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基 本 設 計 図

Department of Public Works and Highways
The Republic of the Philippines

BASIC DESIGN STUDY
ON
THE PROJECT FOR FLOOD DISASTER MITIGATION
IN CAMIGUIN ISLAND
IN THE REPUBLIC OF THE PHILIPPINES

DRAWINGS
(HUBANGON BRIDGE)

February 2009

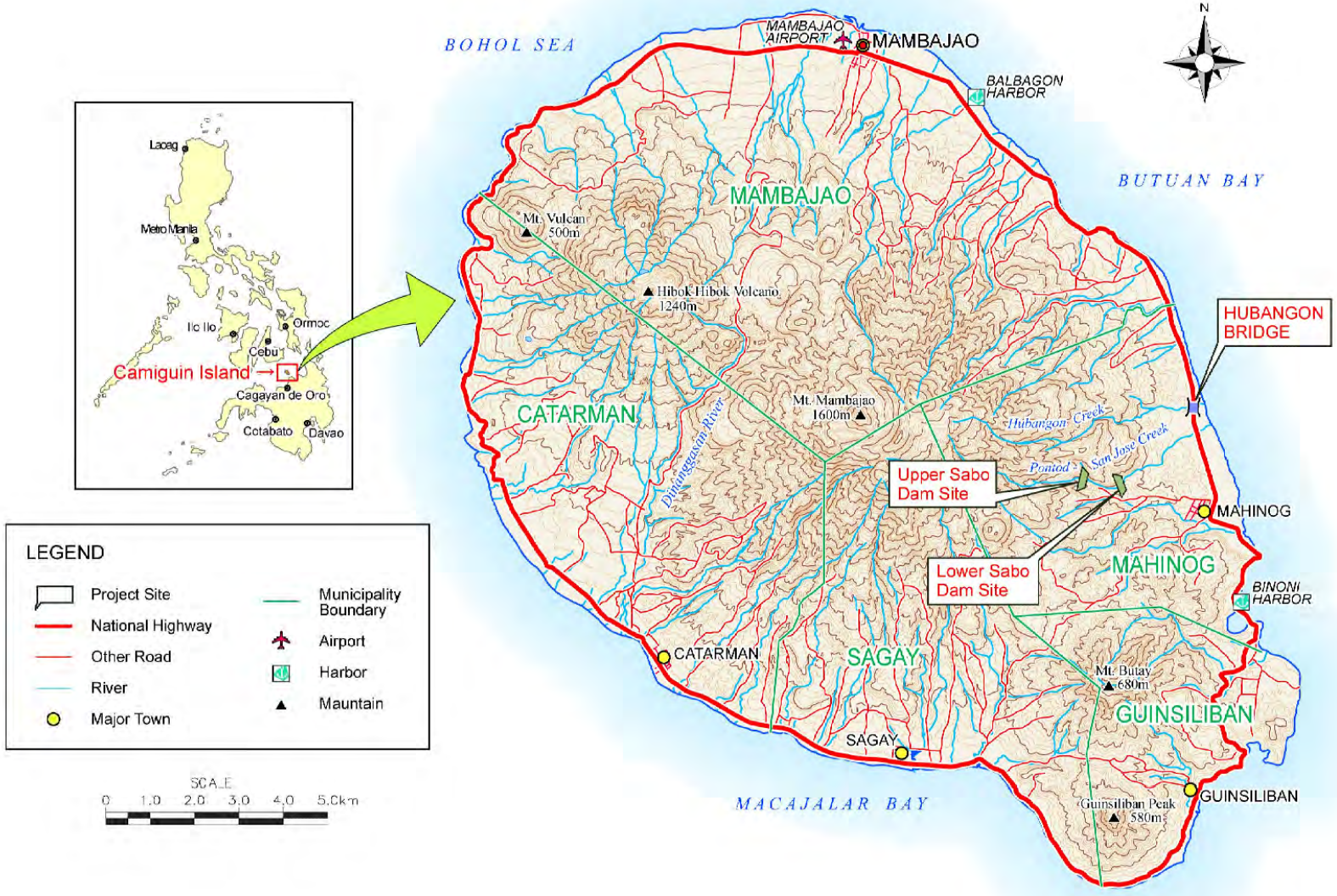
JAPAN INTERNATIONAL COOPERATION AGENCY

CTI ENGINEERING INTERNATIONAL CO., LTD.

別添-1

LIST OF DRAWINGS

No.	Drawing Title	Scale	No.	Drawing Title	Scale
H-01	Project Location Map	-			
H-02	General View of Hubangon Bridge	1/200,1/100,1/50			
H-03	Structure Drawing of Supersturucture	1/100,1/50,1/30			
H-04	Prestressing Tendon for Main Girder	1/30,1/20,1/10			
H-05	Details of Expansion Joint and Drainage	1/200,1/40,1/20,1/10,1/5			
H-06	Structural Drawing of A1 Abutment	1/100,1/50,1/20,1/2			
H-07	Structural Drawing of A2 Abutment	1/100,1/50,1/20,1/2			
H-08	Plan and Profile	H=1/200,V=1/100			
H-09	Cross Section	1/100			
H-10	Typical Section & Detail of Structures	1/50,1/30,1/10			
H-11	Detail of Concrete Pavement	1/100,1/10			



DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS THE REPUBLIC OF THE PHILIPPINES	BASIC DESIGN STUDY ON THE PROJECT FOR FLOOD DISASTER MITIGATION IN CAMIGUIN ISLAND IN THE REPUBLIC OF THE PHILIPPINES	JAPAN INTERNATIONAL COOPERATION AGENCY CTI ENGINEERING INTERNATIONAL CO., LTD.	TITLE : PROJECT LOCATION MAP	SCALE Not on Scale	Drawing No. H-01	/

別添-3

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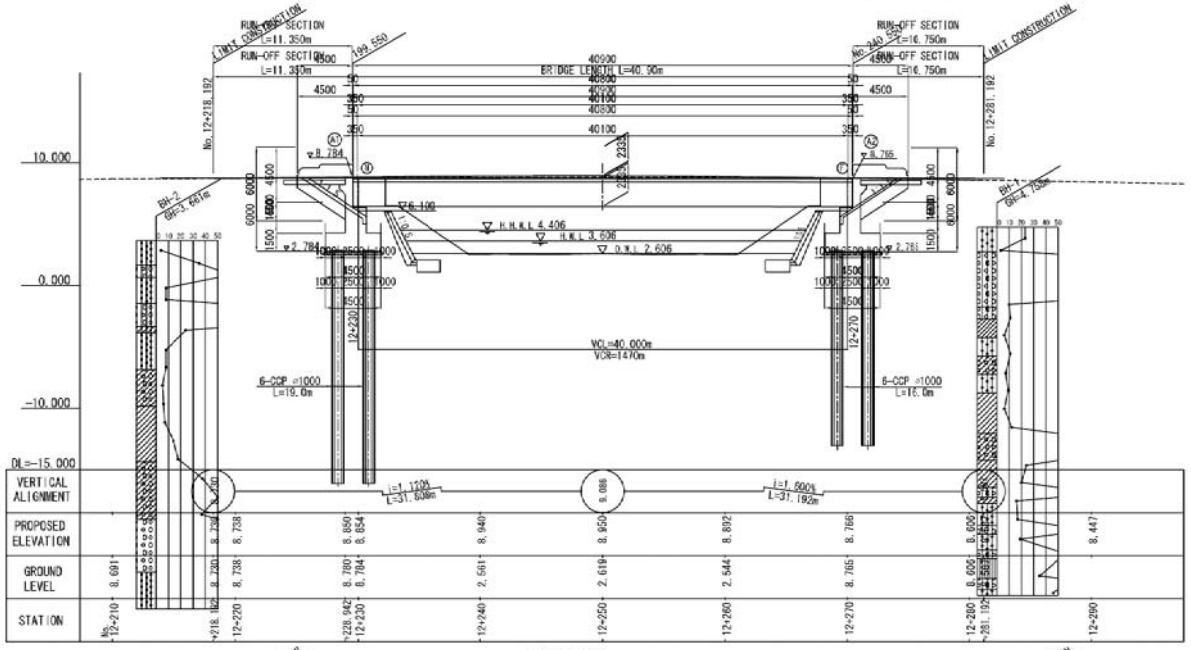
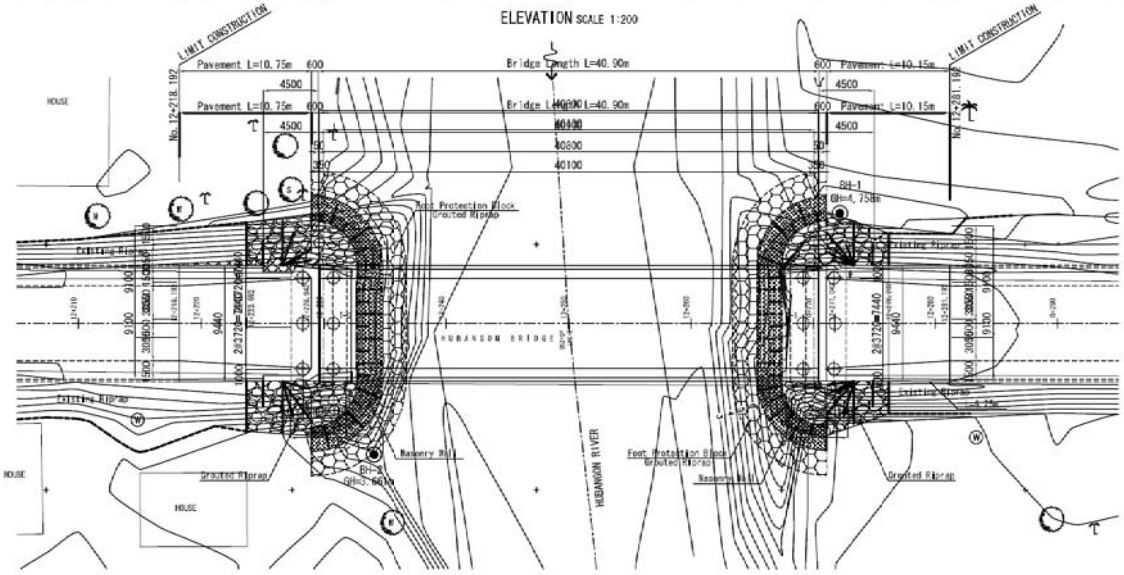
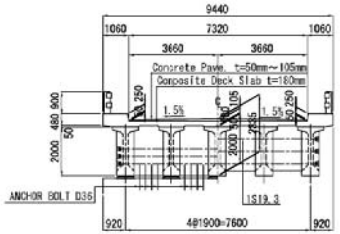
GENERAL VIEW OF HUBANGON BRIDGE



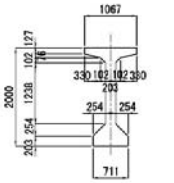
ELEVATION SCALE 1:200



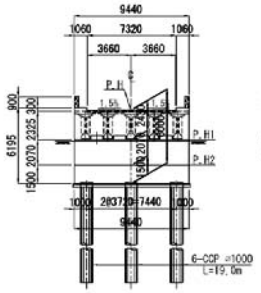
PLAN SCALE 1:200



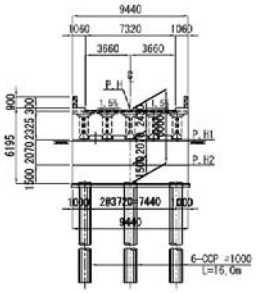
BRIDGE CROSS SECTION SCALE 1:100



DETAIL SCALE 1:50



ABUTMENTS SCALE 1:200
(A1)



ABUTMENTS SCALE 1:200
(A2)

DESIGN CRITERIA

ROAD CLASS		LOCAL ROAD
DESIGN SPEED		V=50km/h
TYPE OF SUPERSTRUCTURE		1-SPAN CONNECTING PC-COMPOSITE GIRDER
BRIDGE LENGTH		40.90m
SPAN LENGTH		40.10m
LIVE LOAD		HS20-44 (AASHTO 1996)
ROADWAY WIDTH		2 x 3.660m = 7.320m
SHOULDER WIDTH		2 × 1.060m
CROSS SLOPE		1.5% 1.5%
SEISMIC COEFFICIENT		kh=0.27
MATERIAL STRENGTH	GIRDER CON.	$\sigma ck=42N/mm^2$
	CROSS BEAM CON.	$\sigma ck=35N/mm^2$
	SLAB, CROSS	$\sigma ck=24N/mm^2$
	WIRE FOR PC.	$fpy=1600N/mm^2$
	REINFORCEMENT	$fy=295N/mm^2$ (SD295) YIELD STRESS
	SUB STRUCTURE CON.	$\sigma ck=24N/mm^2$
DESING STANDARD		National Structual Code of the Philippines(NSCP) AASHTO 1996 Aerican Association of State Highway SPECIFICATION FOR HIGWAY BRIDGES JAPAN

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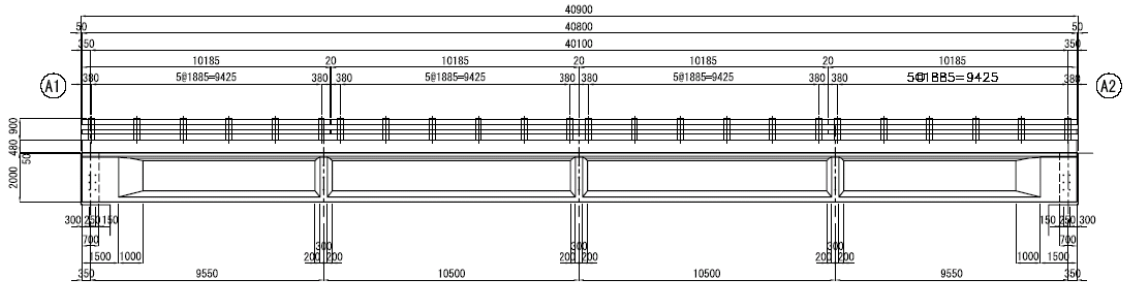
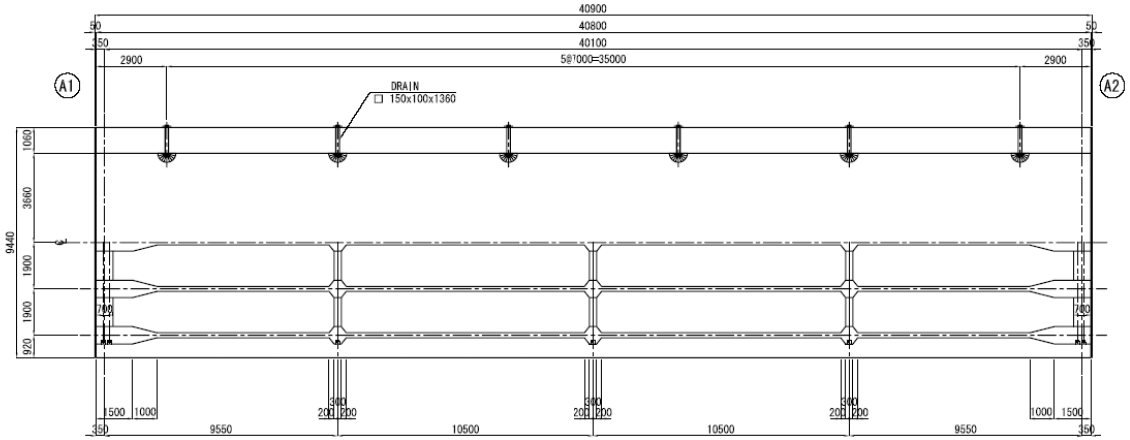
STRUCTURE DRAWING OF SUPERSTURUCTURE

ELEVATION SCALE 1:100

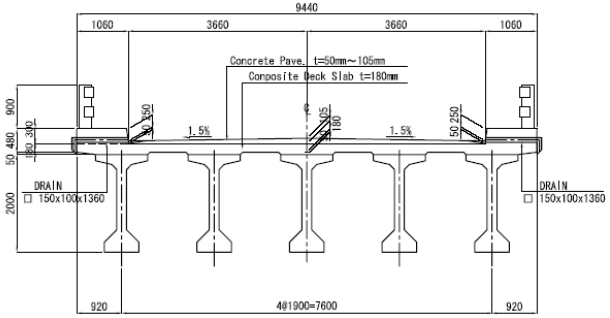


PLAN SCALE 1:100



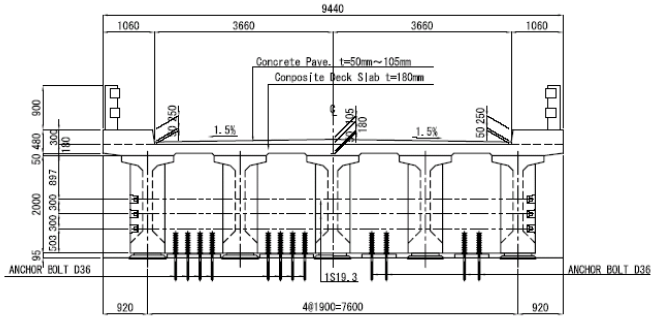
BRIDGE CROSS SECTION SCALE 1:50

STANDARD

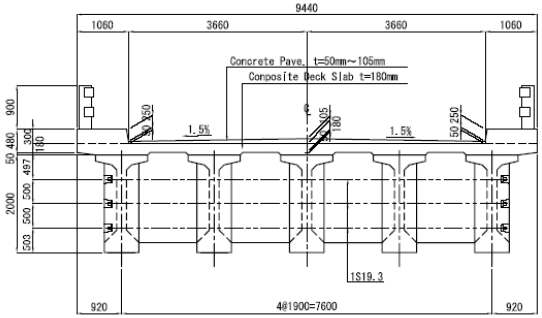


END

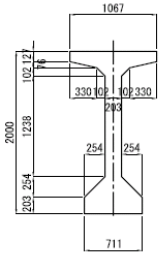
A1 A2



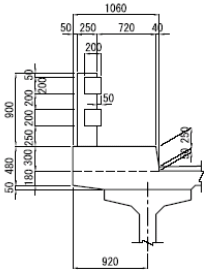
MIDDLE



PC GIRDER TYPE VI SCALE 1:30
(Modified)

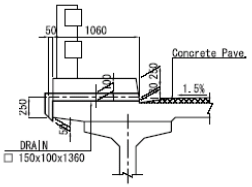


DETAIL SCALE 1:30

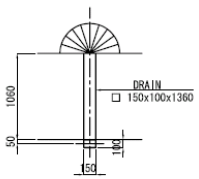


DRAINAGE SCALE 1:30

SECTION



PLAN



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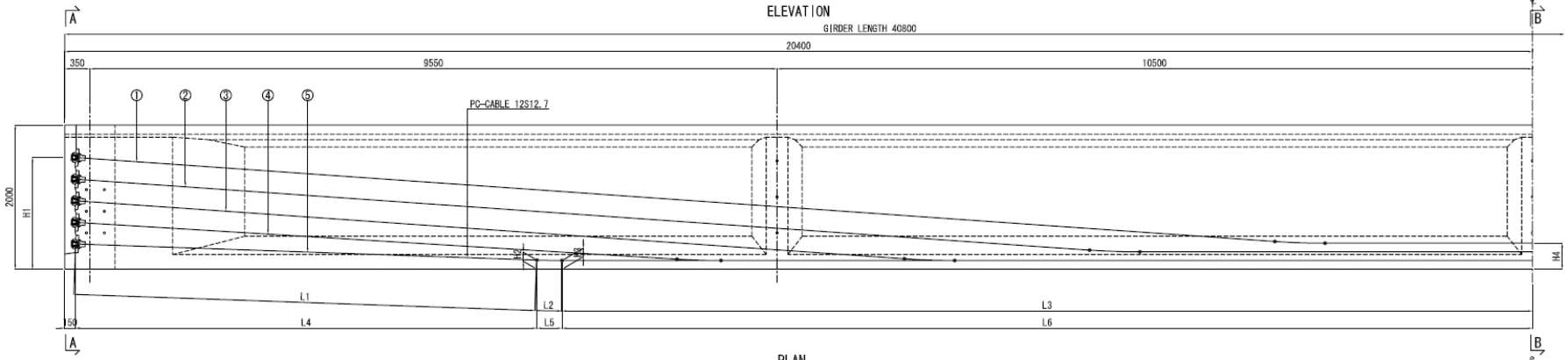
DEPARTMENT OF AGRARIAN REFORM THE REPUBLIC OF THE PHILIPPINES	BASIC DESIGN STUDY ON THE BRIDGE CONSTRUCTION PROJECT FOR EXPANDED AGRARIAN REFORM COMMUNITIES DEVELOPMENT	JAPAN INTERNATIONAL COOPERATION AGENCY CTI ENGINEERING INTERNATIONAL CO., LTD.	TITLE : HUBANGON BRIDGE STRUCTURE DRAWING OF SUPERSTURUCTURE	SCALE S=1:100	Drawing No. H-03	

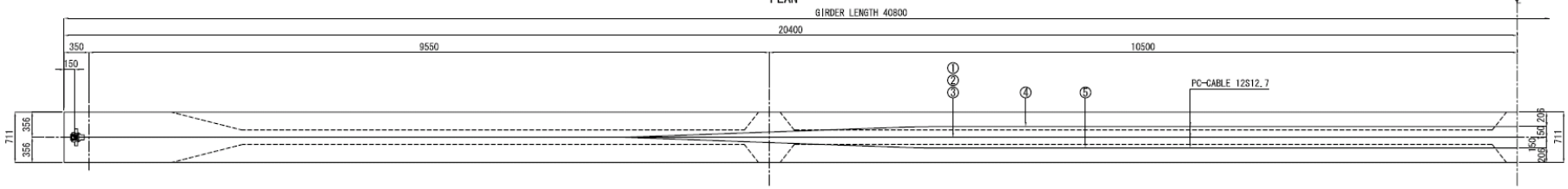
PRESTRESSING TENDON FOR MAIN GIRDER

PROFILE OF PC CABLE SCALE 1:30

ELEVATION

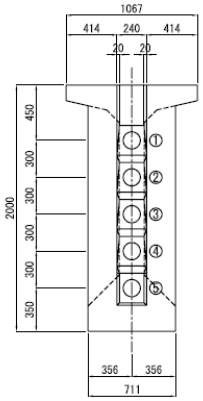


PLAN



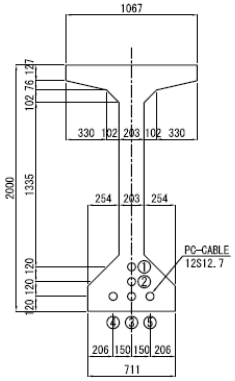
A – A

END OF SPAN SCALE 1:20

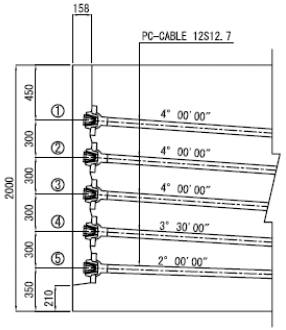


B – B

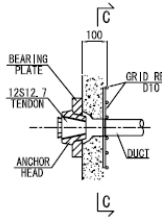
CENTER OF SPAN SCALE 1:20



END OF GIRDER SCALE 1:20



DETAIL SCALE 1:10



C – C

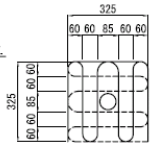
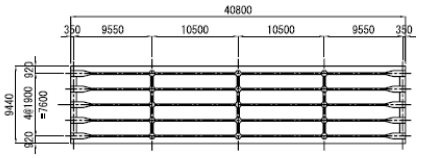


TABLE OF P.C. CABLE

CABLE No.	ANGLE OF ANCHORAGE	HEIGHT FROM BOTT OF GIRDER (MM)				LENGTH OF CABLE (MM)						RADIUS OF CABLE R (M)	CABLE TOTAL NET LENGTH (MM) (L1+L2+L3)x2
		H1	H2	H3	H4	L1	L2	L3	L4	L5	L6		
①	4° 00′ 00″	1550	384	360	360	16710	698	2883	16669	698	2883	10.000	40583
②	4° 00′ 00″	1250	264	240	240	14130	698	5457	14095	698	5457	10.000	40570
③	4° 00′ 00″	950	144	120	120	11549	698	8031	11521	698	8031	10.000	40557
④	3° 30′ 00″	650	139	120	120	8376	611	11279	8360	611	11279	10.000	40532
⑤	2° 00′ 00″	350	126	120	120	6416	349	13489	6412	349	13489	10.000	40508

CABLE No.	TENDON	JACKING FORCE GROSS (KN)
①	12-φ12.7	1540
②	12-φ12.7	1540
③	12-φ12.7	1540
④	12-φ12.7	1540
⑤	12-φ12.7	1540

MARKING DIAGRAM SCALE 1:300



DEPARTMENT OF AGRARIAN REFORM THE REPUBLIC OF THE PHILIPPINES	BASIC DESIGN STUDY ON THE BRIDGE CONSTRUCTION PROJECT FOR EXPANDED AGRARIAN REFORM COMMUNITIES DEVELOPMENT	JAPAN INTERNATIONAL COOPERATION AGENCY CTI ENGINEERING INTERNATIONAL CO., LTD.	TITLE : HUBANGON BRIDGE PRESTRESSING TENDON FOR MAIN GIRDER	SCALE AS SHOWN	Drawing No. H-04

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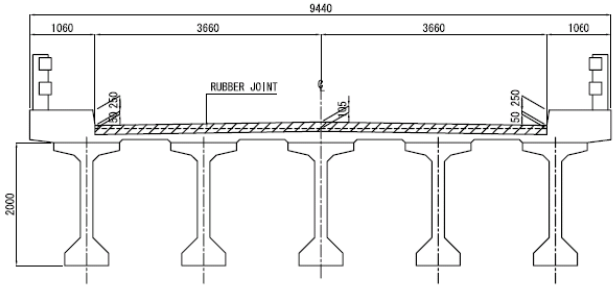
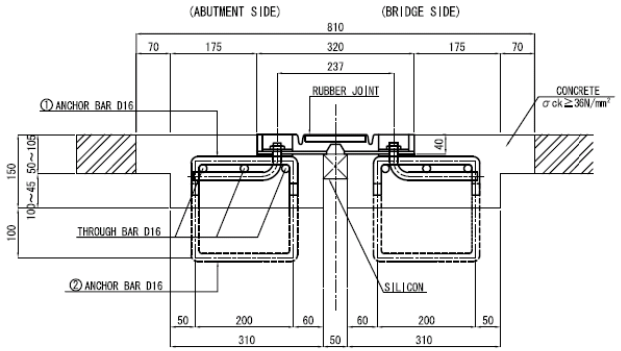
DETAILS OF EXPANSION JOINT AND DRAINAGE

SECTION SCALE 1:40

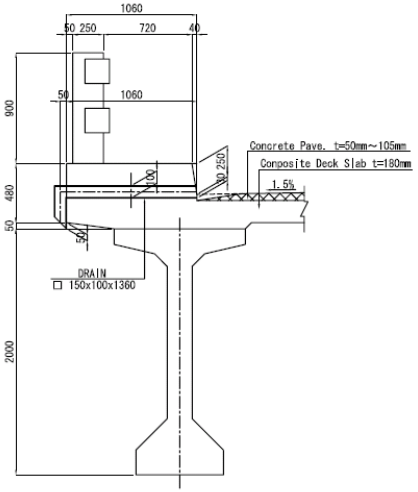


CROSS SECTION SCALE 1:5
RUBBER JOINT FOR ROADWAY

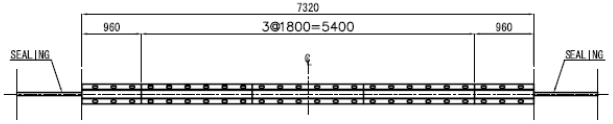


CROSS SECTION SCALE 1:20

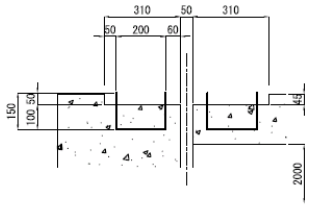
SECTION



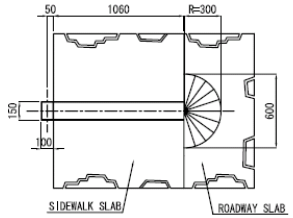
PLAN SCALE 1:40
RUBBER JOINT



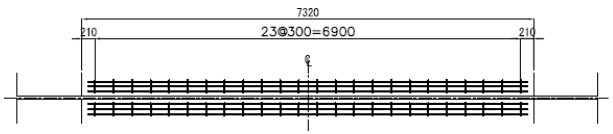
ANCHOR BAR UNDER CONCRETE SCALE 1:10



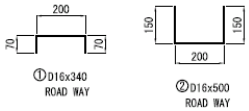
PLAN



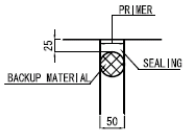
PLAN SCALE 1:40
ANCHOR BAR



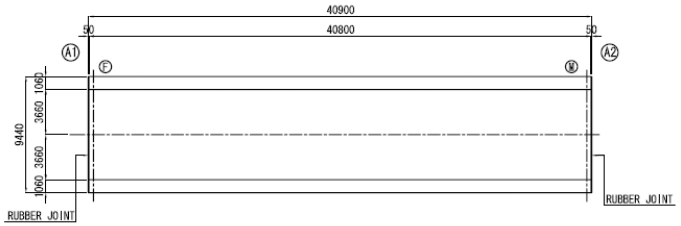
ANCHOR BAR SCALE 1:10



SEALING SCALE 1:5



MARKING DIAGRAM SCALE 1:200



MATERIAL OF EXPANSION JOINT

MATERIAL	QUALITY	QUANTITY			REMARKS
		A1	A2	TOTAL	
RUBBER JOINT FOR ROADWAY	SS400 COMPOSITE RUBBER SR235 SD295	7.32 m	7.32 m	14.64 m	ROADWAY
SEALING	SILICON	1.8 liter	1.8 liter	3.6 liter	

ANCHOR BAR

SIZE	QUANTITY			WEIGHT		REMARKS
	A1	A2	TOTAL	EACH	TOTAL	
① D16x340	48	48	96	0.537 kg	51.55 kg	ROADWAY
② D16x500	48	48	96	0.789 kg	75.74 kg	ROADWAY
TOTAL					127.29 kg	

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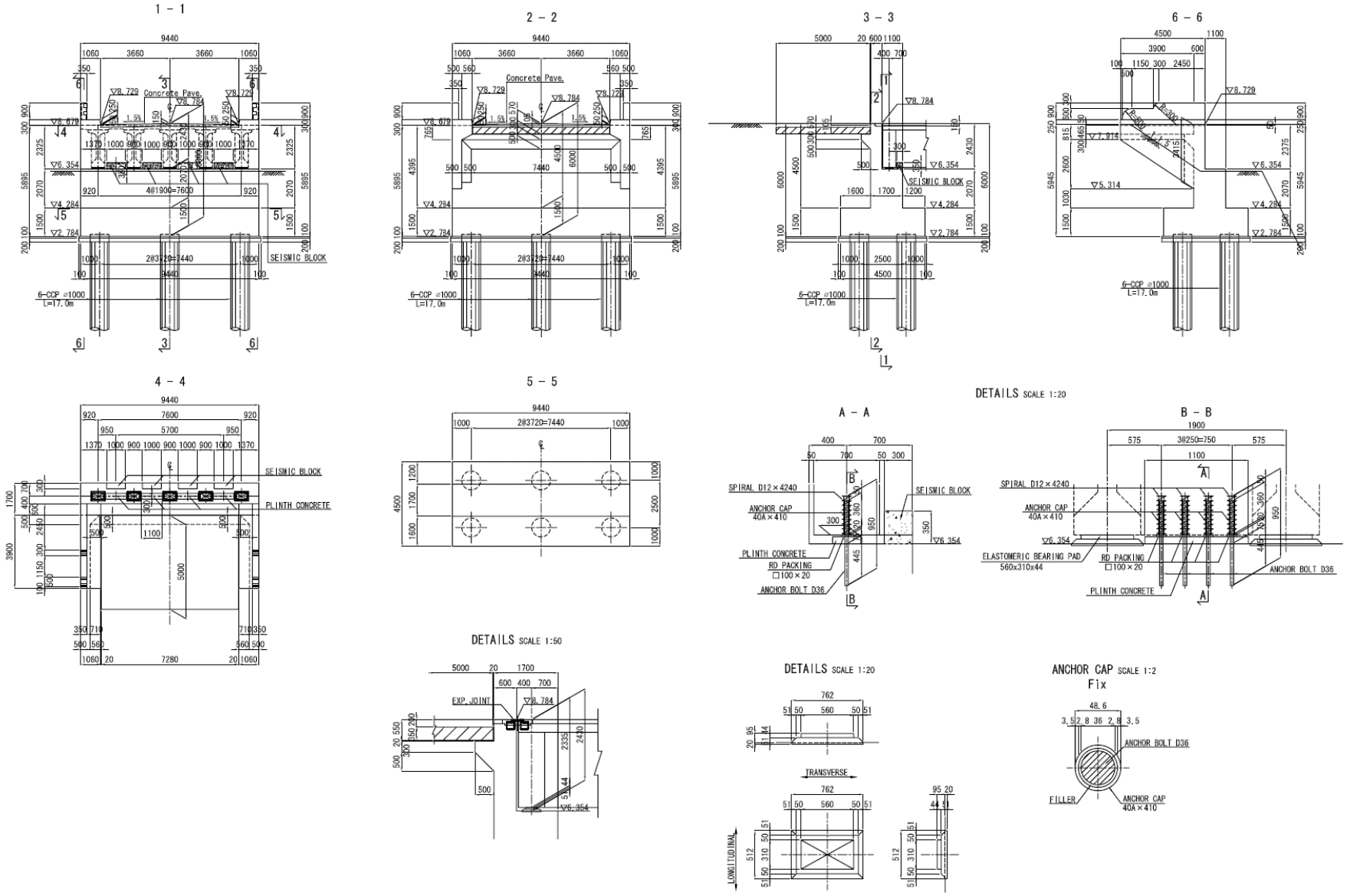
DEPARTMENT OF AGRARIAN REFORM THE REPUBLIC OF THE PHILIPPINES	BASIC DESIGN STUDY ON THE BRIDGE CONSTRUCTION PROJECT FOR EXPANDED AGRARIAN REFORM COMMUNITIES DEVELOPMENT	JAPAN INTERNATIONAL COOPERATION AGENCY CTI ENGINEERING INTERNATIONAL CO., LTD.	TITLE: HUBANGON BRIDGE DETALS OF EXPANSION JOINT AND DRAINAGE	SCALE S=1:5	Drawing No. H-05	

STRUCTURAL DRAWING OF A1 ABUTMENT SCALE 1:100



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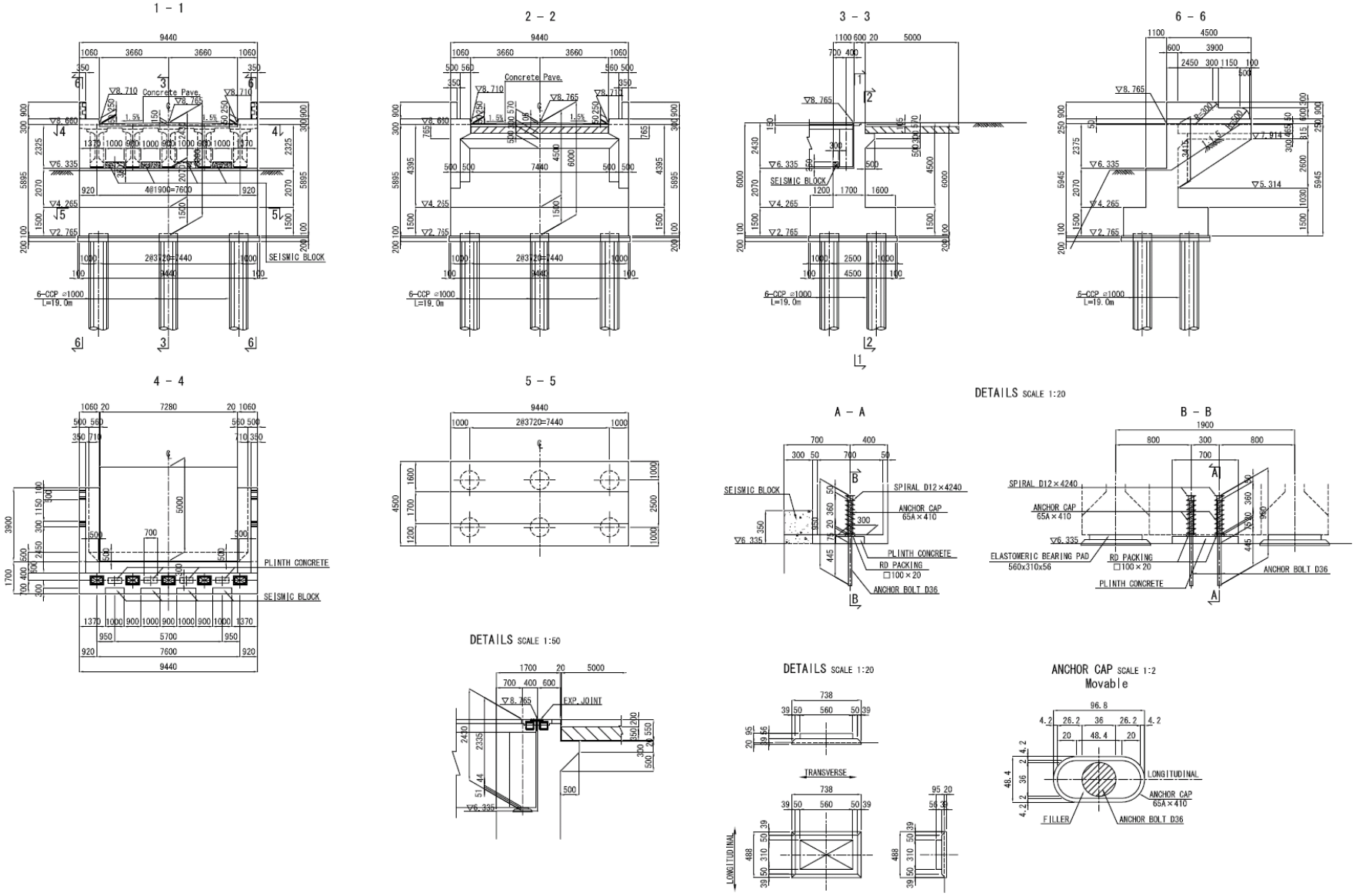
DEPARTMENT OF AGRARIAN REFORM THE REPUBLIC OF THE PHILIPPINES	BASIC DESIGN STUDY ON THE BRIDGE CONSTRUCTION PROJECT FOR EXPANDED AGRARIAN REFORM COMMUNITIES DEVELOPMENT	JAPAN INTERNATIONAL COOPERATION AGENCY CTI ENGINEERING INTERNATIONAL CO., LTD.	TITLE: HUBANGON BRIDGE STRUCTURAL DRAWING OF A1 ABUTMENT	SCALE S=1:100	Drawing No. H-06	

STRUCTURAL DRAWING OF A2 ABUTMENT SCALE 1:100



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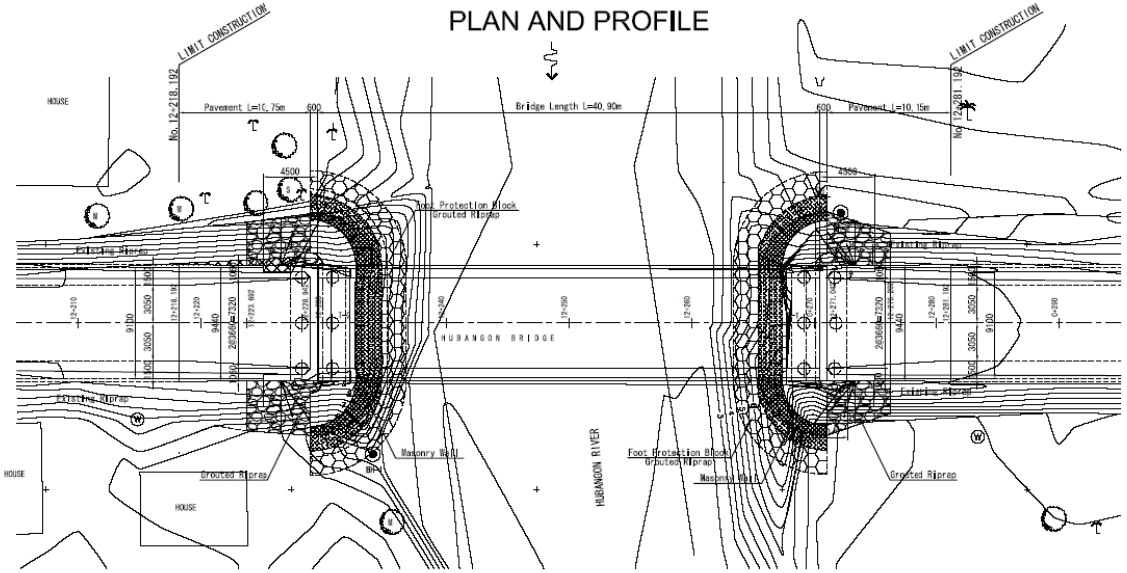
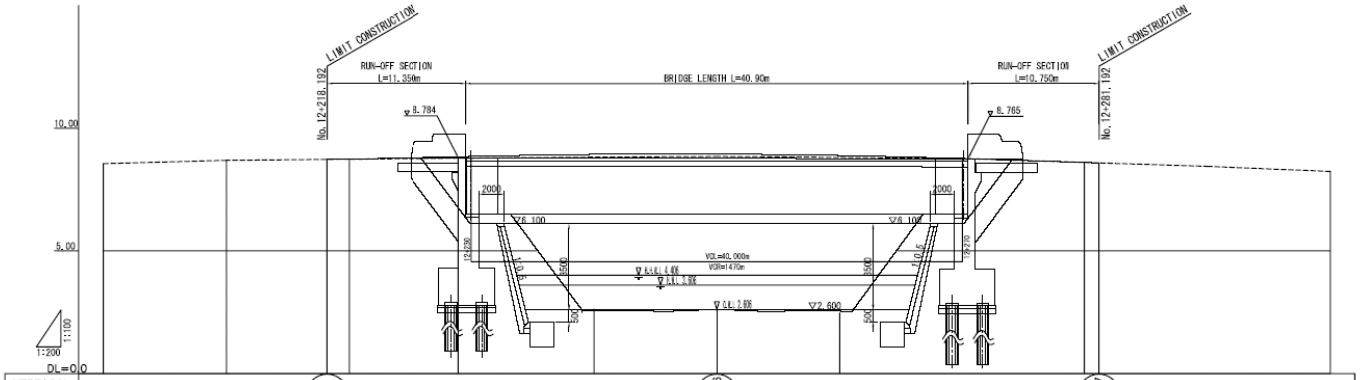
DEPARTMENT OF AGRARIAN REFORM THE REPUBLIC OF THE PHILIPPINES	BASIC DESIGN STUDY ON THE BRIDGE CONSTRUCTION PROJECT FOR EXPANDED AGRARIAN REFORM COMMUNITIES DEVELOPMENT	JAPAN INTERNATIONAL COOPERATION AGENCY CTI ENGINEERING INTERNATIONAL CO., LTD.	TITLE: HUBANGON BRIDGE STRUCTURAL DRAWING OF A2 ABUTMENT	SCALE S=1:100	Drawing No. H-07	

PLAN AND PROFILE



PLAN SCALE 1:200



VERTICAL ALIGNMENT			8.730				9.086				8.587	
PROPOSED ELEVATION			8.730 8.738		8.850 8.854	8.940	8.950	8.892	8.766	8.606 8.587		
GROUND LEVEL	8.556	8.691	8.730 8.738		8.780 8.784	2.561	2.619	2.544	8.765	8.606 8.587	8.447	8.236
DISTANCE	12220.000	12210.000	12218.192 12220.000		12228.842 12230.000	12240.000	12250.000	12260.000	12270.000	12280.000 12281.192	12290.000	12300.000
STATION	No. 12+200	12+210	+218.192 12+220		+228.842 12+230	12+240	12+250	12+260	12+270	12+280 +281.192	12+290	12+300

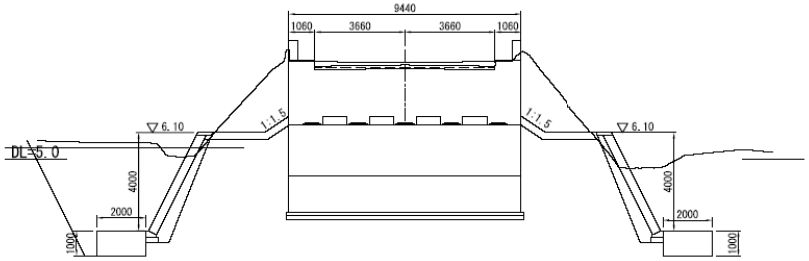
PROFILE SCALE 1:200

DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS THE REPUBLIC OF THE PHILIPPINES	BASIC DESIGN STUDY ON THE PROJECT FOR FLOOD DISASTER MITIGATION IN CAMIGUIN ISLAND IN THE REPUBLIC OF THE PHILIPPINES	JAPAN INTERNATIONAL COOPERATION AGENCY CTI ENGINEERING INTERNATIONAL CO., LTD.	TITLE : HUBANGON BRIDGE PLAN AND PROFILE	SCALE H=1:200 V=1:100	Drawing No. H-08	

別添-10

CROSS SECTION S=1:100

NO. 12+228.942
GH=8.949
FH=8.850



NO. 12+281.192
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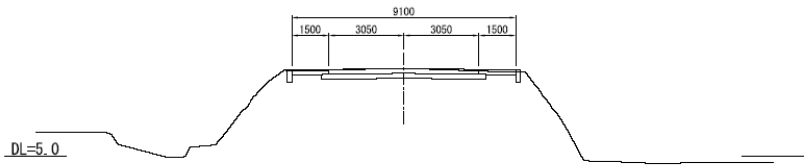
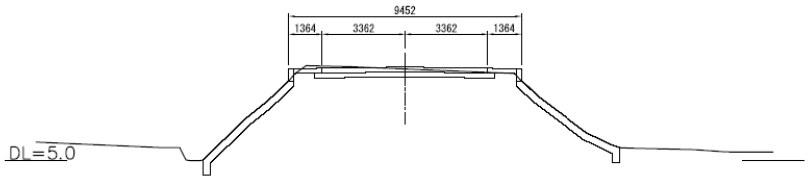
FH=8.587



NO. 12+223.692
GH=8.703
FH=8.781



NO. 12+276.202
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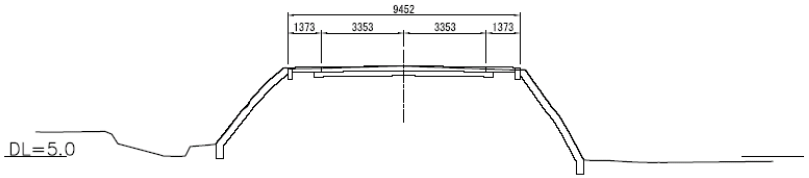
FH=8.667



NO. 12+218.192
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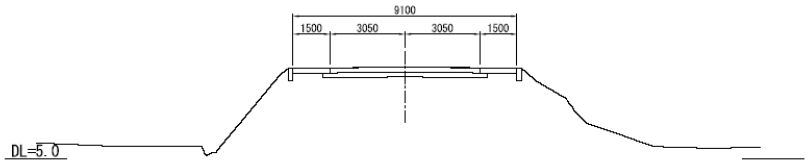
FH=8.730



NO. 12+271.042
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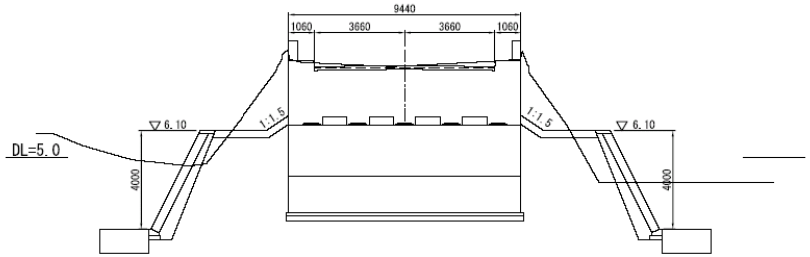
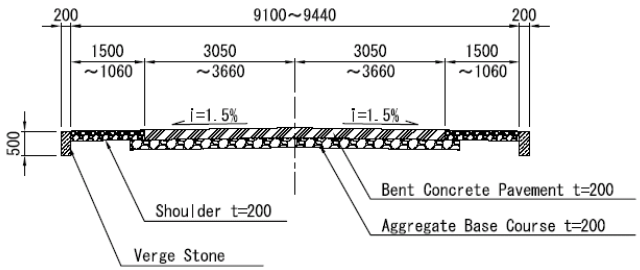
FH=8.749



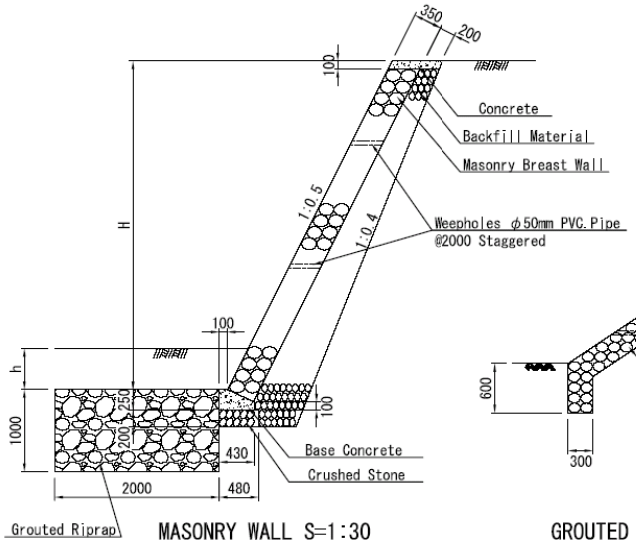
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS THE REPUBLIC OF THE PHILIPPINES	BASIC DESIGN STUDY ON THE PROJECT FOR FLOOD DISASTER MITIGATION IN CAMIGUIN ISLAND IN THE REPUBLIC OF THE PHILIPPINES	JAPAN INTERNATIONAL COOPERATION AGENCY CTI ENGINEERING INTERNATIONAL CO., LTD.	TITLE : HUBANGON BRIDGE CROSS SECTION	SCALE S=1:100	Drawing No. H-09	/

別添-11

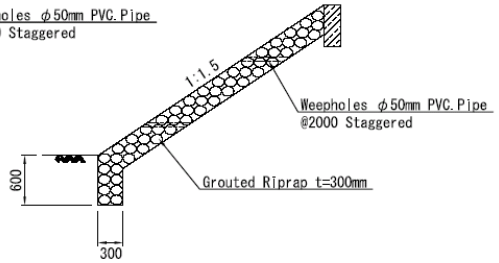
TYPICAL SECTION & DETAIL OF STRUCTURES



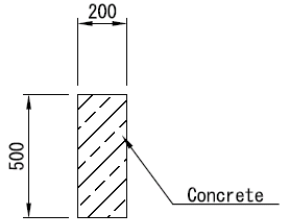
TYPICAL CROSS SECTION S=1:50



MASONRY WALL S=1:30



GROUTED RIPRAP S=1:30

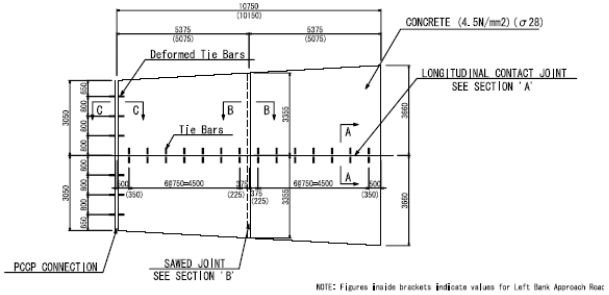


VERGE STONE S=1:10

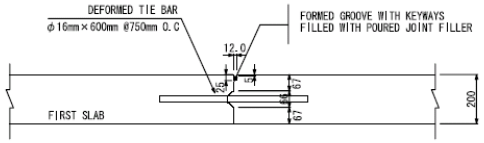
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS THE REPUBLIC OF THE PHILIPPINES	BASIC DESIGN STUDY ON THE PROJECT FOR FLOOD DISASTER MITIGATION IN CAMIGUIN ISLAND IN THE REPUBLIC OF THE PHILIPPINES	JAPAN INTERNATIONAL COOPERATION AGENCY CTI ENGINEERING INTERNATIONAL CO., LTD.	TITLE : HUBANGON BRIDGE TYPICAL SECTION & DETAIL OF STRUCTURES	SCALE As Shown	Drawing No. H-10	

別添-12

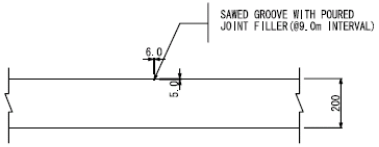
DETAIL OF CONCRETE PAVEMENT



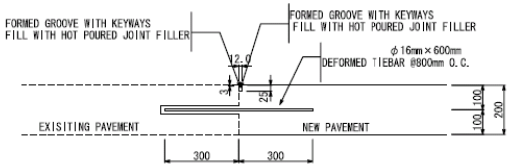
PLAN S=1:100



SECTION 'A' S=1:10
(CONTACT JOINT)



SECTION 'B' S=1:10
(CONTRACTION JOINT)



SECTION 'C' S=1:10

DETAIL OF EXISTING PCCP CONNECTION S=1:10

DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS THE REPUBLIC OF THE PHILIPPINES	BASIC DESIGN STUDY ON THE PROJECT FOR FLOOD DISASTER MITIGATION IN CAMIGUIN ISLAND IN THE REPUBLIC OF THE PHILIPPINES	JAPAN INTERNATIONAL COOPERATION AGENCY CTI ENGINEERING INTERNATIONAL CO., LTD.	TITLE : HUBANGON BRIDGE DETAIL OF CONCRETE PAVEMENT	SCALE AS SHOWN	Drawing No. H-11	/

別添-13

Department of Public Works and Highways
The Republic of the Philippines

BASIC DESIGN STUDY
ON
THE PROJECT FOR FLOOD DISASTER MITIGATION
IN CAMIGUIN ISLAND
IN THE REPUBLIC OF THE PHILIPPINES

DRAWINGS
(SABO DAM)

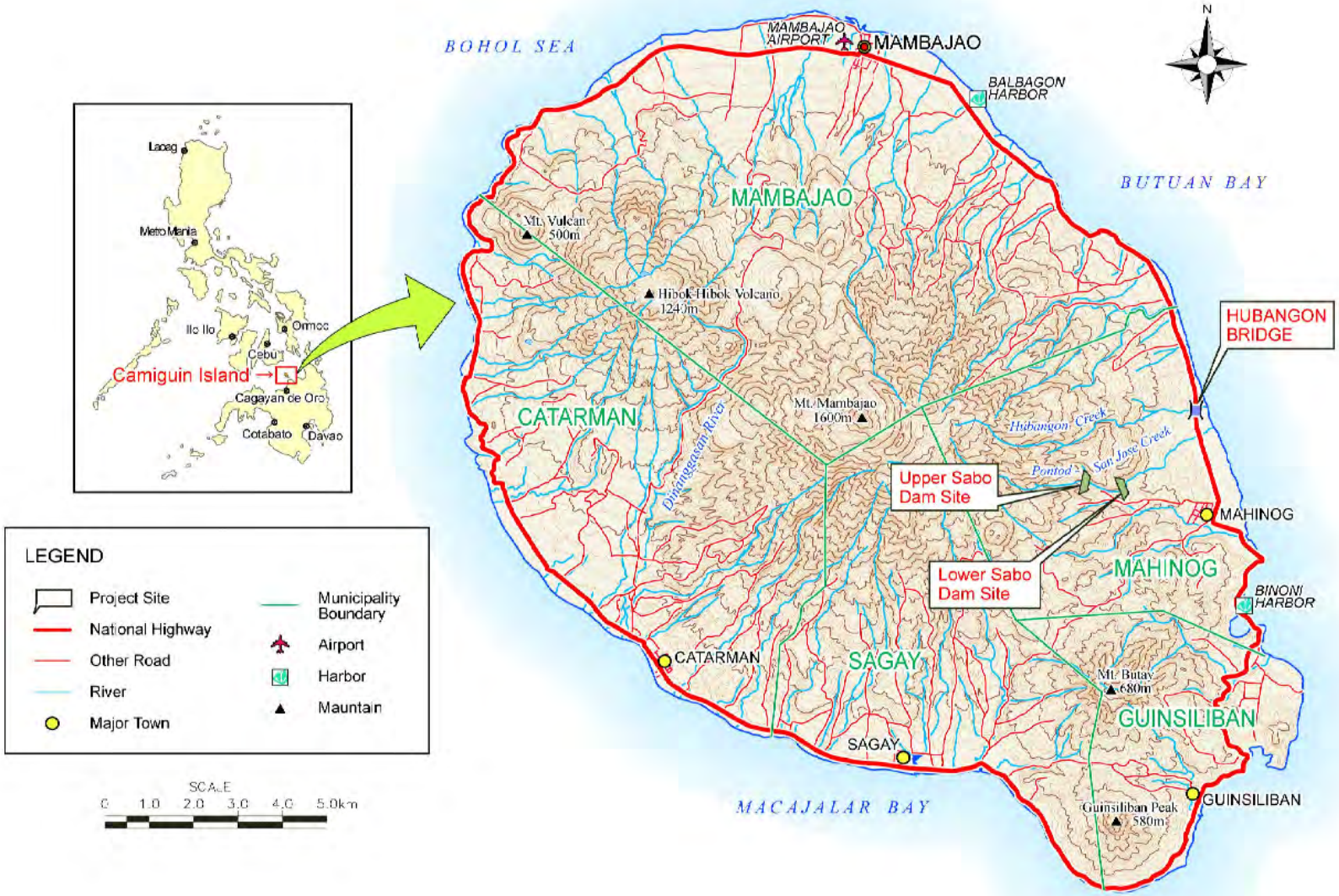
February 2009

JAPAN INTERNATIONAL COOPERATION AGENCY

CTI ENGINEERING INTERNATIONAL CO., LTD.

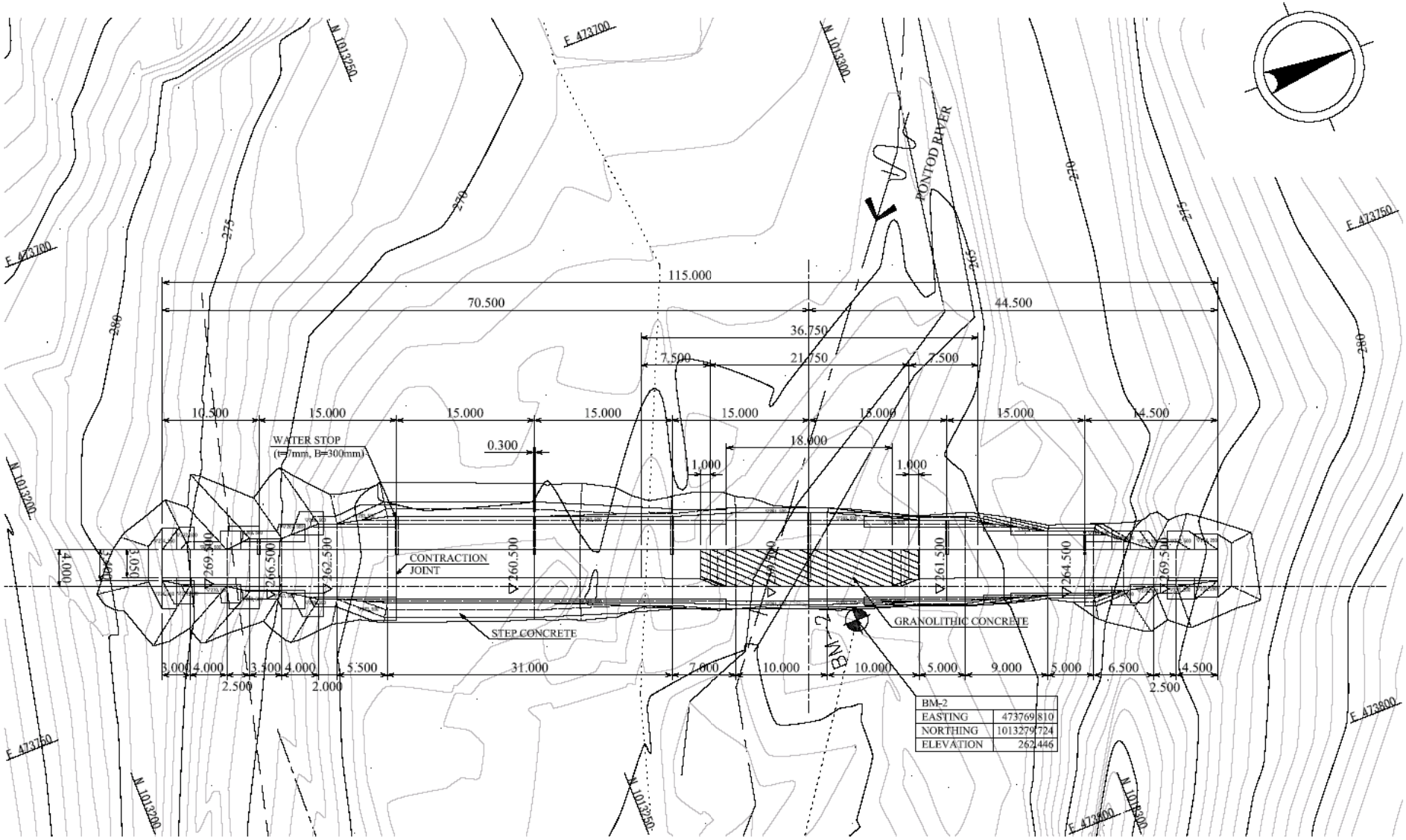
LIST OF DRAWINGS

No.	Drawing Title	Scale	No.	Drawing Title	Scale
S-01	Project Location Map	-			
S-02	Plan of Upper Sabo Dam	1/200			
S-03	Plan of Lower Sabo Dam	1/200			
S-04	General Drawing of Upper Sabo Dam	1/200			
S-05	General Drawing of Lower Sabo Dam	1/200			
S-06	Plan and Profile of Access Road (Upper Sabo Dam)	H=1/1000, V=1/500			
S-07	Plan and Profile of Access Road (Lower Sabo Dam)	H=1/1000, V=1/500			
S-08	Typical Cross Section of Road Section	1/50			



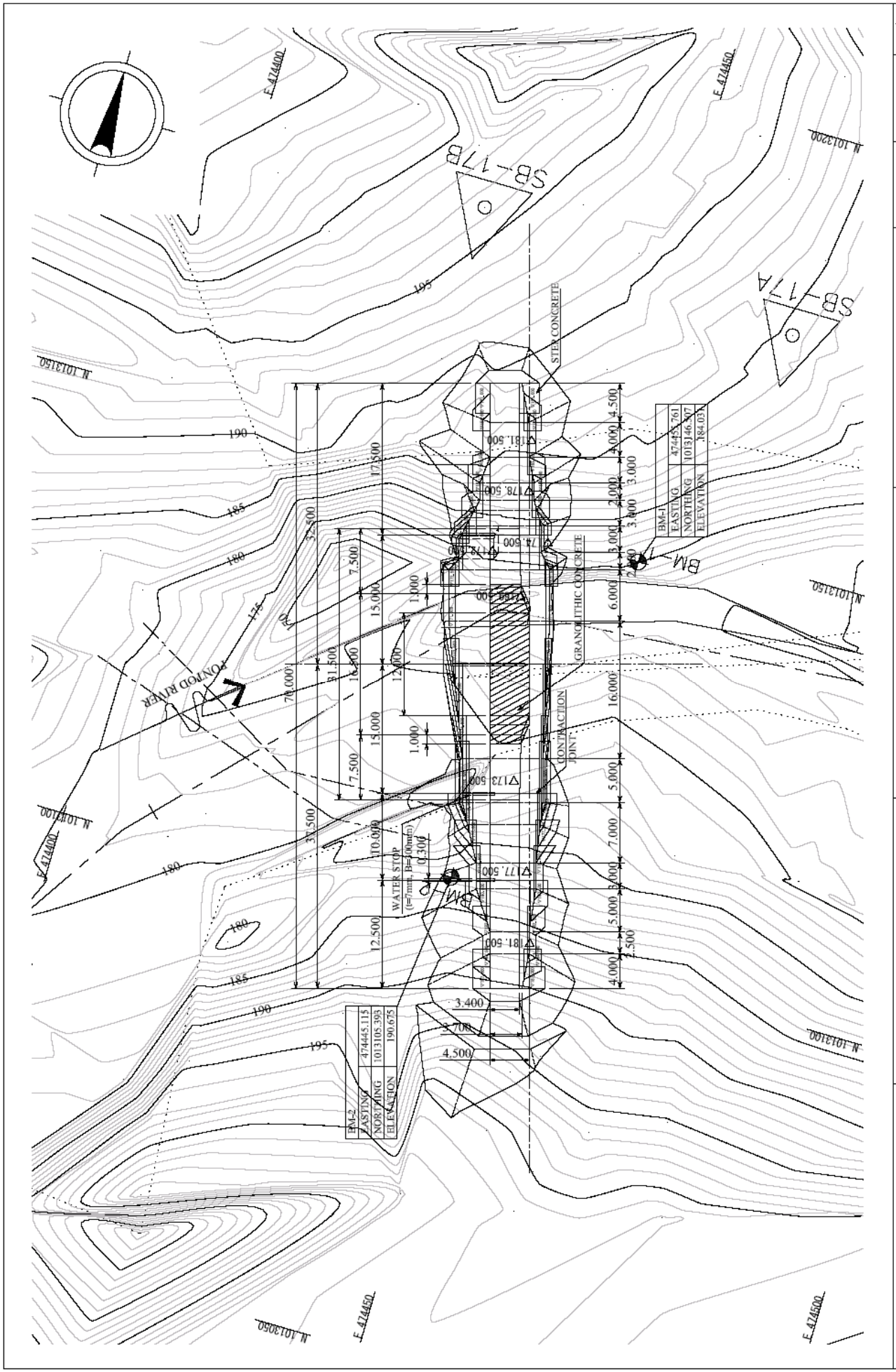
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS THE REPUBLIC OF THE PHILIPPINES	BASIC DESIGN STUDY ON THE PROJECT FOR FLOOD DISASTER MITIGATION IN CAMIGUIN ISLAND IN THE REPUBLIC OF THE PHILIPPINES	JAPAN INTERNATIONAL COOPERATION AGENCY CTI ENGINEERING INTERNATIONAL CO., LTD.	TITLE : PROJECT LOCATION MAP	SCALE Not on Scale	Drawing No. S-01	/

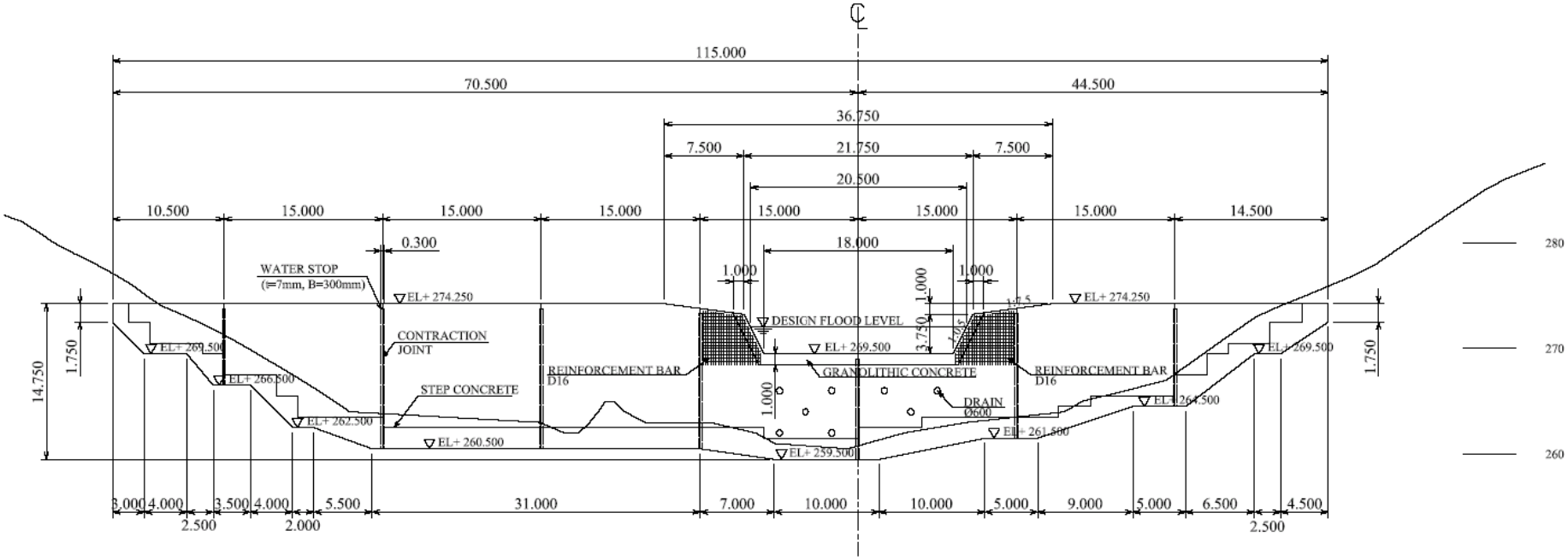
別添-17



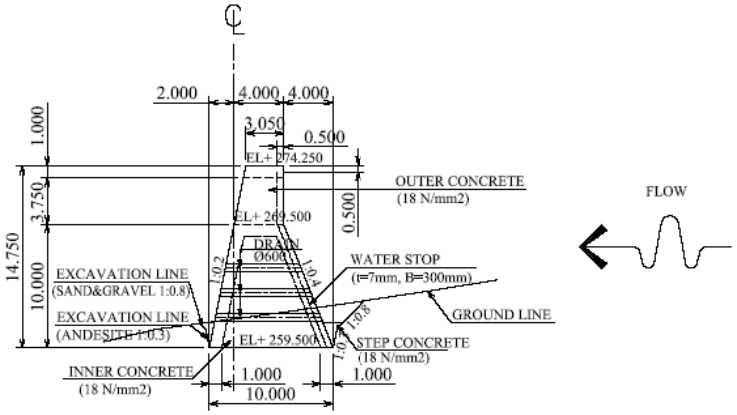
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS THE REPUBLIC OF THE PHILIPPINES	BASIC DESIGN STUDY ON THE PROJECT FOR FLOOD DISASTER MITIGATION IN CAMIGUIN ISLAND IN THE REPUBLIC OF THE PHILIPPINES	JAPAN INTERNATIONAL COOPERATION AGENCY CTI ENGINEERING INTERNATIONAL CO., LTD.	TITLE : PLAN OF UPPER SABO DAM	SCALE 1:200	Drawing No. S-02	

別添-18


DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
THE REPUBLIC OF THE PHILIPPINES
BASIC DESIGN STUDY
ON THE PROJECT FOR FLOOD DISASTER MITIGATION
IN CAMIGUIN ISLAND
IN THE REPUBLIC OF THE PHILIPPINES
JAPAN INTERNATIONAL COOPERATION AGENCY
CTI ENGINEERING INTERNATIONAL CO., LTD.
TITLE :
PLAN OF LOWER SABO DAM
SCALE
1:200
Drawing No.
S-03
SB-17A
SB-17B
PONTOD RIVER
STEP CONCRETE
GRANOLITHIC CONCRETE
CONTRACTION JOINT
WATER STOP
(t=7mm, h=100mm)
BM-1
EASTING 474455.761
NORTHING 1013146.507
ELEVATION 184.074
BM-2
EASTING 474445.115
NORTHING 1013105.393
ELEVATION 190.675
E 474400
E 474450
E 474500
N 1013150
N 1013100
N 1013050
N 1013200

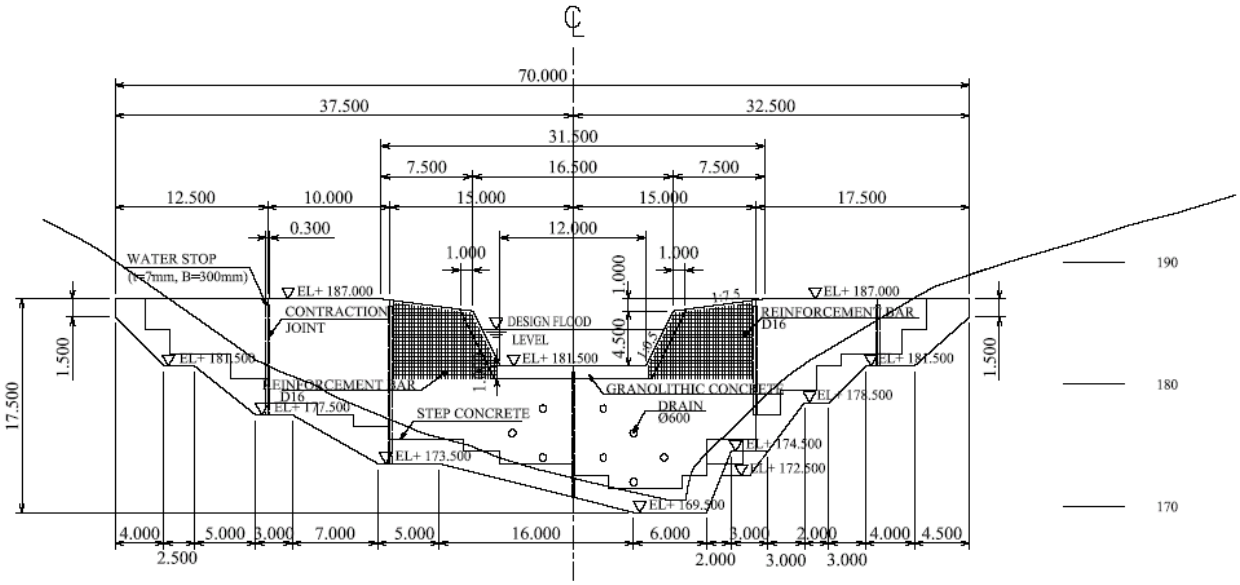


PROFILE ON UPPER SABO DAM AXIS

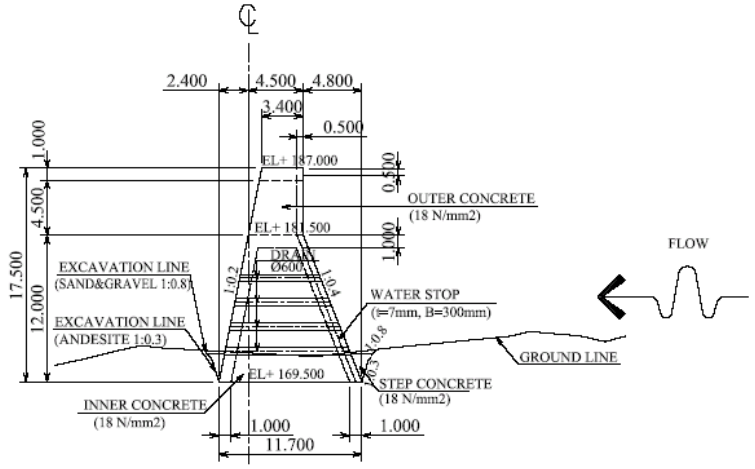


TYPICAL CROSS SECTION OF UPPER SABO DAM

DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS THE REPUBLIC OF THE PHILIPPINES	BASIC DESIGN STUDY ON THE PROJECT FOR FLOOD DISASTER MITIGATION IN CAMIGUIN ISLAND IN THE REPUBLIC OF THE PHILIPPINES	JAPAN INTERNATIONAL COOPERATION AGENCY CTI ENGINEERING INTERNATIONAL CO., LTD.	TITLE : GENERAL DRAWING OF UPPER SABO DAM	SCALE 1:200	Drawing No. S-04	



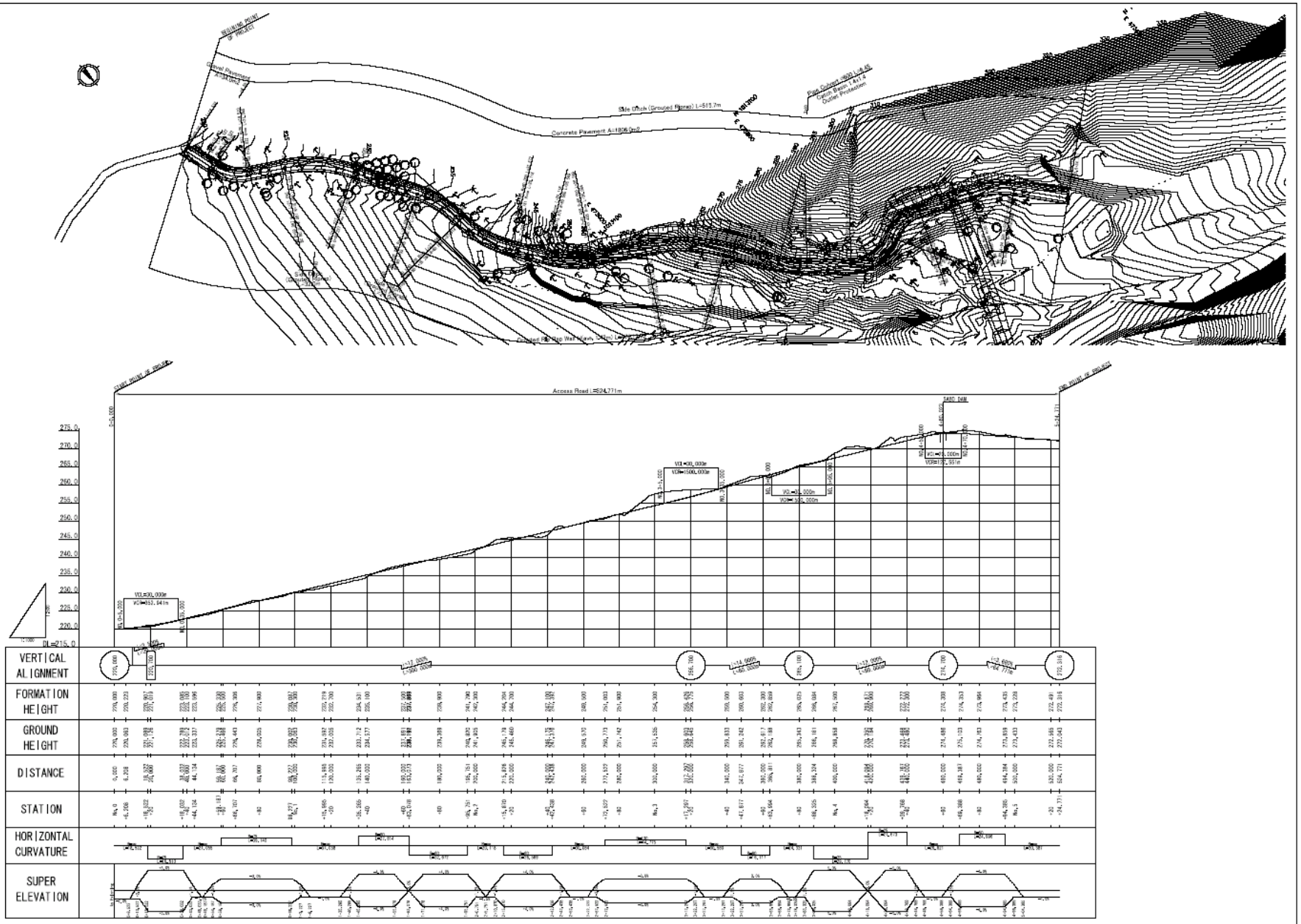
PROFILE ON LOWER SABO DAM AXIS



TYPICAL CROSS SECTION OF LOWER SABO DAM

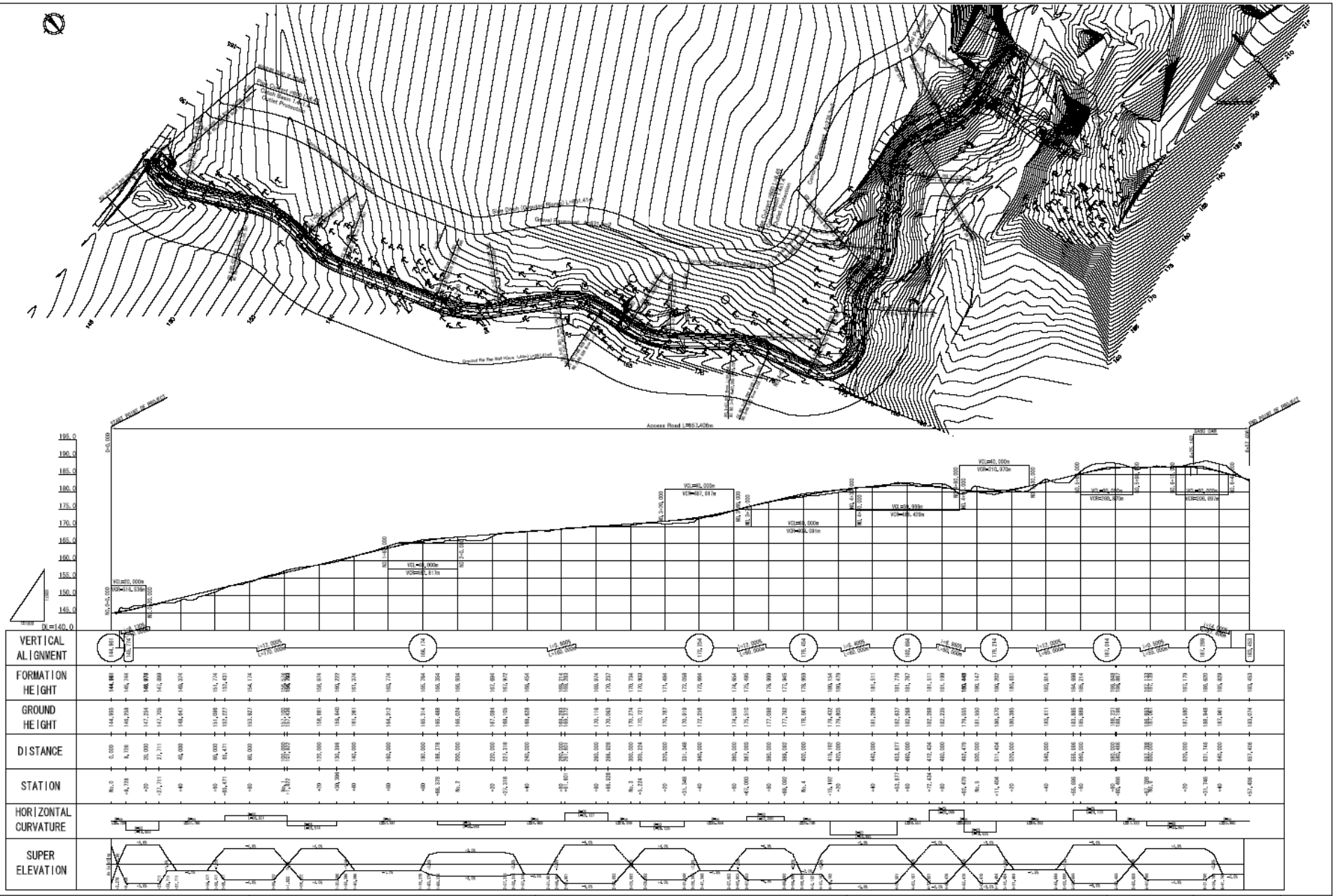
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS THE REPUBLIC OF THE PHILIPPINES	BASIC DESIGN STUDY ON THE PROJECT FOR FLOOD DISASTER MITIGATION IN CAMIGUIN ISLAND IN THE REPUBLIC OF THE PHILIPPINES	JAPAN INTERNATIONAL COOPERATION AGENCY CTI ENGINEERING INTERNATIONAL CO., LTD.	TITLE : GENERAL DRAWING OF LOWER SABO DAM	SCALE 1:200	Drawing No. S-05	

別添-21



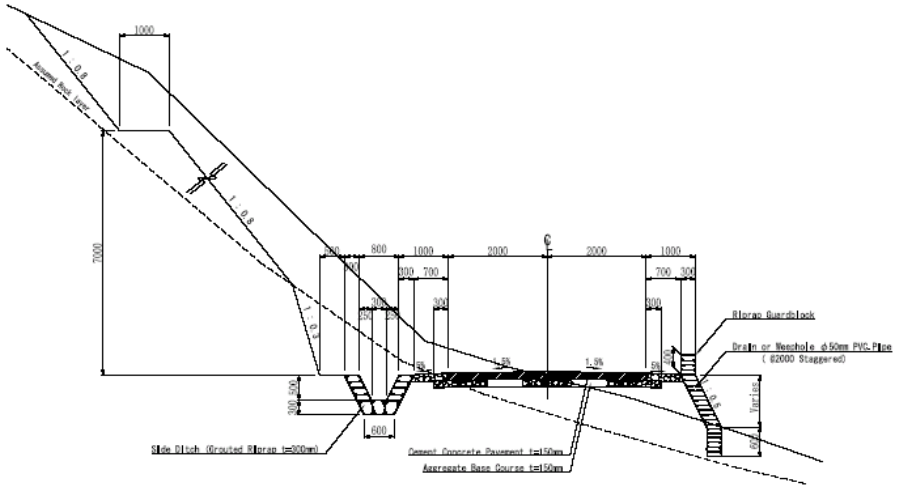
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS THE REPUBLIC OF THE PHILIPPINES	BASIC DESIGN STUDY ON THE PROJECT FOR FLOOD DISASTER MITIGATION IN CAMIGUIN ISLAND IN THE REPUBLIC OF THE PHILIPPINES	JAPAN INTERNATIONAL COOPERATION AGENCY CTI ENGINEERING INTERNATIONAL CO., LTD.	TITLE : UPSTREAM DAM PLAN AND PROFILE OF ACCESS ROAD	SCALE H=1:1000 V=1:500	Drawing No. S-06

別添-22

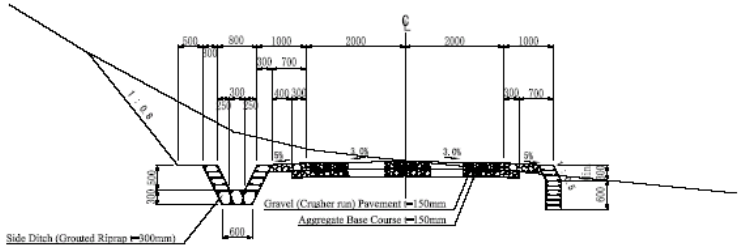


DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS THE REPUBLIC OF THE PHILIPPINES	BASIC DESIGN STUDY ON THE PROJECT FOR FLOOD DISASTER MITIGATION IN CAMIGUIN ISLAND IN THE REPUBLIC OF THE PHILIPPINES	JAPAN INTERNATIONAL COOPERATION AGENCY CTI ENGINEERING INTERNATIONAL CO., LTD.	TITLE : DOWNSTREAM DAM PLAN AND PROFILE OF ACCESS ROAD	SCALE H=1:1000 V=1:500	Drawing No. S-07

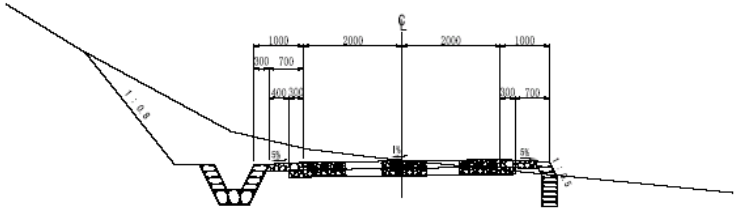
別添-23



Typical Cross Section (Longitudinal Gradient 7 % or more)



Typical Cross Section (Longitudinal Gradient less than 7 %)



Typical Cross Section (Superelevation Section)

NOTES:

1. All dimensions are in millimeters unless otherwise indicated.
2. Concrete pavement shall be provided where longitudinal gradient exceeds 7.0 percent.
3. The bending strength of concrete shall be σ28=4.5N/m2
4. Riprap guardblock shall be provided at every one meter interval where the fill height exceeds 2.0 meters.
5. Drain or weepholes of PVC. pipe φ50mm shall be provided at grouted riprap slope protection at 2.0 meters staggered.

DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS THE REPUBLIC OF THE PHILIPPINES	BASIC DESIGN STUDY ON THE PROJECT FOR FLOOD DISASTER MITIGATION IN CAMIGUIN ISLAND IN THE REPUBLIC OF THE PHILIPPINES	JAPAN INTERNATIONAL COOPERATION AGENCY CTI ENGINEERING INTERNATIONAL CO., LTD.	TITLE : TYPICAL CROSS SECTION OF ROAD SECTION	SCALE 1:50	Drawing No. S-08	