

**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  
DRAFT TENDER DOCUMENT (FINAL VERSION)**

**PACKAGE 1**

**Volume - IV**

**DRAWINGS**

**OCTOBER 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.**

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	(REFERENCE) CONTROL PANEL FOR OBSTRUCTION LIGHT	P1-EL-0023	
	TYPICAL NAVIGATION LATERAL MARKS AND OBSTRUCTION LIGHT	P1-EL-0024	
	TYPICAL SCHEMATIC DIAGRAM	P1-EL-0025	
	(REFERENCE) TYPICAL FLOOD LIGHT INSTALLATION	P1-EL-0026	
	(REFERENCE) TYPICAL WIRING PLAN AND LIGHTING PANEL AT P10	P1-EL-0027	
	REFERENCE DRAWING	QUANTITY TABLE OF LIGHTING AND ELECTRICAL WORKS	P1-EL-0028

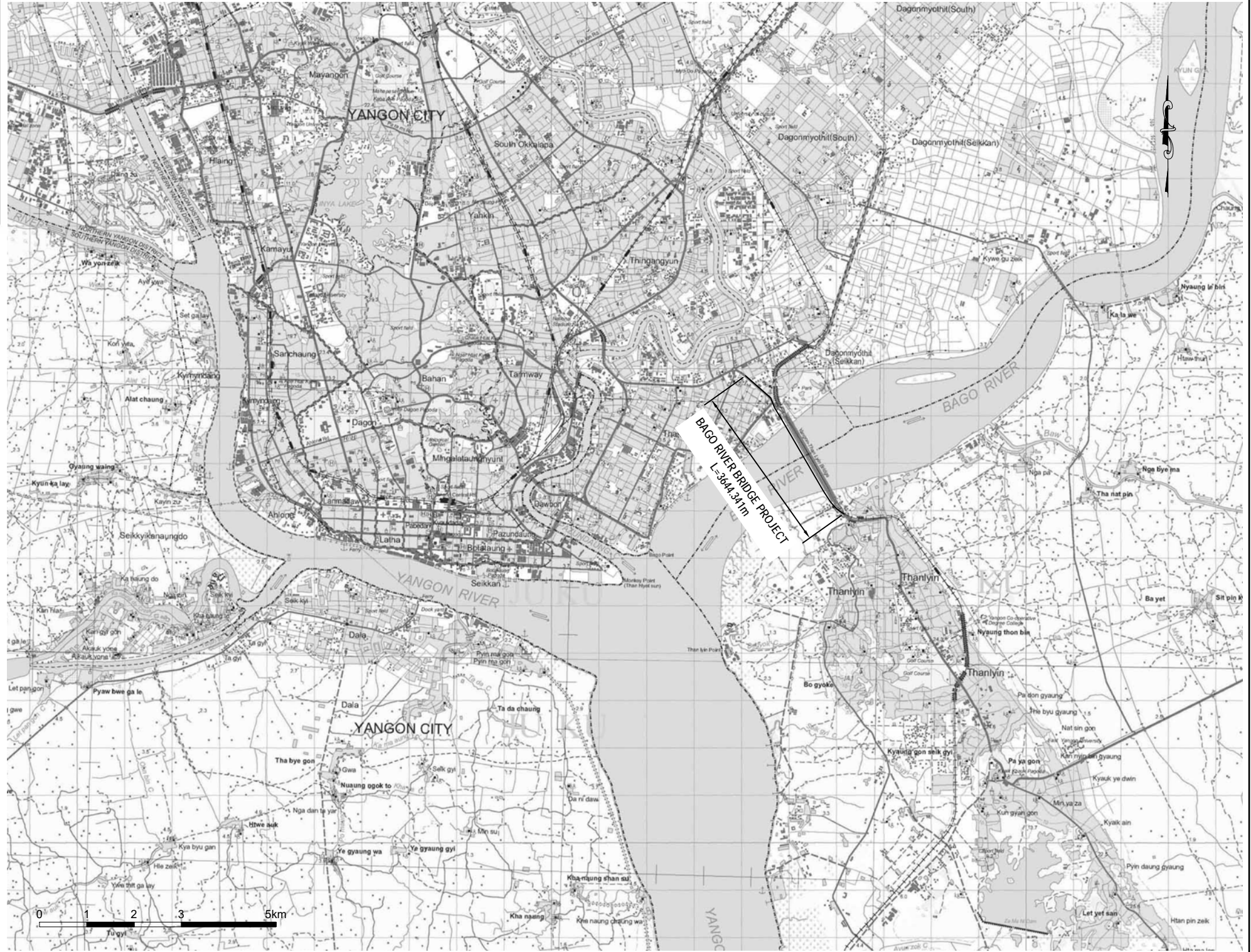
G. REFERENCE DRAWING			
	(REFERENCE) GENERAL LAYOUT OF CONSTRUCTION YARD		P1-REF-0001
	(REFERENCE) NAVIGATION CONTROL PLAN (1)-(2)		P1-REF-0002 ~ 0003
	(REFERENCE) CONSTRUCTION SEQUENCE OF CABLE STAYED BRIDGE		P1-REF-0004
	(REFERENCE) CONSTRUCTION SEQUENCE OF CONTINUOUS STEEL BOX GIRDER		P1-REF-0005
	(REFERENCE) CONSTRUCTION SEQUENCE OF CONTINUOUS PC BOX GIRDER		P1-REF-0006
	(REFERENCE) DIVERSION OF EXISTING TRAFFIC DURING CONSTRUCTION OF INTERSECTION		P1-REF-0007
	(REFERENCE) MONUMENT AND BRIDGE RECORD		P1-REF-0008
	(REFERENCE) NETWORK PLAN		P1-REF-0009
	(REFERENCE) EXISTING UNDERGROUND UTILITIES LAYOUT (1)-(2)		P1-REF-0011 ~ 0012
	(REFERENCE) QUARRY SITE LOCATION		P1-REF-1001
	(REFERENCE) LAND TRANSPORTATION ROUTE TO WASTE DISPOSAL SITE IN THILAWA SEZ		P1-REF-1002
	(REFERENCE) LAND TRANSPORTATION ROUTE FROM LANDING PORT		P1-REF-1003
	(REFERENCE) DIAGRAM OF RAILING POST		P1-REF-2001
	(REFERENCE) INSPECTION LADDER FROM DECK		P1-REF-2002

## **A. GENERAL**



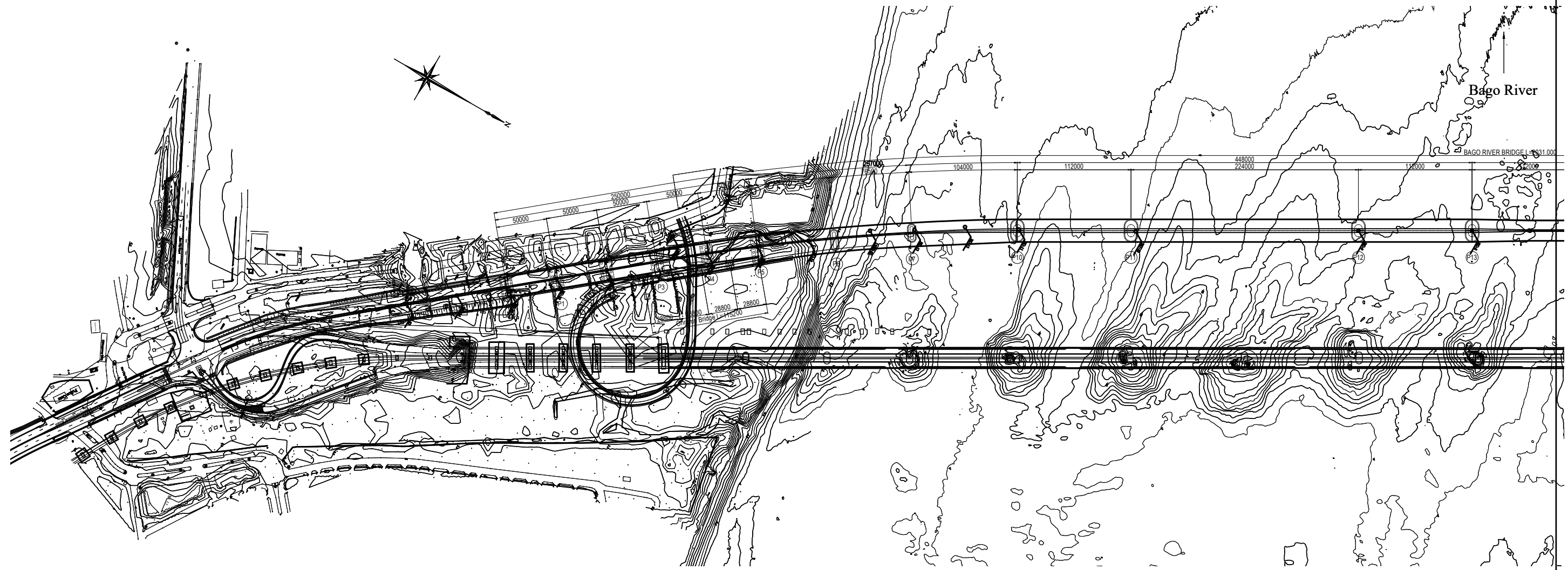
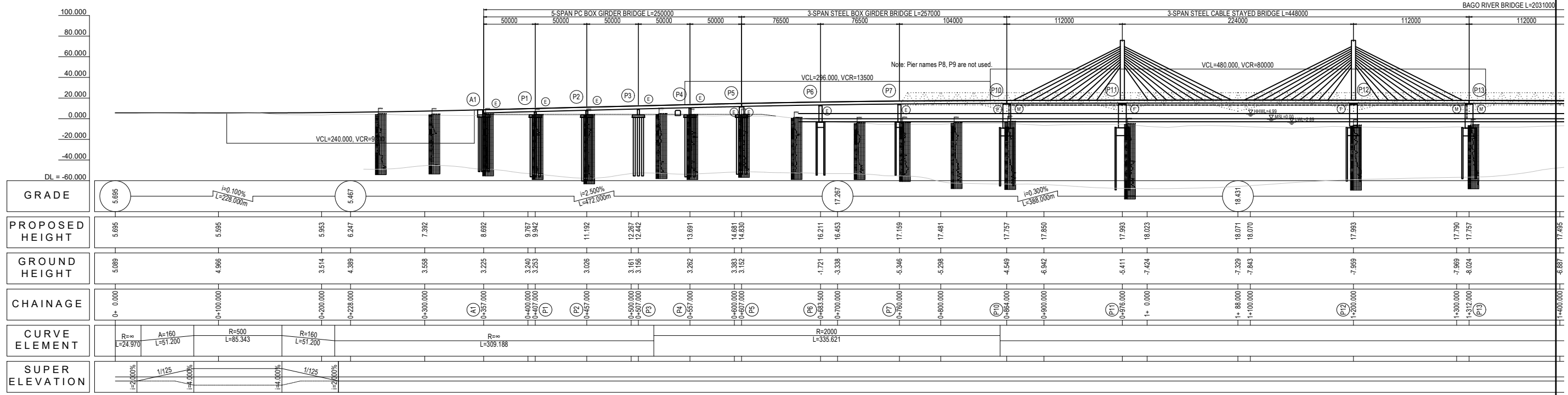
# LOCATION MAP

S=1:100,000



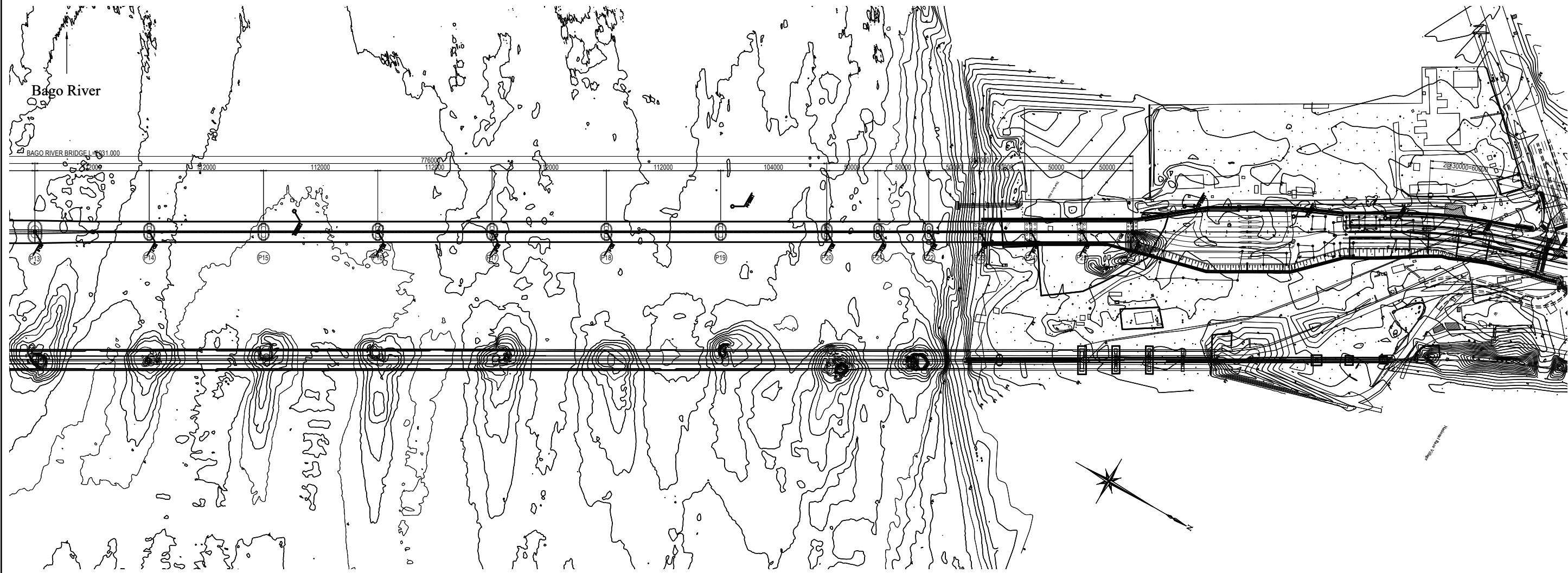
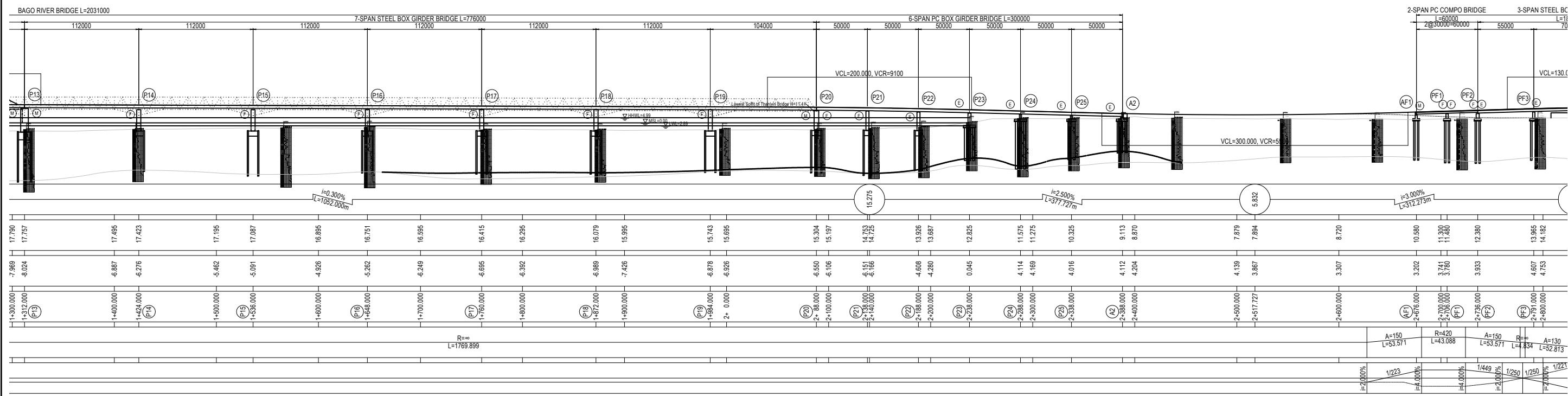
PROJECT NAME DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY JAPAN INTERNATIONAL COOPERATION AGENCY	COUNTERPART REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	JICA STUDY TEAM NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO., LTD. NIPPON ENGINEERING CONSULTANTS CO., LTD.	NAME	SIGNATURE	DATE	DRAWING TITLE  LOCATION MAP	PACKAGE 1 DWG No. P1-GE-0001	
				PREPARED BY	T. HAYAKAWA				15 Sep.2017
				CHECKED BY	T. HAYAKAWA				22 Sep.2017
				APPROVED BY	Y. SANO				29 Sep.2017





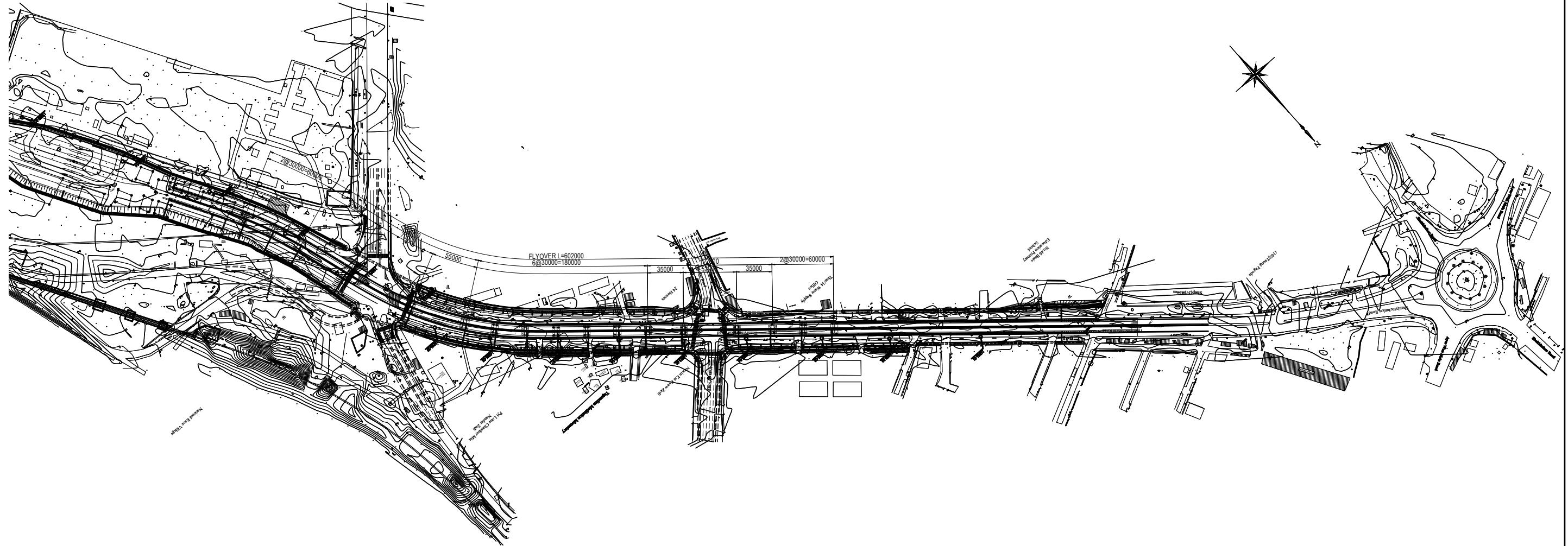
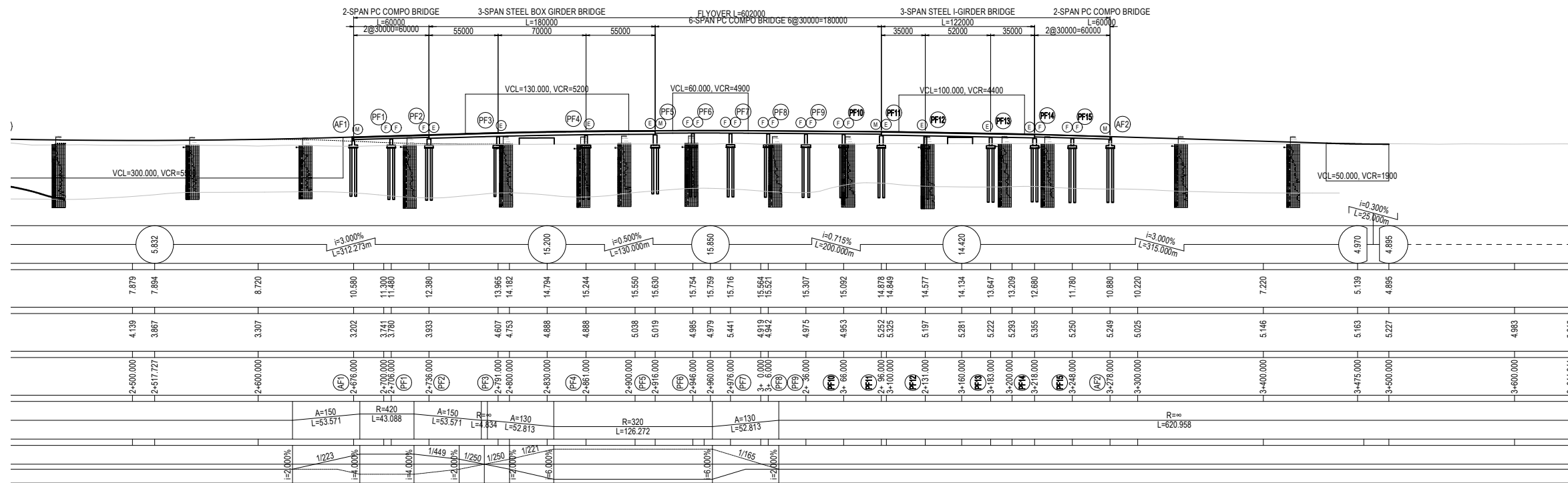
Elevation represents above MSL unless otherwise indicated.

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 BAGO RIVER BRIDGE (1)	PACKAGE	
				PREPARED BY	T. HAYAKAWA			29 Sept. 2017	1
				CHECKED BY	T. HAYAKAWA			3 Oct. 2017	DWG No.
				APPROVED BY	Y. SANO			6 Oct. 2017	P1-GE-0002



Elevation represents above MSL unless otherwise indicated.

PROJECT NAME DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	FINANCED BY JICA 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 BAGO RIVER BRIDGE (2)	PACKAGE 1 DWG No. P1-GE-0003
				PREPARED BY T. HAYAKAWA		29 Sept. 2017		
				CHECKED BY T. HAYAKAWA		3 Oct. 2017		
				APPROVED BY Y. SANO		6 Oct. 2017		



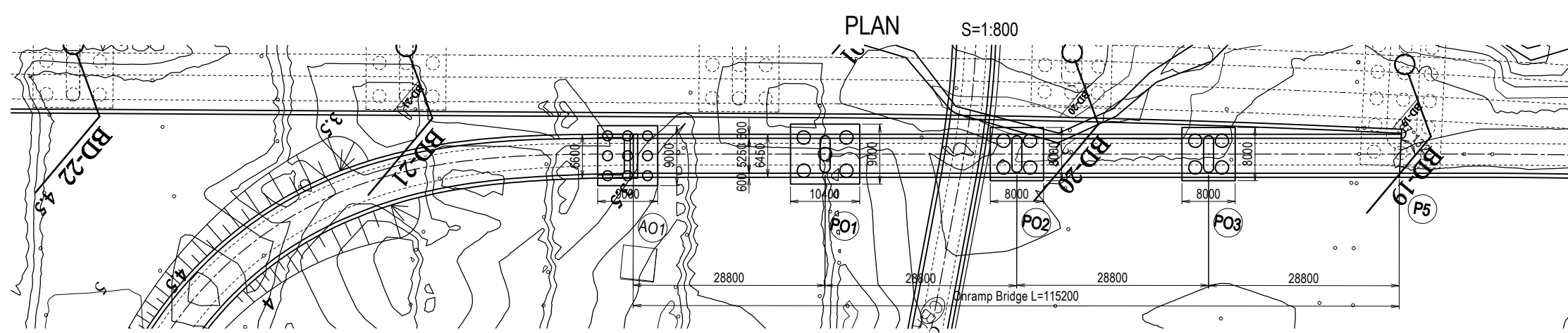
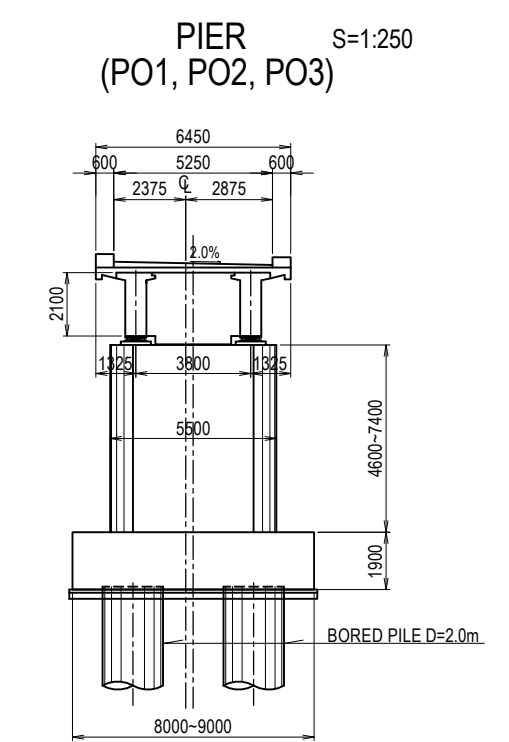
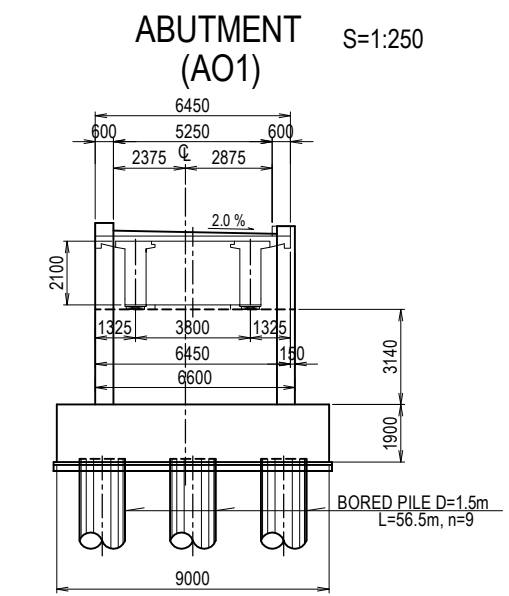
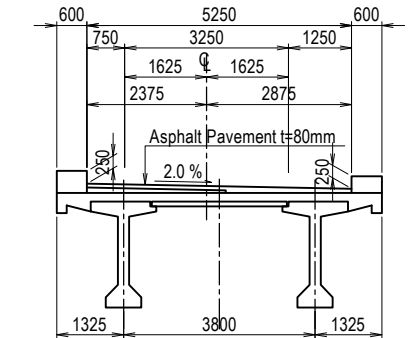
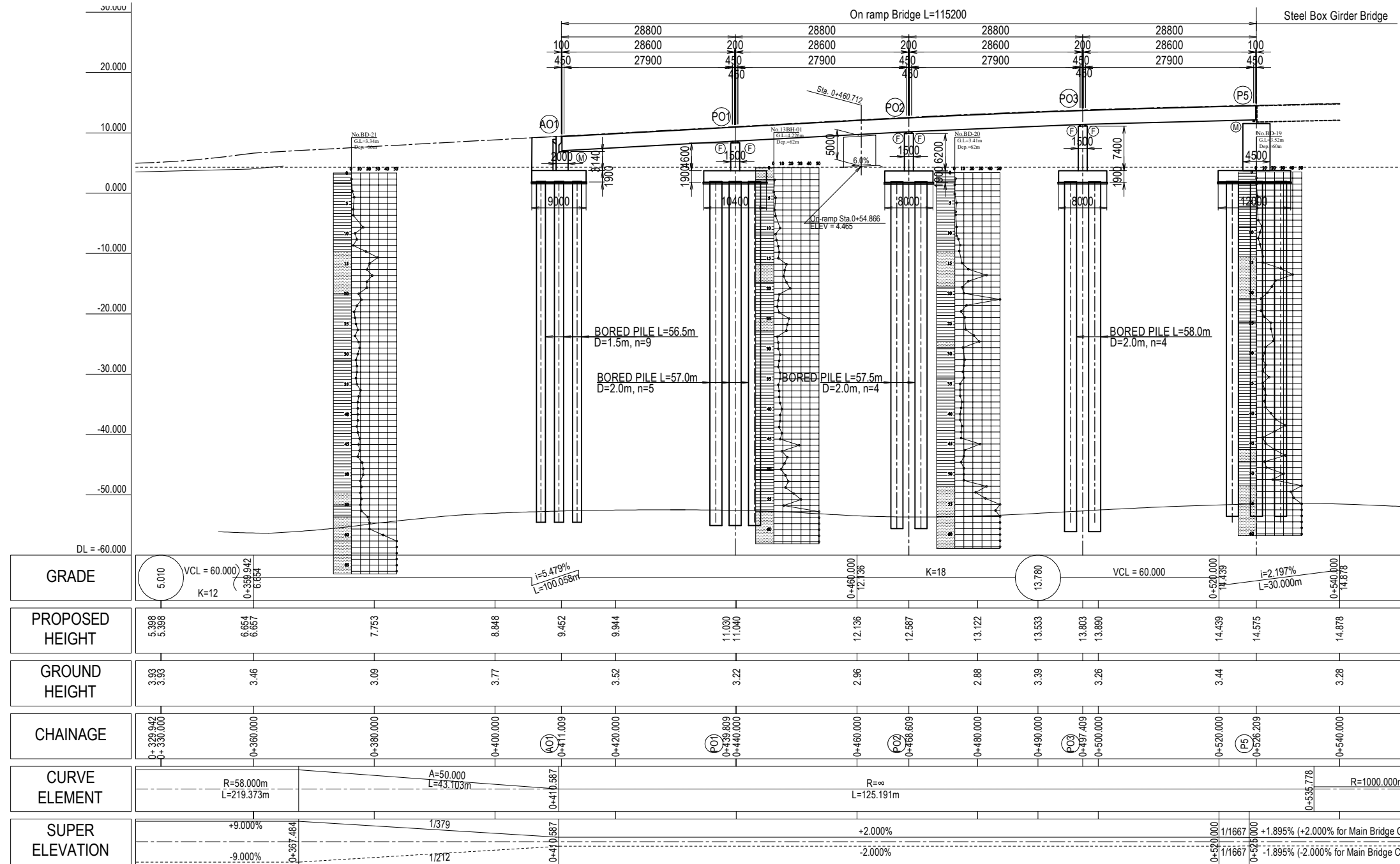
Elevation represents above MSL unless otherwise indicated.

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 BAGO RIVER BRIDGE (3)	PACKAGE	
				PREPARED BY	T. HAYAKAWA			29 Sept. 2017	1
				CHECKED BY	T. HAYAKAWA			3 Oct. 2017	DWG No.
				APPROVED BY	Y. SANO			6 Oct. 2017	P1-GE-004

# GENERAL VIEW OF ON-RAMP BRIDGE

ELEVATION S=1:800

TYPICAL CROSS SECTION S=1:150



# GENERAL NOTES (ROAD DESIGN)

## 1.0 SPECIFICATIONS

- 1.1 ALL WORKS SHALL COMPLY WITH THE AASHTO STANDARD SPECIFICATIONS FOR ROADS AND BRIDGES, AND WITH THE SPECIAL PROVISIONS & SUPPLEMENTAL SPECIFICATIONS PERTAINING TO THIS PROJECT.

## 2.0 DIMENSIONS

- 2.1 DISTANCES AND ELEVATIONS SHOWN ON THE PLANS ARE IN METERS (m) UNLESS OTHERWISE SPECIFIED.  
2.2 DIMENSIONS OF CULVERTS, BRIDGES AND OTHER STRUCTURES ARE MEASURED AND EXPRESSED IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.

## 3.0 STATIONING

- 3.1 STATIONING OF ROAD, BRIDGE, ELEMENTS OF CURVE FOR BOTH HORIZONTAL AND VERTICAL ALIGNMENTS ARE RECKONED FROM THE ROAD CENTERLINE.  
3.2 STATION TICK MARKS ARE SHOWN AT 20m INTERVAL AND STATION LABELS AT 100m INTERVAL. STATIONS ARE SHOWN ALSO AT LOCATIONS OF HORIZONTAL AND VERTICAL GEOMETRY.

## 4.0 HORIZONTAL AND VERTICAL ALIGNMENT

- 4.1 NO ALTERATION/CHANGE IN ALIGNMENT SHALL BE MADE UNLESS EXISTING FIELD CONDITIONS SO WARRANT AND ONLY UPON APPROVAL OF THE ENGINEER.  
4.2 FINISHED GRADE ELEVATIONS SHOWN ON THE PLAN AND PROFILE SHEET REFER TO THE FINISHED GRADE LEVEL AT ROAD CENTERLINE SHOWN ON THE TYPICAL ROADWAY SECTIONS. MODIFICATIONS CAN BE DONE ON DESIGN GRADES AND ELEVATIONS ONLY UPON APPROVAL OF THE ENGINEER.  
4.3 GROUND LEVEL SHOWN ON THE PLAN AND PROFILE SHEET REFERS TO THE ELEVATION OF THE ORIGINAL GROUND ALONG THE DESIGN ROAD CENTERLINE.

## 5.0 ROAD CONNECTIONS AND SHOULDER IMPROVEMENT

- 5.1 ROAD CONNECTIONS SHALL BE CONSTRUCTED BY THE CONTRACTOR AS SHOWN ON THE PLAN OR AS DIRECTED BY THE ENGINEER IN SUCH MANNER AS TO ENSURE SMOOTH CONNECTION AND GOOD RIDING QUALITY.  
5.2 THE SHOULDER STRUCTURE IS ASPHALT CONCRETE WITH VARYING WIDTHS. THE WIDTH MAY BE ADJUSTED DURING CONSTRUCTION TO SUIT EXISTING FIELD CONDITION UPON APPROVAL OF THE ENGINEER.

## 6.0 REMOVAL OF EXISTING UTILITIES, STRUCTURES AND OBSTRUCTIONS

- 6.1 ALL WORKS SHALL COMPLY WITH THE REQUIREMENTS AND CONDITIONS OF CONTRACT OF THE MINISTRY OF CONSTRUCTION.  
6.2 EXTREME PRECAUTION SHALL BE EXERCISED BY THE CONTRACTOR NOT TO DAMAGE ANY PORTION OF EXISTING UTILITIES DURING CONSTRUCTION. ANY DAMAGE THEREOF SHALL BE REPAIRED OR COMPENSATED ON THE ACCOUNT OF THE CONTRACTOR.

## 7.0 DRAINAGE STRUCTURES

- 7.1 EXACT LOCATIONS, SLOPES, OUTFALLS, AND INVERT ELEVATIONS OF DRAINAGE STRUCTURES SHALL BE CHECKED IN THE FIELD BY THE CONTRACTOR BEFORE MAKING ANY REMOVAL OR IMPROVEMENT. MINOR ADJUSTMENTS MAY BE MADE TO SUIT ACTUAL FIELD CONDITIONS UPON APPROVAL OF THE ENGINEER.  
7.2 EXISTING DRAINAGE STRUCTURES THAT ARE FAULTY, BROKEN DOWN, OR NOT IN GOOD WORKING CONDITION SHALL BE DETERMINED IN THE FIELD. RECONSTRUCTION, REPAIR AND/OR REPLACEMENT OF SAME SHALL BE DIRECTED BY THE ENGINEER, AND SHALL CONFORM TO THE STANDARDS SHOWN IN THE DRAWINGS.  
7.3 EXISTING DRAINAGE STRUCTURES OR PARTS THEREOF REMOVED BY THE CONTRACTOR THAT ARE STILL SERVICEABLE SHALL BE TURNED OVER TO THE GOVERNMENT AND SHALL BE DEPOSITED AT A PLACE DESIGNATED BY THE ENGINEER WITHOUT ANY EXTRA COMPENSATION. EXTREME PRECAUTIONS SHALL BE EXERCISED BY THE CONTRACTOR NOT TO DAMAGE THESE MATERIALS DURING THE REMOVAL AND HANDLING OPERATION.  
7.4 PRIOR TO INSTALLATION OF PIPE CULVERTS AND OTHER DRAINAGE STRUCTURES, ALL MATERIALS SHALL BE TESTED TO CHECK ANY DEFECT AND CONFORMITY WITH TECHNICAL SPECIFICATIONS.  
7.5 THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REPLACEMENT OF MATERIALS INSTALLED AND FOUND TO BE DEFICIENT IN WORKMANSHIP AND QUALITY.  
7.6 INLETS AND OUTLETS OF NEW AND OPERATIONAL EXISTING CULVERTS SHALL BE CHANNELIZED AND CLEARED OF DEBRIS AND OBSTRUCTIONS. THIS SHALL BE CONSIDERED AS SUBSIDIARY WORK OF OTHER DRAINAGE PAY ITEMS.  
7.7 ANY REVISION, REMOVAL, CLEANING, UNCLOGGING AND/OR RE-LAYING OF DRAINAGE STRUCTURES AS DIRECTED BY THE ENGINEER TO SUIT EXISTING FIELD CONDITION SHALL BE CONSIDERED AS SUBSIDIARY WORK PERTAINING TO OTHER CONTRACT ITEMS. NO DIRECT PAYMENT SHALL BE MADE FOR THIS WORK UNLESS OTHERWISE SPECIFICALLY IDENTIFIED FOR PAYMENT IN THE BID SCHEDULE.

## 8.0 OPEN DITCHES (LINED CANAL AND EARTH DITCH)

- 8.1 ALL DITCHES SHALL COMPLY WITH THE REQUIRED STANDARDS.  
8.2 INVERT ELEVATIONS AND EXACT LOCATION AND DIMENSION OF OPEN DITCHES MAYBE ADJUSTED IN THE FIELD AS DIRECTED BY THE ENGINEER.

## 9.0 MISCELLANEOUS STRUCTURES

- 9.1 LOCATION AND LENGTH OF GUARDRAILS, SLOPE PROTECTIONS SUCH AS GROUTED RIPRAP, STONE MASONRY RETAINING WALLS AND OTHER STRUCTURES ARE SUBJECT TO ADJUSTMENT TO SUIT EXISTING FIELD CONDITIONS UPON APPROVAL OF THE ENGINEER.  
9.2 GROUTED RIPRAP AND/OR RIPRAP, STONE MASONRY SHOULD BE WELL CONSTRUCTED AS SPECIFIED IN THE STANDARD SPECIFICATION FOR THE SAID ITEM.  
9.3 CUT SLOPE CONSTRUCTION SHALL BE DONE AT PACE WITH EMBANKMENT CONSTRUCTION TO AVOID SLIDING OF FILL MATERIALS.

## 10.0 OTHERS

- 10.1 ALL SCHEDULES/LISTINGS FOR GUARDRAILS, SLOPE PROTECTION STRUCTURES, PAVEMENT MARKINGS, ROAD SIGNS AND ALL OTHER RELATED SCHEDULES/LISTINGS SHOWN ON THE PLANS ARE SUBJECT TO ADJUSTMENT/MODIFICATION TO SUIT ACTUAL FIELD CONDITION. THE ENGINEER MAY ORDER IN WRITING THE CONSTRUCTION/INSTALLATION OF NEW STRUCTURES/OR MISCELLANEOUS ITEMS IF IN HIS OPINION IS DEEMED NECESSARY IN ADDITION TO THE APPROVED SCHEDULES AND LISTINGS.  
10.2 ADEQUATE ROAD SIGNAGE AND SAFETY PRECAUTION SHALL BE PROVIDED TO INFORM, WARN AND ALERT MOTORISTS DURING CONSTRUCTION.

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 NOTES (ROAD DESIGN)	PACKAGE	
				PREPARED BY	T. HAYAKAWA			15 Sep.2017	1
				CHECKED BY	T. HAYAKAWA			22 Sep.2017	DWG No.
				APPROVED BY	Y. SANO			29 Sep.2017	P1-GE-1011

# GENERAL NOTES (PC BOX GIRDER BRIDGE)

## 1. GENERAL DESCRIPTION

- 1) A bridge with 4-lane road with width 3.5m/lane have been provided.
- 2) All drawings are to be read in conjunction with the technical specification.
- 3) All chainages, coordinates and elevations are shown in meter.
- 4) All dimensions are shown in millimeters.
- 5) WGS84 UTM coordinate system is applied.
- 6) Vertical control is based on the BM. 76097 established by Myanmar Survey Department.
- 7) Dimensions shown in the drawing are ones after the period of calculation of creep and/or shrinkage.

## 2. DESIGN CODES

The structure shall be designed in accordance with Specifications for Highway Bridges of Japan Road Associations (JSHB, 2012).

## 3. DESIGN LOADS

- 1) Dead loads
- 2) Live loads  
AASHTO HL-93
- 3) Shrinkage and creep
- 4) Effect of temperature  
+10°C to +40°C (25°C ± 15°C)
- 5) Wind load  
W=44.7m/sec
- 6) Effect of earthquake  
Horizontal seismic coefficient K=0.30
- 7) Earth pressure
- 8) Water pressure
- 9) Buoyant Force

## 4. RIVER CONDITION

	Elevation	Remarks
High Water Level (H.W.L.)	MSL +4.990	100 year flood
H.W.L. for temporary work	MSL +4.340	5 year flood
Low Water Level (L.W.L.)	MSL -2.39	Designed River Bed Level
River Bed Level	A1 N/A	
	A2 side or P20~P22 MSL -7.490	

## 5. CONCRETE

- 1) Unless otherwise indicated the strength of concrete shall be of the following grade based on 28 days cylinder strength.

Strength (MPa)	Structural member
50	Precast segment & CIP portion for PC box girder
40	Main girder for PC-I GIRDER
30	RC CIP slab, crossbeam and connection for PC-I girder Pier head and column : P4 through P23 Cast-In-Place RC pile
24	RC concrete: general, wheel guard.... Abutment A1 , A2 and AO1 Pier for P1 to P3,P24,P25,PO1 to PO3 Footing : P4 through P23
21	Seal concrete (Bottom slab concrete, Filling inside of SPSP)
18	Blinding concrete, etc

- 2) Grouting mortar with  $f_{Dck} = 45\text{MPa}$  is used .
- 3) All exposed edges of concrete shall be chamfered 20x20 mm unless noted otherwise.

## 6. REINFORCEMENT

- 1) Unless otherwise indicated reinforcement bar shall be high strength deformed bar confirming to the requirement of JIS G 3112.

Class	Yield point or 0.2% proof stress (MPa)	Tensile stress (MPa)	Structural member
SD390	>>390	>>560	Pier column axial rebar :P4 through P23
SD345	>>345	>>490	Superstructure, substructure, Stud rebar
SD295	>>295	>>440	Accessories (saddle)

- 2) Clear cover to reinforcement as follows unless otherwise stated on the component of drawings.

Structural member	Cover (mm)
Cast in situ pile	120
Pile cap	70
Pier, abutment and approach slab	70
Pier beam	50
Main girder	35
Slab, wheel guard	30

- 3) Minimum requirements for development length and lap length for reinforcement bar shall be comply to the JSHB. Mechanical splice shall be used for the connection of reinforcement bars 35mm of diameter or exceeded instead of lap joint.

		SD345									
Diameter		D13	D16	D19	D22	D25	D29	D32	D35	D38	
Length la (mm)	$\sigma = 40\text{N/mm}^2$	330	400	480	550	630	730	800	1160		
	$\sigma = 36\text{N/mm}^2$	340	420	500	580	660	760	840	1210		
	$\sigma = 30\text{N/mm}^2$	370	450	530	620	700	810	890	980	1060	
	$\sigma = 24\text{N/mm}^2$	410	510	600	690	790	910	1010	1100	1190	
		SD390									
Length la (mm)	$\sigma = 30\text{N/mm}^2$	420	520	610	710	800	930	1030	1120	1220	
	$\sigma = 24\text{N/mm}^2$	470	580	690	790	900	1050	1150	1260	1370	

## 7. PRESTRESSING STEEL

- 1) Unless otherwise indicated prestressing steel shall be low relaxation strand confirming to the requirement of JIS G 3536 or JIS G 3109.

Class	Grade	Structural member
19S15.2mm ECF strand	SWPR7BL	External tendon for PC box girder
12S15.2mm strand	SWPR7BL	Internal tendon for PC box girder(longitudinal)
3S12.7mm strand	SWPR7BL	Internal tendon for PC box girder(transverse)
4S15.2mm strand	SWPR7BL	Internal tendon for PC box girder(crossbeam)
$\phi 32$ bar	SWPR930/1080	Internal tendon for PC box girder(crossbeam)
12S12.7mm strand	SWPR7BL	Internal tendon for PC-I girder(longitudinal)
1S19.3mm strand	SWPR7A	Internal tendon for precast PC panel of PC -I girder
$\phi 32$ bar	SWPR930/1080	Internal tendon for PC-I girder(crossbeam)

## 8. STEEL PIPE SHEET PILE

- 1) Unless otherwise indicated steel pipe sheet pile shall be confirming to the requirement of JIS A 5530 or JIS G 3444.

Class	Yield point or proof stress (MPa)	Tensile stress (MPa)	Structural member
SKY490	>>315	>>490	Steel pipe sheet pile
SKY400	>>235	>>400	Steel pipe sheet pile
STK400	>>235	>>400	Joint pipe for steel pipe sheet pile

## 9. OTHER STRUCTURE

- 1) Bearings and Anchor bars shall satisfy the requirement of the force and displacement stated on the Drawings.
- 2) Expansion joint shall satisfy the requirement of the displacement stated on the Drawings.

Note : This general notes is not applicable to the following structures;

- Cable stayed bridge
- Piers P10 through P13

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 NOTES (PC BOX GIRDER BRIDGE)	1
				CHECKED BY T. HAYAKAWA		20 Jun.2017		DWG No.
				APPROVED BY Y. SANO		21 Jun.2017		P1-GE-1021

# GENERAL NOTES

## (STEEL BOX GIRDER BRIDGE)

### 1. GENERAL DESCRIPTION

- 1) A bridge with 4-lane road with width 3.5m/lane have been provided.
- 2) All drawings are to be read in conjunction with the technical specification.
- 3) All chainages, coordinates and elevations are shown in meter.
- 4) All dimensions are shown in millimeters.
- 5) WGS84 UTM coordinate system is applied.
- 6) Vertical control is based on the BM. 76097 established by Myanmar Survey Department.

### 2. DESIGN CODES

The structure shall be designed in accordance with Specifications for Highway Bridges of Japan Road Associations (JSHB, 2012).

### 3. DESIGN LOADS

- 1) Dead loads
- 2) Live loads  
AASHTO HL-93
- 3) Effect of temperature  
+10°C to +40°C (25°C ± 15°C)
- 4) Wind load  
W=44.7m/sec
- 5) Effect of earthquake  
Horizontal seismic coefficient K=0.30
- 6) Earth pressure
- 7) Water pressure
- 8) Buoyant Force
- 9) Collision Load

### 4. RIVER CONDITION

	Elevation	Remarks
High Water Level (H.W.L.)	MSL +4.990	100 year flood
H.W.L. for temporary work	MSL +4.340	5 year flood
Low Water Level (L.W.L.)	MSL -2.39	
River Bed Level	P6 MSL-1.721m P7 MSL-5.346m	Designed River Bed Level

### 5. CONCRETE

- 1) Unless otherwise indicated the strength of concrete shall be of the following grade based on 28 days cylinder strength.

Strength (MPa)	Structural member
30	Pier head and column : P6 and P7
24	RC concrete: concrete curb, foundation of lighting pole, connection with expansion joint Footing : P6 and P7
21	Seal concrete (Bottom slab concrete, Filling inside of SPSP)

- 2) All exposed edges of concrete shall be chamfered 20x20 mm unless noted otherwise.

### 6. REINFORCEMENT

- 1) Unless otherwise indicated reinforcement bar shall be high strength deformed bar conforming to the requirement of JIS G 3112.

Class	Yield point or 0.2% proof stress (MPa)	Tensile stress (MPa)	Structural member
SD345	>>345	>>490	Superstructure, Substructure, Foundation

- 2) Clear cover to reinforcement as follows unless otherwise stated on the component of drawings.

Structural member	Cover (mm)
Footing, Pier	70
Pier beam	50
Concrete curb etc.	30

- 3) Minimum requirements for development length and lap length for reinforcement bar shall be comply to the JSHB. Mechanical splice shall be used for the connection of reinforcement bars 35mm of diameter or exceeded instead of lap joint.

		SD345									
Diameter		D13	D16	D19	D22	D25	D29	D32	D35	D38	
Length la (mm)	$\sigma=40\text{N/mm}^2$	330	400	480	550	630	730	800	1160		
	$\sigma=36\text{N/mm}^2$	340	420	500	580	660	760	840	1210		
	$\sigma=30\text{N/mm}^2$	370	450	530	620	700	810	890	980	1060	
	$\sigma=24\text{N/mm}^2$	410	510	600	690	790	910	1010	1100	1190	

### 7. STRUCTURAL STEEL

Structural steel for steel box girder shall comply with the below, unless otherwise indicated on the drawings.

Standard	Designation(Class)	Structural Member
JIS G 3101	SS400	Fabricated steel for main girder
JIS G 3106	SM400	Ditto
	SM490Y	Ditto
	SM520	Ditto
	SM570	Ditto
	SM570	Ditto
	SM570-H	Ditto
JS G 3444	STK400	Shapes
	STK490	Shapes
*	S10T	High strength bolt for splice joints
JIS B 1186	F8T	Galvanized high strength bolt
	F10T	High strength bolt

\* Applied to Technical Specification

### 8. STEEL PIPE SHEET PILE

- 1) Unless otherwise indicated steel pipe sheet pile shall be conforming to the requirement of JIS A 5530 or JIS G 3444.

Class	Yield point or proof stress (MPa)	Tensile stress (MPa)	Structural member
SKY400	>>235	>>400	Steel pipe sheet pile
STK400	>>235	>>400	Joint pipe for steel pipe sheet pile

### 9. OTHER STRUCTURE

- 1) Bearings and Anchor bars shall satisfy the requirement of the force and displacement stated on the Drawings.
- 2) Expansion joint shall satisfy the requirement of the displacement stated on the Drawings.

PROJECT NAME	FINANCED BY	COUNTERPART	JICA STUDY TEAM	NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	JAPAN INTERNATIONAL COOPERATION AGENCY	REPUBLIC OF THE UNION OF MYANMAR MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGE	NIPPON KOEI CO., LTD. ORIENTAL CONSULTANTS GLOBAL CO., LTD. METROPOLITAN EXPRESSWAY COMPANY LIMITED CHODAI CO., LTD. NIPPON ENGINEERING CONSULTANTS CO., LTD.	PREPARED BY S. IMADA CHECKED BY T. HAYAKAWA APPROVED BY Y. SANO	  	29 Sept.2017 3 Oct.2017 6 Oct.2017	GENERAL NOTES (STEEL BOX GIRDER BRIDGE)	1 DWG No. P1-GE-1031

# GENERAL NOTES (STEEL CABLE STAYED BRIDGE)

## 1. GENERAL

- 1) A bridge with 4-lane road with width 3.5m/lane have been provided.
- 2) All drawings are to be read in conjunction with the technical specification.
- 3) All chainages, coordinates and elevations are shown in meter.
- 4) All dimensions are shown in millimeters.
- 5) WGS84 UTM coordinate system is applied.
- 6) Vertical control is based on the BM. 76097 established by Myanmar Survey Department.

## 2. DESIGN CODES

The structure shall be designed in accordance with Specifications for Highway Bridges of Japan Road Associations (JSHB, 2012).  
The design live load shall comply with AASHTO LRFD Bridge Design Specifications.

## 3. DESIGN LOADS

- 1) Dead loads
- 2) Live loads: AASHTO HL-93
- 3) Effect of temperature: +10°C to +40°C (25°C ± 15°C)
- 4) Wind load: W=44.7m/sec (3 sec instantaneous wind speed)  
[30m/sec (10 min average wind speed)]
- 5) Effect of earthquake: Horizontal seismic coefficient K=0.30
- 6) Earth pressure
- 7) Water pressure
- 8) Buoyant Force
- 9) Collision Load

## 4. RIVER CONDITION

	Elevation	Remarks
High Water Level (H.W.L.)	MSL +4.990	100 year flood
H.W.L. for temporary work	MSL +4.340	5 year flood
Low Water Level (L.W.L.)	MSL -2.390	
River Bed Level	P10 MSL-4.55m P11 MSL-5.41m P12 MSL-7.96m P13 MSL-8.02m	Designed River Bed Level

## 5. CONCRETE

- 1) Unless otherwise indicated the strength of concrete shall be of the following grade based on 28 days cylinder strength.

Strength (MPa)	Structural Member
30	Pier head and column
24	Concrete curb, Connection with pile head and footing, Footing
21	Bottom slab concrete
18	Filling inside of SPSP

- 2) All exposed edge of concrete shall be chamfered 20x20mm unless noted otherwise.

## 6. REINFORCEMENT

- 1) Unless otherwise indicated the reinforcement bar shall be high strength deformed bar conforming to the requirement of JIS G 3112.

Class	Yield point or 0.2% proof stress (MPa)	Tensile stress (MPa)	Structural member
SD345	>>345	>>490	Substructure, Stud rebar

- 2) Crear cover to reinforcement as follwos unless otherwise stated on the componets of drawings.

Structural member	Cover (mm)
Footing, Pier	70
Pier beam	50
Concrete curb etc.	40

- 3) Minimum requirement for development length and lap length for reinforcement bar shall be comply to the JSHB. Mechanical splice shall be used for the connection of reinforcement bars 35mm of diameter or exceeded instead of lap joint.

		SD345									
Diameter		D13	D16	D19	D22	D25	D29	D32	D35	D38	
Length la (mm)	σ=40N/mm2	330	400	480	550	630	730	800	1160		
	σ=36N/mm2	340	420	500	580	660	760	840	1210		
	σ=30N/mm2	370	450	530	620	700	810	890	980	1060	
	σ=24N/mm2	410	510	600	690	790	910	1010	1100	1190	
		SD390									
Length la (mm)	σ=30N/mm2	420	520	610	710	800	930	1030	1120	1220	
	σ=24N/mm2	470	580	690	790	900	1050	1150	1260	1370	

## 7. NOTES FOR STEEL STRUCTURE

- 1) All cope holes are to be 35mm radius unless noted otherwise.
- 2) All materials shall be applicable criteria or equivalent in accordance with the technical specification.
- 3) Unless otherwise indicated the steel superstructure is symmetric about C bridge and about the main span.
- 4) The position and methods of field connections (bolted connections and yard welding) shown in the drawings are one of the typical options, the contractor can propose an alternative which shall comply with all the relevant requirements of the specification. In that case, the contractor shall perform calculations and detailed design for that proposal. Any additional cost incurred by the change for his own convenience is at the contractor's responsibility.

## 8. STRUCTURAL STEEL

- 1) Unless noted otherwise structural steel plates shall be in accordance with:

STEEL GRADE	STANDARD
SS400	JIS G 3101
SM400,SM490Y SM520,SM570	JIS G 3106

- 2) Unless noted otherwise section steel shall be in accordance with:

TYPE	STEEL GRADE	STANDARD
ANGLE SECTION	SS400	JIS G 3192
CHANNEL	SS400	JIS G 3192
CIRCULAR HOLLOW SECTION	STK400	JIS G 3444
RECTANGLAR HOLLOW SECTION	STKR400	JIS G 3466

## 9. WELDING OF STRUCTURAL STEEL

- 1) Welding symbols are in accordance with ISO 2553: 1992.
- 2) Dimensions of fillet welds are throat thickness.
- 3) Butt welds: Weld class B in accordance with the specification unless noted otherwise. Fillet Welds: Weld class C in accordance with the specification unless noted otherwise.
- 4) Fillet weld size shall be in accordance with the following table unless noted otherwise.

THICKNESS OF PLATE (THICKER PART) (mm)	MINIMUM FILLET WELD THROAT SIZE (mm)
t ≤ 8	4
8 < t ≤ 12	5
12 < t ≤ 18	6
18 < t ≤ 24	7
24 < t ≤ 32	8
32 < t ≤ 40	9
40 < t ≤ 50	10
50 < t ≤ 60	11
60 < t ≤ 72	12
72 < t ≤ 84	13
84 < t ≤ 98	14

- 5) Fillet weld for stress member shall be 6mm or more in accordance with the JSBH.
- 6) Welds shall be airtight.
- 7) Relocation of erection/section welds is subject to the approval of engineer.

## 10. BOLTS

- 1) Unless noted otherwise bolts and assemblies shall be in accordance with:

TYPE	GRADE OF BOLT	GRADE OF NUT	STANDARD
ISO METRIC PRECISION HEXAGON BOLTS, SCREWS AND NUTS	4.6	5	JIS B 1180, JIS B 1181

- 2) Where high strength friction grip bolt are indicated they shall be in accordance with:

TYPE	GRADE OF BOLT	GRADE OF NUT	STANDARD
HSFG BOLTS AND ASSOCIATED NUTS	F10T S10T	F10T S10T	JIS B 1186 JSS II 09-1996

- 3) HSFG Bolt holes shall be 24.5mm diameter unless noted otherwise.
- 4) Unless noted otherwise the slip factor at friction grip surfaces for HSFG bolts shall be at least 0.40.
- 5) Nuts for Non-HSFG bolts shall be nipped up tight (i.e. not torqued) and shall be secured by locking devices or other mechanical means.
- 6) Unless noted otherwise all bolts, screws and nuts shall be hot-dip galvanized.

## 11. STAY CABLE

Strands for stay cable (7 wire strands) shall be in accordance with JIS G 3536 or ASTM A 416 or equivalent.

## 12. CORROSION PROTECTION AND PAINT APPRICATION

Metal coating and painting systems are shown in the specifications.

## 13. ERECTION

- 1) Be sure to secure an opening for installation of a hanging ring on the erection scaffold, at the location of the erection joint of the main girder and tower. Also, make sure to infill the opening with a bolt after erection.
- 2) As for the bent erection range between back spans and main span, be sure to install separately a stiffener at the bent location of the main girder.
- 3) The Contractor shall install necessary temporary member for construction work (stiffener, hanging metal and etc.) in accordance with the proposed erection methods.

## 14. STEEL PIPE SHEET PILE

- 1) Unless otherwise indicated steel pipe sheet pile shall be conforming to the requirement of JIS A 5530 or JIS A 3444.

Class	Yield point or proof stress (MPa)	Tensile stress (MPa)	Structural member
SKY490	>>315	>>490	Steel pipe sheet pile
SKY400	>>235	>>400	Steel pipe sheet pile
STK400	>>235	>>400	Joint pipe for steel pipe sheet pile

## 15. OTHER STRUCTURE

- 1) Bearing and anchor bars shall satisfy the requirement of force and displacement stated on the Drawings.
- 2) Expansion joint shall satisfy the requirement of the displacement stated on the Drawings.
- 3) Base, bolt hole and hole for erectric wire for electrical equipments shall be adjusted and installed in accordance with the actual electrical equipments (road lighting, light-up for tower and pier, navigation sign and light, aircraft warning light, lighting conductor and etc.) to be used.

## 16. ABBREVIATIONS

☐	CENTER LINE
N.T.S.	NOT TO SCALE
WP	WORKING POINT
EW	ERECTION WELD
YW	YARD WELD
EJ	ERECTION JOINT
YJ	YARD JOINT
APPROX.	APPROXIMATELY
PL	PLATE
THK	THICK
LG	LONG
DIA	DIAMETER
DIA	DIAPHRAGM
R	RADIUS
DWG	DRAWING
Var.	VARIES
EQ.	EQUAL
w/	WITH
TYP.	TYPICAL
TC	TANGENT TO CURVE
CC	CURVE TO CURVE
SYMM ABT.	SYMMETRIC ABOUT
U.N.O	UNLESS NOTED OTHERWISE
HORIZ.	HORIZONTAL
VERT.	VERTICAL
LONGIT.	LONGITUDINAL
DEV.	DEVELOPMENT
CONT	CONTINUE
RB	ROUND BAR
L	L-SHAPE STEEL
CH	CHANNEL
HSFG	HIGH STRENGTH FRICTION GRIP
B.N.	BOLT & NUT
STIFF.	STIFFENER
FLG	FLANGE
BRKT	BRACKET
EL.	ELEVATION
B.S.	BOTH SIDES
F.S.	FAR SIDE
N.S.	NEAR SIDE

## 17. LEGENDS

- WORK POINT
- ⊗ MATCH LINE

PROJECT NAME	FINANCED BY	COUNTERPART	JICA STUDY TEAM	NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	JICA 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.	T.TOMODA			GENERAL NOTES (STEEL CABLE STAYED BRIDGE)	1
				T. HAYAKAWA				DWG No.
				Y. SANO				P1-GE-1041



# GENERAL NOTES (ON-RAMP BRIDGE)

## 1. GENERAL DESCRIPTION

- 1) A bridge with 4-lane road with width 3.5m/lane have been provided.
- 2) All drawings are to be read in conjunction with the technical specification.
- 3) All chainages, coordinates and elevations are shown in meter.
- 4) All dimensions are shown in millimeters.
- 5) WGS84 UTM coordinate system is applied.
- 6) Vertical control is based on the BM. 76097 established by Myanmar Survey Department.
- 7) Dimensions shown in the drawing are ones after the period of calculation of creep and/or shrinkage.

## 2. DESIGN CODES

The structure shall be designed in accordance with Specifications for Highway Bridges of Japan Road Associations (JSHB, 2012).

## 3. DESIGN LOADS

- 1) Dead loads
- 2) Live loads  
AASHTO HL-93
- 3) Shrinkage and creep
- 4) Effect of temperature  
+10°C to +40°C (25°C ± 15°C)
- 5) Wind load  
W=44.7m/sec
- 6) Effect of earthquake  
Horizontal seismic coefficient K=0.30
- 7) Earth pressure
- 8) Water pressure
- 9) Buoyant Force

## 4. RIVER CONDITION

	Elevation	Remarks
High Water Level (H.W.L.)	MSL +4.990	100 year flood
H.W.L. for temporary work	MSL +4.340	5 year flood
Low Water Level (L.W.L.)	MSL -2.39	
River Bed Level	A1 N/A A2 side or P20~P22 MSL -7.490	Designed River Bed Level

## 5. CONCRETE

- 1) Unless otherwise indicated the strength of concrete shall be of the following grade based on 28 days cylinder strength.

Strength (MPa)	Structural member
50	Precast segment & CIP portion for PC box girder
40	Main girder for PC-I GIRDER
30	RC CIP slab, crossbeam and connection for PC-I girder Pier head and column : P4 through P23 Cast-In-Place RC pile
24	RC concrete: general, wheel guard.... Abutment A1 , A2 and AO1 Pier for P1 to P3,P24,P25,PO1 to PO3 Footing : P4 through P23
21	Seal concrete (Bottom slab concrete, Filling inside of SPSP)
18	Blinding concrete, etc

- 2) Grouting mortar with  $f_{Dck} = 45\text{MPa}$  is used .
- 3) All exposed edges of concrete shall be chamfered 20x20 mm unless noted otherwise.

## 6. REINFORCEMENT

- 1) Unless otherwise indicated reinforcement bar shall be high strength deformed bar confirming to the requirement of JIS G 3112.

Class	Yield point or 0.2% proof stress (MPa)	Tensile stress (MPa)	Structural member
SD390	>>390	>>560	Pier column axial rebar :P4 through P23
SD345	>>345	>>490	Superstructure, substructure, Stud rebar
SD295	>>295	>>440	Accessories (saddle)

- 2) Clear cover to reinforcement as follows unless otherwise stated on the component of drawings.

Structural member	Cover (mm)
Cast in situ pile	120
Pile cap	70
Pier, abutment and approach slab	70
Pier beam	50
Main girder	35
Slab, wheel guard	30

- 3) Minimum requirements for development length and lap length for reinforcement bar shall be comply to the JSHB. Mechanical splice shall be used for the connection of reinforcement bars 35mm of diameter or exceeded instead of lap joint.

		SD345									
Diameter		D13	D16	D19	D22	D25	D29	D32	D35	D38	
Length la (mm)	$\sigma = 40\text{N/mm}^2$	330	400	480	550	630	730	800	1160		
	$\sigma = 36\text{N/mm}^2$	340	420	500	580	660	760	840	1210		
	$\sigma = 30\text{N/mm}^2$	370	450	530	620	700	810	890	980	1060	
	$\sigma = 24\text{N/mm}^2$	410	510	600	690	790	910	1010	1100	1190	
		SD390									
Length la (mm)	$\sigma = 30\text{N/mm}^2$	420	520	610	710	800	930	1030	1120	1220	
	$\sigma = 24\text{N/mm}^2$	470	580	690	790	900	1050	1150	1260	1370	

## 7. PRESTRESSING STEEL

- 1) Unless otherwise indicated prestressing steel shall be low relaxation strand confirming to the requirement of JIS G 3536 or JIS G 3109.

Class	Grade	Structural member
19S15.2mm ECF strand	SWPR7BL	External tendon for PC box girder
12S15.2mm strand	SWPR7BL	Internal tendon for PC box girder(longitudinal)
3S12.7mm strand	SWPR7BL	Internal tendon for PC box girder(transverse)
4S15.2mm strand	SWPR7BL	Internal tendon for PC box girder(crossbeam)
$\phi 32$ bar	SWPR930/1080	Internal tendon for PC box girder(crossbeam)
12S12.7mm strand	SWPR7BL	Internal tendon for PC-I girder(longitudinal)
1S19.3mm strand	SWPR7A	Internal tendon for precast PC panel of PC -I girder
$\phi 32$ bar	SWPR930/1080	Internal tendon for PC-I girder(crossbeam)

## 8. STEEL PIPE SHEET PILE

- 1) Unless otherwise indicated steel pipe sheet pile shall be confirming to the requirement of JIS A 5530 or JIS G 3444.

Class	Yield point or proof stress (MPa)	Tensile stress (MPa)	Structural member
SKY490	>>315	>>490	Steel pipe sheet pile
SKY400	>>235	>>400	Steel pipe sheet pile
STK400	>>235	>>400	Joint pipe for steel pipe sheet pile

## 9. OTHER STRUCTURE

- 1) Bearings and Anchor bars shall satisfy the requirement of the force and displacement stated on the Drawings.
- 2) Expansion joint shall satisfy the requirement of the displacement stated on the Drawings.

















Note : This general notes is not applicable to the following structures;

- Cable stayed bridge
- Piers P10 through P13

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 NOTES (ON-RAMP BRIDGE)	1
				CHECKED BY T. HAYAKAWA		20 Jun.2017		DWG No.
				APPROVED BY Y. SANO		21 Jun.2017		P1-GE-1051

# GENERAL NOTES (LIGHTING)

## LEGEND



























-  : Concrete pole
-  : Steel pole
-  : Traffic signal controller
-  : Vehicle traffic signal
-  : Arrow sign traffic signal
-  : Pedestrian signal
-  : Push-button switch
-  : Junction box
-  : Power supply box
-  : Pull box
-  : Hand hole
-  : Raising underground pipe
-  : Base mounted pole signal head pole (with arm)
-  : Pedestrian signal head pole (with push-button)
-  : Underground piping
-  : Underground wiring
- SVV : Control -use vinyl insulated vinyl sheathed cable
- IV : Indoor PVC
- E : Grounding
- G : Vehicle traffic signal : Green light
- Y : Vehicle traffic signal : Yellow light
- R : Vehicle traffic signal : Red light
- A : Arrow traffic signal : Green light
- PG : Pedestrian signal lamp : Green light
- PR : Pedestrian signal lamp : Red light
- COM : Common for all indication



## GENERAL NOTES

1. THE ELECTRICAL WORKS SHALL BE DONE UNDER THE DIRECT SUPERVISION OF THE DUTY REGISTERED ELECTRICAL ENGINEER.
2. THE CONTRACTOR SHALL SECURE ALL PERMITS AND PAY ALL FEES REQUIRED FOR ELECTRICAL INSTALLATION WORKS AND FURNISH THE OWNER, THROUGH THE ENGINEER, THE FINAL CERTIFICATE OF ELECTRICAL INSPECTION AND APPROVAL FROM PROPER GOVERNMENT AUTHORITIES FOR THE COMPLETE ELECTRICAL WORKS.
3. ALL ELECTRICAL MATERIALS TO BE USED SHALL BE BRAND NEW AND APPROVED TYPES.
4. ALL UNDERGROUND CONDUIT PIPES AND CONDUIT RUN EMBEDDED IN CONCRETE SHALL BE HIGH-DENSITY POLYETHYLENE (HDPE)..
5. UNPROTECTED CONDUIT RISERS AND EXPOSED CONDUIT SHALL BE GAS PIPE(GP).
6. ALL CONDUIT RUN SHALL BE PROVIDED WITH A 14mm<sup>2</sup> BARE COPPER GROUND WIRE AND SHALL BE TERMINATED AT MAIN DISTRIBUTION PANEL BOARD, ALL EQUIPMENT, METALLIC PARTS AND SURFACES SHALL BE EFFECTIVELY GROUNDED.
7. ALL STREET LUMINAIRE ASSEMBLIES INCLUDING POLES SHALL WITHSTAND UP TO 180 KpH GUSTING WINDS WITHOUT PERMANENT DEFORMATION.
8. THE ELECTRICAL SERVICE VOLTAGE FOR THAKETA SIDE SHALL BE 11KV/240V SECONDARY, 3-PHASE 4 WIRE, 50 HERTZ AC.
9. THE ELECTRICAL SERVICE VOLTAGE FOR THANLYIN SIDE SHALL BE 6.6KV/240V SECONDARY, 3-PHASE 4 WIRE, 50 HERTZ AC.
10. THE CONTRACTOR SHALL EXERCISE EXTREME CARE IN REMOVING EXISTING INSTALLATIONS, APPROPRIATE TOOLS AND EQUIPMENT SHALL BE UTILIZED TO MINIMIZED DAMAGE.
11. ALL FEEDER LINES AND BRANCH CIRCUITS SHALL BE INSTALLED AS INDICATED ON PLANS, INDIVIDUAL FEEDER AND BRANCH CIRCUIT AND HOMERUNS SHALL NOT BE COMBINED IN THE SAME RACEWAY UNLESS SPECIFIED.
12. LOCATIONS OF ELECTRICAL EQUIPMENT AND DEVICES INCLUDING CONDUIT ROUTINGS SHOWN IN THE DRAWINGS ARE APPROXIMATE LOCATION ONLY. CONTRACTOR SHALL ALLOW FOR NECESSARY FIELD ADJUSTMENTS TO SUIT ACTUAL CONDITION AT SITE.
13. SUBMIT COMPLETE TECHNICAL TECHNICAL SPECIFICATIONS OF MATERIALS/EQUIPMENTS AND SHOP DRAWINGS FOR APPROVAL BY THE ENGINEER PRIOR TO START OF INSTALLATION.

## ABBREVIATIONS:

- A : AMPERE
- AC : ALTERNATING CURRENT
- AF : AMPERE FRAME
- AT : AMPERE TRIP
- BCW : BARE COPPER WIRE
- C : CONDUIT
- CB : CIRCUIT BREAKER
- CHH : COMMUNICATION HANDHOLE
- CT : CURRENT TRANSFORMER
- DF : DEMAND FACTOR
- DIA : DIAMETER
- ECB : ENCLOSED CIRCUIT BREAKER
- EHH : ELECTRICAL HANDHOLE
- EL : ELEVATION
- (GND) : GROUND
- ATS : AUTOMATIC TRANSFER SWICH
- HID : HIGH INTENSITY DISCHARGE LAMP
- HZ : HERTZ
- IMC : INTERMEDIATE METAL CONDUIT
- IND'L : INDUSTRIAL
- KVA : KILOVOLT AMPERE
- KW : KILOWATT
- KWHR : KILOWATT HOUR
- KAIC : KILOAMPERE INTERRUPTIG CAPACITY
- LED : LIGHT EMITTING DIODE
- LP : LIGHTING PANEL BOARD
- LTG : LIGHTING
- MDP : MAIN DISTRIBUTION PANEL BOARD
- MTD : MOUNTED
- P,Ø : POLE, PHASE
- PVC : POLYVINYL CHLORIDE
- uPVC : UNPLASTICIZED POLYVINYL CHLORIDE
- ROW : RIGHT OF WAY
- STA : STATION
- SDBC : SOFT DRAWN BARE COPPER WIRE
- TW : THERMOPLASTIC MOISTURE RESISTANT
- TYP : TYPICAL
- THW : THERMOPLASTIC HEAT AND MOISTURE RESISTANT
- V : VOLT / VOLTAGE
- VA : VOLT - AMPERE
- W : WATT
- XLPE : CORSS-LINKED POLYETHYLENE INSULATED CABLES
- TEI : TARLAC ELECTRIC INCORPORATED

-  : MOLD-CASE CIRCUIT BREAKER
-  : AMPERE TRIPPING
-  : GROUNDING
-  : CONTACTOR
-  : VOLTMETER CHANGE OVER SWITCH
-  : AMMETER CHANGOVER SWITCH
-  : CURRENT TRANSFORMER
-  : DIESEL ENGINE
-  : GENERATOR
-  : EXITER
-  : AMPERE METER
-  : VOLTAGE METER
-  : FREQUENCY METER
-  : BATTERY
-  : AUTOMATIC VOLTAGE LEGULATOR
-  : LOW VOLTAGE RELAY
-  : OVER VOLTAGE
-  : OVERCURRENT RELAY
-  : LIGHTING PANEL
-  : KILOWATT HR.METER
-  : POWER TRANSFORMER
-  : PRIMARY CUTOUT (PE) WITH POWER FUSE (PF)
-  : LIGHTING ARRESTER (LA)
-  : CURRENT FUSE
-  : MAIN DISTRIBUTION PANEL
-  : POWER FUSE

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 T. HAYAKAWA	SIGNATURE 	DATE 15 Sep.2017	DRAWING TITLE GENERAL NOTES (LIGHTING)	PACKAGE 1 DWG No. P1-GE-1061
					CHECKED BY T. HAYAKAWA		22 Sep.2017		
					APPROVED BY Y. SANO		29 Sep.2017		

# DESIGN ELEMENTS OF HORIZONTAL ALIGNMENT

## 1. MAIN HIGHWAY

POINT NAME	STATION	NORTHING X-COORDINATE	EASTING Y-COORDINATE	ELEMENT	AZIMUTH ANGLE	ELEMENT LENGTH	ACCUMULATED DISTANCE
BP	0+000.000000	1857219.291051	205789.549518				0.000000
KE 1-1	0+024.969805	1857233.508737	205769.022741	STRAIGHT LINE	304° 42' 29.009669"	24.969805	24.969805
KA 1-1	0+076.169805	1857263.372323	205727.441550	CLOTHOID A=160	307° 38' 29.767749"	51.200000	76.169805
KA 1-2	0+161.512727	1857320.993624	205664.628061	CIRCLE R=500	317° 25' 16.250510"	85.342923	161.512727
KE 1-2	0+212.712727	1857359.850350	205631.296633	CLOTHOID A=160	320° 21' 17.008590"	51.200000	212.712727
BC 2	0+521.900231	1857597.927606	205434.024909	STRAIGHT LINE	320° 21' 17.008590"	309.187504	521.900231
EC 2	0+857.521703	1857873.073202	205242.524037	CIRCLE R=2000	329° 58' 10.457547"	335.621472	857.521703
KA 3-1	2+627.420376	1859405.380223	204356.760802	STRAIGHT LINE	329° 58' 10.457547"	1769.898673	2627.420376
KE 3-1	2+680.991804	1859452.311131	204330.947038	CLOTHOID A=150	333° 37' 25.100803"	53.571429	2680.991804
KE 3-2	2+724.079800	1859491.826837	204313.816465	CIRCLE R=420	339° 30' 5.903241"	43.087995	2724.079800
KA 3-2	2+777.651228	1859542.749064	204297.209619	CLOTHOID A=150	343° 9' 20.546495"	53.571429	2777.651228
KA 4-1	2+782.485673	1859547.376091	204295.808734	STRAIGHT LINE	343° 9' 20.546495"	4.834445	2782.485673
KE 4-1	2+835.298173	1859597.467560	204279.125895	CLOTHOID A=130	338° 25' 39.671372"	52.812500	2835.298173
KE 4-2	2+961.570619	1859702.829467	204211.024695	CIRCLE R=320	315° 49' 7.291643"	126.272446	2961.570619
KA 4-2	3+014.383119	1859738.611303	204172.202890	CLOTHOID A=130	311° 5' 26.416517"	52.812500	3014.383119
EP	3+575.000000	1860107.078174	203749.682533	STRAIGHT LINE	311° 5' 26.416517"	560.616881	3575.000000

## 2. ACCESS ROAD FROM STAR CITY TO THE PROJECT HIGHWAY

POINT NAME	STATION	NORTHING X-COORDINATE	EASTING Y-COORDINATE	ELEMENT	AZIMUTH ANGLE	ELEMENT LENGTH	ACCUMULATED DISTANCE
BP	0+000.000000	1857586.250773	205393.281977				0.000000
BC-1	0+004.471511	1857589.735828	205396.083549	STRAIGHT LINE	38° 47' 42.593542"	4.471511	4.471511
EC-1	0+058.044963	1857624.134584	205436.728193	CIRCLE R=140	60° 43' 13.433109"	53.573451	58.044963
KA 2-1	0+105.007058	1857647.102428	205477.690573	STRAIGHT LINE	60° 43' 13.433109"	46.962095	105.007058
KE 2-1	0+148.110506	1857663.282883	205517.356898	CLOTHOID A=50	82° 0' 37.609033"	43.103448	148.110506
KE 2-2	0+367.483423	1857554.981013	205497.547926	CIRCLE R=58	298° 43' 11.268296"	219.372917	367.483423
KA 2-2	0+410.586871	1857584.154535	205466.177078	CLOTHOID A=50	320° 0' 35.444221"	43.103448	410.586871
BC-3	0+535.778322	1857680.070576	205385.722045	STRAIGHT LINE	320° 0' 35.444221"	125.191450	535.778322
EP	0+643.083345	1857765.821505	205321.300759	CIRCLE R=1000	326° 9' 28.675974"	107.305023	643.083345

## 3. ACCESS ROAD FROM TOLL PLAZA TO SHUKHINTHAR MAYOPAT ROAD

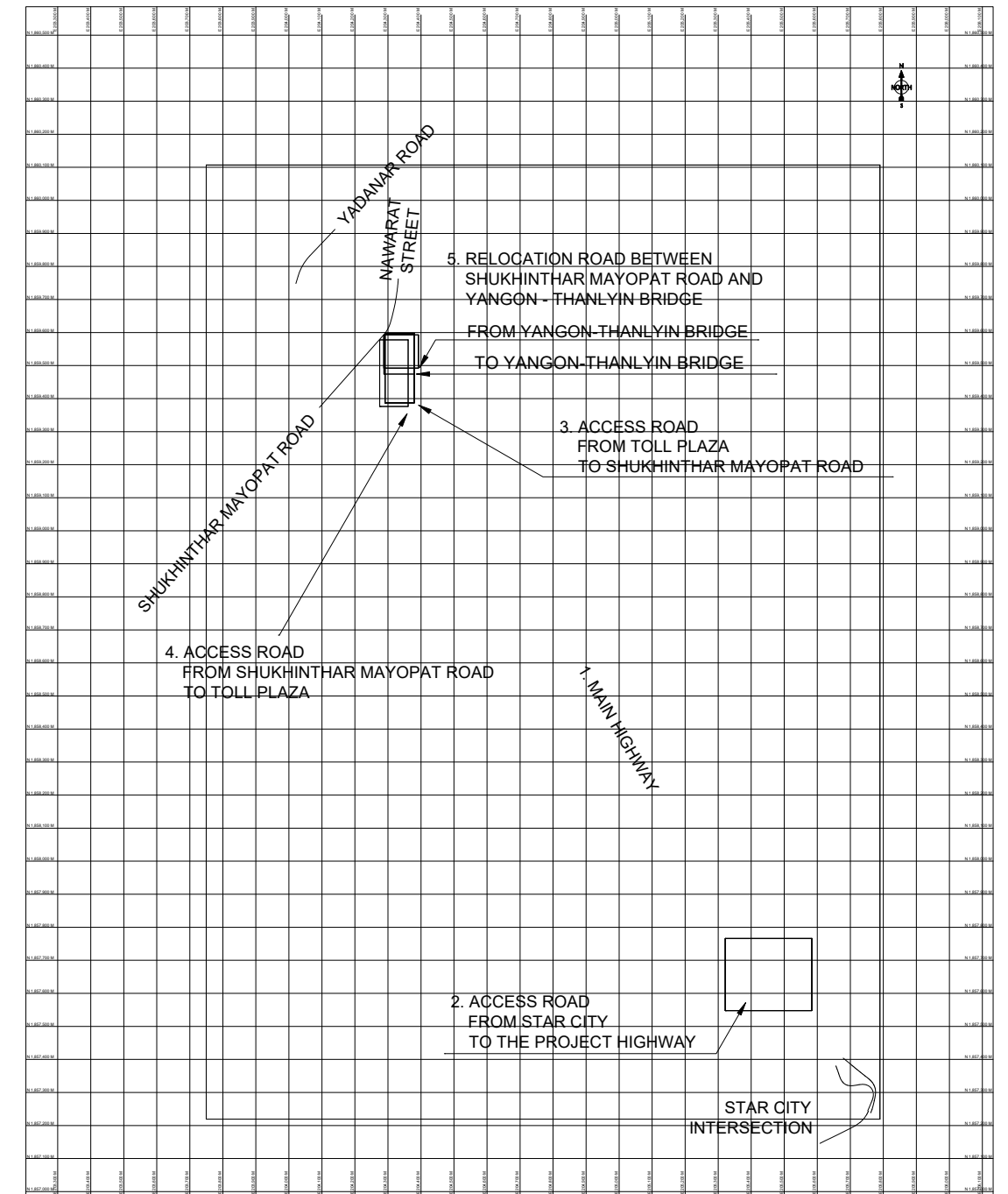
POINT NAME	STATION	NORTHING X-COORDINATE	EASTING Y-COORDINATE	ELEMENT	AZIMUTH ANGLE	ELEMENT LENGTH	ACCUMULATED DISTANCE
BP	0+000.000000	1859387.083266	204379.898737				0.000000
KA 1-1	0+027.420376	1859410.822724	204366.175940	STRAIGHT LINE	329° 58' 10.457547"	27.420376	27.420376
KE 1-1	0+080.298246	1859457.142519	204340.689898	CLOTHOID A=147.083849	333° 40' 19.933366"	52.877870	80.298246
KE 1-2	0+122.270570	1859495.635051	204324.002884	CIRCLE R=409.125000	339° 33' 0.735807"	41.972324	122.270570
KA 1-2	0+175.148440	1859545.900332	204307.618036	CLOTHOID A=147.083849	343° 9' 20.546495"	52.877870	175.148440
KA 2-1	0+179.982885	1859550.527359	204306.217150	STRAIGHT LINE	343° 9' 20.546495"	4.834445	179.982885
EP	0+228.545623	1859596.665312	204291.095464	CLOTHOID A=132.996909	341° 1' 10.050264"	48.562738	228.545623

## 4. ACCESS ROAD FROM SHUKHINTHAR MAYOPAT ROAD TO TOLL PLAZA

POINT NAME	STATION	NORTHING X-COORDINATE	EASTING Y-COORDINATE	ELEMENT	AZIMUTH ANGLE	ELEMENT LENGTH	ACCUMULATED DISTANCE
BP	0+000.000000	1859376.198265	204361.068463				0.000000
KA 1-1	0+027.420376	1859399.937722	204347.345665	STRAIGHT LINE	329° 58' 10.457547"	27.420376	27.420376
KE 1-1	0+081.685363	1859447.479743	204321.204179	CLOTHOID A=152.909864	333° 34' 39.093555"	54.264987	81.685363
KE 1-2	0+125.889030	1859488.018623	204303.630046	CIRCLE R=430.875000	339° 27' 19.895993"	44.203667	125.889030
KA 1-2	0+180.154017	1859539.597796	204286.801203	CLOTHOID A=152.909864	343° 9' 20.546495"	54.264987	180.154017
KA 2-1	0+184.988462	1859544.224823	204285.400317	STRAIGHT LINE	343° 9' 20.546495"	4.834445	184.988462
EP	0+219.973050	1859577.579400	204274.853056	CLOTHOID A=127.777631	341° 0' 29.487429"	34.984588	219.973050

## 5. RELOCATION ROAD BETWEEN SHUKHINTHAR MAYOPAT ROAD AND YANGON - THANLYIN BRIDGE

POINT NAME	STATION	NORTHING X-COORDINATE	EASTING Y-COORDINATE	ELEMENT	AZIMUTH ANGLE	ELEMENT LENGTH	ACCUMULATED DISTANCE
BP	0+000.000000	1859592.452945	204287.866125				0.000000
BC 1	0+024.306092	1859591.810075	204312.163713	STRAIGHT LINE	91° 30' 56.114217"	24.306092	24.306092
EC-1	0+063.975512	1859568.426887	204340.633817	CIRCLE R=30	167° 16' 42.957166"	39.669420	63.975512
<b>TO YANGON-THANLYIN BRIDGE</b>							
BC-2	0+115.859871	1859517.816166	204352.059301	STRAIGHT LINE	167° 16' 42.957166"	51.884359	115.859871
EP	0+168.655834	1859474.391353	204380.139144	CIRCLE R=75	126° 56' 43.638429"	52.795963	168.655834
<b>FROM YANGON-THANLYIN BRIDGE</b>							
BC-2	0+102.399065	1859530.946541	204349.095089	STRAIGHT LINE	167° 16' 42.957166"	38.423553	102.399065
EP	0+164.083776	1859492.287742	204392.126807	CIRCLE R=50	96° 35' 35.259250"	61.684711	164.083776



ALIGNMENT DIAGRAM SCALE = 1:20,000

NOTE: 1. STAR CITY INTERSECTION CONSISTS OF FOUR (4) ROADS, I.E., MAIN HIGHWAY, YANGON ACCESS LINE, THILAWA ACCESS LINE AND STAR CITY ACCESS LINE. SEE STAR CITY INTERSECTION DRAWINGS FOR THE HORIZONTAL ALIGNMENT DATA OF YANGON ACCESS LINE, THILAWA ACCESS LINE AND STAR CITY ACCESS LINE.  
 2. SEE THE DESIGN DATA OF HORIZONTAL ALIGNMENT OF SHUKHINTHAR MAYOPAT ROAD AND NAWARAT STREET IN THE DRAWING INCLUDED IN PACKAGE 3 DRAWINGS.  
 3. SEE THE DESIGN DATA OF HORIZONTAL ALIGNMENT OF YADANAR ROAD IN THE DRAWING INCLUDED IN PACKAGE 3 DRAWINGS.

PROJECT NAME	FINANCED BY	COUNTERPART	JICA STUDY TEAM	NAME	SIGNATURE	DATE	DRAWING TITLE	PACKAGE
DETAILED DESIGN ON BAGO RIVER BRIDGE CONSTRUCTION PROJECT	JICA 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.	T. HAYAKAWA	<i>T. Hayakawa</i>	15 Jun.2017	ALIGNMENT LAYOUT AND GEOMETRIC DATA	1
				T. HAYAKAWA	<i>T. Hayakawa</i>	20 Jun.2017		DWG No.
				Y. SANO	<i>Y. Sano</i>	21 Jun.2017		P1-GE-2001