

**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 3**

**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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## **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

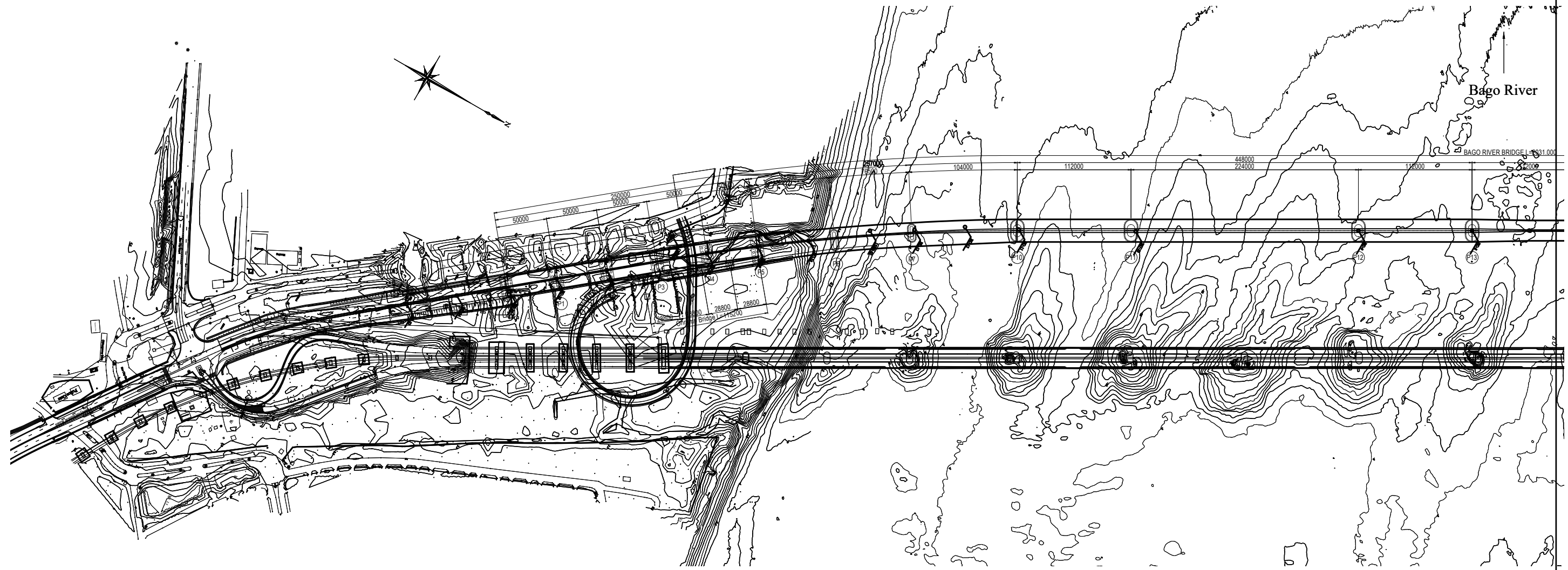
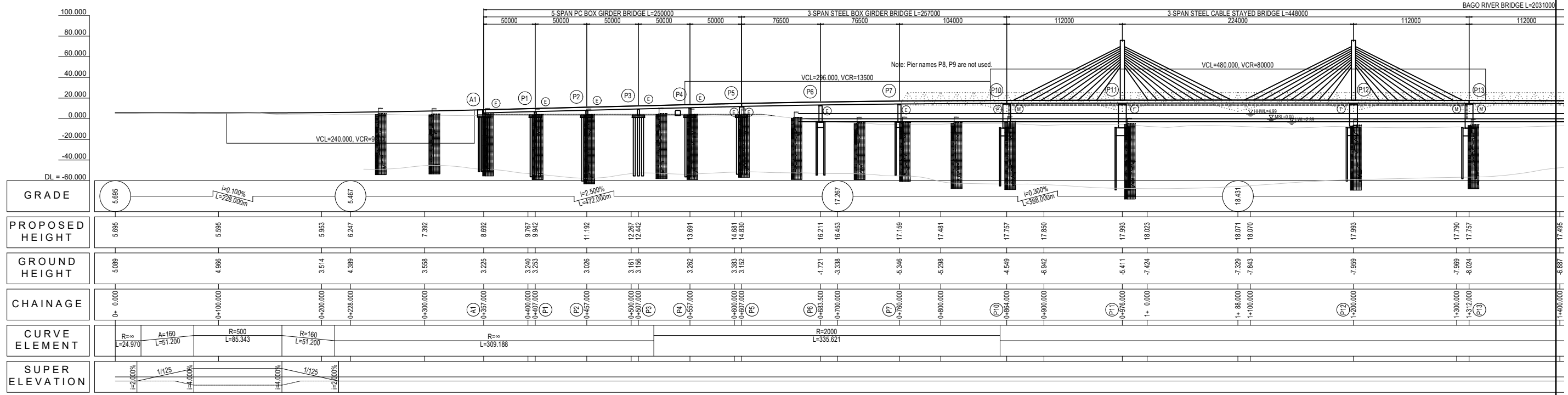
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 CHODAI CO., LTD.  
 NIPPON ENGINEERING CONSULTANTS CO., LTD.

	NAME	SIGNATURE	DATE
PREPARED BY	T. HAYAKAWA		15 Sep.2017
CHECKED BY	T. HAYAKAWA		22 Sep.2017
APPROVED BY	Y. SANO		29 Sep.2017

DRAWING TITLE  
 LOCATION MAP

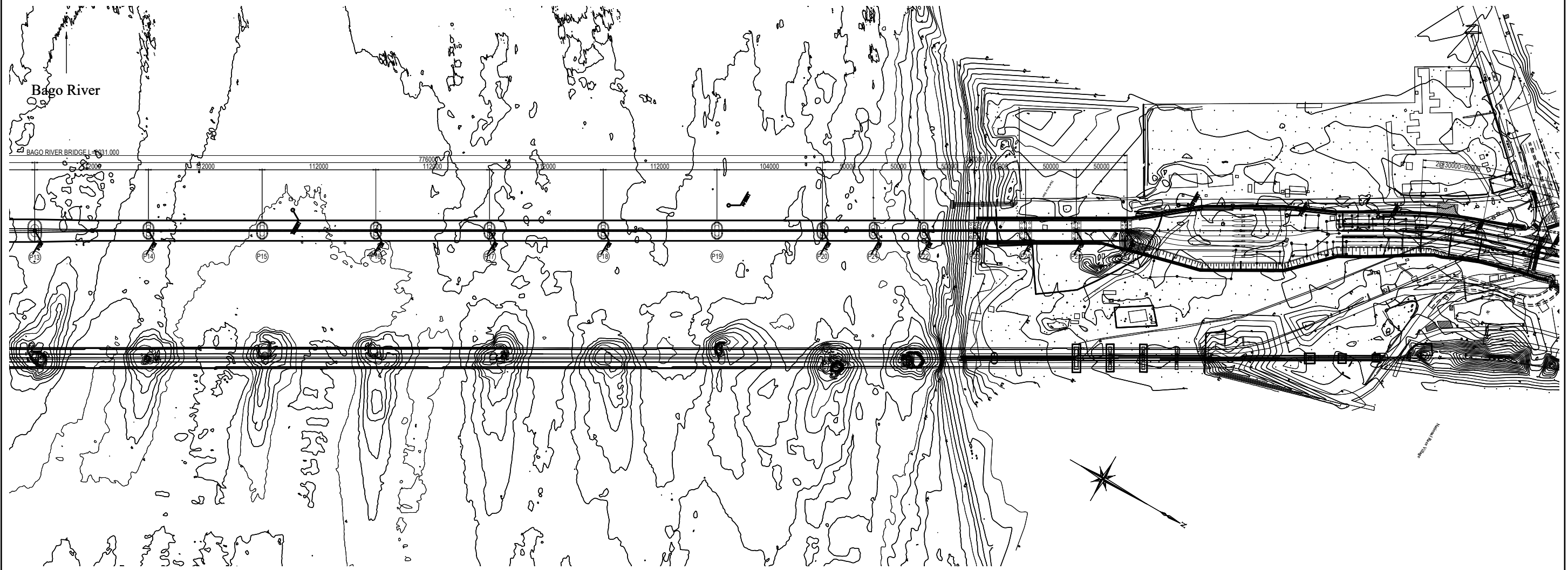
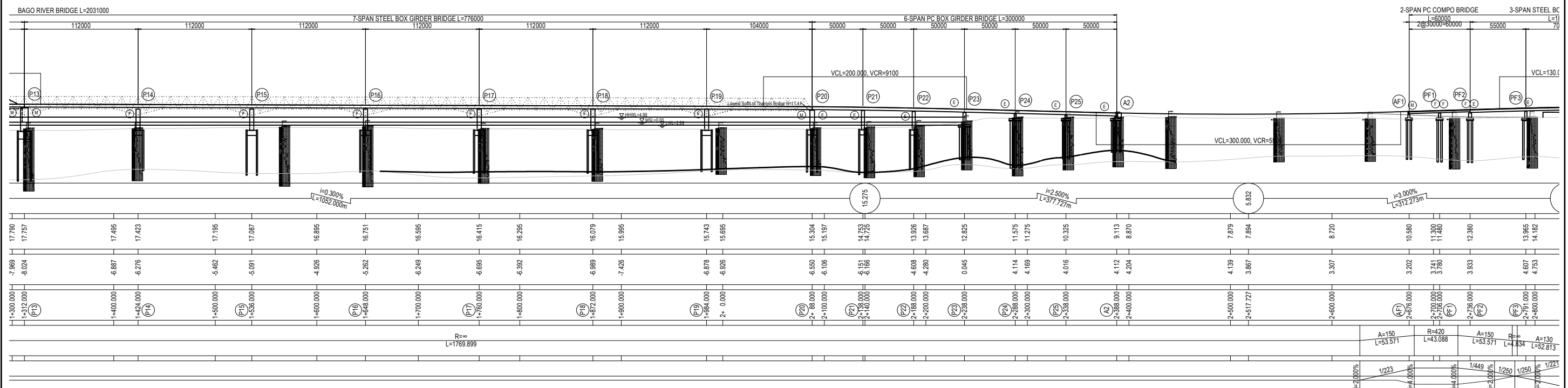
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 P3-GE-001





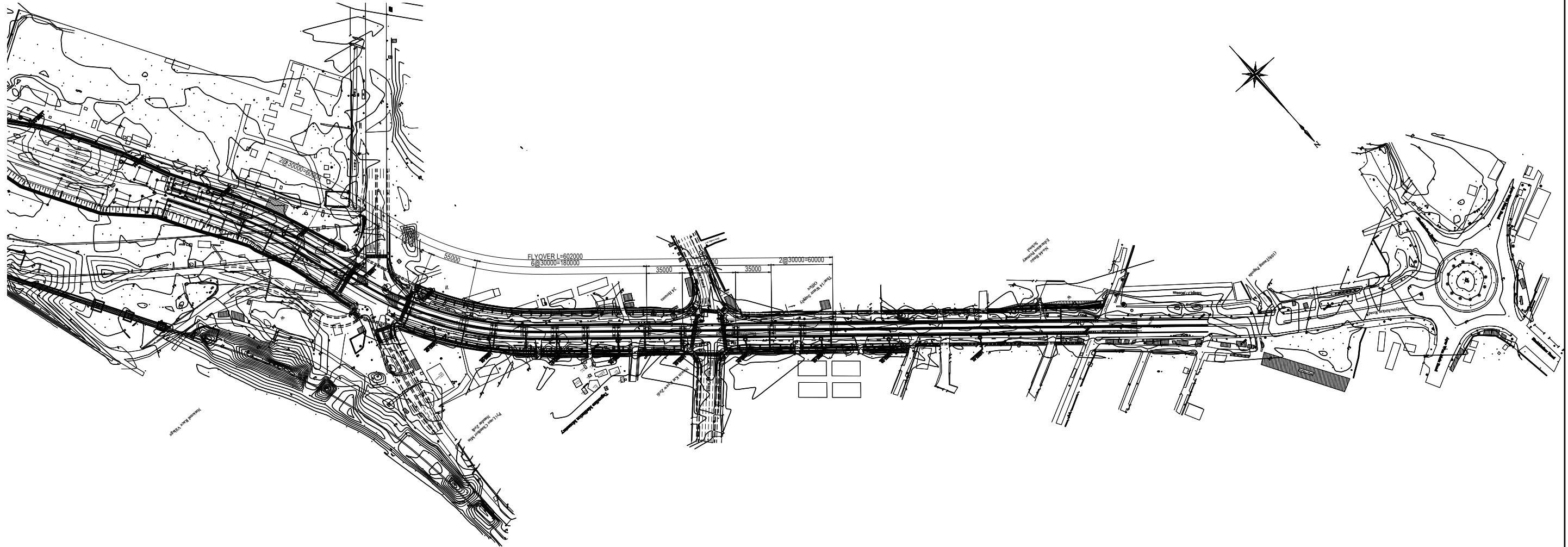
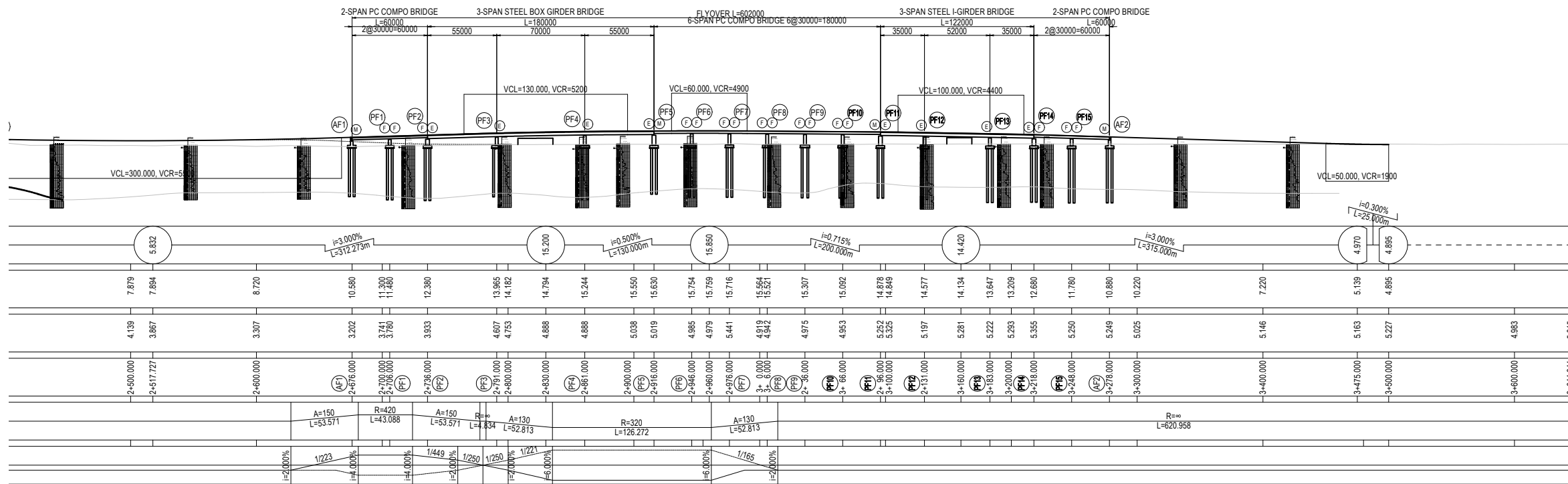
Elevation represents above MSL unless otherwise indicated.

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	3
				CHECKED BY	T. HAYAKAWA			3 Oct. 2017	DWG No.
				APPROVED BY	Y. SANO			6 Oct. 2017	P3-GE-0002



PROJECT NAME <b>DETAILED DESIGN ON          BAGO RIVER BRIDGE          CONSTRUCTION PROJECT</b>	FINANCED BY <b>JAPAN INTERNATIONAL          COOPERATION AGENCY</b>	COUNTERPART <b>REPUBLIC OF THE UNION OF MYANMAR          MINISTRY OF CONSTRUCTION          DEPARTMENT OF BRIDGE</b>	JICA STUDY TEAM <b>NIPPON KOEI CO., LTD.          ORIENTAL CONSULTANTS GLOBAL CO., LTD.          METROPOLITAN EXPRESSWAY COMPANY LIMITED          CHODAI CO., LTD.          NIPPON ENGINEERING CONSULTANTS CO., LTD.</b>	NAME	SIGNATURE	DATE	DRAWING TITLE <b>GENERAL VIEW OF BAGO RIVER BRIDGE (2)</b>	PACKAGE	
				PREPARED BY	T. HAYAKAWA			29 Sept. 2017	3
				CHECKED BY	T. HAYAKAWA			3 Oct. 2017	DWG No.
				APPROVED BY	Y. SANO			6 Oct. 2017	P3-GE-0003





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	3
				CHECKED BY	T. HAYAKAWA			3 Oct. 2017	DWG No.
				APPROVED BY	Y. SANO			6 Oct. 2017	P3-GE-0004

# GENERAL NOTES (1)

## HIGHWAY / CIVIL AND DRAINAGE

### 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.

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					PREPARED BY	T. HAYAKAWA		14 Jul. 2017	GENERAL NOTES (1)	3
					CHECKED BY	T. HAYAKAWA		20 Jul. 2017		DWG No.
					APPROVED BY	Y. SANO		25 Jul. 2017		P3-GE-0005

# GENERAL NOTES (2)

## BRIDGE (1)

### GENERAL

ALL DRAWINGS SHALL BE READ IN CONJUNCTION WITH THE SPECIFICATION  
ALL DIMENSIONS ARE IN MILLIMETER EXCEPT ELEVATIONS OR OTHERWISE INDICATED  
ALL DIMENSIONS SHALL BE CHECKED BY THE CONTRACTOR PRIOR TO CONSTRUCTION

### DESIGN STANDARD

THE LATEST VERSION OF:  
AASHTO LRFD BRIDGE DESIGN (AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS)  
SPECIFICATIONS FOR HIGHWAY BRIDGES (JAPAN ROAD ASSOCIATION)  
SPECIFICATIONS FOR PC-I GIRDER BRIDGE WITH COMPOSITE DECK (JAPAN PRESTRESSED CONCRETE CONSTRUCTIONS ASSOCIATION)

### DESIGN LOAD

DEAD LOAD	SPECIFICATIONS FOR HIGHWAY BRIDGES	
	MATERIALS	UNIT WEIGHT kN/m <sup>3</sup>
	STEEL	77.0
	PLAIN CONCRETE	23.0
	REINFORCED CONCRETE	24.5
	PRE-STRESSED CONCRETE	24.5
	ASPHALT PAVEMENT	22.5

LIVE LOAD AASHTO HL-93

TEMPERATURE REFERENCE TEMPERATURE 30 degrees Celsius  
EFFECTIVE TEMPERATURE RANGE FOR STEEL BRIDGE IS FROM 5 TO 55.  
EFFECTIVE TEMPERATURE RANGE FOR CONCRETE BRIDGE IS FROM 15 TO 45.

WIND BASIC WIND SPEED IS 44.7m/s

### MATERIALS

CONCRETE :  
CONCRETE SHALL HAVE THE FOLLOWING 28 DAYS MINIMUM CUBE COMPRESSIVE STRENGTH IN MPa, AS FOLLOWS :

STRUCTURAL ELEMENT	CUBE STRENGTH (MPa)
Precast Concrete Deck Plate in Composite Deck Slab Main Girder of PC-I Girder Bridge	40
RC Deck Slab in Composite Deck Slab Cross Beam Coupling Concrete of Main Girder Cast-in-place Pile	30
RC Deck Slab of Steel Bridge Pier Column, Abutment, Pilecap Approach Slab Cast-in-place RC Deck Slab in Composite Deck Slab, Earth Wall, L-Type Wall, Gravity Retaining Wall Concrete Kerb, Concrete Barrier, Median, Foundation of Lighting Pole	24
Leveling Concrete on Deck Slab Lean Concrete on Pilecap and Approach Slab	18

ALL CONCRETE ADMIXTURES TO BE USED SHALL BE ACCORDING TO THE SPECIFICATION AND APPROVED BY THE ENGINEER.

REINFORCEMENT BAR :  
GRADE SD345 IN ACCORDANCE WITH JIS G 3112

PRESTRESSING STEEL STRAND :  
PRESTRESSING STEEL STRAND SHALL CONFORM TO JIS STANDARD AS FOLLOWS :

TYPE OF PRESTRESSING STEEL STRAND	BREAKING STRESS	YIELD STRESS
SWPR7AL	9.3mm	88.8kN
SWPR7BL	15.2mm	261kN

STRUCTURAL STEEL :  
STRUCTURAL STEEL SHALL COMFORM TO JIS STANDARD AS FOLLOWS :

JIS G3101 FOR NON-WELDED STEEL	SS400	SM490	SM490Y	SM490Y
THICKNESS (mm)	40 or less	more than 40	40 or less	more than 40
MINIMUM TENSILE STRENGTH Fu (Mpa)	400	490	490	490
SPECIFIED MINIMUM YIELD STRENGTH Fy(Mpa)	235	315	295	355

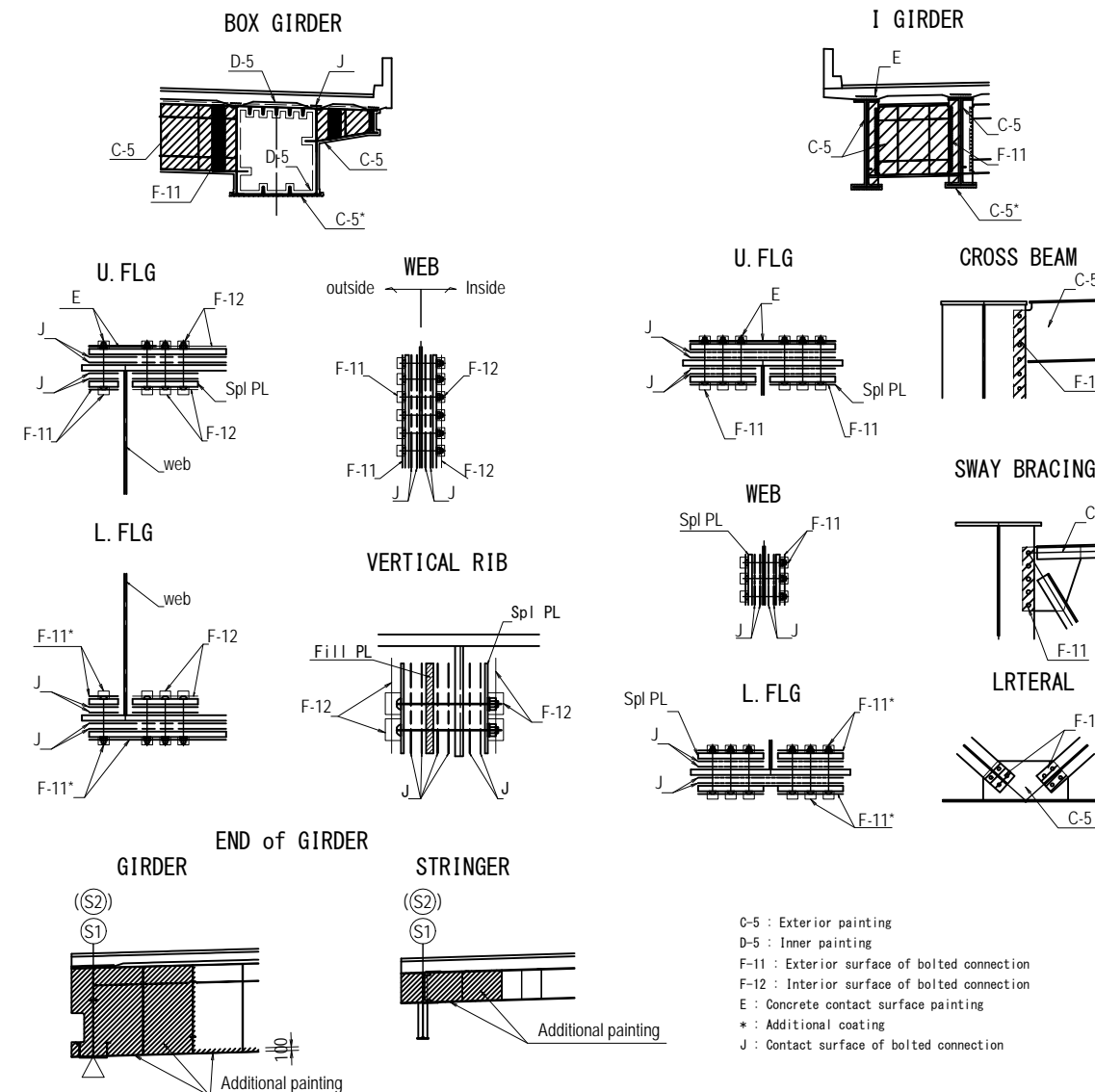
GENERAL :  
-STRUCTURAL STEEL GRADE SM400 U.N.O. , FOR TRANSVERSE WEB STIFFNERS , AND INTERMEDIATE DIAPHRAGMS  
SM490  
-STRUCTURAL STEEL GRADE SM490 FOR SOLE PLATE  
SM400A :  
-STRUCTURAL STEEL GRADE SM400A FOR TRANSVERSE WEB STIFFNERS, T-STIFFENERS, AND INTERMEDIATE DIAPHRAGMS OF ALL BRIDGE GIRDERS.  
SS400 :  
-STRUCTURAL STEEL GRADE SS400A FOR SECONDARY MEMBERS, SHAPE STEEL\*  
\*WHEN THE SHAPE STEELS OF SS400 WHICH USED FOR SECONDARY MEMBERS ARE TO BE WELDED, SHALL BE USED AFTER VERIFYING BY EXAMINING THEIR CHEMICAL CONSTITUENTS BEFOREHAND OR A WELDING TEST.

BOLTS :  
HIGH TENSIONING BOLTS SHALL CONFORM TO JIS B1186 HIGH TENSIONING HEXANGULAR BOLTS, NUTS AND WASHERS FOR SLIP CRITICAL CONNECTION, DESIGNATED AS F10T.  
\*TORQUE SHEAR TYPE HIGH TENSION HEXAGONAL BOLTS, NUTS AND WASHERS\* DESIGNATED AS S10T by JAPAN ROAD ASSOCIATION.

DESIGNATION (NOMINAL BOLT DIAMETER)	F10T/S10T ALLOWABLE FORCE	DESIGN TENSION (kN)
M22	54 *	205

CONTACT SURFACES IN BOLTED JOINTS SHALL BE PAINTED BY SYSTEM NO. J AS SPECIFIED IN PAINTING OF THE SPECIFICATIONS.

### PAINTING ASSIGNMENT



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>	14 Jul. 2017	GENERAL NOTES (2)	3
				T. HAYAKAWA	<i>T. Hayakawa</i>	20 Jul. 2017		DWG No.
				Y. SANO	<i>Y. Sano</i>	25 Jul. 2017		P3-GE-0006



# GENERAL NOTES (3)

## BRIDGE (2)

### REINFORCEMENT

#### ANCHORAGE LENGTH :

- THE ANCHORAGE LENGTH OF STRAIGHT BARS SHALL BE AT LEAST 40 BAR DIAMETERS FOR A SINGLE BAR AND 50 BAR DIAMETERS FOR 2 BARS IN A BUNDLE IF NOT OTHERWISE SHOWN ON THE DRAWINGS.

#### SPLICING

- REINFORCEMENT BARS SHALL BE SPLICED BY LAPS.
- LAP LENGTH SHALL BE EQUAL TO THE ANCHORAGE LENGTH OF THE SMALLER BAR IF NOT OTHERWISE SHOWN ON THE DRAWINGS.
- SPLICING OF BARS NOT INCLUDED ON THE DRAWINGS SHALL BE APPROVED BY THE ENGINEER.
- BARS DRAWN IN FULL LENGTH (ALSO CALLED CONTINUOUS BARS) SHALL HAVE AS FEW SPLICES AS POSSIBLE.

#### HOOKS AND BENDS

- HOOKS AND BENDS OF BARS SHALL BE IN ACCORDANCE WITH JRA's Specifications INCLUDING MINIMUM RADIUS, MINIMUM END DIMENSION ETC.
- STIRRUPS AND COLUMN TIE BARS SHALL ALWAYS HAVE ANOTHER BAR OF AT LEAST ITS OWN SIZE INSIDE THE HOOK.

#### SPACING

- CLEAR HORIZONTAL AND VERTICAL DISTANCE BETWEEN BARS OR PAIR OF BARS SHOULD NOT BE LESS THAN  $H_{agg}+5mm$ .
- CLEAR HORIZONTAL AND VERTICAL DISTANCE BETWEEN BUNDLED BARS SHOULD NOT BE LESS THAN  $H_{agg}+15mm$ , WHERE  $H_{agg}$  IS MAX SIZE OF COARSE AGGREGATE.
- CLEAR HORIZONTAL AND VERTICAL DISTANCE BETWEEN PRESTRESSING STEEL STRAND SHOULD BE MIN 90 mm BUT NOT LESS THAN THE INTERNAL DIAMETER OF THE DUCT.

#### CONCRETE COVER

THE MINIMUM COVER SHALL BE AS FOLLOWS :

- DECK SLAB 30 mm
- SUPERSTRUCTURE EXCEPT DECK SLAB 35 mm
- BEAM OF PIER 35 mm
- ABUTMENT, PIER, PILECAP 70 mm
- CAST-IN-PLACE PILE 120 mm

OR AS SHOWN ON THE DRAWINGS

TOLERANCE SHALL BE IN ACCORDANCE WITH THE SPECIFICATION.

### CONCRETE WORK

- CONSTRUCTION JOINTS SHALL BE LOCATED AS SHOWN ON THE DRAWINGS, AS DESCRIBED IN THE SPECIFICATION OR AS PROPOSED BY THE CONTRACTOR, TO BE APPROVED BY THE ENGINEER.
- ALL FORMWORK SHALL BE FABRICATED AS DESCRIBED IN THE SPECIFICATION
- 20x20 mm CHAMFERS SHALL BE PROVIDED ON ALL EXTERNAL CORNERS UNLESS LARGER VALUES GIVEN ON THE DRAWINGS
- A LAYER OF MIN 100 mm LEAN CONCRETE SHALL BE PLACED UNDER ALL PILECAP LOCATED DIRECTLY ON GROUND
- SURFACE FINISH SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS

### INTERNAL PRESTRESSING WORK

- DUCT DIAMETERS, MATERIALS AND WALL THICKNESSES SHALL BE AS DESCRIBED IN THE SPECIFICATIONS.
- ASSUMED PRESTRESSING LOSS PARAMETERS ARE GIVEN AS FOLLOWS.  
 FRICTIONAL COEFFICIENT  $\mu = 0.30 /rad$   
 WOBBLE COEFFICIENT  $k = 0.004 rad/m$   
 WEDGE DRAW-IN 5mm  
 RELAXATION 1.5%
- PRESTRESSING STEEL STRAND TENSIONING LOADS AND STRESSING SEQUENCE FOR MULTIPLE TENDONS ARE GIVEN ON RELEVANT DRAWINGS
- EXTENSIONS PRIOR TO "LOCK OFF" SHALL BE CALCULATED BY THE CONTRACTOR TO THE APPROVAL OF THE ENGINEER
- GROUTING OF TENDONS SHALL COMPLY WITH REQUIREMENTS IN THE SPECIFICATION

### STEEL WORK







- ALL STEEL WORK SHALL HAVE CORROSION PROTECTION IN ACCORDANCE WITH THE SPECIFICATION
- ALL FABRICATIONS SHALL BE IN ACCORDANCE WITH THE SPECIFICATION UNLESS OTHERWISE INDICATED
- ALL WELDS SHALL BE CONTINUOUS UNLESS OTHERWISE INDICATED
- TEMPORARY WELDED ATTACHMENTS SHALL BE SUBJECT TO ENGINEER'S APPROVAL
- SHAPES AND DIMENSIONS FOR PARTIAL JOINT PENETRATION OF GROVE WELDING OR "TYP" SHOWN IN THE TAIL OF WELDING SYMBOL SHALL BE SUBJECT TO THE ENGINEER'S APPROVAL.

### PILE WORK

- TIP ELEVATION OF PILES SHOWN IN THE DRAWINGS IS DETERMINED WITH BOREHOLE DATA.
- THE CONTRACTOR MAY PROPOSE THE CHANGE OF TIP ELEVATION IN CASE THE ACTUAL ROCK PENETRATION SPEED IS SMALLER INDICATING BEARING STRENGTH IS SUFFICIENT FOR THE DESIGN.
- WHEN APPROVED BY THE ENGINEER, THE TIP ELEVATION MAY BE CHANGED.

### OTHERS

















- WATERPROOFING SHALL BE APPLIED ON BRIDGE DECK SURFACE IN ACCORDANCE WITH THE SPECIFICATIONS.

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 (3)	PACKAGE
				PREPARED BY	T. HAYAKAWA		14 Jul. 2017		3
				CHECKED BY	T. HAYAKAWA		20 Jul. 2017		DWG No.
				APPROVED BY	Y. SANO		25 Jul. 2017		P3-GE-0007

# GENERAL NOTES (4)

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

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 T. HAYAKAWA Y. SANO	SIGNATURE   	DATE 14 Jul. 2017 20 Jul. 2017 25 Jul. 2017	DRAWING TITLE <b>GENERAL NOTES (3)</b>	PACKAGE 3 DWG No. P3-GE-0008
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# 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

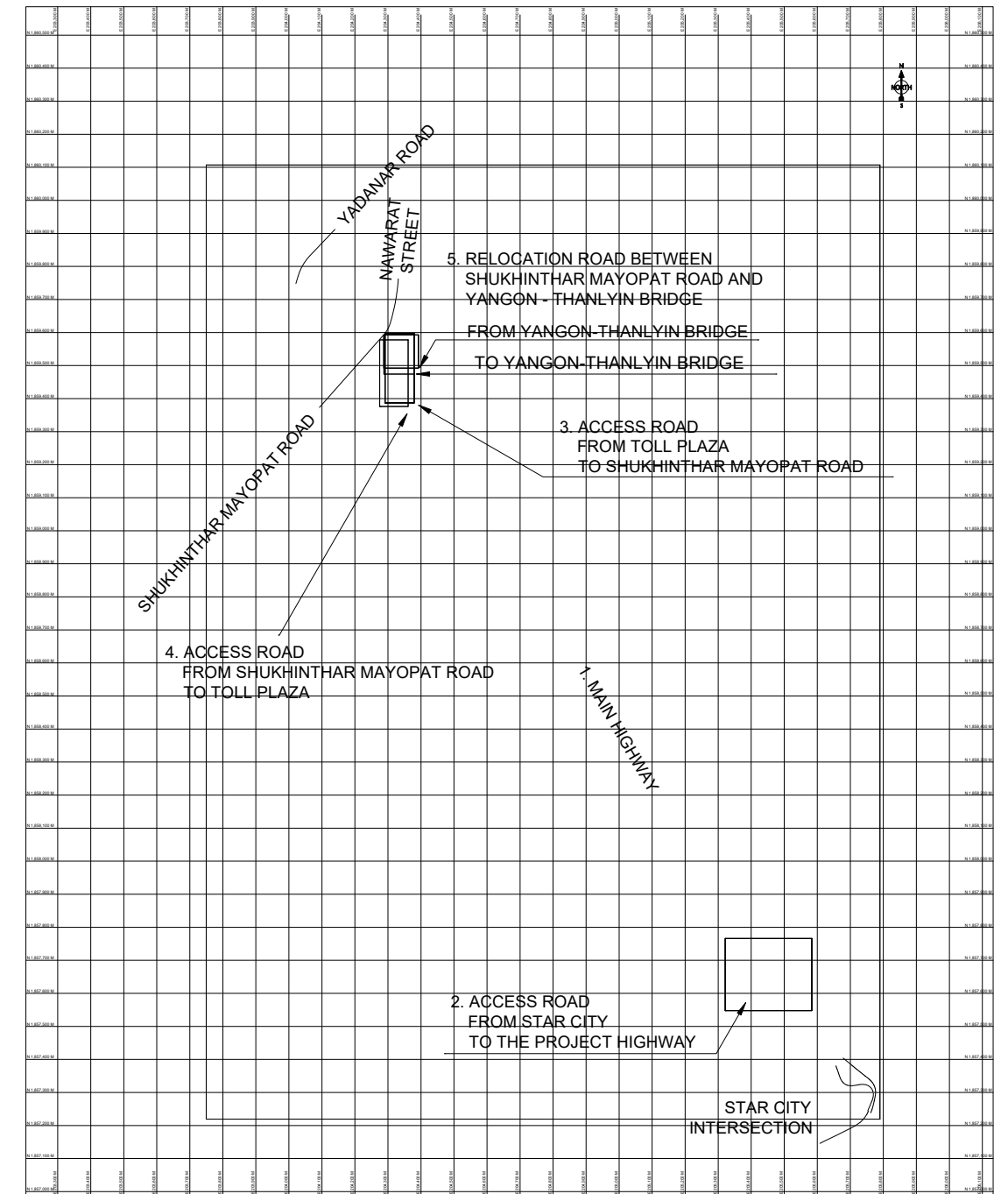
POINT NAME	STATION	NORTHING X-COORDINATE	EASTING Y-COORDINATE	ELEMENT	AZIMUTH ANGLE	ELEMENT LENGTH	ACCUMULATED DISTANCE
BP	0+000.000000	1859387.083266	204379.898737				0.000000
KA 1-1	0+027.420376	1859410.822724	204366.175940	STRAIGHT LINE	329° 58' 10.457547"	27.420376	27.420376
KE 1-1	0+080.298246	1859457.142519	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	3
				T. HAYAKAWA	<i>T. Hayakawa</i>	20 Jun.2017		DWG No.
				Y. SANO	<i>Y. Sano</i>	21 Jun.2017		P3-GE-2001