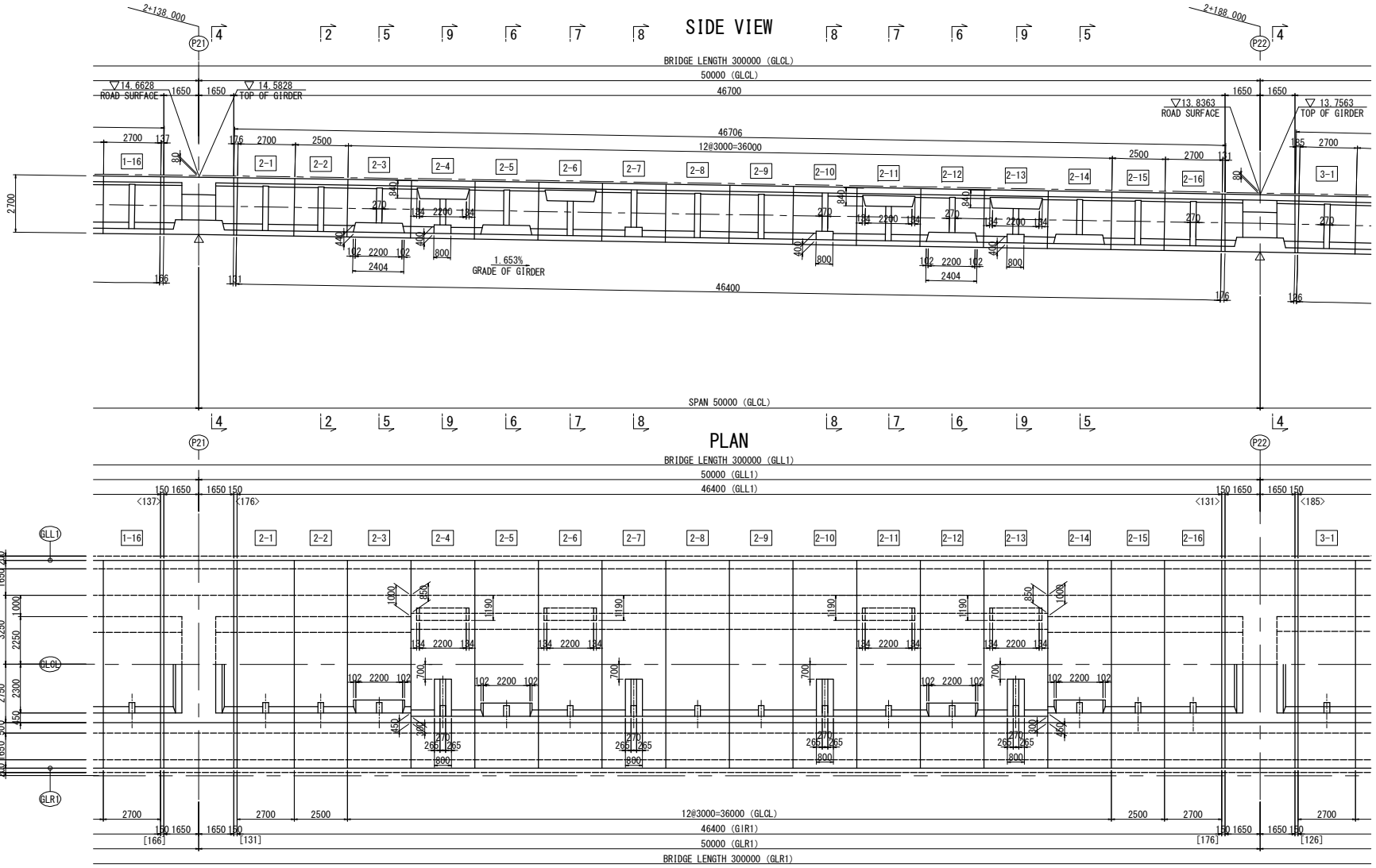


Notes : Values in < >/[ ] are at the top/bottom of the girder accordingly.

LOCATION <L>

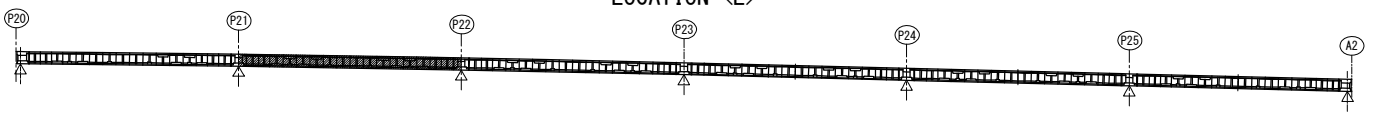
PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.		
				NAME / SIGNATURE / DATE	DRAWING TITLE / PACKAGE
				PREPARED BY: M. OHYAMA	P20-A2 <L> STRUCTURAL OUTLINE OF GIRDER (1) / 2
				CHECKED BY: T. HAYAKAWA	DWG No.
				APPROVED BY: Y. SANO	P02-PB-1011

P20-A2 <L> STRUCTURAL OUTLINE OF GIRDER (2) S=1:200



Notes : Values in < >/[ ] are at the top/bottom of the girder accordingly.

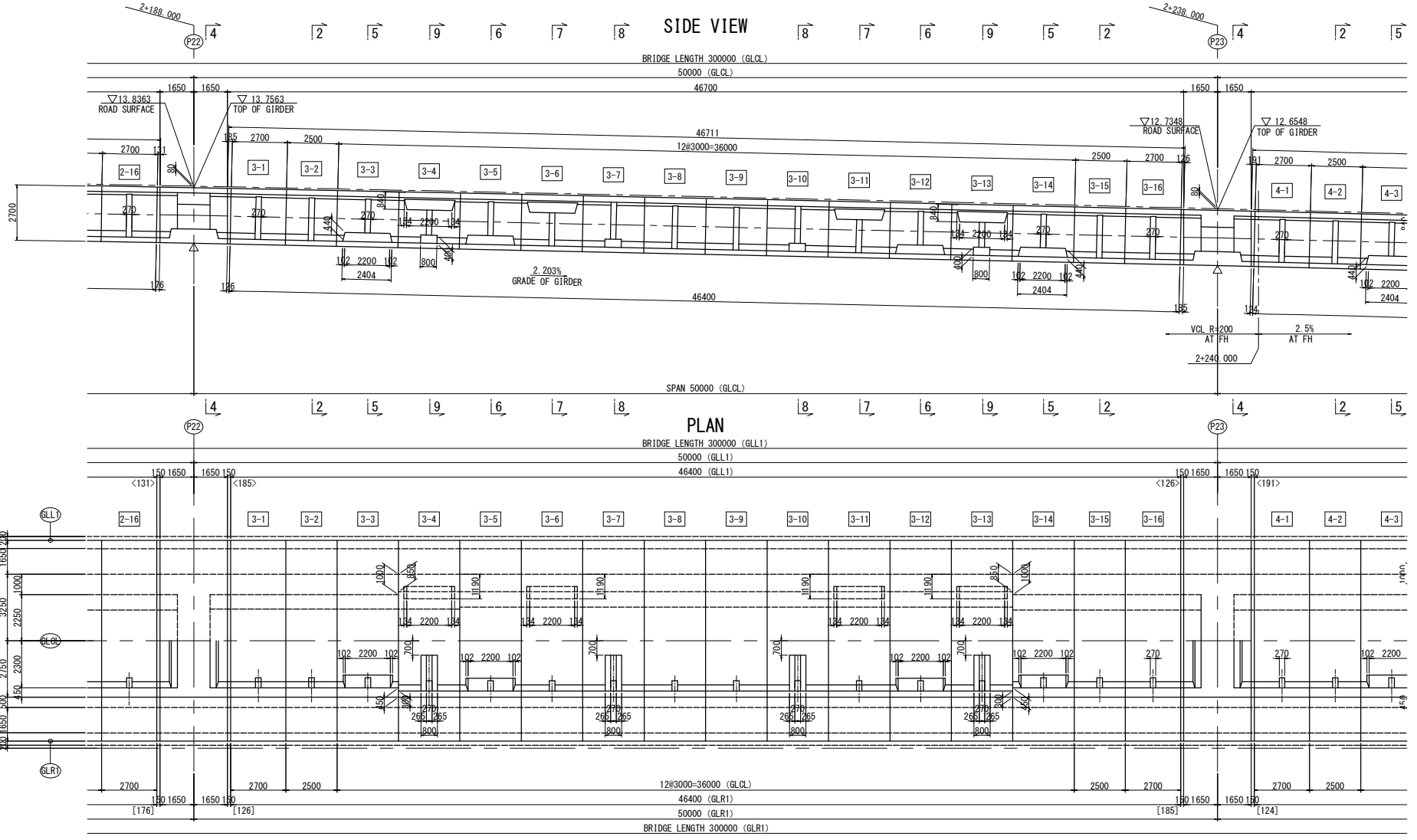
LOCATION <L>



PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.			
				NAME	SIGNATURE	DATE
				PREPARED BY	M. OHYAMA	
				CHECKED BY	T. HAYAKAWA	
				APPROVED BY	Y. SANO	

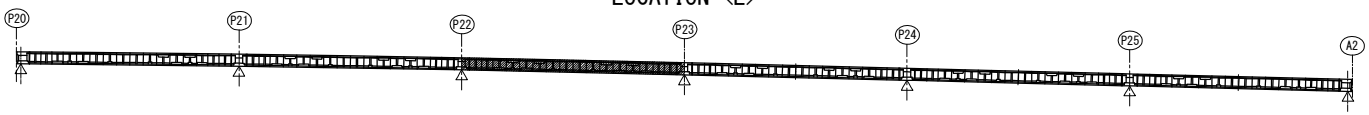
DRAWING TITLE	PACKAGE
P20-A2 <L> STRUCTURAL OUTLINE OF GIRDER (2)	2
	DWG No. P02-PB-1012

P20-A2 <L> STRUCTURAL OUTLINE OF GIRDER (3) S=1:200



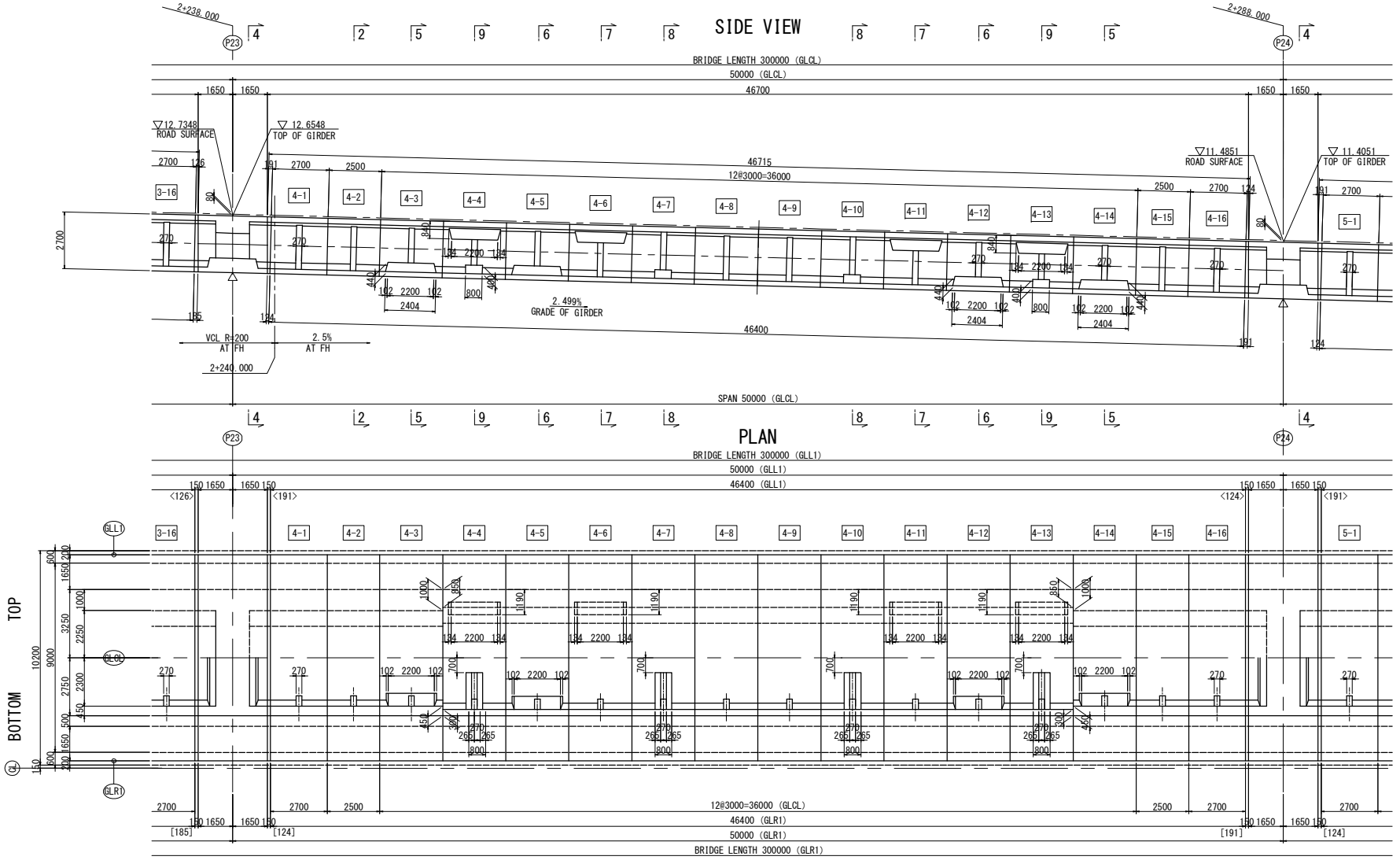
Notes : Values in < >/[ ] are at the top/bottom of the girder accordingly.

LOCATION <L>



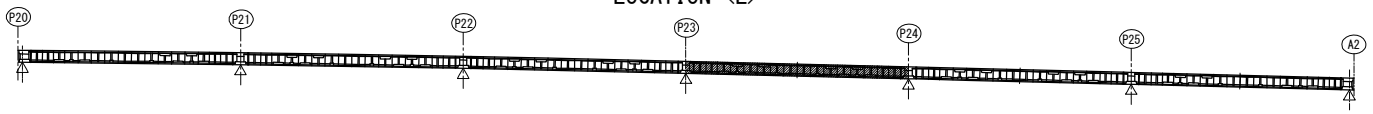
PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.		
	NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
PREPARED BY	M. OHYAMA			P20-A2 <L> STRUCTURAL OUTLINE OF GIRDER (3)	2
CHECKED BY	T. HAYAKAWA				DWG No.
APPROVED BY	Y. SANO				P02-PB-1013

P20-A2 <L> STRUCTURAL OUTLINE OF GIRDER (4) S=1:200



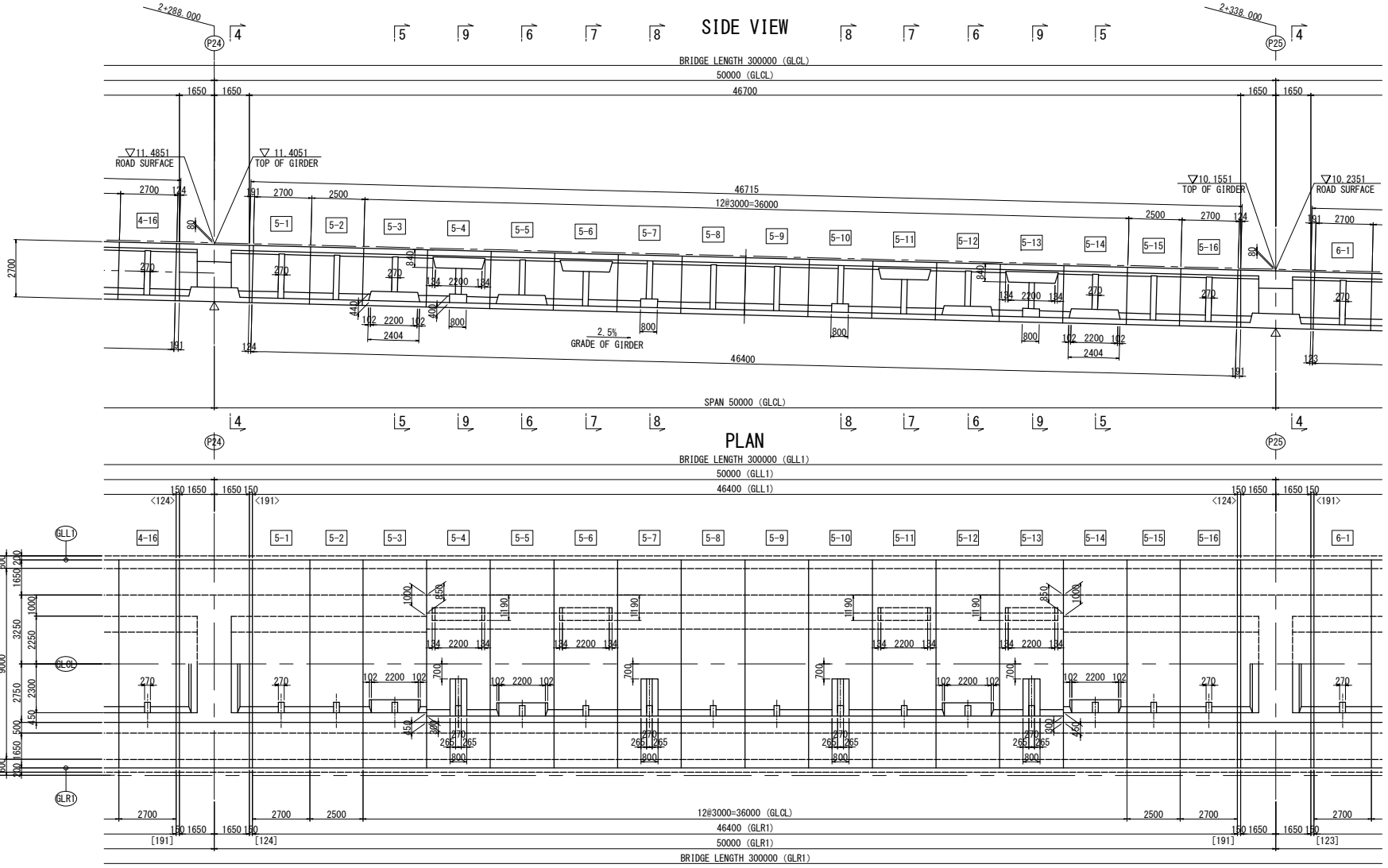
Notes : Values in < >/[ ] are at the top/bottom of the girder accordingly.

LOCATION <L>



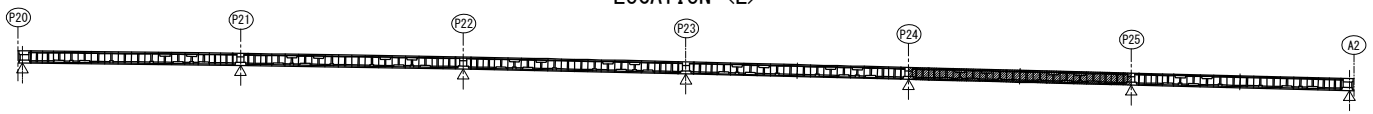
PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.		
	NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
PREPARED BY	M. OHYAMA			P20-A2 <L> STRUCTURAL OUTLINE OF GIRDER (4)	2
CHECKED BY	T. HAYAKAWA				DWG No.
APPROVED BY	Y. SANO				P02-PB-1014

P20-A2 <L> STRUCTURAL OUTLINE OF GIRDER (5) S=1:200



Notes : Values in < >/[ ] are at the top/bottom of the girder accordingly.

LOCATION <L>

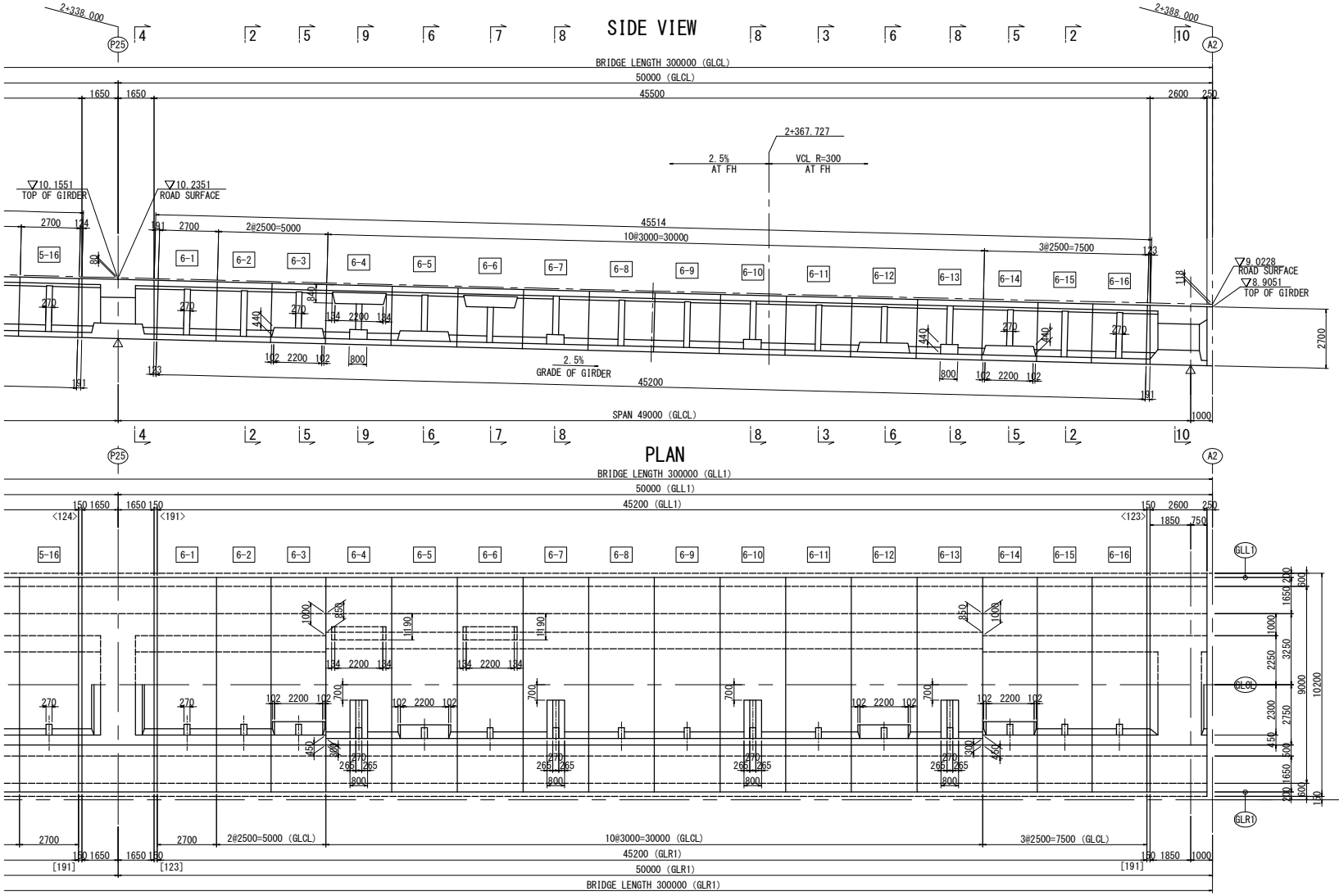


PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN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

	NAME	SIGNATURE	DATE
PREPARED BY	M. OHYAMA		
CHECKED BY	T. HAYAKAWA		
APPROVED BY	Y. SANO		

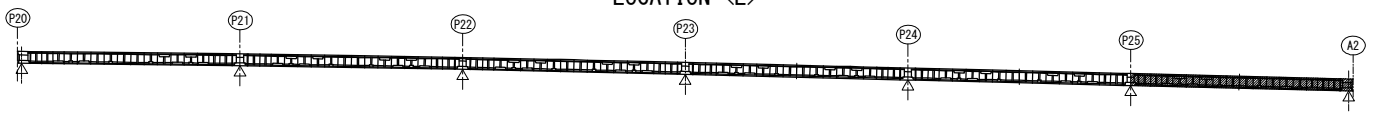
DRAWING TITLE	PACKAGE
P20-A2 <L> STRUCTURAL OUTLINE OF GIRDER (5)	2
	DWG No. P02-PB-1015

P20-A2 <L> STRUCTURAL OUTLINE OF GIRDER (6) S=1:200



Notes : Values in < >/[ ] are at the top/bottom of the girder accordingly.

LOCATION <L>



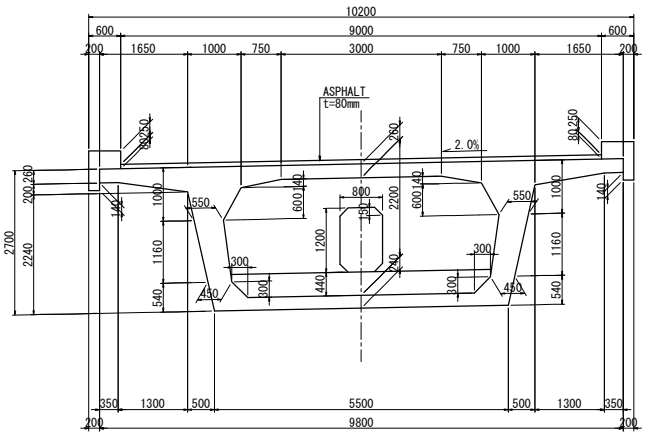
PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.		NAME / SIGNATURE / DATE
				PREPARED BY	M. OHYAMA
				CHECKED BY	T. HAYAKAWA
				APPROVED BY	Y. SANO

DRAWING TITLE	PACKAGE
P20-A2 <L> STRUCTURAL OUTLINE OF GIRDER (6)	2
	DWG No. P02-PB-1016

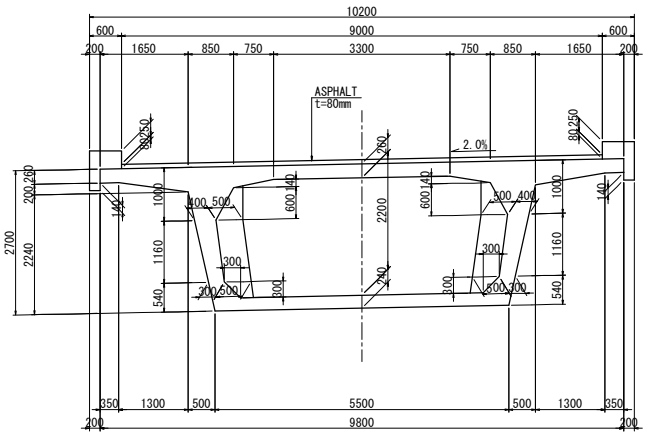
P20-A2 <L> STRUCTURAL OUTLINE OF GIRDER (7)

CROSS SECTIONS S=1:100

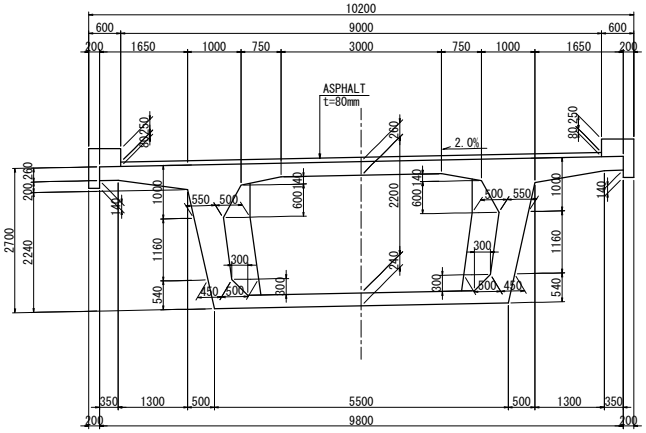
AT P20(1-1)



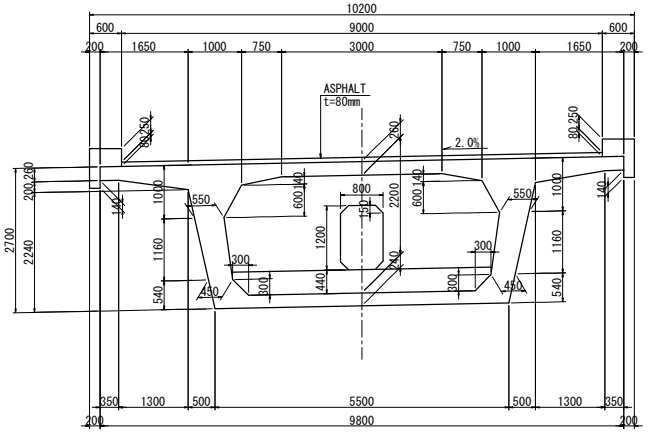
AT RIBS(3-3)



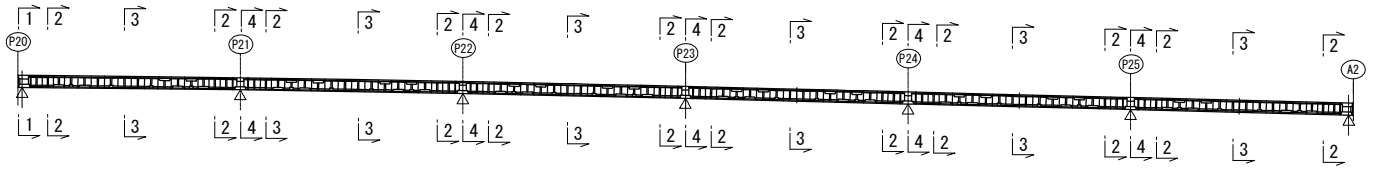
AT RIBS(2-2)



AT PIERS(4-4)



LOCATION <L>

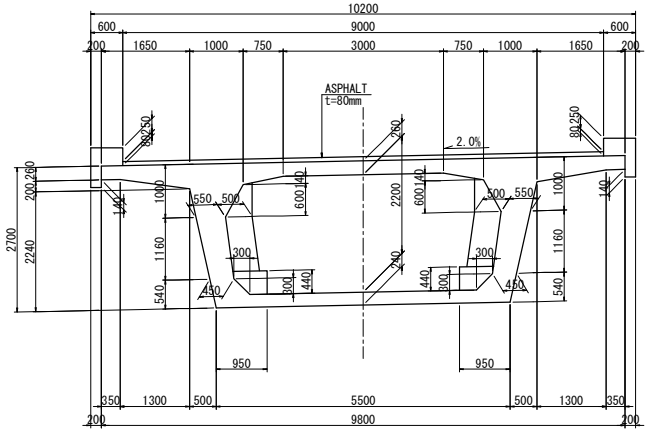


PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.		
				NAME / SIGNATURE / DATE	DRAWING TITLE / PACKAGE
				PREPARED BY: M. OHYAMA	P20-A2 <L> STRUCTURAL OUTLINE OF GIRDER (7) / 2
				CHECKED BY: T. HAYAKAWA	DWG No.
				APPROVED BY: Y. SANO	P02-PB-1017

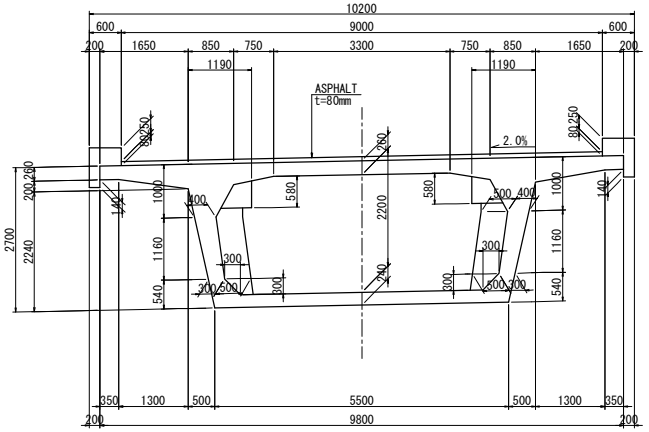
P20-A2 <L> STRUCTURAL OUTLINE OF GIRDER (8)

CROSS SECTIONS S=1:100

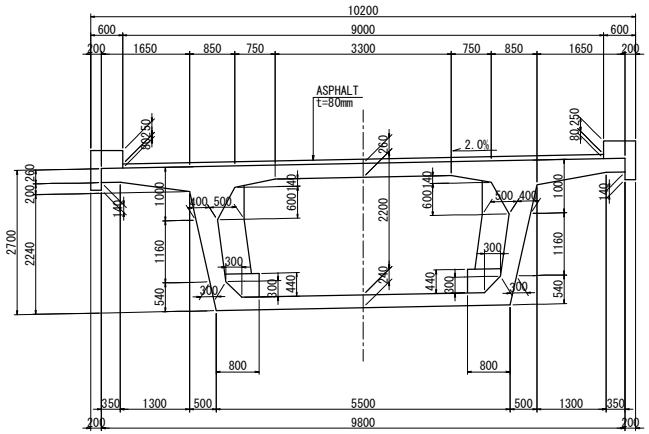
AT RIBS(5-5)



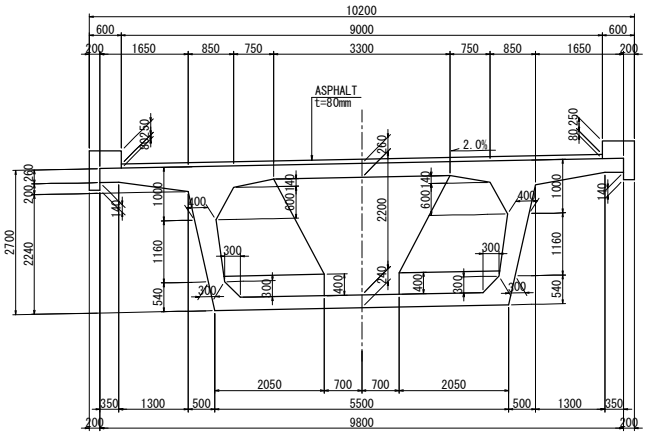
AT RIBS(7-7)



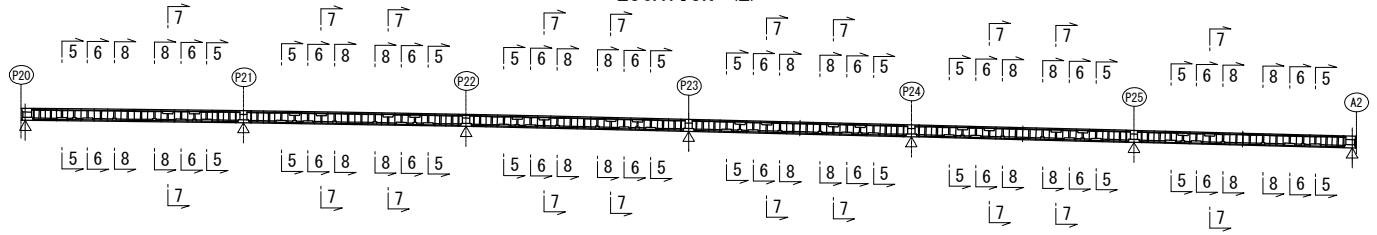
AT RIBS(6-6)



AT DEVIATOR(8-8)



LOCATION <L>

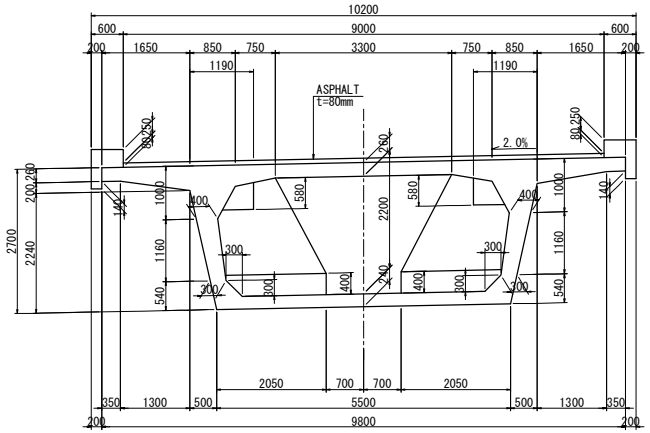


PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.		
	NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
PREPARED BY	M. OHYAMA			P20-A2 <L> STRUCTURAL OUTLINE OF GIRDER (8)	2
CHECKED BY	T. HAYAKAWA				DWG No.
APPROVED BY	Y. SANO				P02-PB-1017

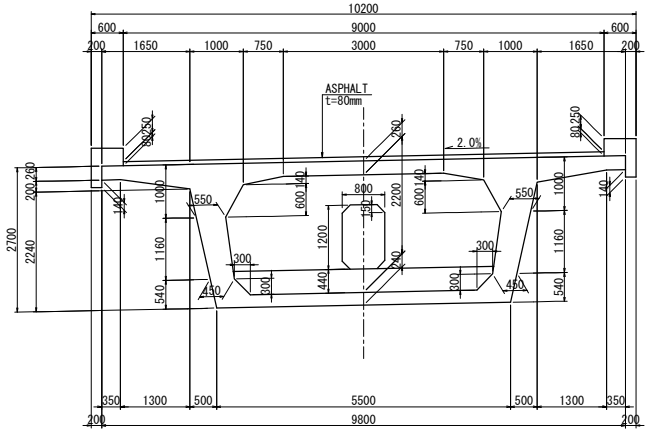
P20-A2 <L> STRUCTURAL OUTLINE OF GIRDER (9)

CROSS SECTIONS S=1:100

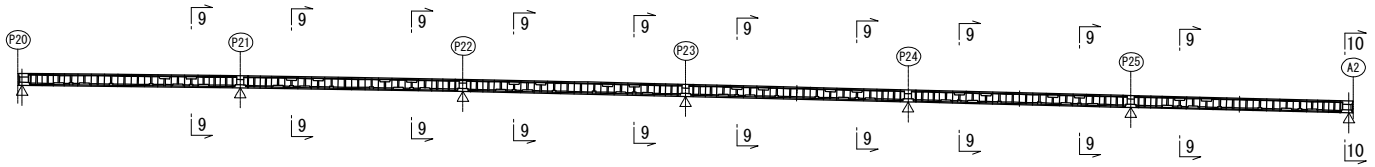
AT DEVIATOR(9-9)



AT A2(10-10)



LOCATION <L>

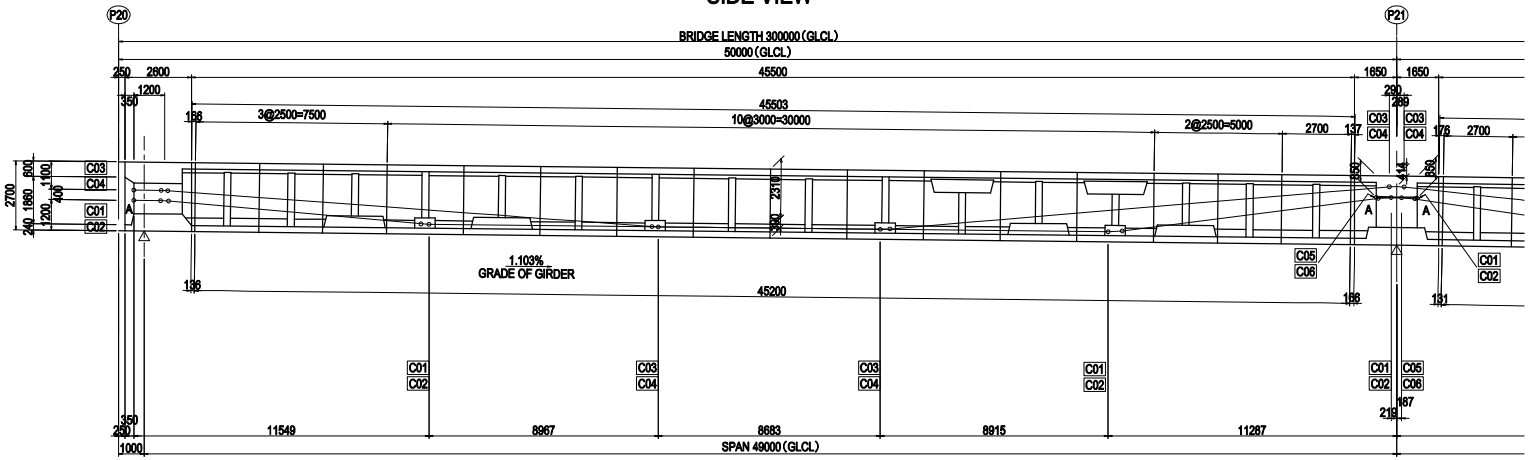


PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.		
				NAME / SIGNATURE / DATE	DRAWING TITLE / PACKAGE
				PREPARED BY: M. OHYAMA	P20-A2 <L> STRUCTURAL OUTLINE OF GIRDER (9) / 2
				CHECKED BY: T. HAYAKAWA	DWG No.
				APPROVED BY: Y. SANO	P02-PB-1017

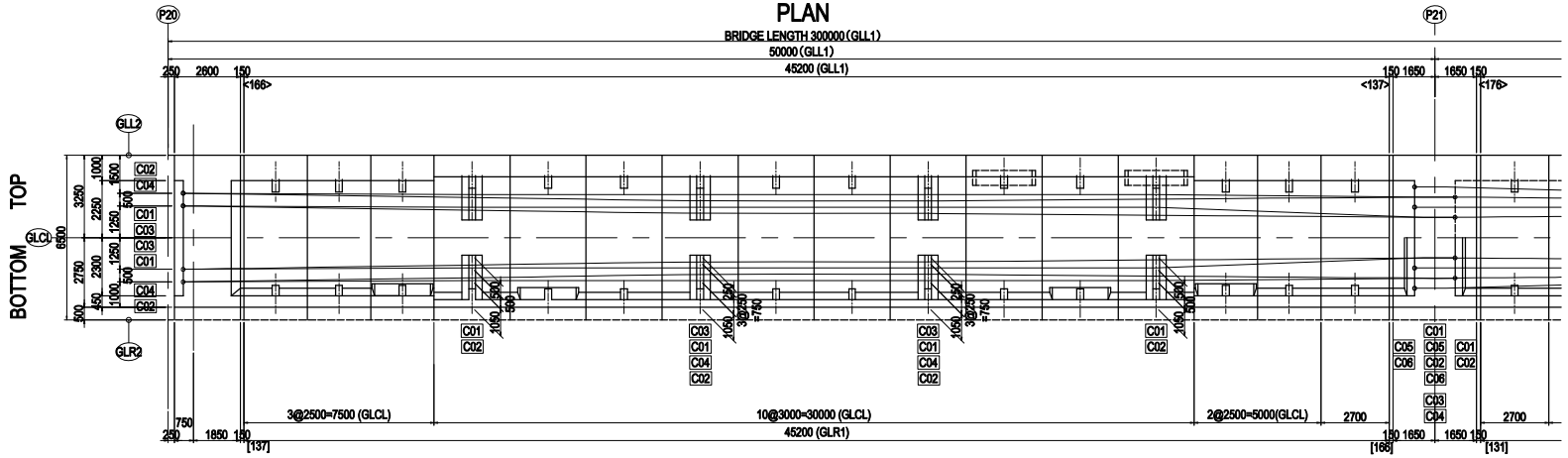
DETAIL OF PRESTERSSING P20-A2 <L,R> (1) [EXTERNAL TENDON]

S=1:200

SIDE VIEW

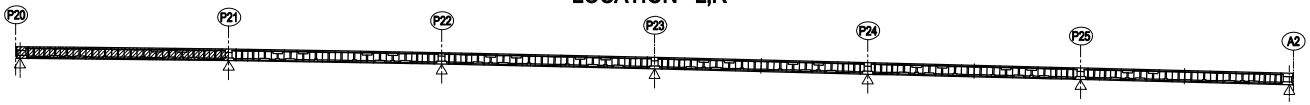


PLAN



Notes
-Values in < > / [ ] are at the top/bottom of the girder accordingly.
-Reinforcement for tendon anchorage such as grid rebar shall be arranged sufficiently.
-Jacking force = 1250 N/mm2
-A:Tension
-B:Fixed

LOCATION <L,R>

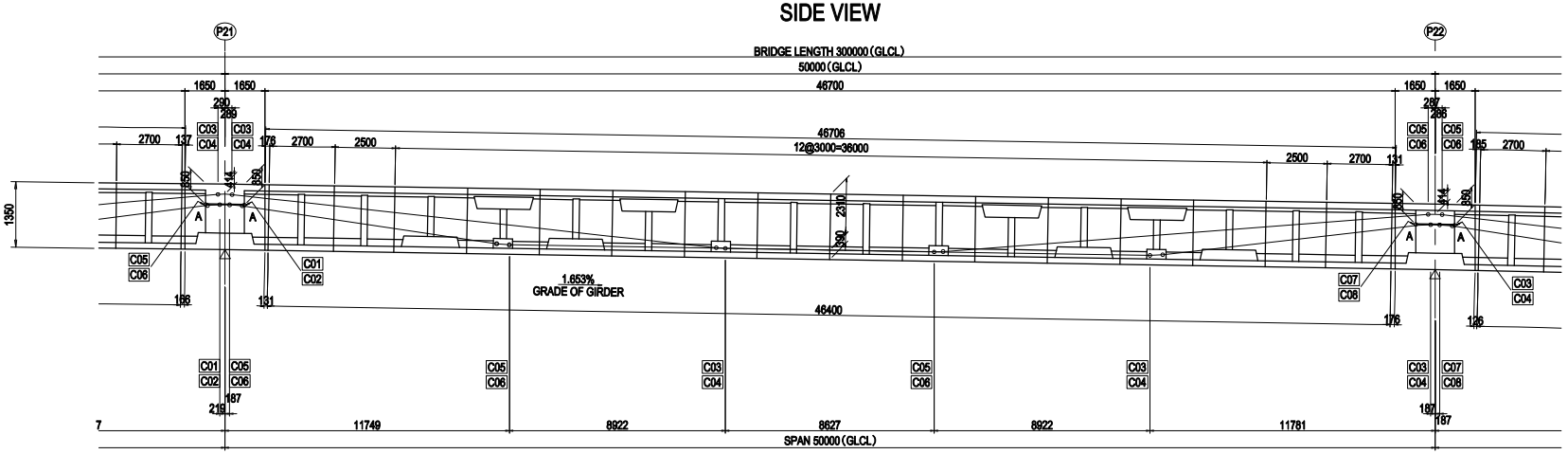


PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.		
	NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
PREPARED BY	M. OHYAMA		15 Jun.2017	DETAIL OF PRESTRESSING P20-A2 <L,R> (1) [EXTERNAL TENDON]	2
CHECKED BY	T. HAYAKAWA		20 Jun.2017		DWG No.
APPROVED BY	Y. SANO		21 Jun.2017		P2-PB-1101

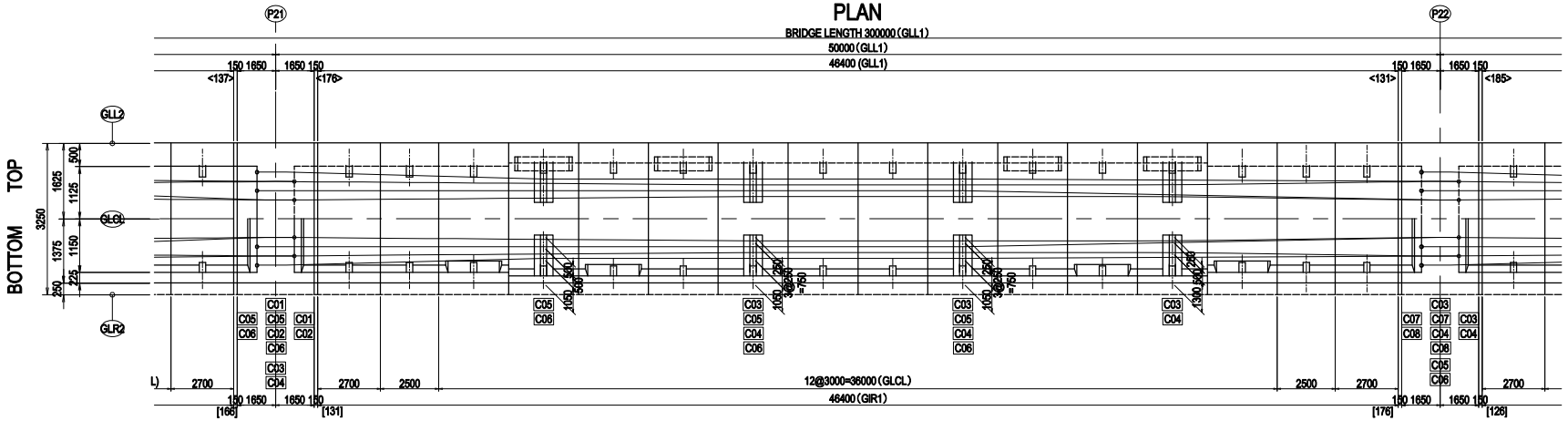
DETAIL OF PRESTERSSING P20-A2 <L,R> (2) [EXTERNAL TENDON]

S=1:200

SIDE VIEW

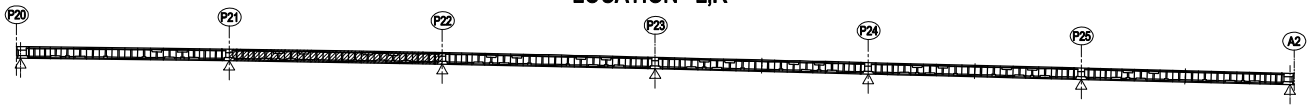


PLAN



Notes
-Values in < > / [ ] are at the top/bottom of the girder accordingly.
-Reinforcement for tendon anchorage such as grid rebar shall be arranged sufficiently.
-Jacking force = 1250 N/mm2
-A:Tension
-B:Fixed

LOCATION <L,R>

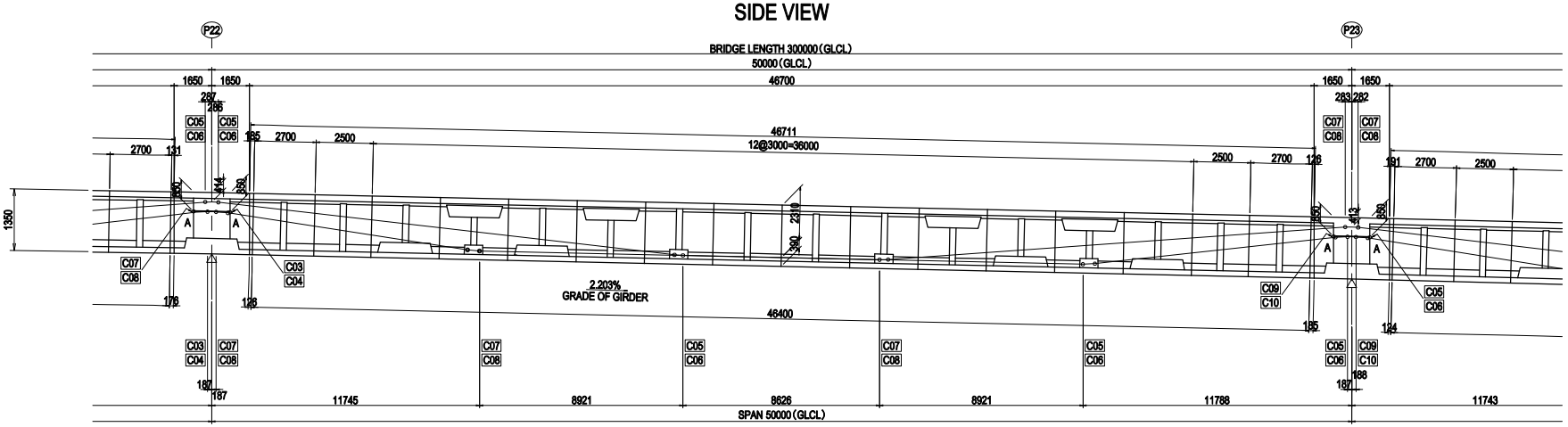


PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.		
				NAME / SIGNATURE / DATE	DRAWING TITLE / PACKAGE
				PREPARED BY: M. OHYAMA — 15 Jun.2017	DETAIL OF PRESTRESSING P20-A2 <L,R> (2) [EXTERNAL TENDON]
				CHECKED BY: T. HAYAKAWA — 20 Jun.2017	PACKAGE: 2
				APPROVED BY: Y. SANO — 21 Jun.2017	DWG No.: P2-PB-1102

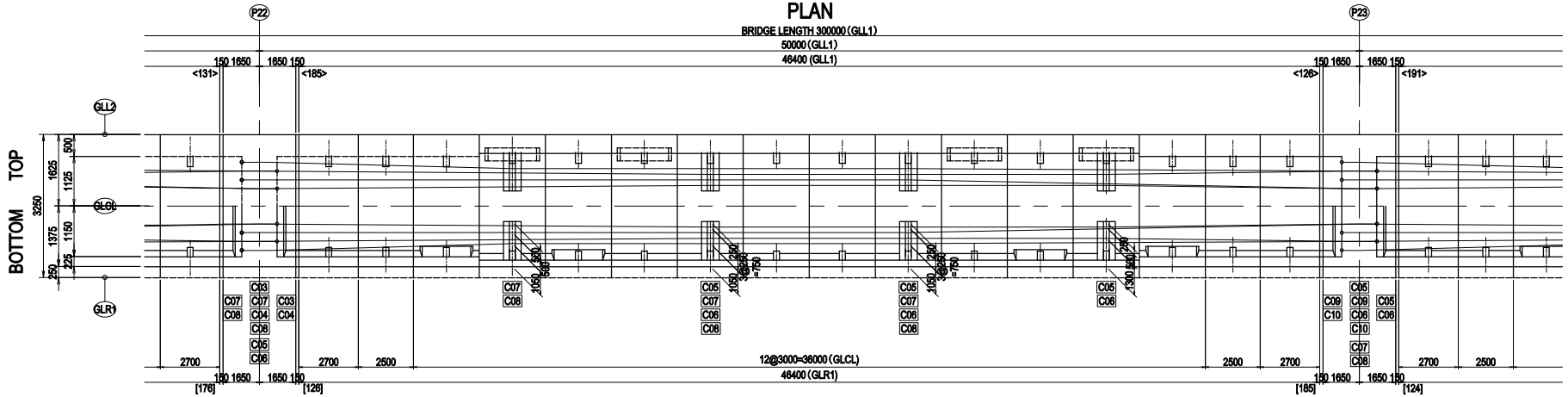
DETAIL OF PRESTERSSING P20-A2 <L,R> (3) [EXTERNAL TENDON]

S=1:200

SIDE VIEW

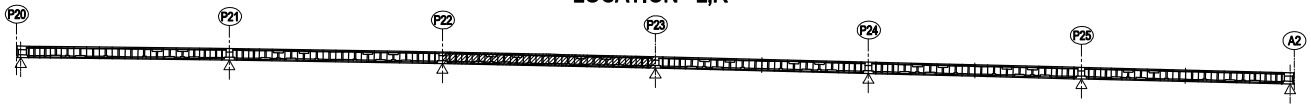


PLAN



Notes
-Values in < > / [ ] are at the top/bottom of the girder accordingly.
-Reinforcement for tendon anchorage such as grid rebar shall be arranged sufficiently.
-Jacking force = 1250 N/mm2
-A:Tension
-B:Fixed

LOCATION <L,R>



PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.	DRAWING TITLE: DETAIL OF PRESTRESSING P20-A2 <L,R> (3) [EXTERNAL TENDON]	PACKAGE: 2

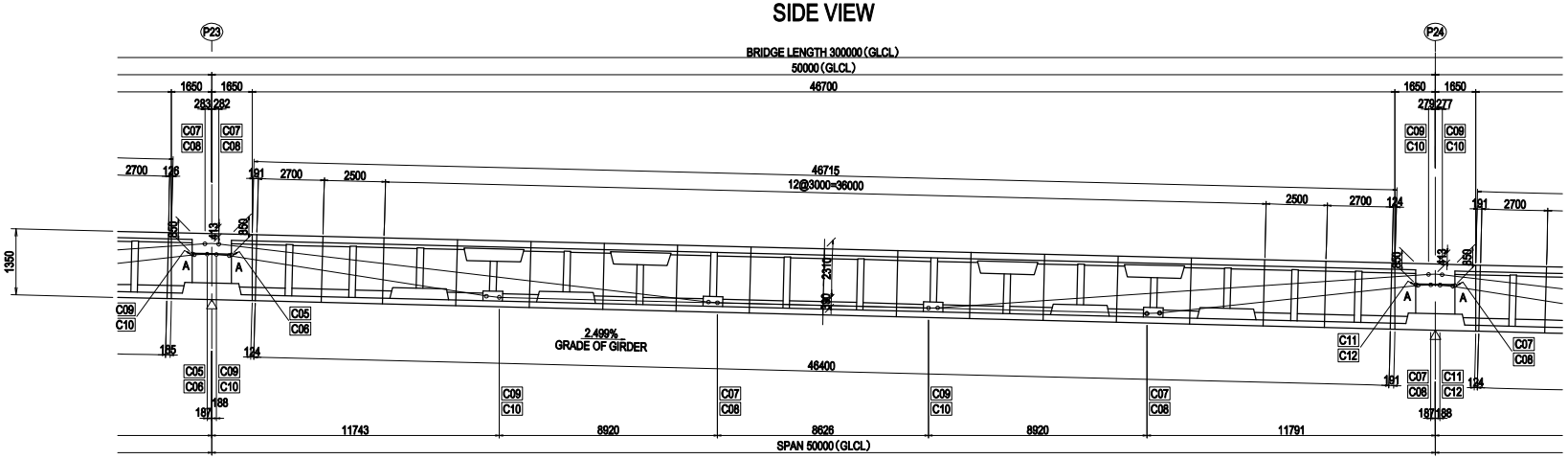
	NAME	SIGNATURE	DATE
PREPARED BY	M. OHYAMA		15 Jun.2017
CHECKED BY	T. HAYAKAWA		20 Jun.2017
APPROVED BY	Y. SANO		21 Jun.2017

DWG No. P2-PB-1103

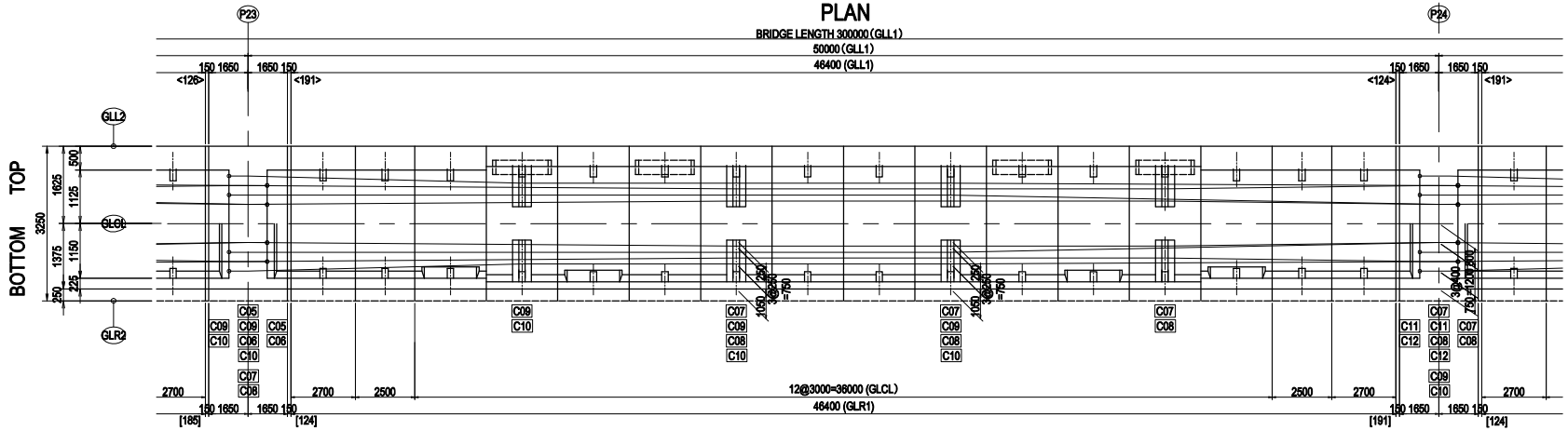
DETAIL OF PRESTERSSING P20-A2 <L,R> (4) [EXTERNAL TENDON]

S=1:200

SIDE VIEW

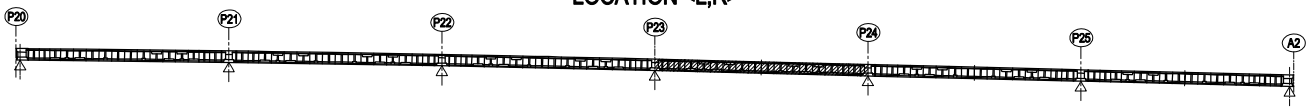


PLAN



Notes
-Values in < > / [ ] are at the top/bottom of the girder accordingly.
-Reinforcement for tendon anchorage such as grid rebar shall be arranged sufficiently.
-Jacking force = 1250 N/mm2
-A:Tension
-B:Fixed

LOCATION <L,R>



PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.	DRAWING TITLE: DETAIL OF PRESTRESSING P20-A2 <L> (4) [EXTERNAL TENDON]	PACKAGE: 2

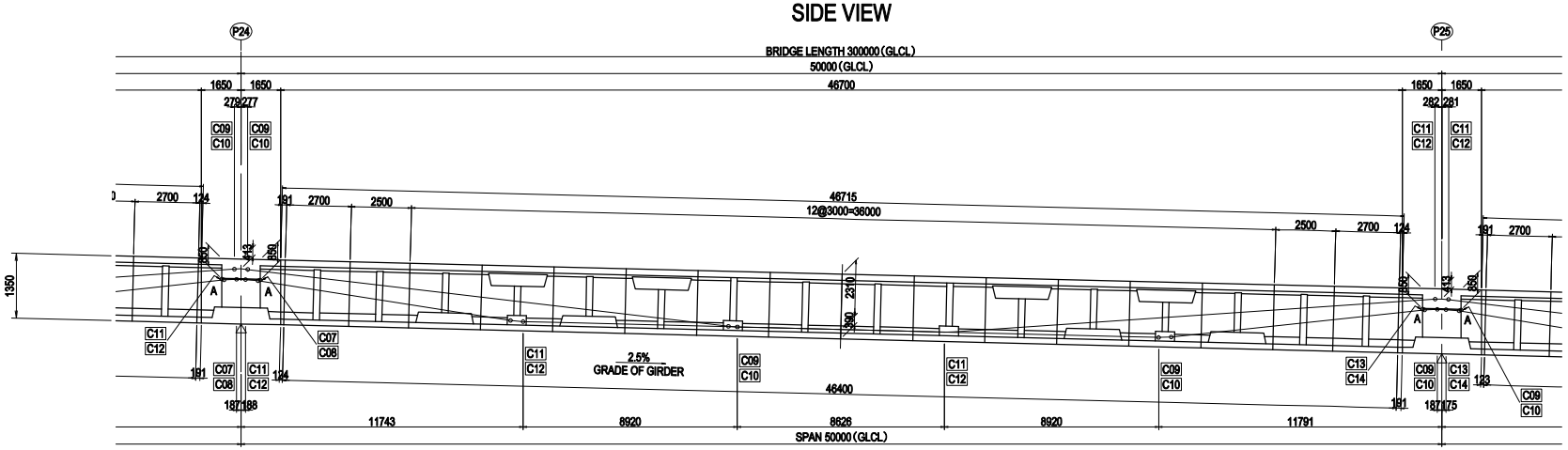
	NAME	SIGNATURE	DATE
PREPARED BY	M. OHYAMA		15 Jun.2017
CHECKED BY	T. HAYAKAWA		20 Jun.2017
APPROVED BY	Y. SANO		21 Jun.2017

DWG No. P2-PB-1104

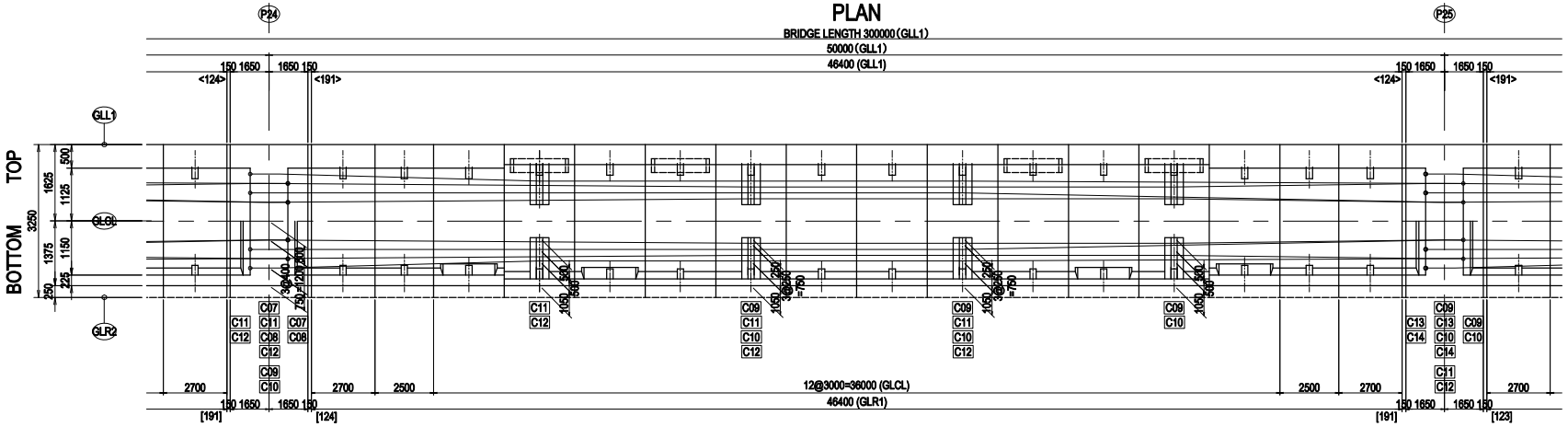
DETAIL OF PRESTERSSING P20-A2 <L,R> (5) [EXTERNAL TENDON]

S=1:200

SIDE VIEW

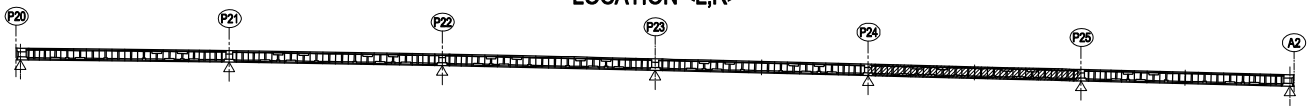


PLAN



Notes
-Values in < > / [ ] are at the top/bottom of the girder accordingly.
-Reinforcement for tendon anchorage such as grid rebar shall be arranged sufficiently.
-Jacking force = 1250 N/mm2
-A:Tension
-B:Fixed

LOCATION <L,R>



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.

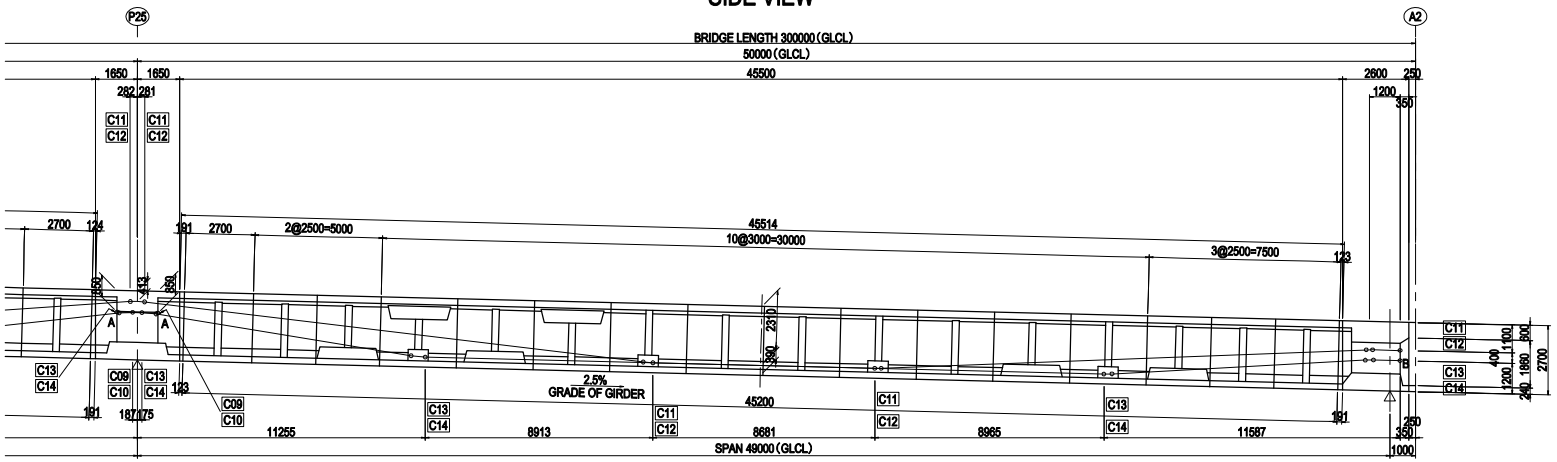
	NAME	SIGNATURE	DATE
PREPARED BY	M. OHYAMA		15 Jun.2017
CHECKED BY	T. HAYAKAWA		20 Jun.2017
APPROVED BY	Y. SANO		21 Jun.2017

DRAWING TITLE	PACKAGE
DETAIL OF PRESTRESSING P20-A2 <L,R> (5) [EXTERNAL TENDON]	2
	DWG No.
	P2-PB-1105

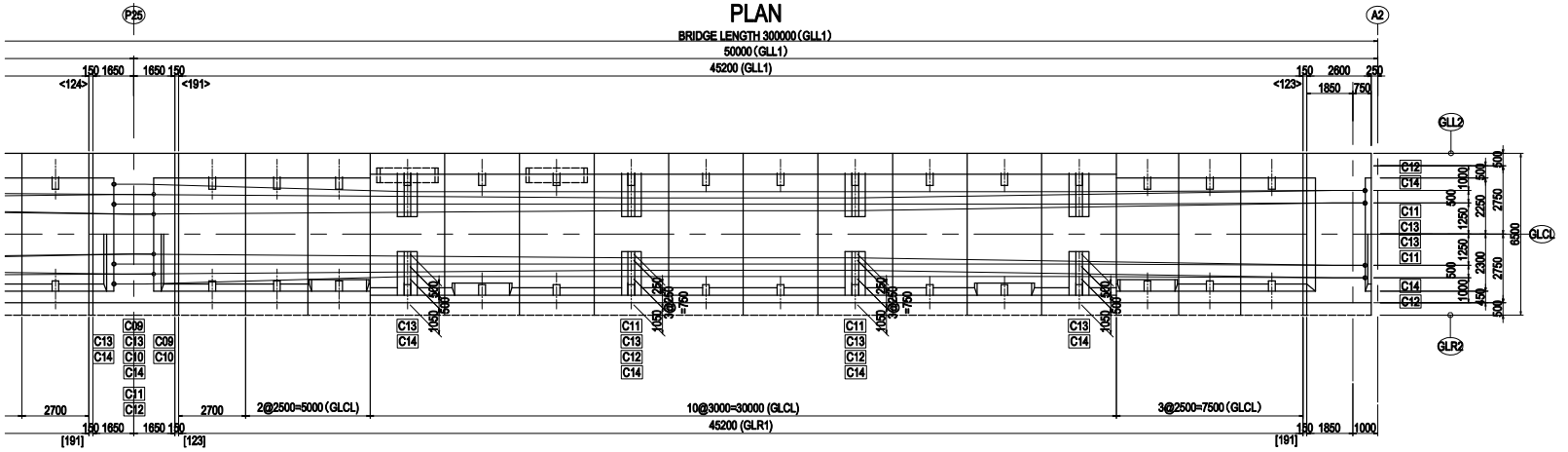
DETAIL OF PRESTERSSING P20-A2 <L,R> (6) [EXTERNAL TENDON]

S=1:200

SIDE VIEW

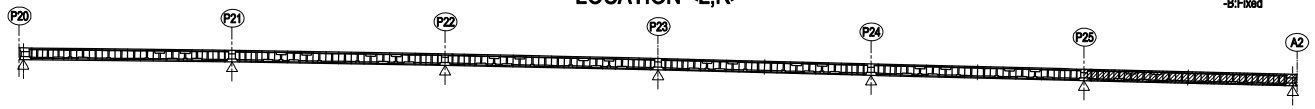


PLAN



Notes
-Values in < > / [ ] are at the top/bottom of the girder accordingly.
-Reinforcement for tendon anchorage such as grid rebar shall be arranged sufficiently.
-Jacking force = 1250 N/mm2
-A:Tension
-B:Fixed

LOCATION <L,R>



PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.		
				PREPARED BY: M. OHYAMA	15 Jun.2017
				CHECKED BY: T. HAYAKAWA	20 Jun.2017
				APPROVED BY: Y. SANO	21 Jun.2017

DRAWING TITLE: DETAIL OF PRESTRESSING P20-A2 <L,R> (6) [EXTERNAL TENDON]

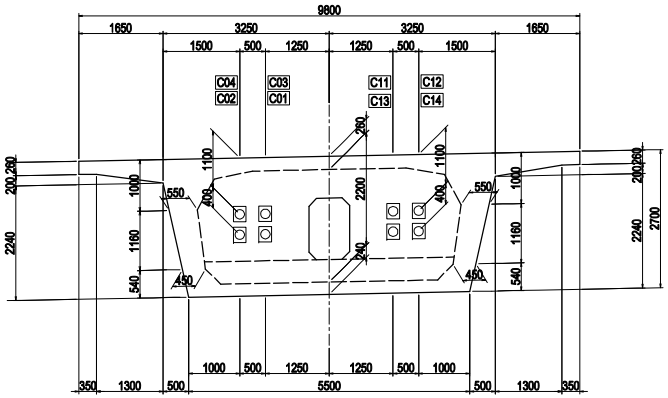
PACKAGE: 2

DWG No.: P2-PB-1106

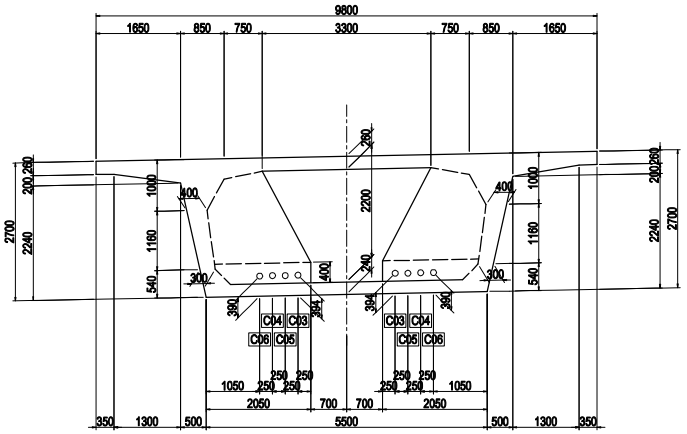
DETAIL OF PRESTRESSING P20-A2 <L,R> (7) [EXTERNAL TENDON]

CROSS SECTIONS S=1:100

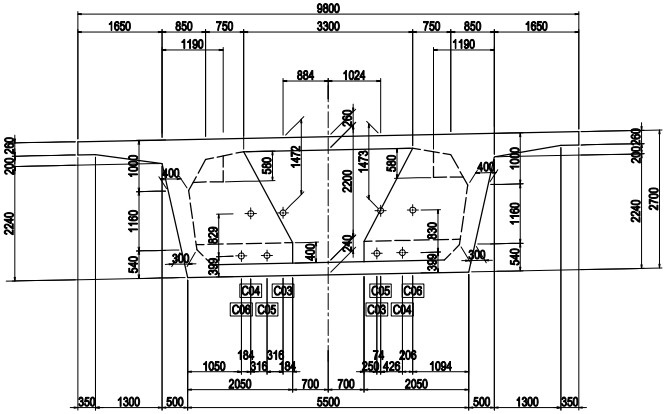
1 - 1　　8 - 8



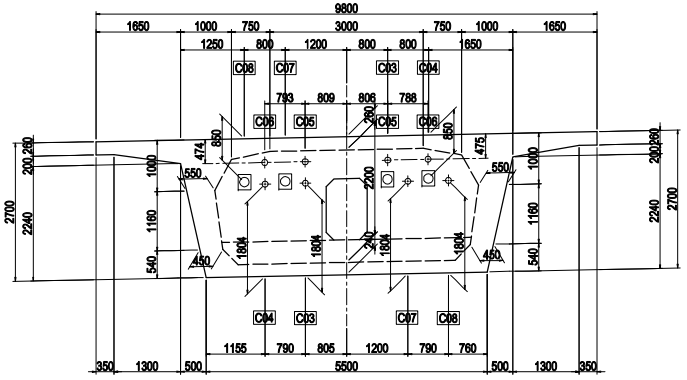
3 - 3　　4 - 4



2 - 2　　5 - 5

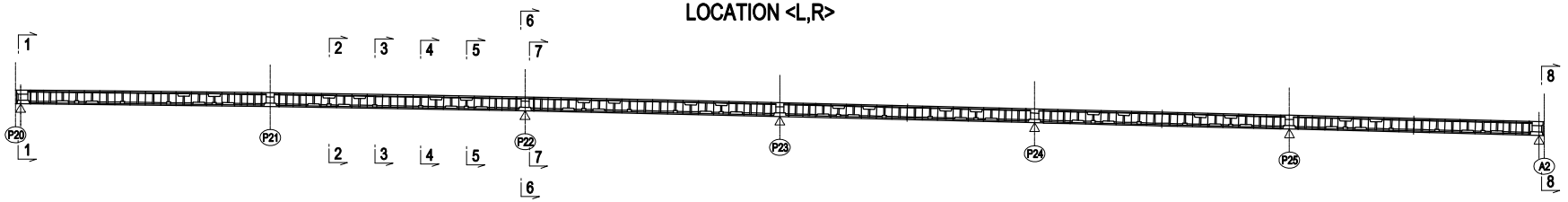


6 - 6　　7 - 7



NOTES: In case of the deviator interferes the cable, a hole or notch for cable passing is should be arranged in the deviator, and the hole and notch should be reinforced properly.

LOCATION <L,R>



PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.	DRAWING TITLE: DETAIL OF PRESTRESSING P20-A2 <L,R> (7) [EXTERNAL TENDON]

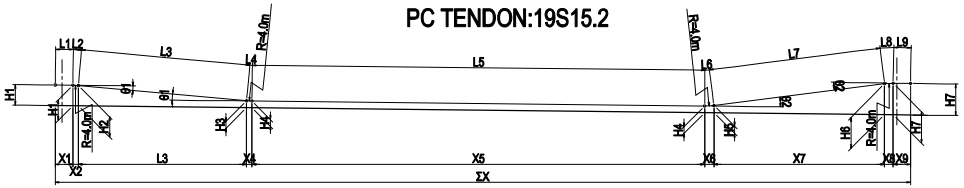
	NAME	SIGNATURE	DATE
PREPARED BY	M. OHYAMA		15 Jun.2017
CHECKED BY	T. HAYAKAWA		20 Jun.2017
APPROVED BY	Y. SANO		21 Jun.2017

PACKAGE	
	2
DWG No.	
	P2-PB-1107

DETAIL OF PRESTRESSING P20-A2 <L,R> (8) [EXTERNAL TENDON]

S=1:300

PC TENDON:19S15.2



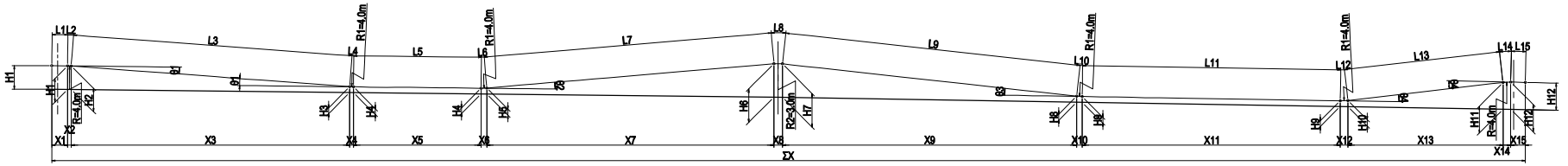
PC TENDON:19S15.2 (mm)

CABLE NUMBER	H1	H2	H3	H4	H5	H6	H7	X1	X2	X3	X4	X5	X6	X7	X8	X9	ΣX
C01	1200	1187	403	390	428	1812	1850	1042	316	9874	316	26564	549	10015	549	975	50200
C02	1200	1187	403	390	428	1812	1850	1042	316	9874	316	26564	549	10015	549	975	50200
C13	1850	1812	428	390	430	1187	1200	1042	316	9912	316	26559	546	9988	546	975	50200
C14	1850	1812	428	390	430	1187	1200	1042	316	9912	316	26559	546	9988	546	975	50200

(mm)

CABLE NUMBER	θ1	θ2	R	L1	L2	L3	L4	L5	L6	L7	L8	L9	TOTAL LENGTH	NUMBER
C03	4.54028°	7.88167°	4000	1042	317	9915	317	26566	550	10095	550	975	50327	2
C04	4.54028°	7.88167°	4000	1042	317	9915	317	26566	550	10095	550	975	50327	2
C05	4.53417°	7.86194°	4000	1042	317	9927	317	26567	549	10121	549	976	50365	2
C06	4.53417°	7.86194°	4000	1042	317	9927	317	26567	549	10121	549	976	50365	2

PC TENDON:19S15.2



PC TENDON:19S15.2 (mm)

CABLE BUMBER	H1	H2	H3	H4	H5	H6	H7	H8	H9	H10	H11	H12	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	ΣX
C03	1600	1592	398	390	408	2272	2265	406	390	424	1816	1850	1074	251	18938	251	8683	380	19531	580	20019	362	17549	525	10545	525	987	100200
C04	1600	1592	398	390	408	2272	2265	406	390	424	1816	1850	1074	251	18938	251	8683	380	19531	580	20019	362	17549	525	10545	525	987	100200
C05	1850	1816	424	390	407	2273	2273	407	390	424	1816	1850	987	523	10516	523	17549	371	20044	572	20010	370	17547	525	10551	525	987	101600
C06	1850	1816	424	390	407	2273	2273	407	390	424	1816	1850	987	523	10516	523	17549	371	20044	572	20010	370	17547	525	10551	525	987	101600
C07	1850	1816	424	390	407	2274	2274	407	390	424	1816	1850	987	522	10513	522	17547	371	20054	565	20011	370	17546	525	10555	525	987	101600
C08	1850	1816	424	390	407	2274	2274	407	390	424	1816	1850	987	522	10513	522	17547	371	20054	565	20011	370	17546	525	10555	525	987	101600
C09	1850	1816	424	390	407	2274	2274	407	390	424	1816	1850	987	522	10511	522	17546	371	20061	556	20016	370	17546	525	10555	525	987	101600
C10	1850	1816	424	390	407	2274	2274	407	390	424	1816	1850	987	522	10511	522	17546	371	20061	556	20016	370	17546	525	10555	525	987	101600
C11	1850	1816	424	390	407	2274	2273	408	390	398	1592	1600	988	522	10512	522	17546	371	20058	563	19508	379	8681	251	18974	251	1074	100200
C12	1850	1816	424	390	407	2274	2273	408	390	398	1592	1600	988	522	10512	522	17546	371	20058	563	19508	379	8681	251	18974	251	1074	100200

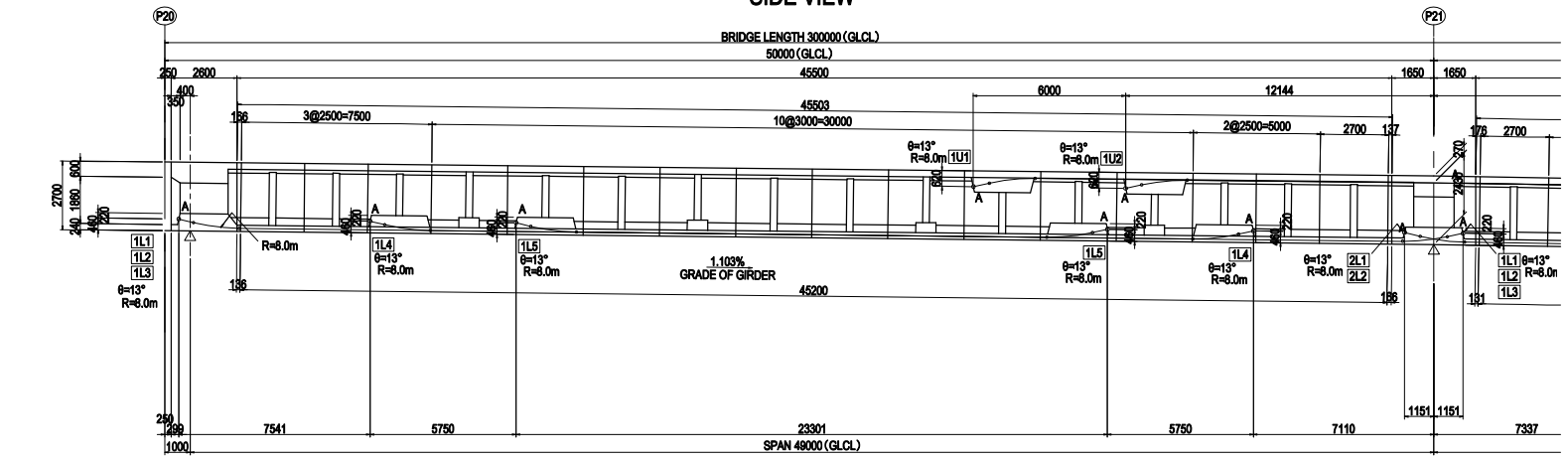
(mm)

CABLE NUMBER	θ1	θ2	θ3	θ4	R1	R2	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	TOTAL LENGTH	NUMBER
C03	3.615°	5.45722°	5.31722°	7.52889°	4000	3000	1074	252	18991	252	8683	381	19600	581	20131	371	17551	526	10615	526	987	100521	2
C04	3.615°	5.45722°	5.31722°	7.52889°	4000	3000	1074	252	18991	252	8683	381	19600	581	20131	371	17551	526	10615	526	987	100521	2
C05	7.51778°	5.32528°	5.31472°	7.52833°	4000	3000	987	525	10632	525	17551	372	20103	574	20142	371	17551	526	10615	526	987	101987	2
C06	7.51778°	5.32528°	5.31472°	7.52833°	4000	3000	987	525	10632	525	17551	372	20103	574	20142	371	17551	526	10615	526	987	101987	2
C07	7.51361°	5.32556°	5.31306°	7.5275°	4000	3000	988	525	10638	525	17551	372	20104	566	20151	371	17551	526	10615	526	987	101996	2
C08	7.51361°	5.32556°	5.31306°	7.5275°	4000	3000	988	525	10638	525	17551	372	20104	566	20151	371	17551	526	10615	526	987	101996	2
C09	7.51083°	5.32528°	5.31306°	7.5275°	4000	3000	988	524	10641	524	17551	372	20108	557	20155	371	17551	526	10615	525	987	101995	2
C10	7.51083°	5.32528°	5.31306°	7.5275°	4000	3000	988	524	10641	524	17551	372	20108	557	20155	371	17551	526	10615	525	987	101995	2
C11	7.51083°	5.32528°	5.445°	3.60472°	4000	3000	988	524	10641	524	17551	372	20104	564	19649	380	8684	252	18988	252	1075	100548	2
C12	7.51083°	5.32528°	5.445°	3.60472°	4000	3000	988	524	10641	524	17551	372	20104	564	19649	380	8684	252	18988	252	1075	100548	2

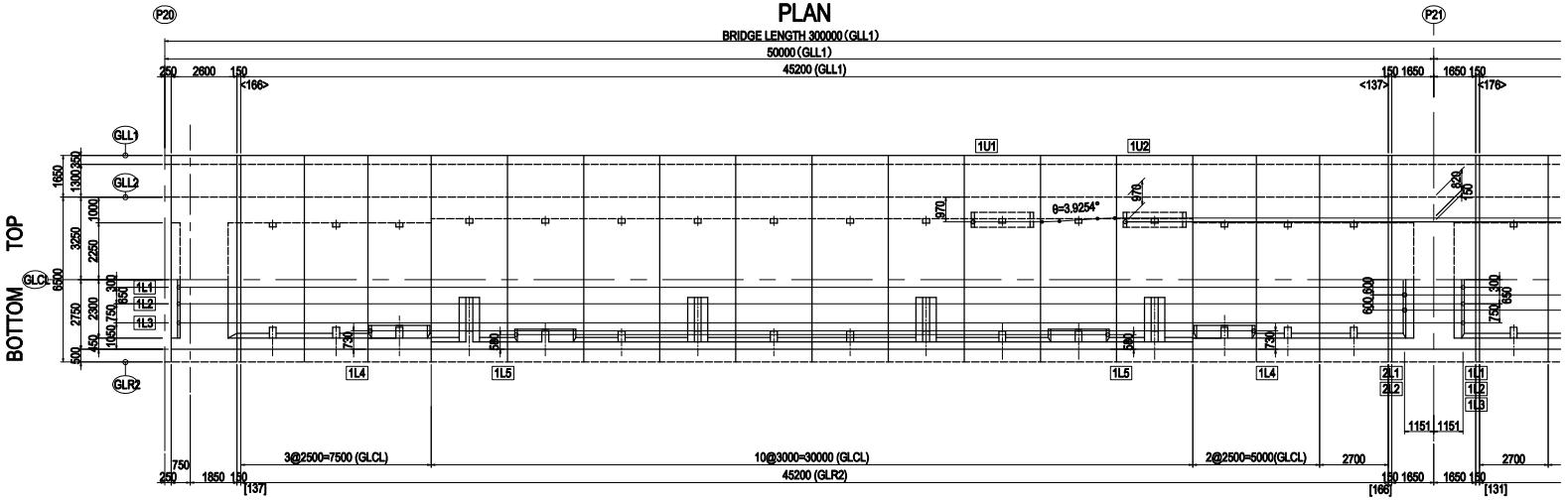
PROJECT NAME	FINANCED BY	COUNTERPART	JICA STUDY TEAM		NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	JAPAN INTERNATIONAL COOPERATION AGENCY	REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.	PREPARED BY	M. OHYAMA		15 Jun.2017	DETAIL OF PRESTRESSING P20-A2 <L,R> (8) [EXTERNAL TENDON]	2
				CHECKED BY	T. HAYAKAWA		20 Jun.2017		DWG No.
				APPROVED BY	Y. SANO		21 Jun.2017		P2-PB-1108

DETAIL OF PRESTRESSING P20-A2 <L,R> (9) [INTERNAL TENDON] S=1:200

SIDE VIEW

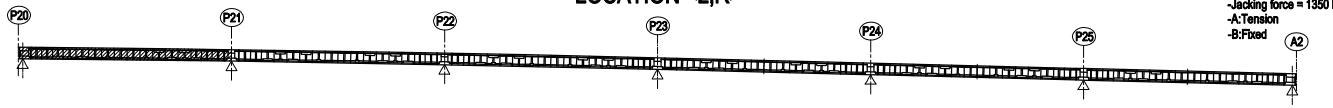


PLAN



Notes
-Values in < > / [ ] are at the top/bottom of the girder accordingly.
-Reinforcement for tendon anchorage such as grid rebar shall be arranged sufficiently.
-Bending radios of PC tendon in Plan is 10m.
-Jacking force = 1350 N/mm2
-A:Tension
-B:Fixed

LOCATION <L,R>

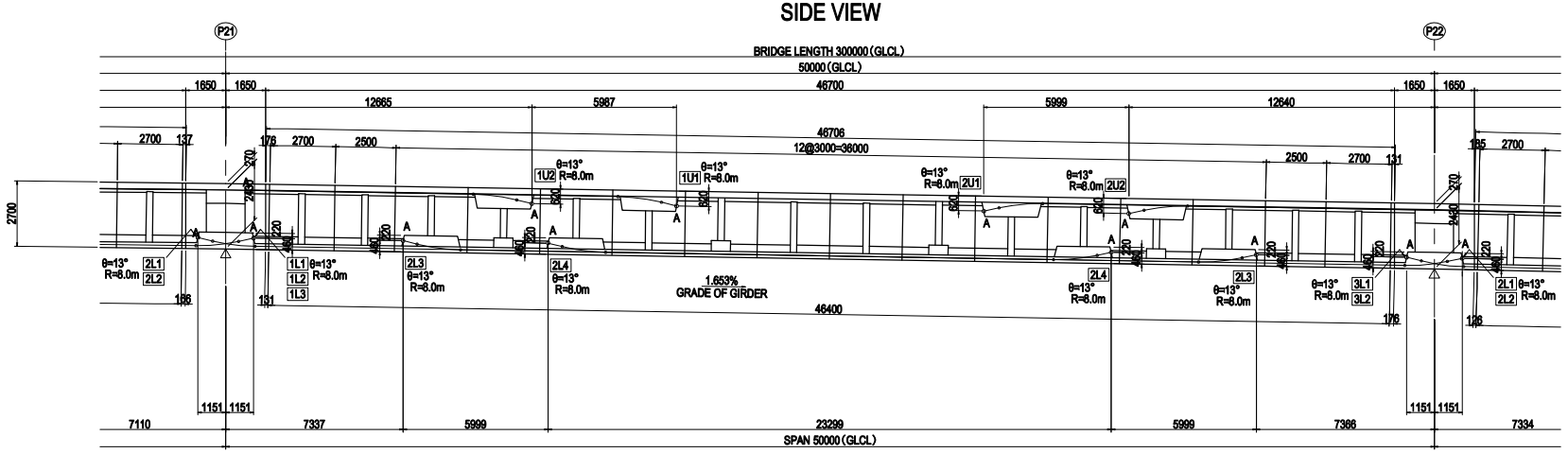


PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN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

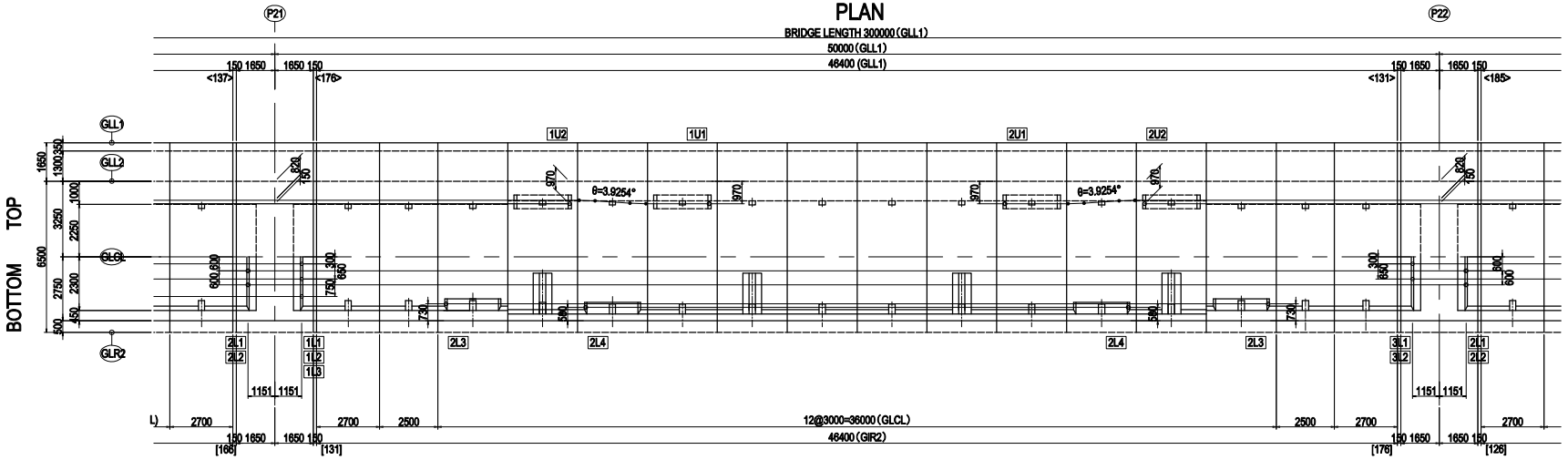
	NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
PREPARED BY	M. OHYAMA		15 Jun.2017	DETAIL OF PRESTRESSING P20-A2 <L,R> (9) [INTERNAL TENDON]	2
CHECKED BY	T. HAYAKAWA		20 Jun.2017		DWG No.
APPROVED BY	Y. SANO		21 Jun.2017		P2-PB-1109

DETAIL OF PRESTRESSING P20-A2 <L,R> (10) [INTERNAL TENDON] S=1:200

SIDE VIEW

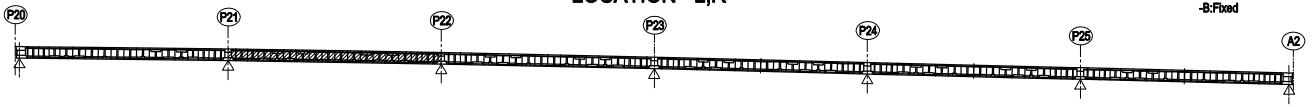


PLAN



Notes
-Values in < > / [ ] are at the top/bottom of the girder accordingly.
-Reinforcement for tendon anchorage such as grid rebar shall be arranged sufficiently.
-Bending radios of PC tendon in Plan is 10m.
-Jacking force = 1350 N/mm2
-A:Tension
-B:Fixed

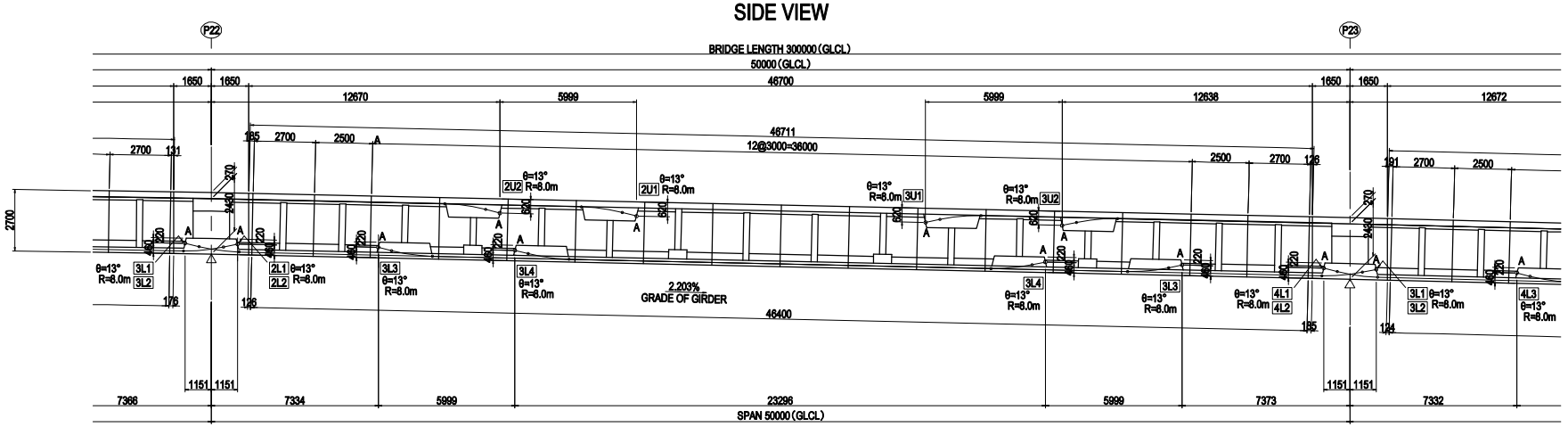
LOCATION <L,R>



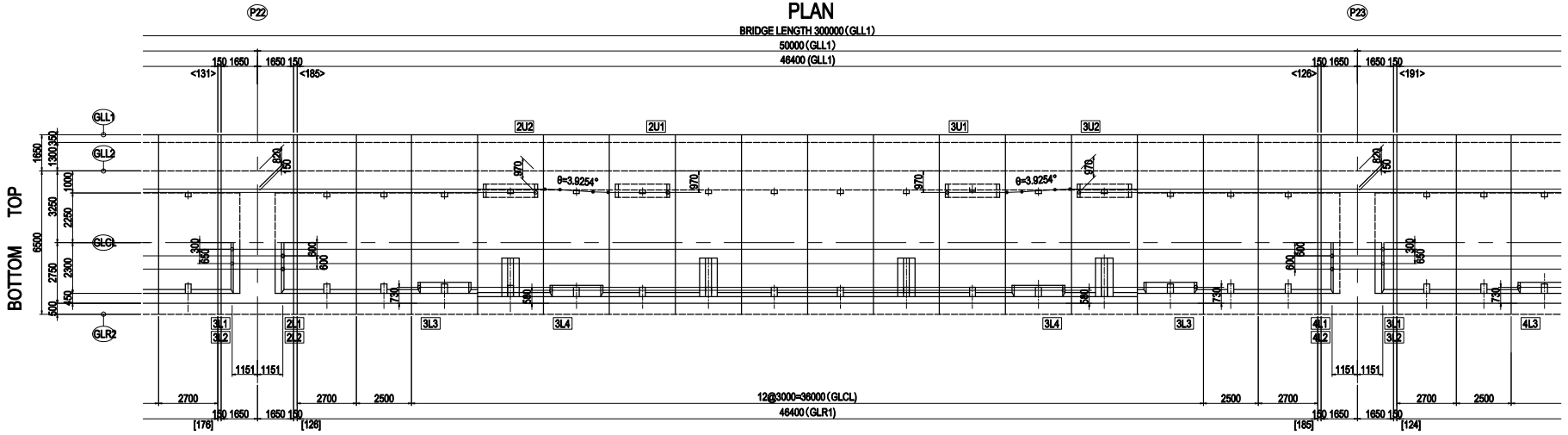
PROJECT NAME	FINANCED BY	COUNTERPART	JICA STUDY TEAM		NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	JAPAN INTERNATIONAL COOPERATION AGENCY	REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.	PREPARED BY	M. OHYAMA		15 Jun.2017	DETAIL OF PRESTRESSING P20-A2 <L,R> (10) [INTERNAL TENDON]	2
				CHECKED BY	T. HAYAKAWA		20 Jun.2017		DWG No.
				APPROVED BY	Y. SANO		21 Jun.2017		P2-PB-1110

DETAIL OF PRESTRESSING P20-A2 <L,R> (11) [INTERNAL TENDON] S=1:200

SIDE VIEW

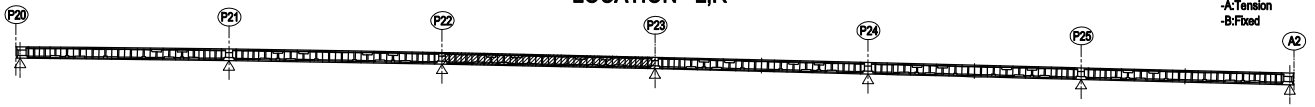


PLAN



Notes
-Values in < > / [ ] are at the top/bottom of the girder accordingly.
-Reinforcement for tendon anchorage such as grid rebar shall be arranged sufficiently.
-Bending radius of PC tendon in Plan is 10m.
-Jacking force = 1350 N/mm2
-A:Tension
-B:Fixed

LOCATION <L,R>



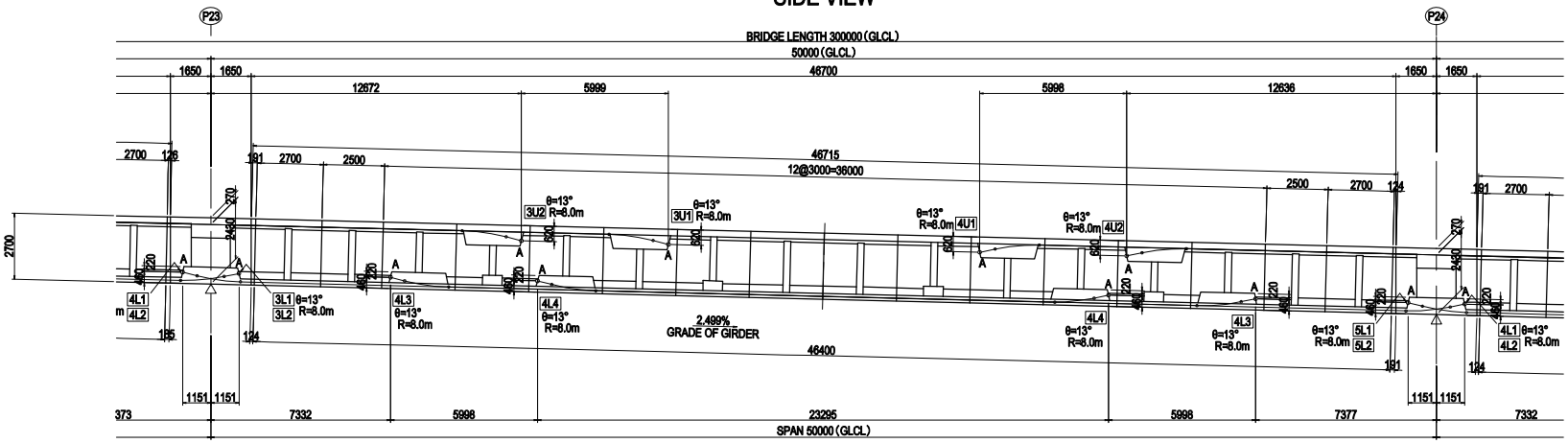
PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN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

	NAME	SIGNATURE	DATE
PREPARED BY	M. OHYAMA		15 Jun.2017
CHECKED BY	T. HAYAKAWA		20 Jun.2017
APPROVED BY	Y. SANO		21 Jun.2017

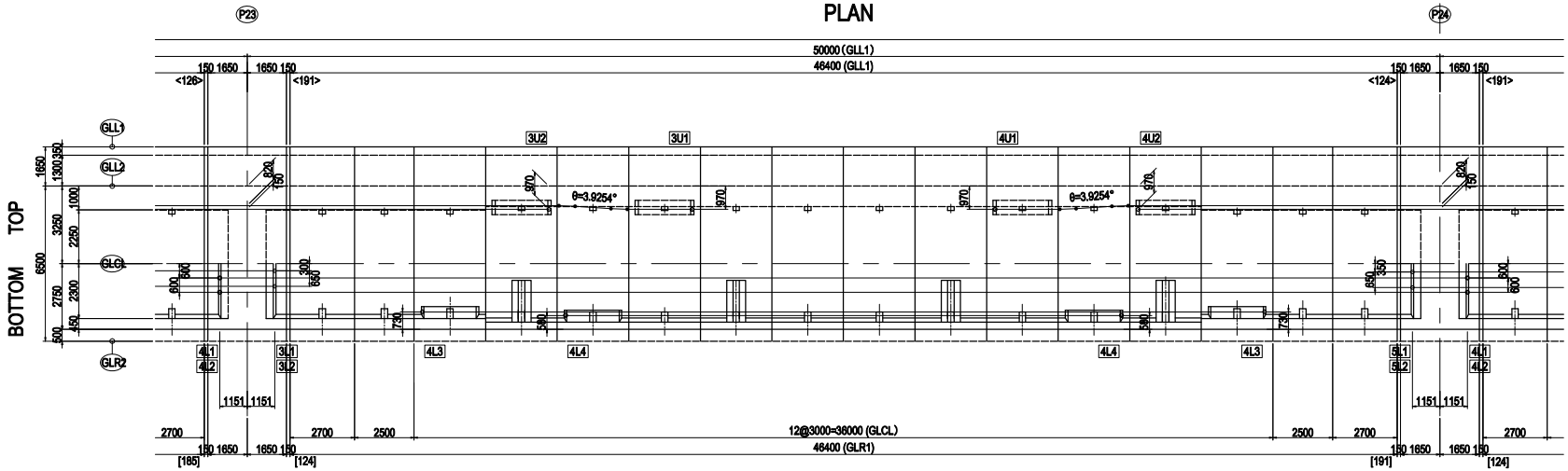
DRAWING TITLE	PACKAGE
DETAIL OF PRESTRESSING P20-A2 <L,R> (11) [INTERNAL TENDON]	2
	DWG No. P2-PB-1111

DETAIL OF PRESTRESSING P20-A2 <L,R> (12) [INTERNAL TENDON] S=1:200

SIDE VIEW

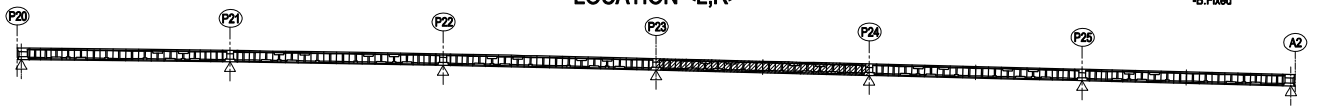


PLAN



Notes
-Values in < > / [ ] are at the top/bottom of the girder accordingly.
-Reinforcement for tendon anchorage such as grid rebar shall be arranged sufficiently.
-Bending radius of PC tendon in Plan is 10m.
-Jacking force = 1350 N/mm2
-A:Tension
-B:Fixed

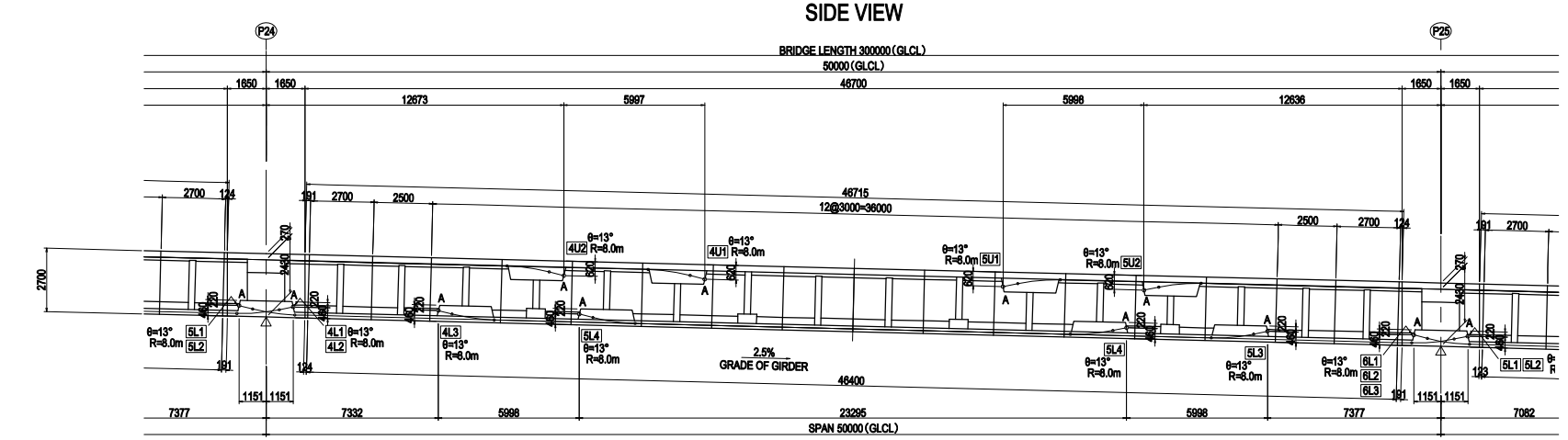
LOCATION <L,R>



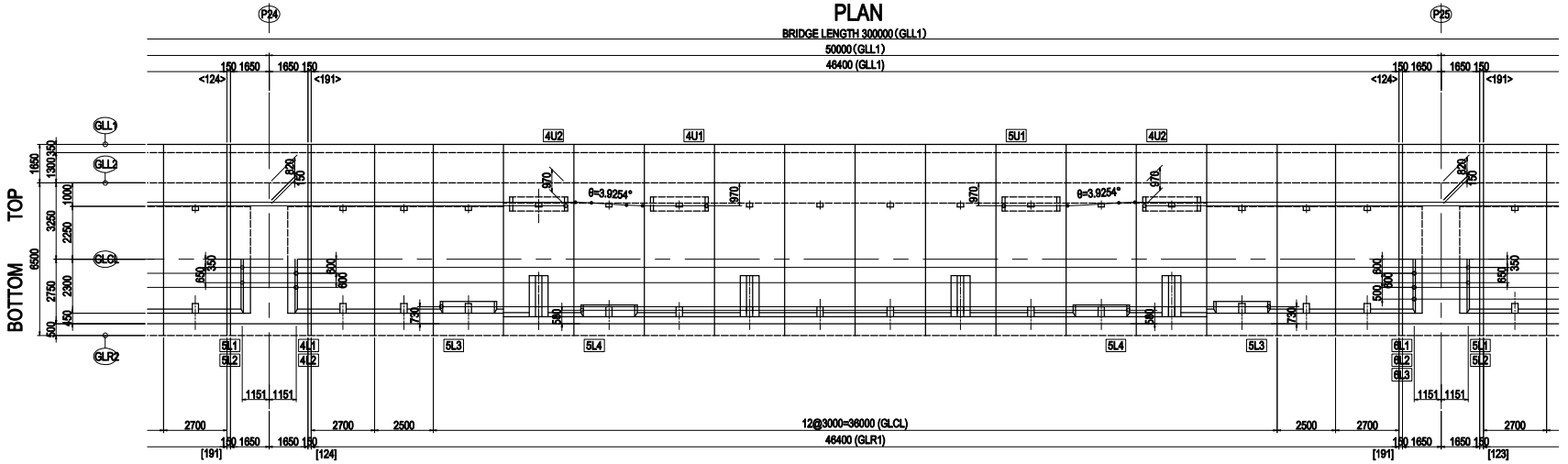
PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.			
				NAME / SIGNATURE / DATE	DRAWING TITLE / PACKAGE
				PREPARED BY: M. OHYAMA — 15 Jun.2017	DETAIL OF PRESTRESSING P20-A2 <L,R> (12) [INTERNAL TENDON]
				CHECKED BY: T. HAYAKAWA — 20 Jun.2017	PACKAGE: 2
				APPROVED BY: Y. SANO — 21 Jun.2017	DWG No.: P2-PB-1112

DETAIL OF PRESTRESSING P20-A2 <L,R> (13) [INTERNAL TENDON] S=1:200

SIDE VIEW

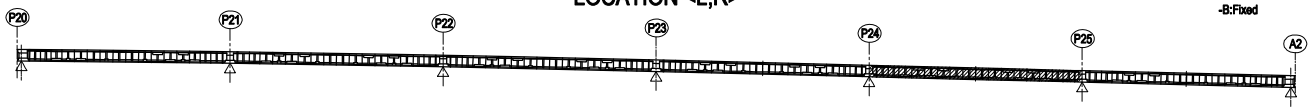


PLAN



Notes
-Values in < > / [ ] are at the top/bottom of the girder accordingly.
-Reinforcement for tendon anchorage such as grid rebar shall be arranged sufficiently.
-Bending radios of PC tendon in Plan is 10m.
-Jacking force = 1350 N/mm2
-A:Tension
-B:Fixed

LOCATION <L,R>



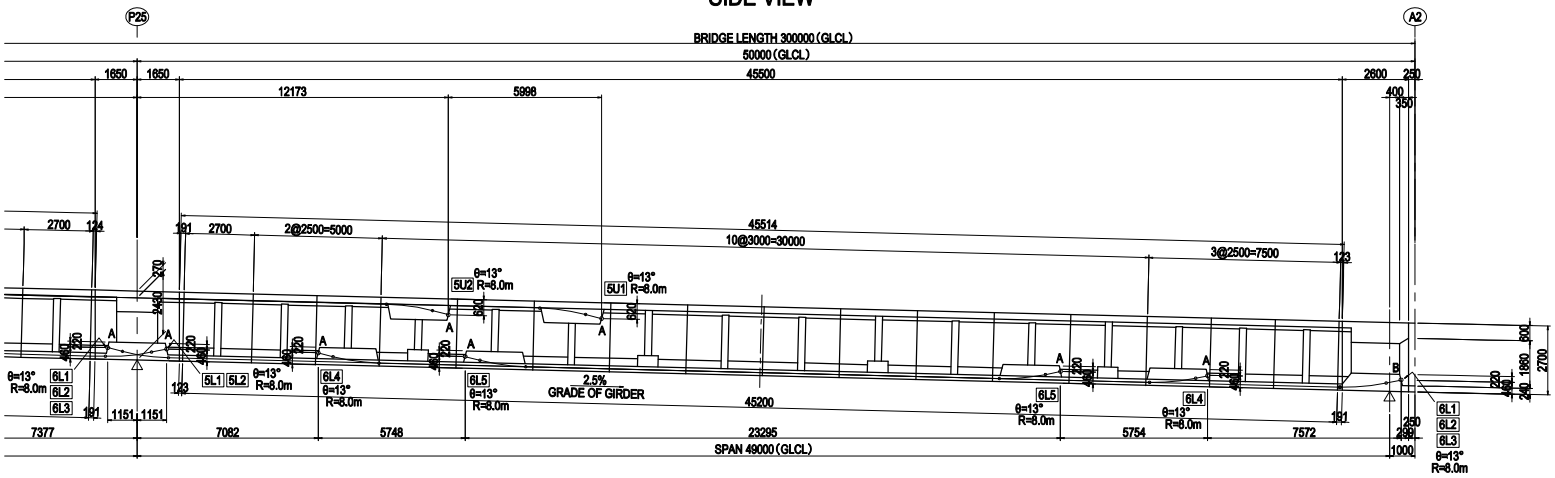
PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR, MINISTRY OF CONSTRUCTION, DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. / ORIENTAL CONSULTANTS GLOBAL CO., LTD. / METROPOLITAN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

	NAME	SIGNATURE	DATE
PREPARED BY	M. OHYAMA		15 Jun.2017
CHECKED BY	T. HAYAKAWA		20 Jun.2017
APPROVED BY	Y. SANO		21 Jun.2017

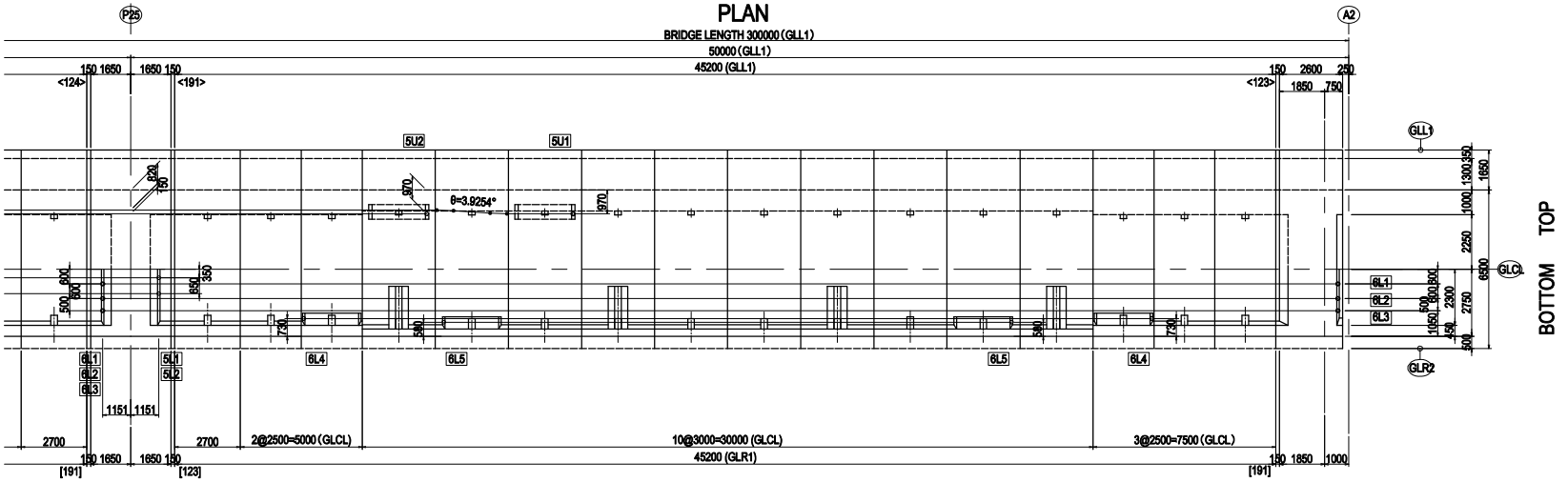
DRAWING TITLE	PACKAGE
DETAIL OF PRESTRESSING P20-A2 <L,R> (13) [INTERNAL TENDON]	2
	DWG No. P2-PB-1113

DETAIL OF PRESTRESSING P20-A2 <L,R> (14) [INTERNAL TENDON] S=1:200

SIDE VIEW

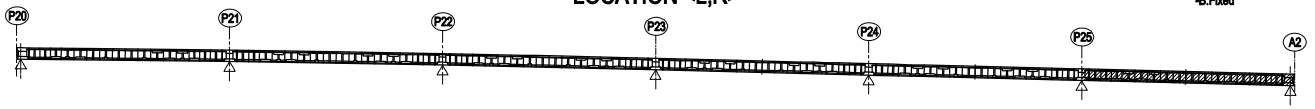


PLAN



Notes
-Values in < > / [ ] are at the top/bottom of the girder accordingly.
-Reinforcement for tendon anchorage such as grid rebar shall be arranged sufficiently.
-Bending radios of PC tendon in Plan is 10m.
-Jacking force = 1350 N/mm2
-A:Tension
-B:Fixed

LOCATION <L,R>



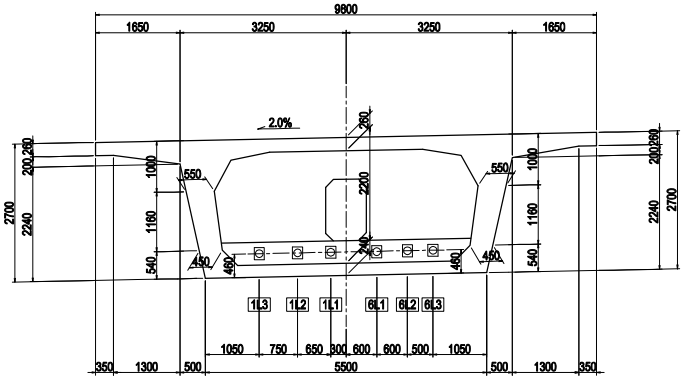
PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR, MINISTRY OF CONSTRUCTION, DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. / ORIENTAL CONSULTANTS GLOBAL CO., LTD. / METROPOLITAN EXPRESSWAY COMPANY LIMITED / CHODAI CO.,LTD. / NIPPON ENGINEERING CONSULTANTS CO.,LTD.	DRAWING TITLE: DETAIL OF PRESTRESSING P20-A2 <L,R> (14) [INTERNAL TENDON]	PACKAGE: 2 / DWG No.: P2-PB-1114

	NAME	SIGNATURE	DATE
PREPARED BY	M. OHYAMA		15 Jun.2017
CHECKED BY	T. HAYAKAWA		20 Jun.2017
APPROVED BY	Y. SANO		21 Jun.2017

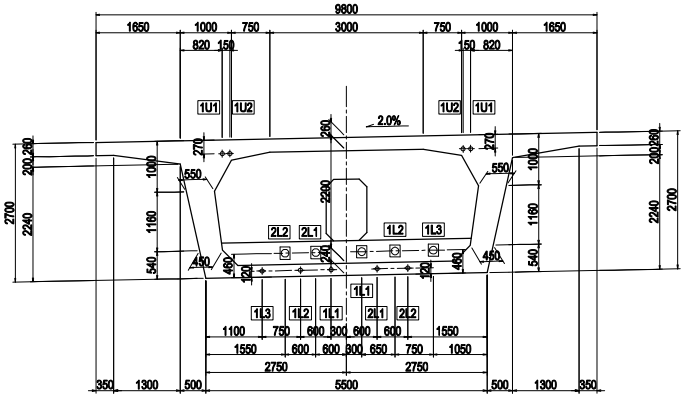
DETAIL OF PRESTRESSING P20-A2 <L,R> (15) [INTERNAL TENDON]

CROSS SECTIONS S=1:100

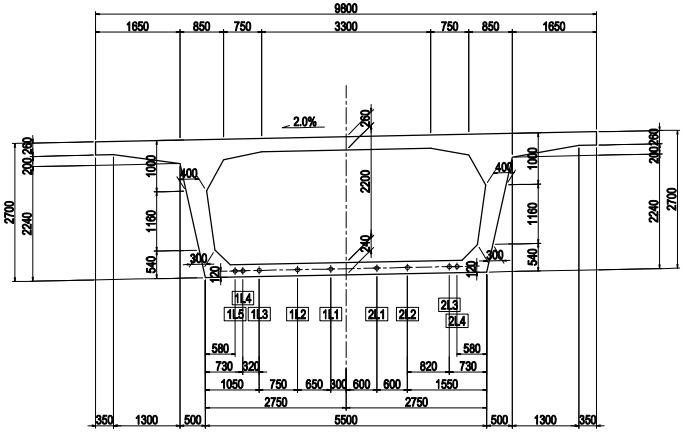
1 - 1 8 - 8



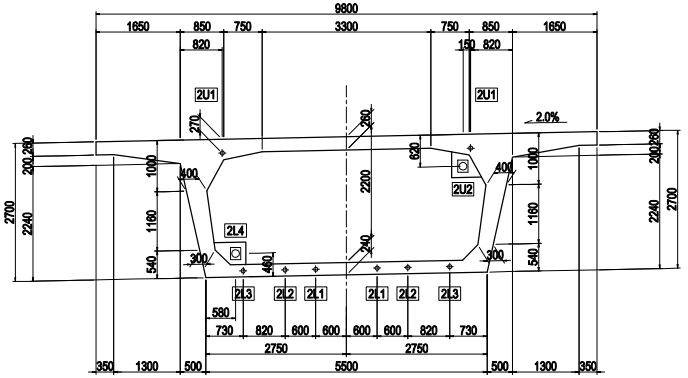
3 - 3 4 - 4



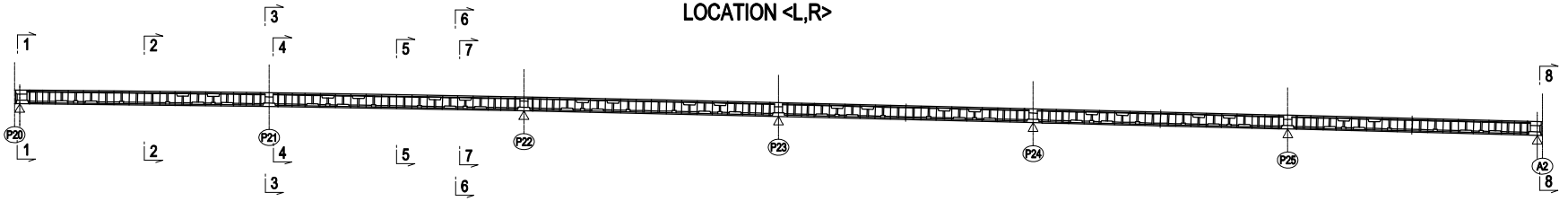
2 - 2 5 - 5



6 - 6 7 - 7



LOCATION <L,R>

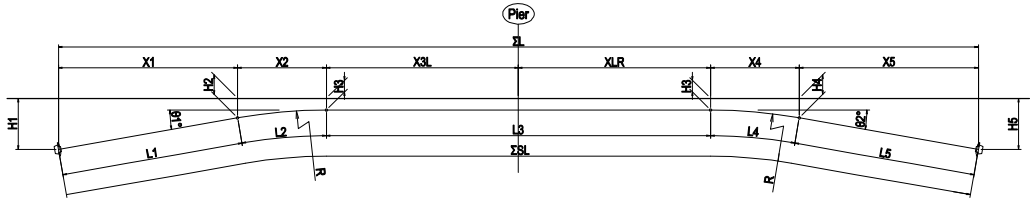


PROJECT NAME	FINANCED BY	COUNTERPART	JICA STUDY TEAM		NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	JAPAN INTERNATIONAL COOPERATION AGENCY	REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.	PREPARED BY	M. OHYAMA		15 Jun.2017	DETAIL OF PRESTRESSING P20-A2 <L,R> (15) [INTERNAL TENDON]	2
				CHECKED BY	T. HAYAKAWA		20 Jun.2017		DWG No.
				APPROVED BY	Y. SANO		21 Jun.2017		P2-PB-1115

DETAIL OF PRESTRESSING P20-A2 <L,R> (16) [INTERNAL TENDON]

S=1:100

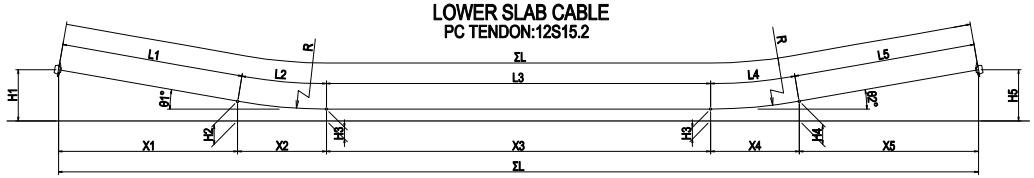
UPPER SLAB CABLE
PC TENDON:12S15.2



PC TENDON:12S15.2 (mm)

CABLE NUMBER	NUMBER	θ1	θ2	R	H1	H2	H3	H4	H5	X1	X2	X3L	X3R	X4	X5	ΣX	L1	L2	L3	L4	L5	TOTAL LENGTH
1U1	2	13°	13°	8000	620	475	270	475	620	629	1802	15712	16230	1796	625	36794	644	1815	31946	1815	644	36864
1U2	2	13°	13°	8000	620	475	270	475	620	629	1802	9712	10243	1796	625	24807	644	1815	19958	1815	644	24876
2U1	2	13°	13°	8000	620	475	270	475	620	630	1803	16207	16250	1795	624	37309	644	1815	32463	1815	644	37381
2U2	2	13°	13°	8000	620	475	270	475	620	630	1803	10208	10251	1795	624	25311	644	1815	20463	1815	644	25381
3U1	2	13°	13°	8000	620	475	270	475	620	631	1804	16202	16254	1794	624	37309	644	1815	32465	1815	644	37383
3U2	2	13°	13°	8000	620	475	270	475	620	631	1804	10203	10255	1794	624	25311	644	1815	20464	1815	644	25382
4U1	2	13°	13°	8000	620	475	270	475	620	631	1804	16200	16253	1794	624	37306	644	1815	32463	1815	644	37381
4U2	2	13°	13°	8000	620	475	270	475	620	631	1804	10201	10255	1794	624	25309	644	1815	20463	1815	644	25381
5U1	2	13°	13°	8000	620	475	270	475	620	631	1804	16200	15753	1794	624	36806	644	1815	31963	1815	644	36881
5U2	2	13°	13°	8000	620	475	270	475	620	631	1804	10201	9775	1794	624	24829	644	1815	19963	1815	644	24881

LOWER SLAB CABLE
PC TENDON:12S15.2



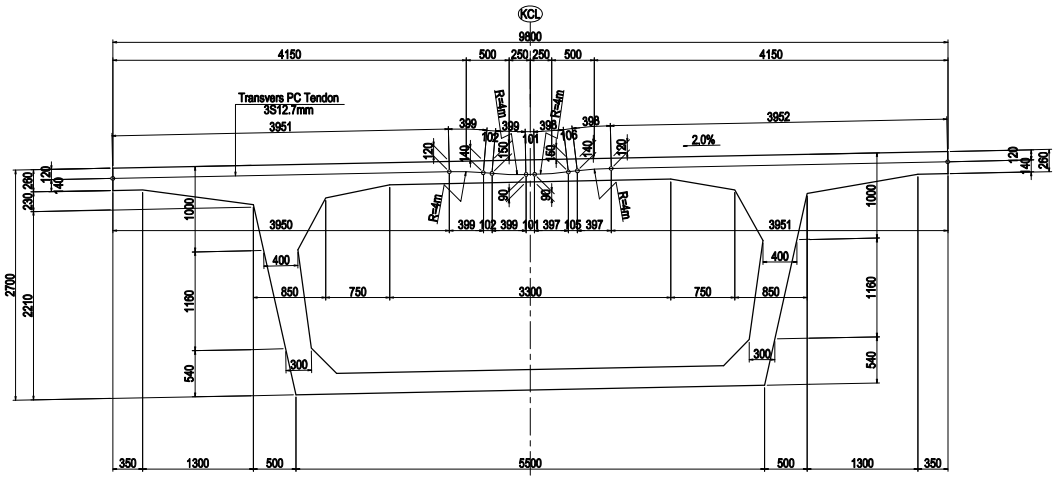
PC TTENDON:12S15.2 (mm)

CABLE NUMBER	NUMBER	θ1	θ2	R	H1	H2	H3	H4	H5	X1	X2	X3	X4	X5	ΣX	L1	L2	L3	L4	L5	TOTAL LENGTH
1L1	2	13°	13°	8000	460	325	120	318	460	583	1797	45845	1759	618	50602	600	1815	45848	1771	632	50666
1L2	2	13°	13°	8000	460	325	120	318	460	583	1797	45845	1759	618	50602	600	1815	45848	1771	632	50666
1L3	2	13°	13°	8000	460	325	120	318	460	583	1797	45845	1759	618	50602	600	1815	45848	1771	632	50666
1L4	2	13°	13°	8000	460	325	120	318	460	583	1797	30032	1802	586	34800	600	1815	30034	1815	600	34864
1L5	2	13°	13°	8000	460	325	120	318	460	583	1797	18533	1802	586	23301	600	1815	18534	1815	600	23364
2L1	2	13°	13°	8000	460	318	120	318	460	612	1753	47560	1760	617	52302	630	1771	47566	1771	630	52368
2L2	2	13°	13°	8000	460	318	120	318	460	612	1753	47560	1760	617	52302	630	1771	47566	1771	630	52368
2L3	2	13°	13°	8000	460	325	120	325	460	582	1796	30530	1803	587	35298	600	1815	30534	1815	600	35364
2L4	2	13°	13°	8000	460	325	120	325	460	582	1796	18531	1803	587	23299	600	1815	18534	1815	600	23364
3L1	2	13°	13°	8000	460	325	120	325	460	611	1752	47555	1781	603	52302	630	1771	47566	1791	616	52374
3L2	2	13°	13°	8000	460	325	120	325	460	611	1752	47555	1781	603	52302	630	1771	47566	1791	616	52374
3L3	2	13°	13°	8000	460	325	120	325	460	581	1795	30527	1803	587	35293	600	1815	30534	1815	600	35364
3L4	2	13°	13°	8000	460	325	120	325	460	581	1795	18530	1803	587	23296	600	1815	18534	1815	600	23364
4L1	2	13°	13°	8000	460	325	120	325	460	597	1771	47543	1803	588	52302	616	1791	47558	1815	600	52380
4L2	2	13°	13°	8000	460	325	120	325	460	597	1771	47543	1803	588	52302	616	1791	47558	1815	600	52380
4L3	2	13°	13°	8000	460	325	120	325	460	581	1794	30525	1804	587	35291	600	1815	30534	1815	599	35363
4L4	2	13°	13°	8000	460	325	120	325	460	581	1794	18529	1804	587	23295	599	1815	18535	1815	599	23363
5L1	2	13°	13°	8000	460	325	120	325	460	581	1794	47536	1804	587	52302	601	1815	47551	1815	600	52382
5L2	2	13°	13°	8000	460	325	120	325	460	581	1794	47536	1804	587	52302	601	1815	47551	1815	600	52382
5L3	2	13°	13°	8000	460	325	120	325	460	581	1794	30525	1804	587	35291	599	1815	30535	1815	599	35363
5L4	2	13°	13°	8000	460	325	120	325	460	581	1794	18529	1804	587	23295	599	1815	18535	1815	599	23363
6L1	2	13°	13°	8000	460	325	120	325	460	581	1794	45836	1804	587	50602	600	1815	45850	1815	599	50679
6L2	2	13°	13°	8000	460	325	120	325	460	581	1794	45836	1804	587	50602	600	1815	45850	1815	599	50679
6L3	2	13°	13°	8000	460	325	120	325	460	581	1794	45836	1804	587	50602	600	1815	45850	1815	599	50679
6L4	2	13°	13°	8000	460	325	120	325	460	581	1796	30023	1804	587	34791	599	1815	30035	1815	599	34863
6L5	2	13°	13°	8000	460	325	120	325	460	581	1794	18529	1804	587	23295	599	1815	18535	1815	599	23363

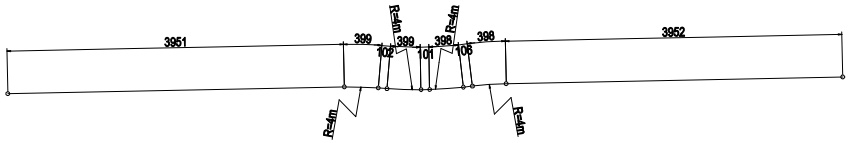
PROJECT NAME	FINANCED BY	COUNTERPART	JICA STUDY TEAM		NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	JAPAN INTERNATIONAL COOPERATION AGENCY	REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.	PREPARED BY	M. OHYAMA		15 Jun.2017	DETAIL OF PRESTRESSING P20-A2 <L,R> (16) [INTERNAL TENDON]	2
				CHECKED BY	T. HAYAKAWA		20 Jun.2017		DWG No.
				APPROVED BY	Y. SANO		21 Jun.2017		P2-PB-1116

DETAIL OF PRESTRESSING P20-A2 <L,R> (17) [SLAB]

CROSS SECTIONS S=1:60



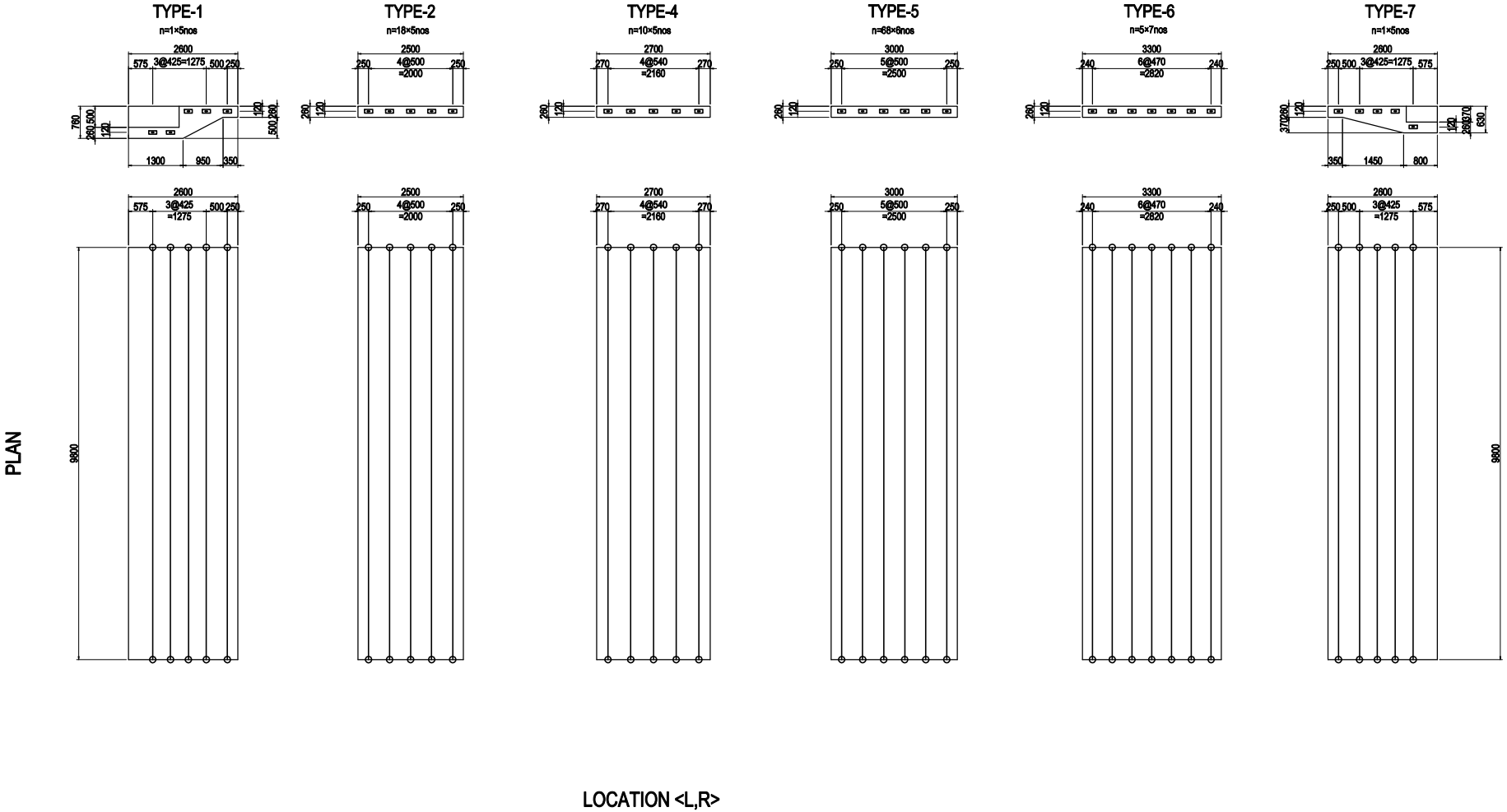
TRANSVERSAL CABLE



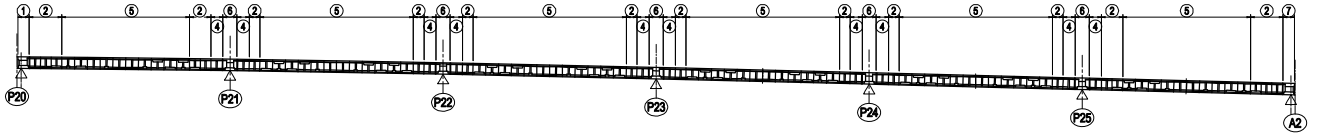
S1 3S12.7 L=9806mm
n=593 nos

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	M. OHYAMA		15 Jun.2017	DETAIL OF PRESTRESSING P20-A2 <L,R> (17) [SLAB]	2
				CHECKED BY	T. HAYAKAWA		20 Jun.2017		DWG No.
				APPROVED BY	Y. SANO		21 Jun.2017		P2-PB-1117

DETAIL OF PRESTRESSING P20-A2 <L,R> (18) [SLAB]



LOCATION <L,R>



Notes
-Alternating tension from one side.
-Reinforcement for tendon anchorage such as grid rebar shall be arranged sufficiently.
-Jacking force = 1300N/mm2

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.

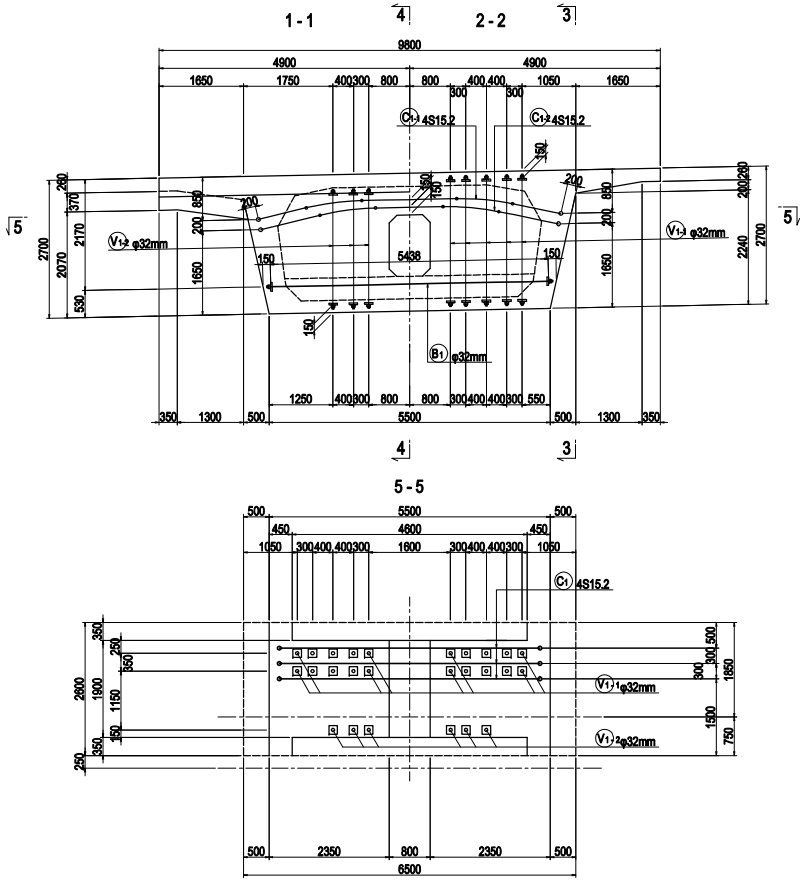
	NAME	SIGNATURE	DATE
PREPARED BY	M. OHYAMA		15 Jun.2017
CHECKED BY	T. HAYAKAWA		20 Jun.2017
APPROVED BY	Y. SANO		21 Jun.2017

DRAWING TITLE	PACKAGE
DETAIL OF PRESTRESSING P20-A2 <L,R> (18) [SLAB]	2
	DWG No.
	P2-PB-1118

DETAIL OF PRESTRESSING P20-A2 <L,R> (19) [END CROSSBEAM]

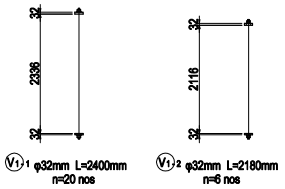
S=1:100

CROSS SECTIONS

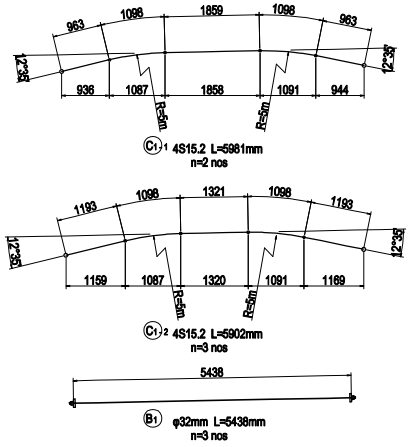


DETAIL DIMENSION OF TENDON

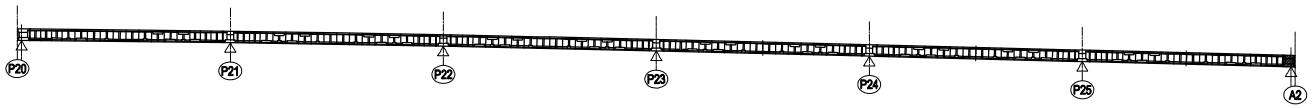
VERTICAL CABLE



TRANSVERSAL CABLE



LOCATION <L,R>



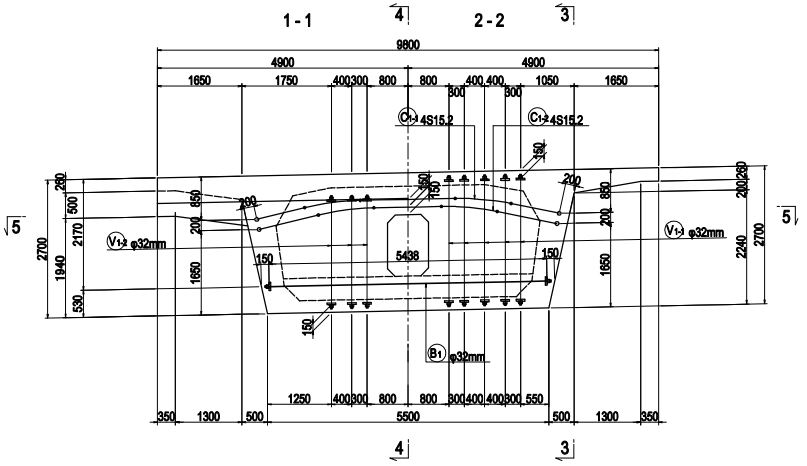
Notes
- -Transverse tendon shall be tensioned from one side alternately.
- -Vertical tendon shall be tensioned at top.
- -Reinforcement for tendon anchorage such as grid rebar shall be arranged sufficiently.
- -Jacking force = 1300N/mm2(4S15.2)
- -Jacking force = 800N/mm2(PT bar)

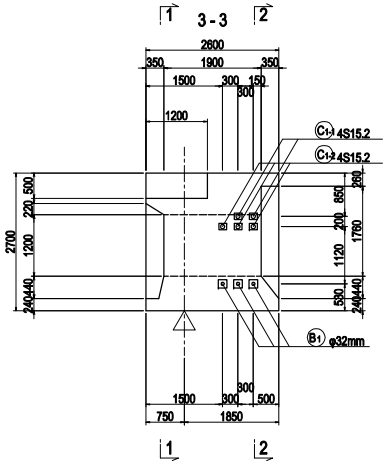
PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.		
				NAME / SIGNATURE / DATE	DRAWING TITLE / PACKAGE
				PREPARED BY: M. OHYAMA — 15 Jun.2017	DETAIL OF PRESTRESSING P20-A2 <L,R> (19) [END CROSSBEAM]
				CHECKED BY: T. HAYAKAWA — 20 Jun.2017	PACKAGE: 2
				APPROVED BY: Y. SANO — 21 Jun.2017	DWG No.: P2-PB-1119

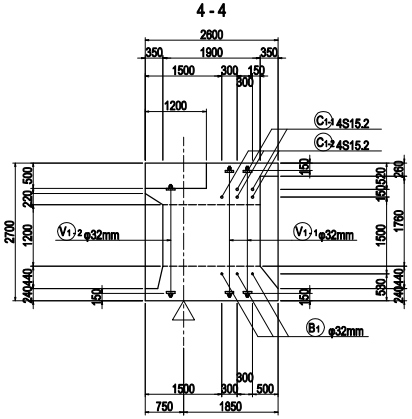
DETAIL OF PRESTRESSING P20-A2 <L,R> (20) [END CROSSBEAM]

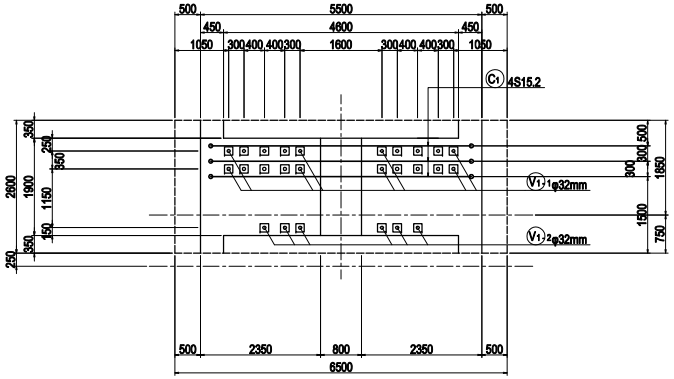
S=1:100

CROSS SECTIONS



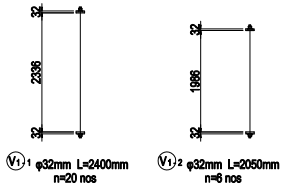




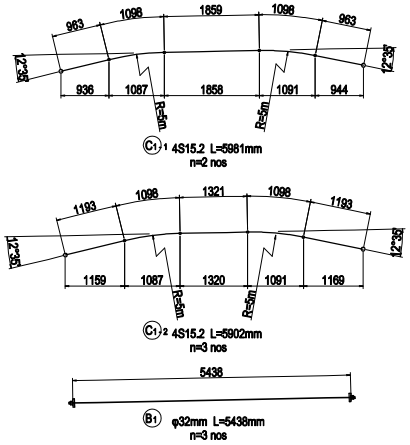


DETAIL DIMENSION OF TENDON

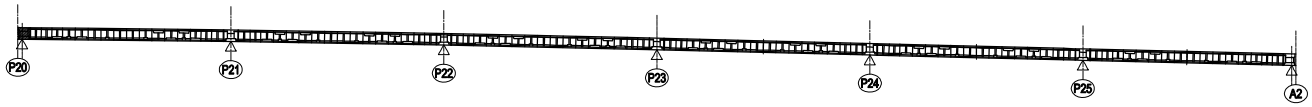
VERTICAL CABLE



TRANSVERSAL CABLE



LOCATION <L,R>



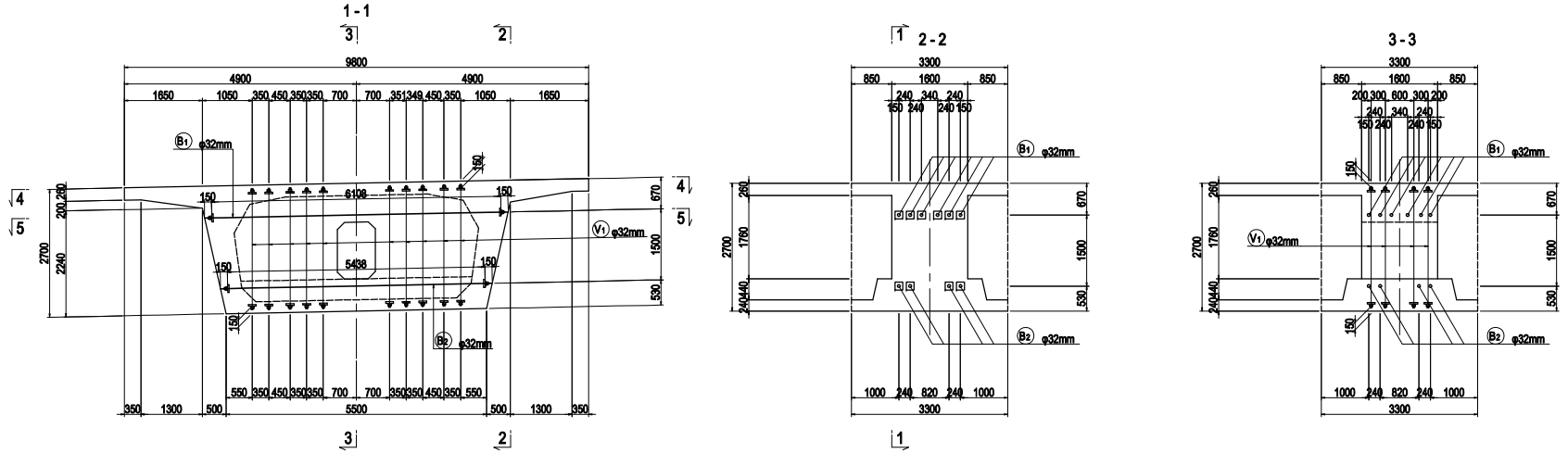
Notes
-Transverse tendon shall be tensioned from one side alternately.
-Vertical tendon shall be tensioned at top.
-Reinforcement for tendon anchorage such as grid rebar shall be arranged sufficiently.
-Jacking force = 1300N/mm2(4S15.2)
-Jacking force = 800N/mm2(PT bar)

PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.		
				PREPARED BY: M. OHYAMA	15 Jun.2017
				CHECKED BY: T. HAYAKAWA	20 Jun.2017
				APPROVED BY: Y. SANO	21 Jun.2017

NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
			DETAIL OF PRESTRESSING P20-A2 <L,R> (20) [END CROSSBEAM]	2
				DWG No. P2-PB-1120

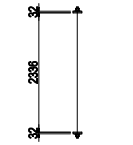
DETAIL OF PRESTRESSING P20-A2 <L,R> (21) [INTERMEDIATE CROSSBEAM]

S=1:100

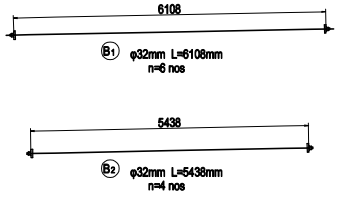


DETAIL DIMENSION OF TENDON

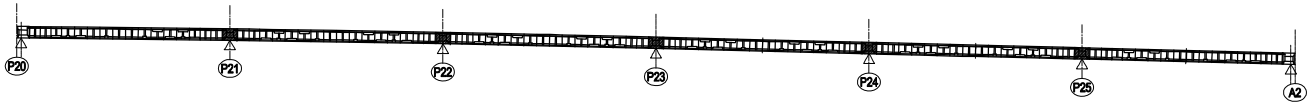
VERTICAL CABLE



TRANSVERSAL CABLE



LOCATION <L,R>



Notes
-Transverse tendon shall be tensioned from one side alternately.
-Vertical tendon shall be tensioned at top.
-Reinforcement for tendon anchorage such as grid rebar shall be arranged sufficiently.
-Jacking force = 800N/mm2(PT bar)

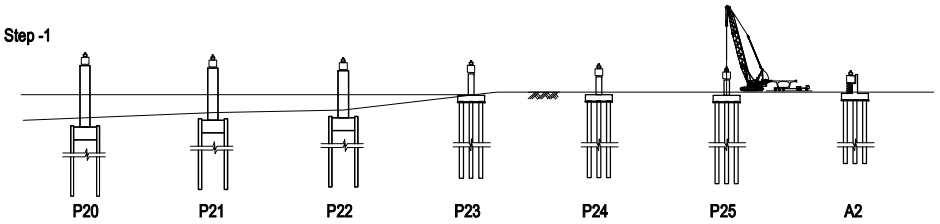
PROJECT NAME	FINANCED BY	COUNTERPART	JICA STUDY TEAM		NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	JAPAN INTERNATIONAL COOPERATION AGENCY	REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.	PREPARED BY	M. OHYAMA		15 Jun.2017	DETAIL OF PRESTRESSING P20-A2 <L,R> (21) [INTERMEDIATE CROSSBEAM]	2
				CHECKED BY	T. HAYAKAWA		20 Jun.2017		DWG No.
				APPROVED BY	Y. SANO		21 Jun.2017		P2-PB-1121

CONSTRUCTION SEQUENCE OF CONTINUOUS PC BOX GIRDER

S=1:2000

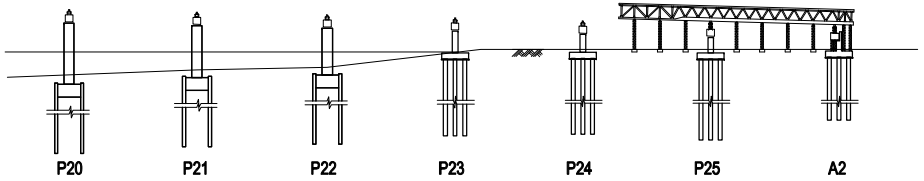
FOR REFERENCE

Step -1



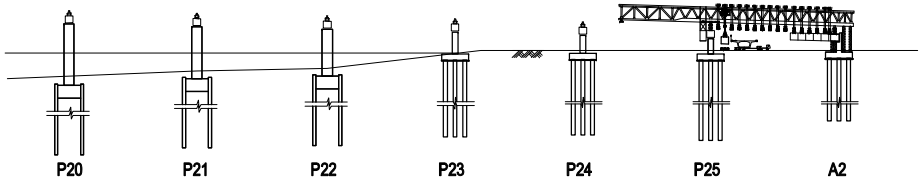
- In advance of segment erection, bearing shoes are set on abutment and piers. Pier head segments are erected by 200t crawler crane and fixed by PC bars.

Step -2



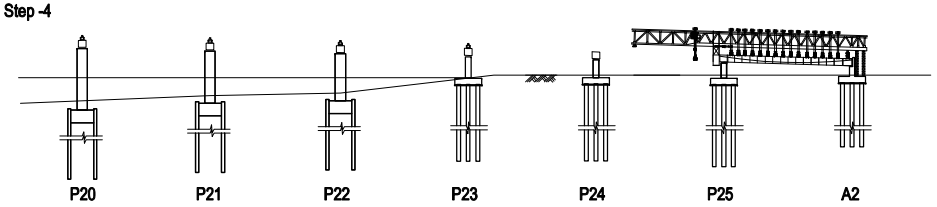
- For assembling of erection girder, temporary bent are installed. The erection girder and erection apparatus are set in designated position and girder support fixed on the pier head segment.

Step -3



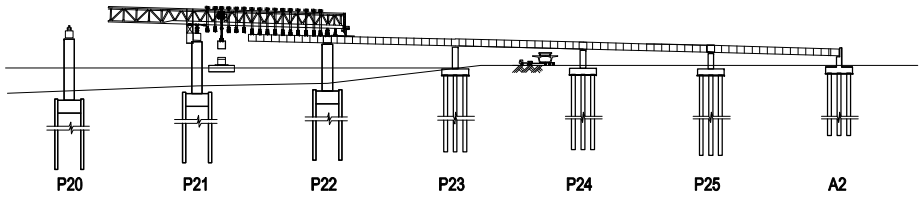
- Span for abutment -A2 to Pier-23 pre-cast segments are transported by trailer under the erection girder and lifted by electric hoist and moved the setting position. The segment transfers the load to temporary hanging beam and adjusts the slope and gradient by jack.

Step -4



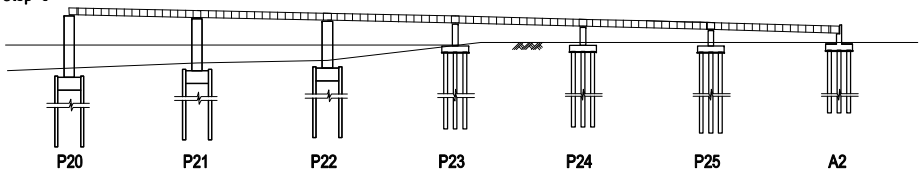
- After all segment are suspended at the designed position, epoxy adhesive applies to the segment which is pulling and connected by PC bars. Mortal is placed in wet joints at both sides. Permanent inner tendons for span are installed and tensioned by hydraulic jack.
- After completion of one span erection sequence, the erection girder advances to next span and erects segments in the same procedure up to pier 20.

Step -5



- Span for Pier-23 to Pier-20 pre-cast segments are transported on barge under the erection girder and lifted by electric hoist and moved the setting position. The segment transfers the load to temporary hanging beam and adjusts the slope and gradient by jack.

Step -6



- Demolition of erection girder and then completion.

PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: 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 CHECKED BY: T. H[illegible]WA APPROVED BY: Y.S[illegible]0004	CONSTRUCTION SEQUENCE OF CONTINUOUS PC BOX GIRDER

CHAPTER 2. DESIGN CONDITIONS

2-1 LOAD CONDITION

(1) SELF WEIGHT

REINFORCED CONCRETE		:	24.5 kN/m3
PRESTRESSED CONCRETE		:	24.5 kN/m3
PLAIN CONCRETE		:	23.0 kN/m3
ASPHALT CONCRETE		:	22.5 kN/m3
STEEL		:	77.0 kN/m3

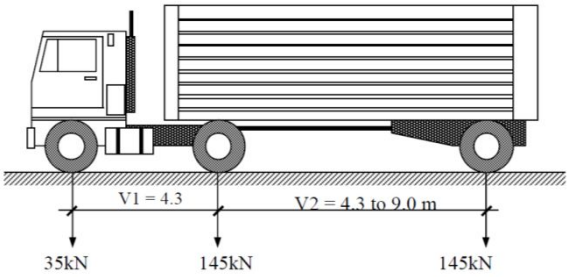
(2) SUPER IMPOSED LOAD

PAVEMENT (t = 80mm)		:	1.80 kN/m2
OVERLAY		:	0.70 kN/m2
CURB		:	24.5 kN/m3
RAILINGS	Side	:	0.70 kN/m
	Center	:	0.60 kN/m
WATER LINE		:	3.00 kN/m / 1bridge

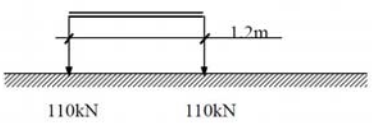
(3) LIVE LOAD

LIVE LOAD is according to AASHTO LRFD Bridge Design Specifications.
IMPACT is according to Specifications for highway bridges, JAPAN.

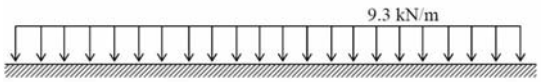
(TRUCK)



(TANDEM)



(LANE)



Design lane width = 3.0 m
Number of design lane = 9.0 m / 3.0 m = 3 Lanes / 1 bridge

Number of Loaded Lanes	Multiple Presence Factors, *m*
1	1.20
2	1.00
3	0.85
>3	0.65

(4) TEMPERATURE

FOR STRUCTURE	:	+ 10℃ ~ + 40℃ (25℃ ± 15℃)
FOR BEARING AND EXPANSION	:	+ 5℃ ~ + 45℃ (25℃ ± 20℃)

(5) CREEP AND SHRINKAGE

According to Specifications for highway bridges, JAPAN.

RELATIVE HUMIDITY	:	74.6 %

(6) SEISMIC

Design seismic coefficient

kh1	=	0.30 (for seismic performance 1)
kh2	= 1.5 x kh1 = 1.5 x 0.30 =	0.45 (for seismic performance 2)

2-2 MATERIALS

(1) CONCRETE

Specified compressive strength	50.0	N/mm2
Young's modulus	3.30E+04	N/mm2
Shear modulus	1.43E+04	N/mm2
Coefficient of thermal expansion	1.00E-05	/℃

(2) REINFORCEMENT

Reinforcement type	SD345	
Yeild strength	345.0	N/mm2
Young's modulus	2.00E+05	N/mm2

(3) PRESTRESSING TENDON

(External cable for longitudinal)

Tendon type	SWPR7BL, 19S15.2, Low relaxation	
Tensile strength	1850.0	N/mm2
Yeild strength	1600.0	N/mm2
Young's modulus	2.00E+05	N/mm2

(Internal cable for longitudinal)

Tendon type	SWPR7BL, 12S15.2, Low relaxation	
Tensile strength	1850.0	N/mm2
Yeild strength	1600.0	N/mm2
Young's modulus	2.00E+05	N/mm2

(Cable strand for upper slab, transverse)

Tendon type	SWPR7BL, 3S12.7, Low relaxation	
Tensile strength	1850.0	N/mm2
Yeild strength	1600.0	N/mm2
Young's modulus	2.00E+05	N/mm2

(Cable strand for crossbeam)

Tendon type	SWPR7BL, 4S15.2, Low relaxation	
Tensile strength	1850.0	N/mm2
Yeild strength	1600.0	N/mm2
Young's modulus	2.00E+05	N/mm2

(PT Bar for crossbeam)

Tendon type	SBPR930/1080, ϕ 32	
Tensile strength	1080.0	N/mm2
Yeild strength	930.0	N/mm2
Young's modulus	2.00E+05	N/mm2

2-3 ALLOWABLE STRESS

(1) CONCRETE

Table 3.2.2 Allowable compressive stress (N/mm^2) for prestressed concrete structure

Stress type			Design standard strength of concrete 30	40	50	60
Immediately after prestressing	Bending compressive stress	1) Rectangular section	15.0	19.0	21.0	23.0
		2) T-shaped or box-shaped section	14.0	18.0	20.0	22.0
	3) Axial compressive stress		11.0	14.5	16.0	17.0
Others	Bending compressive stress	4) Rectangular section	12.0	15.0	17.0	19.0
		5) T-shaped or box-shaped section	11.0	14.0	16.0	18.0
	6) Axial compressive stress		8.5	11.0	13.5	15.0

Table 3.2.3 Allowable tensile stress (N/mm^2) for prestressed concrete structure

Stress type			Design standard strength of concrete 30	40	50	60
Bending tensile stress	1) Immediately after prestressing		1.2	1.5	1.8	2.0
	2) Principal loads other than live load and impact		0	0	0	0
	Principal loads and special loads corresponding to "principal load"	3) Floor slab	0	0	0	0
		4) Segment joint of precast segment bridges	0	0	0	0
		5) Other cases	1.2	1.5	1.8	2.0
6) Axial tensile stress			0	0	0	0

Table 3.2.5 Allowable diagonal tensile stress (N/mm^2) for prestressed concrete structure

Stress type		Design standard strength of concrete 30	40	50	60
Principal loads other than live load and impact	1) Case where shear force alone or torsional moment alone is to be considered	0.8	1.0	1.2	1.3
	2) Case where both shear force and torsional moment are to be considered	1.1	1.3	1.5	1.6
Combination of loads not considering collision load or the effects of earthquakes	3) Case where shear force alone or torsional moment alone is to be considered	1.7	2.0	2.3	2.5
	4) Case where both shear force and torsional moment are to be considered	2.2	2.5	2.8	3.0

(2) REINFORCEMENT

Table 3.3.1 Allowable stress (N/mm^2) of reinforcement

Stress and member type \ Reinforcement type			SR235	SD295A SD295B	SD345
Tensile stress	1) Principal loads other than live load and impact		80	100	100
	2) Reference value of allowable stress to be used when collision load or the effects of earthquakes are not considered in the combination of loads	General members	140	180	180
		Floor slab and slab bridges with a span of 10 m or less	140	140	140
	3) Reference value of allowable stress to be used when collision load or the effects of earthquakes are considered in the combination of loads		140	180	200
	4) Reference value of allowable stress to be used when calculating the lap joint length or bond length of reinforcement		140	180	200
5) Compressive stress			140	180	200

(3) PRESTRESSING TENDON

Table C. 3.4.1 Allowable tensile stress (N/mm^2) of PC tendon

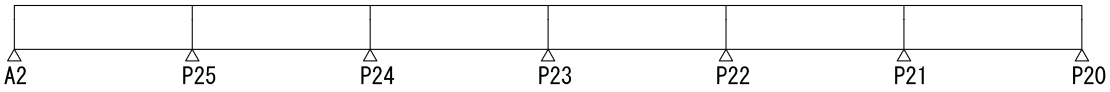
PC tendon type \ Allowable tensile stress			During prestressing	Immediately after prestressing	Under design load
Steel wire	SWPR1AN SWPR1AL SWPD1N SWPD1L	5 mm	1260	1120	960
		7 mm	1170	1050	900
		8 mm	1125	1015	870
		9 mm	1080	980	840
	SWPR1BN SWPR1BL	5 mm	1350	1190	1020
		7 mm	1260	1120	960
		8 mm	1215	1085	930
Steel strand	SWPR2N SWPR2L	2.9 mm (2-strand wire)	1530	1365	1170
	SWPR7AN (7-strand wire) SWPR7AL (7-strand wire)		1305	1190	1020
	SWPR7BN (7-strand wire) SWPR7BL (7-strand wire)		1440	1295	1110
	SWPR19N SWPR19L (19-strand wire)	17.8 mm	1440	1295	1110
		19.3 mm	1440	1295	1110
		20.3 mm	1440	1260	1080
		21.8 mm	1440	1260	1080
		28.6 mm	1350	1260	1080
Steel bar	Round bar Type A	2 SBPR785/1030	706	667	588
	Round bar Type B	1 SBPR930/1080	837	756	648
		2 SBPR930/1180	837	790	697

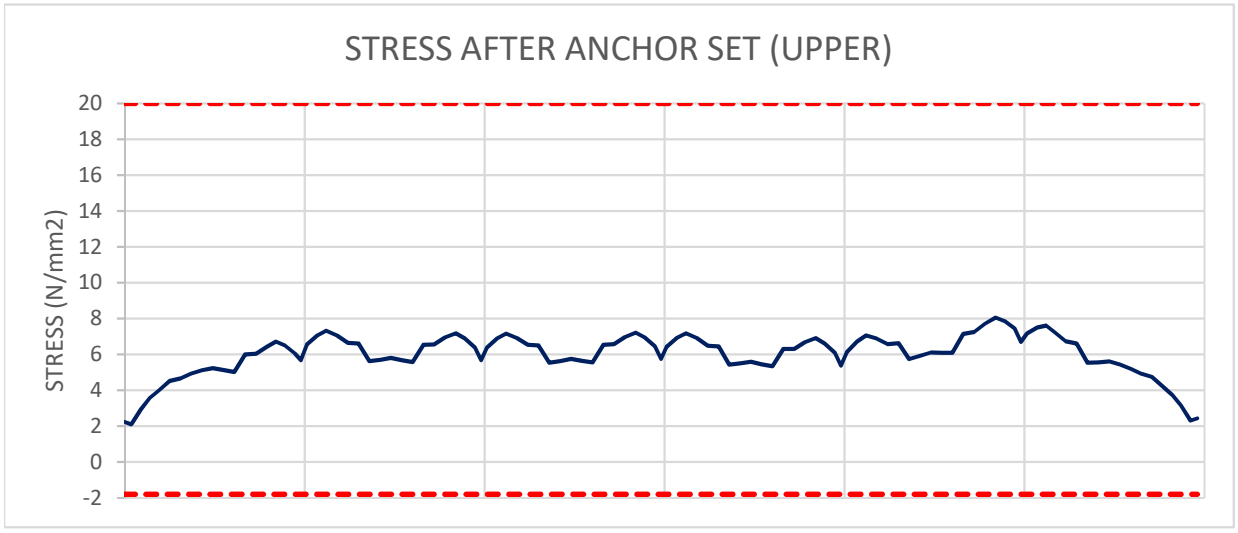
CHAPTER 3. SUMMARY OF DESIGN RESULT

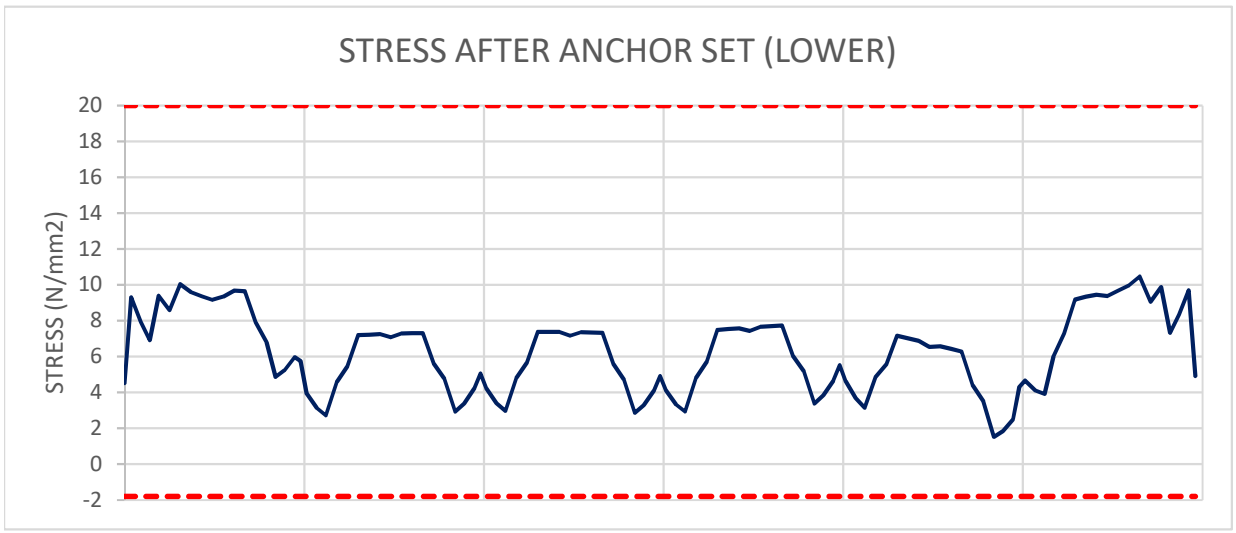
3-1 DESIGN RESULT OF LOGITUDINAL DIRECTION

(1) BENDING MOMENT

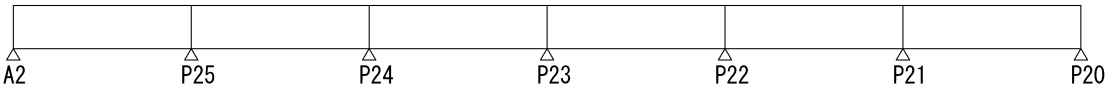
(STRESS AFTER ANCHOR SET)

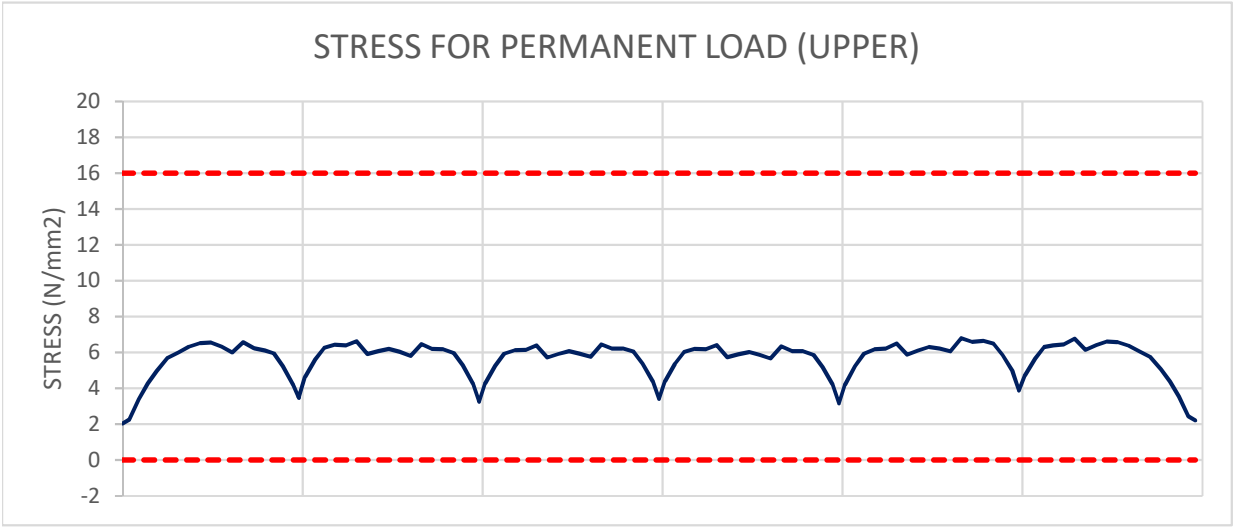


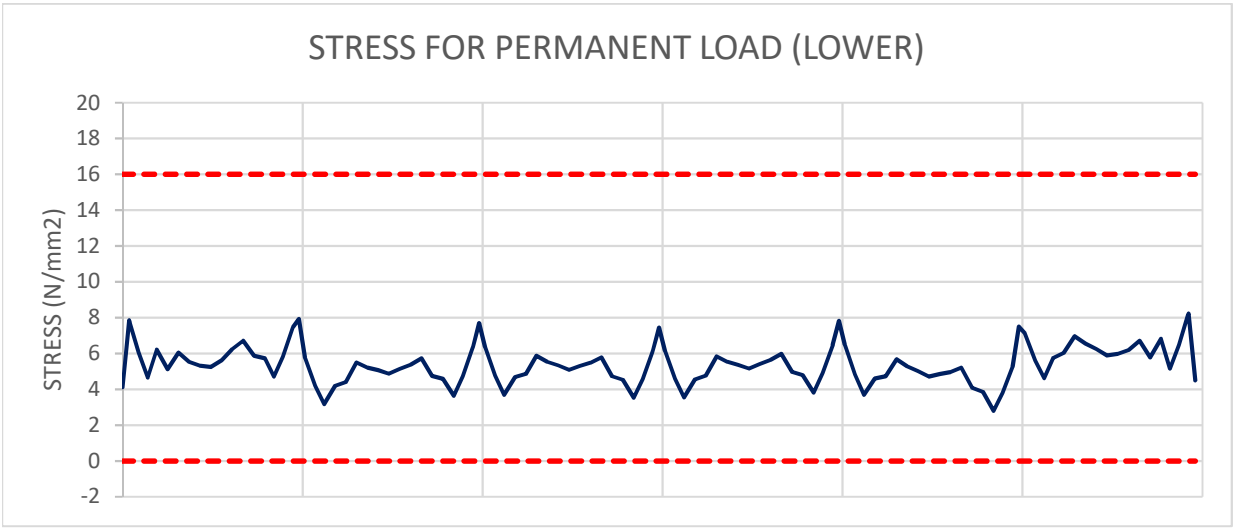




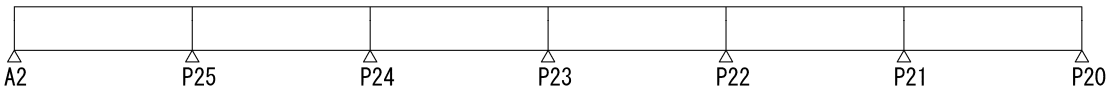
(STRESS FOR PERMANENT LOAD)

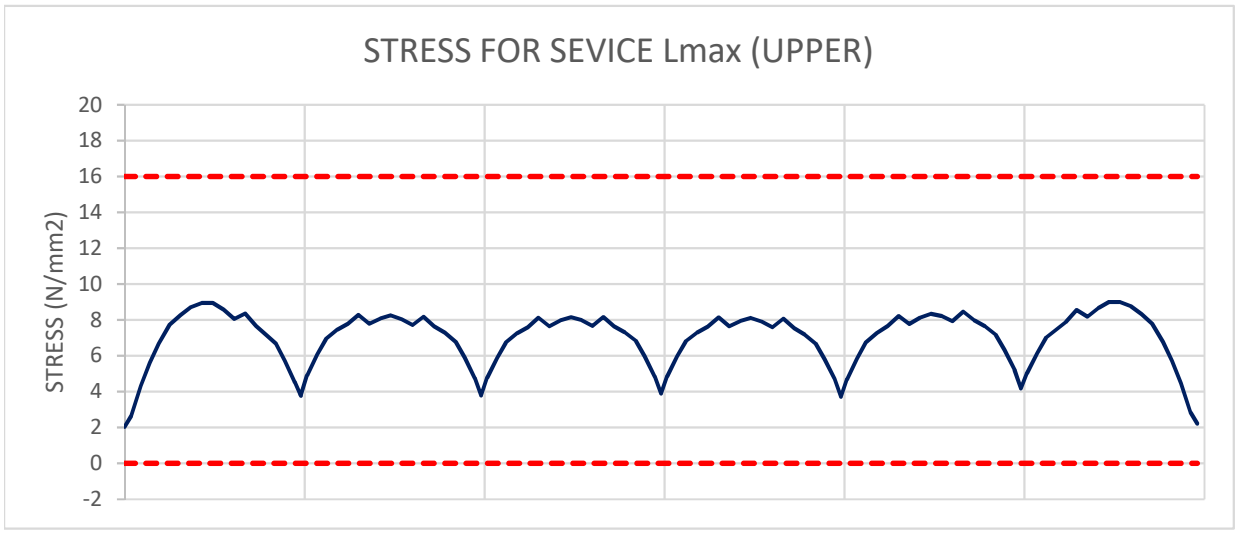


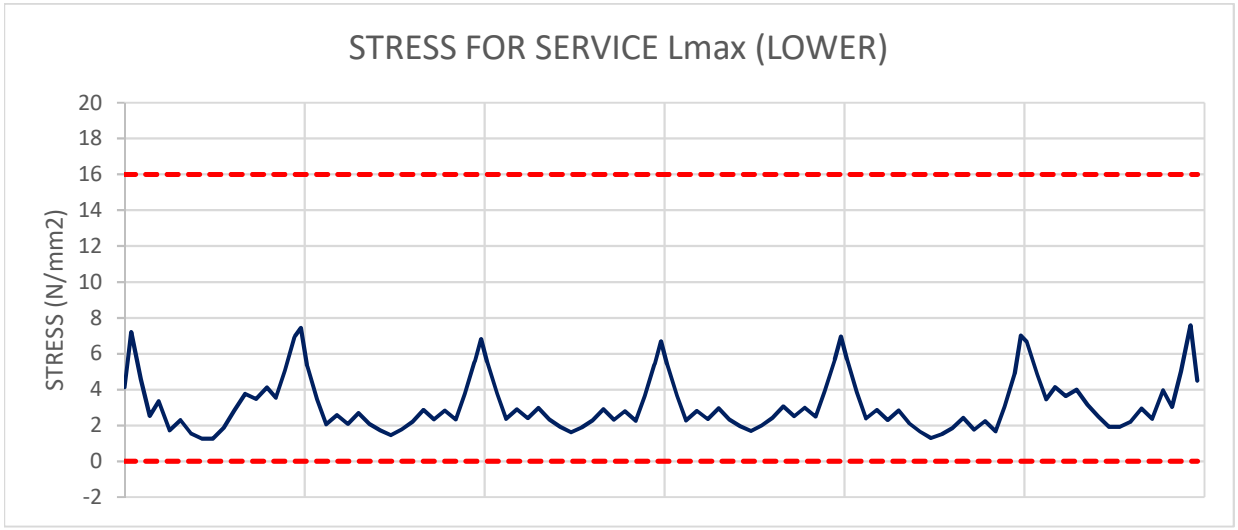




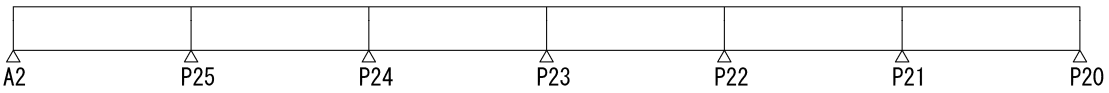
(STRESS FOR SERVICE Lmax)

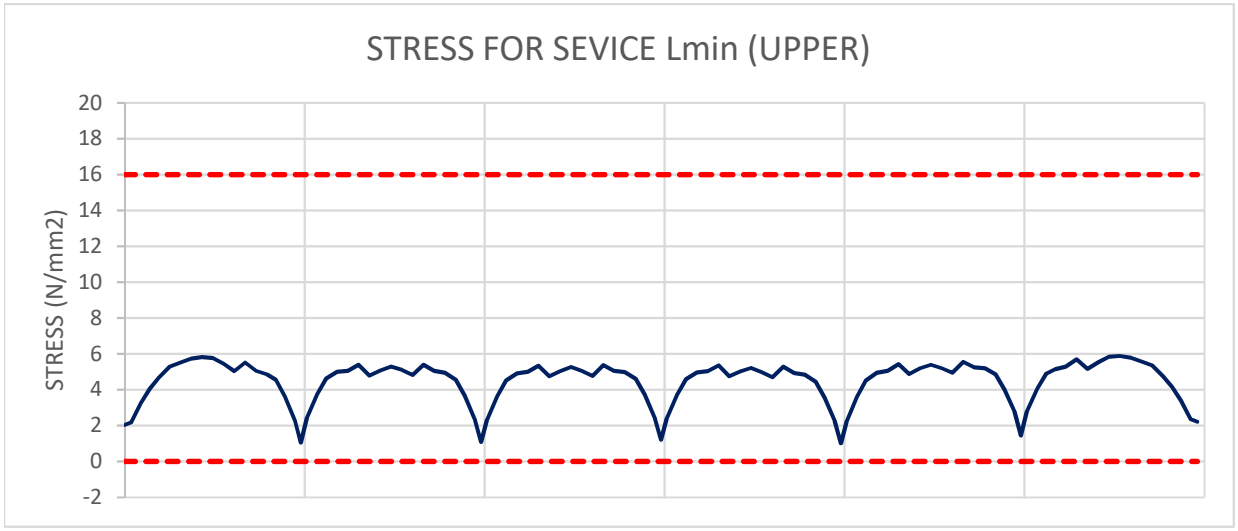


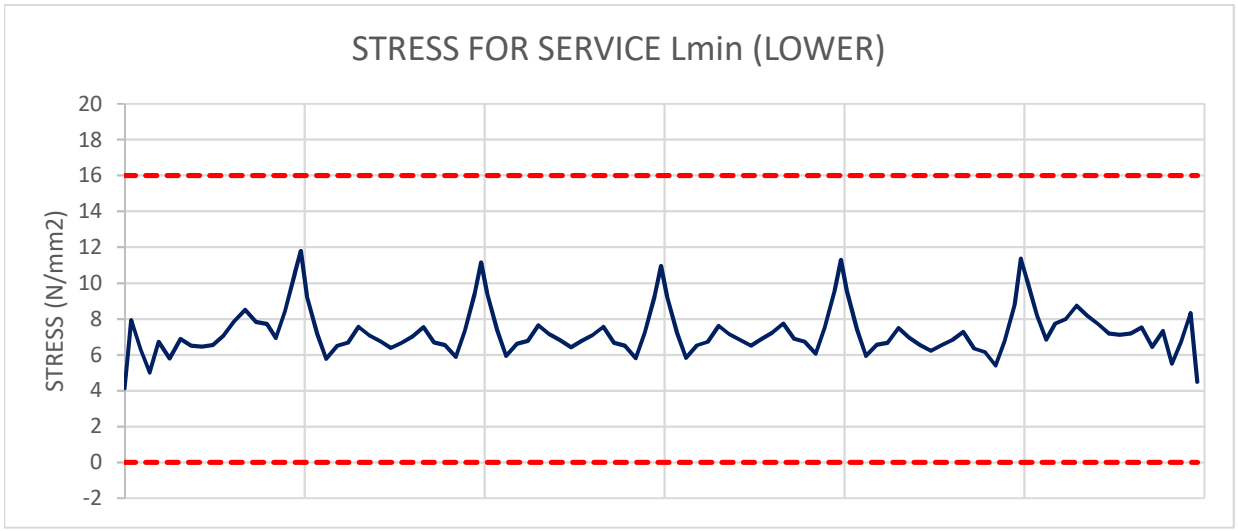




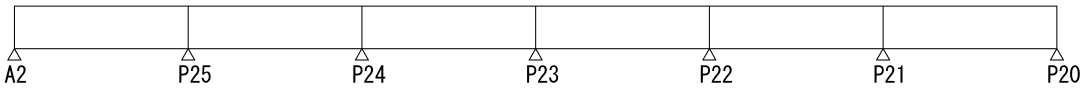
(STRESS FOR SERVICE Lmin)

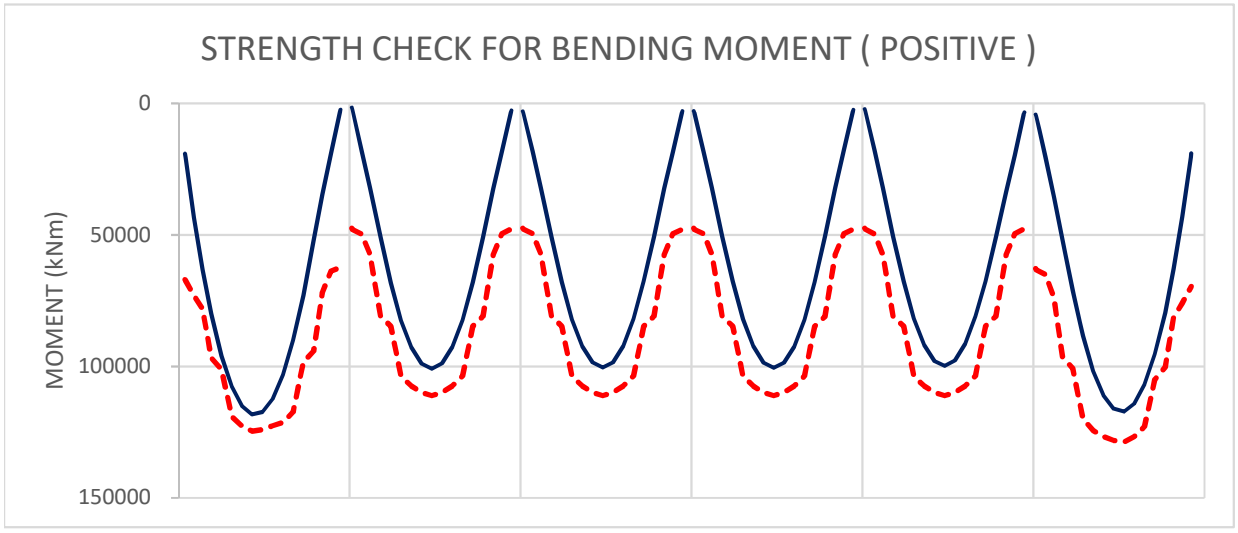


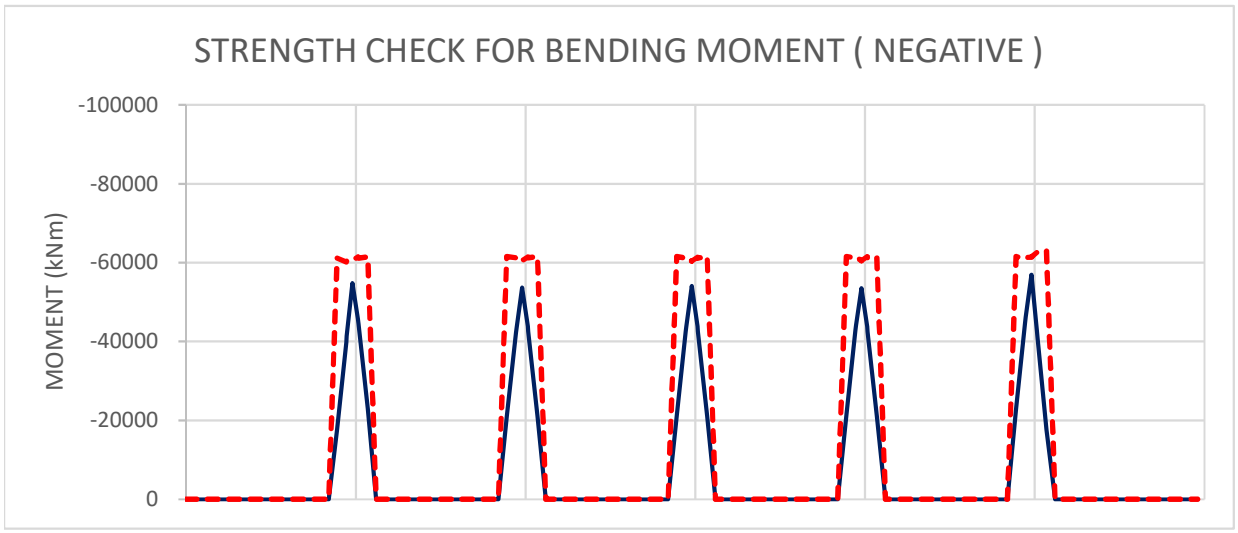




(STRENGTH CHECK)

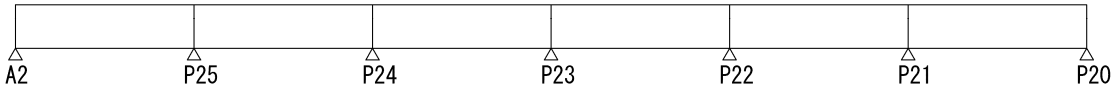


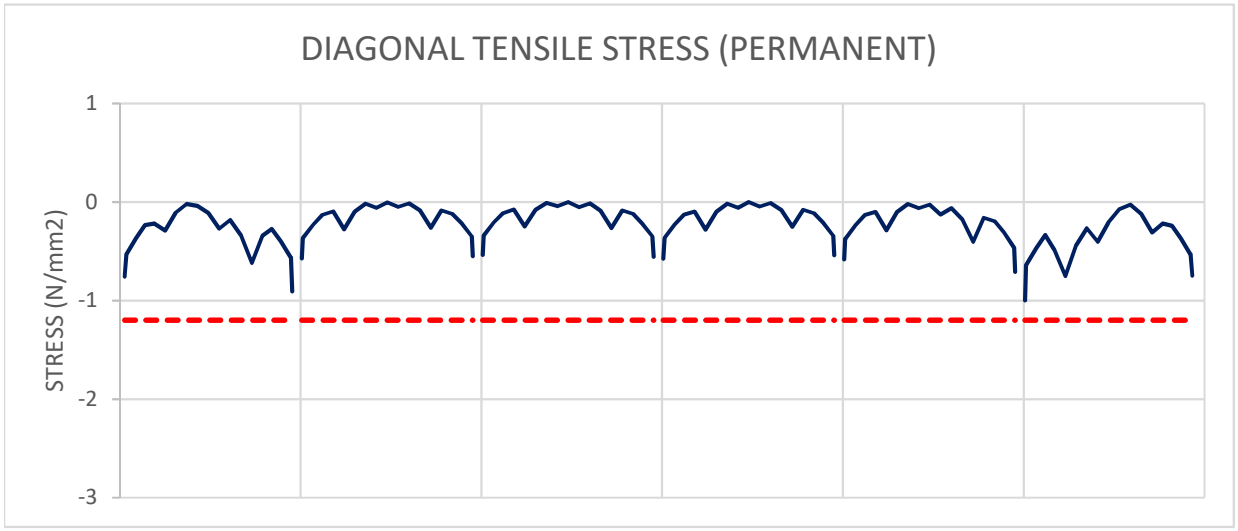


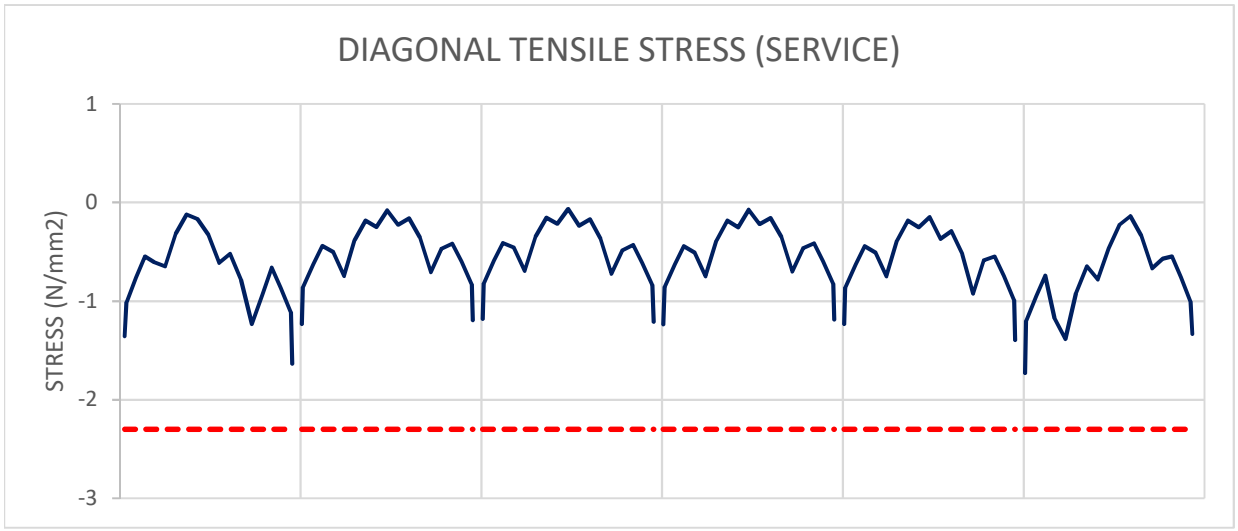


(2) SHEAR FORCE

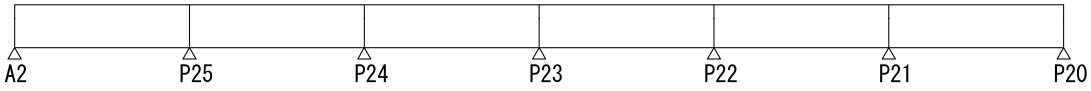
(DIAGONAL TENSILE STRESS)

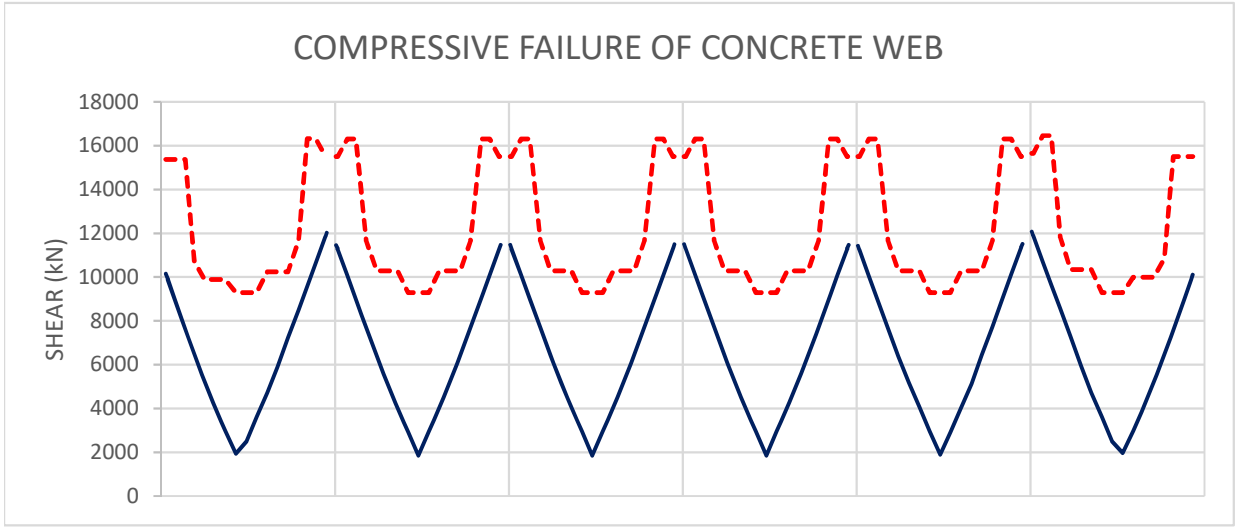




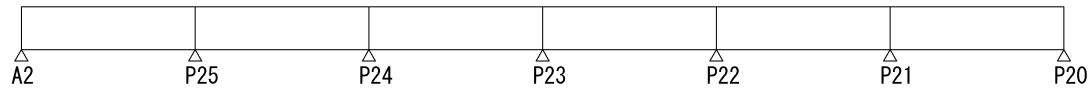


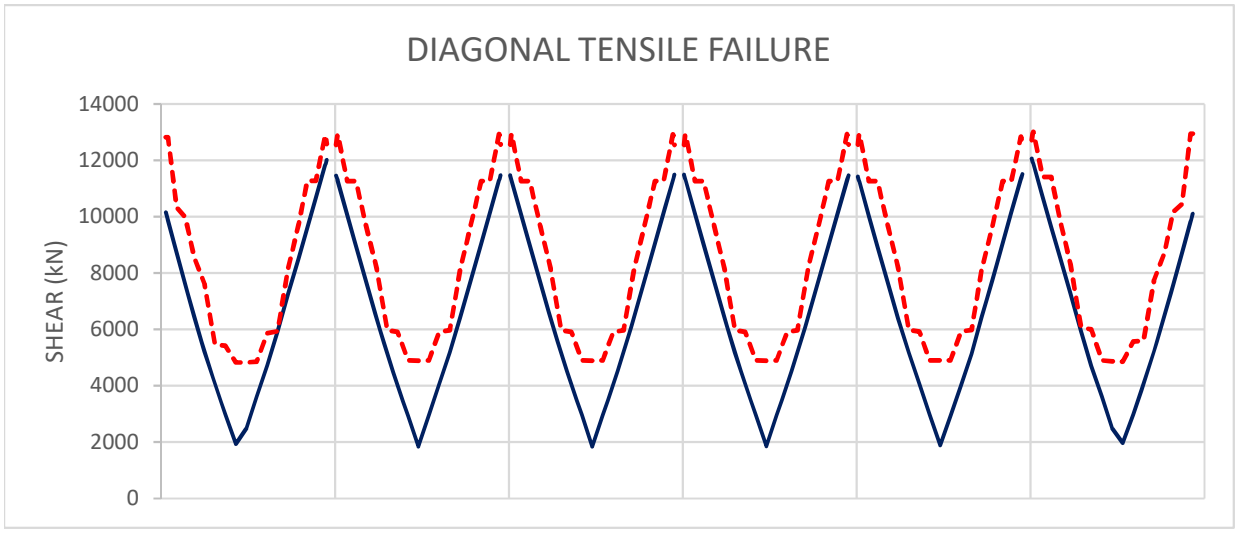
(COMPRESSIVE FAILURE OF CONCRETE WEB)





(DIAGONAL TENSILE FAILURE)





3-2 DESIGN RESULT OF TRANSVERSE DIRECTION

(1) WEB THICKNESS = 300-400 mm

UPPER SLAB							
	Item			unit	Catilever	Middle slab support	Middle slab center
	Arrangement of PC tendon			-	3S12.7 ctc 500mm		
	Anchor set	Fiber stress	Upper	N/mm2	3.17	3.09	0.64
			Lower	N/mm2	-0.33	0.19	4.77
		Allowable stress		N/mm2	≧ - 1.80	≧ - 1.80	≧ - 1.80
	Permanent load	Fiber stress	Upper	N/mm2	2.48	2.58	0.74
			Lower	N/mm2	0.13	0.44	4.19
		Allowable stress		N/mm2	≧ 0.00	≧ 0.00	≧ 0.00
	Service	Fiber stress	Upper	N/mm2	1.09	0.29	4.47
			Lower	N/mm2	1.52	2.73	0.46
		Allowable stress		N/mm2	≧ 0.00	≧ 0.00	≧ 0.00
	Strength	Bending moment		kNm	-154.60	-178.04	113.20
		Resistance		kNm	334.24	273.10	161.01
		Ratio		-	2.16	1.53	1.42
WEB AND LOWER SLAB							
	Item			unit	Web	Lower slab support	Lower slab center
	Arrangement of rebar for transverse design			-	D19ctc250	D13ctc125	D13ctc125
	Permanent load	Design force M		kNm	-11.43	-11.00	7.91
		Stress	Concrete	N/mm2	1.3	1.9	1.4
			Rebar	N/mm2	43.5	61.2	44.1
		Allowable stress (rebar)		N/mm2	100.0	100.0	100.0
	Service	Design force M		kNm	54.95	-17.61	9.93
		Stress	Concrete	N/mm2	3.0	3.1	1.8
			Rebar	N/mm2	130.8	98.0	55.3
		Allowable stress (rebar)		N/mm2	180.0	180.0	180.0
	Strength	Bending moment		kNm	127.95	-31.22	15.95
		Resistance		kNm	156.51	67.98	67.98
		Ratio		-	1.22	2.18	4.26

(2) WEB THICKNESS = 450-550 mm

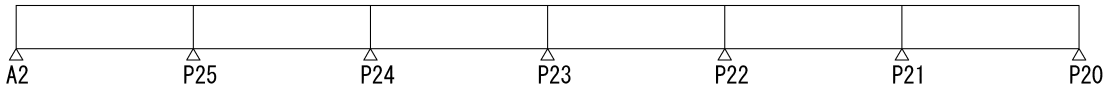
UPPER SLAB							
Item				unit	Catilever	Middle slab support	Middle slab center
Arrangement of PC tendon				-	3S12.7 ctc 500mm		
Anchor set	Fiber stress		Upper	N/mm2	3.17	3.15	0.58
			Lower	N/mm2	-0.33	0.13	4.82
	Allowable stress			N/mm2	≧ - 1.80	≧ - 1.80	≧ - 1.80
Permanent load	Fiber stress		Upper	N/mm2	2.48	2.67	0.68
			Lower	N/mm2	0.13	0.35	4.24
	Allowable stress			N/mm2	≧ 0.00	≧ 0.00	≧ 0.00
Service	Fiber stress		Upper	N/mm2	1.09	0.49	4.18
			Lower	N/mm2	1.52	2.52	0.74
	Allowable stress			N/mm2	≧ 0.00	≧ 0.00	≧ 0.00
Strength	Bending moment			kNm	-154.60	-167.46	109.75
	Resistance			kNm	334.24	273.10	161.01
	Ratio			-	2.16	1.63	1.47

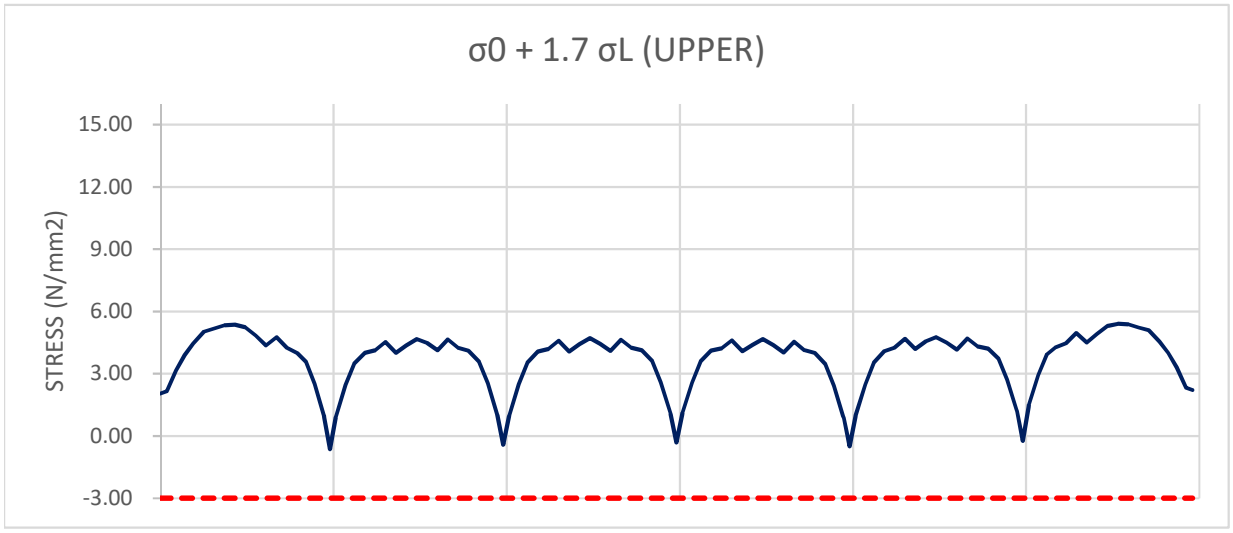
WEB AND LOWER SLAB						
Item			unit	Web	Lower slab support	Lower slab center
Arrangement of rebar for transverse design			-	D16ctc250	D13ctc125	D13ctc125
Permanent load	Design force M		kNm	-11.42	-9.88	6.87
	Stress	Concrete	N/mm2	0.6	1.7	1.2
		Rebar	N/mm2	26.7	55.0	38.3
	Allowable stress (rebar)		N/mm2	100.0	100.0	100.0
Service	Design force M		kNm	52.97	-16.39	7.67
	Stress	Concrete	N/mm2	1.7	2.9	1.4
		Rebar	N/mm2	90.4	91.3	42.7
	Allowable stress (rebar)		N/mm2	180.0	180.0	180.0
Strength	Bending moment		kNm	125.87	-29.58	11.98
	Resistance		kNm	150.40	67.98	67.98
	Ratio		-	1.19	2.30	5.67

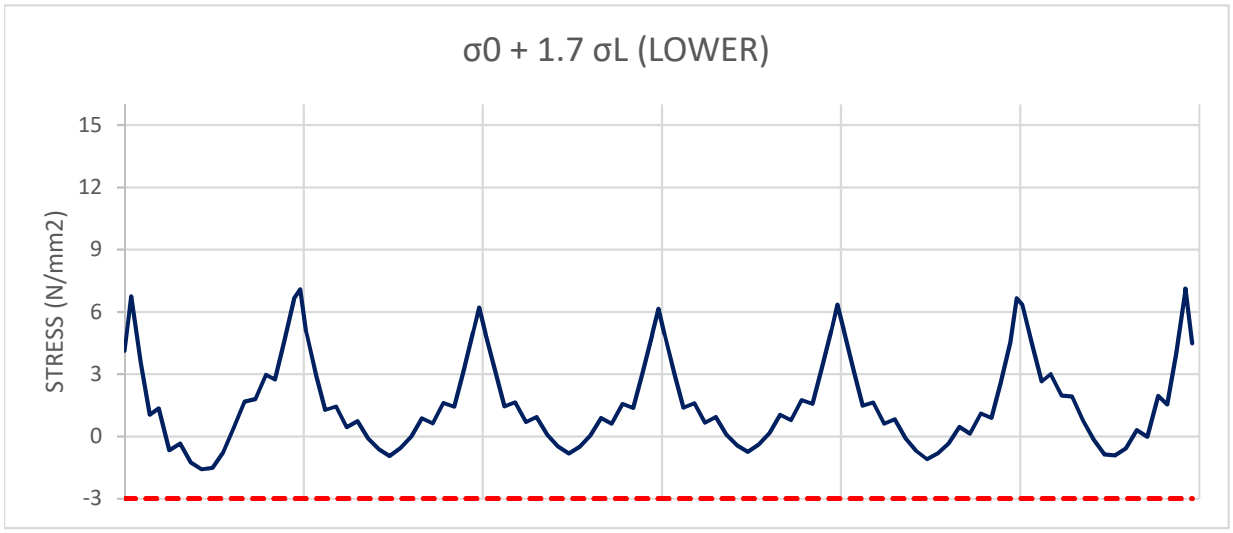
3-3 DESIGN RESULT OF JOINT FOR PRECAST SEGMENT

(1) BENDING MOMENT

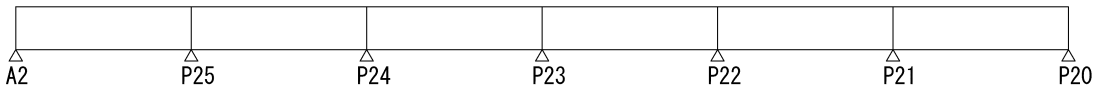
(Stress check for girder)

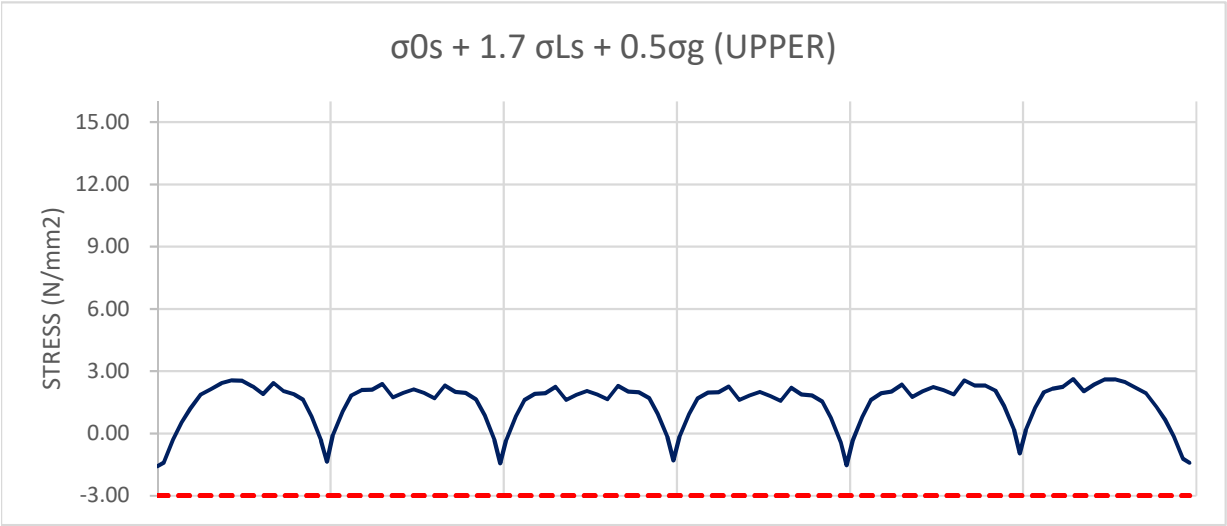


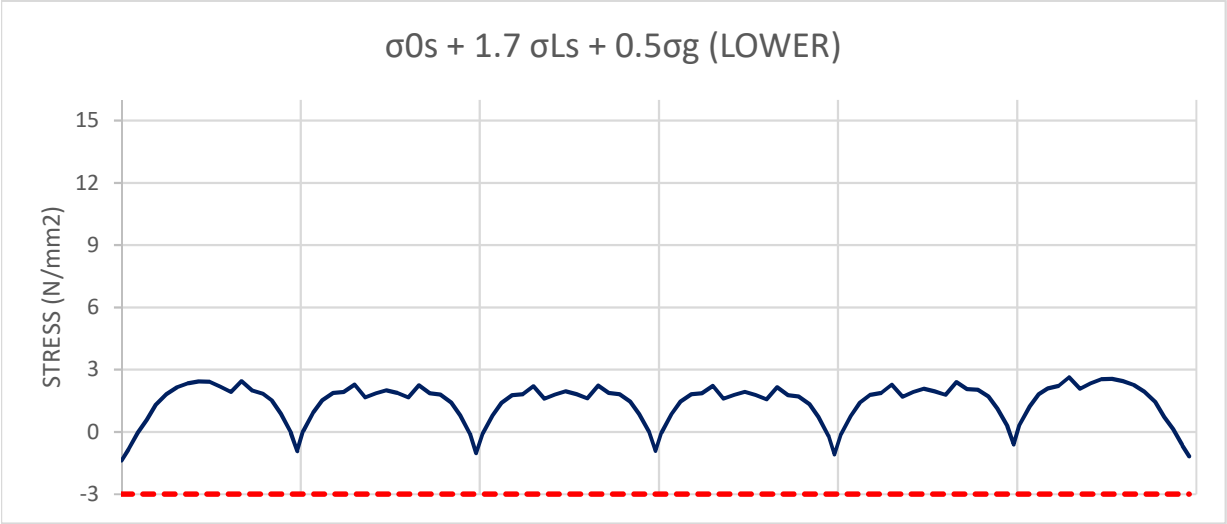




(Stress check for slab)

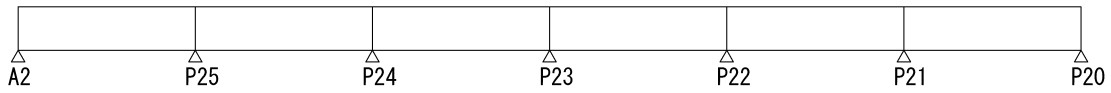


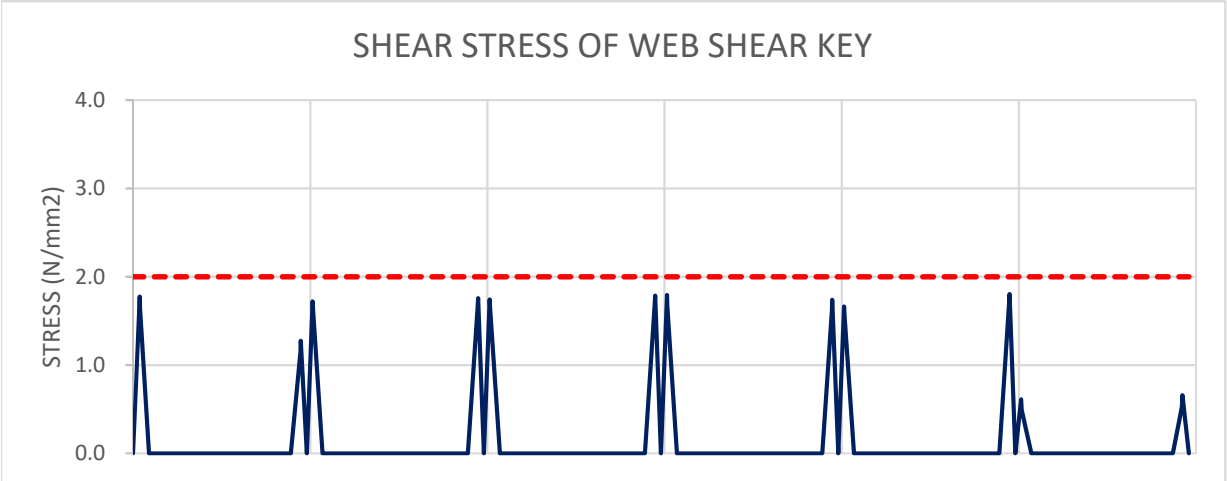




(2) SHEAR FORCE

(Stress check of web shear key)





(Stress check of slab key)

	Cantilever		On Span	
	Convex key	Concave key	Convex key	Concave key
Shear Force	46.0	46.0	56.3	56.3
Shear Stress	0.59	0.50	0.58	0.49
Alowable Shear Stress	0.65	0.65	0.65	0.65

3-4 DESIGN RESULT OF CROSSBEAM

FOR BENDING MOMENT						
	Item			unit	End Crossbeam	Intermediate Crossbeam
	Permanent load	Fiber stress	Upper	N/mm2	0.23	0.02
			Lower	N/mm2	0.45	1.52
		Allowable stress		N/mm2	≧ 0.00	≧ 0.00
	Service	Fiber stress	Upper	N/mm2	0.10	-0.32
			Lower	N/mm2	0.58	1.83
		Allowable stress		N/mm2	≧ -1.80	≧ -1.80
	Strength	Bending moment		kNm	4601.75	10011.06
		Resistance		kNm	7452.04	12924.90
		Ratio		-	1.62	1.29
FOR SHEAR FORCE						
	Item			unit	End Crossbeam	Intermediate Crossbeam
	Service	Design force S		kN	149.46	200.94
		Shear stress		N/mm2	0.03	0.05
		Allowable shear stress		N/mm2	0.65	0.65
	Strength (Ultimate)	Design force S		kN	254.08	341.60
		Shear stress		N/mm2	0.05	0.08
		Allowable shear stress		N/mm2	0.65	0.65

3-5 SUPPORT REACTION

(kN)

			P20	P21	P22	P23	P24	P25	A2
VERTICAL									
	DEAD LOAD / 1 BRIDGE								
		Self Weight	4247.5	9665.4	8928.9	9124.0	9092.8	9400.2	4370.4
		Prestress (in)	306.1	-490.3	234.3	-64.5	9.1	-143.9	149.2
		Prestress (out)	411.7	-540.5	164.0	-43.3	16.7	-325.3	316.7
		Superimposed	820.0	2315.8	1991.1	2099.6	1991.1	2315.8	820.0
		Prestress loss	-84.9	111.5	-26.7	-29.0	117.6	-91.6	3.0
		TOTAL	5700.4	11061.9	11291.6	11086.8	11227.3	11155.2	5659.3
	LIVE LOAD								
		Lmax (/ 1Br) *1)	1338.5	2788.8	2733.4	2765.1	2733.4	2788.8	1338.5
		Lmax (/ 1Bearing) *2)	1124.3	2332.3	2285.3	2311.1	2285.3	2308.6	1124.3
HORIZONTAL									
	SERVICE (Longitudinal) / 1 PIER								
		Temperature	354.9	480.0	256.0	0.0	256.0	411.4	332.7
		Shrinkage	354.9	480.0	256.0	0.0	256.0	411.4	332.7
		Creep	617.1	864.0	448.0	0.0	448.0	740.6	578.6
		Elastic	262.3	544.0	288.0	0.0	288.0	466.3	361.6
	SEISMIC / 1 PIER								
		Longitudinal (kh = 0.3)	3280.0	6370.0	6470.0	8020.0	7130.0	6120.0	3230.0
		Transverse (kh = 0.3)	2670.0	7580.0	6580.0	6950.0	6610.0	7600.0	2640.0

*1) Without Impact for design of foundation and column.

*2) With Impact for design of pierhead.

ON-RAMP BRIDGE

SUPERSTRUCTURE

1. OUTLINE OF DESIGN

1.1 OUTLINE

This report describe the design calculation of a prestressed concrete highway bridge below:

- Bridge Name: Bago River Bridge (On-ramp Bridge)
- Bridge Length: L = 115.200m

The bridge type is 4-span continuous PC-I girder bridge with precast PC panels. Its main girder is constructed by post-tension method.

Summary of design overview are as follows:

1.2 DESIGN OVERVIEW

1.2.1 Deck slab

Deck slab is composed of precast PC panel and CIP concrete which are made monolithic.

Before hardening of CIP portion, precast PC panels acts panel by panel as both formwork and falsework. After hardening of CIP portion, precast PC panels behaves as composite slab together with CIP RC portion to resist live load etc.

The precast PC panels are designed not to induce tensile stress at the center of deck slab under service load.

At the support of composite deck slab and the supports of PC panels, and deck slab in longitudinal direction are designed as RC member.

1.2.2 Main Girder

Main girder is composed of post-tensioned I-shape beams.

Sectional forces due to live load and superimposed dead load are calculated using plane grid models. Torsional stiffness of the members are neglected in this calculation.

Sectional forces due to self weight, difference in age of concrete members and change of structural systems are calculated using beam models.

Effect of differential creep and shrinkage between deck slab and main girders are taken into account.

Precast PC panels are neglected in the calculation of effective cross section of composite girder used for calculation of stresses. On the other hand, gross section is taken as effective in the calculation of sectional forces and deflection.

Dowel rebars are installed at the interface of main girder and deck slab, in order to satisfy allowable shear stress at the surface.

1.2.3 Cross Beams

One intermediate crossbeams is installed at the center of each span.

Crossbeams are reinforced with prestressing tendons.

1.2.4 Longitudinal Connection at Support

Longitudinal connection of girders at supports are designed as RC member.

1.2.5 Assumption of Construction Schedule

In relation to the difference of age of concrete members, construction schedule is assumed as follows in the design:

Girder Fabrication	→	Girder Erection	→	Crosbeem Casting	→	PC Panel Installation	→	Deck Slab Casting	→	Bridge Deck Finishing
Day 0								Day 90		Day 120

1.2.6 Bearings

Bearings are installed in 2 lines (under each individual girder) at intermediate support.

1.3 DESIGN CONDITIONS

1.3.1 Basic Conditions

- Structure Category: Prestressed concrete highway bridges
- Structure Type: Continuous Post-tensioned PC-I girder (composite PC deck slab)
- Girder Fabrication: Fabrication in on-site yard
- Bridge Length: 115.200 [m] (on road centerline)
- Girder Length: 28.600+28.600+28.600+28.588 [m] (on girder centerline)
- Span Length: 27.900+27.900+27.900+27.888 [m] (on girder centerline)
- Road Composition: Total width Curb + Carriageway + Curb
  6.450 [m] 0.600 + 5.250 + 0.600
- Live Load: HL-93 (AASHTO)
- Impact factor: i = 10／(25＋L) (applied to all of truck, tandem and lane loads)
- Skew Angle: 90°00’00” (AO1~PO3), 87°13’02” (P5)

1.3.2 Material and Allowable Stresses

1.3.2.1 Concrete

[N/mm2]

	Main Girder	Cross-beam	Precast PC panel	CIP Deck Slab
Specified characterisic strength of concrete (cylinder)	40.0	30.0	40.0	30.0
Concrete strength at jacking	34.0	25.0	34.0	-
Allowable flexural compressive stress				
Imediately after prestressing	19.00	15.00	19.00	-
At service limit state	14.00	11.00	14.00	10.00
At transfer / during construction	14.00	-	-	-
Allowable flexural tensile stress				
Imediately after prestressing	-1.50	-1.20	-1.50	-

At service limit state		-1.50	-1.20	-0.00	-
Under permanent load		-0.00	-0.00	-	-
Mean shear stress carriable by concrete		0.55	0.45	-	-
Maximum mean shear stress in concrete	(for sher)	5.30	4.00	-	-
(ditto)	(for shear + torsion)	6.10	4.80	-	-
Allowable diagonal tensil stress under permanent load	(for shear)	1.00	0.80	-	-
(ditto)	(for shear + torsion)	1.30	1.10	-	-
Allowable diagonal tensil stress under service load	(for shear)	2.00	1.70	-	-
(ditto)	(for shear + torsion)	2.50	2.20	-	-

1.3.2.2 PC Tendons

[N/mm2]

	Main Girder	Cross-beam	Precast PC panel
Notation of PC tendons	SWPR7B	Type B-1 (SBPR 930/1080)	SWPR7A
Name of PC tendons	12S12.7mm	Φ32B-1	1S9.3
Tensile Strength	1850	1080	1700
Yield Stress	1600	930	1450
Allowable Tensile Stress			
At jacking	1440	837	1305
Imediately after prestressing	1295	756	1190
At service limit state	1110	648	1020

1.3.2.3 Reinforcing Steel

[N/mm2]

		Main Girder	Cross-beam	Precast PC panel	CIP Deck Slab
Class of Reinforcing Steel		SD345	SD345	SD345	SD345
Yield Strength		345.00	345.00	345.00	345.00
Allowable tensile stress	(basic value)	180.00	180.00	180.00	180.00
	(at longitudinal connection on support)	160.00	-	-	-

1.3.3 General items for Design Calculation

1.3.3.1 Load Combinations under Ultimate Load

(a) 1.3 x (Permanent Load) + 2.5 x (Live Load + Impact) + 1.0 x (Effect of Creep)

(b) 1.0 x (Permanent Load) + 2.5 x (Live Load + Impact) + 1.0 x (Effect of Creep)

(c) 1.7 x (Permanent Load + Live Load + Impact) + 1.0 x (Effect of Creep)

1.3.3.2 Concrete

		Main Girder	Cross-beam	Precast PC panel	CIP Deck Slab
Unit weight	[kN/m3]	24.5	24.5	24.5	24.5
Elastic modulus	[x 10^4 N/mm2]				
Under service load		3.10	2.80	3.10	2.80
At jacking		2.92	2.55	2.92	-
Creep coefficient					
At deck slab casting (after 90 days)		1.4	-	-	-
At bridge deck finishing (after 120 days)		1.5	-	-	-
After completion		2.6	2.6	3.0	2.6
Shrinkage coefficient	[x 10^-5]				
At jacking of main girder (after 4 days)		0.7	-	-	-
At deck slab casting (after 90 days)		7.3	-	-	-
After completion		21.4	20.0	20.0	20.0

1.3.3.3 Steel

		PC Tendon	Reinforcing Steel
Elastic Modulus	[x 10^-5 N/mm2]	2.00	2.00

			Main Girder	Cross-beam	Precast PC panel
Name of PC tendons			12S12.7mm	Φ32B-1	1S9.3
Relaxation ratio	(before jacking)	[%]	-	-	2.5
	(after jacking)	[%]	1.5	1.5	1.5
Cross sectional area of steel		[mm2]	1184.52	804.2	51.61
Pull-in at anchorage set		[mm]	8.0	3.0	-

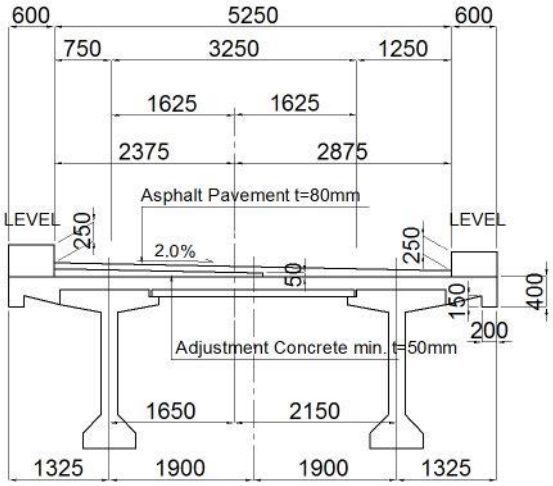
1.3.3.4 Other values

Number of main girder in a section		Number	2
Spacing of center of main girder		m	3.800
Height of main girder		m	2.100
Thickness of CIP deck portion		m	0.170
Thickness of CIP deck on main girder		m	0.170
Number of intermediate crossbeam per span		Number	1
Thickness of crossbeam	at support	m	0.700
	at span center	m	0.300
	at longitudinal connection	m	2.300

1.3.3.5 Thermal Load

Differential temperature between main girder and deck	5°C
Temperature rise / fall	±15°C

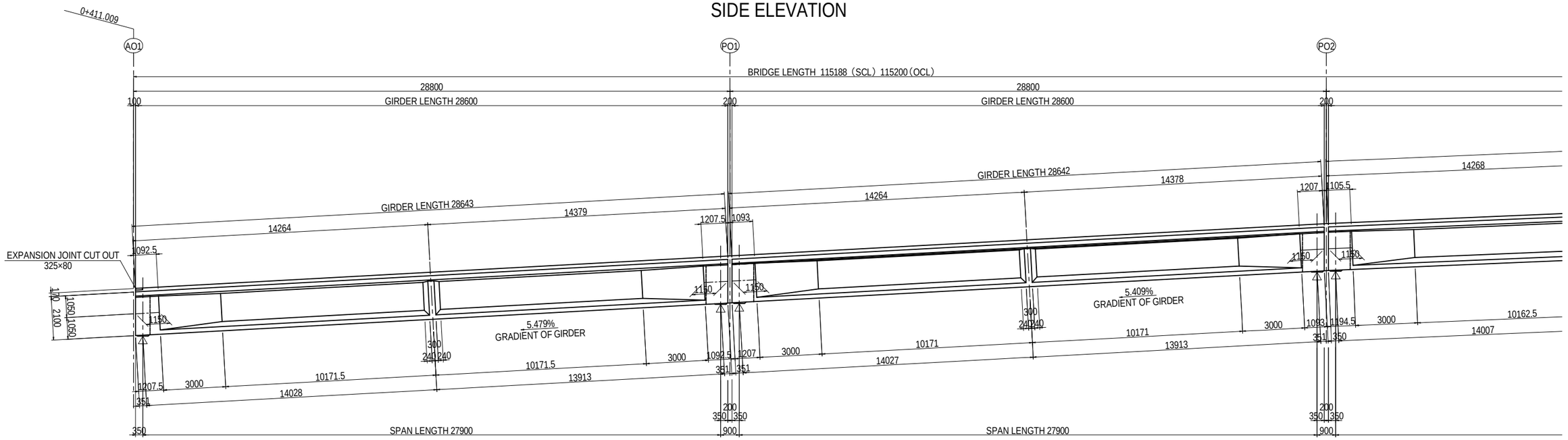
Figure Cross Section of Girder



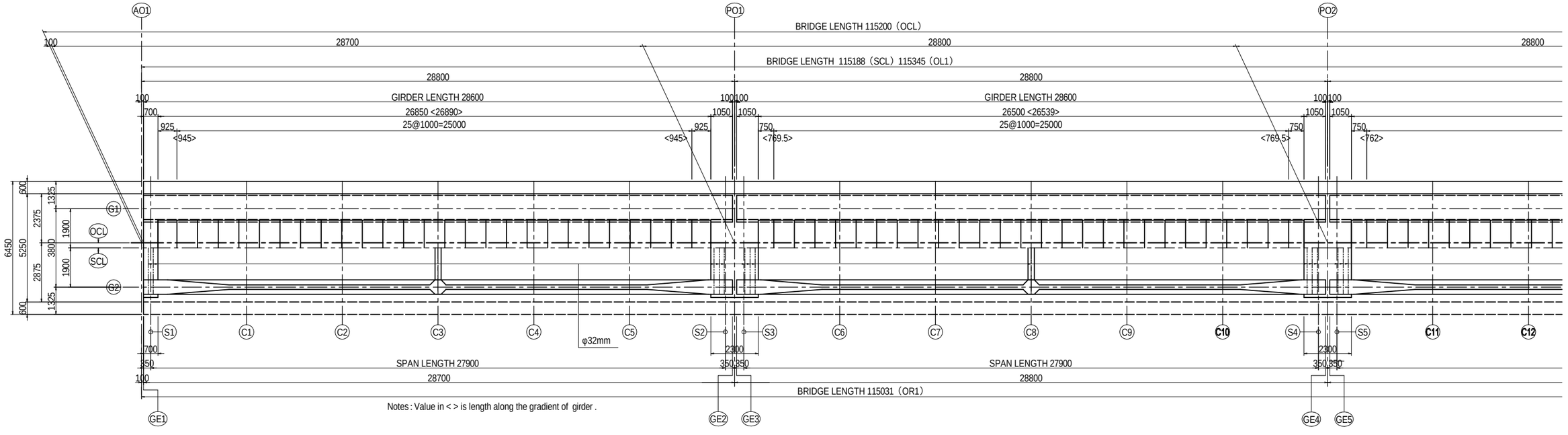
1.4 General View of Superstructure

GENERAL VIEW OF SUPERSTRUCTRE FOR ON-RAMP (1) S=1:200

SIDE ELEVATION



PLAN VIEW



Notes : Value in < > is length along the gradient of girder .

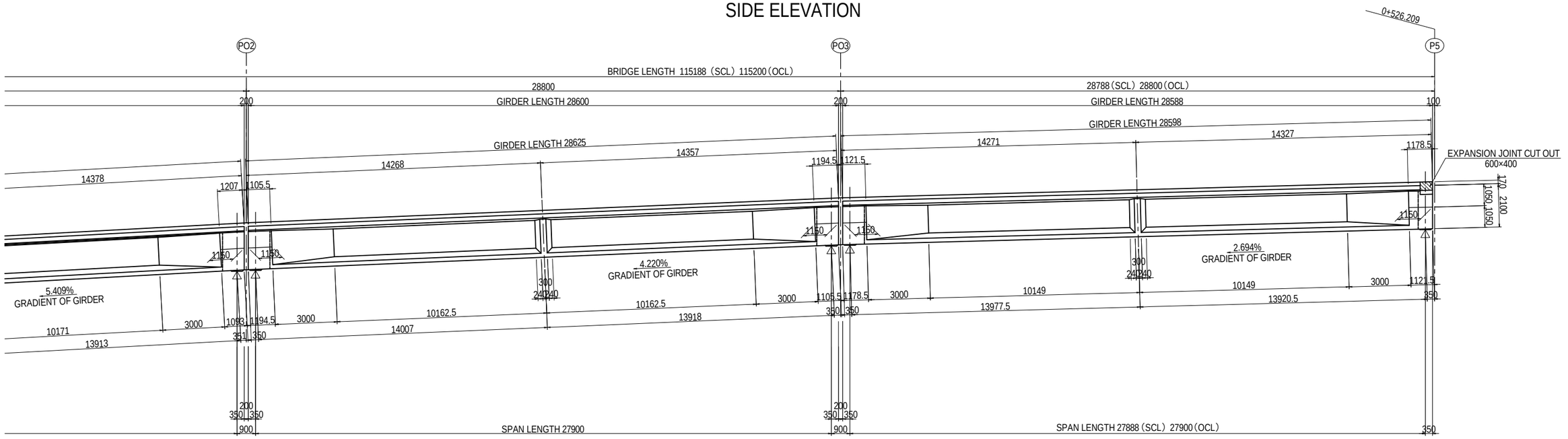
PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN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

	NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
PREPARED BY	M. OHYAMA	大山満弘	15 Jun.2017	GENERAL VIEW OF SUPERSTRUCTURE FOR ON-RAMP (1)	1
CHECKED BY	T. HAYAKAWA	早川知邦	20 Jun.2017		DWG No.
APPROVED BY	Y. SANO	佐野雄一	21 Jun.2017		P1-OR-1001

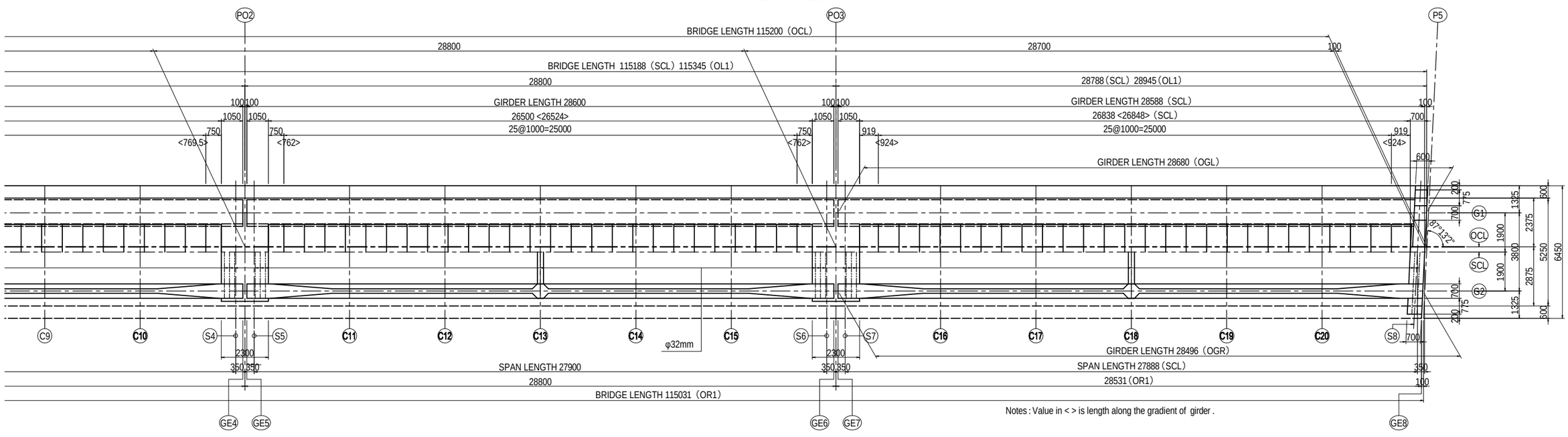
GENERAL VIEW OF SUPERSTRUCTRE FOR ON-RAMP (2)

S=1:200

SIDE ELEVATION



PLAN VIEW



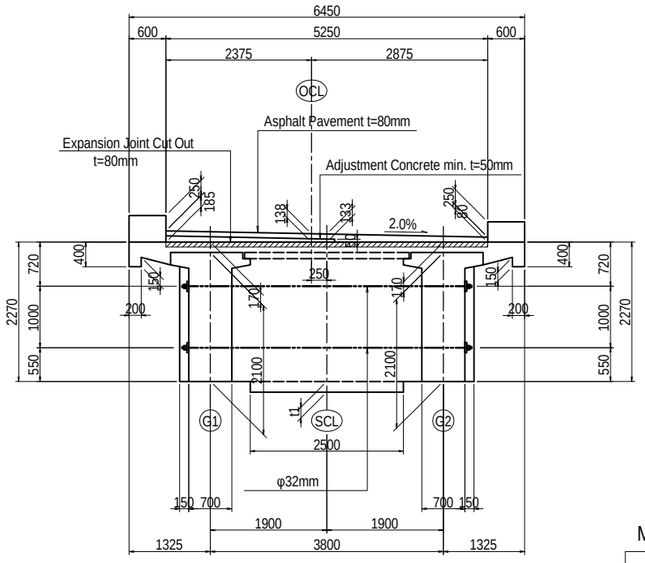
Notes : Value in < > is length along the gradient of girder .

PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: 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: M. OHYAMA 大山満弘 15 Jun.2017	GENERAL VIEW OF SUPERSTRUCTURE FOR ON-RAMP (2)
				CHECKED BY: T. HAYAKAWA 早川知邦 20 Jun.2017	PACKAGE: 1
				APPROVED BY: Y. SANO 佐野雄一 21 Jun.2017	DWG No.: P1-OR-1002

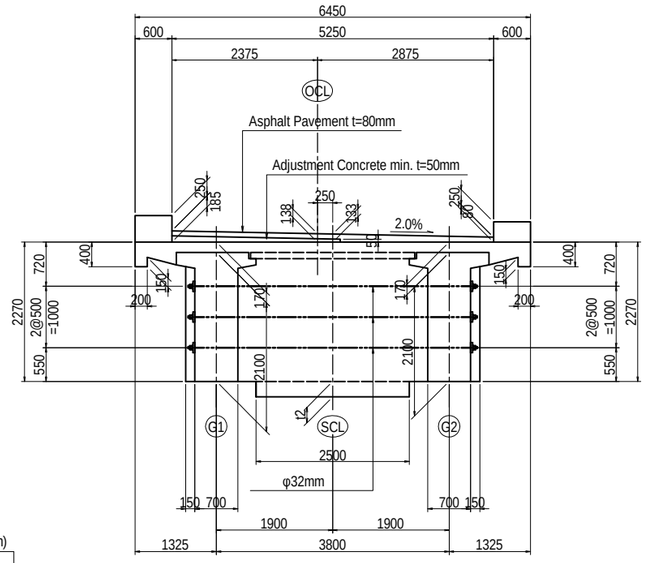
GENERAL VIEW OF SUPERSTRUCTURE FOR ON-RAMP (3)

CROSS SECTIONS S=1:100

AT AO1（GE1）



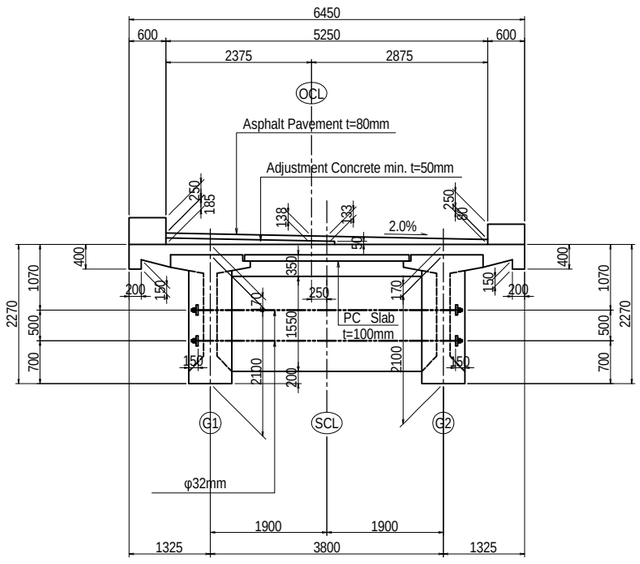
AT CROSS BEAM SECTION（PO1）



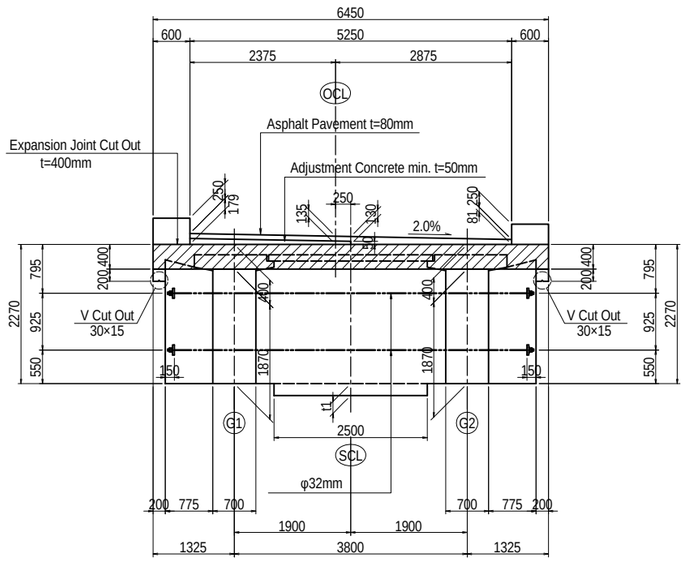
MEMBER DIMENSIONS (mm)

	AO1	P01	P02	P03	P5	
t1	171	—	—	—	189	on bearing support line
t2	—	267	263	259	—	on center of pier

AT INTERMEDIATE CROSS BEAM SECTION（C3）



AT P5（GE8）



Notes:
- Unless otherwise indicated in drawing, transverse PC bars shall be tensioned from one side alternately.
- Reinforcement for tendon anchorage such as grid rebar shall be arranged sufficiently.
- 800 N/mm2 is assumed as jacking force of φ32mm in design stage. Jacking force considering jacking sequence shall be indicated on shop drawings and shall be approved by Engineer.

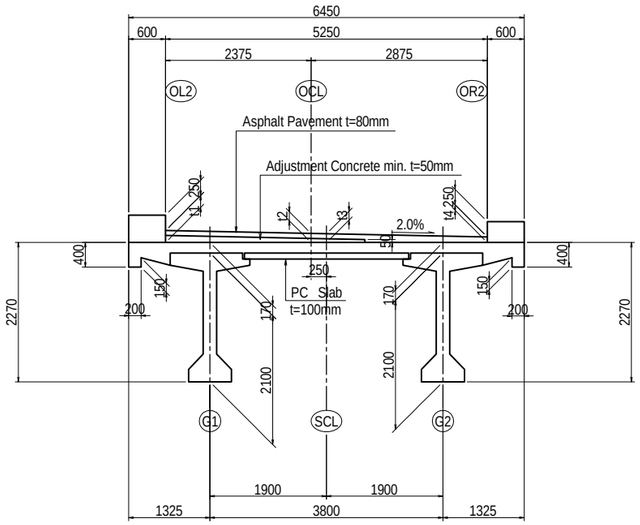
PROJECT NAME	DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT				
FINANCED BY	JAPAN INTERNATIONAL COOPERATION AGENCY				
COUNTERPART	REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE				
JICA STUDY TEAM	NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.				
	NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
PREPARED BY	M. OHYAMA	大山満弘	15 Jun.2017	GENERAL VIEW OF SUPERSTRUCTURE FOR ON-RAMP(3)	1
CHECKED BY	T. HAYAKAWA	早川知邦	20 Jun.2017		DWG No.
APPROVED BY	Y. SANO	佐野雄一	21 Jun.2017		P1-OR-1003

GENERAL VIEW OF SUPERSTRUCTURE FOR ON-RAMP (4)

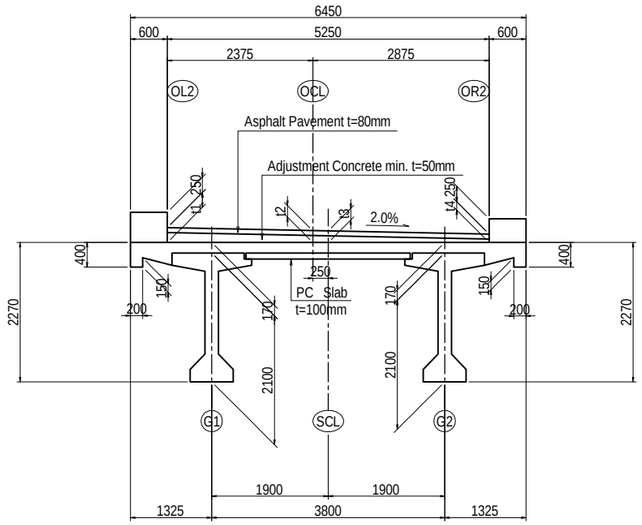
CROSS SECTIONS S=1:100

STANDARD SECTION

AT（C8）



AT（C13）



MEMBER DIMENSIONS

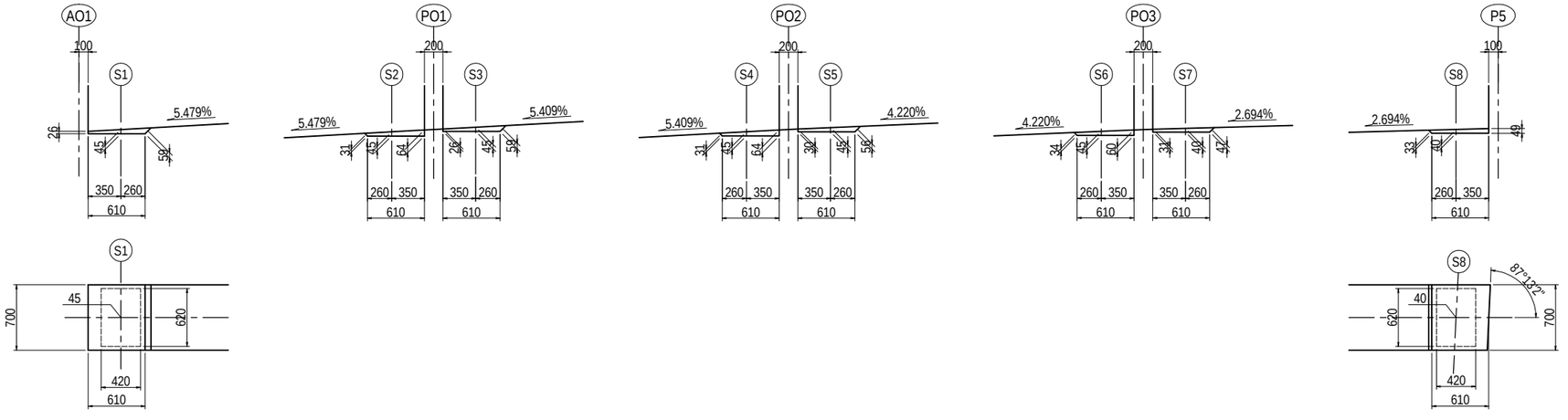
（UNIT：mm）

		AO1	GE1	S1	C1	C2	C3	C4	C5	S2	GE2	PO1	GE3	S3	C6	C7	C8	C9	C10	S4	GE4	PO2	GE5	S5	C11	C12	C13	C14	C15	S6	GE6
OL2	t1	185	185	185	185	185	185	185	185	185	185	185	185	185	189	192	195	198	198	187	185	185	186	189	218	236	242	236	218	189	186
OCL	t2	138	138	138	138	138	138	138	138	138	138	138	138	138	141	144	148	151	151	139	138	138	138	141	171	188	194	188	171	141	138
SCL	t3	133	133	133	133	133	133	133	133	133	133	133	133	133	136	139	143	146	146	134	133	133	133	136	166	183	189	183	166	136	133
OR2	t4	80	80	80	80	80	80	80	80	80	80	80	80	80	84	87	90	93	93	82	80	80	81	84	113	131	137	131	113	84	81

（UNIT：mm）

		PO3	GE7	S7	C16	C17	C18	C19	C20	S8	GE8	P5
OL2	t1	185	186	188	216	231	235	226	206	181	179	178
OCL	t2	138	138	141	168	184	187	179	159	136	134	134
SCL	t3	133	133	136	163	179	182	174	154	131	130	129
OR2	t4	80	81	83	111	126	130	121	102	82	81	80

DETAIL OF ADJUSTMENT LAYER S=1:30

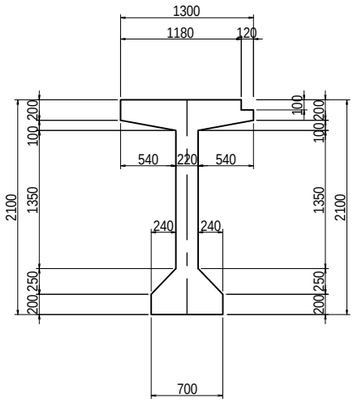


PROJECT NAME	FINANCED BY	COUNTERPART	JICA STUDY TEAM		NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	JAPAN INTERNATIONAL COOPERATION AGENCY	REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.	PREPARED BY	M. OHYAMA	大山満弘	15 Jun.2017	GENERAL VIEW OF SUPERSTRUCTURE FOR ON-RAMP (4)	1
				CHECKED BY	T. HAYAKAWA	早川知邦	20 Jun.2017		DWG No.
				APPROVED BY	Y. SANO	佐野裕一	21 Jun.2017		P1-OR-1004

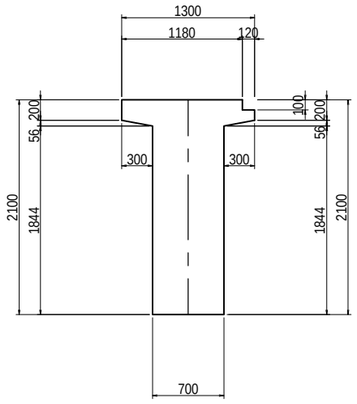
GENERAL VIEW OF SUPERSTRUCTURE FOR ON-RAMP (5)

CROSS SECTION S=1:30

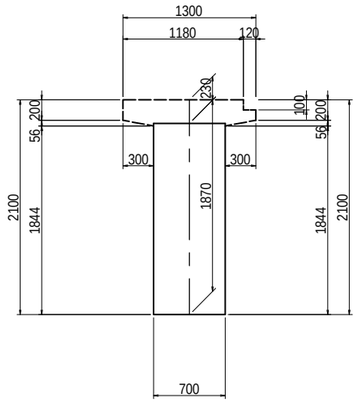
TYPICAL SECTION



SUPPORT SECTION

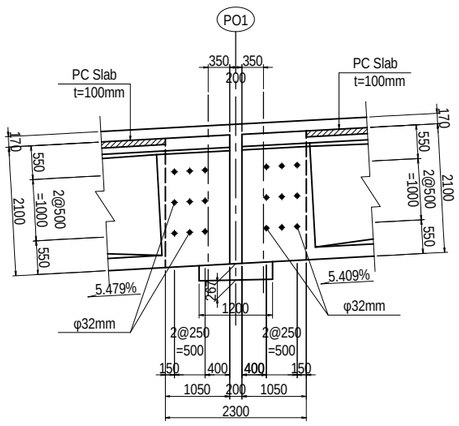


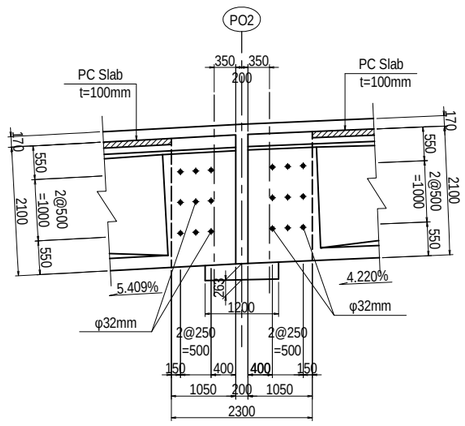
SUPPORT SECTION (P5)

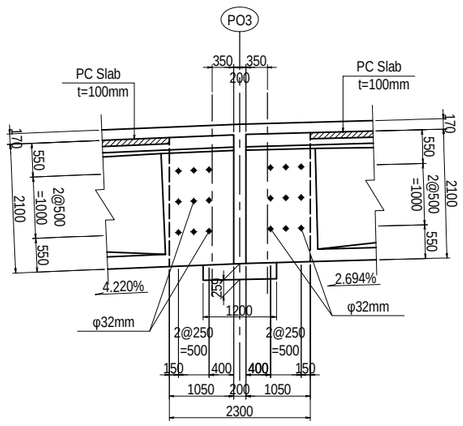


DETAIL OF CROSS BEAM S=1:50

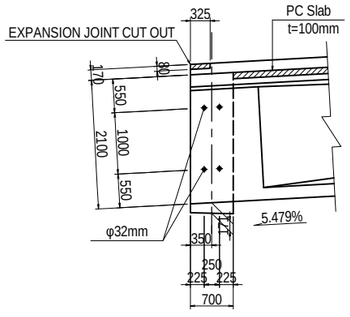
CONNECTION PART



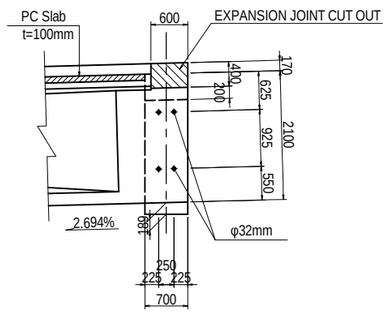




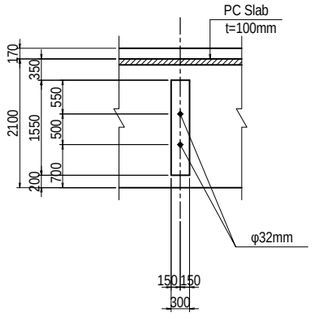
AO1 END CROSS BEAM



P5 END CROSS BEAM



INTERMEDIATE CROSS BEAM



DESIGN DONDITION

ROAD GARDE	Equivalent to CLASS C
BRIDGE TYPE	4 span continuous PC-I girder bridge with composite deck(PC board and RC deck)
BRIDGE LENGTH	L = 115.200m
SPAN LENGTH	L = 27.900 + 27.900 + 27.900 + 27.900m
WIDTH OF THE ROAD	TOTAL : 6.450m L = 0.600 + 0.750 + 3.250 + 1.250 + 0.600m
HORIZONTAL ALIGNMENT	R = ∞
LONGITUDINAL SLOPE	5.479% ～ 2.197%
SUPERELEVATION	2.00%
ANGLE OF SKEW	AO1, PO1, PO2, PO3 : 90°00'00" , P5 : 87°13'02"
PAVEMENT	ASPHALT PAVEMENT t = 80 mm
SLAB	REINFORCED CONCRETE t = 170 mm
PLATE	PRESTRESS CONCRETE BOARD t = 100 mm
LIVE ROAD	AASHTO HL-93
DESIGN STANDARD	AASHTO LRFD BRIDGE DESIGN 2014(LIVE LOAD) Specifications for highway bridges (Japan Road Association) Part I Common, Part III Concrete Bridges, Part V Seismic Design (April 2012)

MATERIALS LIST

(N/mm^2)

CONCRETE		MAIN GIRDER	CROSS BEAM	PC BOARD	RC SLAB	COUPLING CONCRETE
DESIGN STRENGTH OF CONCRETE		40.0	30.0	40.0	30.0	30.0
ALLOWABLE FLEXURAL COMPRESSIVE STRESS	IMMEDIATELY AFTER PRESTRESSING	19.0	15.0	19.0	—	—
	OTHERS	14.0	11.0	14.0	10.0	10.0
ALLOWABLE FLEXURAL TENSILE STRESS	IMMEDIATELY AFTER PRESTRESSING	-1.5	-1.2	-1.5	—	—
	DEAD LOAD	0.0	0.0	—	—	—
	OTHERS	-1.5	-1.2	0.0	—	—
MEAN SHEAR STRESS CONCRETE CAN CARRY		0.55	0.45	—	—	—
MAXIMUM MEAN CONCRETE SHEAR STRESS	IN CASE WHERE ONLY SHEAR FORCES	5.3	4.0	—	—	—
ALLOWABLE DIAGONAL TENSILE STRESS (DEAD LOAD)	IN CASE WHERE ONLY SHEAR FORCES	-1.0	-0.8	—	—	—
ALLOWABLE DIAGONAL TENSILE STRESS (DESIGN LOAD)	IN CASE WHERE ONLY SHEAR FORCES	-2.0	-1.7	—	—	—

(N/mm^2)

PC STRAND		SWPR7BL 12S12.7mm	SBPR930/1080 ϕ 32mm	SWPR7 1S9.3mm
TENSILE STRENGTH		1850	1080	1700
YIELD POINT		1600	980	1450
ALLOWABLE TENSILE STRESS	DURING PRESTRESSING	1440	837	1305
	IMMEDIATELY AFTER PRESTRESSING	1295	756	1190
	UNDER DESIGN LOAD	1110	648	1020

(N/mm^2)

REINFORCING STEEL		MAIN GIRDER	CROSS BEAM	RC SLAB	COUPLING CONCRETE
STEEL TYPE		SD345	SD345	SD345	SD345
YIELD POINT		345	345	345	345
ALLOWABLE TENSILE STRESS	DEAD LOAD	—	—	100	100
	DESIGN LOAD	180	180	140	160

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	M. OHYAMA	大山満弘	15 Jun.2017	GENERAL VIEW OF SUPERSTRUCTURE FOR ON-RAMP (5)	1
				CHECKED BY	T. HAYAKAWA	早川知邦	20 Jun.2017		DWG No.
				APPROVED BY	Y. SANO	佐野雅一	21 Jun.2017		P1-OR-1005

1.5 REFERENCES

- Specifications for Highway Bridges

  Part-I Common — Japan Roadway Association

  Part-III Concrete Bridges — Japan Roadway Association
- Handbook for Design of Concrete Highway Bridges — Japan Roadway Association
- Handbook for Construction of Concrete Highway Bridges — Japan Roadway Association
- Handbook for Construction of Concrete Highway Bridges — Japan Roadway Association
- Guidelines for Design and Construction of PC Composite Deck Slabs (Draft)

  Japan Society of Civil Engineering
- Handbook for Design and Construction of PC Composite Deck Slabs for Highway Bridges

  Prestressed Concrete Panel Composite Slab Association, Japan
- Manualfor design and construction of PC-I girder bridges with precast PC panel (darft)

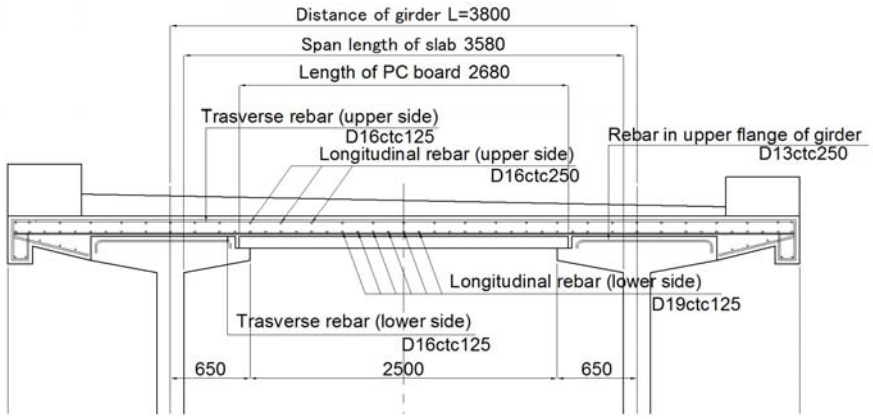
  Japan Prestressed Concrete Contractors Association.
- Guidebook for design and construction of PC-I girder bridges with precast PC panel

  Japan Prestressed Concrete Contractors Association.
- AASHTO LRFD Bridge Specifications

1.6 DESIGN PROGRAM

In the design calculation of Superstructure of On-ramp Bridge, “JIP-COMPO” by JIP Techno Schence Co. Ltd. was used. This program has been developed for design of PC-I girders with PC composite decks.

SLAB BETWEEN GIRDERS



PC BOARD AND PC COMPOSITE SLAB

		UNIT	PC BOARD			CIP CONCRETE
			IMMEDIATELY AFTER PRESTRESSING	CONSTRUCTION LOAD	DESIGN LOAD	DESIGN FORCE
SECTIONAL FORCE		(kNm)	2.05	8.48	46.4	46.4
COMPRESSION STRESS		(Mpa)	9.31 ≦ 10.0	-	-	-
TOTAL STRESS	UPPER	(Mpa)	9.98	12.25	9.54	3.72
	LOWER	(Mpa)	8.63	2.99	0.82	-0.85
	ALLOWABLE STRESS	(Mpa)	-1.5≦σc≦19.0	0.0≦σc≦14.0	0.0≦σc≦14.0	σc≦10.0
RATIO OF SECTIONAL STRESS			0.865 ≧ 3/5	-	-	-
AMOUNT OF TENSILE REBAR		(cm2)	-	-	-	-
AMOUNT OF ARRANGED REBAR		(cm2)	-	-	-	-

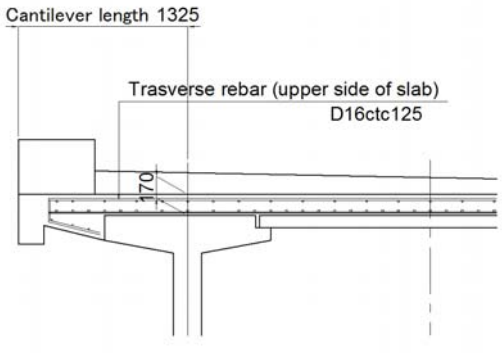
CIP CONCRETE（DESIGN FORCE）

	UNIT	AT SUPPORT	AT EDGE OF PC BOARD		LONGITUDINAL DIRECTION
			MAX	MIN	
BENDING MOMENT	(kNm)	-72.63	23.77	-35.42	31.84
AMOUNT OF ARRANGED REBAR		D16 ctc 125	D16 ctc 125	D16 ctc 125	D19 ctc 125
	(cm2)	15.888	15.888	15.888	22.920
STRESS OF CONCRETE	(Mpa)	3.1 ≦ 10.0	5.8 ≦ 10.0	4.2 ≦ 10.0	8.9 ≦ 10.0
STRESS OF REBAR	(Mpa)	117.4 ≦ 140.0	116.3 ≦ 140.0	110.3 ≦ 140.0	128.7 ≦ 140.0

JOINT OF UPPER FLANGE（CONSTRUCTION LOAD）

	SECTIONAL FORCE	AMOUNT OF ARRANGED REBAR(cm2)	STRESS			
BENDING MOMENT	7.57 kNm	D13 ctc 250 5.07	CONCRETE	1.2 ≦ 10.0	REBAR	63.1 ≦ 140.0
SHEAR FORCE	13.55 kN	-	AVERAGE SHEAR	0.14 ≦ 0.55	-	

CANTILEVER SLAB

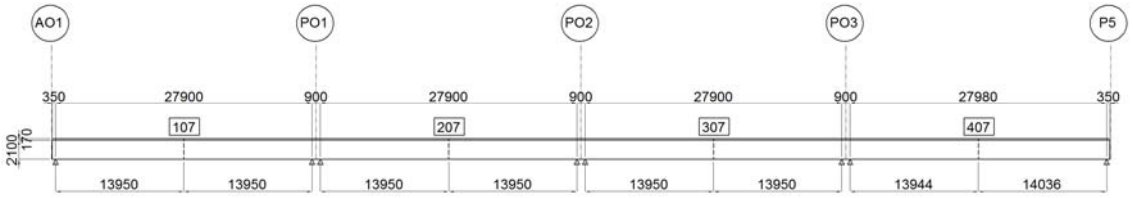


BENDING STRESS（DESIGNED FORCE）

	UNIT	TYPICAL SECTION	END OF GIRDER
BENDING MOMENT	(kNm)	63.94	114.32
AMOUNT OF ARRANGED REBAR		D16 ctc 125	D19 ctc 125
	(cm2)	15.888	22.920
STRESS OF CONCRETE	(Mpa)	2.7 ≦ 10.0	4.2 ≦ 10.0
STRESS OF REBAR	(Mpa)	103.3 ≦ 140.0	130.2 ≦ 140.0

VERIFICATION OF MAIN FOR BENDING MOMENT (FIRST SPAN, SECOND SPAN)

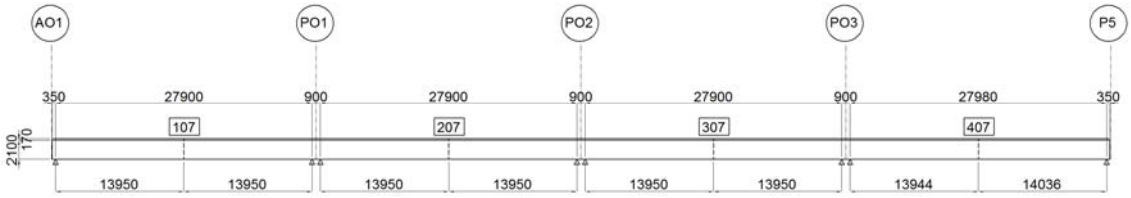
GIRDER NO.	G1
ARRANGEMENT OF PC TENDON	12S12.7mm x 4EA.
JACKING STRESS	1340 Mpa



			UNIT	FIRST SPAN(107)			SECOND SPAN(207)		
SECTIONAL FORCE	DEAD LOAD OF MAIN GIRDER		(kNm)	2207.8			2207.8		
	DEAD LOAD OF CROSSBEAM			123.2			123.2		
	DEAD LOAD OF SLAB			1829.7			1829.4		
	SURFACE LOAD			1130.1			600.8		
	LIVE LOAD	MAX		2917.3			2419.6		
		MIN		-573.0			-775.2		
	CREEP			962.8			1533.1		
	SHRINKAGE			-272.6			-452.1		
	TEMPERATURE GRADIENT			400.3			663.8		
	DEAD LOAD			5980.9			5842.2		
	DESIGN LOAD STATE	MAX		8898.2			8261.8		
		MIN		5407.9			5067.0		
STRESS				UPPER EDGE OF SLAB	UPPER EDGE OF MAIN GIRDER	LOWER EDGE OF MAIN GIRDER	UPPER EDGE OF SLAB	UPPER EDGE OF MAIN GIRDER	LOWER EDGE OF MAIN GIRDER
	PRESTRESS	IMMEDIATELY AFTER	(Mpa)	-	-4.58	20.66	-	-4.35	19.67
		BEFORE CASTING SLAB		-	-4.04	18.25	-	-3.85	17.39
		DESIGN LOAD		-	-3.77	17.01	-	-3.58	16.15
	LOCKED-IN FORCE			0.50	0.42	-1.22	0.74	0.61	-1.97
	DEAD LOAD OF MAIN GIRDER			-	4.18	-5.38	-	4.18	-5.38
	DEAD LOAD OF SIDE GIRDER			-	0.23	-0.27	-	0.23	-0.27
	DEAD LOAD OF SLAB			-	3.38	-4.05	-	3.38	-4.05
	SURFACE LOAD			0.84	0.71	-1.98	0.45	0.38	-1.05
	LIVE LOAD	MAX		2.17	1.84	-5.11	1.80	1.53	-4.24
		MIN		-0.43	-0.36	1.00	-0.58	-0.49	1.36
	DIFFERENCE IN SHRINKAGE			-0.12	0.34	-0.13	-0.12	0.34	-0.13
	DIFFERENCE IN CREEP			0.76	-1.84	0.70	0.79	-1.89	0.72
	DIFFERRENCE IN TEMPERATURE			0.67	-0.77	-0.33	0.89	-0.58	-0.77
TOTAL STRESS	IMMEDIATELY AFTER PRESTRESSING		(Mpa)	-	-0.39	15.28	-	-0.17	14.29
	ALLOWABLE STRESS			-	-1.5≦σ≦19.0		-	-1.5≦σ≦19.0	
	AFTER CASTING THE SLAB			-	3.75	8.54	-	3.94	7.68
	ALLOWABLE STRESS			-	-1.5≦σ≦14.0		-	-1.5≦σ≦14.0	
	DEAD LOAD			1.95	3.61	4.64	1.68	3.44	3.82
	ALLOWABLE STRESS			σ≦10.0	0.0≦σ≦14.0		σ≦10.0	0.0≦σ≦14.0	
	DESIGN LOAD	MAX		4.12	5.46	-0.47	3.48	4.97	-0.42
		MIN		1.52	3.25	5.64	1.10	2.95	5.18
	ALLOWABLE STRESS			σ≦10.0	-1.5≦σ≦14.0		σ≦10.0	-1.5≦σ≦14.0	
	TEMPERATURE GRADIENT	MAX		4.76	4.66	-0.83	4.20	4.21	-1.36
		MIN		1.55	3.28	5.68	1.26	3.14	5.36
	ALLOWABLE STRESS			σ≦11.5	-2.0≦σ≦16.1		σ≦11.5	-2.0≦σ≦16.1	
STRESS OF PC TENDON		IMMEDIATELY AFTER	(Mpa)	1175.0	≦	1295.0	1118.3	≦	1295.0
		EFFECTIVE TIME		967.3	≦	1110.0	918.6	≦	1110.0
		AFTER AN INCREASE		1035.2	≦	1110.0	975.7	≦	1110.0
SAFETY RATIO OF STRENGTH			-	1.14	≧	1.00	1.26	≧	1.00
TENSILE REBAR		REQUIRED AMOUNT OF REBAR	(cm2)	4.36			10.59		
		MIN AMOUNT OF REBAR		10.43			13.45		
		ARRANGEMENT		D19 N=6EA As=17.19			D19 N=6EA As=17.19		

VERIFICATION OF MAIN FOR BENDING MOMENT (THIRD SPAN, FOURTH SPAN)

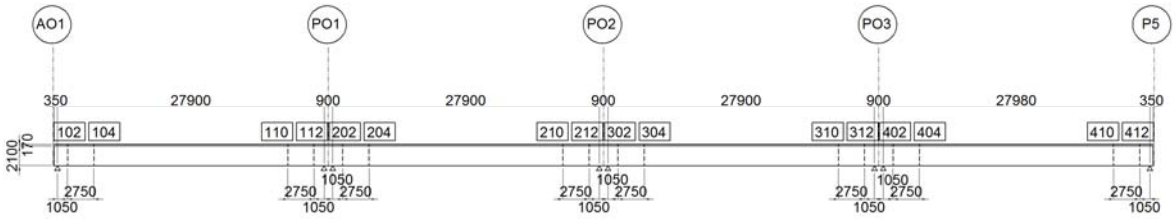
GIRDER NO.	G1
ARRANGEMENT OF PC TENDON	12S12.7mm x 4EA.
JACKING STRESS	1340 Mpa



			UNIT	THIRD SPAN(307)			FOURTH SPAN(407)		
SECTIONAL FORCE	DEAD LOAD OF MAIN GIRDER		(kNm)	2207.8			2220.0		
	DEAD LOAD OF CROSSBEAM			123.2			123.5		
	DEAD LOAD OF SLAB			1829.4			1840.2		
	SURFACE LOAD			701.3			1277.8		
	LIVE LOAD	MAX		2417.8			2891.2		
		MIN		-776.4			-572.2		
	CREEP			1531.0			963.7		
	SHRINKAGE			-452.1			-273.6		
	TEMPERATURE GRADIENT			663.9			401.7		
	DEAD LOAD			5940.5			6151.7		
	DESIGN LOAD STATE	MAX		8358.3			9042.9		
		MIN		5164.1			5579.5		
STRESS				UPPER EDGE OF SLAB	UPPER EDGE OF MAIN GIRDER	LOWER EDGE OF MAIN GIRDER	UPPER EDGE OF SLAB	UPPER EDGE OF MAIN GIRDER	LOWER EDGE OF MAIN GIRDER
	PRESTRESS	IMMEDIATELY AFTER	(Mpa)	-	-4.35	19.67	-	-4.57	20.66
		BEFORE CASTING SLAB		-	-3.85	17.39	-	-4.04	18.25
		DESIGN LOAD		-	-3.58	16.17	-	-3.77	17.04
	LOCKED-IN FORCE			0.75	0.62	-1.95	0.50	0.42	-1.22
	DEAD LOAD OF MAIN GIRDER			-	4.18	-5.38	-	4.21	-5.41
	DEAD LOAD OF SIDE GIRDER			-	0.23	-0.27	-	0.23	-0.27
	DEAD LOAD OF SLAB			-	3.38	-4.05	-	3.40	-4.08
	SURFACE LOAD			0.52	0.44	-1.23	0.95	0.81	-2.24
	LIVE LOAD	MAX		1.80	1.53	-4.23	2.15	1.83	-5.06
		MIN		-0.58	-0.49	1.36	-0.43	0.36	1.00
	DIFFERENCE IN SHRINKAGE			-0.12	0.34	-0.13	-0.12	0.34	-0.13
	DIFFERENCE IN CREEP			0.79	-1.89	0.72	0.77	-1.86	0.71
	DIFFERRENCE IN TEMPERATURE			0.88	-0.58	-0.77	0.67	-0.77	-0.33
TOTAL STRESS	IMMEDIATELY AFTER PRESTRESSING		(Mpa)	-	-0.17	14.29	-	-0.37	15.25
	ALLOWABLE STRESS			-	-1.5≦σ≦19.0		-	-1.5≦σ≦19.0	
	AFTER CASTING THE SLAB			-	3.94	7.68	-	3.79	8.49
	ALLOWABLE STRESS			-	-1.5≦σ≦14.0		-	-1.5≦σ≦14.0	
	DEAD LOAD			1.79	3.55	3.71	2.07	3.73	4.36
	ALLOWABLE STRESS			σ≦10.0	0.0≦σ≦14.0		σ≦10.0	0.0≦σ≦14.0	
	DESIGN LOAD	MAX		3.59	5.07	-0.53	4.22	5.55	-0.70
		MIN		1.21	3.06	5.07	1.64	3.36	5.37
	ALLOWABLE STRESS			σ≦10.0	-1.5≦σ≦14.0		σ≦10.0	-1.5≦σ≦14.0	
	TEMPERATURE GRADIENT	MAX		4.33	4.34	-1.45	4.86	4.75	-1.06
		MIN		1.35	3.21	5.22	1.67	3.40	5.40
	ALLOWABLE STRESS			σ≦11.5	-2.0≦σ≦16.1		σ≦11.5	-2.0≦σ≦16.1	
STRESS OF PC TENDON		IMMEDIATELY AFTER	(Mpa)	1118.3	≦	1295.0	1174.9	≦	1295.0
		EFFECTIVE TIME		919.6	≦	1110.0	969.1	≦	1110.0
		AFTER AN INCREASE		977.8	≦	1110.0	1038.5	≦	1110.0
SAFETY RATIO OF STRENGTH			-	1.25	≧	1.00	1.13	≧	1.00
TENSILE REBAR		REQUIRED AMOUNT OF REBAR	(cm2)	11.41			6.6		
		MIN AMOUNT OF REBAR		13.58			11.80		
		ARRANGEMENT		D19 N=6EA As=17.19			D19 N=6EA As=17.19		

VERIFICATION OF MAIN GIRDER FOR SHEAR FORCE (FIRST SPAN)

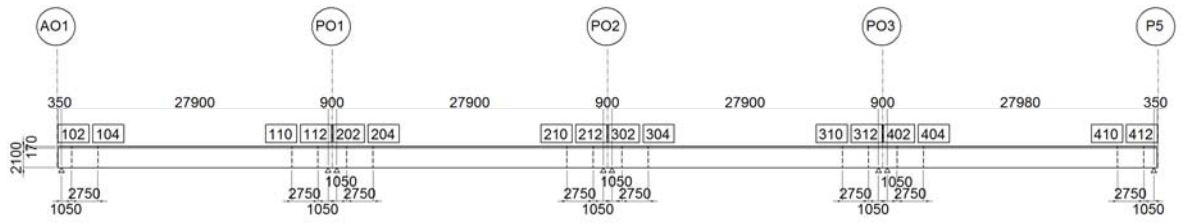
GIRDER NO.	G1



				UNIT	102	104	110	112
					POSITION OF SHEAR FORCE VERIFICATION	POSITION OF WEB EXTENSION	POSITION OF WEB EXTENSION	POSITION OF SHEAR FORCE VERIFICATION
SECTIONAL FORCE	DEAD LOAD BEFORE COMPOSITION			(kN)	560.6	422.6	-422.6	-559.9
	DEAD LOAD AFTER COMPOSITION				192.4	128.3	-247.3	-311.9
	LIVE LOAD		MAX		447.9	348.7	22.7	17.0
			MIN		-52.0	-55.0	-456.5	-537.4
	TOTAL SHEAR FORCE AFTER COMPOSITION		MAX		640.2	476.9	-224.5	-294.9
			MIN		140.4	73.3	-703.7	-849.4
	LOCKED-IN FORCE		CREEP		69.0	69.0	69.0	69.0
			SHRINKAGE		-19.5	-19.5	-19.5	-19.5
	VERTICAL COMPONENT FORCE OF PRESTRESSING				536.1	416.5	524.5	54.3
STRESS	THICKNESS OF WEB			(cm)	66.0	22.0	22.0	66.0
	EFFECTIVE HIGHT OF COMPOSITE GIRDER				220.5	220.5	220.5	221.0
	VERIFICATION OF DIAGONAL TENSILE STRESS	DEAD LOAD	BOTTOM OF UPPER FLANGE	(Mpa)	-0.02 ≧ -1.00	-0.05 ≧ -1.00	-0.02 ≧ -1.00	-0.11 ≧ -1.00
			NEUTURAL AXIS OF SECTION BEFORE COMPOSITION		-0.02 ≧ -1.00	-0.05 ≧ -1.00	-0.01 ≧ -1.00	-0.20 ≧ -1.00
			NEUTURAL AXIS OF SECTION AFTER COMPOSITION		-0.02 ≧ -1.00	-0.05 ≧ -1.00	-0.01 ≧ -1.00	-0.19 ≧ -1.00
			TOP OF LOWER FLANGE		0.00 ≧ -1.00	-0.02 ≧ -1.00	-0.01 ≧ -1.00	-0.02 ≧ -1.00
		DESIGNED LOAD	BOTTOM OF UPPER FLANGE		-0.13 ≧ -2.00	-0.39 ≧ -2.00	-0.42 ≧ -2.00	-0.42 ≧ -2.00
			NEUTURAL AXIS OF SECTION BEFORE COMPOSITION		-0.14 ≧ -2.00	-0.40 ≧ -2.00	-0.37 ≧ -2.00	-0.43 ≧ -2.00
			NEUTURAL AXIS OF SECTION AFTER COMPOSITION		-0.16 ≧ -2.00	-0.42 ≧ -2.00	-0.42 ≧ -2.00	-0.49 ≧ -2.00
			TOP OF LOWER FLANGE		-0.01 ≧ -2.00	-0.27 ≧ -2.00	-0.21 ≧ -2.00	-0.04 ≧ -2.00
	AVERAGE SHEAR STRAIN			(Mpa)	0.492 ≧ 0.55	1.099 ≧ 0.55	1.121 ≧ 0.55	0.925 ≧ 0.55
	STIRRUPS	MINIMUM AMOUNT OF REBAR		(cm2)	6.60	2.20	2.20	6.60
		REQIRED AMOUNT OF REBAR			0.08	5.45	6.84	6.30
		REQUIRED REBAR AMOUNT FOR SLAB			14.17	14.17	14.17	14.17
		TOTAL AMOUNT OF REBAR (Aw/2+As/4)			3.62	8.99	10.38	9.84
		ARRANGED AMOUNT OF REBAR			15.888	15.888	15.888	15.888
					D16 ctc 125	D16 ctc 125	D16 ctc 125	D16 ctc 125
	VERIFICATION OF DIAGONAL TENSILE FAILURE	SHEAR FORCE OF ULTIMATE STATE		(kN)	2148.00	1637.23	1962.60	2427.42
		SHEAR STRENGTH			4238.90	3018.03	3160.06	3698.68
		VERIFICATION			1.97 ≧ 1.00	1.84 ≧ 1.00	1.61 ≧ 1.00	1.52 ≧ 1.00
	VERIFICATION OF COMPRESSIVE FAILURE	SHEAR FORCE OF ULTIMATE STATE		(kN)	2148.00	1637.23	1962.60	2427.42
		SHEAR STRENGTH			8249.18	2987.50	3095.50	7784.88
		VERIFICATION			3.84 ≧ 1.00	1.82 ≧ 1.00	1.58 ≧ 1.00	3.21 ≧ 1.00
	REBAR IN AXIAL DIRECTION	UPPER SIDE		(cm2)	0.00	0.00	0.00	12.11
		LOWER SIDE			0.16	10.45	13.11	0.00
		ARRANGED AMOUNT OF REBAR			17.19	17.19	17.19	22.92
					D19 - 6	D19 - 6	D19 - 6	D19 - 8

VERIFICATION OF MAIN GIRDER FOR SHEAR FORCE (SECOND SPAN)

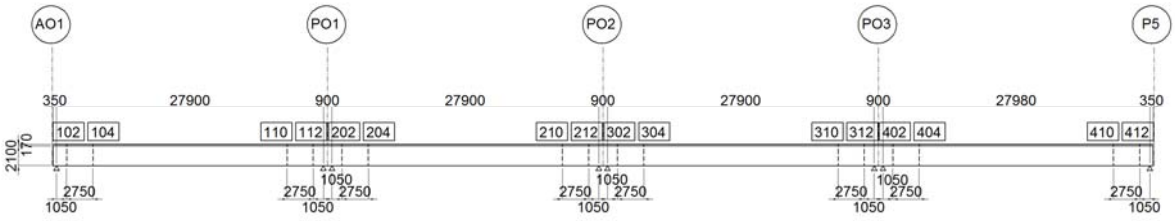
GIRDER NO.	G1



				UNIT	202	204	210	212
					POSITION OF SHEAR FORCE VERIFICATION	POSITION OF WEB EXTENSION	POSITION OF WEB EXTENSION	POSITION OF SHEAR FORCE VERIFICATION
SECTIONAL FORCE	DEAD LOAD BEFORE COMPOSITION			(kN)	559.8	422.6	-422.6	-559.8
	DEAD LOAD AFTER COMPOSITION				276.3	209.1	-180.3	-247.4
	LIVE LOAD		MAX		537.3	444.3	92.7	90.8
			MIN		-68.4	-70.4	-414.2	-503.9
	TOTAL SHEAR FORCE AFTER COMPOSITION		MAX		813.6	653.4	-87.7	-156.6
			MIN		207.9	138.7	-594.5	-751.3
	LOCKED-IN FORCE		CREEP		-25.2	-25.2	-25.2	-25.2
			SHRINKAGE		6.1	6.1	6.1	6.1
	VERTICAL COMPONENT FORCE OF PRESTRESSING				54.2	522.8	523.8	54.2
STRESS	THICKNESS OF WEB			(cm)	66.0	22.0	22.0	66.0
	EFFECTIVE HIGHT OF COMPOSITE GIRDER				221.0	220.5	220.5	221.0
	VERIFICATION OF DIAGONAL TENSILE STRESS	DEAD LOAD	BOTTOM OF UPPER FLANGE	(Mpa)	-0.11 ≧ -1.00	-0.01 ≧ -1.00	-0.02 ≧ -1.00	-0.12 ≧ -1.00
			NEUTURAL AXIS OF SECTION BEFORE COMPOSITION		-0.21 ≧ -1.00	-0.01 ≧ -1.00	-0.01 ≧ -1.00	-0.21 ≧ -1.00
			NEUTURAL AXIS OF SECTION AFTER COMPOSITION		-0.20 ≧ -1.00	-0.01 ≧ -1.00	-0.02 ≧ -1.00	-0.20 ≧ -1.00
			TOP OF LOWER FLANGE		-0.03 ≧ -1.00	0.00 ≧ -1.00	-0.01 ≧ -1.00	-0.03 ≧ -1.00
		DESIGNED LOAD	BOTTOM OF UPPER FLANGE		-0.43 ≧ -2.00	-0.41 ≧ -2.00	-0.38 ≧ -2.00	-0.41 ≧ -2.00
			NEUTURAL AXIS OF SECTION BEFORE COMPOSITION		-0.45 ≧ -2.00	-0.36 ≧ -2.00	-0.33 ≧ -2.00	-0.43 ≧ -2.00
			NEUTURAL AXIS OF SECTION AFTER COMPOSITION		-0.51 ≧ -2.00	-0.41 ≧ -2.00	-0.38 ≧ -2.00	-0.49 ≧ -2.00
			TOP OF LOWER FLANGE		-0.04 ≧ -2.00	-0.21 ≧ -2.00	-0.19 ≧ -2.00	-0.04 ≧ -2.00
	AVERAGE SHEAR STRAIN			(Mpa)	0.921 ≧ 0.55	1.084 ≧ 0.55	1.039 ≧ 0.55	0.905 ≧ 0.55
	STIRRUPS	MINIMUM AMOUNT OF REBAR		(cm2)	6.60	2.20	2.20	6.60
		REQIRED AMOUNT OF REBAR			5.90	6.47	5.90	5.05
		REQUIRED REBAR AMOUNT FOR SLAB			14.17	14.17	14.17	14.17
		TOTAL AMOUNT OF REBAR (Aw/2+As/4)			9.44	10.01	9.44	8.59
		ARRANGED AMOUNT OF REBAR			15.888	15.888	15.888	15.888
					D16 ctc 125	D16 ctc 125	D16 ctc 125	D16 ctc 125
	VERIFICATION OF DIAGONAL TENSILE FAILURE	SHEAR FORCE OF ULTIMATE STATE		(kN)	2411.05	1912.83	1838.40	2328.29
		SHEAR STRENGTH			3735.69	3158.41	3159.35	3765.41
		VERIFICATION			1.55 ≧ 1.00	1.65 ≧ 1.00	1.72 ≧ 1.00	1.62 ≧ 1.00
	VERIFICATION OF COMPRESSIVE FAILURE	SHEAR FORCE OF ULTIMATE STATE		(kN)	2411.05	1912.83	1838.40	2328.29
		SHEAR STRENGTH			7784.73	3093.85	3094.79	7784.78
		VERIFICATION			3.23 ≧ 1.00	1.62 ≧ 1.00	1.68 ≧ 1.00	3.34 ≧ 1.00
	REBAR IN AXIAL DIRECTION	UPPER SIDE		(cm2)	11.33	0.00	0.00	9.70
		LOWER SIDE			0.00	12.41	11.32	0.00
		ARRANGED AMOUNT OF REBAR			22.92	17.19	17.19	22.92
					D19 - 8	D19 - 6	D19 - 6	D19 - 8

VERIFICATION OF MAIN GIRDER FOR SHEAR FORCE (THIRD SPAN)

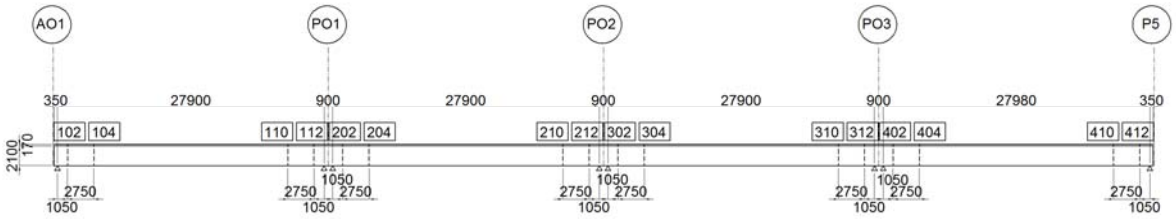
GIRDER NO.	G1



				UNIT	302	304	310	312
					POSITION OF SHEAR FORCE VERIFICATION	POSITION OF WEB EXTENSION	POSITION OF WEB EXTENSION	POSITION OF SHEAR FORCE VERIFICATION
SECTIONAL FORCE	DEAD LOAD BEFORE COMPOSITION			(kN)	559.8	422.6	-422.6	-559.8
	DEAD LOAD AFTER COMPOSITION				267.2	192.9	-239.0	-313.3
	LIVE LOAD	MAX			529.2	436.9	70.5	68.4
		MIN			-90.9	-92.8	-422.0	-512.6
	TOTAL SHEAR FORCE AFTER COMPOSITION	MAX			796.3	629.8	-168.5	-244.9
		MIN			176.3	100.1	-661.0	-825.8
	LOCKED-IN FORCE	CREEP			25.1	25.1	25.1	25.1
		SHRINKAGE			-6.1	-6.1	-6.1	-6.1
	VERTICAL COMPONENT FORCE OF PRESTRESSING				54.2	524.0	522.5	54.1
STRESS	THICKNESS OF WEB			(cm)	66.0	22.0	22.0	66.0
	EFFECTIVE HIGHT OF COMPOSITE GIRDER				221.0	220.5	220.5	221.0
	VERIFICATION OF DIAGONAL TENSILE STRESS	DEAD LOAD	BOTTOM OF UPPER FLANGE	(Mpa)	-0.12 ≧ -1.00	-0.02 ≧ -1.00	-0.02 ≧ -1.00	-0.13 ≧ -1.00
			NEUTURAL AXIS OF SECTION BEFORE COMPOSITION		-0.22 ≧ -1.00	-0.01 ≧ -1.00	-0.02 ≧ -1.00	-0.22 ≧ -1.00
			NEUTURAL AXIS OF SECTION AFTER COMPOSITION		-0.21 ≧ -1.00	-0.02 ≧ -1.00	-0.02 ≧ -1.00	-0.21 ≧ -1.00
			TOP OF LOWER FLANGE		-0.03 ≧ -1.00	-0.01 ≧ -1.00	-0.01 ≧ -1.00	-0.03 ≧ -1.00
		DESIGNED LOAD	BOTTOM OF UPPER FLANGE		-0.44 ≧ -2.00	-0.42 ≧ -2.00	-0.42 ≧ -2.00	-0.44 ≧ -2.00
			NEUTURAL AXIS OF SECTION BEFORE COMPOSITION		-0.45 ≧ -2.00	-0.37 ≧ -2.00	-0.36 ≧ -2.00	-0.45 ≧ -2.00
			NEUTURAL AXIS OF SECTION AFTER COMPOSITION		-0.51 ≧ -2.00	-0.43 ≧ -2.00	-0.42 ≧ -2.00	-0.51 ≧ -2.00
			TOP OF LOWER FLANGE		-0.04 ≧ -2.00	-0.22 ≧ -2.00	-0.21 ≧ -2.00	-0.04 ≧ -2.00
	AVERAGE SHEAR STRAIN			(Mpa)	0.935 ≧ 0.55	1.111 ≧ 0.55	1.1 ≧ 0.55	0.93 ≧ 0.55
	STIRRUPS	MINIMUM AMOUNT OF REBAR		(cm2)	6.60	2.20	2.20	6.60
		REQIRED AMOUNT OF REBAR			5.72	6.45	6.35	5.96
		REQUIRED REBAR AMOUNT FOR SLAB			14.17	14.17	14.17	14.17
		TOTAL AMOUNT OF REBAR (Aw/2+As/4)			9.26	9.99	9.89	9.50
		ARRANGED AMOUNT OF REBAR			15.888 D16 ctc 125	15.888 D16 ctc 125	15.888 D16 ctc 125	15.888 D16 ctc 125
	VERIFICATION OF DIAGONAL TENSILE FAILURE	SHEAR FORCE OF ULTIMATE STATE		(kN)	2417.06	1911.31	1896.05	2397.51
		SHEAR STRENGTH			3765.41	3159.58	3158.08	3713.84
		VERIFICATION			1.56 ≧ 1.00	1.65 ≧ 1.00	1.67 ≧ 1.00	1.55 ≧ 1.00
	VERIFICATION OF COMPRESSIVE FAILURE	SHEAR FORCE OF ULTIMATE STATE		(kN)	2417.06	1911.31	1896.05	2397.51
		SHEAR STRENGTH			7784.79	3095.02	3093.52	7784.70
		VERIFICATION			3.22 ≧ 1.00	1.62 ≧ 1.00	1.63 ≧ 1.00	3.25 ≧ 1.00
	REBAR IN AXIAL DIRECTION	UPPER SIDE		(cm2)	10.99	0.00	0.00	11.46
		LOWER SIDE			0.00	12.37	12.17	0.00
		ARRANGED AMOUNT OF REBAR			22.92 D19 - 8	17.19 D19 - 6	17.19 D19 - 6	22.92 D19 - 8

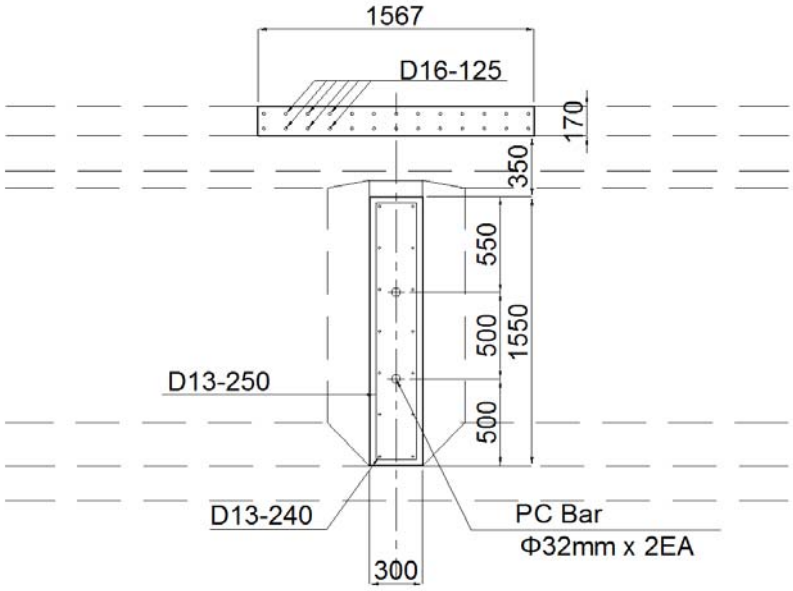
VERIFICATION OF MAIN GIRDER FOR SHEAR FORCE (FOURTH SPAN)

GIRDER NO.	G1



				UNIT	402	404	410	412
					POSITION OF SHEAR FORCE VERIFICATION	POSITION OF WEB EXTENSION	POSITION OF WEB EXTENSION	POSITION OF SHEAR FORCE VERIFICATION
SECTIONAL FORCE	DEAD LOAD BEFORE COMPOSITION			(kN)	561.5	424.3	-424.1	-562.3
	DEAD LOAD AFTER COMPOSITION				354.5	281.5	-145.5	-218.2
	LIVE LOAD		MAX		566.9	482.9	56.0	51.8
			MIN		-17.0	-18.0	-328.5	-427.2
	TOTAL SHEAR FORCE AFTER COMPOSITION		MAX		921.5	764.4	-89.5	-166.5
			MIN		377.5	263.4	-474.0	-645.5
	LOCKED-IN FORCE		CREEP		-68.7	-68.7	-68.7	-68.7
			SHRINKAGE		19.5	19.5	19.5	19.5
	VERTICAL COMPONENT FORCE OF PRESTRESSING				54.3	524.2	416.8	536.2
STRESS	THICKNESS OF WEB			(cm)	66.0	22.0	22.0	66.0
	EFFECTIVE HIGHT OF COMPOSITE GIRDER				221.0	220.5	220.5	220.5
	VERIFICATION OF DIAGONAL TENSILE STRESS	DEAD LOAD	BOTTOM OF UPPER FLANGE	(Mpa)	-0.13 ≧ -1.00	-0.03 ≧ -1.00	-0.07 ≧ -1.00	-0.02 ≧ -1.00
			NEUTURAL AXIS OF SECTION BEFORE COMPOSITION		-0.21 ≧ -1.00	-0.02 ≧ -1.00	-0.05 ≧ -1.00	-0.02 ≧ -1.00
			NEUTURAL AXIS OF SECTION AFTER COMPOSITION		-0.21 ≧ -1.00	-0.03 ≧ -1.00	-0.07 ≧ -1.00	-0.03 ≧ -1.00
			TOP OF LOWER FLANGE		-0.03 ≧ -1.00	-0.01 ≧ -1.00	-0.03 ≧ -1.00	0.00 ≧ -1.00
		DESIGNED LOAD	BOTTOM OF UPPER FLANGE		-0.48 ≧ -2.00	-0.51 ≧ -2.00	-0.38 ≧ -2.00	-0.13 ≧ -2.00
			NEUTURAL AXIS OF SECTION BEFORE COMPOSITION		-0.46 ≧ -2.00	-0.44 ≧ -2.00	-0.40 ≧ -2.00	-0.14 ≧ -2.00
			NEUTURAL AXIS OF SECTION AFTER COMPOSITION		-0.54 ≧ -2.00	-0.51 ≧ -2.00	-0.41 ≧ -2.00	-0.16 ≧ -2.00
			TOP OF LOWER FLANGE		-0.04 ≧ -2.00	-0.25 ≧ -2.00	-0.28 ≧ -2.00	-0.01 ≧ -2.00
	AVERAGE SHEAR STRAIN			(Mpa)	0.976 ≧ 0.55	1.251 ≧ 0.55	1.095 ≧ 0.55	0.497 ≧ 0.55
	STIRRUPS	MINIMUM AMOUNT OF REBAR		(cm2)	6.60	2.20	2.20	6.60
		REQIRED AMOUNT OF REBAR			7.98	7.69	5.30	0.00
		REQUIRED REBAR AMOUNT FOR SLAB			14.17	14.17	14.17	14.17
		TOTAL AMOUNT OF REBAR (Aw/2+As/4)			11.52	11.23	8.84	3.54
		ARRANGED AMOUNT OF REBAR			15.888 D16 ctc 125	15.888 D16 ctc 125	15.888 D16 ctc 125	15.888 D16 ctc 125
	VERIFICATION OF DIAGONAL TENSILE FAILURE	SHEAR FORCE OF ULTIMATE STATE		(kN)	2559.01	2075.60	1610.86	2131.89
		SHEAR STRENGTH			3607.94	3159.82	3011.66	4238.98
		VERIFICATION			1.41 ≧ 1.00	1.52 ≧ 1.00	1.87 ≧ 1.00	1.99 ≧ 1.00
	VERIFICATION OF COMPRESSIVE FAILURE	SHEAR FORCE OF ULTIMATE STATE		(kN)	2559.01	2075.60	1610.86	2131.89
		SHEAR STRENGTH			7784.84	3095.26	2987.83	8249.25
		VERIFICATION			3.04 ≧ 1.00	1.49 ≧ 1.00	1.85 ≧ 1.00	3.87 ≧ 1.00
	REBAR IN AXIAL DIRECTION	UPPER SIDE		(cm2)	15.33	0.00	0.00	0.00
		LOWER SIDE			0.00	14.75	10.16	0.00
		ARRANGED AMOUNT OF REBAR			22.92 D19 - 8	17.19 D19 - 6	17.19 D19 - 6	17.19 D19 - 6

CROSSBEAM IN SPAN



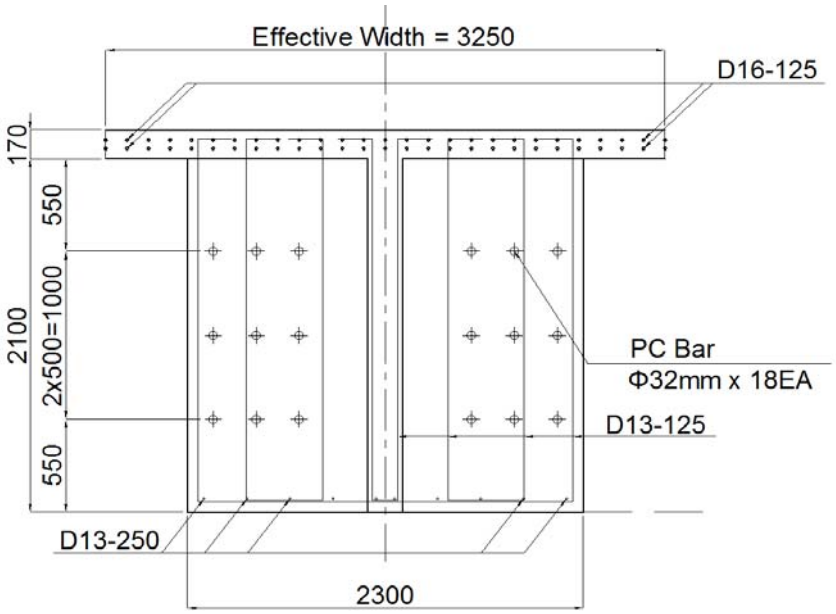
VERIFICATION FOR BENDING MOMENT

			SYMBOL	UNIT	DESIGN VALUE	ALLOWABLE VALUE
PC TENDON ARRANGEMENT			-	-	φ32mm 2EA	
BENDING MOMENT AT		MAX	M	(kNm)	160.0	
		MIN			-98.0	
TOTAL STRESS	SLAB UPPER EDGE	MAX	σc	(Mpa)	0.40	≦10.0
		MIN			-0.25	REBAR ADDED
	SLAB LOWER EDGE	MAX	σc	(Mpa)	0.32	≦10.0
		MIN			-0.20	REBAR ADDED
	CROSSBEAM UPPER EDGE	MAX	σc	(Mpa)	1.91	-1.20≦σca≦11.0
		MIN			1.66	
	CROSSBEAM LOWER EDGE	MAX	σc	(Mpa)	1.57	-1.20≦σca≦11.0
		MIN			2.48	
TENSILE REBAR (A>T/σsa)	REQUIRED AMOUNT OF REBAR		Asreq	(cm2)	4.210	
	REBAR ARRANGEMENT	SLAB UPPER		(-)	16 ctc 125	
		SLAB LOWER		(-)	16 ctc 125	
			As	(cm2)	49.782	
SAFETY RATIO OF STRENGTH		MAX	F	(-)	5.25 > 1.00	
		MIN			19.05 > 1.00	

VERIFICATION FOR SHEAR

			SYMBOL	UNIT	VALUE
DIAGONAL TENSILE STRESS	DEAD LOAD STATE		σI	(Mpa)	0.00 < 0.80
	DESIGN LOAD STATE		σI	(Mpa)	0.14 < 1.70
VERIFICATION FOR COMPRESSIVE FAILURE	ULTIMATE SHEAR FORCE		Sh	(kN)	587.2
	SHEAR STRENGTH		Suc	(kN)	2412.0
	VERIFICATION (Suc/Sh)		-	-	4.11 > 1.00
STIRRUPS	REQUIRED AMOUNT OF REBAR		Awreq	(cm2)	5.200
	MINIMUM AMOUNT OF REBAR		Awmin	(cm2)	4.650
	ARRANGED AMOUNT OF REBAR		Aw	(cm2)	10.136
				-	D13 ctc 250
LONGITUDINAL REBAR	REQUIRED AMOUNT OF REBAR		Asreq	(cm2)	4.500
	MINIMUM AMOUNT OF REBAR		Asmin	(cm2)	10.971
	ARRANGED AMOUNT OF REBAR	SLAB UPPER	-	-	16 ctc 125
		SLAB LOWER	-	-	16 ctc 125
			As	(cm2)	51.636

CROSSBEAM AT INTERMEDIATE SUPPORT



REQUIRED PRESTRESSING FORCE

	SYMBOL	UNIT	DESIGN VALUE	ALLOWABLE VALUE
ARRANEMENT OF PC TENDON	-	-	φ32mm x 18EA	
PRESTRESSING METHOD	-	-	ALTERNATIVE TENSIONING	
COMPRESSIVE STRESS DUE TO PRESTRESSING	σcn	(Mpa)	1.56	
REQUIRED PRESTRESSING STRESS	σca	(Mpa)	1.50	
JUDGEMENT			OK	

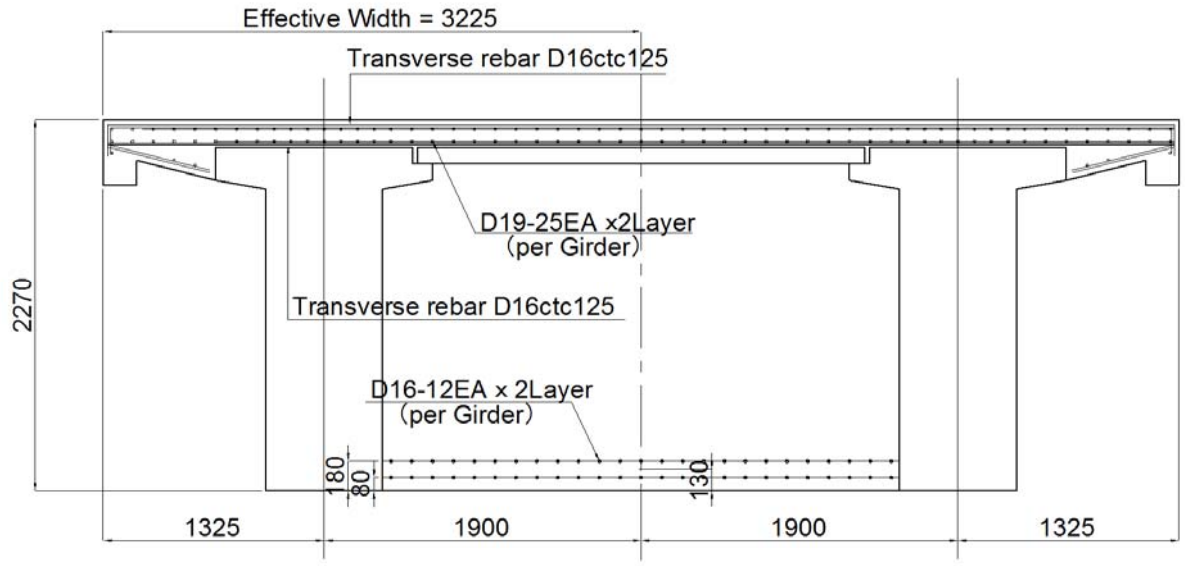
VERIFICATION FOR BENDING MOMENT

			SYMBOL	UNIT	DESIGN VALUE	ALLOWABLE VALUE
BENDING MOMENT AT DESIGN LOAD STATE		MAX	M	(kNm)	169.6	
		MIN			-115.2	
TOTAL STRESS	SLAB UPPER	MAX	σc	(Mpa)	1.14	σca≦10.0
		MIN			1.01	
	SLAB LOWER	MAX	σc	(Mpa)	1.87	-1.20≦σca≦11.0
		MIN			2.00	
SAFETY RATIO OF STRENGTH		MAX	F	(-)	38.70 >	1.00
		MIN			83.78 >	1.00

VERIFICATION FOR SHEAR FORCE

			SYMBOL	UNIT	VALUE
DIAGONAL TENSILE STRESS	DEAD LOAD STATE		σI	(Mpa)	0.00 < 0.80
	DESIGN LOAD STATE		σI	(Mpa)	0.00 < 1.70
VERIFICATION FOR COMPRESSIVE FAILURE	ULTIMATE SHEAR FORCE		Sh	(kN)	593.81
	SHEAR STRENGTH		Suc	(kN)	20332.00
	VERIFICATION (Suc/Sh)		-	-	34.24 > 1.00
STIRRUPS	REQUIRED AMOUNT OF REBAR		Awreq	(cm2)	0.000
	MINIMUM AMOUNT OF REBAR		Awmin	(cm2)	54.533
	ARRANGED AMOUNT OF REBAR		Aw	(cm2)	60.816
				-	D13 ctc 125 - 3set
LONGITUDINAL REBAR	REQUIRED AMOUNT OF REBAR		Asreq	(cm2)	0.000
	MINIMUM AMOUNT OF REBAR		Asmin	(cm2)	81.800
	ARRANGED AMOUNT OF REBAR	SLAB UPPER	-	-	16 ctc 125
		SLAB LOWER	-	-	16 ctc 125
		CROSSBEAM LOWER	-	-	13 ctc 250
			As	(cm2)	111.970

CONNETCTION GIRDER



VERIFICATION FOR BENDING MOMENT

			SYMBOL	UNIT	POSITIVE MOMENT	NEGATIVE MOMENT
BENDING MOMENT	DEAD LOAD STATE		M	(kNm)	-273.5	-516.9
	DESIGN LOAD STATE				244.3	-3324.9
	TEMPERATURE STATE				890.3	-3324.9
TOTAL STRESS	DEAD LOAD STATE	CONCRETE	σc	(Mpa)	0.00 ≦ 10.00	0.58 ≦ 10.00
		REBAR	σs		0.0 ≦ 100.0	25.7 ≦ 100.0
	DESIGN LOAD STATE	CONCRETE	σc	(Mpa)	0.00 ≦ 10.00	4.58 ≦ 10.00
		REBAR	σs		78.6 ≦ 180.0	131.0 ≦ 180.0
	TEMPERATURE STATE	CONCRETE	σc	(Mpa)	0.82 ≦ 11.50	4.58 ≦ 10.00
		REBAR	σs		130.0 ≦ 184.0	131.0 ≦ 160.0
SAFETY RATIO OF STRENGTH			F	(-)	130.0 > 1.00	1.24 > 1.00
REBAR ARRANGEMENT		1ST LAYER	As1	(cm2)	D16 ctc 125	D19 ctc 125
		2ND LAYER			D16 ctc 125	D19 ctc 125

PC BOX GIRDER BRIDGE &
ON-RAMP BRIDGE

SUBSTRUCTURE

CONTENTS

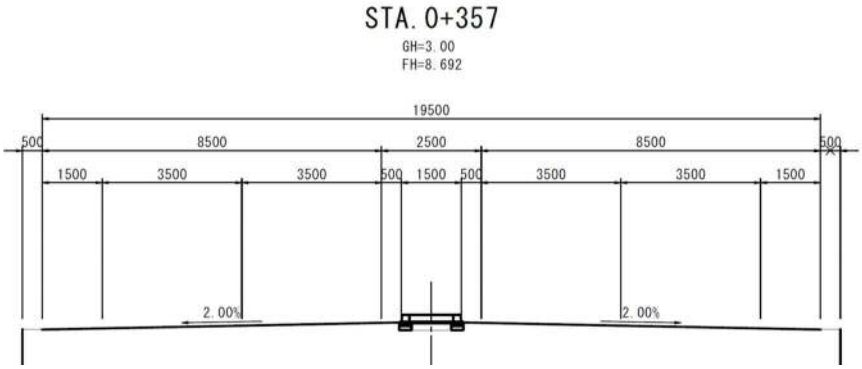
CHAPTER 1. GENERAL CONDITION

(1) Project Name : Construction of Bago River Bridge

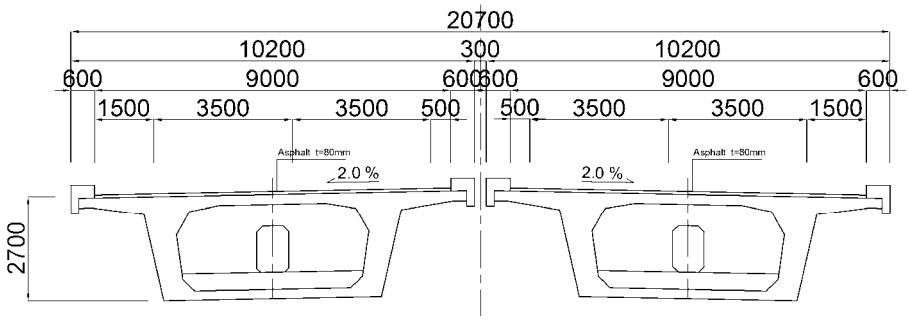
(2) Road Classification : [Bago River Bridge] Equivalent to Class 2-2
[On-Ramp] Equivalent to Class C

(3) Design Speed : [Bago River Bridge] 60 km/h
[On-Ramp] 30 km/h

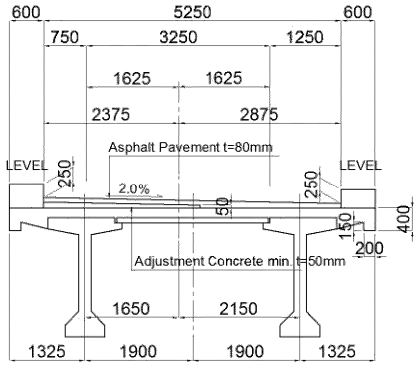
(4) Width Composition :



[Bago River Bridge (Approach Road)]



[Bago River Bridge (PC Box Girder)]



[On-Ramp]

(5) Bridge Length	:	[PC Box Girder] (Thanlyin side)		5@50m = 250 m
		(Thaketa side)		6@50m = 300 m
		[On-Ramp]		4@28.8m = 115.2 m
(6) Superstructure Type	:	[PC Box Girder]	Precast PC box girder	
		[On-Ramp]	Composite PC I girder	
(7) Substructure Type	:	[Abutment]	Reversed T-type abutment (A1, A2 and AO1)	
		[Pier]	Wall pier (P1~P3, P24~P25 and PO1~PO3)	
			Hammerhead pier (P4~P5 and P20~P23)	
(8) Foundation Type	:	[In River]	Steel pipe sheet pile (SPSP)	
		[On Land]	Cast-in-place (CIP) pile	

CHAPTER 2. DESIGN CONSIDERATIONS

Design Principal

2-1. Design Specifications

Basically, the Substructure and Foundation design in this project shall be designed with the Japanese Standard of "Specifications for Highway Bridges -Part IV" (SHB-2002).

2-2. Design River Condition

River Name : Bago River

Design Discharge : 16,169m3/s (100year return period)

Design High Water Level :

Load Combination	Supposition	Water Level (MSL+m)	River Flow (m/s)
Ordinary	Full/low tide of spring tide	+3.18 /-2.39	—
Storm (Wind)	Highest HWL (100year return period)	+4.99	—
Corrosion at navigation span	Full tide of spring tide	+3.18	—
Corrosion at side span	Maximum river flow at flood of 100year return period	+2.53	1.19
Earthquake	Normal water level	+0.29	0.60
During construction	5year return period	+4.34	0.65

Navigation : Pier P10 to P13 will be the navigation after construction.
Pier P7 to P20 will also be the navigation in the future.

Clearance : Vertical height and width shall be secured between Pier P7 to P20 as Thanlyin Bridge

2-3. Design Soil Condition

Design soil condition is shown in the following table.

Proposed Geotechnical Design Parameters for **THANLIN** Side (on Land)									
No.	Soil Name	N Value	Unit Weight			Friction Angle	Cohesion	Modulus of Elasticity	Liquefaction Evaluation
		N	γ_t	γ_{sat}	γ'	φ	Cu	αE_0	—
		times	kN/m^3	kN/m^3	kN/m^3	degree	kN/m^2	kN/m^2	—
1	Filled Soil	1	18.0	18.0	8.0	-	6	2,800	-
2	CLAY –I	1	17.5	17.5	7.5	-	15	3,600	Liquefaction (D_E = 2/3~1)
3	Sandy CLAY –I	3	17.5	17.5	7.5	-	15	8,000	Liquefaction (D_E=1/3~2/3)
4	Silty SAND –I	15	16.5	17.5	7.5	33	-	24,000	Liquefaction (D_E = 1)
5	CLAY –AII	5	17.5	17.5	7.5	-	30	12,800	-
6	Clayey SAND –B	17	17.0	18.0	8.0	33	-	47,600	-
7	CLAY –AIII	7	17.6	17.6	7.6	-	42	19,600	-
8	Clayey SAND –C	20	17.0	18.0	8.0	32	-	56,000	-
9	Clayey SAND –I	23	17.0	18.0	8.0	31	-	64,400	-
10	Clayey SAND –II	50	19.0	20.0	10.0	35	-	140,000	-

Proposed Geotechnical Design Parameters for **THANLIN** Side (River Section)									
No.	Soil Name	N Value	Unit Weight			Friction Angle	Cohesion	Modulus of Elasticity	Liquefaction Evaluation
		N	γ_t	γ_{sat}	γ'	φ	Cu	αE_0	—
		times	kN/m^3	kN/m^3	kN/m^3	degree	kN/m^2	kN/m^2	—
1	CLAY –I	1	17.5	17.5	7.5	-	10	3,600	Liquefaction (D_E = 1/3)
2	Clayey SAND –A	3	17.5	18.5	8.5	28	-	4,800	Liquefaction (D_E = 1/3)
3	Silty SAND –I	13	17.0	18.0	8.0	33	-	20,800	Liquefaction (D_E = 1/3~1)
4	Sandy CLAY –II	9	17.5	17.5	7.5	-	54	25,200	Liquefaction (D_E = 1)
5	CLAY –AII	7	17.5	17.5	7.5	-	42	19,600	-
6	CLAY –AIII	18	18.0	18.0	8.0	-	108	50,400	-
7	Clayey SAND –II	50	19.0	20.0	10.0	35	-	140,000	-

Proposed Geotechnical Design Parameters for **YANGON** Side (on Land)									
No.	Soil Name	N Value	Unit Weight			Friction Angle	Cohesion	Modulus of Elasticity	Liquefaction Evaluation
		N	γ_t	γ_{sat}	γ'	φ	Cu	αE_0	—
		times	kN/m^3	kN/m^3	kN/m^3	degree	kN/m^2	kN/m^2	—
1	Filled Soil	3	19.0	20.0	10.0	-	18	8,400	-
2	CLAY –I	1	17.5	17.5	7.5	-	15	3,600	Liquefaction (D_E = 2/3)
3	Silty SAND –I	13	17.0	18.0	8.0	32	-	26,000	Liquefaction (D_E = 1/3~1)
4	Silty SAND –II	25	17.0	18.0	8.0	34	-	70,000	Liquefaction (D_E = 1)
5	Clayey SAND –I	35	19.0	20.0	10.0	34	-	98,000	-
6	Clayey SAND –II	50	19.0	20.0	10.0	35	-	140,000	-

Proposed Geotechnical Design Parameters for **YANGON** Side (River Section)									
No.	Soil Name	N Value	Unit Weight			Friction Angle	Cohesion	Modulus of Elasticity	Liquefaction Evaluation
		N	γ_t	γ_{sat}	γ'	φ	Cu	αE_0	—
		times	kN/m^3	kN/m^3	kN/m^3	degree	kN/m^2	kN/m^2	—
1	Silty SAND –River Sediments	3	17.0	18.0	8.0	29	-	4,800	Liquefaction (D_E = 1/3)
2	CLAY –I	1	17.5	17.5	7.5	-	10	3,600	Liquefaction (D_E = 1/3)
3	Silty SAND –I	13	17.0	18.0	8.0	33	-	20,800	Liquefaction (D_E = 2/3~1)
4	CLAY –AII	7	17.5	17.5	7.5	-	42	19,600	Liquefaction (D_E = 1)
5	Clayey SAND –C	20	17.0	18.0	8.0	33	-	56,000	Liquefaction (D_E = 1)
6	Silty SAND –II	30	17.0	18.0	8.0	34	-	84,000	Liquefaction (D_E = 1)
7	Clayey SAND –I	35	19.0	20.0	10.0	34	-	98,000	-
8	Clayey SAND –II	50	19.0	20.0	10.0	35	-	140,000	-

Liquefaction

Liquefaction potential at earthquake for stability is shown in the following table.

			A1 (BD-23)		P1 (BD-22)		P2 (BD-21)		P3 (2013-BH-01)		P4 (BD-20)		P5 (BD-19)	
EL of Future GL		MSL+m	4.300		4.300		4.300		4.300		4.300		4.300	
EL of Borehole		MSL+m	3.980		3.380		3.340		4.226		3.411		3.520	
No.	Soil Name		Thickness	D_E n /R /F_L	Thickness	D_E n /R /F_L	Thickness	D_E n /R /F_L	Thickness	D_E n /R /F_L	Thickness	D_E n /R /F_L	Thickness	D_E n /R /F_L
1	Filled Soil /River Sedimentation	Add Offset	0.320	–	0.920	–	0.960	–	0.074	–	0.889	–	0.780	–
		Thickness	1.500	–	1.500	–	1.500	–	2.000	–	1.500	–	2.000	–
2	CLAY –I	Non-Liquefaction	5.500	–	5.500	–	6.500	–	9.000	–	5.500	–	5.000	–
		Liquefaction			3.000	2/3 3(3)/0.24/0.71	2.000 1.000	2/3 and 1 3(3)/0.30/0.88			2.000	1/3 1(1)/0.21/0.60	2.000	2/3 1(1)/0.26/0.76
3	Sandy CLAY –I	x≦10m	3.000	1/3 4(6)/0.18/0.53							1.000	2/3 4(4)/0.24/0.72	1.000	2/3 4(4)/0.23/0.71
		x>10m	4.000	2/3 4(6)/0.18/0.53	4.000		2.000	1 2(2)/0.26/0.77	5.000		3.000	1 4(4)/0.24/0.72	4.000	1 4(4)/0.23/0.71
4	Silty SAND –I	x≦10m												
		x>10m	6.000	1 6(6)/0.25/0.82	6.000	1 6(6)/0.38/1.25	7.000	1 5(7)/0.36/1.18	3.000	1 3(3)/0.23/0.83	6.000	1 4(5)/0.23/0.75	7.000	1 5(6)/0.32/1.07

			(P20) (BD-03)		(P21) (BD-02)		(P22) (BD-01)		(P23) (BD-17)		(P24) (BD-16)		(P25) (BD-15)		A2 (BD-14)	
EL of Future GL		MSL+m	-7.490		-7.490		-7.490		0.550		4.300		4.300		4.300	
EL of Borehole		MSL+m	-6.220		-6.450		-4.400		0.350		4.350		4.240		4.130	
No.	Soil Name		Thickness	D_E n /R /F_L	Thickness	D_E n /R /F_L	Thickness	D_E n /R /F_L	Thickness	D_E n /R /F_L	Thickness	D_E n /R /F_L	Thickness	D_E n /R /F_L	Thickness	D_E n /R /F_L
1	Filled Soil /River Sedimentation	Add Offset	-1.270	–	-2.040	–	-3.090	(CLAY-I)	0.200	(CLAY-I)	-0.050	–	0.060	–	0.170	–
		Thickness	4.000	1/3 3(3)/0.24/0.61	2.000						1.000		1.000		1.000	
2	CLAY - I	Non-Liquefaction	1.000	–	1.000	–	3.19		4.641	–	10.000	–	7.000	–	6.000	
		Liquefaction			3.000	2/3 3(4)/0.27/0.69	2.810	1/3 5(5)/0.21/0.52	2.359	1/3 3(5)/0.15/0.37					1.000	2/3 1(1)/0.25/0.82
3	Sandy CLAY - I	x≦10m														
		x>10m														
4	Silty SAND - I	x≦10m	5.000	1/3 8(9)/0.23/0.655	4.000	2/3 4(4)/0.27/0.76	4.000	2/3 3(3)/0.28/0.76	3.000	2/3 9(9)/0.29/0.84			2.000	1 9(10)/0.33/1.10	2.000	1 9(10)/0.30/1.02
		x>10m	4.000	2/3 8(9)/0.23/0.655	1.000	1 4(4)/0.27/0.76			6.000	1 9(9)/0.29/0.84	9.000	1 8(9)/0.28/1.01	8.000	1 9(10)/0.33/1.10	8.000	1 9(10)/0.30/1.02

Settlement of Embankment in Cohesive Soils

Downdrag zone due to setttlement of embankment is shown in the following table.

1. A1 (Thilawa) Side: PC-Box Girder Bridge

Item	Mark	Unit	A1	P1	P2	P3	P4	P5
Station Number	STA	m	357.00	407.00	457.00	507.00	557.00	607.00
Existing Ground EL	GL1	m	3.223	3.254	3.025	3.156	3.260	3.149
Future Ground EL	GL	m	4.300	4.300	4.300	4.300	4.300	4.300
Foundation Type	–	–	CIP Pile	CIP Pile	CIP Pile	CIP Pile	CIP Pile	CIP Pile
Pile Length	L	m	53.000	58.000	62.000	57.000	58.000	55.500
Downdrag Zone	EL	m	-10.0	-10.6	-9.7	-11.8	-9.6	-10.5
Reference Boring No.	–	–	*BD23*	*BD22*	*BD21*	*BH-01*	*BD20*	*BD19*
Bearing Stratum	–	–	*CS-II*	*CS-II*	*CS-II*	*CS-II*	*CS-II*	*CS-II*

2. A2 (Taketa) Side: PC-Box Girder Bridge

Item	Mark	Unit	P20	P21	P22	P23	P24	P25	A2
Station Number	STA	m	2088.00	2138.00	2188.00	2238.00	2288.00	2338.00	2388.00
Existing Ground EL	GL1	m	-6.554	-6.155	-4.610	-0.041	4.116	4.016	4.110
Future Ground EL	GL	m	-7.490	-7.490	-7.490	0.550	4.300	4.300	4.300
Foundation Type	–	–	SPSP	SPSP	SPSP	CIP Pile	CIP Pile	CIP Pile	CIP Pile
Pile Length	L	m	3800%	4350%	36.500	32.500	47.000	38.000	31.500
Downdrag Zone	EL	m				-6.7	-6.7	-3.8	-3.9
Reference Boring No.	–	–	*BD3*	*BD2*	*BD1*	*BD17*	*BD16*	*BD15*	*BD14*
Bearing Stratum	–	–	*CS-I*	*CS-I*	*CS-I*	*CS-I*	*CS-I*	*CS-I*	*CS-I*

3. ON Ramp Bridge: PC-T Girder Bridge

Item	Mark	Unit	AO1	PO1	PO2	PO3	PO4 (P5)
Station Number	STA	m	0+411.009	0+439.809	0+468.609	0+497.409	0+526.209
Existing Ground EL	GL1	m	3.281	2.936	2.959	3.076	3.149
Future Ground EL	GL	m	4.300	4.300	4.300	4.300	4.300
Foundation Type	–	–	CIP Pile	CIP Pile	CIP Pile	CIP Pile	CIP Pile
Pile Length	L	m	56.500	57.000	57.500	58.000	55.500
Downdrag Zone	EL	m	-11.8	-11.8	-9.6	-9.6	-10.5
Reference Boring No.	–	–	*BH-01*	*BH-01*	*BD20*	*BD20*	*BD19*
Bearing Stratum	–	–	*CS-II*	*CS-II*	*CS-II*	*CS-II*	*CS-II*

2-4. Loading Combination and Safety Factors

The design cases and corresponding safety factor for stability and allowable stress for members is shown in the following table.

Safety Factor for Bearing Capacity and Allowable Stress in Steel Pipe

Loading Combinations	Safety factor (n) for stability	Increase of allowable stress
1.Ordinary Condition : (DC+DW)+EV+CR+SH+EL+LL+WA	3.0	1.00
2.Temperature Condition : (DC+DW)+EV+CR+SH+EL+LL+WA +TG+TU	3.0	1.15
3.Wind Condition: (DC+DW)+EV+CR+SH+EL+LL +WA +WS	2.0	1.25
4.Seismic Condition: (DC+DW)+EV+CR+SH+EL+WA' +EQ	2.0	1.50
5.Vessel Collision force (DC+DW)+EV+CR+SH+EL+LL+WA' +CV	2.0	1.70

DC = Dead load of structural components and non-structural attachments
DW = Dead load of wearing surfaces and utilities
EV = Vertical pressure from dead load of earth fill
CR = Creep
SH = Shrinkage
EL = Accumulated locked-in force effects resulting from the construction process, including the secondary forces from post-tensioning
LL = Vehicular live load
TG = Temperature gradient
TU = Uniform temperature
WA,WA' = Water load (WA': due to MWL)
WS = Wind load on structure
EQ = Earthquake, Includes effect of liquefaction due to earthquake
CV = Vessel collision force

Table for Vessel collision force to the pier

Pier	Impact speed	Impact speed	KE	aB	P_B	P_B	Design Impact Force		Impact Height
							Trans.	Long.	
	(m/s)	(ft/s)	(kip-ft)	(ft)	(kip)	(kN)	(kN)	(kN)	(m)
P6	1.00	3.3	433	0.38	1,391	**6,175**	6,175	3,088	3.98
P7	2.08	6.8	1,872	1.56	1,521	**6,752**	6,752	3,376	3.98
P8	3.60	11.8	5,608	4.18	1,809	**8,032**	8,032	4,016	3.98
P10 - P12	5.14	16.9	114,333	7.51	2,175	**9,658**	9,658	4,829	3.98
P13	1.84	6.0	1,465	1.24	1,486	**6,595**	6,595	3,298	3.98
P14 - P21	1.00	3.3	433	0.38	1,391	**6,175**	6,175	3,088	3.98

Table for Design Reaction Force from Superstructure

					Package-1 : PC-Box									Package-2 : PC-Box								Package-1 : On-Ramp			
					A1	P1	P2	P3	P4	P5				P20			P21	P22	P23	P24	P25	A2	AO1	PO1	PO2	PO3
										P4 side	P6 side	PO4	Total	P19 side	P21 side	Total										
Bearing Condition					E	E	E	E	E	E	E	M		E	E		E	E	E	E	E	E	M	F	F	F
Action Height (From the top of abutment wall / beam of pier)		Longitudinal		m	0.000	0.000	0.000	0.000	0.000				0.000			0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
		Transverse		m	2.500	2.500	2.500	2.500	2.500				2.500			2.500	2.500	2.500	2.500	2.500	2.500	1.900	1.900	1.900	1.900
Vertical Force (V)	Dead Load (including bridge deck and secondary prestressing)		①	kN	11,600	22,800	22,800	23,200	22,800	11,800	—	2,000	13,800	7,650	11,800	19,450	22,600	23,200	22,800	23,000	22,800	11,600	2,000	4,000	4,200	4,200
	Live Load	Max	②	kN	2,800	5,600	5,600	5,600	5,600	2,800	—	600	3,400	3,400	2,800	6,200	5,600	5,600	5,600	5,600	5,600	2,800	600	1200	1100	1200
		Min	③		-400	-600	-1,000	-1,000	-600	-400	—	-100	-500	-900	-400	-1,300	-600	-1,000	-1,000	-1,000	-600	-400	-100	-100	-200	-100
Horizontal Force (H)	Drying Shrinkage *1		④	kN	300	390	160	-160	-390	-350	—	-110	-460	0	360	360	480	260	0	-260	-420	-340	110	480	-100	-390
	Creep *1		⑤	kN	530	640	270	-270	-640	-620	—	-50	-670	0	620	620	870	450	0	-450	-750	-580	50	190	-40	-150
	Temperature Change (+) *1		⑥	kN	-620	-770	-350	350	770	650	—	100	750	-110	-620	-730	-1,030	-550	0	550	880	700	-100	-440	90	350
	Temperature Change (-) *1		⑦	kN	620	770	350	-350	-770	-650	—	-100	-750	110	620	730	1,030	550	0	-550	-880	-700	100	440	-90	-350
	Inertial force due to earthquake	Longitudinal	⑧	kN	3,050	6,250	7,500	7,450	6,200	3,500	—	300	3,800	1,150	3,300	4,450	6,400	6,500	8,050	7,150	6,150	3,250	300	2650	1250	900
		Transverse	⑨	kN	2,650	7,400	6,700	6,700	7,600	2,650	—	750	3,400	2,250	2,700	4,950	7,600	6,600	6,950	6,650	7,600	2,650	550	1300	1300	950
Moment (M)	Eccentric moment due to dead load *2	Longitudinal	⑩	kNm	0	0	0	0	0				-12,700			5,000	0	0	0	0	0	0	0	0	0	0
		Transverse	⑪	kNm	0	0	0	0	0				-60,900			0	0	0	0	0	0	0	0	0	0	0
Ordinary (1.00) Storms (1.25) Vessels Collision (1.50)	V	N max	①+②	kN	14,400	28,400	28,400	28,800	28,400				17,200			25,650	28,200	28,800	28,400	28,600	28,400	14,400	2,600	5200	5300	5400
		N min	①+③	kN	11,200	22,200	21,800	22,200	22,200				13,300			18,150	22,000	22,200	21,800	22,000	22,200	11,200	1,900	3900	4000	4100
	H	Longitudinal	④+⑤	kN	830	1,030	430	-430	-1,030				-1,130			980	1,350	710	0	-710	-1,170	-920	160	670	-140	-540
	M	Longitudinal	⑩	kNm	0	0	0	0	0				-12,700			5,000	0	0	0	0	0	0	0	0	0	0
		Transverse	⑪	kNm	0	0	0	0	0				-60,900			0	0	0	0	0	0	0	0	0	0	0
+Temperature Change (1.15)	V	N max	①+②	kN	14,400	28,400	28,400	28,800	28,400				17,200			25,650	28,200	28,800	28,400	28,600	28,400	14,400	2,600	5200	5300	5400
		N min	①+③	kN	11,200	22,200	21,800	22,200	22,200				13,300			18,150	22,000	22,200	21,800	22,000	22,200	11,200	1,900	3900	4000	4100
	H	Temperature Change (+)	④+⑤+⑥	kN	210	260	80	-80	-260				-380			250	320	160	0	-160	-290	-220	60	230	-50	-190
		Temperature Change (-)	④+⑤+⑦	kN	1,450	1,800	780	-780	-1,800				-1,880			1,710	2,380	1,260	0	-1,260	-2,050	-1,620	260	1110	-230	-890
	M	Longitudinal	⑩	kNm	0	0	0	0	0				-12,700			5,000	0	0	0	0	0	0	0	0	0	0
		Transverse	⑪	kNm	0	0	0	0	0				-60,900			0	0	0	0	0	0	0	0	0	0	0
Earthquake (1.50)	V		①	kN	11,600	22,800	22,800	23,200	22,800				13,800			19,450	22,600	23,200	22,800	23,000	22,800	11,600	2,000	4000	4200	4200
	H	Longitudinal	④+⑤+⑧	kN	3,880	7,280	7,930	7,020	5,170				2,670			5,430	7,750	7,210	8,050	6,440	4,980	2,330	460	3320	1110	360
			④+⑤−⑧	kN	-2,220	-5,220	-7,070	-7,880	-7,230				-4,930			-3,470	-5,050	-5,790	-8,050	-7,860	-7,320	-4,170	-140	-1980	-1390	-1440
		Transverse	⑨	kN	2,650	7,400	6,700	6,700	7,600				3,400			4,950	7,600	6,600	6,950	6,650	7,600	2,650	550	1300	1300	950
	M	Longitudinal	⑩	kNm	0	0	0	0	0				-12,700			5,000	0	0	0	0	0	0	0	0	0	0
		Transverse	⑪	kNm	0	0	0	0	0				-60,900			0	0	0	0	0	0	0	0	0	0	0

*1 The horizontal force in the bridge axis direction is positive(+) when it acts in the direction of station point (direction from starting point to endding point).

*2 The eccentric moment with the center line of substructure as a fulcrum is positive(+) in clockwise as it is seen from upstream side or starting station point.

2-5. Material

Steel Pipe Sheet Pile

Two types of steel pipe of steel pipe sheet pile Grade SKY400 and Grade SKY 490 based on the Japanese Standard JIS 5530 or equivalent international standard shall be used.

Table for Properties and Stress Limit of Steel Pipe for Steel Pipe Sheet Pile

Type	Yield Strength f y (MPa)	Tensile Strength f u (MPa)	Modulus of Elasticity (MPa)
Grade SKY 400	235	400	200,000
Grade SKY 490	315	490	200,000

Estimated Corrosion Thickness of Steel Pile

The estimated corrosion thickness of steel pipe sheet pile shall be used. The design of corrosion thickness is as follows.

Table for Design of Estimated Corrosion Thicknesses

	Cast Against Earth
Estimated Corrosion Thickness	2mm

Reinforcement Bar

Table for Strength and Allowable Stress of Reinforcement Bar

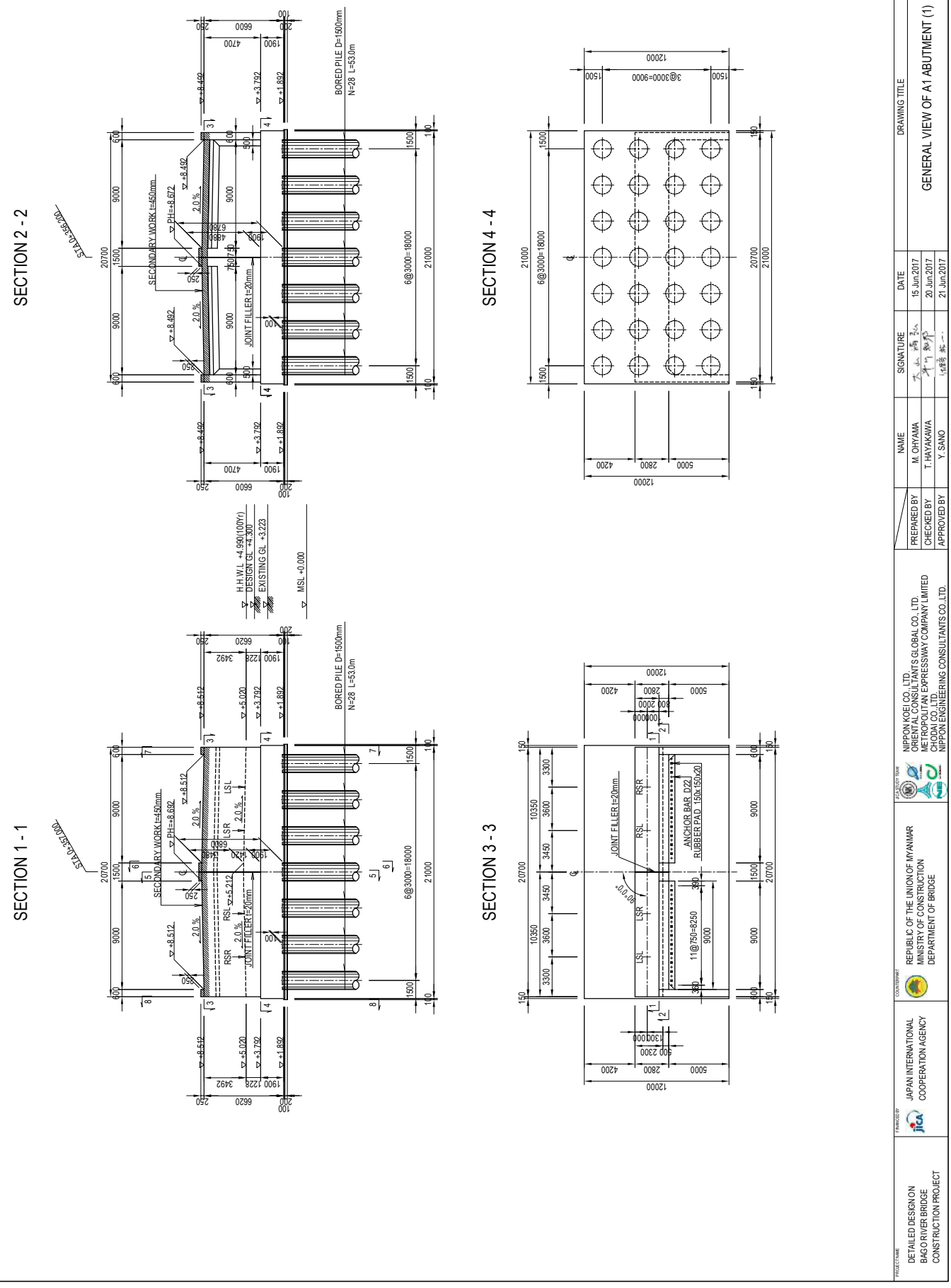
Item			Unit	Abutment, Pier (Beam, Column and Pile cap) and Foundation	Pier (Column for P4, P20~P23)
Yield Stress			N/mm2	345	390
Allowable Tensile Stress	Under Dead Load		N/mm2	100	100
	Under Live Load	Normal Member	N/mm2	180	180
		Underwater Member	N/mm2	160	160
	Under Impact		N/mm2	200	230

Concrete

Table for Strength and Allowable Stress of Concrete

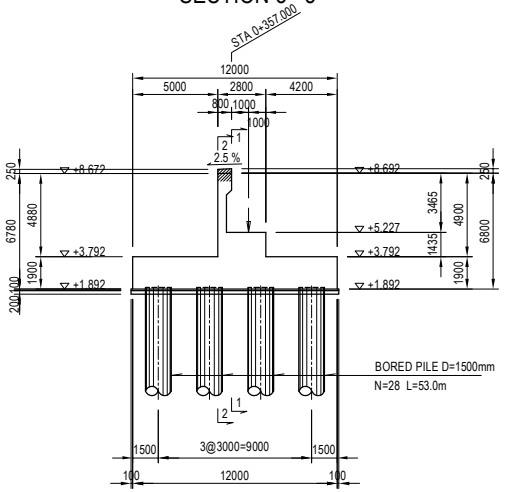
Item	Unit	Abutment and Pier	CIP Pile
Design Strength (or Nominal Strength)	N/mm2	24.00	(30.00)
Young's Modulus	N/mm2	2.5×10^4	2.5×10^4
Allowable Flexural Compressive Stress	N/mm2	7.0	10.0
Allowable Axial Compressive Stress	N/mm2	5.5	8.5

3-1. Structural Drawing

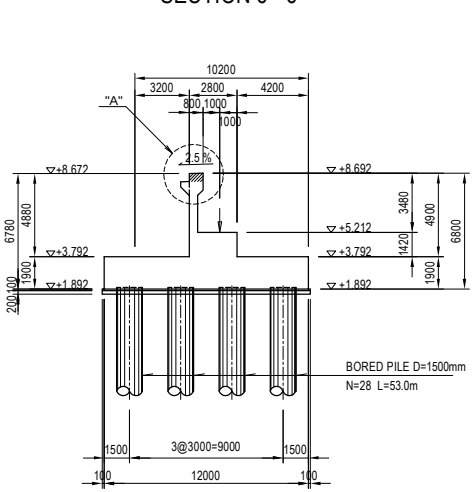


GENERAL VIEW OF A1 ABUTMENT(2) S =1:300

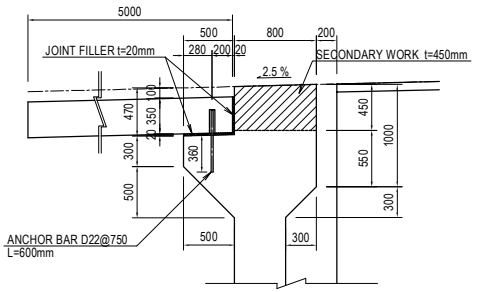
SECTION 5 - 5



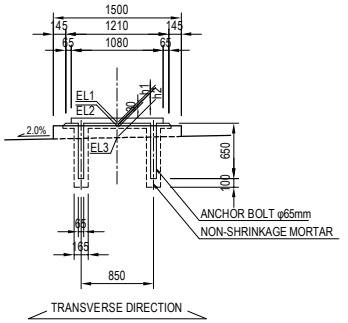
SECTION 6 - 6

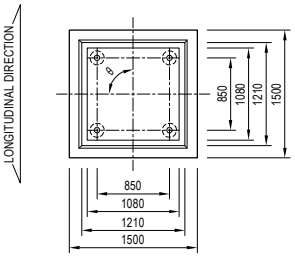


DETAIL "A" S =1:50



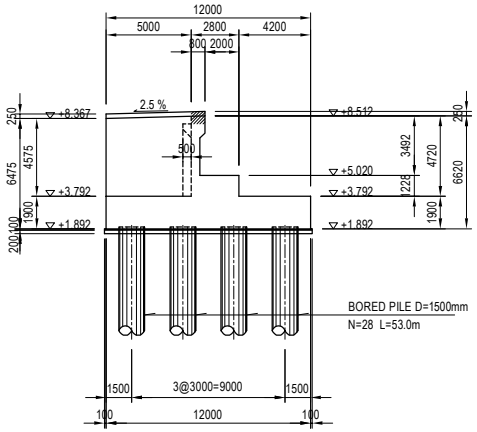
DETAIL OF BEARING S =1:60



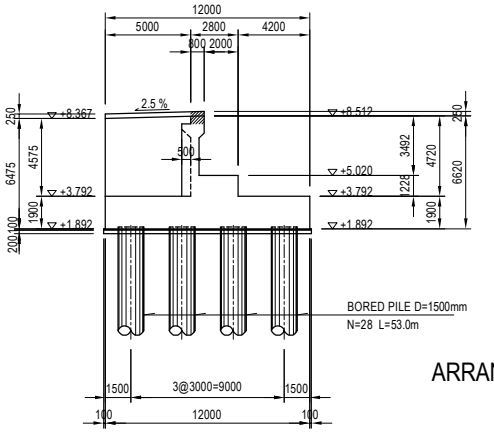


Unit : m	LSL	LSR	RSL	RSR
EL1	5.258	5.330	5.330	5.258
EL2	5.226	5.298	5.298	5.226
EL3	5.086	5.158	5.158	5.086
h1	0.032	0.032	0.032	0.032
h2	0.140	0.140	0.140	0.140
θ	90d0'0"	90d0'0"	90d0'0"	90d0'0"

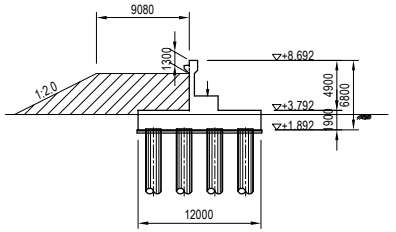
SECTION 7 - 7



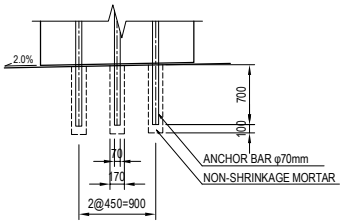
SECTION 8 - 8



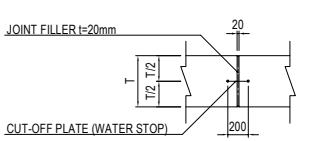
ARRANGEMENT OF BACK-FILLING APPROACH S =1:500

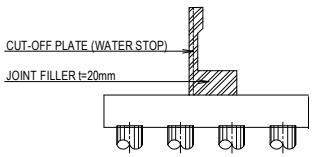


DETAIL OF ANCHOR BAR S =1:60

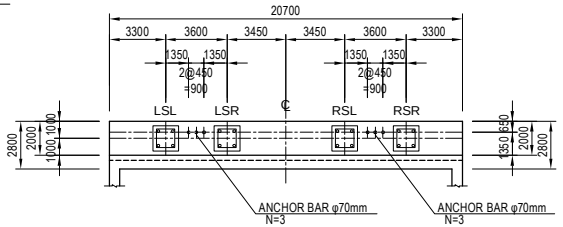


DETAIL OF JOINT FILLER





ARRANGEMENT OF BRIDGE SEAT



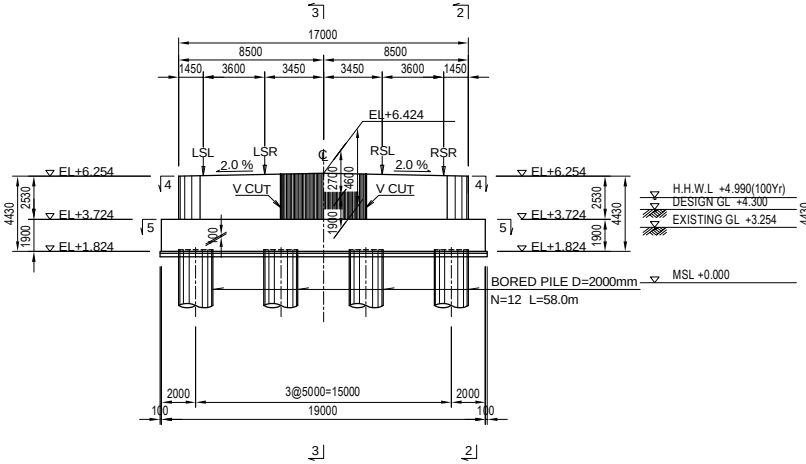
NOTE : 1. Weep holes shall be installed in abutment wall by 3 meter interval for discharge of water from backfilled soil.
2. Regardless of existences of indications on the Drawings, baseplates of bridge bearings shall be embedded into leveling mortar by 10 mm and the leveling motar shall be embedded into concrete pedestal or top surface of substructures by 30 mm.

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.	

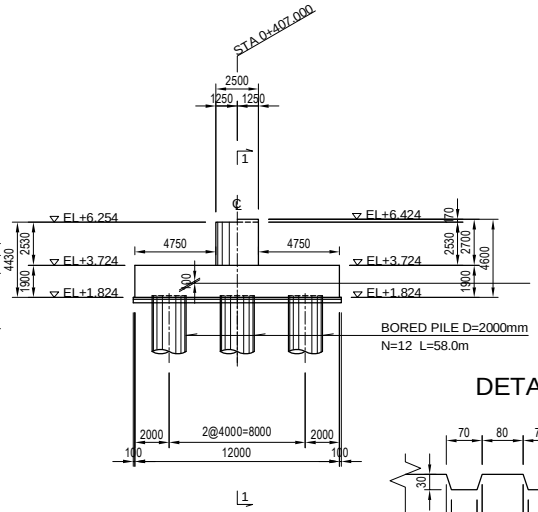
	NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
PREPARED BY	M. OHYAMA		15 Jun.2017	GENERAL VIEW OF A1 ABUTMENT (2)	1
CHECKED BY	T. HAYAKAWA		20 Jun.2017		DWG No.
APPROVED BY	Y. SANO		21 Jun.2017		P1-PB-2002

GENERAL VIEW OF P1 PIER S =1:300

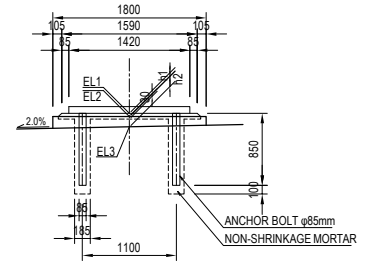
FRONT VIEW 1 - 1



SIDE VIEW 2 - 2 3 - 3

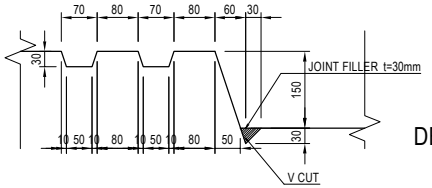


DETAIL OF BEARING S =1:60

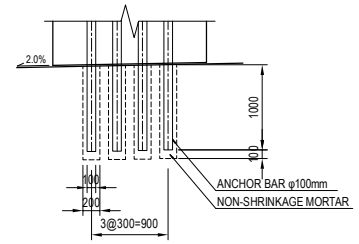


Unit : m	LSL	LSR	RSL	RSR
EL1	6.443	6.515	6.515	6.443
EL2	6.403	6.475	6.475	6.403
EL3	6.283	6.355	6.355	6.283
h1	0.040	0.040	0.040	0.040
h2	0.120	0.120	0.120	0.120
θ	90d0'0"	90d0'0"	90d0'0"	90d0'0"

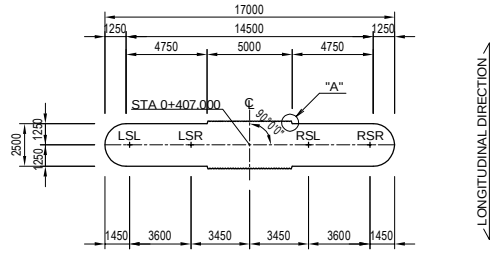
DETAIL "A" S =1:10



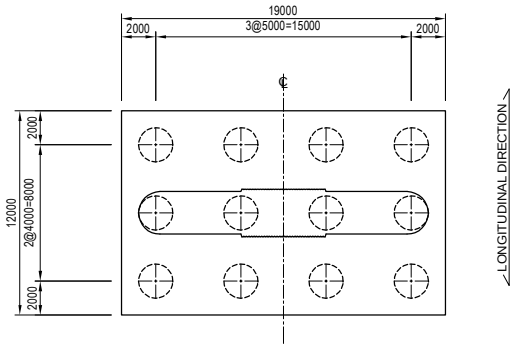
DETAIL OF ANCHOR BAR S =1:60



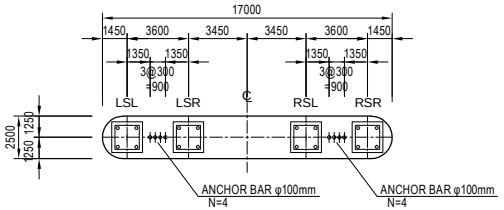
PLAN VIEW 4 - 4



PILE ARRANGEMENT 5 - 5



ARRANGEMENT OF BRIDGE SEAT



NOTES : 1. V-cut passes with joint filler shall be made on abutment wall. The V-cut passes shall be coutinued from a front side surface to a back side surface.
2. Regardless of existences of indications on the Drawings,
baseplates of bridge bearings shall be embedded into leveling mortar by 10 mm and the
leveling motar shall be embedded into concrete pedestal or top surface of substructures by 30 mm.

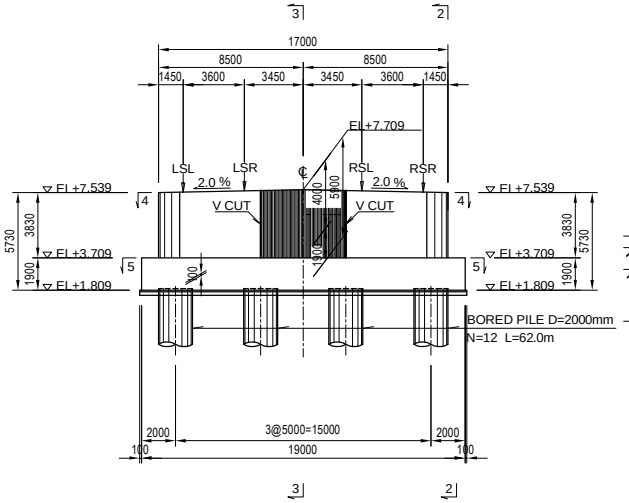
PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN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

	NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
PREPARED BY	M. OHYAMA		15 Jun.2017	GENERAL VIEW OF P1 PIER	1
CHECKED BY	T. HAYAKAWA		20 Jun.2017		DWG No.
APPROVED BY	Y. SANO		21 Jun.2017		P1-PB-2011

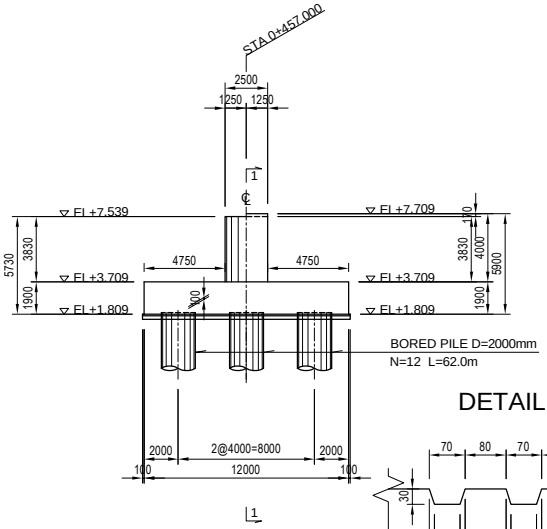
GENERAL VIEW OF P2 PIER

S =1:300

FRONT VIEW
1 - 1

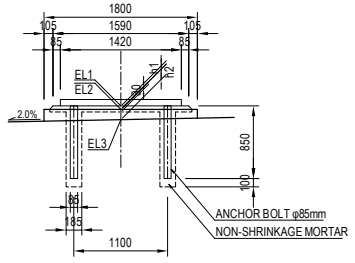


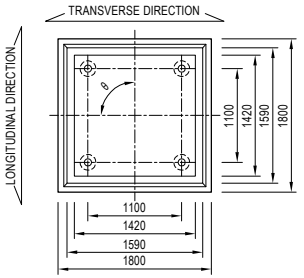
SIDE VIEW
2 - 2 3 - 3



DETAIL OF BEARING

S =1:60

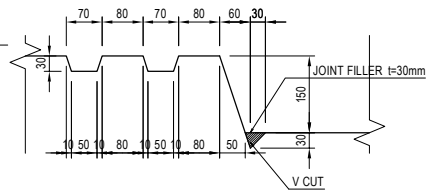




Unit : m	LSL	LSR	RSL	RSR
EL1	7.728	7.800	7.800	7.728
EL2	7.688	7.760	7.760	7.688
EL3	7.568	7.640	7.640	7.568
h1	0.040	0.040	0.040	0.040
h2	0.120	0.120	0.120	0.120
θ	90d0'0"	90d0'0"	90d0'0"	90d0'0"

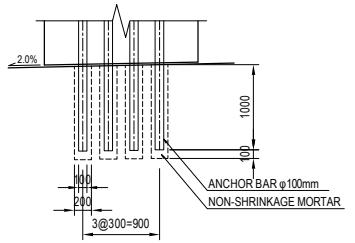
DETAIL "A"

S =1:10

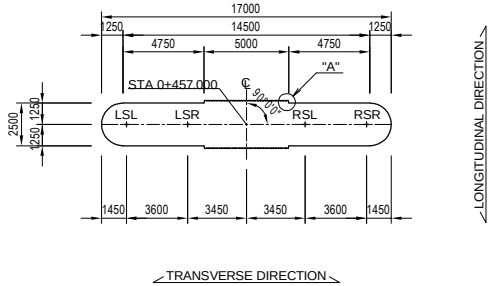


DETAIL OF ANCHOR BAR

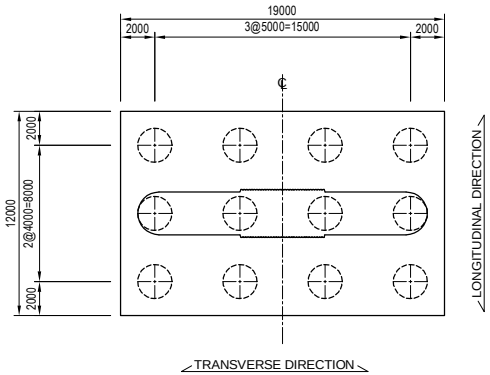
S =1:60



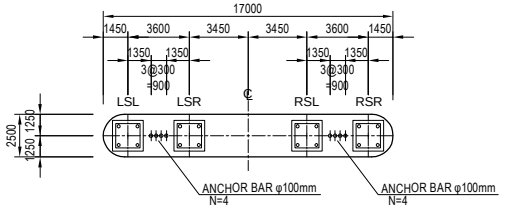
PLAN VIEW
4 - 4



PILE ARRANGEMENT
5 - 5



ARRANGEMENT OF BRIDGE SEAT



NOTE :1. V-cut passes with joint filler shall be made on abutment wall. The V-cut passes shall be coutinued from a front side surface to a back side surface.
2. Regardless of existences of indications on the Drawings,
baseplates of bridge bearings shall be embedded into leveling mortar by 10 mm and the
leveling motar shall be embedded into concrete pedestal or top surface of substructures by 30 mm.

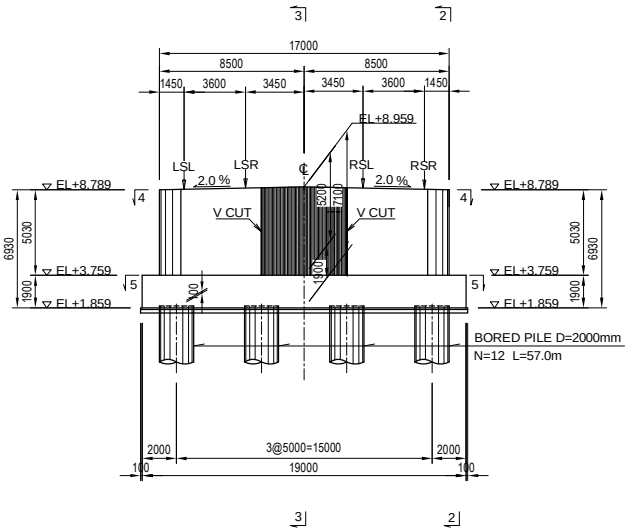
PROJECT NAME	FINANCED BY	COUNTERPART	JICA STUDY TEAM
DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	JAPAN INTERNATIONAL COOPERATION AGENCY	REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN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

	NAME	SIGNATURE	DATE
PREPARED BY	M. OHYAMA		15 Jun.2017
CHECKED BY	T. HAYAKAWA		20 Jun.2017
APPROVED BY	Y. SANO		21 Jun.2017

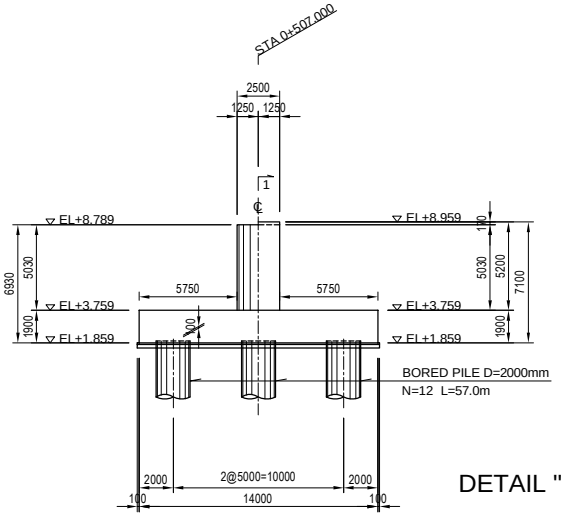
DRAWING TITLE	PACKAGE
GENERAL VIEW OF P2 PIER	1
	DWG No.
	P1-PB-2021

GENERAL VIEW OF P3 PIER S =1:300

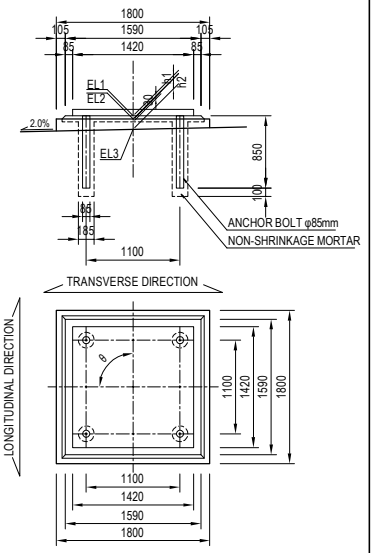
FRONT VIEW 1 - 1



SIDE VIEW 2 - 2 3 - 3

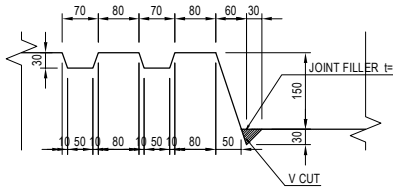


DETAIL OF BEARING S =1:60

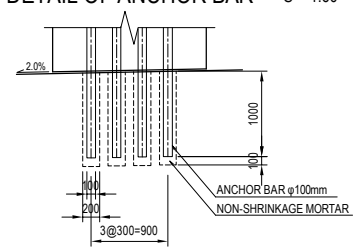


Unit : m	LSL	LSR	RSL	RSR
EL1	8.978	9.050	9.050	8.978
EL2	8.938	9.010	9.010	8.938
EL3	8.818	8.890	8.890	8.818
h1	0.040	0.040	0.040	0.040
h2	0.120	0.120	0.120	0.120
θ	90d0'0"	90d0'0"	90d0'0"	90d0'0"

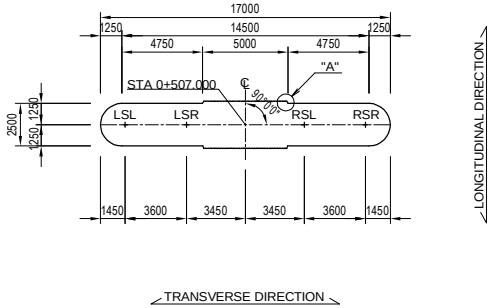
DETAIL "A" S =1:10



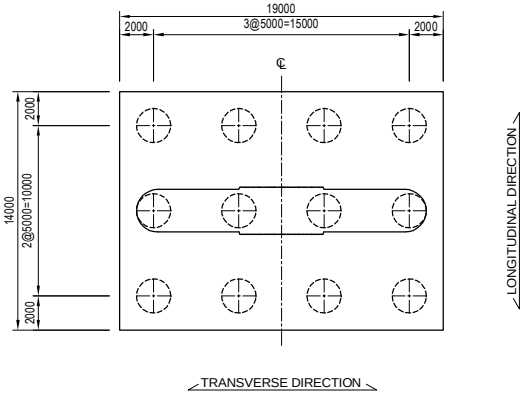
DETAIL OF ANCHOR BAR S =1:60



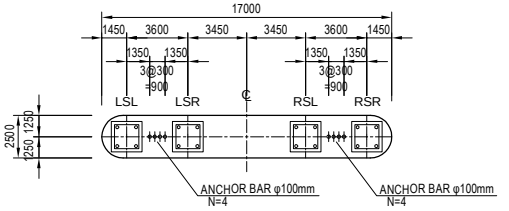
PLAN VIEW 4 - 4



PILE ARRANGEMENT 5 - 5



ARRANGEMENT OF BRIDGE SEAT



NOTE : 1.V-cut passes with joint filler shall be made on abutment wall. The V-cut passes shall be coutinued from a front side surface to a back side surface.
2.Regardless of existences of indications on the Drawings,baseplates of bridge bearings shall be embedded into leveling mortar by 10 mm and the leveling motar shall be embedded into concrete pedestal or top surface of substructures by 30 mm.

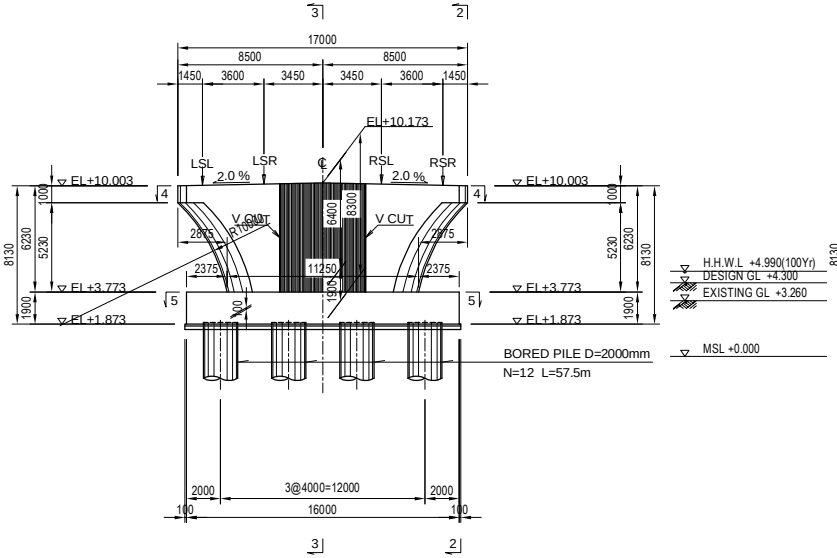
PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN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

	NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
PREPARED BY	M. OHYAMA		15 Jun.2017	GENERAL VIEW OF P3 PIER	1
CHECKED BY	T. HAYAKAWA		20 Jun.2017		DWG No.
APPROVED BY	Y. SANO		21 Jun.2017		P1-PB-2031

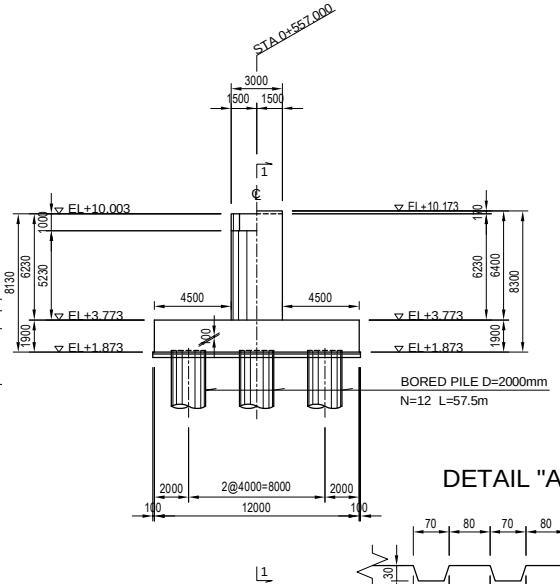
GENERAL VIEW OF P4 PIER

S =1:300

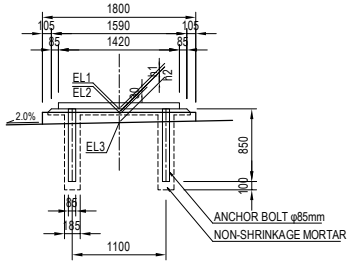
FRONT VIEW
1 - 1

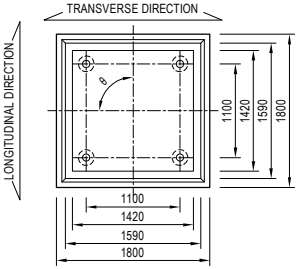


SIDE VIEW
2 - 2 3 - 3



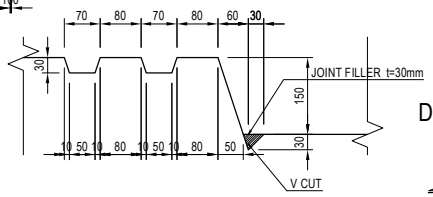
DETAIL OF BEARING
S =1:60



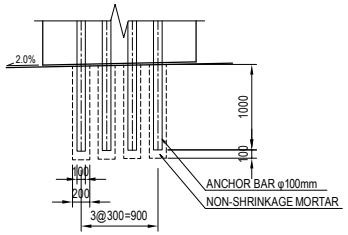


Unit : m	LSL	LSR	RSL	RSR
EL1	10.192	10.264	10.264	10.192
EL2	10.152	10.224	10.224	10.152
EL3	10.032	10.104	10.104	10.032
h1	0.040	0.040	0.040	0.040
h2	0.120	0.120	0.120	0.120
θ	90d0'0"	90d0'0"	90d0'0"	90d0'0"

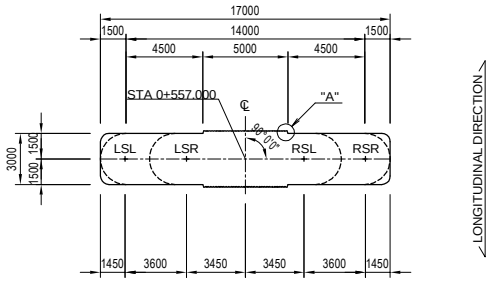
DETAIL "A"
S =1:10



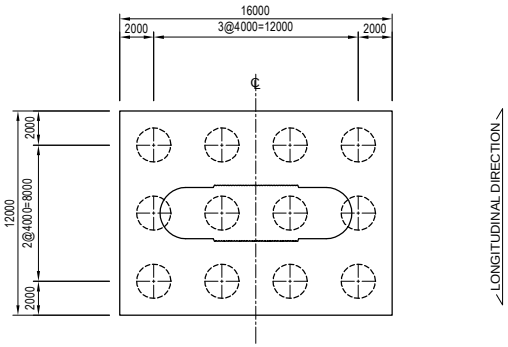
DETAIL OF ANCHOR BAR
S =1:60



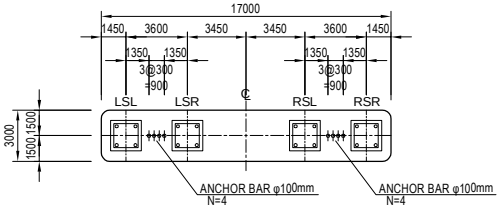
PLAN VIEW
4 - 4



PILE ARRANGEMENT
5 - 5



ARRANGEMENT OF BRIDGE SEAT



NOTE : 1. V-cut passes with joint filler shall be made on abutment wall. The V-cut passes shall be continued from a front side surface to a back side surface.

2. Regardless of existences of indications on the Drawings, baseplates of bridge bearings shall be embedded into leveling mortar by 10 mm and the leveling motar shall be embedded into concrete pedestal or top surface of substructures by 30 mm.

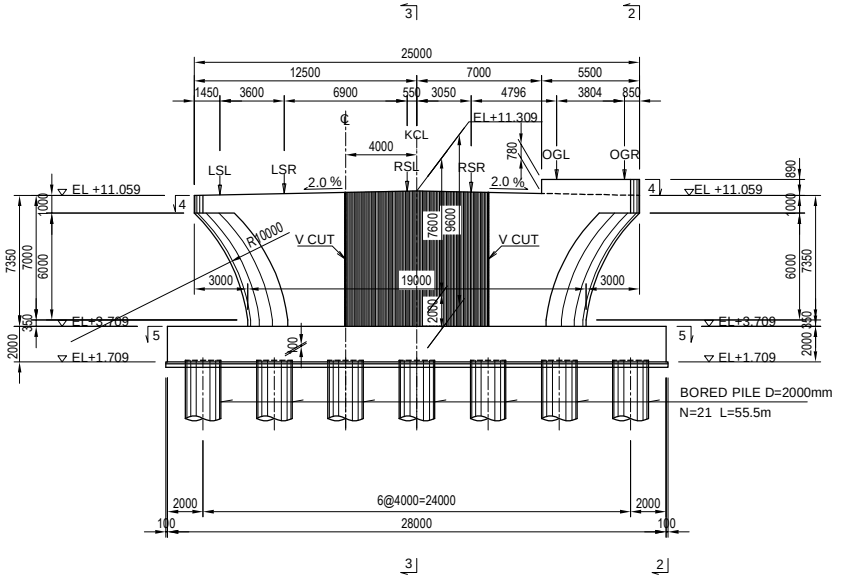
PROJECT NAME	FINANCED BY	COUNTERPART	JICA STUDY TEAM	
DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	JAPAN INTERNATIONAL COOPERATION AGENCY	REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN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

	NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
PREPARED BY	M. OHYAMA		15 Jun.2017	GENERAL VIEW OF P4 PIER	1
CHECKED BY	T. HAYAKAWA		20 Jun.2017		DWG No.
APPROVED BY	Y. SANO		21 Jun.2017		P1-PB-2041

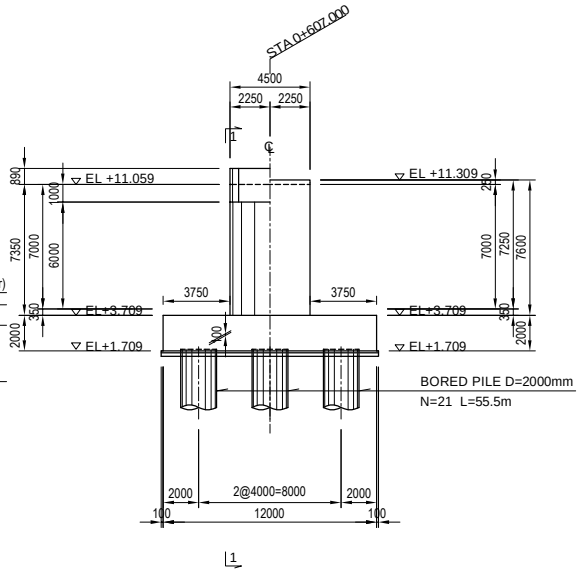
GENERAL VIEW OF P5 PIER(1)

S =1:300

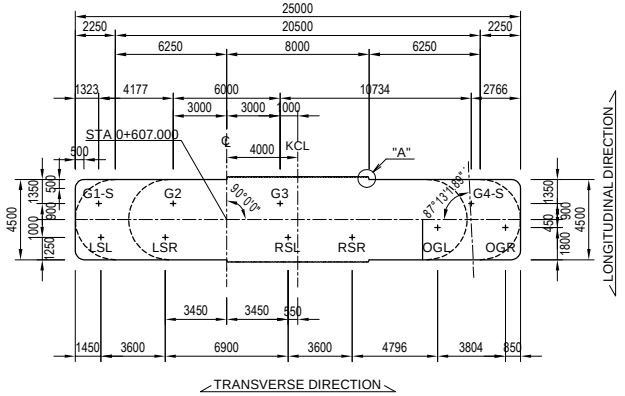
FRONT VIEW
1 - 1



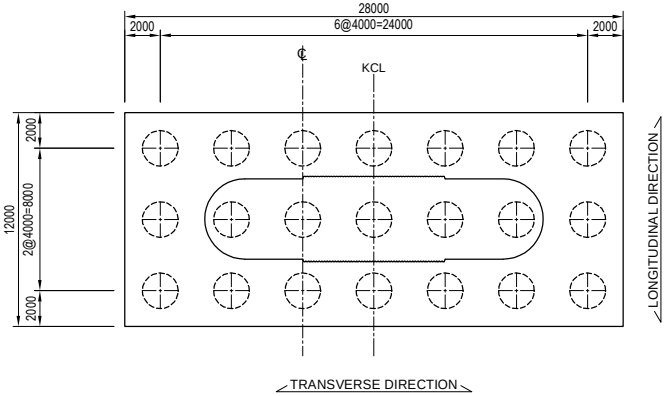
SIDE VIEW
2 - 2 3 - 3



PLAN VIEW
4 - 4



PILE ARRANGEMENT
5 - 5



PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: 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	M. OHYAMA		15 Jun.2017	GENERAL VIEW OF P5 PIER(1)	1
CHECKED BY	T. HAYAKAWA		20 Jun.2017		DWG No.
APPROVED BY	Y. SANO		21 Jun.2017		P1-PB-2051

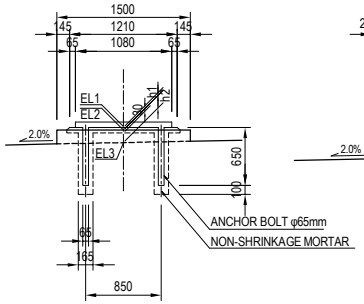
GENERAL VIEW OF P5 PIER(2)

S =1:300

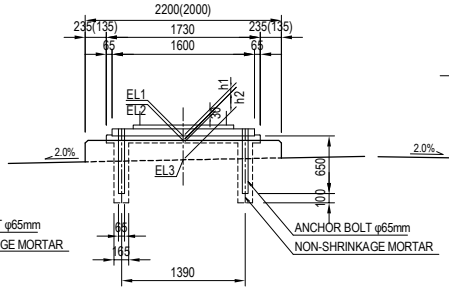
DETAIL OF BEARING

S =1:60

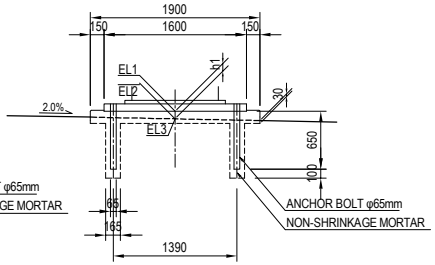
(LSL,LSR,RSL,RSR)



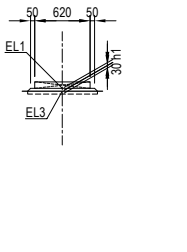
(G1-S,G2 (G3))



(G4-S)

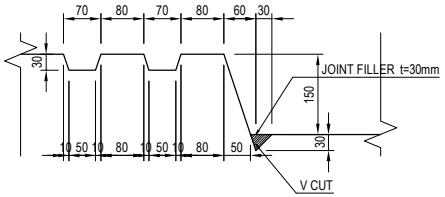


(OGL,OGR)

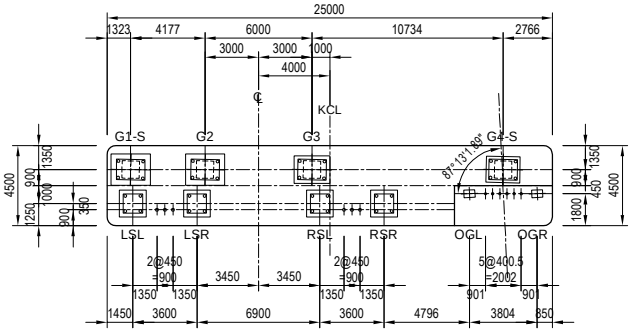


DETAIL "A"

S =1:10



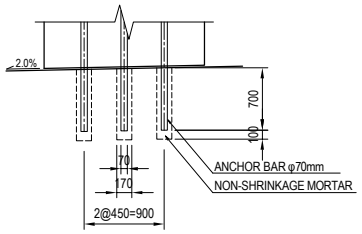
ARRANGEMENT OF BRIDGE SEAT



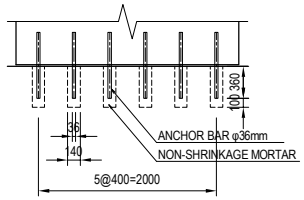
DETAIL OF ANCHOR BAR

S =1:60

(PC BOX)



(ON-RAMP)



Unit : m	LSL	LSR	RSL	RSR	OGL	OGR	G1-S	G2	G3	G4-S
EL1	11.384	11.456	11.456	11.384	11.986	11.981	11.335	11.424	11.424	11.200
EL2	11.338	11.410	11.418	11.348			11.305	11.389	11.389	11.114
EL3	11.088	11.160	11.298	11.248	11.949	11.949	11.085	11.169	11.289	11.114
h1	0.046	0.046	0.038	0.036	0.037	0.032	0.030	0.035	0.035	0.086
h2	0.250	0.250	0.120	0.100			0.220	0.220	0.100	0.000
θ	90d0'0"	90d0'0"	90d0'0"	90d0'0"	87d13'1.89"	87d13'1.89"	91d6'42"	91d6'42"	91d6'42"	91d6'42"

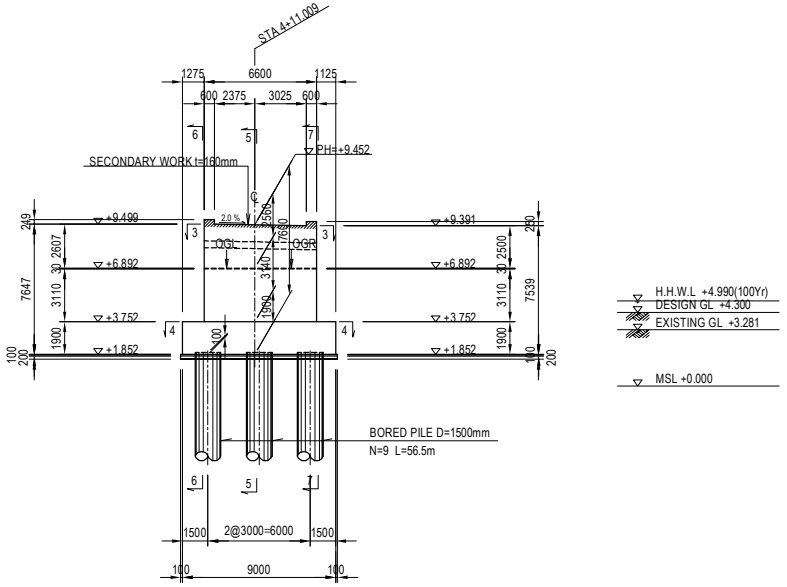
NOTE : 1. V-cut passes with joint filler shall be made on abutment wall.
The V-cut passes shall be coutinued from a front side surface to a back side surface.
2. Regardless of existences of indications on the Drawings,
baseplates of bridge bearings shall be embedded into leveling mortar by 10 mm and the
leveling motar shall be embedded into concrete pedestal or top surface of substructures by 30 mm.

PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.		NAME	SIGNATURE	DATE
				PREPARED BY	M. OHYAMA		15 Jun.2017
				CHECKED BY	T. HAYAKAWA		20 Jun.2017
				APPROVED BY	Y. SANO		21 Jun.2017

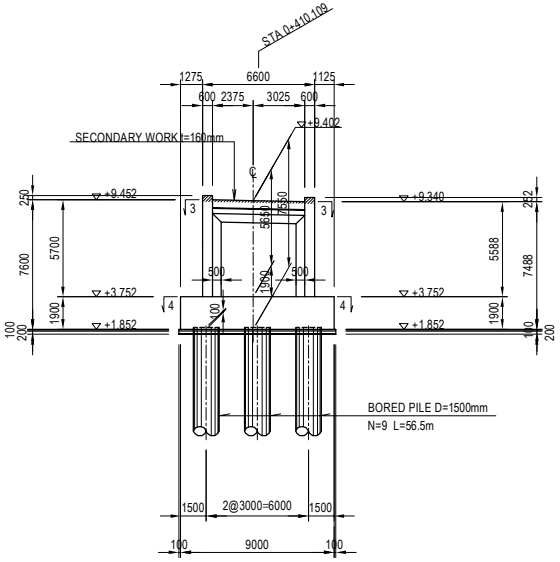
DRAWING TITLE	PACKAGE
GENERAL VIEW OF P5 PIER(2)	1
	DWG No.
	P1-PB-2052

GENERAL VIEW OF AO1 ABUTMENT(1) S =1:300

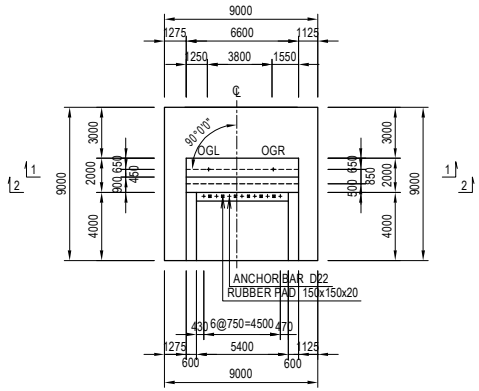
SECTION 1 - 1



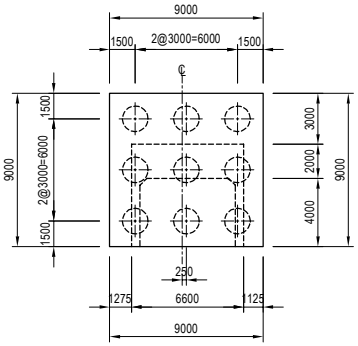
SECTION 2 - 2



SECTION 3 - 3



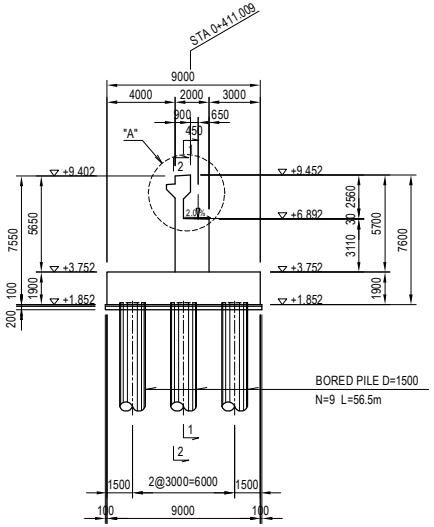
SECTION 4 - 4

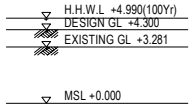


PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR, MINISTRY OF CONSTRUCTION, DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. / ORIENTAL CONSULTANTS GLOBAL CO., LTD. / METROPOLITAN EXPRESSWAY COMPANY LIMITED / CHODAI CO.,LTD. / NIPPON ENGINEERING CONSULTANTS CO.,LTD.		
	NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
PREPARED BY	M. OHYAMA		15 Jun.2017	GENERAL VIEW OF AO1 ABUTMENT(1)	1
CHECKED BY	T. HAYAKAWA		20 Jun.2017		DWG No.
APPROVED BY	Y. SANO		21 Jun.2017		P1-OR-2001

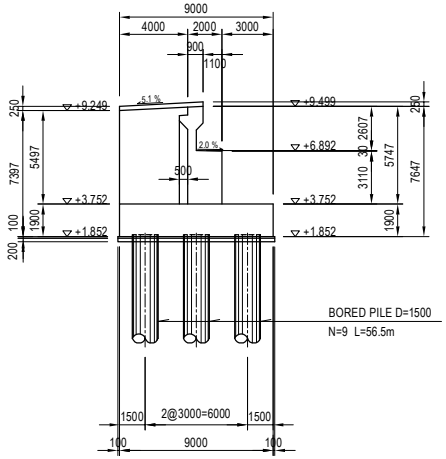
GENERAL VIEW OF AO1 ABUTMENT(2) S =1:300

SECTION 5 - 5

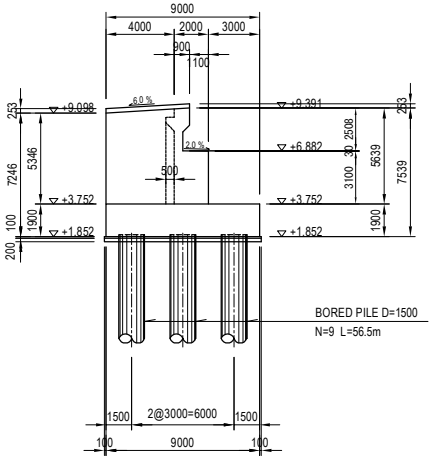




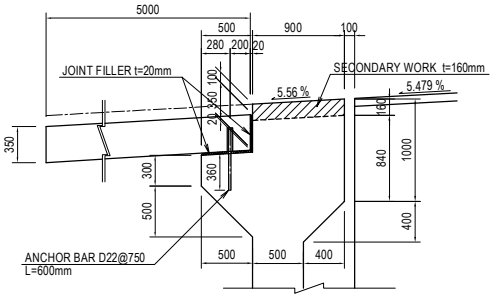
SECTION 6 - 6



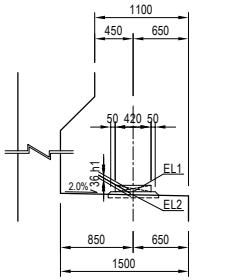
SECTION 7 - 7



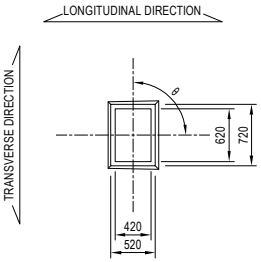
DETAIL "A" S =1:50



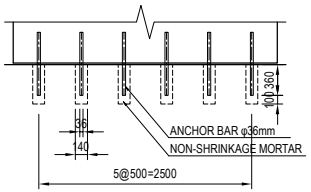
DETAIL OF BEARING S =1:60



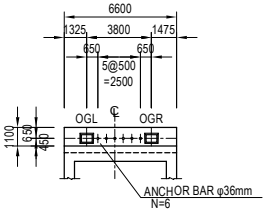
Unit : m	OGL	OGR
EL1	6.909	6.909
EL2	6.875	6.875
h1	0.034	0.034
θ	90d0'0"	90d0'0"



DETAIL OF ANCHOR BAR S =1:60



ARRANGEMENT OF BRIDGE SEAT



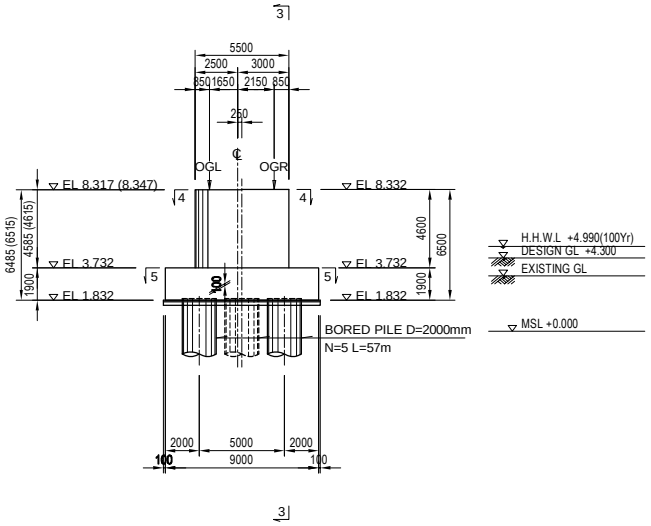
NOTES :
1. Weep holes shall be installed in abutment wall by 3 meter interval for discharge of water from backfilled soil.
2. The Contractor shall adjust gradients of top surface of a parapet wall to retain continuity in road profile.
3. Regardless of existences of indications on the Drawings, baseplates of bridge bearings shall be embedded into leveling mortar by 10 mm and the leveling motar shall be embedded into concrete pedestal or top surface of substructures by 30 mm.

PROJECT NAME	DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT			
FINANCED BY	JAPAN INTERNATIONAL COOPERATION AGENCY			
COUNTERPART	REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE			
JICA STUDY TEAM	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	M. OHYAMA		15 Jun.2017	GENERAL VIEW OF AO1 ABUTMENT(2) / 1
CHECKED BY	T. HAYAKAWA		20 Jun.2017	DWG No.
APPROVED BY	Y. SANO		21 Jun.2017	P1-OR-2002

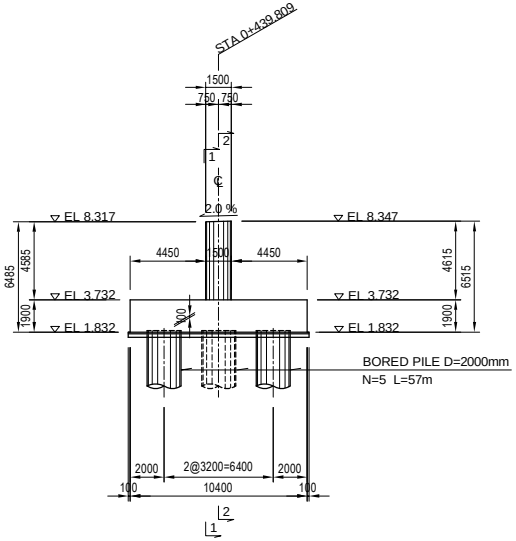
GENERAL VIEW OF PO1 PIER

S =1:300

FRONT VIEW
1 - 1　2 - 2

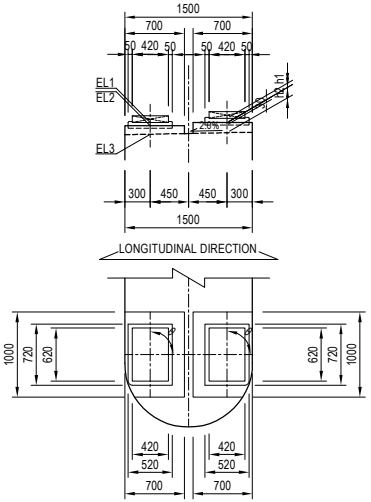


SIDE VIEW
3 - 3



DETAIL OF BEARING

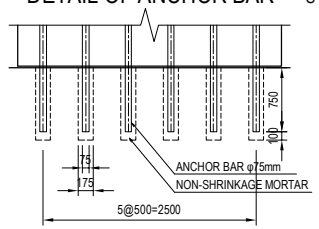
S =1:60



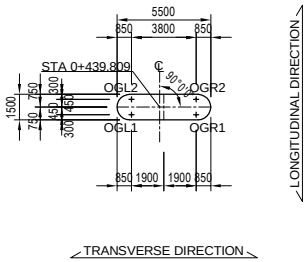
Unit : m	OGL1	OGR1	OGL2	OGR2
EL1	8.461	8.461	8.510	8.510
EL2	8.423	8.423	8.461	8.461
EL3	8.323	8.323	8.341	8.341
h1	0.038	0.038	0.049	0.049
h2	0.100	0.100	0.120	0.120
θ	90d0'0"	90d0'0"	90d0'0"	90d0'0"

DETAIL OF ANCHOR BAR

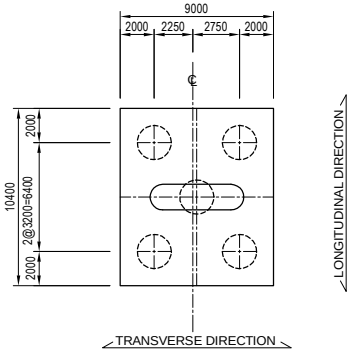
S =1:60



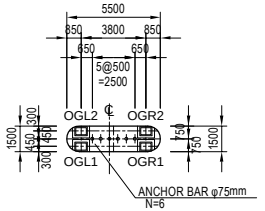
PLAN VIEW
4 - 4



PILE ARRANGEMENT
5 - 5



ARRANGEMENT OF BRIDGE SEAT



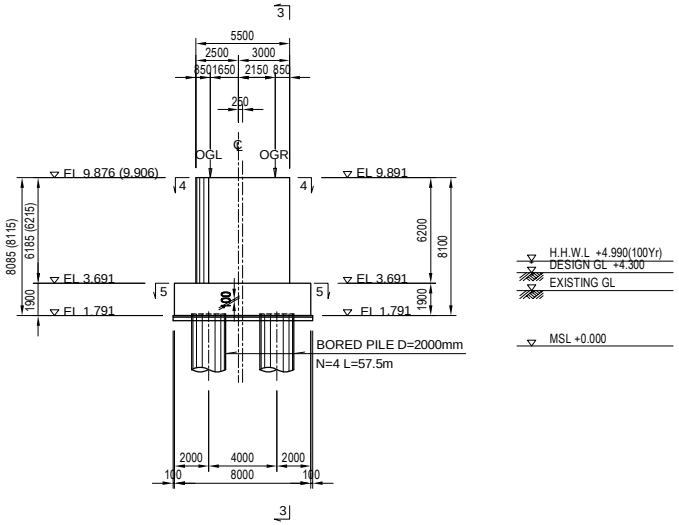
Notes : Regardless of existences of indications on the Drawings,
baseplates of bridge bearings shall be embedded into leveling mortar by 10 mm and the
leveling motar shall be embedded into concrete pedestal or top surface of substructures by 30 mm.

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	M. OHYAMA		15 Jun.2017	GENERAL VIEW OF PO1 PIER	1
				CHECKED BY	T. HAYAKAWA		20 Jun.2017		DWG No.
				APPROVED BY	Y. SANO		21 Jun.2017		P1-OR-2011

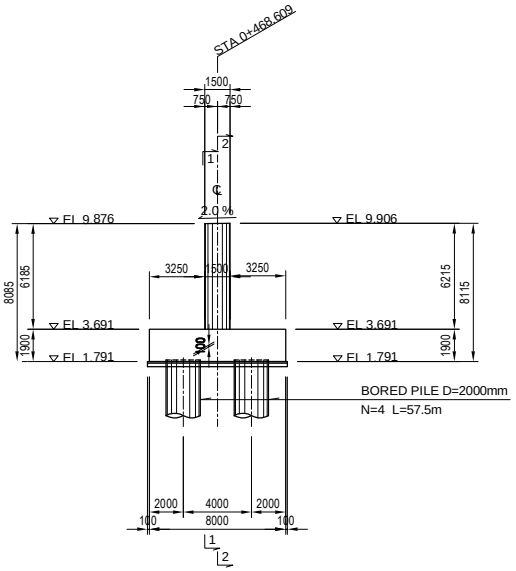
GENERAL VIEW OF PO2 PIER

S =1:300

FRONT VIEW
1 - 1　　2 - 2

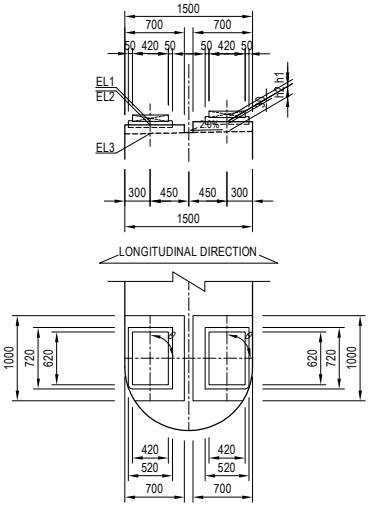


SIDE VIEW
3 - 3



DETAIL OF BEARING

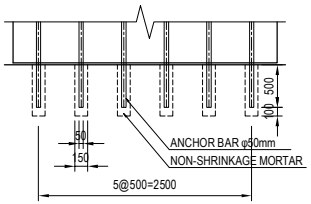
S =1:60



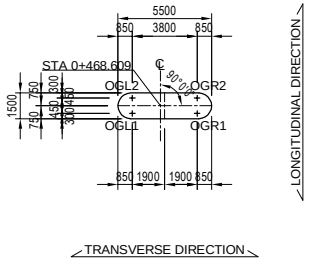
Unit : m	OGL1	OGR1	OGL2	OGL2
EL1	10.019	10.019	10.064	10.064
EL2	9.982	9.982	10.020	10.020
EL3	9.882	9.882	9.900	9.900
h1	0.037	0.037	0.044	0.044
h2	0.100	0.100	0.120	0.120
θ	90d0'0"	90d0'0"	90d0'0"	90d0'0"

DETAIL OF ANCHOR BAR

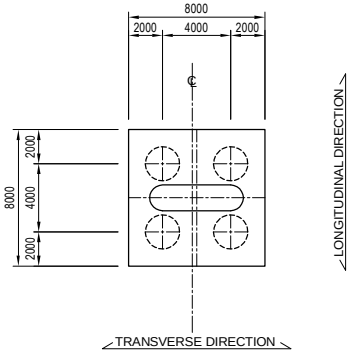
S =1:60



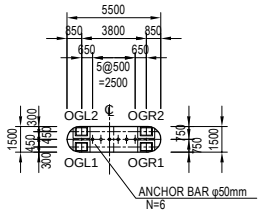
PLAN VIEW
4 - 4



PILE ARRANGEMENT
5 - 5



ARRANGEMENT OF BRIDGE SEAT



Notes : Regardless of existences of indications on the Drawings,
baseplates of bridge bearings shall be embedded into leveling mortar by 10 mm and the
leveling motar shall be embedded into concrete pedestal or top surface of substructures by 30 mm.

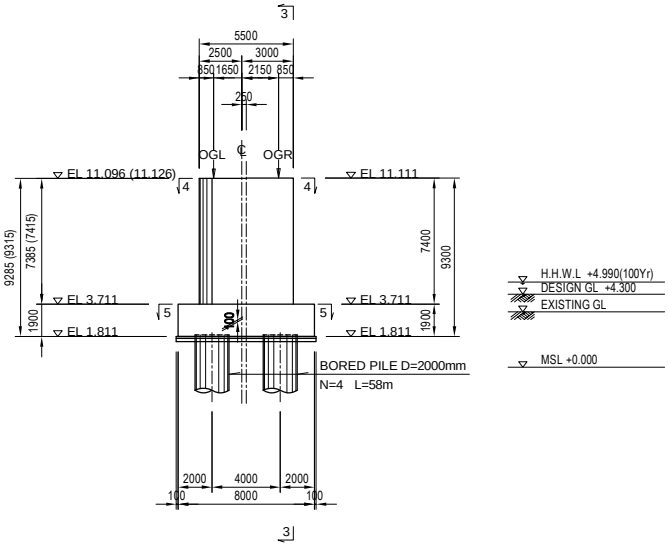
PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR, MINISTRY OF CONSTRUCTION, DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. / ORIENTAL CONSULTANTS GLOBAL CO., LTD. / METROPOLITAN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

	NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
PREPARED BY	M. OHYAMA		15 Jun.2017	GENERAL VIEW OF PO2 PIER	1
CHECKED BY	T. HAYAKAWA		20 Jun.2017		DWG No.
APPROVED BY	Y. SANO		21 Jun.2017		P1-OR-2021

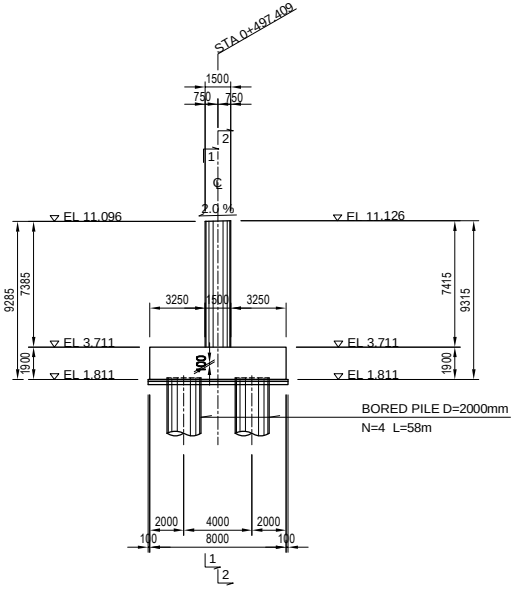
GENERAL VIEW OF PO3 PIER

S =1:300

FRONT VIEW
1 - 1　　2 - 2

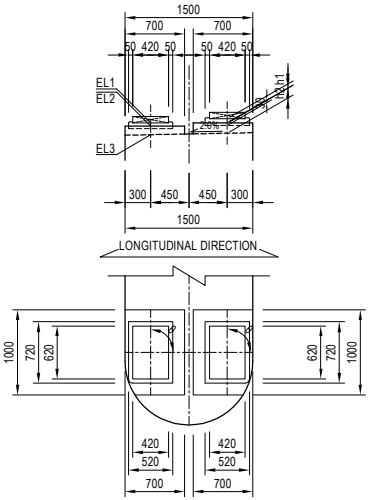


SIDE VIEW
3 - 3



DETAIL OF BEARING

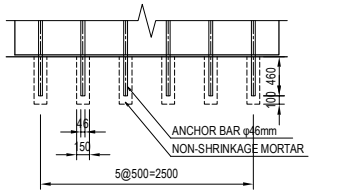
S =1:60



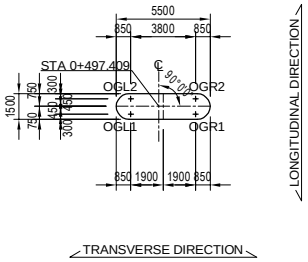
Unit : m	OGL1	OGR1	OGL2	OGL2
EL1	11.241	11.241	11.278	11.278
EL2	11.202	11.202	11.240	11.240
EL3	11.102	11.102	11.120	11.120
h1	0.039	0.039	0.038	0.038
h2	0.100	0.100	0.120	0.120
θ	90d0'0"	90d0'0"	90d0'0"	90d0'0"

DETAIL OF ANCHOR BAR

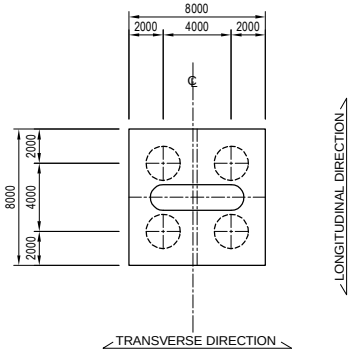
S =1:60



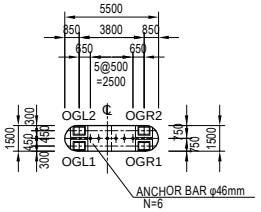
PLAN VIEW
4 - 4



PILE ARRANGEMENT
5 - 5



ARRANGEMENT OF BRIDGE SEAT



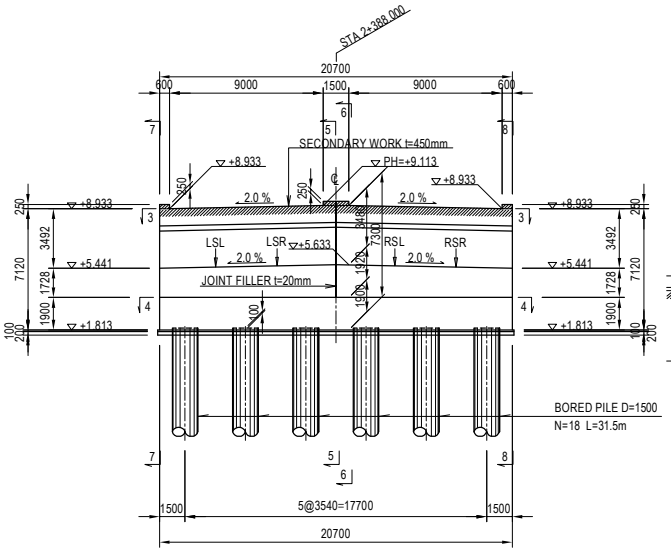
Notes : Regardless of existences of indications on the Drawings,
baseplates of bridge bearings shall be embedded into leveling mortar by 10 mm and the
leveling motar shall be embedded into concrete pedestal or top surface of substructures by 30 mm.

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	M. OHYAMA		15 Jun.2017	GENERAL VIEW OF PO3 PIER	1
				CHECKED BY	T. HAYAKAWA		20 Jun.2017		DWG No.
				APPROVED BY	Y. SANO		21 Jun.2017		P1-OR-2031

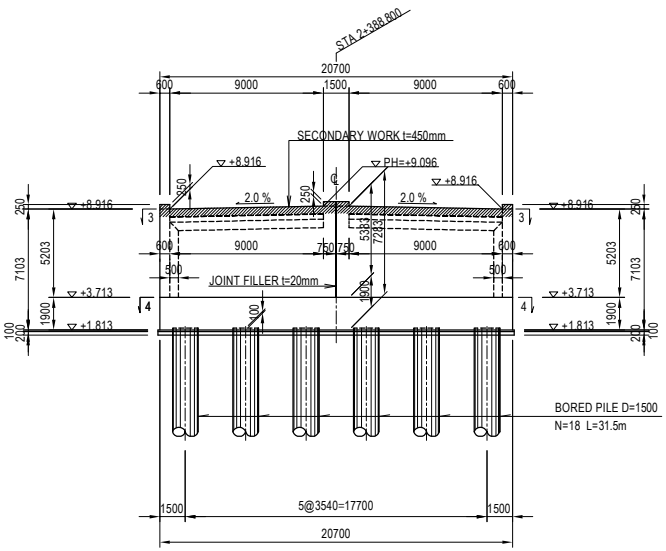
GENERAL VIEW OF A2 ABUTMENT(1)

S=1:300

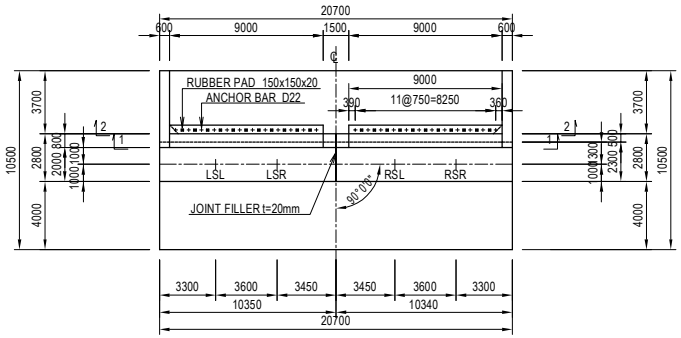
SECTION 1 - 1



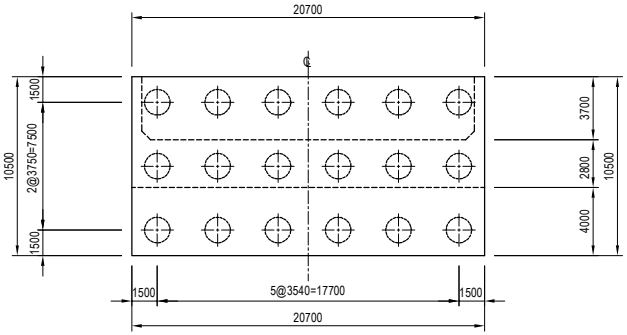
SECTION 2 - 2



SECTION 3 - 3



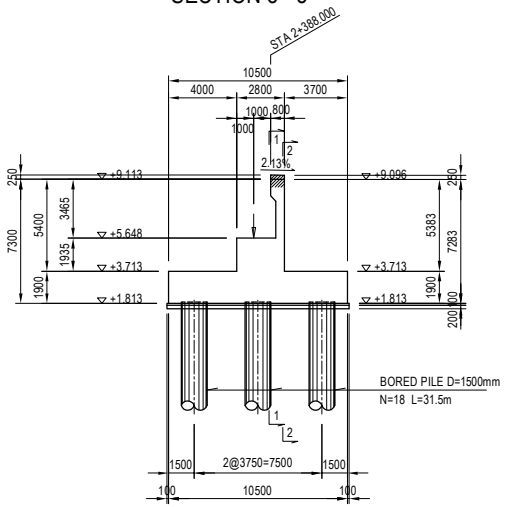
SECTION 4 - 4



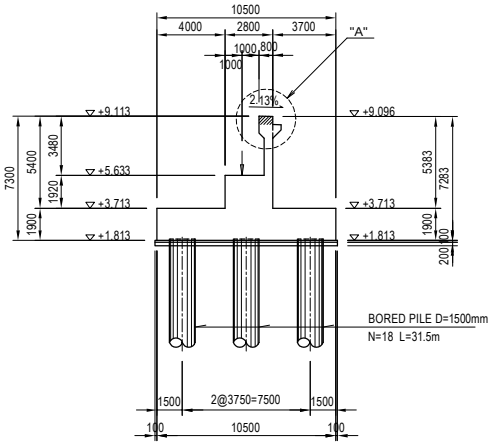
PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.		
				NAME / SIGNATURE / DATE	DRAWING TITLE / PACKAGE
				PREPARED BY: M. OHYAMA / 15 Jun.2017	GENERAL VIEW OF A2 ABUTMENT(1) / 2
				CHECKED BY: T. HAYAKAWA / 20 Jun.2017	DWG No.
				APPROVED BY: Y. SANO / 21 Jun.2017	P2-PB-2001

GENERAL VIEW OF A2 ABUTMENT(2) S=1:300

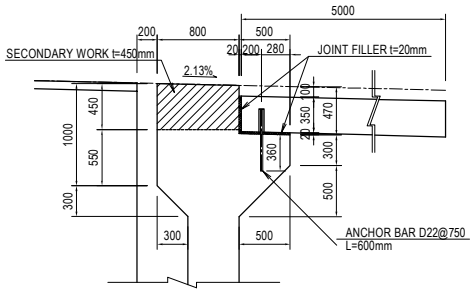
SECTION 5 - 5



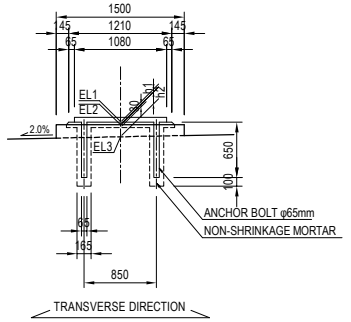
SECTION 6 - 6



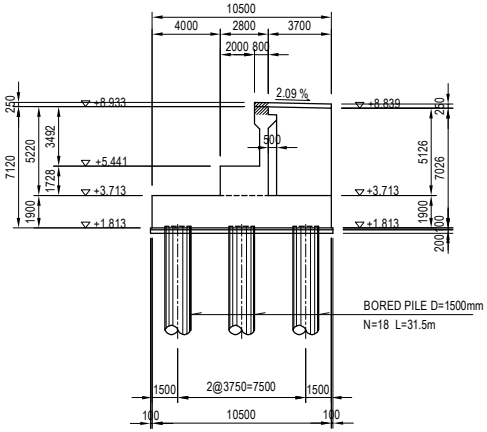
DETAIL "A" S=1:50



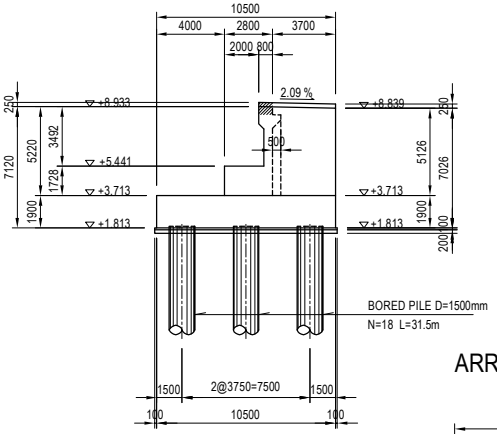
DETAIL OF BEARING S =1:60



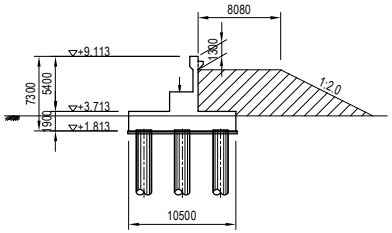
SECTION 7 - 7

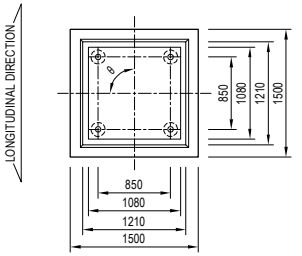


SECTION 8 - 8



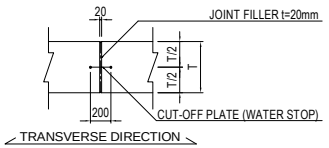
ARRANGEMENT OF BACK-FILLING APPROACH S=1:500

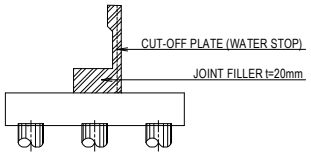




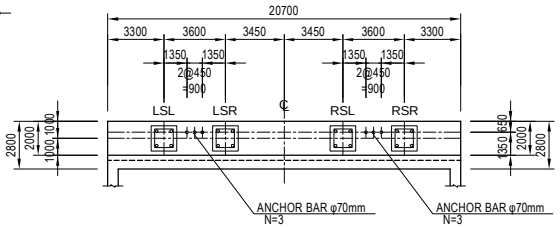
Unit : m	LSL(RSL)	LSR(RSR)
EL1	5.627	5.699
EL2	5.597	5.669
EL3	5.507	5.579
h1	0.030	0.030
h2	0.090	0.090
θ	90d0'0"	90d0'0"

DETAIL OF JOINT FILLER

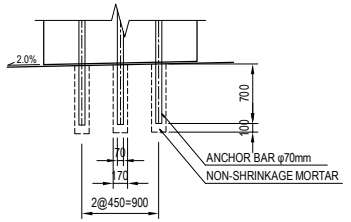




ARRANGEMENT OF BRIDGE SEAT



DETAIL OF ANCHOR BAR S =1:60



NOTES :
1. Weep holes shall be installed in abutment wall by 3 meter interval for discharge of water from backfilled soil.
2. The Contractor shall adjust gradients of top surface of a parapet wall to retain continuity in road profile.
3. Regardless of existences of indications on the Drawings, baseplates of bridge bearings shall be embedded into leveling mortar by 10 mm and the leveling motar shall be embedded into concrete pedestal or top surface of substructures by 30 mm.

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.

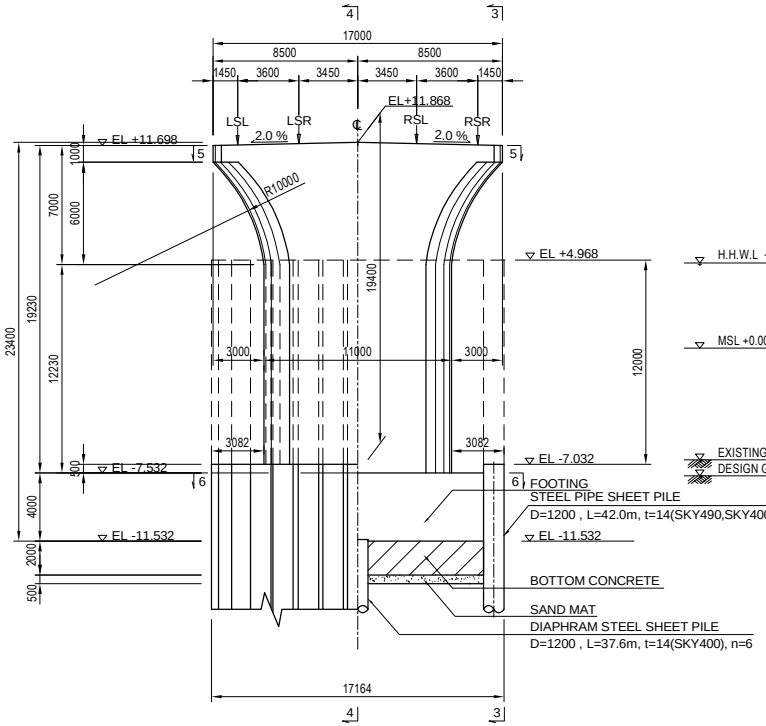
	NAME	SIGNATURE	DATE
PREPARED BY	M. OHYAMA		15 Jun.2017
CHECKED BY	T. HAYAKAWA		20 Jun.2017
APPROVED BY	Y. SANO		21 Jun.2017

DRAWING TITLE	PACKAGE
GENERAL VIEW OF A2 ABUTMENT(2)	2
	DWG No.
	P2-PB-2002

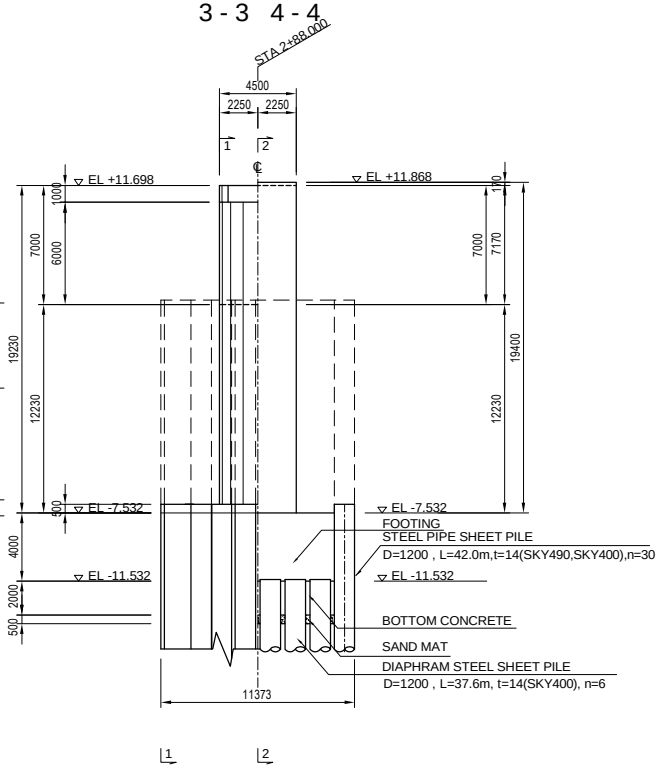
GENERAL VIEW OF P20 PIER(1)

S =1:300

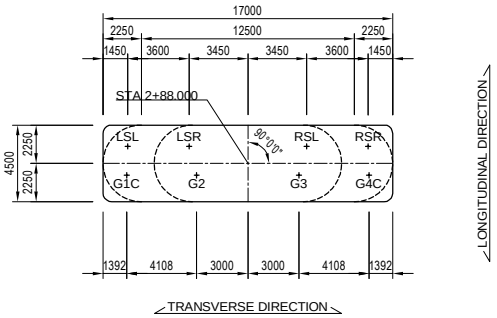
FRONT VIEW
1 - 1 2 - 2



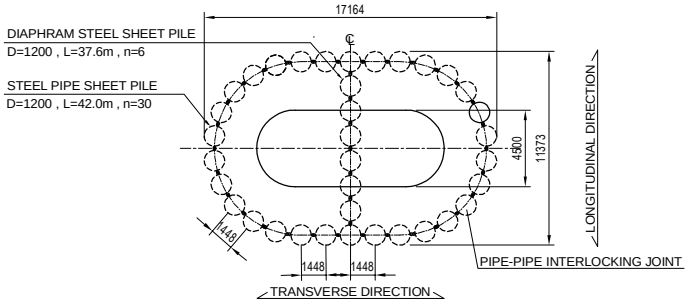
SIDE VIEW
3 - 3 4 - 4



PLAN VIEW
5 - 5



PILE ARRANGEMENT
6 - 6



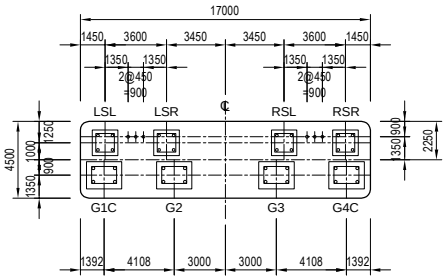
PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN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

	NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
PREPARED BY	M. OHYAMA		15 Jun.2017	GENERAL VIEW OF P20 PIER(1)	2
CHECKED BY	T. HAYAKAWA		20 Jun.2017		DWG No.
APPROVED BY	Y. SANO		21 Jun.2017		P2-PB-2011

GENERAL VIEW OF P20 PIER(2)

S =1:300

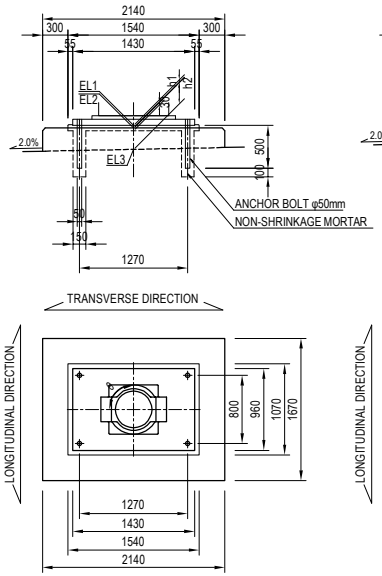
ARRANGEMENT OF BRIDGE SEAT



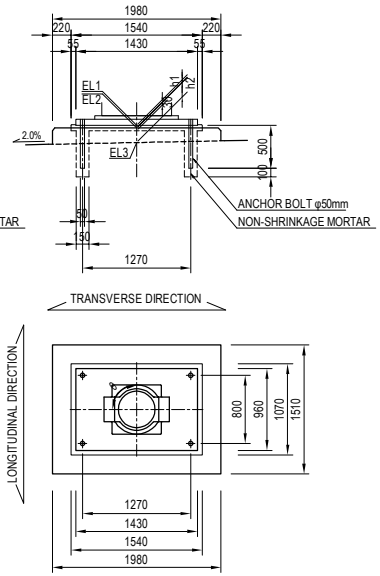
DETAIL OF BEARING

S =1:60

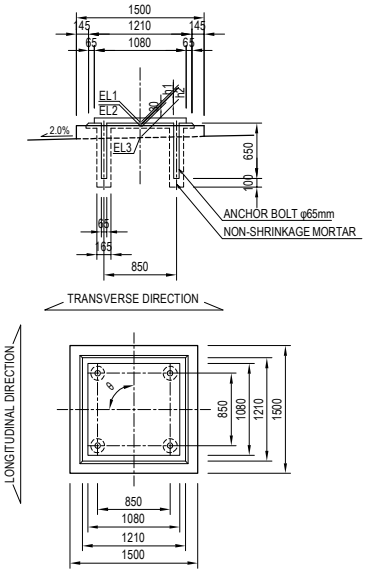
(G1C,G4C)



(G2,G3)



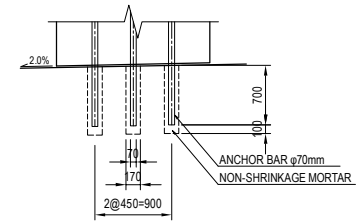
(LSL,LSR,RSL,RSR)



Unit : m	G1C	G2	G3	G4C	LSL	LSR	RSL	RSR
EL1	12.023	12.023	12.023	12.023	11.847	11.919	11.919	11.847
EL2	11.977	11.978	11.978	11.977	11.817	11.889	11.889	11.817
EL3	11.727	11.808	11.808	11.727	11.727	11.799	11.799	11.727
h1	0.046	0.045	0.045	0.046	0.030	0.030	0.030	0.030
h2	0.250	0.170	0.170	0.250	0.090	0.090	0.090	0.090
θ	90d0'00"	90d0'00"	90d0'00"	90d0'00"	90d0'00"	90d0'00"	90d0'00"	90d0'00"

DETAIL OF ANCHOR BAR

S =1:60



Notes : Regardless of existences of indications on the Drawings,
baseplates of bridge bearings shall be embedded into leveling mortar by 10 mm and the
leveling motar shall be embedded into concrete pedestal or top surface of substructures by 30 mm.

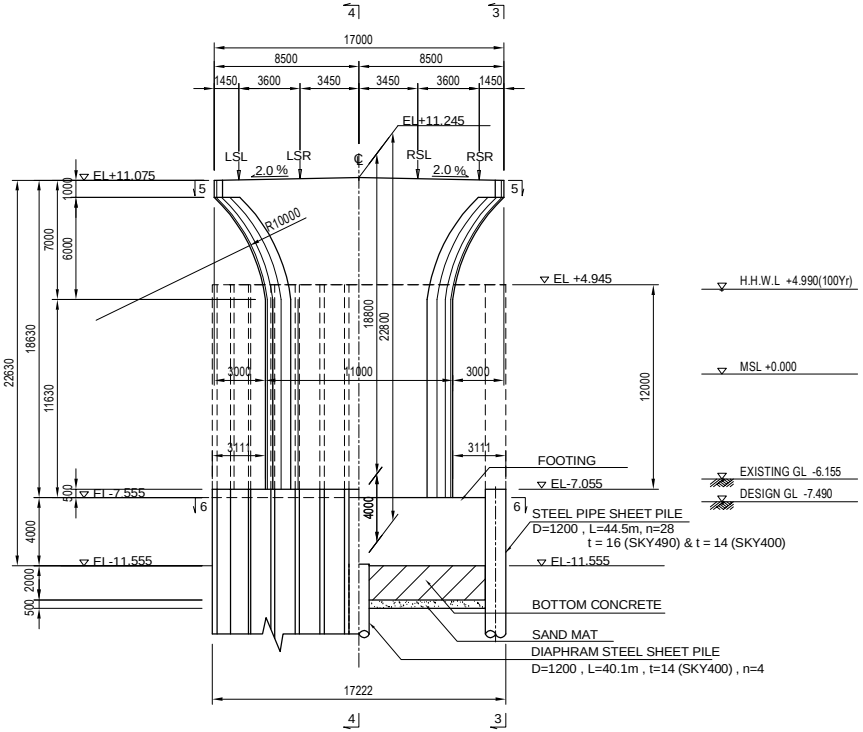
PROJECT NAME: DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY: JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART: REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM: NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN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

	NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
PREPARED BY	M. OHYAMA		15 Jun.2017	GENERAL VIEW OF P20 PIER(2)	2
CHECKED BY	T. HAYAKAWA		20 Jun.2017		DWG No.
APPROVED BY	Y. SANO		21 Jun.2017		P2-PB-2012

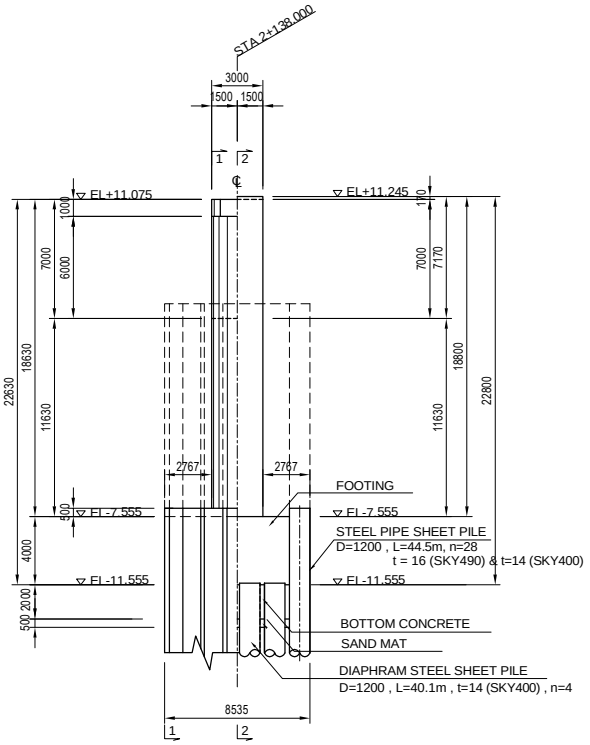
GENERAL VIEW OF P21 PIER

S =1:300

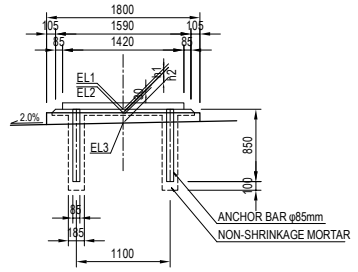
FRONT VIEW
1 - 1　2 - 2

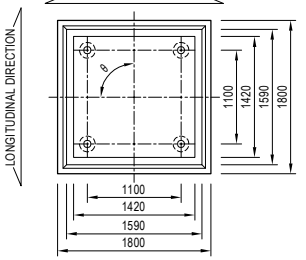


SIDE VIEW
3 - 3　4 - 4



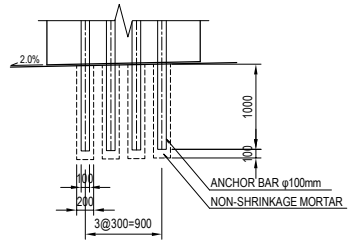
DETAIL OF BEARING
S =1:60



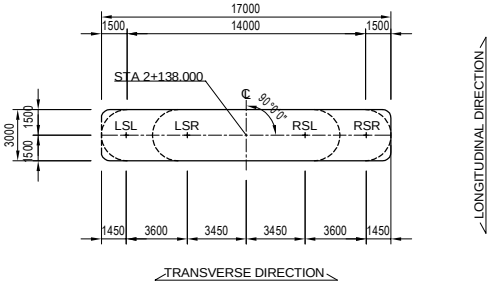


Unit : m	LSL	LSR	RSL	RSR
EL1	11.264	11.336	11.336	11.264
EL2	11.224	11.296	11.296	11.224
EL3	11.104	11.176	11.176	11.104
h1	0.040	0.040	0.040	0.040
h2	0.120	0.120	0.120	0.120
θ	90d0'0"	90d0'0"	90d0'0"	90d0'0"

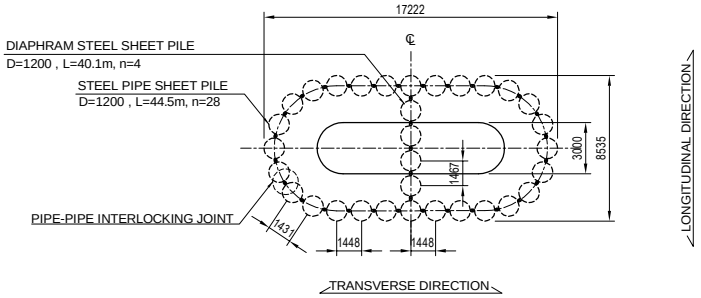
DETAIL OF ANCHOR BAR
S =1:60



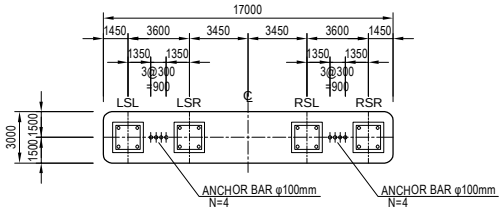
PLAN VIEW
5 - 5



PILE ARRANGEMENT
6 - 6



ARRANGEMENT OF BRIDGE SEAT



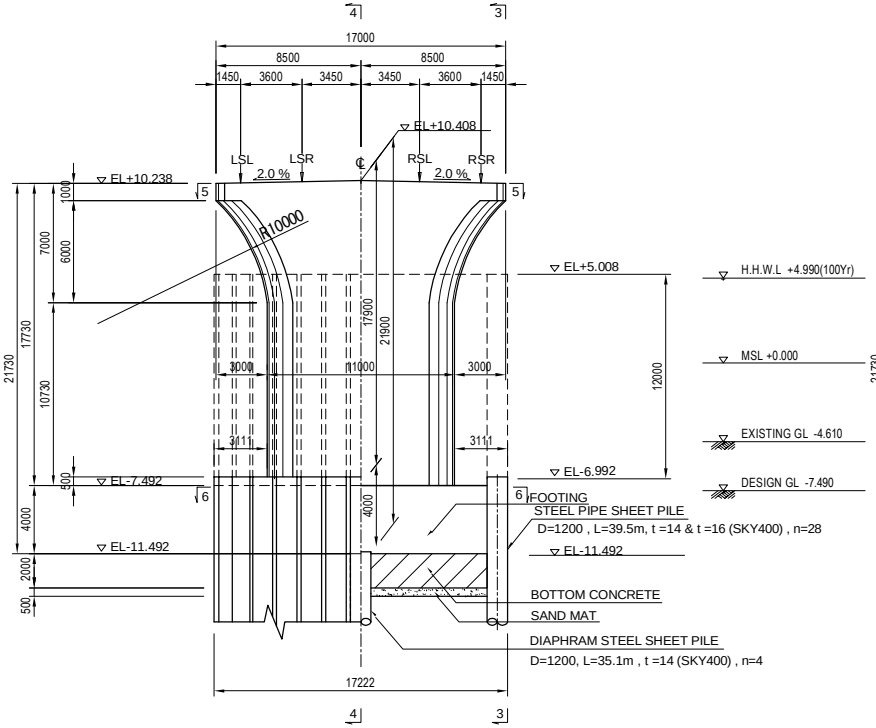
Notes : Regardless of existences of indications on the Drawings,
baseplates of bridge bearings shall be embedded into leveling mortar by 10 mm and the
leveling motar shall be embedded into concrete pedestal or top surface of substructures by 30 mm.

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	M. OHYAMA		15 Jun.2017	GENERAL VIEW OF P21 PIER	2
				CHECKED BY	T. HAYAKAWA		20 Jun.2017		DWG No.
				APPROVED BY	Y. SANO		21 Jun.2017		P2-PB-2021

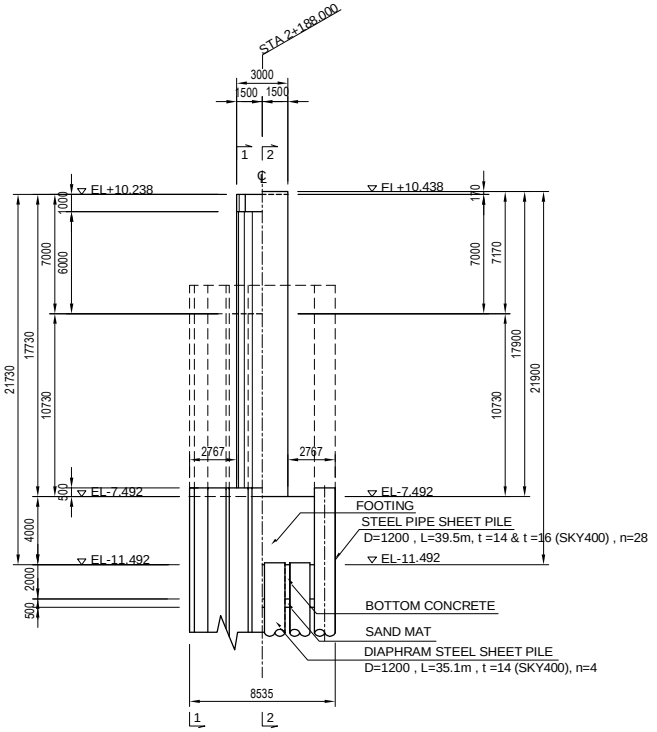
GENERAL VIEW OF P22 PIER

S =1:300

FRONT VIEW
1 - 1　2 - 2

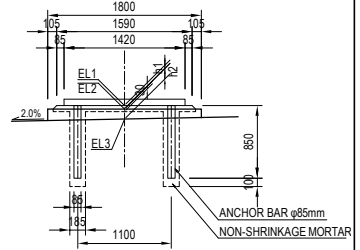


SIDE VIEW
3 - 3　4 - 4



DETAIL OF BEARING

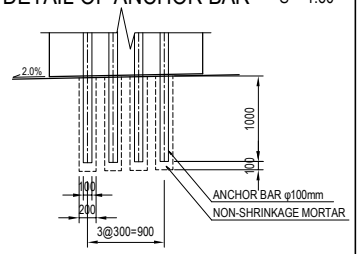
S =1:60



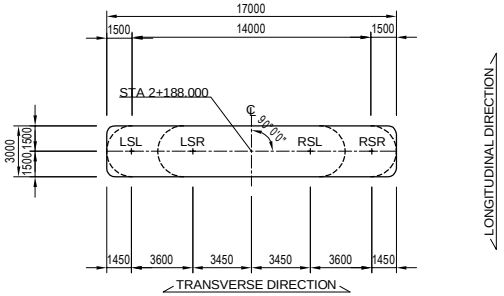
Unit : m	LSL	LSR	RSL	RSR
EL1	10.427	10.499	10.499	10.427
EL2	10.387	10.459	10.459	10.387
EL3	10.267	10.339	10.339	10.267
h1	0.040	0.040	0.040	0.040
h2	0.120	0.120	0.120	0.120
θ	90d0'0"	90d0'0"	90d0'0"	90d0'0"

DETAIL OF ANCHOR BAR

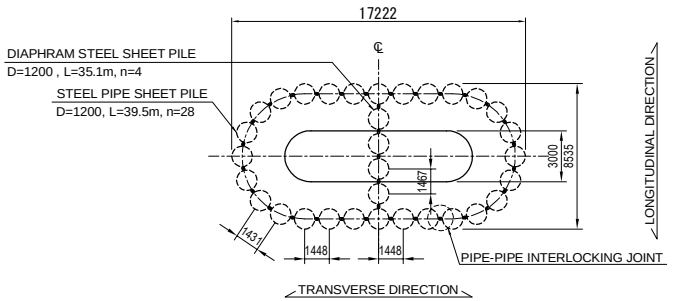
S =1:60



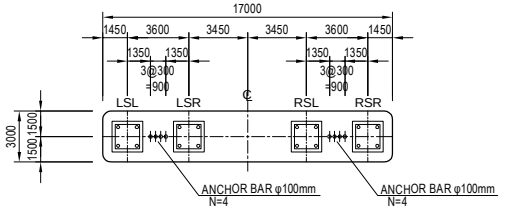
PLAN VIEW
5 - 5



PILE ARRANGEMENT
6 - 6



ARRANGEMENT OF BRIDGE SEAT

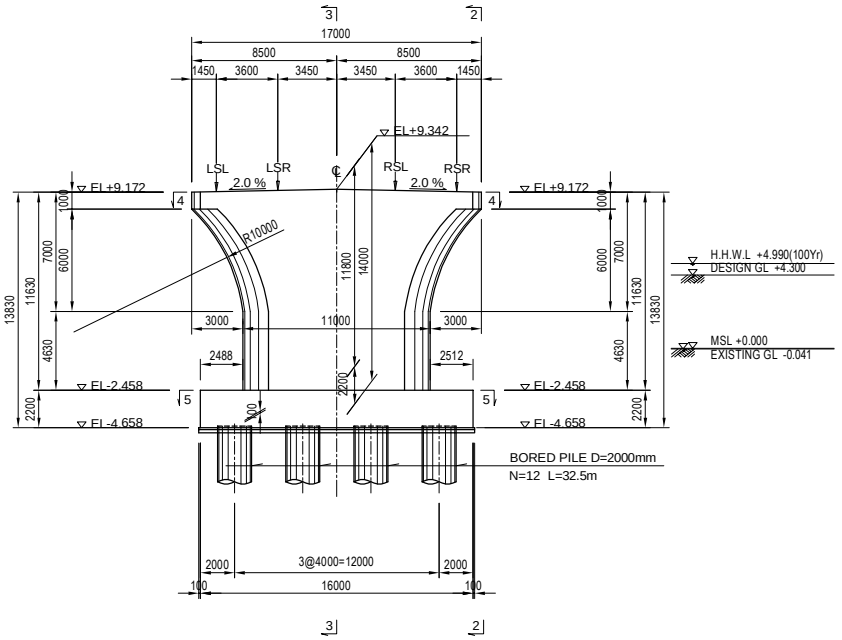


Notes : Regardless of existences of indications on the Drawings,
baseplates of bridge bearings shall be embedded into leveling mortar by 10 mm and the
leveling motar shall be embedded into concrete pedestal or top surface of substructures by 30 mm.

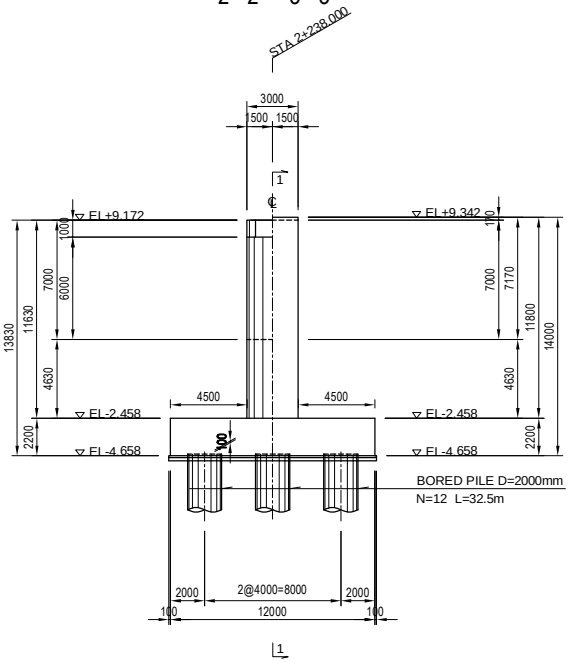
PROJECT NAME	DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT			
FINANCED BY	JAPAN INTERNATIONAL COOPERATION AGENCY			
COUNTERPART	REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE			
JICA STUDY TEAM	NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.			
	NAME	SIGNATURE	DATE	DRAWING TITLE / PACKAGE
PREPARED BY	M. OHYAMA		15 Jun.2017	GENERAL VIEW OF P22 PIER / 2
CHECKED BY	T. HAYAKAWA		20 Jun.2017	DWG No.
APPROVED BY	Y. SANO		21 Jun.2017	P2-PB-2031

GENERAL VIEW OF P23 PIER S=1:300

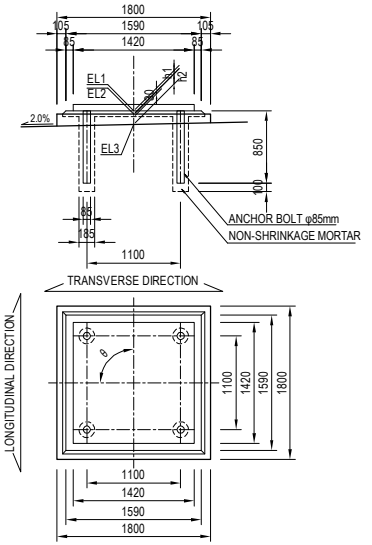
FRONT VIEW 1 - 1



SIDE VIEW 2 - 2 3 - 3

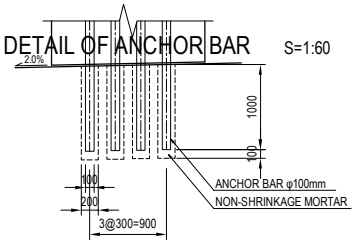


DETAIL OF BEARING S=1:60

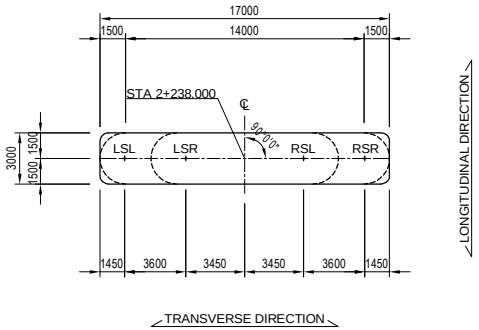


Unit : m	LSL	LSR	RSL	RSR
EL1	9.361	9.433	9.433	9.361
EL2	9.321	9.393	9.393	9.321
EL3	9.201	9.273	9.273	9.201
h1	0.040	0.040	0.040	0.040
h2	0.120	0.120	0.120	0.120
θ	90d0'0"	90d0'0"	90d0'0"	90d0'0"

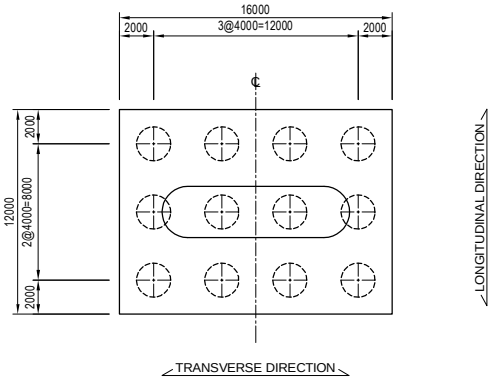
DETAIL OF ANCHOR BAR S=1:60



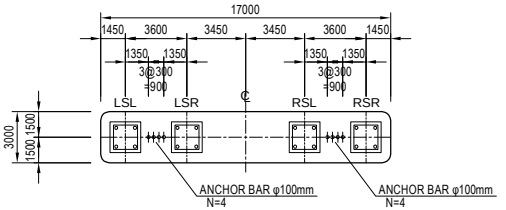
PLAN VIEW 4 - 4



PILE ARRANGEMENT 5 - 5



ARRANGEMENT OF BRIDGE SEAT



Notes : Regardless of existences of indications on the Drawings, baseplates of bridge bearings shall be embedded into leveling mortar by 10 mm and the leveling motar shall be embedded into concrete pedestal or top surface of substructures by 30 mm.

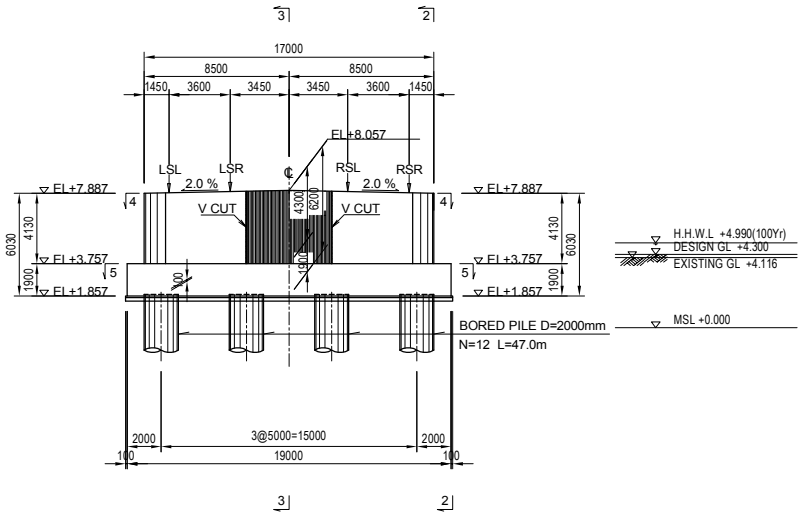
PROJECT NAME	FINANCED BY	COUNTERPART	JICA STUDY TEAM
DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	JAPAN INTERNATIONAL COOPERATION AGENCY	REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN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

	NAME	SIGNATURE	DATE
PREPARED BY	M. OHYAMA		15 Jun.2017
CHECKED BY	T. HAYAKAWA		20 Jun.2017
APPROVED BY	Y. SANO		21 Jun.2017

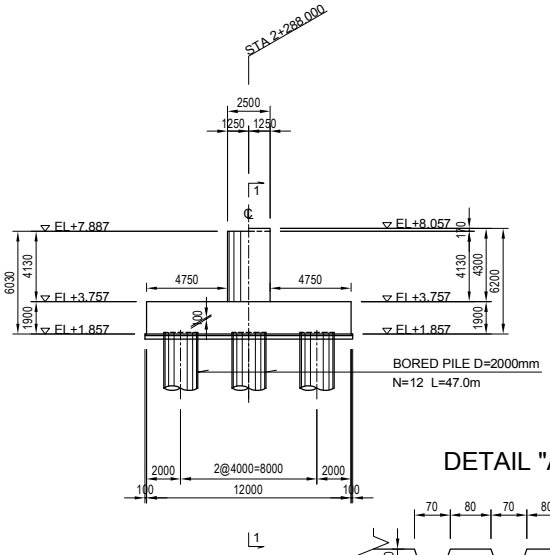
DRAWING TITLE	PACKAGE
GENERAL VIEW OF P23 PIER	2
	DWG No.
	P2-PB-2041

GENERAL VIEW OF P24 PIER S =1:300

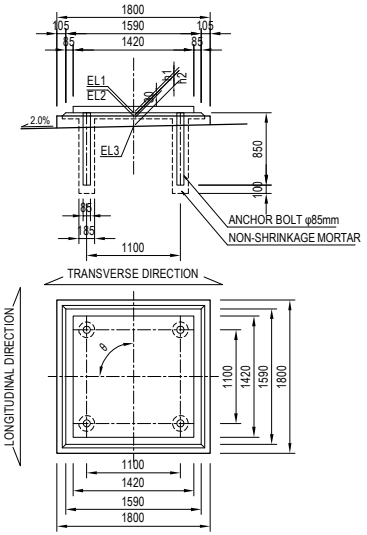
FRONT VIEW 1 - 1



SIDE VIEW 2 - 2 3 - 3

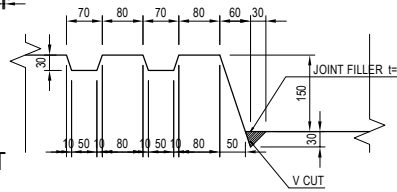


DETAIL OF BEARING S =1:60

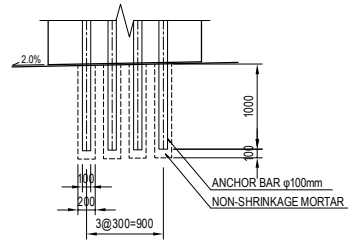


Unit : m	LSL	LSR	RSL	RSR
EL1	8.076	8.148	8.148	8.076
EL2	8.036	8.108	8.108	8.036
EL3	7.916	7.988	7.988	7.916
h1	0.040	0.040	0.040	0.040
h2	0.120	0.120	0.120	0.120
θ	90d0'0"	90d0'0"	90d0'0"	90d0'0"

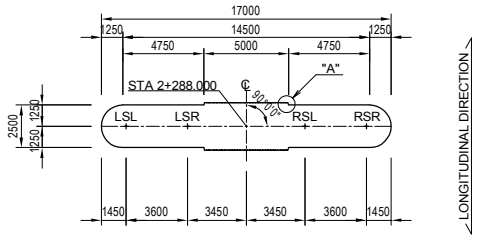
DETAIL "A" S =1:10



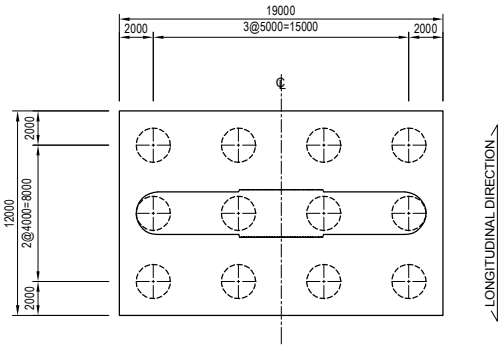
DETAIL OF ANCHOR BAR S =1:60



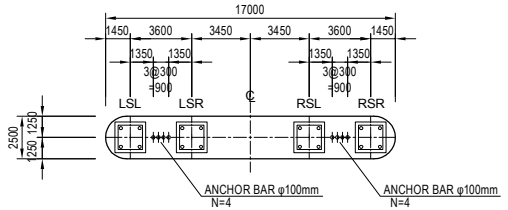
PLAN VIEW 4 - 4



PILE ARRANGEMENT 5 - 5



ARRANGEMENT OF BRIDGE SEAT

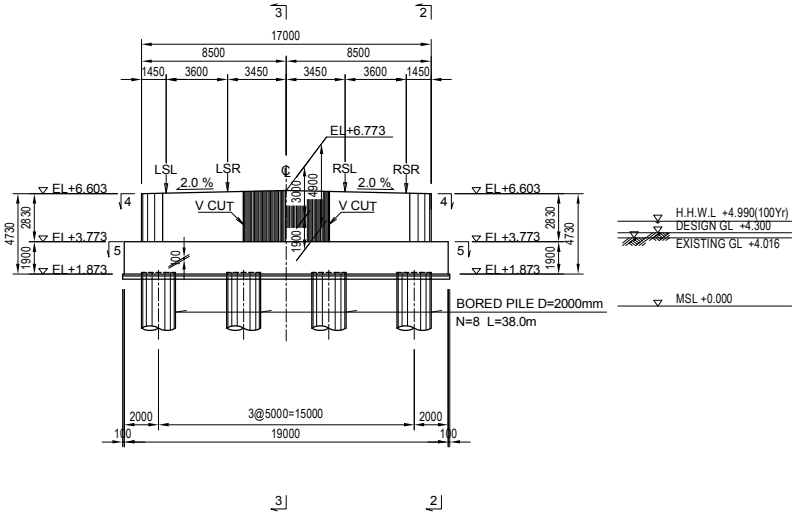


NOTE : 1.V-cut passes with joint filler shall be made on abutment wall. The V-cut passes shall be coutinued from a front side surface to a back side surface.
2. Regardless of existences of indications on the Drawings,
baseplates of bridge bearings shall be embedded into leveling mortar by 10 mm and the
leveling motar shall be embedded into concrete pedestal or top surface of substructures by 30 mm.

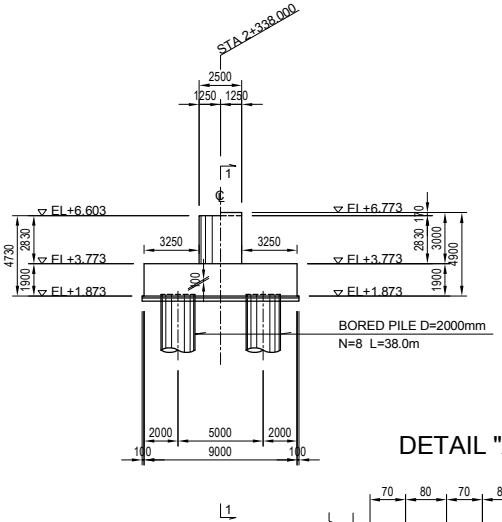
PROJECT NAME	DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT				
FINANCED BY	JAPAN INTERNATIONAL COOPERATION AGENCY				
COUNTERPART	REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE				
JICA STUDY TEAM	NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO.,LTD. NIPPON ENGINEERING CONSULTANTS CO.,LTD.				
		NAME	SIGNATURE	DATE	DRAWING TITLE / PACKAGE
	PREPARED BY	M. OHYAMA		15 Jun.2017	GENERAL VIEW OF P24 PIER / 2
	CHECKED BY	T. HAYAKAWA		20 Jun.2017	DWG No.
	APPROVED BY	Y. SANO		21 Jun.2017	P2-PB-2051

GENERAL VIEW OF P25 PIER S =1:300

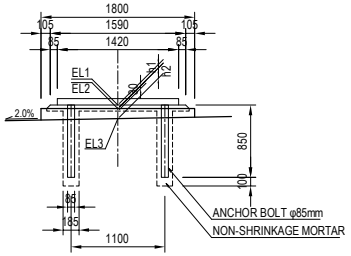
FRONT VIEW 1 - 1

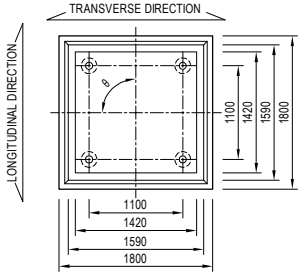


SIDE VIEW 2 - 2 3 - 3



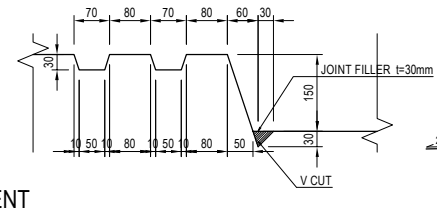
DETAIL OF BEARING S =1:60



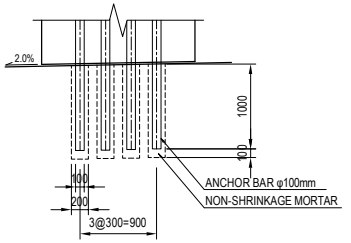


Unit : m	LSL	LSR	RSL	RSR
EL1	6.792	6.864	6.864	6.792
EL2	6.752	6.824	6.824	6.752
EL3	6.632	6.704	6.704	6.632
h1	0.040	0.040	0.040	0.040
h2	0.120	0.120	0.120	0.120
θ	90d0'0"	90d0'0"	90d0'0"	90d0'0"

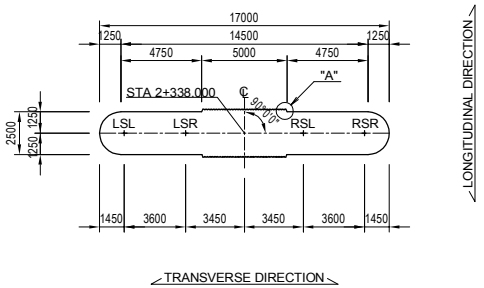
DETAIL "A" S =1:10



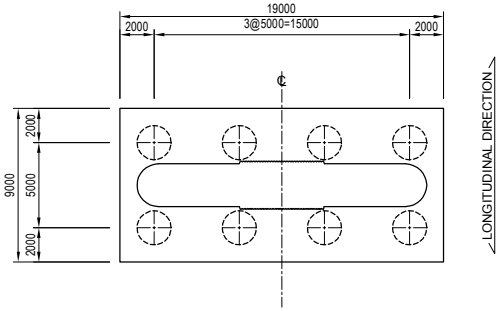
DETAIL OF ANCHOR BAR S =1:60



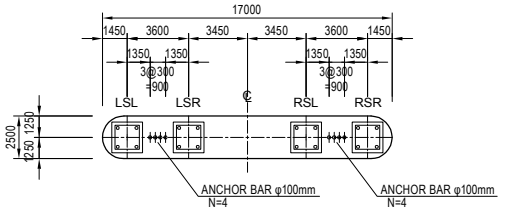
PLAN VIEW 4 - 4



PILE ARRANGEMENT 5 - 5



ARRANGEMENT OF BRIDGE SEAT



NOTE : 1. V-cut passes with joint filler shall be made on abutment wall. The V-cut passes shall be coutinued from a front side surface to a back side surface.
2. Regardless of existences of indications on the Drawings, baseplates of bridge bearings shall be embedded into leveling mortar by 10 mm and the leveling motar shall be embedded into concrete pedestal or top surface of substructures by 30 mm.

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	M. OHYAMA		15 Jun.2017	GENERAL VIEW OF P25 PIER	2
CHECKED BY	T. HAYAKAWA		20 Jun.2017		DWG No.
APPROVED BY	Y. SANO		21 Jun.2017		P2-PB-2061

3-2. Rebar Arrangement

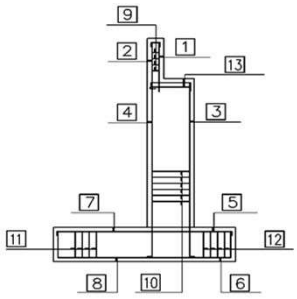
Rebar Arrangement of PC Concrete Bridge:

Member			A1		P1		P2		P3		P4		P5		P20		P21		P22		P23		P24		P25		A2	
Column height			4.900		2.700		4.000		5.200		6.400		7.600		19.400		18.800		17.900		11.800		4.300		3.000		5.400	
Pilecap/top slab height			1.900		1.900		1.900		1.900		1.900		1.900		4.000		4.000		4.000		2.200		1.900		1.900		1.900	
Total height			6.800		4.600		5.900		7.100		8.300		9.500		23.400		22.800		21.900		14.000		6.200		4.900		7.300	
Beam	width		20.700		17.000		17.000		17.000		17.000		25.000		17.000		17.000		17.000									
	thickness		0.500		2.500		2.500	3.000	2.500	2.500	3.000	2.500	4.500	0.500	4.500		3.000		3.000									
Column	width		20.700		17.000		17.000		17.000		17.000		12.000		11.000		11.000		11.000									
	thickness		2.800		2.500		2.500	3.000	2.500	2.500	3.000	2.500	4.500	2.800	4.500		3.000		3.000									
Pilecap /Top Slab	Longitudinal		12.000		12.000		12.000	12.000	12.000	12.000	12.000	9.000	12.000	10.500	11.373		8.535		8.535									
	Transversal		21.000		19.000		19.000	16.000	19.000	19.000	16.000	19.000	24.000	20.700	17.061		17.222		17.222									
On land / In River			Land		Land		Land		Land		Land		Land		River		River		River		River		Land		Land		Land	
Foundation Type			CIP		CIP		CIP		CIP		CIP		CIP		SPSP		SPSP		SPSP		CIP		CIP		CIP		CIP	
Pile diameter and length			1.5m x53.0m		2.0m x 58.0m		2.0m x 62.0m		2.0m x 57.0m		2.0m x 58.0m		2.0m x 55.5m		1.2m x 41.5m		1.2m x 44.0m		1.2m x 39.0m		2.0m x 32.5m		2.0m x 47.0m		2.0m x 38.0m		1.5m x 31.5m	
Pile layout and number			4x7=28		3x4=12		3x4=12		3x4=12		3x4=12		3x6=18		36		32		32		3x4=12		3x4=12		2x4=8		3x6=18	
Beam/Pier Top	Transversal Direction				D16	150ctc 1 layer	D16	150ctc 1 layer	D16	150ctc 1 layer	D32	140ctc 1 layer 20+20= 40 nos	D29	140ctc 2 layer 29+29= 58 nos	D29	140ctc 2 layer 29+29= 58 nos	D32	140ctc 2 layer 20+20= 40 nos	D32	140ctc 2 layer 20+20= 40 nos	D32	140ctc 2 layer 20+20= 40 nos	D16	150ctc 1 layer	D16	150ctc 1 layer		
	Compression Rebar										D29	140ctc 1 layer 20 nos	D25	140ctc 1 layer 29 nos	D25	140ctc 1 layer 29 nos	D29	140ctc 1 layer 20 nos	D29	140ctc 1 layer 20 nos	D29	140ctc 1 layer 20 nos						
	Side Surface				D16	150ctc ~ 1 layer	D16	150ctc ~ 1 layer	D16	150ctc ~ 1 layer	D19	200ctc ~ 23 nos	D22	200ctc ~ 23 nos	D22	200ctc ~ 23 nos	D19	200ctc ~ 23 nos	D19	200ctc ~ 23 nos	D19	200ctc ~ 23 nos	D16	150ctc ~ 1 layer 2 nos	D16	150ctc ~ 1 layer 2 nos		
	Stirrups (Longi Direc.)				D25	150ctc	D25	150ctc	D25	150ctc	D25	150ctc ~ 6 nos	D25	150ctc ~ 6 nos	D25	150ctc ~ 6 nos	D25	150ctc ~ 6 nos	D25	150ctc ~ 6 nos	D25	150ctc ~ 6 nos	D25	150ctc	D25	150ctc		
Column/wall	Main Rebar		D32	250ctc	D19	250ctc ~ 1 layer	D19	250ctc ~ 1 layer 59 nos	D22	250ctc ~ 1 layer 59 nos	D25	250ctc ~ 1 layer 33 nos	D25	250ctc ~ 1 layer 59 nos	D29	125ctc ~ 2 layer 53+53= 106 nos	D38	125ctc ~ 2 layer 65+65= 130 nos	D38	125ctc ~ 2 layer 65+65= 130 nos	D29	125ctc ~ 2 layer 65+65= 130 nos	D19	250ctc ~ 1 layer 59 nos	D19	250ctc ~ 1 layer 59 nos	D32	250ctc
	Hoop Tie				D16	150ctc ~ 1 layer 2 nos	D16	150ctc ~ 1 layer 2 nos	D16	150ctc ~ 1 layer 2 nos	D16	150ctc ~ 1 layer 2 nos	D16	150ctc ~ 1 layer 2 nos	D16	150ctc ~ 1 layer 2 nos	D16	150ctc ~ 1 layer 2 nos	D16	150ctc ~ 1 layer 2 nos	D16	150ctc ~ 1 layer 2 nos	D16	150ctc ~ 1 layer 2 nos	D16	150ctc ~ 1 layer 2 nos		
	Middle sttip				D16	150ctc 1000ctc ~ 16 nos	D16	150ctc 1000ctc ~ 16 nos	D16	150ctc 1000ctc ~ 16 nos	D16	150ctc 1000ctc ~ 9 nos	D16	150ctc 1000ctc ~ 16 nos	D16	150ctc 1000ctc ~ 8 nos	D16	150ctc 1000ctc ~ 9 nos	D16	150ctc 1000ctc ~ 9 nos	D16	150ctc 1000ctc ~ 9 nos	D16	150ctc 1000ctc ~ 16 nos	D16	150ctc 1000ctc ~ 16 nos		
Footing	Longi Direction Upper		D29 D25	F:250 ~ 1 layer R:125 ~ 1 layer	D25	125ctc ~ 1 layer	D25	125ctc ~ 1 layer	D29	125ctc ~ 1 layer	D29	125ctc ~ 1 layer	D25	125ctc ~ 1 layer	D29	125ctc ~ 1 layer	D29	125ctc ~ 1 layer	D29	125ctc ~ 1 layer	D29	125ctc ~ 1 layer	D32	250ctc ~ 1 layer	D29	250ctc ~ 1 layer	D29 D25	F:250 ~ 1 layer R:250 ~ 1 layer
	Longi Direction Bottom		D29 D29	F:125 ~ 1 layer R:250 ~ 1 layer	D29	125ctc ~ 2 layer	D29	125ctc ~ 2 layer	D32	125ctc ~ 2 layer	D32	125ctc ~ 2 layer	D29	125ctc ~ 2 layer	D35	125ctc ~ 2 layer	D32	125ctc ~ 2 layer	D32	125ctc ~ 2 layer	D35	125ctc ~ 2 layer	D32	125ctc ~ 1.5 layer	D32	125ctc ~ 1 layer	D29 D29	F:125 ~ 1 layer R:250 ~ 1 layer
	Longi Direction Stirrups		D16	500ctc ~ 1 nos/m	D16	500ctc ~ 1 nos/m	D16	500ctc ~ 1 nos/m	D22	500ctc ~ 2 nos/m	D16	500ctc ~ 1 nos/m	D16	500ctc ~ 1 nos/m	D16	500ctc ~ 1 nos/m	D16	500ctc ~ 1 nos/m	D16	500ctc ~ 1 nos/m	D16	500ctc ~ 1 nos/m	D16	500ctc ~ 1 nos/m	D16	500ctc ~ 1 nos/m	D16	500ctc ~ 1 nos/m
	Trans Direction Upper		D19 D22	F:250 ~ 1 layer R:250 ~ 1 layer	D22	250ctc ~ 1 layer	D22	250ctc ~ 1 layer	D25	250ctc ~ 1 layer	D29	250ctc ~ 1 layer	D22	250ctc ~ 1 layer	D29	125ctc ~ 1 layer	D29	125ctc ~ 1 layer	D29	125ctc ~ 1 layer	D29	250ctc ~ 1 layer	D22	250ctc ~ 1 layer	D19	250ctc ~ 1 layer	D19 D16	F:250 ~ 1 layer R:250 ~ 1 layer
	Trans Direction Bottom		D25 D19	F:250 ~ 1 layer R:250 ~ 1 layer	D25	250ctc ~ 2 layer	D25	250ctc ~ 2 layer	D29	250ctc ~ 2 layer	D32	250ctc ~ 2 layer	D25	250ctc ~ 2 layer	D32	125ctc ~ 2 layer	D32	125ctc ~ 2 layer	D32	125ctc ~ 2 layer	D32	250ctc ~ 2 layer	D25	250ctc ~ 2 layer	D29	250ctc ~ 1 layer	D25 D19	F:250 ~ 1 layer R:250 ~ 1 layer
	Trans Direction Stirrups		D16	500ctc ~ 1 nos/m	D16	500ctc ~ 1 nos/m	D16	500ctc ~ 1 nos/m	D22	500ctc ~ 2 nos/m	D16	500ctc ~ 1 nos/m	D16	500ctc ~ 1 nos/m	D16	500ctc ~ 1 nos/m	D16	500ctc ~ 1 nos/m	D16	500ctc ~ 1 nos/m	D16	500ctc ~ 1 nos/m	D16	500ctc ~ 1 nos/m	D16	500ctc ~ 1 nos/m	D16	500ctc ~ 1 nos/m
Pile	Axial Rebar		D29	32 nos	D32	44 nos	D32	44 nos	D32	44 nos	D35	44 nos	D29	44 nos				44 nos			D35		D32	44 nos	D35	44 nos	D35	32 nos
	Axial Rebar		D29	16 nos	D32	22 nos	D32	22 nos	D32	22 nos	D35	22 nos	D29	22 nos						22 nos	D35		D32	22 nos	D35	22 nos	D35	16 nos
	Axial Rebar		D25	16 nos	D29	22 nos	D29	22 nos	D29	22 nos	D29	22 nos	D29	22 nos							D29	22 nos	D29	22 nos	D29	22 nos	D25	16 nos
	Hoop Tie		D19	150(300)ctc	D22	150(300)ctc	D22	150(300)ctc	D22	150(300)ctc	D22	150(300)ctc	D22	150(300)ctc							D22	150(300)ctc	D22	150(300)ctc	D22	150(300)ctc	D19	150(300)ctc

Member			AO1		PO1		PO2		PO3	
Column height			5.700		4.600		6.200		7.400	
Pilecap/top slab height			1.900		1.900		1.900		1.900	
Total height			7.600		6.500		8.100		9.300	
Beam		width	6.450		5.500		5.500		5.500	
		thickness	0.500		1.500		1.500		1.500	
Column		width	6.450		5.500		5.500		5.500	
		thickness	2.000		1.500		1.500		1.500	
Pilecap /Top Slab		Longitudinal	9.000		10.400		8.000		8.000	
		Transversal	9.000		9.000		8.000		8.000	
On land / In River			Land		Land		Land		Land	
Foundation Type			CIP		CIP		CIP		CIP	
Pile diameter and length			φ1.5, 56.5		φ2.0, 57.0		φ2.0, 57.5		φ2.0, 57.0	
Pile layout and number			3x3=9		2+1+2=5		2x2=4		2x2=4	
Beam/Pier Top		Transversal Direction			D16	150ctc 1 layer	D16	150ctc 1 layer	D16	150ctc 1 layer
		Compression Rebar								
		Side Surface			D16	150ctc ~ 1 layer 2 nos	D16	150ctc ~ 1 layer 2 nos	D16	150ctc ~ 1 layer 2 nos
		Stirrups (Longi Direc.)			D25 D16	150ctc 150ctc	D25 D22	150ctc 150ctc	D25 D16	150ctc 150ctc
Column/Wall		Main Rebar	D22	250ctc	D32	125ctc ~ 1.5 layer 33+17= 50 nos	D25	125ctc ~ 1 layer 33 nos	D32	125ctc ~ 1 layer 33 nos
		Hoop Tie			D16	150ctc ~ 1 layer 2 nos	D16	150ctc ~ 1 layer 2 nos	D16	150ctc ~ 1 layer 2 nos
		Middle sttip			D16	150ctc 1000ctc ~ 5 nos	D16	150ctc 1000ctc ~ 5 nos	D16	150ctc 1000ctc ~ 5 nos
Footing	Longi. Direction	Upper	D22 D32	F:250 ~ 1 layer R:250 ~ 1 layer	D25	125ctc ~ 1 layer	D22	250ctc ~ 1 layer	D25	250ctc ~ 1 layer
		Bottom	D29 D25	F:250 ~ 1 layer R:250 ~ 1 layer	D32	125ctc ~ 1 layer	D29	250ctc ~ 2 layer	D25	125ctc ~ 1 layer
		Stirrups	D16	500ctc ~ 1 nos/m	D16	500ctc ~ 1 nos/m	D16	500ctc ~ 1 nos/m	D16	500ctc ~ 1 nos/m
	Trans Direction	Upper	D16 D19	F:250 ~ 1 layer R:250 ~ 1 layer	D22	250ctc ~ 1 layer	D19	250ctc ~ 1 layer	D19	250ctc ~ 1 layer
		Bottom	D19 D16	F:250 ~ 1 layer R:250 ~ 1 layer	D29	250ctc ~ 1 layer	D19	250ctc ~ 2 layer	D22	250ctc ~ 1 layer
		Stirrups	D16	500ctc ~ 1 nos/m	D16	500ctc ~ 1 nos/m	D16	500ctc ~ 1 nos/m	D16	500ctc ~ 1 nos/m
Pile		Axial Rebar	D29	32 nos	D32	44 nos	D29	44 nos	D29	44 nos
			D29	16 nos	D32	22 nos				
			D25	16 nos	D29	22 nos	D29	22 nos	D29	22 nos
		Hoop Tie	D19	150(300)ctc	D22	150(300)ctc	D22	150(300)ctc	D22	150(300)ctc

Rebar Arrangement of PC Concrete Bridge:

A1 Abutment

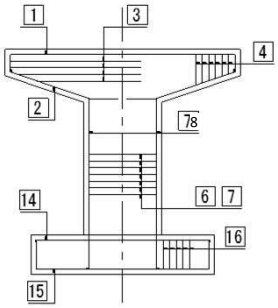


Member				Design Results				Drawing			Check
				Diameter	Interval (mm)	Area (mm^2)	Cover (mm^2)	Diameter	Interval (mm)	Cover (mm^2)	
Parapet Wall	1	Front	Axial Rebar	D32	125ctc	6353.6	150	D	ctc		
			Distribution Bar	D29	250ctc	2569.6	119.5	D	ctc		
	2	Back	Axial Rebar	D32	125ctc	6353.6	150	D	ctc		
			Distribution Bar	D29	250ctc	2569.6	119.5	D	ctc		
Wall	3	Front	Compression Rebar	D32	250ctc	3176.8	150	D	ctc		
			Distribution Bar	D19	250ctc	1146.0	124.5	D	ctc		
	4	Back	Main Rebar	D32	250ctc	3176.8	150	D	ctc		
			Distribution Bar	D19	250ctc	1146.0	124.5	D	ctc		
Footing(Front)	5	Upper	Compression Rebar	D29	250ctc	2569.6	150	D	ctc		
			Distribution Bar	D19	250ctc	1146.0	126	D	ctc		
	6	Bottom	Main Rebar	D29	125ctc	5139.2	250	D	ctc		
			Distribution Bar	D25	250ctc	2026.8	223	D	ctc		
Footing (Back)	7	Upper	Main Rebar	D25	125ctc	4053.6	150	D	ctc		
			Distribution Bar	D22	250ctc	1548.4	126.5	D	ctc		
	8	Bottom	Compression Rebar	D29	250ctc	2569.6	250	D	ctc		
			Distribution Bar	D19	250ctc	1146.0	226	D	ctc		
Share Reinforcement	9		Parapet	D16	250ctc ～1 nos/m	198.6	–	D	ctc		
	10		Wall	D19	500ctc ～1 nos/m	286.5	–	D	ctc		
	11		Footing (Back side)	D16	500ctc ～1 nos/m	198.6	–	D	ctc		
	12		Footing (Front side)	D16	500ctc ～1 nos/m	198.6	–	D	ctc		
Bridge Seat	13		Longitudinal Direction	D16	250ctc ～4 nos/m	794.4	100	D 16	250ctc ～8 nos/m	100 200	
			Transversal Direction	D16	200ctc ～5 nos/m	993.0	84	D 16	200ctc ～5 nos/m	84	
Wing Wall	–	Outside	Horizontal	D16	250ctc	794.4	132.5	D	ctc		
			Vertical	D19	250ctc	1146.0	150	D	ctc		
	–	Inside	Horizontal	D19	250ctc	1146.0	126	D	ctc		
			Vertical	D29	250ctc	2569.6	150	D	ctc		
	–	Share Reinforcement		D16	500ctc ～1 nos/m	198.6	–	D	ctc		
Pile	Axial Rebar		Upper	D29	116ctc ～ 1 layer 32nos	20556.8	160	D	ctc		
			Middle	D29	232ctc ～ 1 layer 16nos	10278.4	160	D	ctc		
			Lower	D25	232ctc ～ 1 layer 16nos	8107.2	160	D	ctc		
	Hoop tie			D19	150ctc ～ 1 layer 2nos	573.0	136	D	ctc		

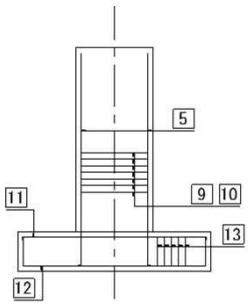
Rebar Arrangement of PC Concrete Bridge:

P1 Pier
(Wall type pier)

Front View



Side View

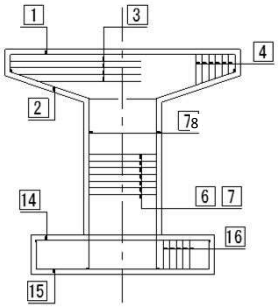


Member				Design Results					Drawing			Check
				Diameter	公称断面積	Interval (mm)	Area (mm^2)	Cover (mm^2)	Diameter	Interval (mm)	Cover (mm^2)	
Beam/Pier Top	1		Transversal Direction	D16	198.6	150ctc 1 layer	1324.0	100.0	D	ctc		
	2		Compression Rebar				-		D	ctc		
	3		Side Surface	D16	198.6	150ctc ～ 1 layer 2 nos	397.2	105.5	D	ctc		
	4		Stirrups (Longi Direc.)	D25 D25	506.7 506.7	150ctc 150ctc	6756.0	79.5 159.5	D	ctc		
Column	Straight Section	5	Main Rebar	D19	286.5	250ctc ～ 1 layer 59 nos	16903.5	150	D	ctc		
		6	Hoop Tie	D16	198.6	150ctc ～ 1 layer 2 nos	397.2	132.5	D	ctc		
		7	Middle sttip	D16	198.6	150ctc 1000ctc ～ 16 nos	3177.6	-	D	ctc		
	Circular Section	8	Main Rebar	D19	286.5	250ctc ～ 1 layer 13 nos	3724.5	150	D	ctc		
		9	Hoop Tie	D16	198.6	150ctc ～ 1 layer 2 nos	397.2	132.5	D	ctc		
		10	Middle sttip	D16	198.6	150ctc 800ctc ～ 2 nos	397.2	-	D	ctc		
Footing	Longi. Direction	11	Upper	D25	506.7	125ctc ～ 1 layer	4053.6	150	D	ctc		
		12	Bottom	D29	642.4	125ctc ～ 2 layer	10278.4	250 350	D	ctc		
		13	Stirrups	D16	198.6	500ctc ～ 1 nos/m	198.6	-	D	ctc		
	Trans. Direction	14	Upper	D22	387.1	250ctc ～ 1 layer	1548.4	126.5	D	ctc		
		15	Bottom	D25	506.7	250ctc ～ 2 layer	4053.6	223 323	D	ctc		
		16	Stirrups	D16	198.6	500ctc ～ 1 nos/m	198.6	-	D	ctc		
Pile	Axial Rebar		Upper	D32	794.2	120ctc ～ 1 layer 44 nos	34944.8	160	D	ctc		
			Middle	D32	794.2	240ctc ～ 1 layer 22 nos	17472.4	160	D	ctc		
			Lower	D29	642.4	240ctc ～ 1 layer 22 nos	14132.8	160	D	ctc		
	Hoop Tie			D22	387.1	150ctc ～ 1 layer 2 nos	774.2	133	D	ctc		

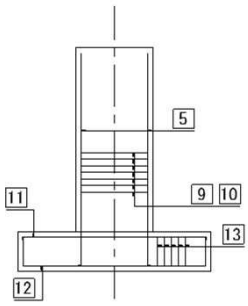
Rebar Arrangement of PC Concrete Bridge:

P2 Pier
(Wall type pier)

Front View



Side View

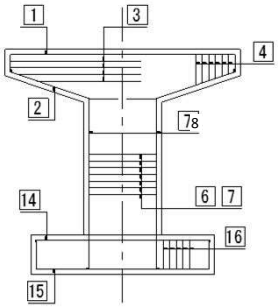


Member				Design Results					Drawing			Check
				Diameter	公称断面積	Interval (mm)	Area (mm^2)	Cover (mm^2)	Diameter	Interval (mm)	Cover (mm^2)	
Beam/Pier Top	1		Transversal Direction	D16	198.6	150ctc 1 layer	1324.0	100.0	D	ctc		
	2		Compression Rebar				-		D	ctc		
	3		Side Surface	D16	198.6	150ctc ～ 1 layer 2 nos	397.2	105.5	D	ctc		
	4		Stirrups (Longi Direc.)	D25 D22	506.7 387.1	150ctc 150ctc	5958.7	79.5 159.5	D	ctc		
Column	Straight Section	5	Main Rebar	D19	286.5	250ctc ～ 1 layer 59 nos	16903.5	150	D	ctc		
		6	Hoop Tie	D16	198.6	150ctc ～ 1 layer 2 nos	397.2	132.5	D	ctc		
		7	Middle sttip	D16	198.6	150ctc 1000ctc ～ 16 nos	3177.6	-	D	ctc		
	Circular Section	8	Main Rebar	D19	286.5	250ctc ～ 1 layer 13 nos	3724.5	150	D	ctc		
		9	Hoop Tie	D16	198.6	150ctc ～ 1 layer 2 nos	397.2	132.5	D	ctc		
		10	Middle sttip	D16	198.6	150ctc 800ctc ～ 2 nos	397.2	-	D	ctc		
Footing	Longi. Direction	11	Upper	D25	506.7	125ctc ～ 1 layer	4053.6	150	D	ctc		
		12	Bottom	D29	642.4	125ctc ～ 2 layer	10278.4	250 350	D	ctc		
		13	Stirrups	D16	198.6	500ctc ～ 1 nos/m	198.6	-	D	ctc		
	Trans. Direction	14	Upper	D22	387.1	250ctc ～ 1 layer	1548.4	126.5	D	ctc		
		15	Bottom	D25	506.7	250ctc ～ 2 layer	4053.6	223 323	D	ctc		
		16	Stirrups	D16	198.6	500ctc ～ 1 nos/m	198.6	-	D	ctc		
Pile	Axial Rebar		Upper	D32	794.2	120ctc ～ 1 layer 44 nos	34944.8	160	D	ctc		
			Middle	D32	794.2	240ctc ～ 1 layer 22 nos	17472.4	160	D	ctc		
			Lower	D29	642.4	240ctc ～ 1 layer 22 nos	14132.8	160	D	ctc		
	Hoop Tie			D22	387.1	150ctc ～ 1 layer 2 nos	774.2	133	D	ctc		

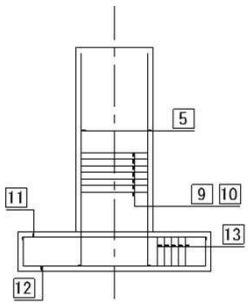
Rebar Arrangement of PC Concrete Bridge:

P3 Pier
(Wall type pier)

Front View



Side View

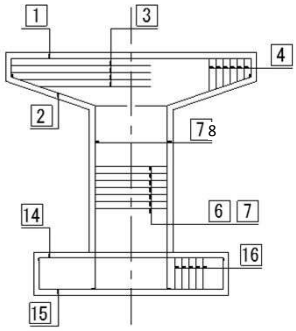


Member				Design Results					Drawing			Check
				Diameter	公称断面積	Interval (mm)	Area (mm^2)	Cover (mm^2)	Diameter	Interval (mm)	Cover (mm^2)	
Beam/Pier Top	1		Transversal Direction	D16	198.6	150ctc 1 layer	1324.0	100.0	D	ctc		
	2		Compression Rebar				-		D	ctc		
	3		Side Surface	D16	198.6	150ctc ～ 1 layer 2 nos	397.2	105.5	D	ctc		
	4		Stirrups (Longi Direc.)	D25 D22	506.7 387.1	150ctc 150ctc	5958.7	79.5 159.5	D	ctc		
Column	Straight Section	5	Main Rebar	D22	387.1	250ctc ～ 1 layer 59 nos	22838.9	150	D	ctc		
		6	Hoop Tie	D16	198.6	150ctc ～ 1 layer 2 nos	397.2	131	D	ctc		
		7	Middle sttip	D16	198.6	150ctc 1000ctc ～ 16 nos	3177.6	-	D	ctc		
	Circular Section	8	Main Rebar	D22	387.1	250ctc ～ 1 layer 13 nos	5032.3	150	D	ctc		
		9	Hoop Tie	D16	198.6	150ctc ～ 1 layer 2 nos	397.2	131	D	ctc		
		10	Middle sttip	D16	198.6	150ctc 800ctc ～ 2 nos	397.2	-	D	ctc		
Footing	Longi. Direction	11	Upper	D29	642.4	125ctc ～ 1 layer	5139.2	150	D	ctc		
		12	Bottom	D32	794.2	125ctc ～ 2 layer	12707.2	250 350	D	ctc		
		13	Stirrups	D22	387.1	500ctc ～ 2 nos/m	774.2	-	D	ctc		
	Trans. Direction	14	Upper	D25	506.7	250ctc ～ 1 layer	2026.8	123	D	ctc		
		15	Bottom	D29	642.4	250ctc ～ 2 layer	5139.2	219.5 319.5	D	ctc		
		16	Stirrups	D22	387.1	500ctc ～ 2 nos/m	774.2	-	D	ctc		
Pile	Axial Rebar		Upper	D32	794.2	120ctc ～ 1 layer 44 nos	34944.8	160	D	ctc		
			Middle	D32	794.2	240ctc ～ 1 layer 22 nos	17472.4	160	D	ctc		
			Lower	D29	642.4	240ctc ～ 1 layer 22 nos	14132.8	160	D	ctc		
	Hoop Tie			D22	387.1	150ctc ～ 1 layer 2 nos	774.2	133	D	ctc		

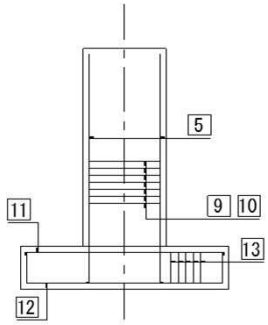
Rebar Arrangement of PC Concrete Bridge:

P4 Pier

Front View



Side View

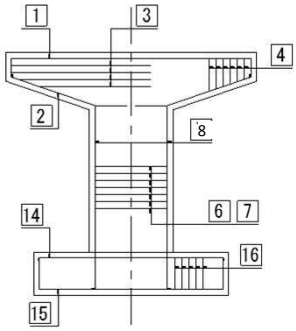


Member				Design Results				Drawing			Check
				Diameter	Interval (mm)	Area (mm^2)	Cover (mm^2)	Diameter	Interval (mm)	Cover (mm^2)	
Beam/Pier Top	1		Main Rebar	D32	140ctc 1 layer 20+20= 40 nos	31768.0	100 200	D	ctc		
	2		Compression Rebar	D29	140ctc 1 layer 20 nos	12848.0	100	D	ctc		
	3		Side Surface	D19	200ctc ～ 23 nos	6589.5	63	D	ctc		
	4		Stirrups	D25	150ctc ～ 6 nos	3040.2	71.5	D	ctc		
Column	Straight Section	5	Main Rebar	D25	250ctc ～ 1 layer 33 nos	16721.1	150	D	ctc		
		6	Hoop Tie	D16	150ctc ～ 1 layer 2 nos	397.2	129.5	D	ctc		
		7	Middle sttip	D16	150ctc 1000ctc ～ 9 nos	1787.4	-	D	ctc		
	Circular Section	8	Main Rebar	D25	250ctc ～ 1 layer 15 nos	7600.5	150	D	ctc		
		9	Hoop Tie	D16	150ctc ～ 1 layer 2 nos	397.2	129.5	D	ctc		
		10	Middle sttip	D16	150ctc 1000ctc ～ 2 nos	397.2	-	D	ctc		
Footing	Longi. Direction	11	Upper	D29	125ctc ～ 1 layer	5139.2	150	D	ctc		
		12	Bottom	D32	125ctc ～ 2 layer	12707.2	250 350	D	ctc		
		13	Stirrups	D16	500ctc ～ 1 nos/m	198.6	-	D	ctc		
	Trans. Direction	14	Upper	D29	250ctc ～ 1 layer	2569.6	121	D	ctc		
		15	Bottom	D32	250ctc ～ 2 layer	6353.6	218 318	D	ctc		
		16	Stirrups	D16	500ctc ～ 1 nos/m	198.6	-	D	ctc		
Pile	Axial Rebar		Upper	D35	120ctc ～ 1 layer 44 nos	42090.4	160	D	ctc		
			Middle	D35	240ctc ～ 1 layer 22 nos	21045.2	160	D	ctc		
			Lower	D29	240ctc ～ 1 layer 22 nos	14132.8	160	D	ctc		
	Hoop Tie			D22	150ctc ～ 1 layer 2 nos	774.2	131.5	D	ctc		

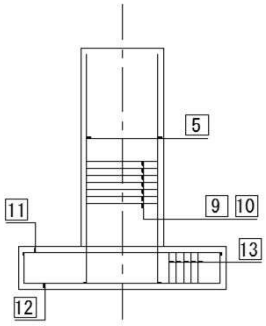
Rebar Arrangement of PC Concrete Bridge:

P5 Pier

Front View



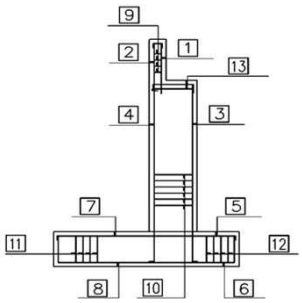
Side View



Member				Design Results				Drawing			Check
				Diameter	Interval (mm)	Area (mm^2)	Cover (mm^2)	Diameter	Interval (mm)	Cover (mm^2)	
Beam/Pier Top	1		Main Rebar	D29	140ctc 2 layer 29+29= 58 nos	37259.2	100 200	D	ctc		
	2		Compression Rebar	D25	140ctc 1 layer 29 nos	14694.3	100	D	ctc		
	3		Side Surface	D22	200ctc ～ 23 nos	8903.3	63	D	ctc		
	4		Stirrups	D25	150ctc ～ 6 nos	3040.2	73	D	ctc		
Column	Straight Section	5	Main Rebar	D25	250ctc ～ 1 layer 59 nos	29895.3	150	D	ctc		
		6	Hoop Tie	D16	150ctc ～ 1 layer 2 nos	397.2	129.5	D	ctc		
		7	Middle sttip	D16	150ctc 1000ctc ～ 16 nos	3177.6	-	D	ctc		
	Circular Section	8	Main Rebar	D25	250ctc ～ 1 layer 27 nos	13680.9	150	D	ctc		
		9	Hoop Tie	D16	150ctc ～ 1 layer 2 nos	397.2	129.5	D	ctc		
		10	Middle sttip	D16	150ctc 1000ctc ～ 4 nos	794.4	-	D	ctc		
Footing	Longi. Direction	11	Upper	D29	250ctc ～ 1 layer	2569.6	150	D	ctc		
		12	Bottom	D29	125ctc ～ 1.5 layer	7708.8	250 350	D	ctc		
		13	Stirrups	D16	500ctc ～ 1 nos/m	198.6	-	D	ctc		
	Trans. Direction	14	Upper	D29	125ctc ～ 1 layer	5139.2	121	D	ctc		
		15	Bottom	D32	125ctc ～ 2 layer	12707.2	219.5 319.5	D	ctc		
		16	Stirrups	D16	500ctc ～ 1 nos/m	198.6	-	D	ctc		
Pile	Axial Rebar		Upper	D32	120ctc ～ 1 layer 44 nos	34944.8	160	D	ctc		
			Middle	D32	240ctc ～ 1 layer 22 nos	17472.4	160	D	ctc		
			Lower	D29	240ctc ～ 1 layer 22 nos	14132.8	160	D	ctc		
	Hoop Tie			D22	150ctc ～ 1 layer 2 nos	774.2	133	D	ctc		

Rebar Arrangement of On-ramp Bridge:

AO1 Abutment

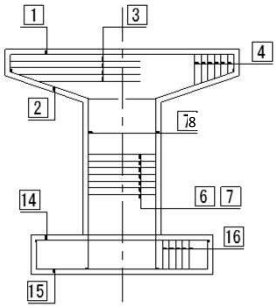


Member				Design Results				Drawing			Check
				Diameter	Interval (mm)	Area (mm^2)	Cover (mm^2)	Diameter	Interval (mm)	Cover (mm^2)	
Parapet Wall	1	Front	Axial Rebar	D22	125ctc	3096.8	150	D	ctc		
			Distribution Bar	D19	250ctc	1146.0	129.5	D	ctc		
	2	Back	Axial Rebar	D22	125ctc	3096.8	150	D	ctc		
			Distribution Bar	D19	250ctc	1146.0	129.5	D	ctc		
Wall	3	Front	Compression Rebar	D22	250ctc	1548.4	150	D	ctc		
			Distribution Bar	D16	250ctc	794.4	131	D	ctc		
	4	Back	Main Rebar	D22	250ctc	1548.4	150	D	ctc		
			Distribution Bar	D16	250ctc	794.4	131	D	ctc		
Footing(Front)	5	Upper	Compression Rebar	D22	250ctc	1548.4	150	D	ctc		
			Distribution Bar	D16	250ctc	794.4	131	D	ctc		
	6	Bottom	Main Rebar	D29	250ctc	2569.6	250	D	ctc		
			Distribution Bar	D19	250ctc	1146.0	226	D	ctc		
Footing (Back)	7	Upper	Main Rebar	D32	250ctc	3176.8	150	D	ctc		
			Distribution Bar	D19	250ctc	1146.0	124.5	D	ctc		
	8	Bottom	Compression Rebar	D25	250ctc	2026.8	250	D	ctc		
			Distribution Bar	D16	250ctc	794.4	229.5	D	ctc		
Share Reinforcement	9		Parapet	D16	250ctc ～1 nos/m	198.6	–	D	ctc		
	10		Wall	D16	500ctc ～1 nos/m	198.6	–	D	ctc		
	11		Footing (Back side)	D16	500ctc ～1 nos/m	198.6	–	D	ctc		
	12		Footing (Front side)	D16	500ctc ～1 nos/m	198.6	–	D	ctc		
Bridge Seat	13		Longitudinal Direction	D16	250ctc	794.4	100	D 16	250ctc ～8 nos/m	100 200	
			Transversal Direction	D16	200ctc	993.0	84	D 16	200ctc ～5 nos/m	84	
Wing Wall	–	Outside	Horizontal	D16	250ctc	794.4	132.5	D	ctc		
			Vertical	D19	250ctc	1146.0	150	D	ctc		
	–	Inside	Horizontal	D25	250ctc	2026.8	121.5	D	ctc		
			Vertical	D32	250ctc	3176.8	150	D	ctc		
	–	Share Reinforcement		D16	500ctc ～1 nos/m	198.6	–	D	ctc		
Pile	Axial Rebar		Upper	D29	116ctc ～ 1 layer 32nos	20556.8	160	D	ctc		
			Middle	D29	232ctc ～ 1 layer 16nos	10278.4	160	D	ctc		
			Lower	D25	232ctc ～ 1 layer 16nos	8107.2	160	D	ctc		
	Hoop tie			D19	150ctc ～ 1 layer 2nos	573.0	136	D	ctc		

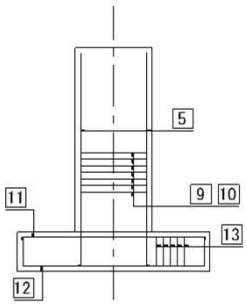
Rebar Arrangement of On-rmap Bridge:

PO1 Pier
(Wall type pier)

Front View



Side View

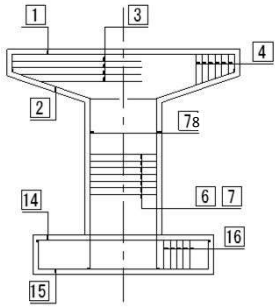


Member				Design Calculation Results					Drawing			Check
				Diameter	公称断面積	Interval (mm)	Area (mm^2)	Cover (mm^2)	Diameter	Interval (mm)	Cover (mm^2)	
Beam/Pier Top		1	Transversal Direction	D16	198.6	150ctc 1 layer	1324.0	100.0	D	ctc		
		2	Compression Rebar				-		D	ctc		
		3	Side Surface	D16	198.6	150ctc ～ 1 layer 2 nos	397.2	105.5	D	ctc		
		4	Stirrups (Longi Direc.)	D25 D16	506.7 198.6	150ctc 150ctc	4702.0	79.5 159.5	D	ctc		
Column	Straight Section	5	Main Rebar	D32	794.2	125ctc ～ 1.5 layer 33+17= 50 nos	39710.0	150 250	D	ctc		
		6	Hoop Tie	D16	198.6	150ctc ～ 1 layer 2 nos	397.2	126	D	ctc		
		7	Middle sttip	D16	198.6	150ctc 1000ctc ～ 5 nos	993.0	-	D	ctc		
	Circular Section	8	Main Rebar	D32	794.2	125ctc ～ 1.5 layer 13+6= 19 nos	15089.8	150 250	D	ctc		
		9	Hoop Tie	D16	198.6	150ctc ～ 1 layer 2 nos	397.2	126	D	ctc		
		10	Middle sttip	D16	198.6	150ctc 600ctc ～ 1 nos	198.6	-	D	ctc		
Footing	Longi. Direction	11	Upper	D25	506.7	125ctc ～ 1 layer	4053.6	150	D	ctc		
		12	Bottom	D32	794.2	125ctc ～ 1 layer	6353.6	250	D	ctc		
		13	Stirrups	D16	198.6	500ctc ～ 1 nos/m	198.6	-	D	ctc		
	Trans. Direction	14	Upper	D22	387.1	250ctc ～ 1 layer	1548.4	126.5	D	ctc		
		15	Bottom	D29	642.4	250ctc ～ 1 layer	2569.6	219.5	D	ctc		
		16	Stirrups	D16	198.6	500ctc ～ 1 nos/m	198.6	-	D	ctc		
Pile	Axial Rebar		Upper	D32	794.2	120ctc ～ 1 layer 44 nos	34944.8	160	D	ctc		
			Middle	D32	794.2	240ctc ～ 1 layer 22 nos	17472.4	160	D	ctc		
			Lower	D29	642.4	240ctc ～ 1 layer 22 nos	14132.8	160	D	ctc		
	Hoop Tie			D22	387.1	150ctc ～ 1 layer 2 nos	774.2	133	D	ctc		

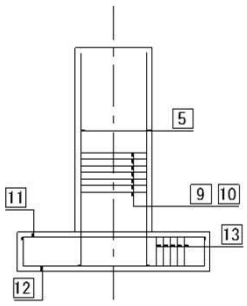
Rebar Arrangement of On-rmap Bridge:

PO2 Pier
(Wall type pier)

Front View



Side View

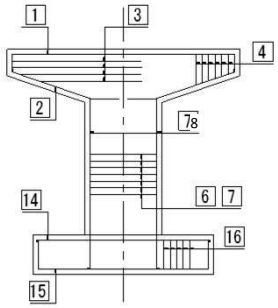


Member				Design Calculation Results					Drawing			Check
				Diameter	公称断面積	Interval (mm)	Area (mm^2)	Cover (mm^2)	Diameter	Interval (mm)	Cover (mm^2)	
Beam/Pier Top		1	Transversal Direction	D16	198.6	150ctc 1 layer	1324.0	100.0	D	ctc		
		2	Compression Rebar				-		D	ctc		
		3	Side Surface	D16	198.6	150ctc ～ 1 layer 2 nos	397.2	105.5	D	ctc		
		4	Stirrups (Longi Direc.)	D25 D16	506.7 198.6	150ctc 150ctc	4702.0	79.5 159.5	D	ctc		
Column	Straight Section	5	Main Rebar	D25	506.7	125ctc ～ 1 layer 33 nos	16721.1	150 250	D	ctc		
		6	Hoop Tie	D16	198.6	150ctc ～ 1 layer 2 nos	397.2	126	D	ctc		
		7	Middle sttip	D16	198.6	150ctc 1000ctc ～ 5 nos	993.0	-	D	ctc		
	Circular Section	8	Main Rebar	D25	506.7	125ctc ～ 1 layer 13 nos	6587.1	150 250	D	ctc		
		9	Hoop Tie	D16	198.6	150ctc ～ 1 layer 2 nos	397.2	126	D	ctc		
		10	Middle sttip	D16	198.6	150ctc 600ctc ～ 1 nos	198.6	-	D	ctc		
Footing	Longi. Direction	11	Upper	D22	387.1	250ctc ～ 1 layer	1548.4	150	D	ctc		
		12	Bottom	D29	642.4	250ctc ～ 2 layer	5139.2	250	D	ctc		
		13	Stirrups	D16	198.6	500ctc ～ 1 nos/m	198.6	-	D	ctc		
	Trans. Direction	14	Upper	D19	286.5	250ctc ～ 1 layer	1146.0	129.5	D	ctc		
		15	Bottom	D19	286.5	250ctc ～ 2 layer	2292.0	226	D	ctc		
		16	Stirrups	D16	198.6	500ctc ～ 1 nos/m	198.6	-	D	ctc		
Pile	Axial Rebar		Upper	D29	642.4	120ctc ～ 1 layer 44 nos	28265.6	160	D	ctc		
			Middle			～			D	ctc		
			Lower	D29	642.4	240ctc ～ 1 layer 22 nos	14132.8	160	D	ctc		
	Hoop Tie			D22	387.1	150ctc ～ 1 layer 2 nos	774.2	134.5	D	ctc		

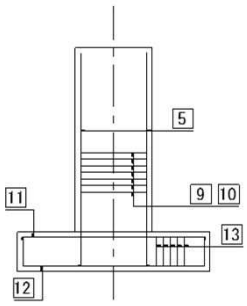
Rebar Arrangement of On-rmap Bridge:

PO3 Pier
(Wall type pier)

Front View



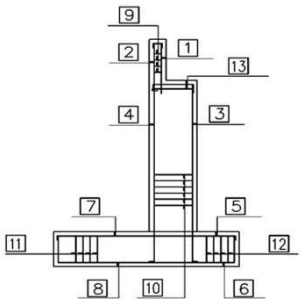
Side View



Member				Design Calculation Results					Drawing			Check
				Diameter	公称断面積	Interval (mm)	Area (mm^2)	Cover (mm^2)	Diameter	Interval (mm)	Cover (mm^2)	
Beam/Pier Top		1	Transversal Direction	D16	198.6	150ctc 1 layer	1324.0	100.0	D	ctc		
		2	Compression Rebar				-		D	ctc		
		3	Side Surface	D16	198.6	150ctc ～ 1 layer 2 nos	397.2	105.5	D	ctc		
		4	Stirrups (Longi Direc.)	D25 D16	506.7 198.6	150ctc 150ctc	4702.0	79.5 159.5	D	ctc		
Column	Straight Section	5	Main Rebar	D32	794.2	125ctc ～ 1 layer 33 nos	26208.6	150	D	ctc		
		6	Hoop Tie	D16	198.6	150ctc ～ 1 layer 2 nos	397.2	126	D	ctc		
		7	Middle sttip	D16	198.6	150ctc 1000ctc ～ 5 nos	993.0	-	D	ctc		
	Circular Section	8	Main Rebar	D32	794.2	125ctc ～ 1 layer 13 nos	10324.6	150	D	ctc		
		9	Hoop Tie	D16	198.6	150ctc ～ 1 layer 2 nos	397.2	126	D	ctc		
		10	Middle sttip	D16	198.6	150ctc 600ctc ～ 1 nos	198.6	-	D	ctc		
Footing	Longi. Direction	11	Upper	D25	506.7	250ctc ～ 1 layer	2026.8	150	D	ctc		
		12	Bottom	D25	506.7	125ctc ～ 1 layer	4053.6	250	D	ctc		
		13	Stirrups	D16	198.6	500ctc ～ 1 nos/m	198.6	-	D	ctc		
	Trans. Direction	14	Upper	D19	286.5	250ctc ～ 1 layer	1146.0	128	D	ctc		
		15	Bottom	D22	387.1	250ctc ～ 1 layer	1548.4	226.5	D	ctc		
		16	Stirrups	D16	198.6	500ctc ～ 1 nos/m	198.6	-	D	ctc		
Pile	Axial Rebar		Upper	D29	642.4	120ctc ～ 1 layer 44 nos	28265.6	160	D	ctc		
			Middle						D	ctc		
			Lower	D29	642.4	240ctc ～ 1 layer 22 nos	14132.8	160	D	ctc		
	Hoop Tie			D22	387.1	150ctc ～ 1 layer 2 nos	774.2	134.5	D	ctc		

Rebar Arrangement of PC Concrete Bridge:

A2 Abutment

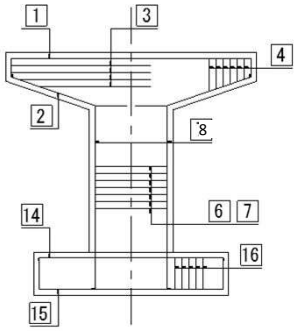


Member				Design Results				Drawing			Check
				Diameter	Interval (mm)	Area (mm^2)	Cover (mm^2)	Diameter	Interval (mm)	Cover (mm^2)	
Parapet Wall	1	Front	Axial Rebar	D32	125ctc	6353.6	150	D	ctc		
			Distribution Bar	D29	250ctc	2569.6	119.5	D	ctc		
	2	Back	Axial Rebar	D32	125ctc	6353.6	150	D	ctc		
			Distribution Bar	D29	250ctc	2569.6	119.5	D	ctc		
Wall	3	Front	Compression Rebar	D32	250ctc	3176.8	150	D	ctc		
			Distribution Bar	D19	250ctc	1146.0	124.5	D	ctc		
	4	Back	Main Rebar	D32	250ctc	3176.8	150	D	ctc		
			Distribution Bar	D19	250ctc	1146.0	124.5	D	ctc		
Footing(Front)	5	Upper	Compression Rebar	D29	250ctc	2569.6	150	D	ctc		
			Distribution Bar	D19	250ctc	1146.0	126	D	ctc		
	6	Bottom	Main Rebar	D29	125ctc	5139.2	250	D	ctc		
			Distribution Bar	D25	250ctc	2026.8	223	D	ctc		
Footing (Back)	7	Upper	Main Rebar	D25	250ctc	2026.8	150	D	ctc		
			Distribution Bar	D16	250ctc	794.4	129.5	D	ctc		
	8	Bottom	Compression Rebar	D29	250ctc	2569.6	250	D	ctc		
			Distribution Bar	D19	250ctc	1146.0	226	D	ctc		
Share Reinforcement	9		Parapet	D16	250ctc ～1 nos/m	198.6	–	D	ctc		
	10		Wall	D19	500ctc ～1 nos/m	286.5	–	D	ctc		
	11		Footing (Back side)	D16	500ctc ～1 nos/m	198.6	–	D	ctc		
	12		Footing (Front side)	D16	500ctc ～1 nos/m	198.6	–	D	ctc		
Bridge Seat	13		Longitudinal Direction	D16	250ctc	0.0	100	D 16	250ctc ～8 nos/m	100 200	
			Transversal Direction	D16	200ctc	0.0	84	D 16	200ctc ～5 nos/m	84	
Wing Wall	–	Outside	Horizontal	D16	250ctc	794.4	132.5	D	ctc		
			Vertical	D19	250ctc	1146.0	150	D	ctc		
	–	Inside	Horizontal	D22	250ctc	1548.4	124.5	D	ctc		
			Vertical	D29	250ctc	2569.6	150	D	ctc		
	–	Share Reinforcement		D16	500ctc ～1 nos/m	198.6	–	D	ctc		
Pile	Axial Rebar		Upper	D35	116ctc ～ 1 layer 32nos	30611.2	160	D	ctc		
			Middle	D35	232ctc ～ 1 layer 16nos	15305.6	160	D	ctc		
			Lower	D25	232ctc ～ 1 layer 16nos	8107.2	160	D	ctc		
	Hoop tie			D19	150ctc ～ 1 layer 2nos	573.0	133	D	ctc		

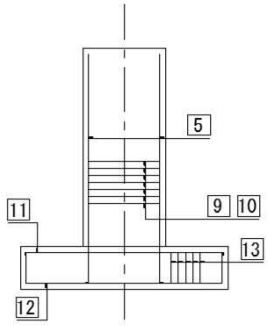
Rebar Arrangement of PC Concrete Bridge:

P20 Pier

Front View



Side View

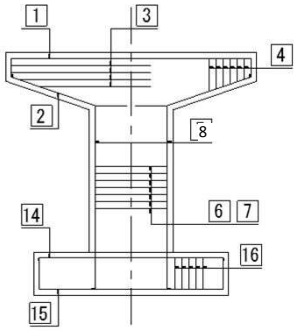


Member				Design Results				Drawing			Check
				Diameter	Interval (mm)	Area (mm^2)	Cover (mm^2)	Diameter	Interval (mm)	Cover (mm^2)	
Beam/Pier Top	1		Main Rebar	D29	140ctc 2 layer 29+29= 58 nos	37259.2	100 200	D	ctc		
	2		Compression Rebar	D25	140ctc 1 layer 29 nos	14694.3	100	D	ctc		
	3		Side Surface	D22	200ctc ～ 23 nos	8903.3	63	D	ctc		
	4		Stirrups	D25	150ctc ～ 6 nos	3040.2	73	D	ctc		
Column	Straight Section	5	Main Rebar	D29	125ctc ～ 2 layer 53+53= 106 nos	68094.4	150 250	D	ctc		
		6	Hoop Tie	D16	150ctc ～ 1 layer 2 nos	397.2	127.5	D	ctc		
		7	Middle sttip	D16	150ctc 1000ctc ～ 8 nos	1588.8	-	D	ctc		
	Circular Section	8	Main Rebar	D32	125ctc ～ 2 layer 52+52= 104 nos	82596.8	150 250	D	ctc		
		9	Hoop Tie	D16	150ctc ～ 1 layer 2 nos	397.2	127.5	D	ctc		
		10	Middle sttip	D16	150ctc 1000ctc ～ 4 nos	794.4	-	D	ctc		
Footing	Longi. Direction	11	Upper	D29	125ctc ～ 1 layer	5139.2	150	D	ctc		
		12	Bottom	D35	125ctc ～ 2 layer	15305.6	250 350	D	ctc		
		13	Stirrups	D16	500ctc ～ 1 nos/m	198.6	-	D	ctc		
	Trans. Direction	14	Upper	D29	125ctc ～ 1 layer	5139.2	121	D	ctc		
		15	Bottom	D32	125ctc ～ 2 layer	12707.2	216.5 316.5	D	ctc		
		16	Stirrups	D16	500ctc ～ 1 nos/m	198.6	-	D	ctc		
Pile	Axial Rebar		Upper					D	ctc		
			Middle					D	ctc		
			Lower					D	ctc		
	Hoop Tie							D	ctc		

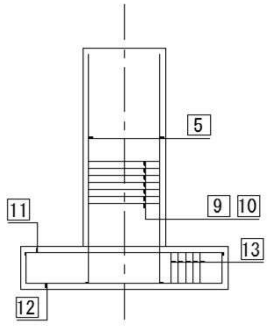
Rebar Arrangement of PC Concrete Bridge:

P21 Pier

Front View



Side View

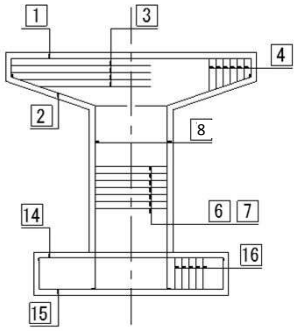


Member				Design Results				Drawing			Check
				Diameter	Interval (mm)	Area (mm^2)	Cover (mm^2)	Diameter	Interval (mm)	Cover (mm^2)	
Beam/Pier Top	1		Main Rebar	D32	140ctc 2 layer 20+20= 40 nos	31768.0	100 200	D	ctc		
	2		Compression Rebar	D29	140ctc 1 layer 20 nos	12848.0	100	D	ctc		
	3		Side Surface	D19	200ctc ～ 23 nos	6589.5	63	D	ctc		
	4		Stirrups	D25	150ctc ～ 6 nos	3040.2	71.5	D	ctc		
Column	Straight Section	5	Main Rebar	D38	125ctc ～ 2 layer 65+65= 130 nos	148200.0	150 250	D	ctc		
		6	Hoop Tie	D16	150ctc ～ 1 layer 2 nos	397.2	123 223	D	ctc		
		7	Middle sttip	D16	150ctc 1000ctc ～ 9 nos	1787.4	-	D	ctc		
	Circular Section	8	Main Rebar	D38	125ctc ～ 2 layer 33+33= 66 nos	75240.0	150 250	D	ctc		
		9	Hoop Tie	D16	150ctc ～ 1 layer 2 nos	397.2	123 223	D	ctc		
		10	Middle sttip	D16	150ctc 1000ctc ～ 2 nos	397.2	-	D	ctc		
Footing	Longi. Direction	11	Upper	D29	125ctc ～ 1 layer	5139.2	150	D	ctc		
		12	Bottom	D32	125ctc ～ 2 layer	12707.2	250 350	D	ctc		
		13	Stirrups	D16	500ctc ～ 1 nos/m	198.6	-	D	ctc		
	Trans. Direction	14	Upper	D29	125ctc ～ 1 layer	5139.2	121	D	ctc		
		15	Bottom	D32	125ctc ～ 2 layer	12707.2	218 318	D	ctc		
		16	Stirrups	D16	500ctc ～ 1 nos/m	198.6	-	D	ctc		
Pile	Axial Rebar		Upper					D	ctc		
			Middle					D	ctc		
			Lower					D	ctc		
	Hoop Tie							D	ctc		

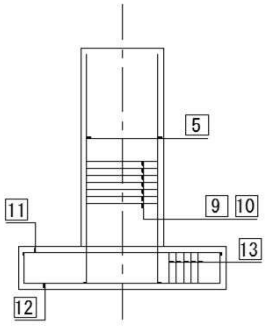
Rebar Arrangement of PC Concrete Bridge:

P22 Pier

Front View



Side View

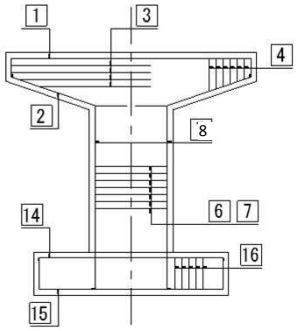


Member				Design Results				Drawing			Check
				Diameter	Interval (mm)	Area (mm^2)	Cover (mm^2)	Diameter	Interval (mm)	Cover (mm^2)	
Beam/Pier Top	1		Main Rebar	D32	140ctc 2 layer 20+20= 40 nos	31768.0	100 200	D	ctc		
	2		Compression Rebar	D29	140ctc 1 layer 20 nos	12848.0	100	D	ctc		
	3		Side Surface	D19	200ctc ～ 23 nos	6589.5	63	D	ctc		
	4		Stirrups	D25	150ctc ～ 6 nos	3040.2	71.5	D	ctc		
Column	Straight Section	5	Main Rebar	D38	125ctc ～ 2 layer 65+65= 130 nos	148200.0	150 250	D	ctc		
		6	Hoop Tie	D16	150ctc ～ 1 layer 2 nos	397.2	123 223	D	ctc		
		7	Middle sttip	D16	150ctc 1000ctc ～ 9 nos	1787.4	–	D	ctc		
	Circular Section	8	Main Rebar	D38	125ctc ～ 2 layer 33+33= 66 nos	75240.0	150 250	D	ctc		
		9	Hoop Tie	D16	150ctc ～ 1 layer 2 nos	397.2	123 223	D	ctc		
		10	Middle sttip	D16	150ctc 1000ctc ～ 2 nos	397.2	–	D	ctc		
Footing	Longi. Direction	11	Upper	D29	125ctc ～ 1 layer	5139.2	150	D	ctc		
		12	Bottom	D32	125ctc ～ 2 layer	12707.2	250 350	D	ctc		
		13	Stirrups	D16	500ctc ～ 1 nos/m	198.6	–	D	ctc		
	Trans. Direction	14	Upper	D29	125ctc ～ 1 layer	5139.2	121	D	ctc		
		15	Bottom	D32	125ctc ～ 2 layer	12707.2	218 318	D	ctc		
		16	Stirrups	D16	500ctc ～ 1 nos/m	198.6	–	D	ctc		
Pile	Axial Rebar		Upper					D	ctc		
			Middle					D	ctc		
			Lower					D	ctc		
	Hoop Tie							D	ctc		

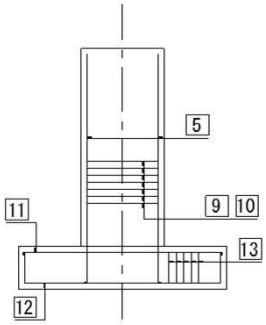
Rebar Arrangement of PC Concrete Bridge:

P23 Pier

Front View



Side View

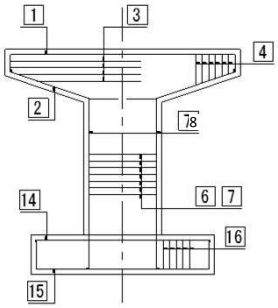


Member				Design Results				Drawing			Check
				Diameter	Interval (mm)	Area (mm^2)	Cover (mm^2)	Diameter	Interval (mm)	Cover (mm^2)	
Beam/Pier Top	1		Main Rebar	D32	140ctc 2 layer 20+20= 40 nos	31768.0	100 200	D	ctc		
	2		Compression Rebar	D29	140ctc 1 layer 20 nos	12848.0	100	D	ctc		
	3		Side Surface	D19	200ctc ～ 23 nos	6589.5	63	D	ctc		
	4		Stirrups	D25	150ctc ～ 6 nos	3040.2	71.5	D	ctc		
Column	Straight Section	5	Main Rebar	D29	125ctc ～ 2 layer 65+65= 130 nos	83512.0	150 250	D	ctc		
		6	Hoop Tie	D16	150ctc ～ 1 layer 2 nos	397.2	127.5 227.5	D	ctc		
		7	Middle sttip	D16	150ctc 1000ctc ～ 9 nos	1787.4	-	D	ctc		
	Circular Section	8	Main Rebar	D29	125ctc ～ 2 layer 33+33= 66 nos	42398.4	150 250	D	ctc		
		9	Hoop Tie	D16	150ctc ～ 1 layer 2 nos	397.2	127.5 227.5	D	ctc		
		10	Middle sttip	D16	150ctc 1000ctc ～ 2 nos	397.2	-	D	ctc		
Footing	Longi. Direction	11	Upper	D29	125ctc ～ 1 layer	5139.2	150	D	ctc		
		12	Bottom	D35	125ctc ～ 2 layer	15305.6	250 350	D	ctc		
		13	Stirrups	D16	500ctc ～ 1 nos/m	198.6	-	D	ctc		
	Trans. Direction	14	Upper	D29	250ctc ～ 1 layer	2569.6	121	D	ctc		
		15	Bottom	D32	250ctc ～ 2 layer	6353.6	216.5 316.5	D	ctc		
		16	Stirrups	D16	500ctc ～ 1 nos/m	198.6	-	D	ctc		
Pile	Axial Rebar		Upper	D35	120ctc ～ 1 layer 44 nos	42090.4	160	D	ctc		
			Middle	D35	240ctc ～ 1 layer 22 nos	21045.2	160	D	ctc		
			Lower	D29	240ctc ～ 1 layer 22 nos	14132.8	160	D	ctc		
	Hoop Tie			D22	150ctc ～ 1 layer 2 nos	774.2	131.5	D	ctc		

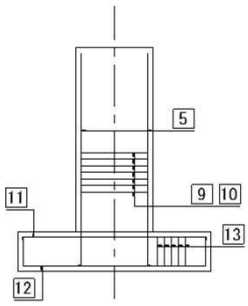
Rebar Arrangement of PC Concrete Bridge:

P24 Pier
(Wall type pier)

Front View



Side View

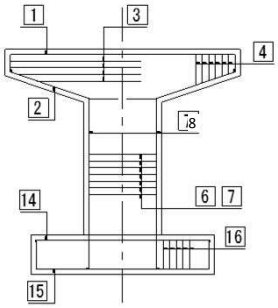


Member				Design Results					Drawing			Check
				Diameter	公称断面積	Interval (mm)	Area (mm^2)	Cover (mm^2)	Diameter	Interval (mm)	Cover (mm^2)	
Beam/Pier Top		1	Transversal Direction	D16	198.6	150ctc 1 layer	1324.0	100.0	D	ctc		
		2	Compression Rebar				-		D	ctc		
		3	Side Surface	D16	198.6	150ctc ～ 1 layer 2 nos	397.2	105.5	D	ctc		
		4	Stirrups (Longi Direc.)	D25 D22	506.7 387.1	150ctc 150ctc	5958.7	79.5 159.5	D	ctc		
Column	Straight Section	5	Main Rebar	D19	286.5	250ctc ～ 1 layer 59 nos	16903.5	150	D	ctc		
		6	Hoop Tie	D16	198.6	150ctc ～ 1 layer 2 nos	397.2	132.5	D	ctc		
		7	Middle sttip	D16	198.6	150ctc 1000ctc ～ 16 nos	3177.6	-	D	ctc		
	Circular Section	8	Main Rebar	D19	286.5	250ctc ～ 1 layer 13 nos	3724.5	150	D	ctc		
		9	Hoop Tie	D16	198.6	150ctc ～ 1 layer 2 nos	397.2	132.5	D	ctc		
		10	Middle sttip	D16	198.6	150ctc 800ctc ～ 2 nos	397.2	-	D	ctc		
Footing	Longi. Direction	11	Upper	D32	794.2	250ctc ～ 1 layer	3176.8	150	D	ctc		
		12	Bottom	D32	794.2	125ctc ～ 1.5 layer	9530.4	250 350	D	ctc		
		13	Stirrups	D16	198.6	500ctc ～ 1 nos/m	198.6	-	D	ctc		
	Trans. Direction	14	Upper	D22	387.1	250ctc ～ 1 layer	1548.4	123	D	ctc		
		15	Bottom	D25	506.7	250ctc ～ 2 layer	4053.6	221.5 321.5	D	ctc		
		16	Stirrups	D16	198.6	500ctc ～ 1 nos/m	198.6	-	D	ctc		
Pile	Axial Rebar		Upper	D32	794.2	120ctc ～ 1 layer 44 nos	34944.8	160	D	ctc		
			Middle	D32	794.2	240ctc ～ 1 layer 22 nos	17472.4	160	D	ctc		
			Lower	D29	642.4	240ctc ～ 1 layer 22 nos	14132.8	160	D	ctc		
	Hoop Tie			D22	387.1	150ctc ～ 1 layer 2 nos	774.2	133	D	ctc		

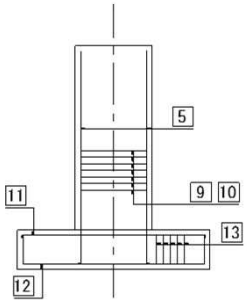
Rebar Arrangement of PC Concrete Bridge:

P25 Pier
(Wall type pier)

Front View



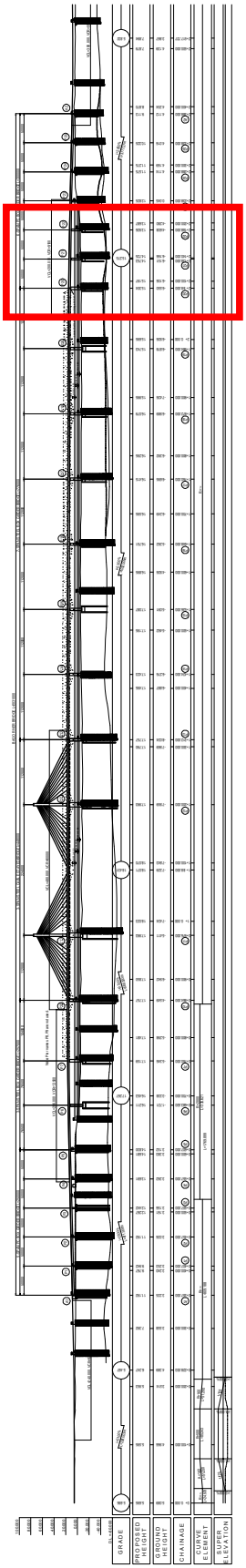
Side View



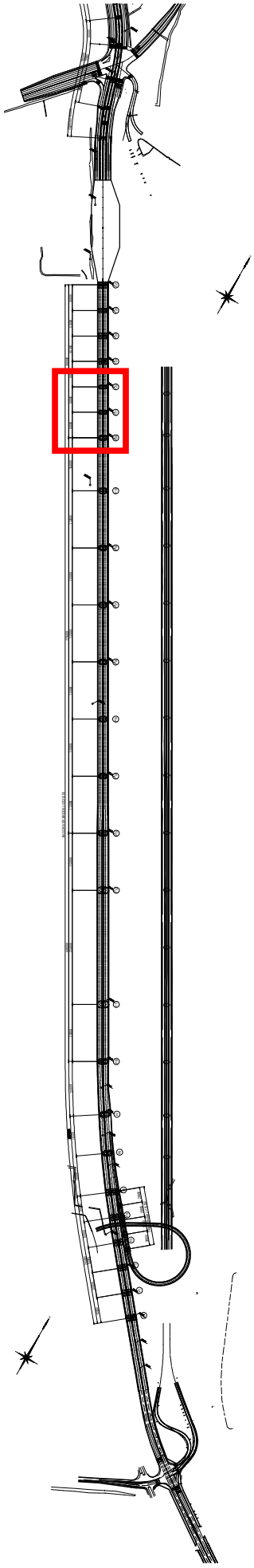
Member				Design Results					Drawing			Check
				Diameter	公称断面積	Interval (mm)	Area (mm^2)	Cover (mm^2)	Diameter	Interval (mm)	Cover (mm^2)	
Beam/Pier Top	1		Transversal Direction	D16	198.6	150ctc 1 layer	1324.0	100.0	D	ctc		
	2		Compression Rebar				-		D	ctc		
	3		Side Surface	D16	198.6	150ctc ～ 1 layer 2 nos	397.2	105.5	D	ctc		
	4		Stirrups (Longi Direc.)	D25 D25	506.7 506.7	150ctc 150ctc	6756.0	79.5 159.5	D	ctc		
Column	Straight Section	5	Main Rebar	D19	286.5	250ctc ～ 1 layer 59 nos	16903.5	150	D	ctc		
		6	Hoop Tie	D16	198.6	150ctc ～ 1 layer 2 nos	397.2	132.5	D	ctc		
		7	Middle sttip	D16	198.6	150ctc 1000ctc ～ 16 nos	3177.6	-	D	ctc		
	Circular Section	8	Main Rebar	D19	286.5	250ctc ～ 1 layer 13 nos	3724.5	150	D	ctc		
		9	Hoop Tie	D16	198.6	150ctc ～ 1 layer 2 nos	397.2	132.5	D	ctc		
		10	Middle sttip	D16	198.6	150ctc 800ctc ～ 2 nos	397.2	-	D	ctc		
Footing	Longi. Direction	11	Upper	D29	642.4	250ctc ～ 1 layer	2569.6	150	D	ctc		
		12	Bottom	D32	794.2	125ctc ～ 1 layer	6353.6	250	D	ctc		
		13	Stirrups	D16	198.6	500ctc ～ 1 nos/m	198.6	-	D	ctc		
	Trans. Direction	14	Upper	D19	286.5	250ctc ～ 1 layer	1146.0	126	D	ctc		
		15	Bottom	D29	642.4	250ctc ～ 1 layer	2569.6	219.5	D	ctc		
		16	Stirrups	D16	198.6	500ctc ～ 1 nos/m	198.6	-	D	ctc		
Pile	Axial Rebar		Upper	D35	956.6	120ctc ～ 1 layer 44 nos	42090.4	160	D	ctc		
			Middle	D35	956.6	240ctc ～ 1 layer 22 nos	21045.2	160	D	ctc		
			Lower	D29	642.4	240ctc ～ 1 layer 22 nos	14132.8	160	D	ctc		
	Hoop Tie			D22	387.1	150ctc ～ 1 layer 2 nos	774.2	131.5	D	ctc		

CHAPTER 4. DESIGN OF SPSP FOUNDATION

4-1. Location Map



P20~P22



Version 2017/05/15
Note:
All the survey data are updated
Shapes of the structures are modified by Detailed Design results.
Road plan including toll plaza and intersection is not finalized.
Spanning of P3-P10 is reconsidered as Option-2b.

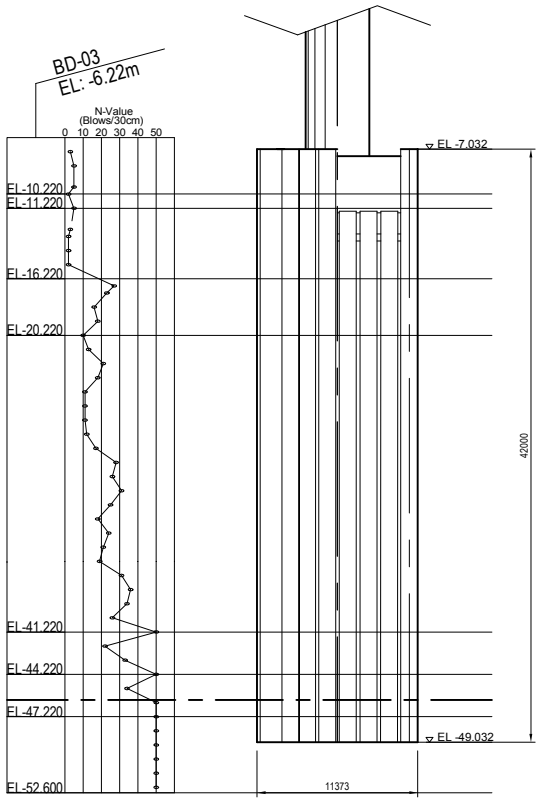
Elevation represents above MSL unless otherwise indicated.

4-2. Design Soil Condition

P20

Soil Parameters

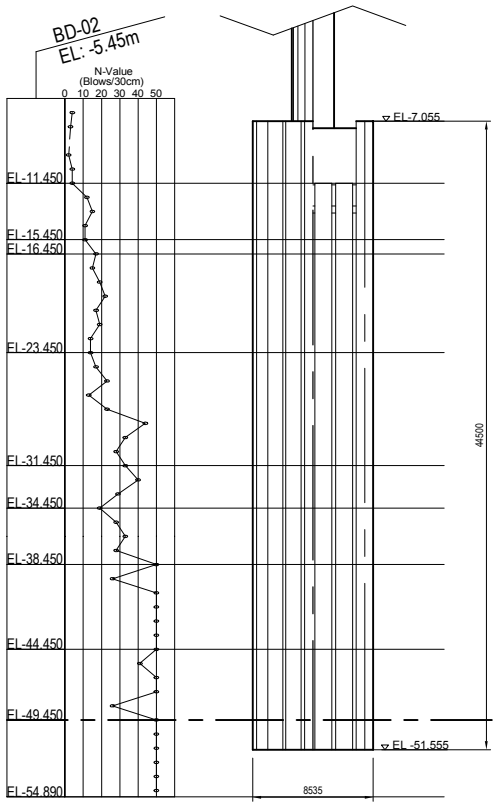
N	γt	Φ	Cu	E0	Layer Thickness	Soil Name
times	kN/m3	deg.	kN/m2	kN/m2	m	
3	17.0	29	0	1200	4.0	S S (RS)
1	17.5	0	10	900	1.0	C-I
13	17.0	33	0	5200	5.0	S S-I
13	17.0	33	0	5200	4.0	S S-I
20	17.0	33.0	0	14000	21.0	C S-C
30	17.0	34	0	21000	3.0	S S-II
35	19.0	34	0	24500	3.0	C S-I
50	19.0	35	0	35000	5.38	C S-II



P21

Soil Parameters

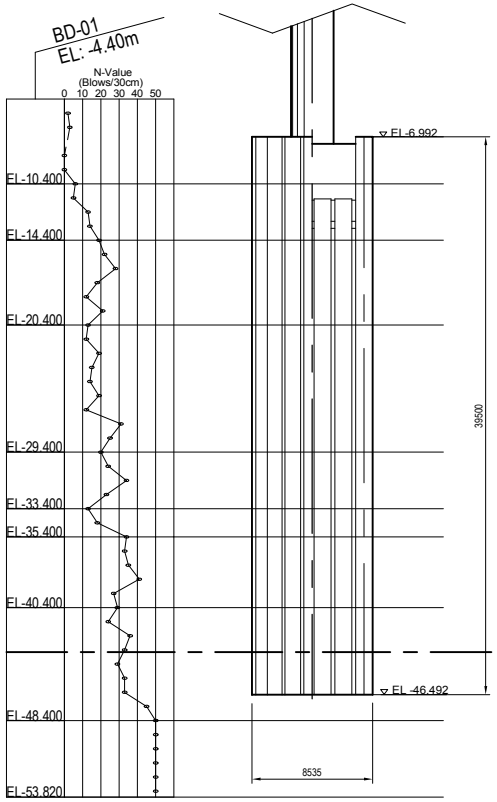
N	γt	Φ	Cu	E0	Layer Thickness	Soil Name
times	kN/m3	deg.	kN/m2	kN/m2	m	
1	17.5	0	0	900	6.0	C-I
13	17.0	33	0	5200	5.0	S S-I
13	17.0	33	0	5200	1.0	S S-I
30	17.0	34.0	0	21000	7.0	S S-II
20	17.0	33	0	14000	8.0	C S-C
30	17.0	34	0	21000	3.0	S S-II
20	17.0	33	0	14000	4.0	C S-C
30	17.0	34	0	21000	6.0	S S-II
35	19.0	34	0	24500	5.0	C S-I
50	19.0	35	0	35000	5.44	C S-II



P22

Soil Parameters

N	γt	Φ	Cu	E0	Layer Thickness	Soil Name
times	kN/m3	deg.	kN/m2	kN/m2	m	
1	17.5	0	0	900	6.0	C-I
13	17.0	33	0	5200	4.0	S S-I
30	17.0	34.0	0	21000	6.0	S S-II
20	17.0	33	0	14000	9.0	C S-C
30	17.0	34.0	0	21000	4.0	S S-II
20	17.0	33	0	14000	2.0	C S-C
30	17.0	34.0	0	21000	5.0	S S-II
35	19.0	34	0	24500	8.0	C S-I
50	19.0	35	0	35000	5.42	C S-II



1. Design Results of steel pipe sheet pile Foundation

A summary of calculation results for steel pipe sheet pile foundation is shown as following tables. And the stress diagrams of exterior sheet piles is shown as following figures.

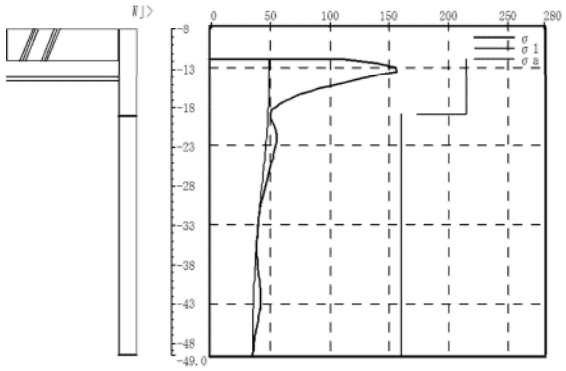
Longitudinal direction

Table for Design Results of SPSP for Longitudinal Direction

Item			Unit	P20		P21		P22	
				Ordinary	Seismic	Ordinary	Seismic	Ordinary	Seismic
Forces*2		Vo	kN	58,871.1	51,485.3	52,152.5	45,736.5	53,296.9	47,057.5
		Ho	kN	1,710.0	13,531.0	2,380.0	13,400.6	1,260.0	12,319.8
		Mo	kN.m	38,174.0	188,271.1	44,744.0	197,122.1	22,554.0	175,437.3
Displacement*2									
At Top of Top Slab	Displacement	δ1	cm	0.281	1.971	0.453	2.076	0.185	1.413
	Allowable	δa	cm	5.000	5.000	5.000	5.000	5.000	5.000
Pile Bearing*2 (P20:L=47.5m, P21:L=56.5m, P22:L=51.5m)									
Vertical Reaction	Max	Rmax	kN/pile	1,646	1,538	1,639	1,478	1,670	1,516
	Min	Rmin	kN/pile	1,625	1,322	1,621	1,381	1,661	1,425
	Bearing	Ra	kN/pile	3,760	5,440	4,231	6,286	4,483	6,664
	Pull-out	Pa	kN/pile	-1,672	-2,778	-1,940	-3,375	-1,602	-2,757
Pile Stresses									
Exterior P20,21:SKY490 P22:SKY400	Thickness	t	mm	14		14		14	
	After Construction	σ_1*2	N/mm^2	44.85	106.40	48.29	127.76	37.71	104.43
	During construction	σ_2	N/mm^2	107.16	107.16	95.35	95.35	83.11	83.11
	Combined	σ_{max}	N/mm^2	152.01	213.56	143.64	223.11	120.82	187.54
	Allowable	σa	N/mm^2	185.00	280.00	185.00	280.00	140.00	210.00
Bulkhead*2 (SKY400) t=14mm	After Construction	σ_1	N/mm^2	43.40	112.73	48.50	132.77	—	—
	Allowable	σa	N/mm^2	140.00	210.00	140.00	210.00	—	—

*1:Designed by Well Model according

*2:due to after construction loads



Longitudinal Direction – Ordinary Condition

Figure:Stress Diagram of Steel Pipe Sheet Pile for P22

Transversal direction

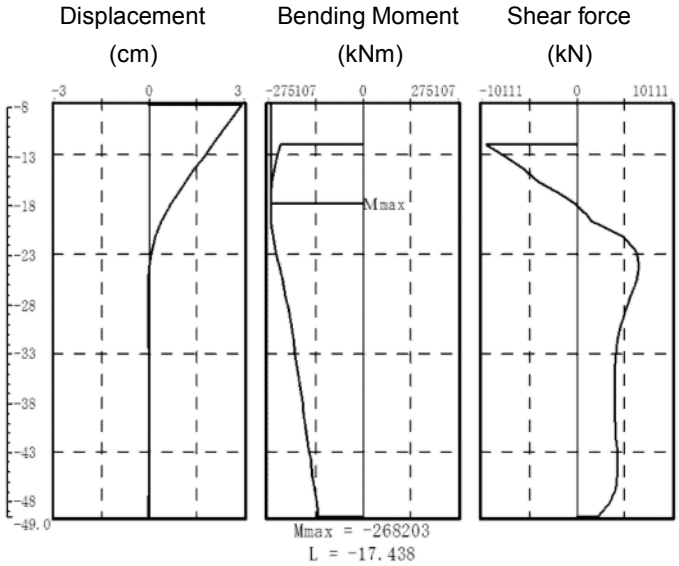
Table for Design Results of SPSP for Transversal direction

Item			Unit	P20		P21		P22	
				Ordinary	Seismic	Ordinary	Seismic	Ordinary	Seismic
Forces*2		Vo	kN	58,871.1	51,485.3	52,152.5	45,736.5	53,296.9	46,880.9
		Ho	kN	2.7	12,290.8	1.6	12,430.5	1.0	11,196.3
		Mo	kN.m	9.6	183,347.3	6.0	209,890.0	4.3	178,441.8
Displacement*2									
At Top of Top Slab	Displacement	δ1	cm	0.000	1.521	0.000	1.308	0.000	0.903
	Allowable	δa	cm	5.000	5.000	5.000	5.000	5.000	5.000
Pile Bearing*2 (P20:L=47.5m, P21:L=56.5m, P22:L=51.5m)									
Vertical Reaction	Max	Rmax	kN/pile	1,635	1,486	1,630	1,557	1,666	1,528
	Min	Rmin	kN/pile	1,635	1,374	1,630	1,301	1,666	1,402
	Bearing	Ra	kN/pile	3,760	5,440	4,231	6,286	4,483	6,664
	Pull-out	Pa	kN/pile	-1,672	-2,778	-1,940	-3,375	-1,602	-2,757
Pile Stresses									
Exterior (SKY490) (P22:SKY400)	Thickness	t	mm	14		16		14	
	After Construction	σ_1*2	N/mm²	36.64	99.65	36.52	115.76	32.62	91.13
	During construction	σ_2	N/mm²	102.80	102.80	80.18	79.95	70.37	70.37
	Combined	σ_{max}	N/mm²	139.45	202.46	116.70	195.70	102.98	161.50
	Allowable	σa	N/mm²	185.00	280.00	185.00	280.00	140.00	210.00
Bulkhead*2 (SKY400) t=14mm	After Construction	σ_1	N/mm²	36.65	109.72	36.52	122.44	—	—
	Allowable	σa	N/mm²	140.00	210.00	140.00	210.00	—	—

*1:Designed by Well Model according

*2:due to after construction loads

*:Designed by Well Model according



Transversal Direction – Seismic Condition

Figure:calculation results of Steel Pipe Sheet Pile for P22

3) Design of top slab

A summary of calculation results for Top Slab is shown as following tables.

Longitudinal direction

b = 100.0 (cm), h = 400.0 (cm)

The lower tensile(P20:As = 153.056 (cm^2), P21~22:As = 127.072 (cm^2))

1layer reinforcement cover, P20~21:250 (mm), P22:150(mm) P20:D35 @ 125, P21~22: D32 @ 125

2layer reinforcement cover, P20~21:350 (mm), P22:250(mm) P20:D35 @ 125, P21~22: D32 @ 125

The upper tensile(As = 51.392 (cm^2))

1layer reinforcement cover, 150 (mm) D29 @ 125

Table for Design Results of Top Slab for Longitudinal direction

				P20		P21		P22	
			Unit	Ordinary	Seismic	Ordinary	Seismic	Ordinary	Seismic
Lower tensile	Bending moment	MA	kN.m	3807.0	7869.0	3494.0	7243.0	2719.0	6729.0
	Necessary reinforcement	Asr	cm^2	72.627	80.397	56.271	72.589	50.456	67.240
	Neutral axis	x	cm	108.5	108.5	100.8	100.8	100.8	100.8
	Stresses	σc	N/mm^2	2.13	4.41	2.07	4.30	1.61	4.00
		σs	N/mm^2	78.49	162.25	84.62	175.40	65.84	162.95
	Resultant tensile force	T	kN	1691.9	3497.5	1552.9	3219.0	1208.4	2990.6
	Reinforcement requirements	As	cm^2	105.742	116.582	83.943	107.301	75.524	99.685
Upper tensile	Bending moment	MA'	kN.m	2644.0	-2340.0	1242.0	-3165.0	2075.0	-2578.0
	Necessary reinforcement	Asr	cm^2	0.000	21.104	0.000	28.733	0.000	23.303
	Neutral axis	x	cm	9.3	69.7	9.3	69.7	9.3	69.7
	Stresses	σc	N/mm^2	0.00	1.85	0.00	2.51	0.00	2.04
		σs	N/mm^2	0.00	125.86	0.00	170.27	0.00	138.70
	Resultant tensile force	T	kN	0.0	1039.8	0.0	1406.7	0.0	1145.9
	Reinforcement requirements	As	cm^2	0.000	34.662	0.000	46.891	0.000	38.197
Allowable stresses		σca	N/mm^2	8.00	12.00	9.20	12.00	8.00	12.00
		σsa	N/mm^2	160.00	300.00	185.00	300.00	160.00	300.00
Average shearing force		QB	kN	1230.0	2533.0	1525.0	3165.0	1208.0	2975.0
		τm	N/mm^2	0.34	0.69	0.41	0.86	0.33	0.81
		τa1'	N/mm^2	1.01	1.53	1.16	1.56	1.03	1.56
Average shearing force		S	kN	1214.0	2517.0	1525.0	3165.0	1208.0	2975.0
		τm	N/mm^2	0.33	0.69	0.41	0.86	0.33	0.81
		τa1'	N/mm^2	1.01	1.53	1.16	1.56	1.03	1.56
Shearing force carried by concrete		Sca	kN	3675.0	5592.0	4261.0	5736.0	3769.0	5736.0
Diagonal tension reinforcement	Shearing force	Sh'	kN	0.0	0.0	0.0	0.0	0.0	0.0
	Longitudinal spacing	s	cm	100.0	100.0	100.0	100.0	100.0	100.0
	Reduction coefficient	Cds	—	0.245	0.245	0.171	0.171	0.171	0.171
	Allowable tensile stresses	σsa	N/mm^2	160.00	200.00	160.00	200.00	160.00	200.00
	Used reinforcement	Aw	cm^2	1.986	1.986	1.986	1.986	1.986	1.986
	Necessary reinforcement	Awreq	cm^2	0.000	0.000	0.000	0.000	0.000	0.000

Transversal direction

b = 100.0 (cm) , h = 400.0 (cm)

The lower tensile(As = 127.072 (cm^2))

1layer reinforcement cover, 218 (mm) D32 @ 125

2layer reinforcement cover, 318 (mm) D32 @ 125

The upper tensile(As = 51.392 (cm^2))

1layer reinforcement cover, 121 (mm) D29 @ 125

Table for Design Results of Top Slab for Transversal direction

				P20		P21		P22	
			Unit	Ordinary+ W	Seismic	Ordinary	Seismic	Ordinary	Seismic
Lower tensile	Bending moment	MA	kN.m	2879.0	6672.0	2765.0	7418.0	2825.0	6763.0
	Necessary reinforcement	Asr	cm^2	53.017	66.002	50.862	73.694	51.986	66.953
	Neutral axis	x	cm	101.3	101.3	101.3	101.3	101.3	101.3
	Stresses	σc	N/mm^2	1.68	3.90	1.62	4.34	1.65	3.96
		σs	N/mm^2	69.07	160.06	66.35	178.00	67.78	162.28
	Resultant tensile force	T	kN	1279.7	2965.4	1229.1	3297.0	1255.4	3005.9
	Reinforcement requirements	As	cm^2	79.983	98.847	76.817	109.902	78.463	100.196
Upper tensile	Bending moment	MA’	kN.m	2879.0	-1745.0	2765.0	-2676.0	2824.0	-1916.0
	Necessary reinforcement	Asr	cm^2	0.000	15.535	0.000	24.014	0.000	17.084
	Neutral axis	x	cm	8.0	70.0	8.0	70.0	8.0	70.0
	Stresses	σc	N/mm^2	0.00	1.37	0.00	2.10	0.00	1.50
		σs	N/mm^2	0.00	93.16	0.00	142.83	0.00	102.28
	Resultant tensile force	T	kN	0.0	775.6	0.0	1189.2	0.0	851.6
	Reinforcement requirements	As	cm^2	0.000	25.854	0.000	39.640	0.000	28.387
Allowable stresses		σca	N/mm^2	8.00	12.00	8.00	12.00	8.00	12.00
		σsa	N/mm^2	160.00	300.00	160.00	300.00	160.00	300.00
Average shearing force		QB	kN	1045.0	2338.0	1046.0	2701.0	1079.0	2480.0
		τm	N/mm^2	0.28	0.63	0.28	0.73	0.29	0.67
		τa1’	N/mm^2	0.92	1.40	0.95	1.44	0.95	1.44
Average shearing force		S	kN	1022.0	2316.0	1031.0	2686.0	1061.0	2462.0
		τm	N/mm^2	0.28	0.62	0.28	0.72	0.29	0.66
		τa1’	N/mm^2	0.92	1.40	0.95	1.44	0.95	1.44
Shearing force carried by concrete		Sca	kN	3417.0	5199.0	3508.0	5339.0	3508.0	5339.0
Diagonal tension reinforcement	Shearing force	Sh’	kN	0.0	0.0	0.0	0.0	0.0	0.0
	Longitudinal spacing	s	cm	100.0	100.0	100.0	100.0	100.0	100.0
	Reduction coefficient	Cds	—	0.252	0.252	0.239	0.239	0.239	0.239
	Allowable tensile stresses	σsa	N/mm^2	160.00	200.00	160.00	200.00	160.00	200.00
	Used reinforcement	Aw	cm^2	1.986	1.986	1.986	1.986	1.986	1.986
	Necessary reinforcement	Awreq	cm^2	0.000	0.000	0.000	0.000	0.000	0.000

4) Design of connection between Top Slab and Steel Pipe Sheet Pile

A summary of calculation results for connection between Top Slab and Steel Pipe Sheet Pile is shown as following tables.

Design condition

- Type of stad bars : SD345（underwater）
- Design strength of concrete : σck = 24 (N/mm^2)
- Material of sheet pile : SKY490 (P20,P21), SKY400(P22)
- Diameter of sheet pile : D = 1200.0 (mm)
- Section modulus of sheet pile : Z = 13081.0(P20,P21), 15184.5(P22) (cm^3)
- Connection method : reinforcement stud welding

Table 8.3.56-5 Design Results of connection between Top Slab and Steel Pipe Sheet Pile

	Load case	σs1 (N/mm^2)	σs2 (N/mm^2)	σs (N/mm^2)	σsa (N/mm^2)	nb nba (nos/layer)	τs (N/mm^2)	τsa (N/mm^2)	ns nsa (nos)
P20	Ordinary	153.93	4.60	158.53	185.00	16 ≧ 14	66.15	111.00	76 ≧ 46
P20	Seismic	200.46	38.51	238.97	300.00	16 ≧ 13	124.64	180.00	76 ≧ 53
P21	Ordinary	153.93	6.86	160.79	185.00	16 ≧ 14	75.05	111.00	76 ≧ 52
P21	Seismic	200.46	38.67	239.13	300.00	16 ≧13	155.78	180.00	76 ≧66
P22	Ordinary	116.35	2.02	118.37	160.00	16 ≧ 12	59.42	96.00	76 ≧ 48
P22	Seismic	174.52	35.52	210.04	300.00	16 ≧ 12	146.40	180.00	76 ≧ 62

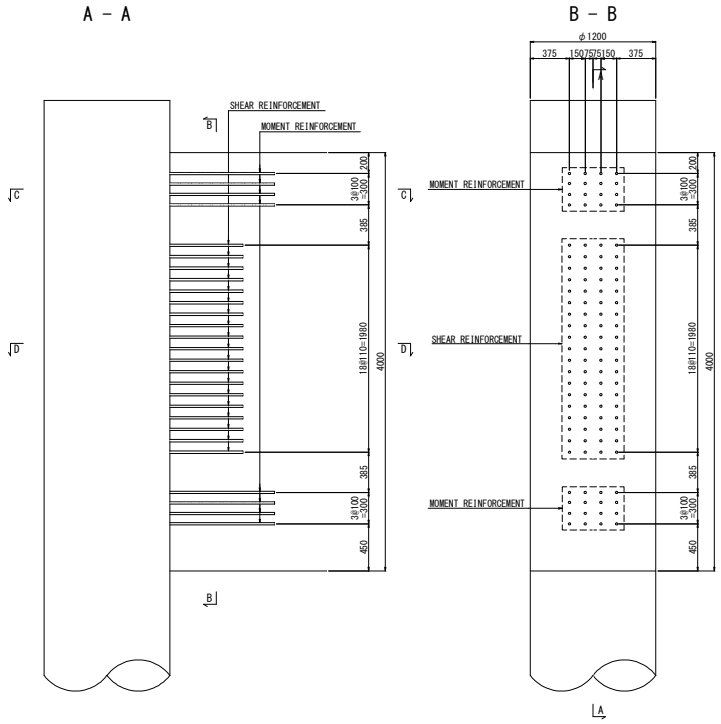
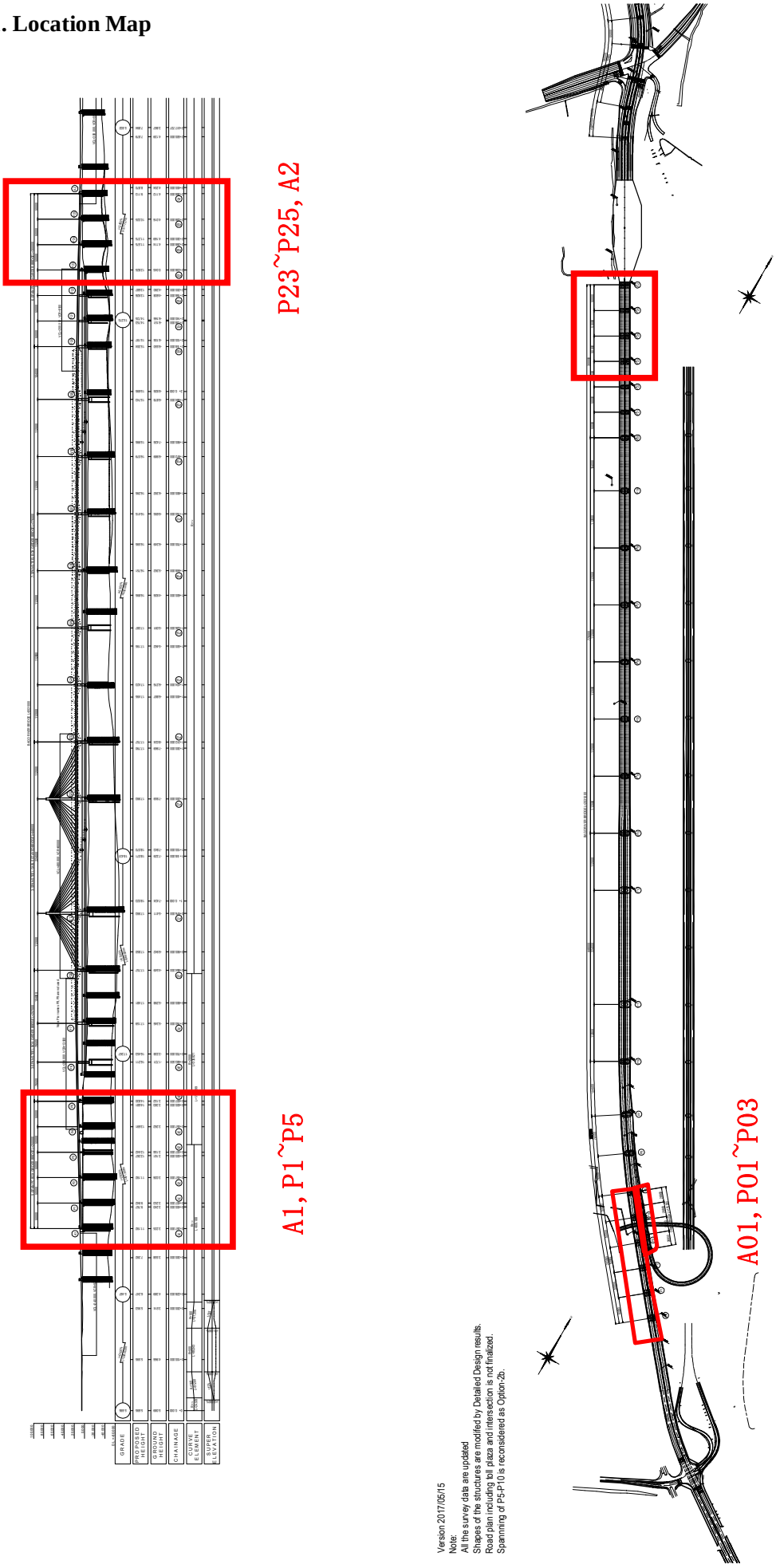


Figure : Detail for Connection between Top Slab and Steel Pipe Sheet Pile

CHAPTER 5. DESIGN OF CIP PILE FOUNDATION

5-1. Location Map

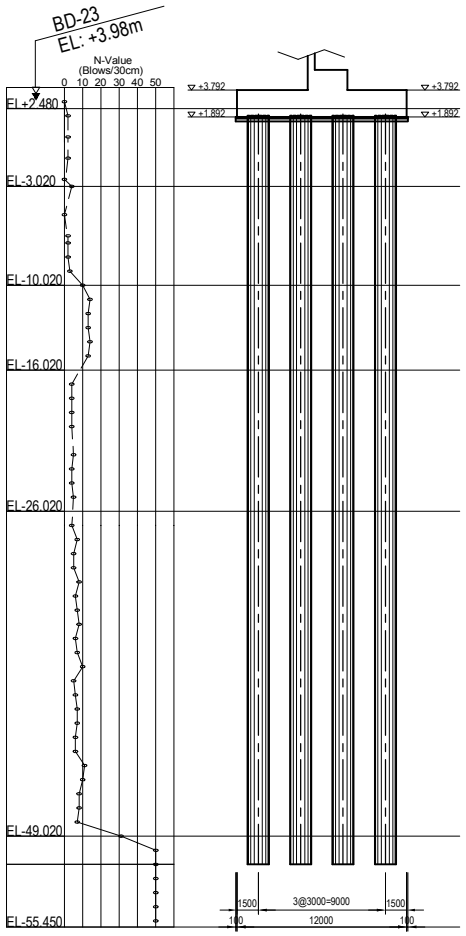


5-2. Design Soil Condition

A1

Soil Parameters

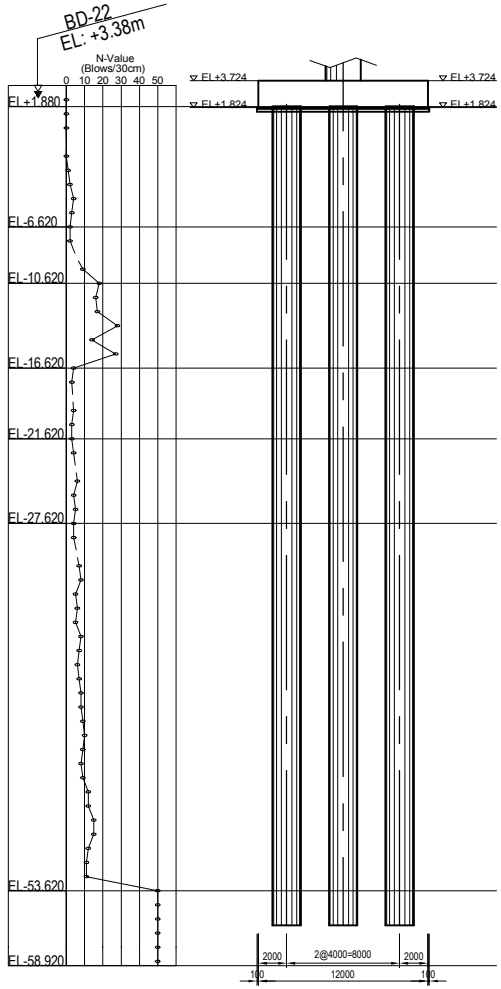
N	γt	Φ	Cu	E0	Layer Thickness	Soil Name
times	kN/m3	deg.	kN/m2	kN/m2	m	
1	18	0	6	700	1.5	F S
1	17.5	0	15	900	5.5	C-I
3	17.5	0	15	2000	7.0	S C-I
15	16.5	33.0	0	6000	6.0	S S-I
5	17.5	0	30	3200	10.0	C-AII
7	17.6	0	42	4900	23.0	C-AIII
50	19.0	35.0	0	35000	6.43	C S-II



P1

Soil Parameters

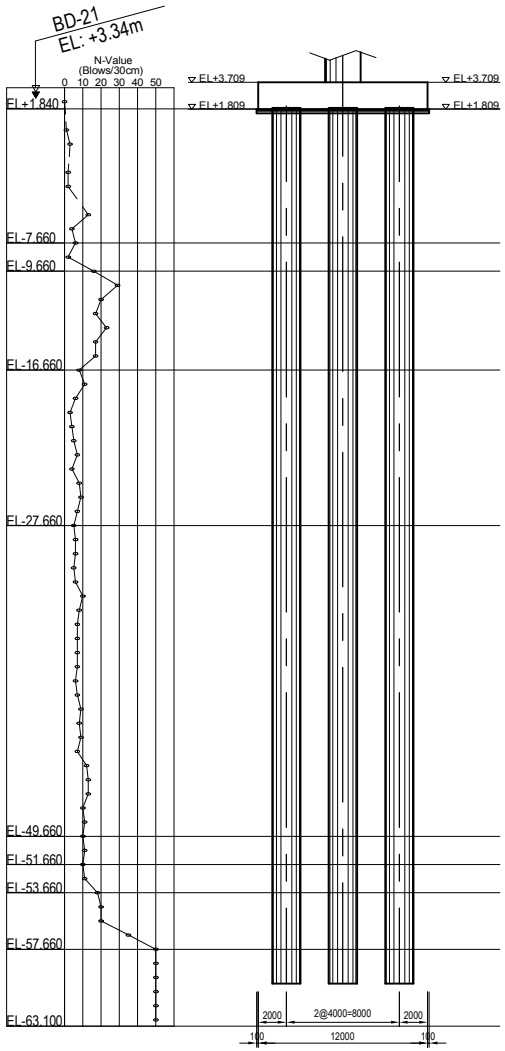
N	γt	Φ	Cu	E0	Layer Thickness	Soil Name
times	kN/m3	deg.	kN/m2	kN/m2	m	
1	18	0	6	700	1.5	F S
1	17.5	0	15	900	8.5	C-I
3	17.5	0	15	2000	4.0	S C-I
15	16.5	33.0	0	6000	6.0	S S-I
5	17.5	0	30	3200	5.0	C-AII
5	17.5	0	30	3200	6.0	C-AII
7	17.6	0	42	4900	26.0	C-AIII
50	19.0	35.0	0	35000	5.30	C S-II



P2

Soil Parameters

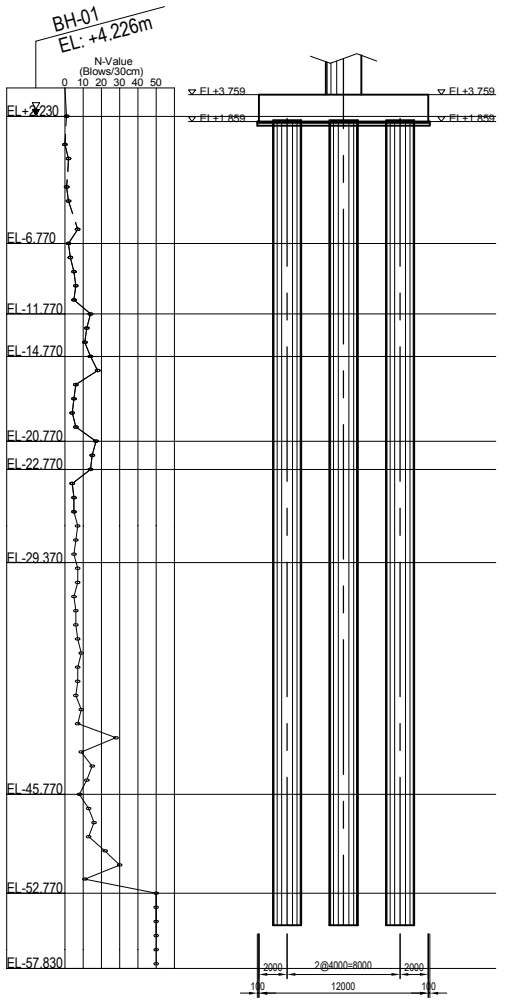
N	γt	Φ	Cu	E0	Layer Thickness	Soil Name
times	kN/m3	deg.	kN/m2	kN/m2	m	
1	18	0	6	700	1.5	F S
1	17.5	0	15	900	9.5	C-I
3	17.5	0	15	2000	2.0	S C-I
15	16.5	33.0	0	6000	7.0	S S-I
5	17.5	0	30	3200	11.0	C-AII
7	17.6	0	42	4900	22.0	C-AIII
23	17.0	31	0	16100	2.0	CS-I
23	17.0	31	0	16100	2.0	CS-I
23	17.0	31	0	16100	4.0	CS-I
50	19.0	35.0	0	35000	5.44	C S-II



P3

Soil Parameters

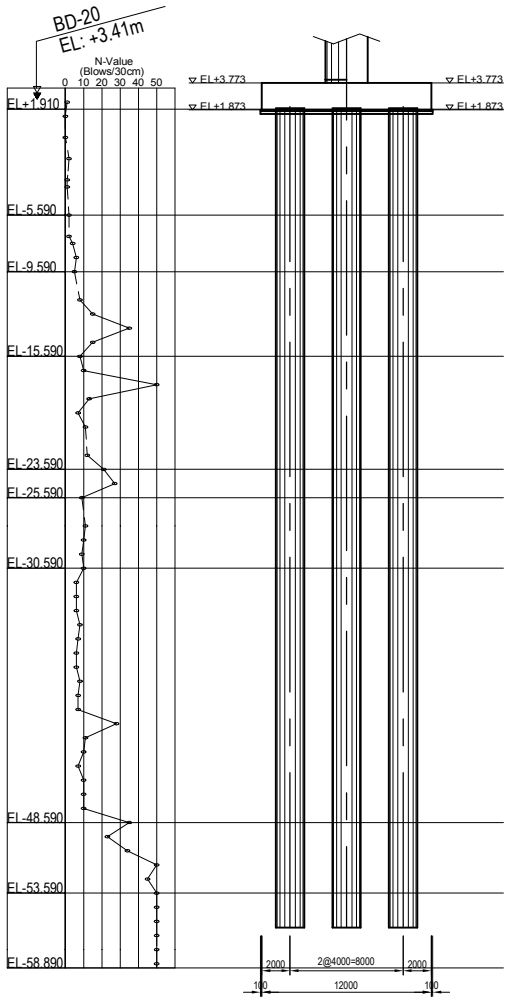
N	γt	Φ	Cu	E0	Layer Thickness	Soil Name
times	kN/m3	deg.	kN/m2	kN/m2	m	
1	18	0	6	700	2.0	F S
1	17.5	0	15	900	9.0	C-I
3	17.5	0	15	2000	5.0	S C-I
15	16.5	33.0	0	6000	3.0	S S-I
5	17.5	0	30	3200	6.0	C-AII
17	17.0	33	0	11900	2.0	CS-B
5	17.5	0	30	3200	6.6	C-AII
7	17.6	0	42	4900	16.4	C-AIII
23	17.0	31	0	16100	7.0	CS-I
50	19.0	35.0	0	35000	6.43	C S-II



P4

Soil Parameters

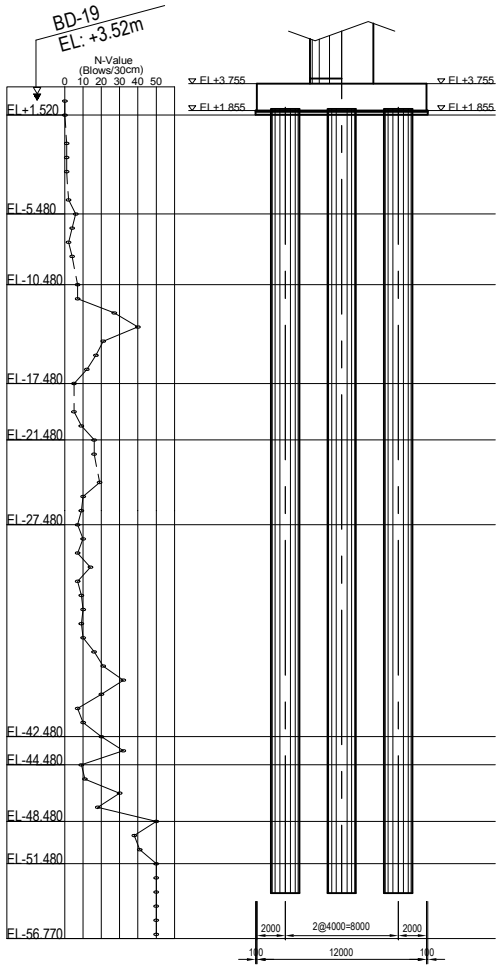
N	γt	Φ	Cu	E0	Layer Thickness	Soil Name
times	kN/m3	deg.	kN/m2	kN/m2	m	
1	18	0	6	700	1.5	F S
1	17.5	0	15	900	7.5	C-I
3	17.5	0	15	2000	4.0	S C-I
15	16.5	33.0	0	6000	6.0	S S-I
5	17.5	0	30	3200	8.0	C-AII
17	17.0	33	0	11900	2.0	C S-B
5	17.5	0	30	3200	5.0	C-AII
7	17.6	0	42	4900	18.0	C-AIII
23	17.0	31	0	16100	5.0	C S-I
50	19.0	35.0	0	35000	5.30	C S-II



P5

Soil Parameters

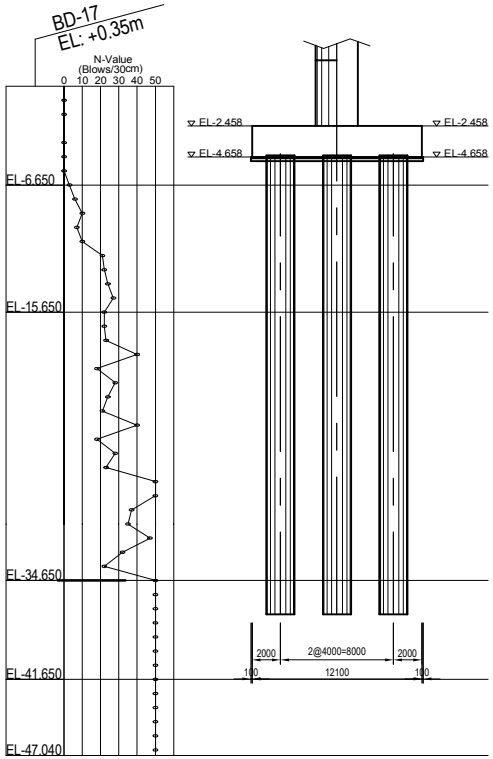
N	γt	Φ	Cu	E0	Layer Thickness	Soil Name
times	kN/m3	deg.	kN/m2	kN/m2	m	
1	18	0	6	700	2.0	F S
1	17.5	0	15	900	7.0	C-I
3	17.5	0	15	2000	5.0	S C-I
15	16.5	33.0	0	6000	7.0	S S-I
5	17.5	0	30	3200	4.0	C-AII
5	17.5	0	30	3200	6.0	C-AII
7	17.6	0	42	4900	15.0	C-AIII
20	17.0	32	0	14000	2.0	CS-C
7	17.6	0	42	4900	4.0	C-AIII
23	17.0	31	0	16100	3.0	CS-I
50	19.0	35.0	0	35000	5.29	C S-II



P23

Soil Parameters

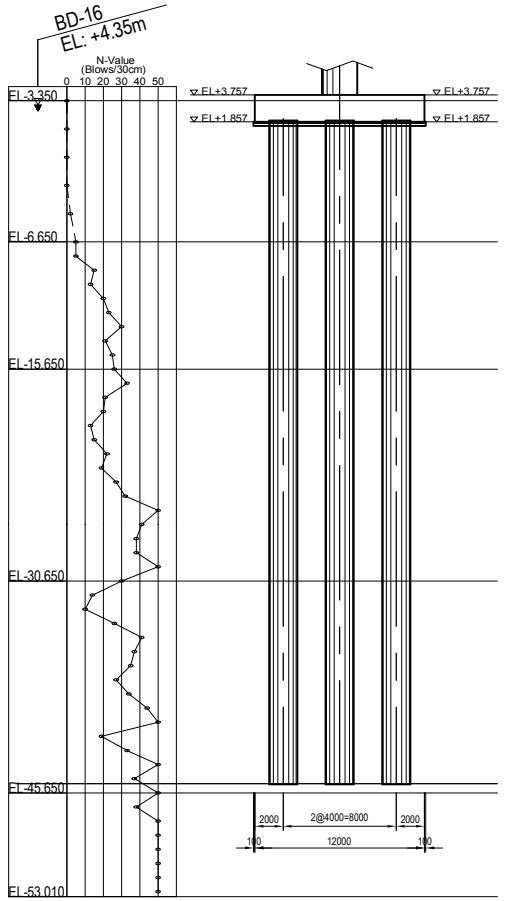
N	γt	Φ	Cu	E0	Layer Thickness	Soil Name
times	kN/m3	deg.	kN/m2	kN/m2	m	
1	17.5	0	10	900	7.0	C-I
13	17.0	33	0	5200	9.0	S S-I
30	17.0	34.0	0	21000	19.0	S S-II
35	19.0	34	0	24500	7.0	C S-I
50	19.0	35	0	35000	5.39	C S-II



P24

Soil Parameters

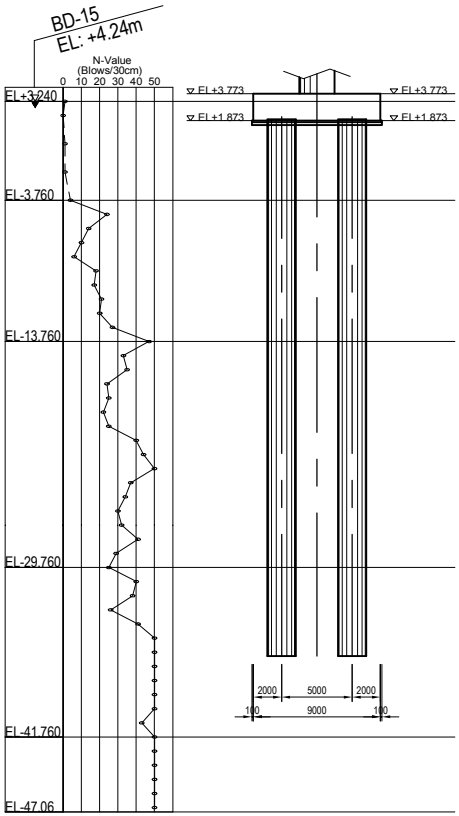
N	γt	Φ	Cu	E0	Layer Thickness	Soil Name
times	kN/m3	deg.	kN/m2	kN/m2	m	
3	19	0	18	2100	1.0	F S
1	17.5	0	15	900	10.0	C-I
13	17.0	32.0	0	6500	9.0	S S-I
25	17.0	34	0	17500	15.0	S S-II
35	19.0	34	0	24500	15.0	C S-I
50	19.0	35.0	0	35000	7.36	C S-II



P25

Soil Parameters

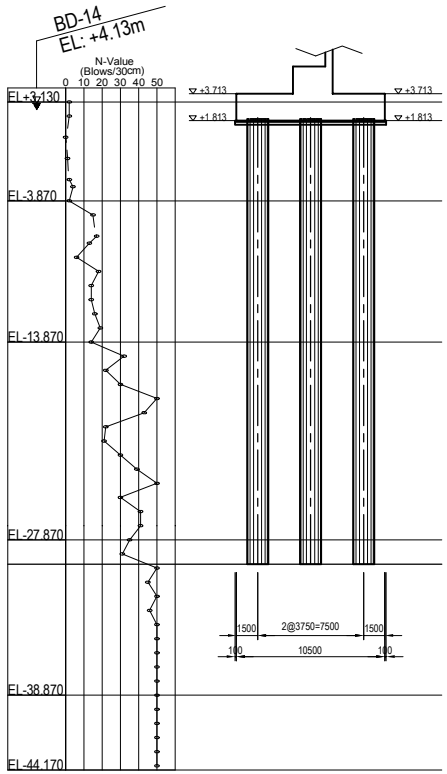
N	γt	Φ	Cu	E0	Layer Thickness	Soil Name
times	kN/m3	deg.	kN/m2	kN/m2	m	
3	19	0	18	2100	1.0	F S
1	17.5	0	15	900	7.0	C-I
13	17.0	32	0	6500	10.0	S S-I
25	17.0	34	0	17500	16.0	S SII
35	19.0	34	0	24500	12.0	C S-I
50	19.0	35.0	0	35000	5.30	C S-II



A2

Soil Parameters

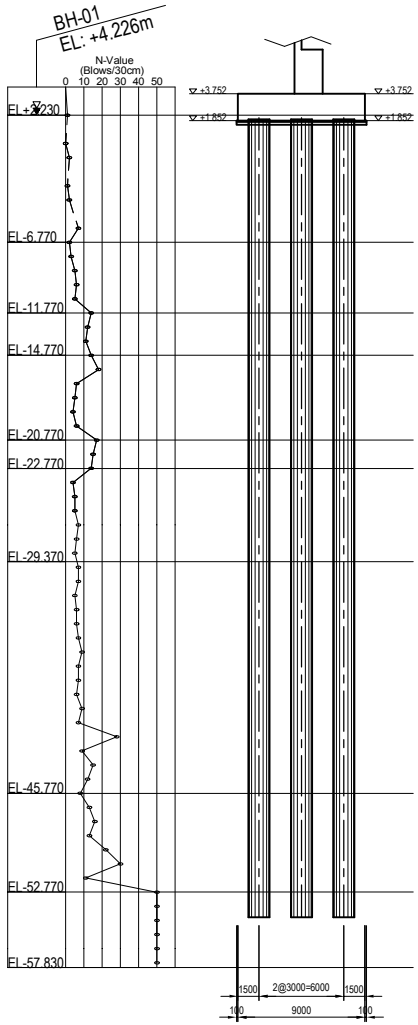
N	γt	Φ	Cu	E0	Layer Thickness	Soil Name
times	kN/m3	deg.	kN/m2	kN/m2	m	
3	19	0	18	2100	1.0	F S
1	17.5	0	15	900	7.0	C-I
13	17.0	32	0	6500	10.0	S S-I
25	17.0	34	0	17500	14.0	S S-II
35	19.0	34	0	24500	11.0	C S-I
50	19.0	35.0	0	35000	5.30	C S-II



AO1

Soil Parameters

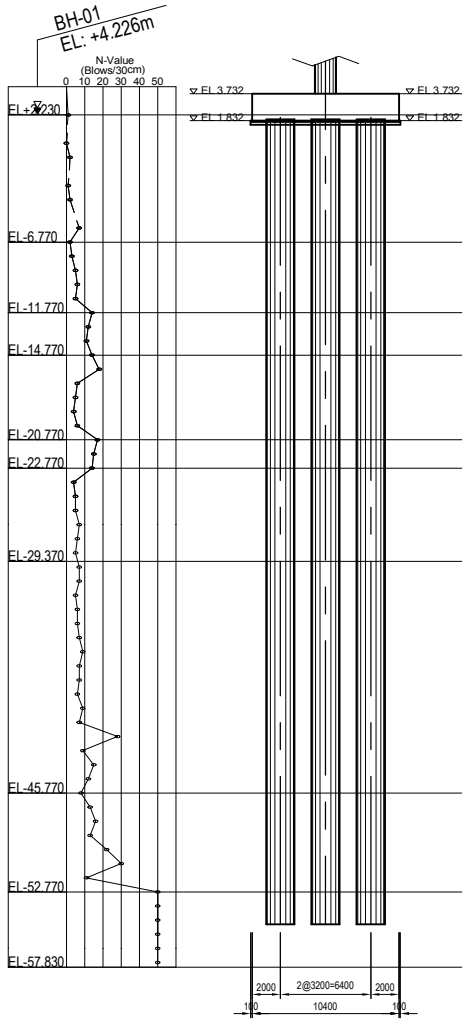
N	γt	Φ	Cu	E0	Layer Thickness	Soil Name
times	kN/m3	deg.	kN/m2	kN/m2	m	
1	18	0	6	700	2.0	F S
1	17.5	0	15	900	9.0	C-I
3	17.5	0	15	2000	5.0	S C-I
15	16.5	33.0	0	6000	3.0	S S-I
5	17.5	0	30	3200	6.0	C-AII
17	17.0	33	0	11900	2.0	CS-B
5	17.5	0	30	3200	6.6	C-AII
7	17.6	0	42	4900	16.4	C-AIII
23	17.0	31	0	16100	7.0	CS-I
50	19.0	35.0	0	35000	6.43	C S-II



PO1

Soil Parameters

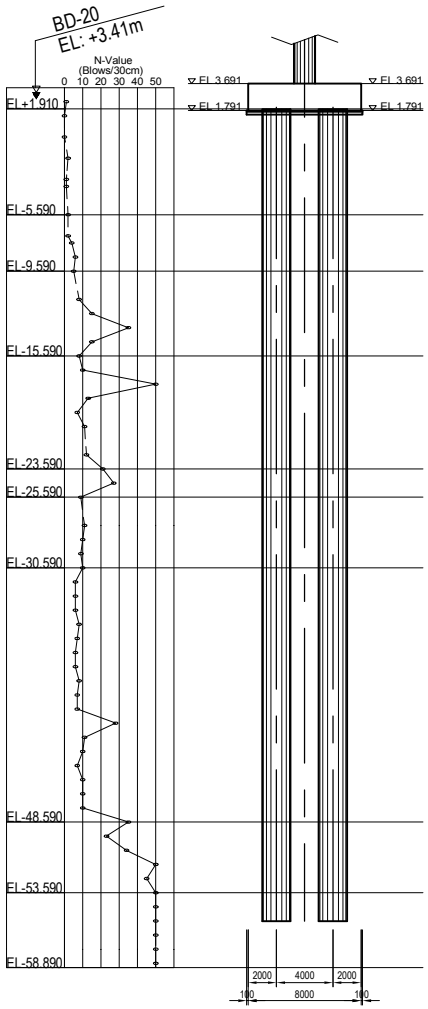
N	γt	Φ	Cu	E0	Layer Thickness	Soil Name
times	kN/m3	deg.	kN/m2	kN/m2	m	
1	18	0	6	700	2.0	F S
1	17.5	0	15	900	9.0	C-I
3	17.5	0	15	2000	5.0	S C-I
15	16.5	33.0	0	6000	3.0	S S-I
5	17.5	0	30	3200	6.0	C-AII
17	17.0	33	0	11900	2.0	CS-B
5	17.5	0	30	3200	6.6	C-AII
7	17.6	0	42	4900	16.4	C-AIII
23	17.0	31	0	16100	7.0	CS-I
50	19.0	35.0	0	35000	6.43	C S-II



PO2

Soil Parameters

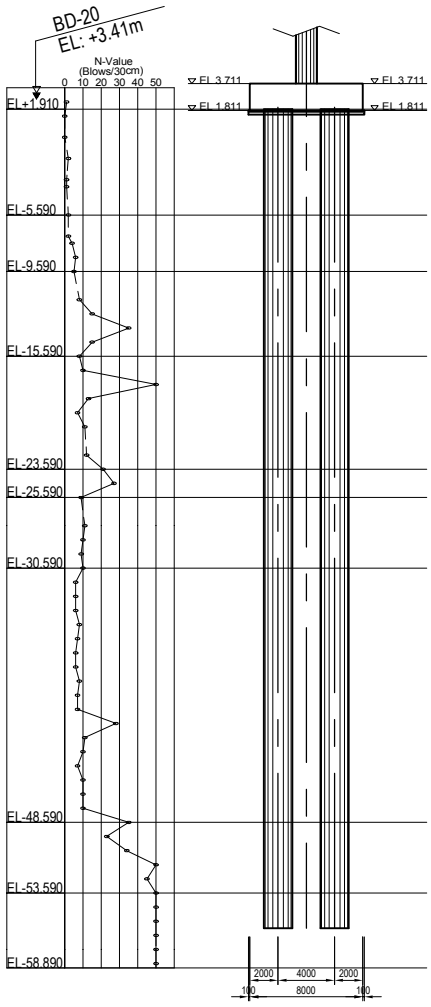
N	γt	Φ	Cu	E0	Layer Thickness	Soil Name
times	kN/m3	deg.	kN/m2	kN/m2	m	
1	18	0	6	700	1.5	F S
1	17.5	0	15	900	7.5	C-I
3	17.5	0	15	2000	4.0	S C-I
15	16.5	33.0	0	6000	6.0	S S-I
5	17.5	0	30	3200	8.0	C-AII
17	17.0	33	0	11900	2.0	C S-B
5	17.5	0	30	3200	5.0	C-AII
7	17.6	0	42	4900	18.0	C-AIII
23	17.0	31	0	16100	5.0	C S-I
50	19.0	35.0	0	35000	5.30	C S-II



PO3

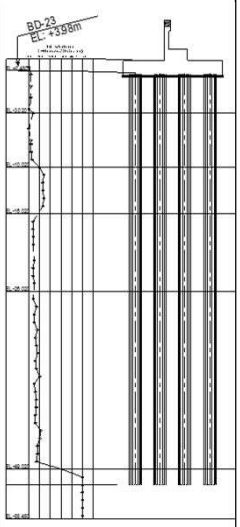
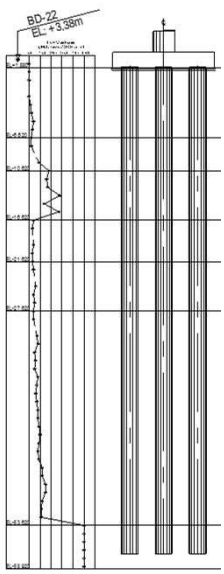
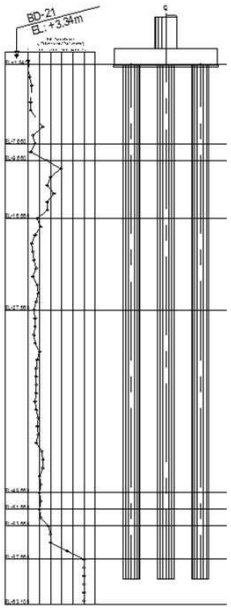
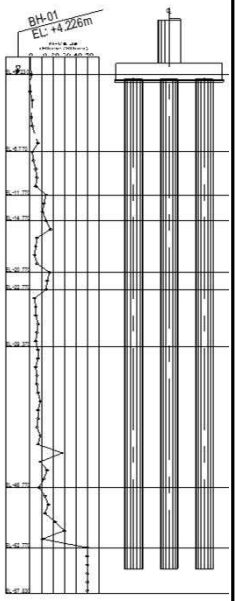
Soil Parameters

N	γt	Φ	Cu	E0	Layer Thickness	Soil Name
times	kN/m3	deg.	kN/m2	kN/m2	m	
1	18	0	6	700	1.5	F S
1	17.5	0	15	900	7.5	C-I
3	17.5	0	15	2000	4.0	S C-I
15	16.5	33.0	0	6000	6.0	S S-I
5	17.5	0	30	3200	8.0	C-AII
17	17.0	33	0	11900	2.0	C S-B
5	17.5	0	30	3200	5.0	C-AII
7	17.6	0	42	4900	18.0	C-AIII
23	17.0	31	0	16100	5.0	C S-I
50	19.0	35.0	0	35000	5.30	C S-II



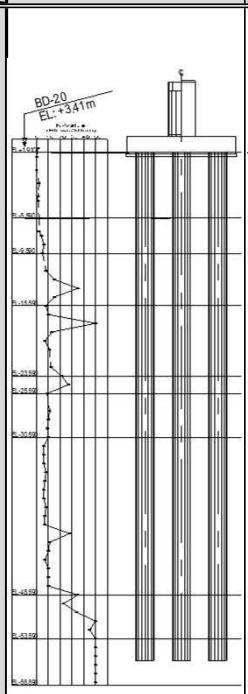
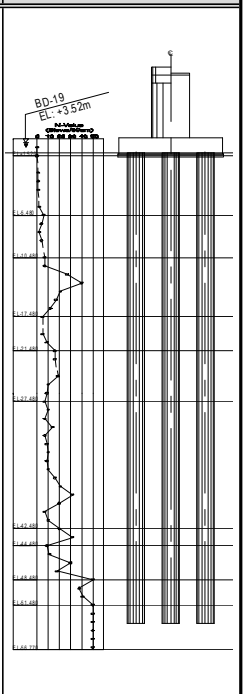
2.Summary for CIP Pile Foundation

(1)Summary of Foundation Stability 1)

	A1	P1	P2	P3
Boling Log & Pile Length (m)				
Pile Information				
Diameter of Pile (mm)	1,500	2,000	2,000	2,000
Number of Piles (Nos.)	28	12	12	12
Pile Length (m)	52.9	57.9	61.9	56.9
Bearing Resistance of Ordinary				
Pile Head Reaction (kN)	1,602	4,196	4,019	4,307
Bearing Capacity (kN)	3,730	5,531	7,140	6,320
R-Ratio	0.430	0.759	0.563	0.681
Horizontal Movement of Ordinary				
Horizontal Movement (mm)	3.7	4.1	1.8	1.7
Capacity (mm)	15.0	20.0	20.0	20.0
R-Ratio	0.246	0.205	0.090	0.083
Bearing Resistance of Seismic				
Pile Head Reaction (kN)	2,384	5,982	6,677	6,762
Bearing Capacity (kN)	5,916	8,920	11,372	10,087
R-Ratio	0.403	0.671	0.587	0.670
Horizontal Movement of Seismic				
Horizontal Movement (mm)	13.5	17.5	19.3	18.2
Capacity (mm)	15.0	20.0	20.0	20.0
R-Ratio	0.902	0.876	0.964	0.909
Bearing Capacity of Group Piles of Ordinary				
Axial Compression Fordes (kN	42,816	43,606	44,962	—
Bearing Capacity (kN)	1,053,211	949,265	1,026,902	—
R-Ratio	0.041	0.046	0.044	—
Judgement of Lateral Movement				
Identifying Index	1.830	—	—	—
Capacity	1.200	—	—	—

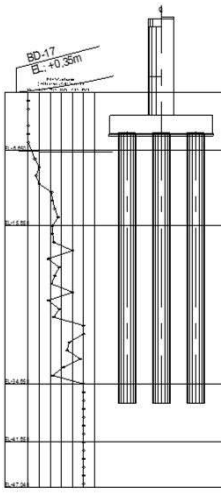
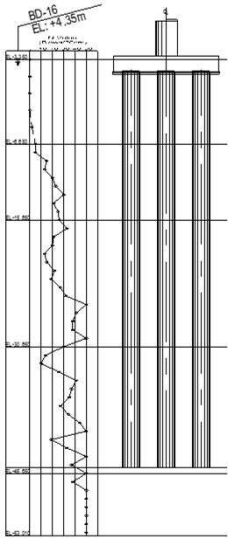
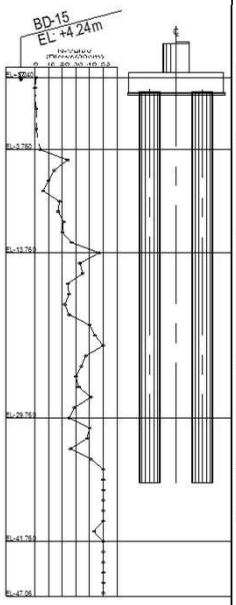
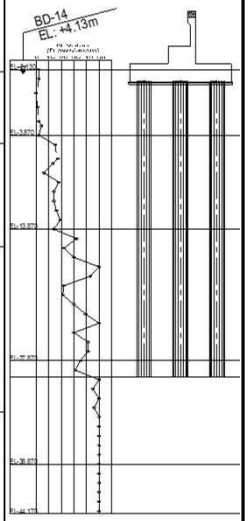
* We also conducted a study on the negative skin friction force, but another case became severe in all foundations, so the value of bearing resistance is ordinary case.

(1)Summary of Foundation Stability 2)

	P4	P5
Boling Log & Pile Length (m)		
Pile Information		
Diameter of Pile (mm)	2,000	2,000
Number of Piles (Nos.)	12	21
Pile Length (m)	57.9	55.4
Bearing Resistance of Ordinary		
Pile Head Reaction (kN)	4,506	3,415
Bearing Capacity (kN)	6,511	6,127
R-Ratio	0.692	0.557
Horizontal Movement of Ordinary		
Horizontal Movement (mm)	4.2	1.8
Capacity (mm)	20.0	20.0
R-Ratio	0.209	0.088
Bearing Resistance of Seismic		
Pile Head Reaction (kN)	7,090	6,443
Bearing Capacity (kN)	10,386	9,783
R-Ratio	0.683	0.659
Horizontal Movement of Seismic		
Horizontal Movement (mm)	19.1	18.0
Capacity (mm)	20.0	20.0
R-Ratio	0.955	0.901
Bearing Capacity of Group Piles of Ordinary		
Axial Compression Fordes (kN)	45,210	63,530
Bearing Capacity (kN)	791,906	1,413,665
R-Ratio	0.057	0.045

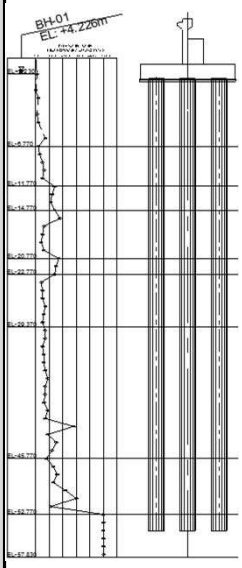
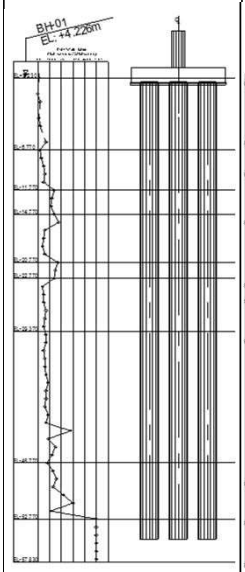
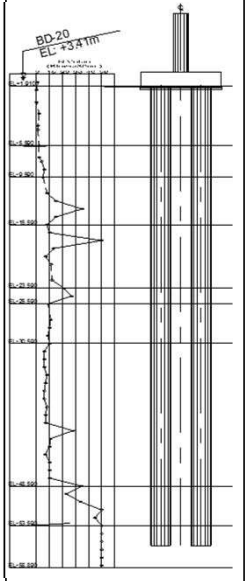
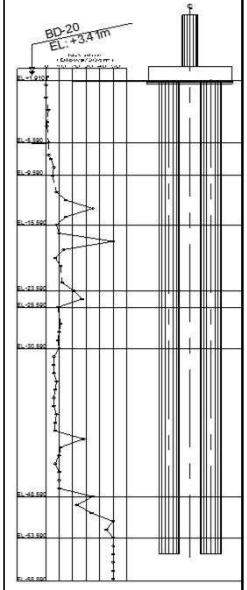
* We also conducted a study on the negative skin friction force, but another case became severe in all foundations, so the value of bearing resistance is ordinary case.

(1)Summary of Foundation Stability 3)

	P23	P24	P25	A2
Boling Log & Pile Length (m)				
Pile Information				
Diameter of Pile (mm)	2,000	2,000	2,000	1,500
Number of Piles (Nos.)	12	12	8	18
Pile Length (m)	32.4	46.9	37.9	31.4
Bearing Resistance of Ordinary				
Pile Head Reaction (kN)	5,554	4,223	5,922	2,299
Bearing Capacity (kN)	8,559	11,527	9,177	5,085
R-Ratio	0.649	0.366	0.645	0.452
Horizontal Movement of Ordinary				
Horizontal Movement (mm)	0.3	2.5	5.0	4.6
Capacity (mm)	20.0	20.0	20.0	15.0
R-Ratio	0.017	0.123	0.251	0.303
Bearing Resistance of Seismic				
Pile Head Reaction (kN)	10352.4	6,676	7,879	3,537
Bearing Capacity (kN)	12959.0	17,731	14,137	7,807
R-Ratio	0.799	0.376	0.557	0.453
Horizontal Movement of Seismic				
Horizontal Movement (mm)	13.9	16.4	17.8	14.6
Capacity (mm)	20.0	20.0	20.0	15.0
R-Ratio	0.695	0.819	0.892	0.971
Bearing Capacity of Group Piles of Ordinary				
Axial Compression Fordes (kN)	65,741	45,475	—	39,934
Bearing Capacity (kN)	460,353	812,083	—	534,902
R-Ratio	0.143	0.056	—	0.075
Judgement of Lateral Movement				
Identifying Index	—	—	—	0.509
Capacity	—	—	—	1.200

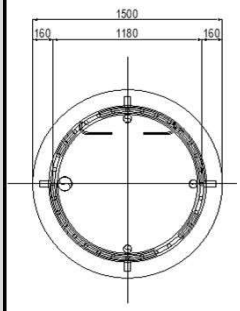
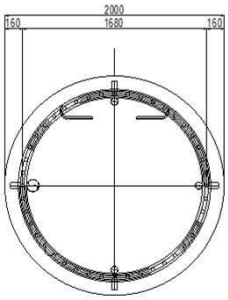
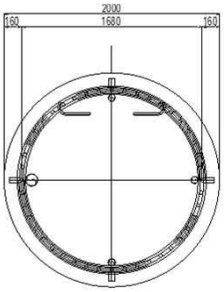
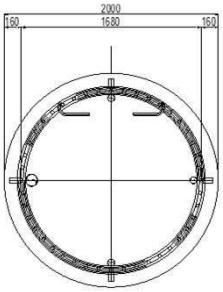
* We also conducted a study on the negative skin friction force, but another case became severe in all foundations, so the value of bearing resistance is ordinary case.

(1)Summary of Foundation Stability 4)

	AO1	PO1	PO2	PO3
Boling Log & Pile Length (m)				
Pile Information				
Diameter of Pile (mm)	1,500	2,000	2,000	2,000
Number of Piles (Nos.)	9	5	4	4
Pile Length (m)	56.4	57.0	57.5	58.0
Bearing Resistance of Ordinary				
Pile Head Reaction (kN)	1,546	3,220	2,805	3,864
Bearing Capacity (kN)	4,476	6,361	6,385	6,550
R-Ratio	0.345	0.506	0.439	0.590
Horizontal Movement of Ordinary				
Horizontal Movement (mm)	6.4	6.9	2.1	8.6
Capacity (mm)	15.0	20.0	20.0	20.0
R-Ratio	0.427	0.347	0.107	0.432
Bearing Resistance of Seismic				
Pile Head Reaction (kN)	2,512	5,330	4,733	5,088
Bearing Capacity (kN)	7,054	10,149	10,193	10,445
R-Ratio	0.356	0.525	0.464	0.487
Horizontal Movement of Seismic				
Horizontal Movement (mm)	14.2	19.8	16.4	17.7
Capacity (mm)	15.0	20.0	20.0	20.0
R-Ratio	0.949	0.992	0.818	0.887
Bearing Capacity of Group Piles of Ordinary				
Axial Compression Fordes (kN)	12,144	11,248	9,993	10,322
Bearing Capacity (kN)	310,198	330,692	205,404	207,765
R-Ratio	0.039	0.034	0.049	0.050
Judgement of Lateral Movement				
Identifying Index	3.569	—	—	—
Capacity	1.200	—	—	—

* We also conducted a study on the negative skin friction force, but another case became severe in all foundations, so the value of bearing resistance is ordinary case.

(2)Summary of Pile Section 1)

	A1	P1	P2	P3
Cross Section of Pile SD345				
	32-D29@116 AS=205.568cm^2	44-D32@120 AS=349.448cm^2	44-D32@120 AS=349.448cm^2	44-D32@120 AS=349.448cm^2
Check for Bending Stress				
Ordinary				
σs (N/mm^2)	37.98	2.05	—	—
σsa (N/mm^2)	184.00	184.00	—	—
R-ratio	0.21	0.01	—	—
Seismic				
σs (N/mm^2)	261.33	231.75	261.79	272.44
σsa (N/mm^2)	300.00	300.00	300.00	300.00
R-ratio	0.87	0.77	0.87	0.91
Check for Shear Stress				
Ordinary				
τm (N/mm^2)	0.095	0.052	0.022	0.022
τa (N/mm^2)	0.446	0.505	0.601	0.601
R-ratio	0.21	0.10	0.04	0.04
Seismic				
τ m(N/mm^2)	0.335	0.324	0.354	0.378
τa (N/mm^2)	0.445	0.399	0.399	0.399
R-ratio	0.75	0.81	0.89	0.95

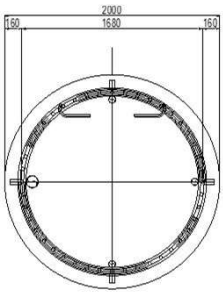
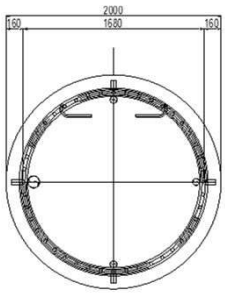
σs ; Bending Unit Stress

σsa ; Allowable Unit Stress

τm ; Unit Share Force

τa ; Allowable Unit Share Force

(2)Summary of Pile Section 2)

	P4	P5
Cross Section of Pile SD345	 44-D35@120 AS=420.904cm^2	 44-D32@120 AS=349.448cm^2
Check for Bending Stress		
Ordinary		
σs (N/mm^2)	1.24	—
σsa (N/mm^2)	184.00	—
R-ratio	0.01	—
Seismic		
σs (N/mm^2)	211.74	248.61
σsa (N/mm^2)	300.00	300.00
R-ratio	0.71	0.83
Check for Shear Stress		
Ordinary		
τm (N/mm2)	0.052	0.018
τa (N/mm2)	0.562	0.524
R-ratio	0.09	0.03
Seismic		
τ m(N/mm2)	0.338	0.315
τa (N/mm2)	0.422	0.399
R-ratio	0.80	0.79

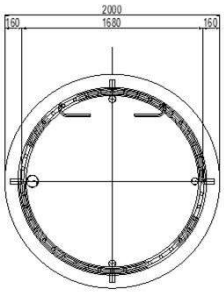
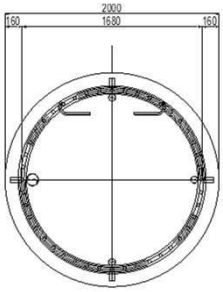
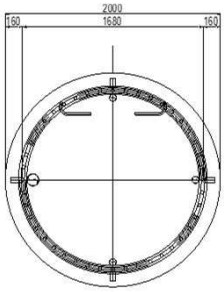
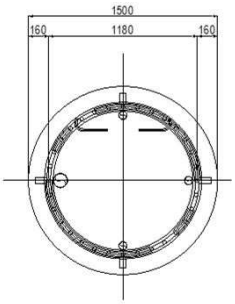
σs ; Bending Unit Stress

σsa ; Allowable Unit Stress

τm ; Unit Share Force

τa ; Allowable Unit Share Force

(2)Summary of Pile Section 3)

	P23	P24	P25	A2
Cross Section of Pile SD345	 44-D35@120 AS=420.904cm^2	 44-D32@120 AS=349.448cm^2	 44-D35@120 AS=420.904cm^2	 32-D35@116 AS=306.112cm^2
Check for Bending Stress				
Ordinary				
σs (N/mm2)	—	—	5.88	54.92
σsa (N/mm2)	—	—	184.00	184.00
R-ratio	—	—	0.03	0.30
Seismic				
σs (N/mm2)	288.62	271.91	260.33	269.11
σsa (N/mm2)	300.00	300.00	300.00	300.00
R-ratio	0.96	0.91	0.87	0.90
Check for Shear Stress				
Ordinary				
τm (N/mm2)	0.035	0.036	0.088	0.164
τa (N/mm2)	0.636	0.601	0.616	0.474
R-ratio	0.06	0.06	0.14	0.35
Seismic				
τ m(N/mm2)	0.457	0.355	0.457	0.529
τa (N/mm2)	0.422 (2.550)	0.399	0.437 (2.550)	0.508 (2.550)
R-ratio	1.08 (0.18)	0.89	1.05 (0.18)	1.04 (0.21)

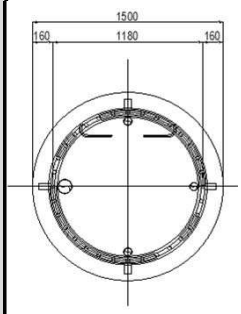
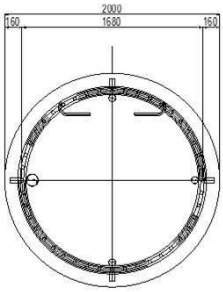
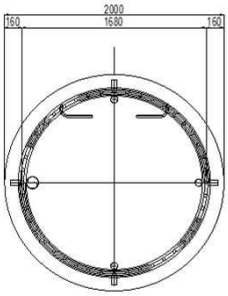
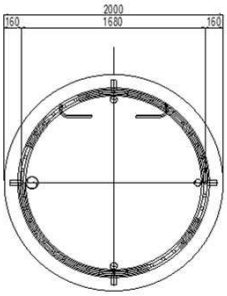
σs ; Bending Unit Stress

σsa ; Allowable Unit Stress

τm ; Unit Share Force

τa ; Allowable Unit Share Force

(2)Summary of Pile Section 4)

	AO1	PO1	PO2	PO3
Cross Section of Pile SD345	 32-D29@115.84 AS=205.568cm^2	 44-D32@120 AS=349.448cm^2	 44-D29@124 AS=282.656cm^2	 44-D29@124 AS=282.656cm^2
Check for Bending Stress				
Ordinary				
σs (N/mm2)	57.60	39.39	—	50.64
σsa (N/mm2)	184.00	184.00	—	184.00
R-ratio	0.31	0.21	—	0.28
Seismic				
σs (N/mm2)	251.96	268.69	203.16	227.68
σsa (N/mm2)	300.00	300.00	300.00	300.00
R-ratio	0.84	0.90	0.68	0.76
Check for Shear Stress				
Ordinary				
τm (N/mm2)	0.105	0.076	0.020	0.076
τa (N/mm2)	0.412	0.349	0.566	0.379
R-ratio	0.25	0.22	0.04	0.20
Seismic				
τm(N/mm2)	0.332	0.336	0.227	0.238
τa (N/mm2)	0.438	0.399	0.375	0.375
R-ratio	0.76	0.84	0.61	0.63

σs ; Bending Unit Stress

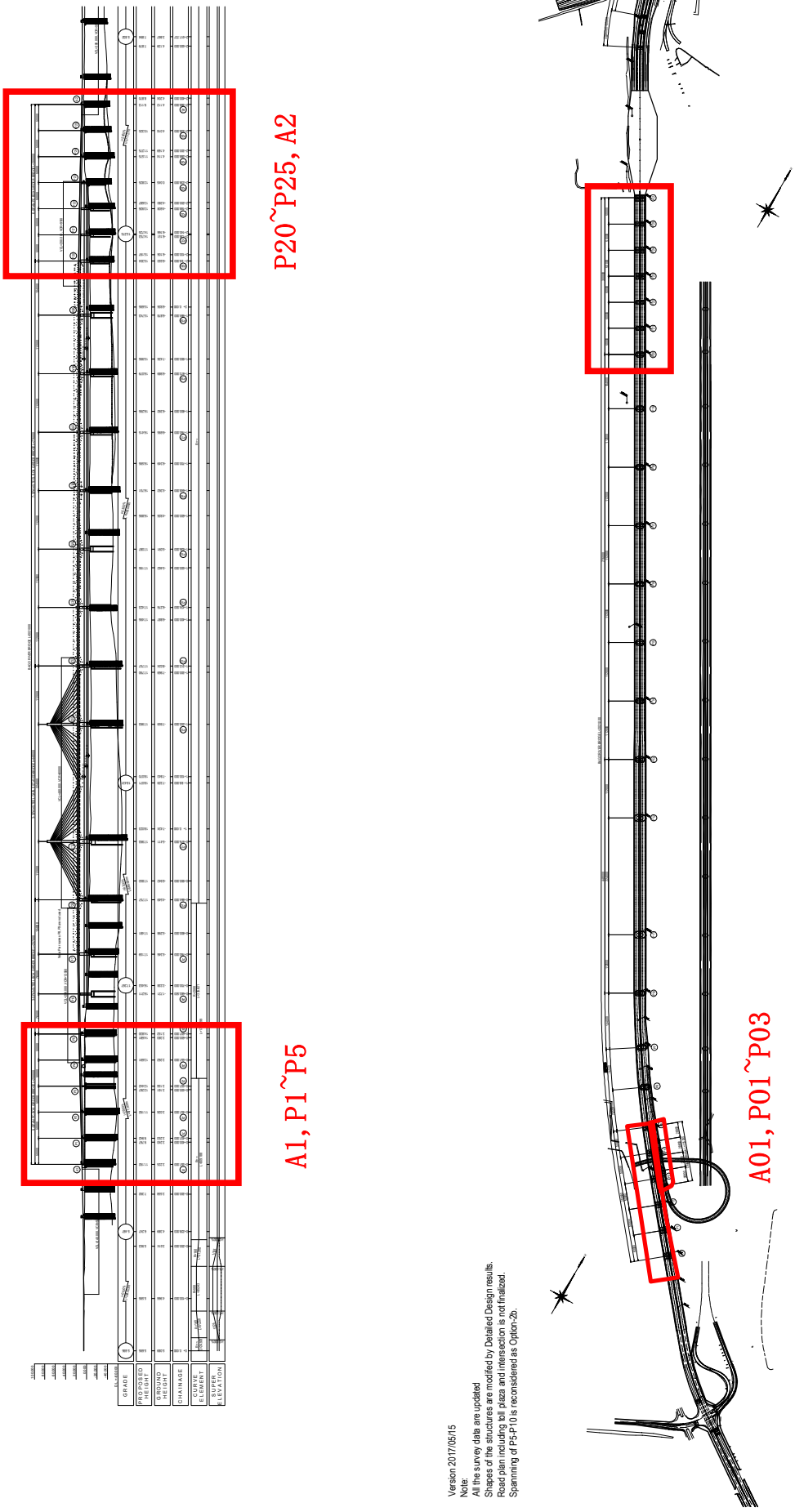
σsa ; Allowable Unit Stress

τm ; Unit Share Force

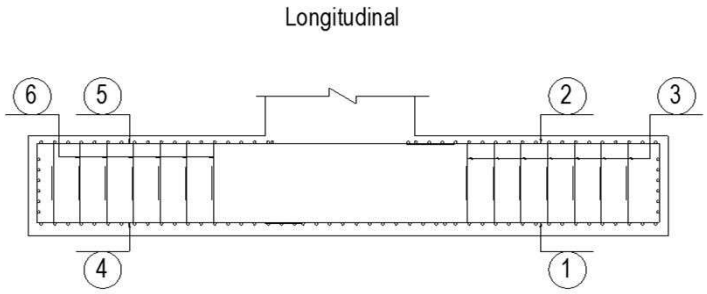
τa ; Allowable Unit Share Force

CHAPTER 6. DESIGN OF BEAM, COLUMN AND PILECAP

6-1. Location Map



(3)Summary of Pile Cap Section 1)

			ABUTMENT					
Cross Section of Pile Cap (Longitudinal & Transversal Direction) SD345								
			A1		A2		AO1	
			FRONT	BACK	FRONT	BACK	FRONT	BACK
Arangement of reinforcement	①	④	D29@125	D29@250	D29@125	D29@250	D29@250	D25@250
	②	⑤	D29@250	D25@125	D29@250	D25@250	D22@250	D32@250
	③	⑥	D16@500	D16@500	D16@500	D16@500	D16@500	D16@500
Check for Bending Stress	Ordinary	σs (N/mm^2)	117.42	27.92	152.83	38.34	135.89	60.23
		σsa(N/mm^2)	160.00	184.00	160.00	160.00	160.00	160.00
		R-ratio	0.73	0.15	0.96	0.24	0.85	0.38
	Seismic	σs (N/mm^2)	224.96	204.16	283.10	273.60	264.21	235.89
		σsa(N/mm^2)	300.00	300.00	300.00	300.00	300.00	300.00
		R-ratio	0.75	0.68	0.94	0.91	0.88	0.79
Check for Shear Stress	Ordinary	τm (N/mm^2)	0.254	0.154	0.335	0.153	0.260	0.143
		τa (N/mm^2)	0.473	0.190	0.519	0.259	0.747	0.282
		R-ratio	0.54	0.81	0.65	0.59	0.35	0.51
	Seismic	τm (N/mm^2)	0.439	0.284	0.579	0.204	0.466	0.264
		τa (N/mm^2)	0.720	0.289	0.790	0.348	1.137	0.429
		R-ratio	0.61	0.98	0.73	0.59	0.41	0.62

σs ; Bending Unit Stress

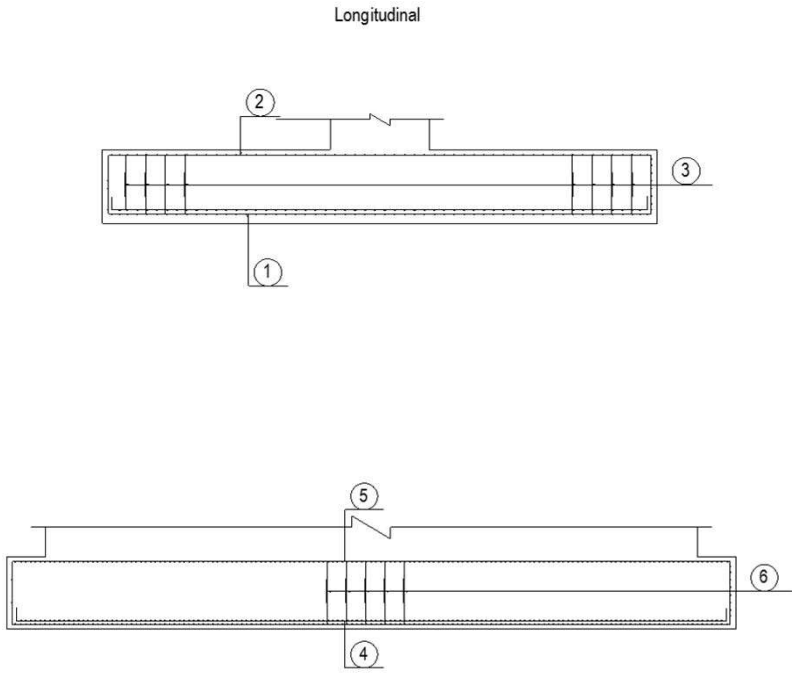
σsa ; Allowable Unit Stress

τm ; Unit Share Force

τa ; Allowable Unit Share Force

R-ratio ; Design result / Capacity

(3)Summary of Pile Cap Section 2)

	PIER
Cross Section of Pile Cap (Longitudinal & Transversal Direction) SD345	

			P1		P2		P3	
			LL	TT	LL	TT	LL	TT
Arangement of reinforcement	①	④	2-D29@125	2-D25@250	2-D29@125	2-D25@250	2-D32@125	2-D29@250
	②	⑤	D25@125	D22@250	D25@125	D22@250	D29@125	D25@250
	③	⑥	D16@500	D16@500	D16@500	D16@500	D22@500	D22@500
Check for Bending Stress	Ordinary	σs (N/mm^2)	120.29	47.39	117.83	47.39	142.02	42.43
		σsa(N/mm^2)	160.00	160.00	160.00	160.00	160.00	160.00
		R-ratio	0.75	0.30	0.74	0.30	0.89	0.27
	Seismic	σs (N/mm^2)	205.79	47.39	235.02	47.39	262.49	42.43
		σsa(N/mm^2)	300.00	300.00	300.00	300.00	300.00	300.00
		R-ratio	0.69	0.16	0.78	0.16	0.87	0.14
Check for Shear Stress	Ordinary	τm(N/mm^2)	0.450	—	0.443	—	0.482	—
		τa (N/mm^2)	0.566	—	0.566	—	0.341 (1.700)	—
		R-ratio	0.80	—	0.78	—	1.41 (0.28)	—
	Seismic	τm(N/mm^2)	0.717	—	0.809	—	0.820	—
		τa (N/mm^2)	0.861	—	0.861	—	0.519 (2.550)	—
		R-ratio	0.83	—	0.94	—	1.58 (0.32)	—

σs ; Bending Unit Stress

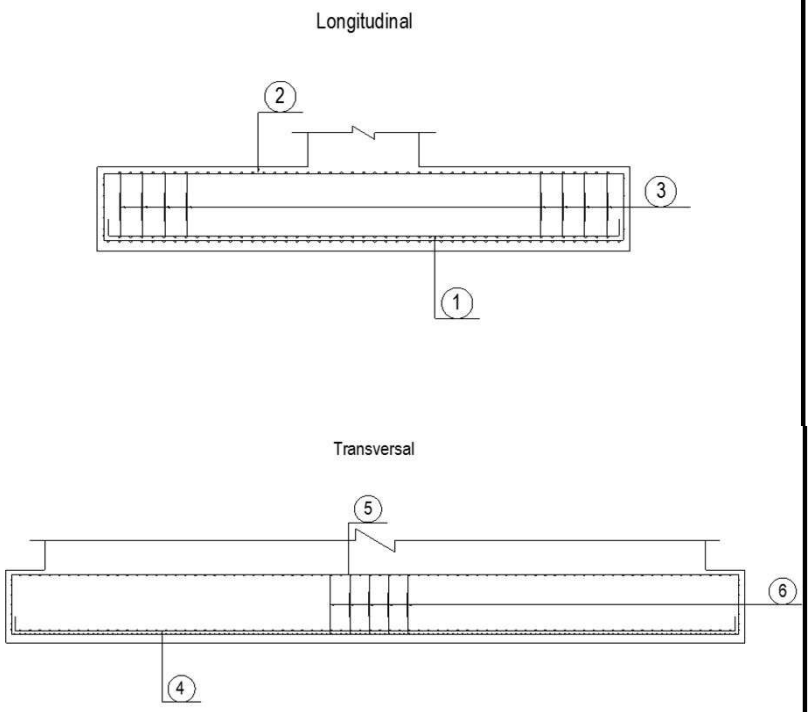
σsa ; Allowable Unit Stress

τm ; Unit Share Force

τa ; Allowable Unit Share Force

R-ratio ; Design result / Capacity

(3)Summary of Pile Cap Section 3)

			PIER					
Cross Section of Pile Cap (Longitudinal & Transversal Direction) SD345								
			P4		P5			
			LL	TT	LL	TT	LL	TT
Arangement of reinforcement	①	④	2-D32@125	2-D32@250	1.5-D29@125	2-D32@125		
	②	⑤	D29@125	D29@250	D29@250	D29@125		
	③	⑥	D16@500	D16@500	D16@500	D16@500		
Check for Bending Stress	Ordinary	σs (N/mm^2)	142.48	113.89	120.81	148.30		
		σsa(N/mm^2)	160.00	160.00	160.00	160.00		
		R-ratio	0.89	0.71	0.76	0.93		
	Seismic	σs (N/mm^2)	268.55	259.49	268.95	235.88		
		σsa(N/mm^2)	300.00	300.00	300.000	300.000		
		R-ratio	0.90	0.86	0.90	0.79		
Check for Shear Stress	Ordinary	τm(N/mm^2)	0.585	—	0.429	—		
		τa (N/mm^2)	0.686	—	0.930	—		
		R-ratio	0.85	—	0.46	—		
	Seismic	τm (N/mm^2)	1.038	—	0.870	—		
		τa (N/mm^2)	1.044 (2.550)	—	1.415(2.550)	—		
		R-ratio	0.99 (0.41)	—	0.61(0.34)	—		

σs ; Bending Unit Stress

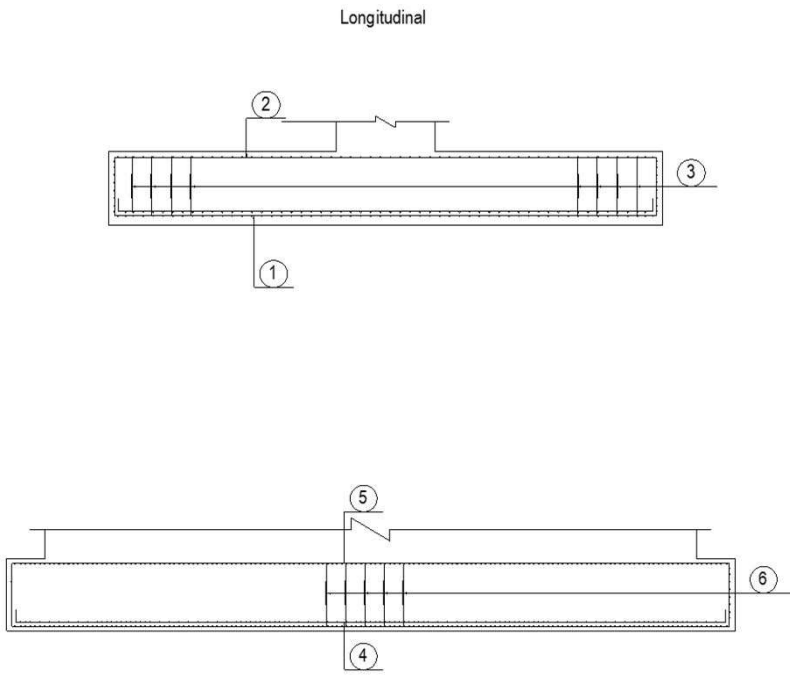
σsa ; Allowable Unit Stress

τm ; Unit Share Force

τa ; Allowable Unit Share Force

R-ratio ; Design result / Capacity

(3)Summary of Pile Cap Section 4)

	PIER
Cross Section of Pile Cap (Longitudinal & Transversal Direction) SD345	

			P23		P24		P25	
			LL	TT	LL	TT	LL	TT
Arangement of reinforcement	①	④	2-D35@125	2-D32@250	1.5-D32@125	2-D25@250	D32@125	D29@250
	②	⑤	D29@125	D29@250	D32@250	D22@250	D29@250	D19@250
	③	⑥	D16@500	D16@500	D16@500	D16@500	D16@500	D16@500
Check for Bending Stress	Ordinary	σs (N/mm^2)	115.19	119.20	128.54	47.28	124.04	47.67
		σsa(N/mm^2)	160.00	160.00	160.00	160.00	160.00	160.00
		R-ratio	0.72	0.75	0.80	0.30	0.78	0.30
	Seismic	σs (N/mm^2)	255.46	247.37	244.38	47.28	188.66	47.67
		σsa(N/mm^2)	300.00	300.00	300.00	300.00	300.00	300.00
		R-ratio	0.85	0.82	0.81	0.16	0.63	0.16
Check for Shear Stress	Ordinary	τm (N/mm^2)	0.556	—	0.456	—	0.642	—
		τa (N/mm^2)	0.838	—	0.559	—	1.160	—
		R-ratio	0.66	—	0.82	—	0.55	—
	Seismic	τm (N/mm^2)	1.191	—	0.800	—	0.937	—
		τa (N/mm^2)	1.275	—	0.851	—	1.766	—
		R-ratio	0.93	—	0.94	—	0.53	—

σs ; Bending Unit Stress

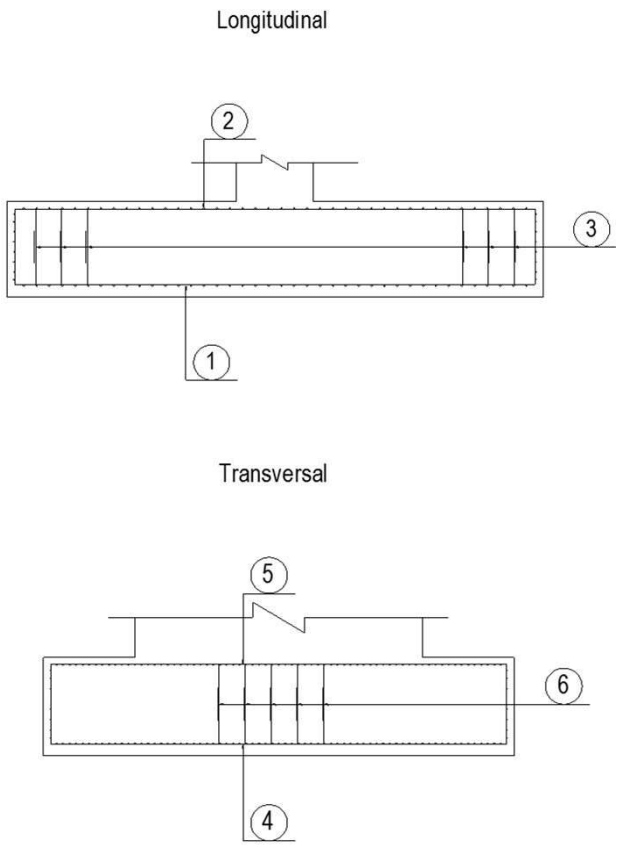
σsa ; Allowable Unit Stress

τm ; Unit Share Force

τa ; Allowable Unit Share Force

R-ratio ; Design result / Capacity

(3)Summary of Pile Cap Section 5)

			PIER					
Cross Section of Pile Cap (Longitudinal & Transversal Direction) SD345								
			PO1		PO2		PO3	
			LL	TT	LL	TT	LL	TT
Arangement of reinforcement	①	④	D32@125	D29@250	D29@250	D19@250	D25@125	D22@250
	②	⑤	D25@125	D22@250	D22@250	D19@250	D25@250	D19@250
	③	⑥	D16@500	D16@500	D16@500	D16@500	D16@500	D16@500
Check for Bending Stress	Ordinary	σs (N/mm2)	131.97	124.07	132.88	69.67	150.20	69.58
		σsa(N/mm2)	184.00	160.00	160.00	160.00	184.00	160.00
		R-ratio	0.72	0.78	0.83	0.44	0.82	0.43
	Seismic	σs (N/mm2)	258.47	124.07	289.50	69.67	214.81	69.58
		σsa(N/mm2)	300.00	300.00	300.00	300.00	300.00	300.00
		R-ratio	0.86	0.41	0.97	0.23	0.72	0.23
Check for Shear Stress	Ordinary	τm (N/mm2)	0.366	—	0.339	—	0.441	—
		τa (N/mm2)	0.656	—	0.880	—	1.009	—
		R-ratio	0.56	—	0.39	—	0.44	—
	Seismic	τm (N/mm2)	0.650	—	0.649	—	0.703	—
		τa (N/mm2)	0.868	—	1.339	—	1.536	—
		R-ratio	0.75	—	0.48	—	0.46	—

σs ; Bending Unit Stress

σsa ; Allowable Unit Stress

τm ; Unit Share Force

τa ; Allowable Unit Share Force

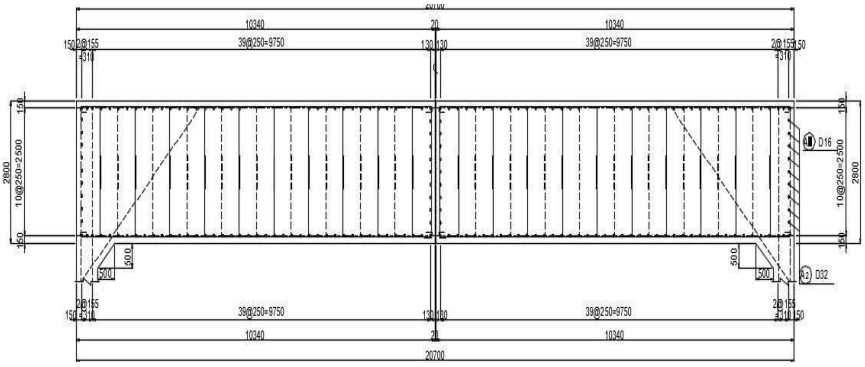
R-ratio ; Design result / Capacity

3. Summary of Design of Pier Column

Summary of Column Section (1)

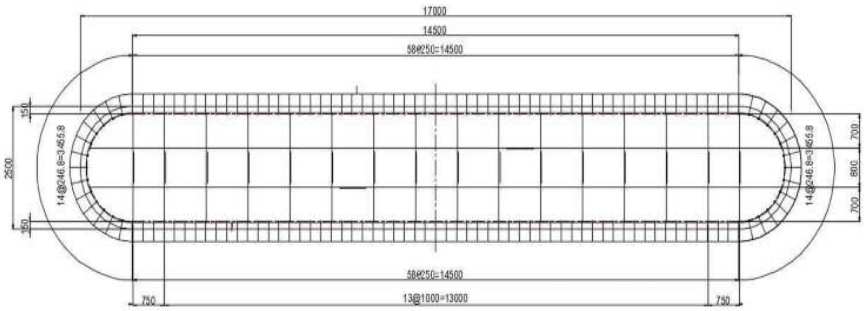
Cross Section of Column

A1



D32@250

P1~P3



D19@250 (P1,P2)
D22@250 (P3)

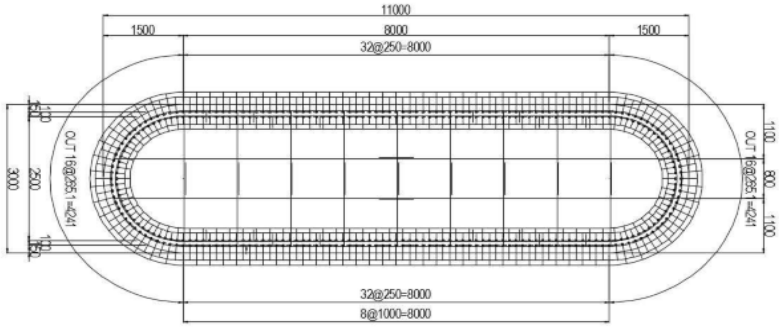
			A1		P1		P2		P3	
			LL	TT	LL	TT	LL	TT	LL	TT
Material		concrete	24N/mm2		24N/mm2		24N/mm2		24N/mm2	
		reinforcement	SD345		SD345		SD345		SD345	
Check for Bending Moment	Ordinary	σs (N/mm2)	-2.25	-	-9.04	-	-10.32	-	-10.46	-
		σsa(N/mm2)	-200.00	-	-200.00	-	-200.00	-	-200.00	-
		R-ratio	0.01	-	0.05	-	0.05	-	0.05	-
	Seismic	σs (N/mm2)	3.11	-	23.20	-3.94	174.33	-3.57	278.19	-2.86
		σsa(N/mm2)	300.00	-	300.00	-300.00	300.00	-300.00	300.00	-300.00
		R-ratio	0.01	-	0.08	0.01	0.58	0.01	0.93	0.01
Check for Shear	Ordinary	τm(N/mm2)	0.059	-	0.046	-	0.020	-	0.020	-
		τa(N/mm2)	0.145	-	0.129	-	0.129	-	0.137	-
		R-ratio	0.41	-	0.36	-	0.16	-	0.15	-
	Seismic	τm(N/mm2)	0.131	-	0.209	0.201	0.236	0.194	0.244	0.202
		τa(N/mm2)	0.195	-	0.170 (2.550)	0.105 (2.550)	0.170 (2.550)	0.105 (2.550)	0.181 (2.550)	0.111 (2.550)
		R-ratio	0.67	-	1.23 (0.08)	1.91 (0.08)	1.39 (0.09)	1.85 (0.08)	1.35 (0.10)	1.82 (0.08)

Note : σs ; Bending Unit Stress
σsa ; Allowable Unit Stress
τm ; Unit Share Force
τa ; Allowable Unit Share Force
R-ratio ; Design result / Capacity

Summary of Column Section (2)

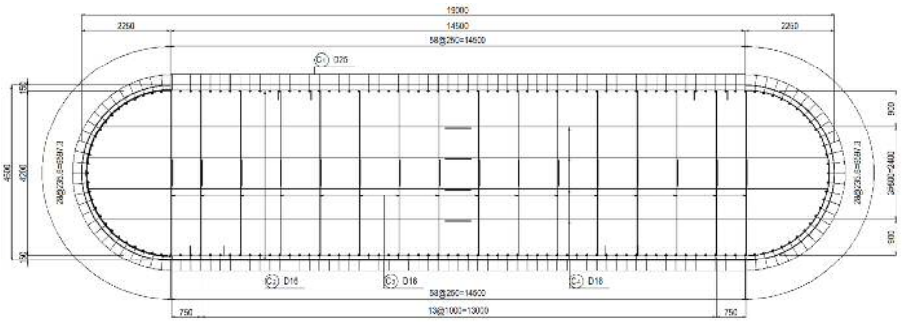
Cross Section of Column

P4



D25@250

P5



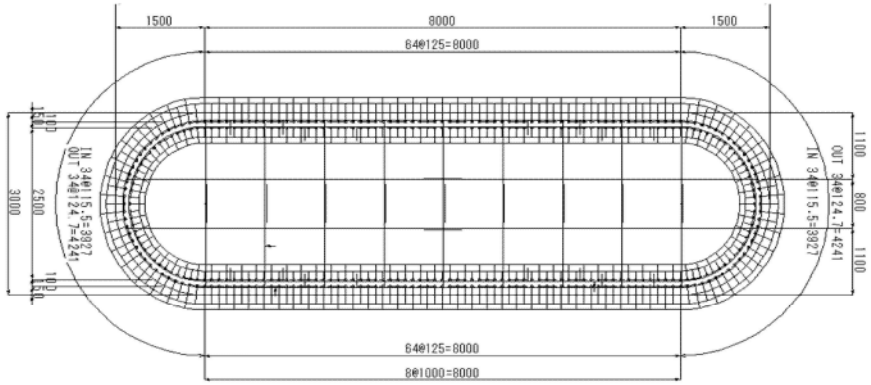
			P4		P5					
			LL	TT	LL	TT				
Material		concrete	30N/mm2		30N/mm3					
		reinforcement	SD390		SD390					
Check for Bending Moment	Ordinary	σs (N/mm2)	-10.61	-	-4.63	-5.75				
		σsa(N/mm2)	-230.00	-	-230.00	-230.00				
		R-ratio	0.05	-	0.02	0.03				
	Seismic	σs (N/mm2)	313.80	10.98	166.92	0.03				
		σsa(N/mm2)	345.00	345.00	345.00	345.00				
		R-ratio	0.91	0.03	0.48	0.00				
Check for Shear	Ordinary	τm(N/mm2)	0.061	-	0.014	0.000				
		τa(N/mm2)	0.140	-	0.097	0.076				
		R-ratio	0.44	-	0.14	0.00				
	Seismic	τm(N/mm2)	0.308	0.309	0.182	0.132				
		τa(N/mm2)	0.180 (2.850)	0.122 (2.850)	0.144 (2.850)	0.112 (2.850)				
		R-ratio	1.71 (0.11)	2.53 (0.11)	1.26 (0.06)	1.18 (0.05)				

Note :
σs ; Bending Unit Stress
σsa ; Allowable Unit Stress
τm ; Unit Share Force
τa ; Allowable Unit Share Force
R-ratio ; Design result / Capacity

Summary of Column Section (3)

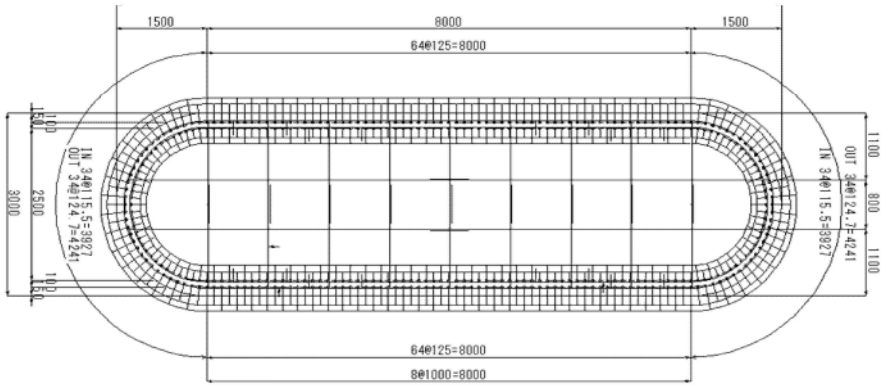
Cross Section of Column

P20



2-D29@125

P21~P23



2-D38@125(P21,P22)
2-D29@125(P23)

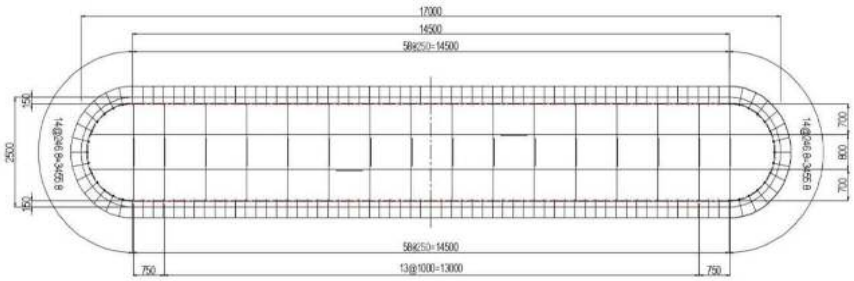
			P20		P21		P22		P23	
			LL	TT	LL	TT	LL	TT	LL	TT
Material		concrete	30N/mm2		30N/mm3		30N/mm3		30N/mm3	
		reinforcement	SD390		SD390		SD390		SD390	
Check for Bending Moment	Ordinary	σs (N/mm2)	1.82	-15.04	25.38	-17.45	-9.21	-17.41	-14.95	-
		σsa(N/mm2)	184.00	-230.00	184.00	-230.00	-230.00	-230.00	-230.00	-
		R-ratio	0.01	0.07	0.14	0.08	0.04	0.08	0.07	-
	Seismic	σs (N/mm2)	271.55	59.12	326.91	78.05	282.56	55.39	305.67	33.46
		σsa(N/mm2)	345.00	345.00	345.00	345.00	345.00	345.00	345.00	345.00
		R-ratio	0.79	0.17	0.95	0.23	0.82	0.16	0.89	0.10
Check for Shear	Ordinary	τm(N/mm2)	0.039	-	0.082	-	0.043	-	0.049	-
		τa(N/mm2)	0.187	-	0.290	-	0.290	-	0.210	-
		R-ratio	0.21	-	0.28	-	0.15	-	0.23	-
	Seismic	τm(N/mm2)	0.312	0.276	0.460	0.406	0.423	0.366	0.444	0.330
		τa(N/mm2)	0.241 (2.850)	0.186 (2.850)	0.373 (2.850)	0.248 (2.850)	0.373 (2.850)	0.248 (2.850)	0.310 (2.850)	0.206 (2.850)
		R-ratio	1.29 (0.11)	1.48 (0.10)	1.23 (0.16)	1.64 (0.14)	1.13 (0.15)	1.48 (0.13)	1.43 (0.16)	1.60 (0.12)

Note :
σs ; Bending Unit Stress
σsa ; Allowable Unit Stress
τm ; Unit Share Force
τa ; Allowable Unit Share Force
R-ratio ; Design result / Capacity

Summary of Column Section (4)

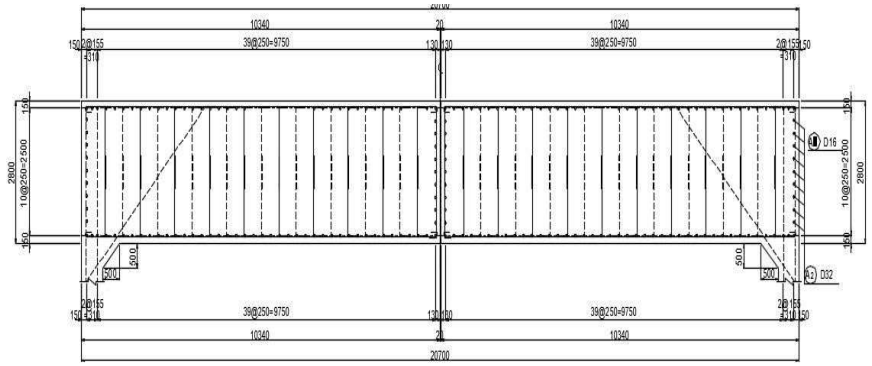
Cross Section of Column
(Longitudinal Direction)

P24,P25



D19@250

A2



D32@250

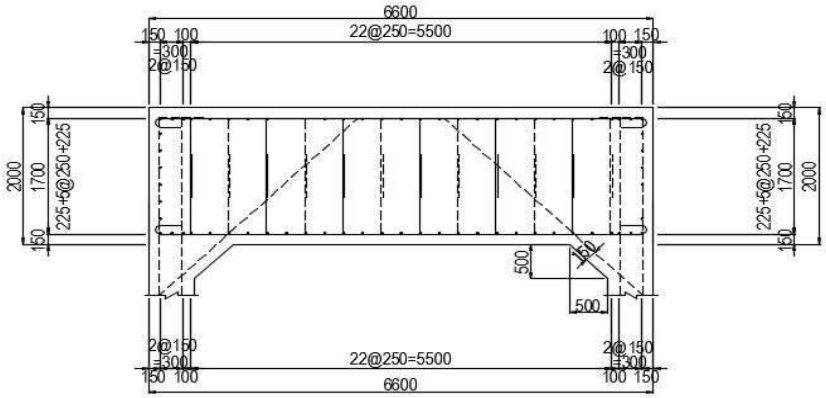
			P24		P25		A2			
			LL	TT	LL	TT	LL	TT		
Material		concrete	24N/mm2		24N/mm2		24N/mm2			
		reinforcement	SD345		SD345		SD345			
Check for Bending Moment	Ordinary	σs (N/mm2)	-9.48	-	-8.59	-	-1.69	-		
		σsa(N/mm2)	-200.00	-	-200.00	-	-200.00	-		
		R-ratio	0.05	-	0.04	-	0.01	-		
	Seismic	σs (N/mm2)	210.82	-3.48	38.86	-3.58	11.14	-		
		σsa(N/mm2)	300.00	-300.00	300.00	-300.00	300.00	-		
		R-ratio	0.70	0.01	0.13	0.01	0.04	-		
Check for Shear	Ordinary	τm(N/mm2)	0.032	-	0.053	-	0.068	-		
		τa(N/mm2)	0.129	-	0.129	-	0.145	-		
		R-ratio	0.25	-	0.41	-	0.47	-		
	Seismic	τm(N/mm2)	0.236	0.195	0.212	0.208	0.150	-		
		τa(N/mm2)	0.170 (2.550)	0.105 (2.550)	0.170 (2.550)	0.105 (2.550)	0.195	-		
		R-ratio	1.39 (0.09)	1.86 (0.08)	1.25 (0.08)	1.98 (0.08)	0.77	-		

Note : σs ; Bending Unit Stress
σsa ; Allowable Unit Stress
τm ; Unit Share Force
τa ; Allowable Unit Share Force
R-ratio ; Design result / Capacity

Summary of Column Section (5)

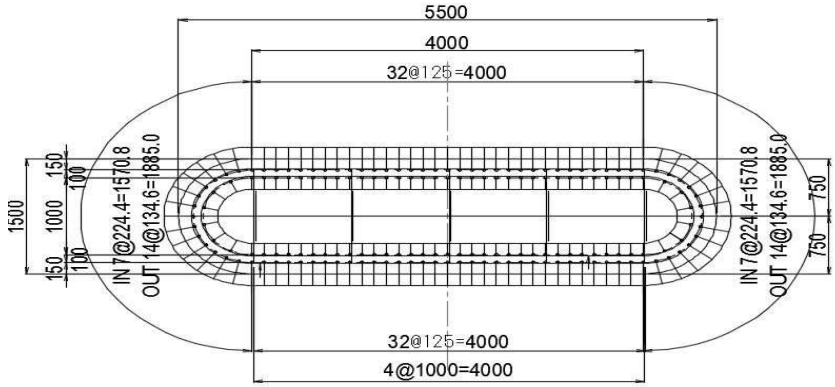
Cross Section of Column
(Longitudinal Direction)

AO1



D22@250

PO1~PO3

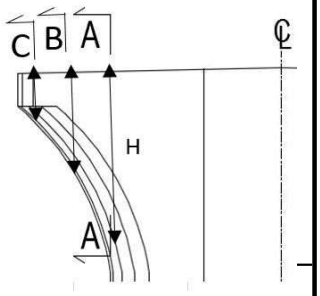
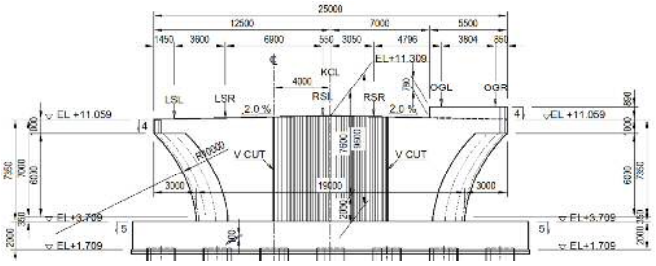
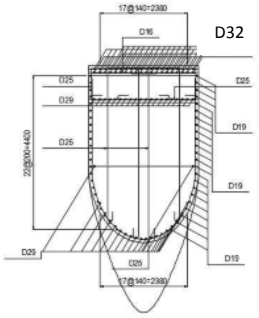
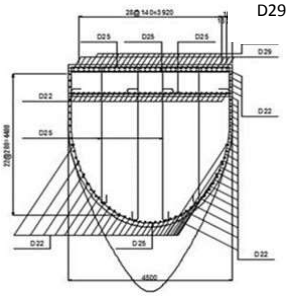
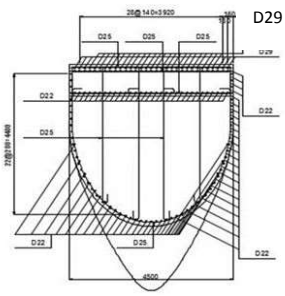


1.5-D32@125 (PO1)
D25@125 (PO2)
D32@125 (PO3)

			AO1		PO1		PO2		PO3	
			LL	TT	LL	TT	LL	TT	LL	TT
Material		concrete	24N/mm2		24N/mm2		24N/mm2		24N/mm2	
		reinforcement	SD345		SD345		SD345		SD345	
Check for Bending Moment	Ordinary	σs (N/mm2)	13.34	-	51.66	-	-6.56	-	94.87	-
		σsa(N/mm2)	184.00	-	184.00	-	-200.00	-	184.00	-
		R-ratio	0.07	-	0.28	-	0.03	-	0.52	-
	Seismic	σs (N/mm2)	91.47	-	244.12	16.79	260.62	44.67	232.05	23.49
		σsa(N/mm2)	300.00	-	300.00	300.00	300.00	300.00	300.00	300.00
		R-ratio	0.30	-	0.81	0.06	0.87	0.15	0.77	0.08
Check for Shear	Ordinary	τm(N/mm2)	0.075	-	0.162	-	0.033	-	0.127	-
		τa(N/mm2)	0.134	-	0.349	-	0.260	-	0.305	-
		R-ratio	0.56	-	0.46	-	0.13	-	0.42	-
	Seismic	τm(N/mm2)	0.154	-	0.522	0.207	0.248	0.218	0.265	0.181
		τa(N/mm2)	0.204	-	0.462 (2.550)	0.279	0.344	0.210 (2.550)	0.404	0.246
		R-ratio	0.75	-	1.13 (0.20)	0.74	0.72	1.04 (0.09)	0.66	0.74

Note : σs ; Bending Unit Stress
σsa ; Allowable Unit Stress
τm ; Unit Share Force
τa ; Allowable Unit Share Force
R-ratio ; Design result / Capacity

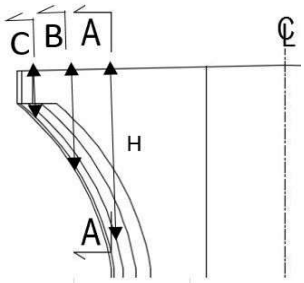
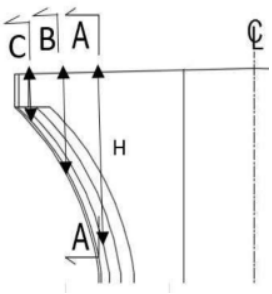
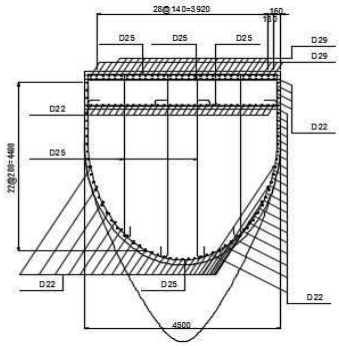
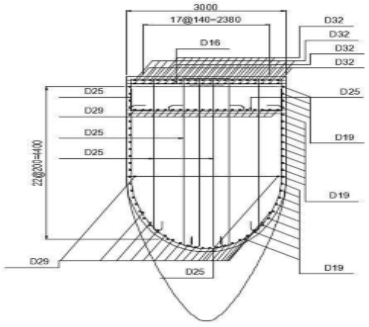
(2) Summary of beam Section 1)

	P4 LEFT&RIGHT	P5 LEFT	P5 RIGHT
Side View of Beam & Cross Section of Beam			
Cross Section of Beam	 2-D32@140	 2-D29@140	 2-D29@140

		P4 LEFT&RIGHT			P5 LEFT			P5 RIGHT		
		Section	Section	Section	Section	Section	Section	Section	Section	Section
Material	concrete	30N/mm2			30N/mm2			30N/mm2		
	reinforcement	SD345			SD345			SD345		
section position	B	3.000	3.000	3.000	4.500	4.500	4.500	4.500	4.500	4.500
	H	5.000	1.818	2.444	5.000	2.267	2.933	5.000	2.018	4.000
Check for Bending Moment	σs (N/mm2)	79.360		-	72.940	-	-	51.110	-	-
	σsa(N/mm2)	100.000	-	-	100.000	-	-	100.000	-	-
	R-ratio	0.794	-	-	0.729	-	-	0.511	-	-
Check for Shear	τm(N/mm2)	-	0.020	1.250	-	0.020	0.620	-	0.210	0.470
	τa(N/mm2)	-	0.288	1.900	-	0.224	1.900	-	0.245	1.900
	R-ratio	-	0.069	0.658	-	0.089	0.326	-	0.857	0.247
Judgement		OK	OK	OK	OK	OK	OK	OK	OK	OK

Note : σs ; Bending Unit Stress
σsa ; Allowable Unit Stress
τm ; Unit Share Force
τa ; Allowable Unit Share Force
R-ratio ; Design result / Capacity

(2) Summary of beam Section 2)

	P20 LEFT&RIGHT	P21 ~P23LEFT&RIGHT
Side View of Beam & Cross Section of Beam		
	Cross Section of Beam	Cross Section of Beam
	 2-D29@140	 2-D32@140

		P20 LEFT&RIGHT			P21 ~P23LEFT&RIGHT		
		Section A	Section B	Section C	Section A	Section B	Section C
Material	concrete	24N/mm2			24N/mm2		
	reinforcement	SD345			SD345		
section position	B	4.500	4.500	4.500	3.000	3.000	3.000
	H	5.000	2.016	2.744	5.000	1.800	2.750
Check for Bending Moment	σs (N/mm2)	68.110	-	-	80.660	-	-
	σsa(N/mm2)	100.000	-	-	100.000	-	-
	R-ratio	0.681	-	-	0.807	-	-
Check for Shear	τm(N/mm2)	-	0.020	0.680	-	0.020	1.110
	τa(N/mm2)	-	0.249	1.900	-	0.290	1.900
	R-ratio	-	0.080	0.358	-	0.069	0.584
Judgement		OK	OK	OK	OK	OK	OK

Note : σs ; Bending Unit Stress
σsa ; Allowable Unit Stress
τm ; Unit Share Force
τa ; Allowable Unit Share Force
R-ratio ; Design result / Capacity

Calculation for Rebar Arrangement of Bridge Seat

		Unit	A1	P1	P2	P3	P4	P5		P20		P21	P22	P23	P24	P25	A2	AO1	PO1	PO2	PO3	PO4
								P4 Side	P6 Side	P19 Side	P21 Side											(P5)
Breadth of Anchor Bars	B	mm	900	900	900	900	900	900	1390	1270	900	900	900	900	900	900	900	2500	2500	2500	2500	2500
Distance from the Center of the Anchor Bar to the Edge of Bridge Seat	da	mm	650	1250	1250	1250	1500	900	1820	1750	900	1500	1500	1500	1250	1250	650	650	750	750	750	450
Resisting Area in Concrete	Ac	mm2	2,022,325	6,010,408	6,010,408	6,010,408	8,273,149	3,436,539	########	########	3,436,539	8,273,149	8,273,149	8,273,149	6,010,408	6,010,408	2,022,325	3,493,107	4,242,641	4,242,641	4,242,641	2,163,747
Design Strength of Concrete	σck	N/mm2	24.0	24.0	24.0	24.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	30.0
Vertical Force of a Bearing	Rd	kN	2,900	5,700	5,700	5,800	5,700	2,950	1,950	1,913	2,950	5,650	5,800	5,700	5,750	5,700	2,900	1,000	1,000	1,050	1,050	1,000
Area of the Bearing Base Plate	Asp	mm2	1,166,400	2,016,400	2,016,400	2,016,400	2,016,400	1,166,400	2,800,000	1,470,000	1,166,400	2,016,400	2,016,400	2,016,400	2,016,400	2,016,400	1,166,400	260,400	260,400	260,400	260,400	260,400
Bearing Stress at the Lower Face of Bearing Support due to Vertical Forces; σn = Rd/Asp	σn	N/mm2	2.49	2.83	2.83	2.88	2.83	2.53	0.70	1.30	2.53	2.80	2.88	2.83	2.85	2.83	2.49	3.84	3.84	4.03	4.03	3.84
σn／√σck	-	-	0.51	0.58	0.58	0.59	0.52	0.46	0.13	0.24	0.46	0.51	0.53	0.52	0.58	0.58	0.51	0.78	0.78	0.82	0.82	0.70
Coefficient to Calculate Pc	α	-	0.31	0.33	0.33	0.34	0.31	0.30	0.19	0.23	0.30	0.31	0.32	0.31	0.34	0.33	0.31	0.40	0.40	0.41	0.41	0.37
Load Carried by Concrete; Pc = 0.32α√σck*Ac	Pc	kN	**990**	**3,151**	**3,151**	**3,181**	**4,566**	**1,792**	**4,326**	**4,674**	**1,792**	**4,546**	**4,608**	**4,566**	**3,166**	**3,151**	**990**	**2,193**	**2,664**	**2,747**	**2,747**	**1,419**
Yield Point of Reinforcement	σsy	N/mm2	345	345	345	345	345	345	345	345	345	345	345	345	345	345	345	345	345	345	345	345
Modification Coefficient for Load Carried by Reinforcement	β	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Cross Sectional Area of Reinforcing Bar *1	ΣAsi	mm2	6111	16198	12760	12760	11083	9696	15788	14138	9696	11083	11083	11083	12760	16198	6111	4384	13572	13572	13572	2471
Load Carried by Reinforcement; Ps = Σ{β (1-hi/da) σsy*Asi}	Ps	kN	**1,054**	**2,794**	**2,201**	**2,201**	**1,912**	**1,673**	**2,723**	**2,439**	**1,673**	**1,912**	**1,912**	**1,912**	**2,201**	**2,794**	**1,054**	**756**	**2,341**	**2,341**	**2,341**	**426**
Strength of the Bridge Seat; Pbs = Pc + Ps	Pbs	kN	2,044	5,945	5,352	5,382	6,478	3,465	7,049	7,113	3,465	6,457	6,520	6,478	5,367	5,945	2,044	2,949	5,005	5,088	5,088	1,845
Design Horizontal Force	H	kN	2,025	5,850	5,100	5,100	5,850	2,025	1,556	431	2,025	5,775	5,100	5,325	5,100	5,850	2,025	810	3,825	1,845	1,350	1,035
R-ratio	R	-	**0.99**	**0.98**	**0.95**	**0.95**	**0.90**	**0.58**	**0.22**	**0.06**	**0.58**	**0.89**	**0.78**	**0.82**	**0.95**	**0.98**	**0.99**	**0.27**	**0.76**	**0.36**	**0.27**	**0.56**

Calculation of Reinforcing Bar Area (ΣAsi)

		Unit	A1	P1	P2	P3	P4	P5		P20		P21	P22	P23	P24	P25	A2	AO1	PO1	PO2	PO3	PO4
								P4 Side	P6 Side	P19 Side	P21 Side							(P5)				
Diameter of Reinforcing Bar	φ	mm	D16	D25	D25	D25	D25	D25	D25	D25	D25	D25	D25	D25	D25	D25	D16	D16	D25	D25	D25	D16
Number of Reinforcing Bar	n	nos.	20	18	16	16	19	18	24	24	18	19	19	19	16	18	20	21	23	23	23	16
Cross Sectional Area of Reinforcing Bar	As1	mm2	3972	9120.6	8107.2	8107.2	9627.3	9120.6	12160.8	12160.8	9120.6	9627.3	9627.3	9627.3	8107.2	9120.6	3972	4170.6	11654.1	11654.1	11654.1	3177.6
Depth of Reinforcing Bar from the Surface of the Bridge Seat	h1	mm	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
(1-h1/da)	-	-	0.846	0.920	0.920	0.920	0.933	0.889	0.945	0.943	0.889	0.933	0.933	0.933	0.920	0.920	0.846	0.846	0.867	0.867	0.867	0.778
Diameter of Reinforcing Bar	φ	mm	D16	D25	D22	D22	D16	D16	D16	D16	D16	D16	D16	D16	D22	D25	D16	D16	D16	D16	D16	D16
Number of Reinforcing Bar	n	nos.	20	18	16	16	12	10	24	15	10	12	12	12	16	18	20	7	23	23	23	0
Cross Sectional Area of Reinforcing Bar	As2	mm2	3972	9120.6	6193.6	6193.6	2383.2	1986	4766.4	2979	1986	2383.2	2383.2	2383.2	6193.6	9120.6	3972	1390.2	4567.8	4567.8	4567.8	0
Depth of Reinforcing Bar from the Surface of the Bridge Seat	h2	mm	200	180	180	180	180	180	180	180	180	180	180	180	180	180	200	250	180	180	180	180
(1-h2/da)	-	-	0.692	0.856	0.856	0.856	0.880	0.800	0.901	0.897	0.800	0.880	0.880	0.880	0.856	0.856	0.692	0.615	0.760	0.760	0.760	0.600
Total Cross Sectional Area of Reinforcing Bar; ΣAsi = Σ{Asi (1-hi/da)}	ΣAsi	mm2	6111	16198	12760	12760	11083	9696	15788	14138	9696	11083	11083	11083	12760	16198	6111	4384	13572	13572	13572	2471