

REPUBLIC OF THE PHILIPPINES  
NATIONAL IRRIGATION ADMINISTRATION

**FEASIBILITY STUDY  
ON  
THE ASUE RIVER BASIN  
AGRICULTURAL DEVELOPMENT PROJECT**

**VOLUME 4  
DRAWINGS**

AUGUST 1985

JAPAN INTERNATIONAL COOPERATION AGENCY

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85-39-4/5

FEASIBILITY STUDY

ON

THE ASUE RIVER BASIN

AGRICULTURAL DEVELOPMENT PROJECT

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- II. Meteorology and Hydrology
- III. Geology and Embankment Materials
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REPUBLIC OF THE PHILIPPINES  
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**FEASIBILITY STUDY  
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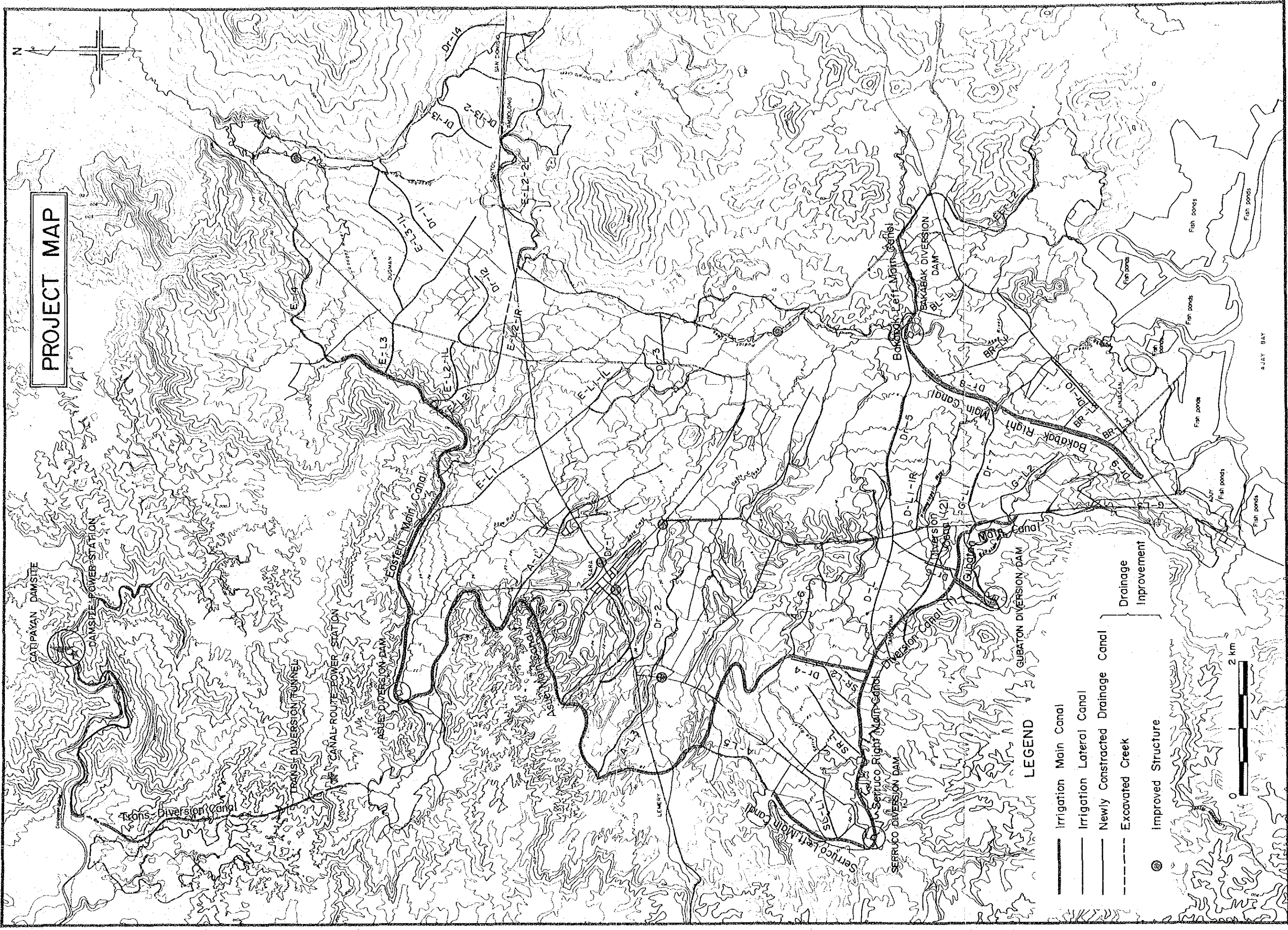
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DRAWINGS

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# PROJECT MAP



CATIPAYAN DAMSITE

DAMSITE POWER STATION

Trans-Diversion Canal

TRANS DIVERSION TUNNEL

CANAL ROUTE POWER STATION

ASQUES DIVERSION DAM

Eastern Main Canal

ASQUES DIVERSION DAM

ASQUES DIVERSION DAM

ASQUES DIVERSION DAM

ASQUES DIVERSION DAM

ASQUES DIVERSION DAM

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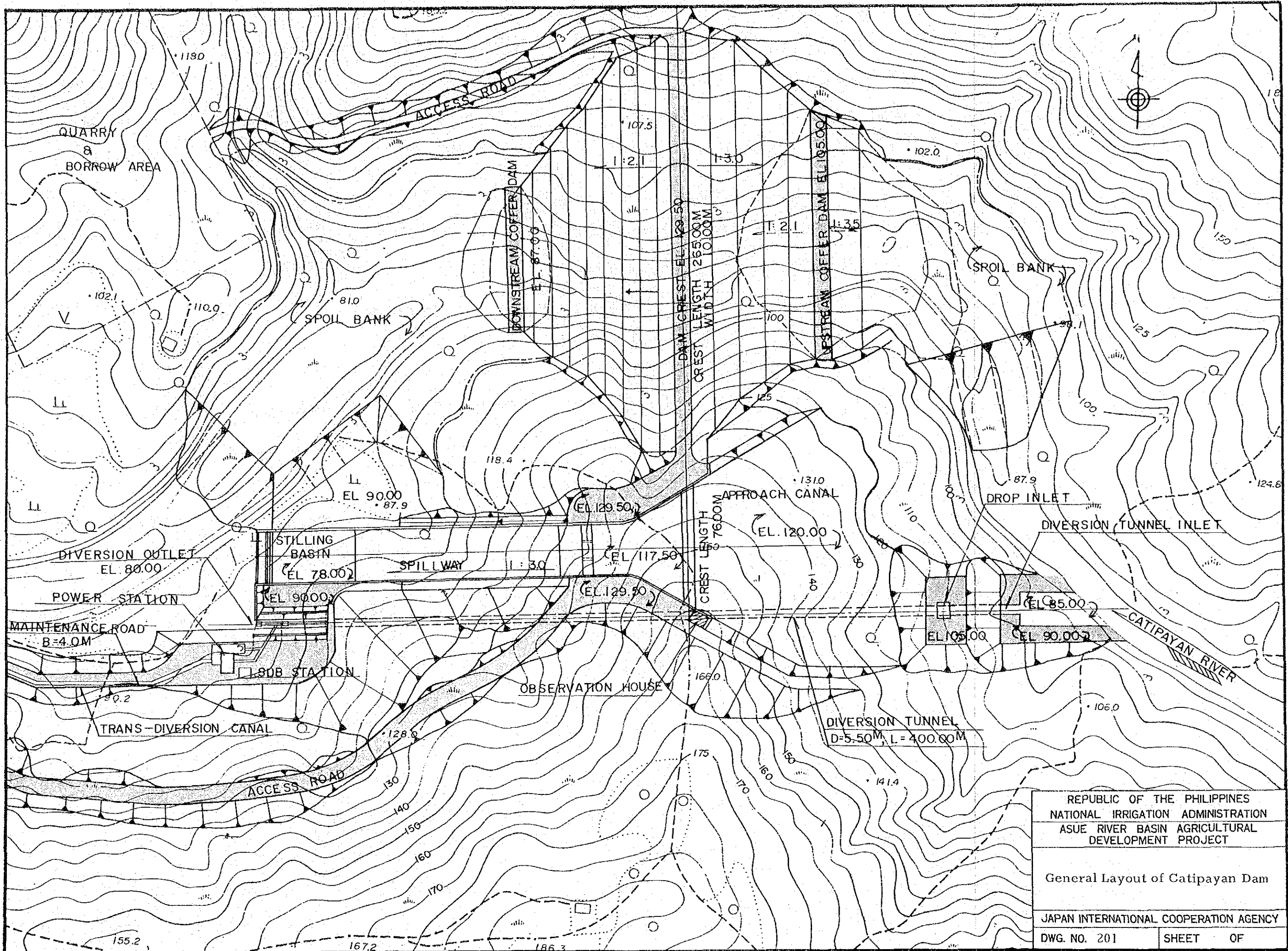
## LEGEND

- Irrigation Main Canal
- Irrigation Lateral Canal
- Newly Constructed Drainage Canal
- Excavated Creek
- Improved Structure

Drainage Improvement

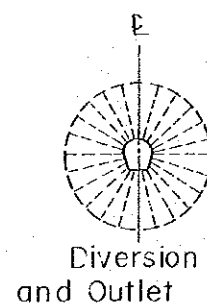
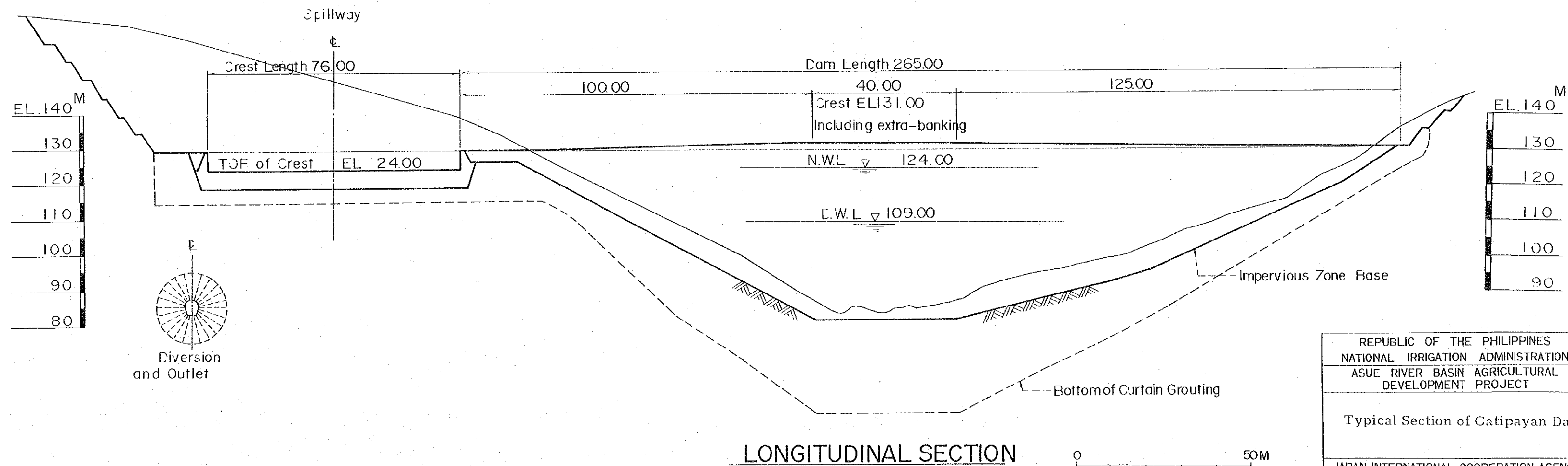
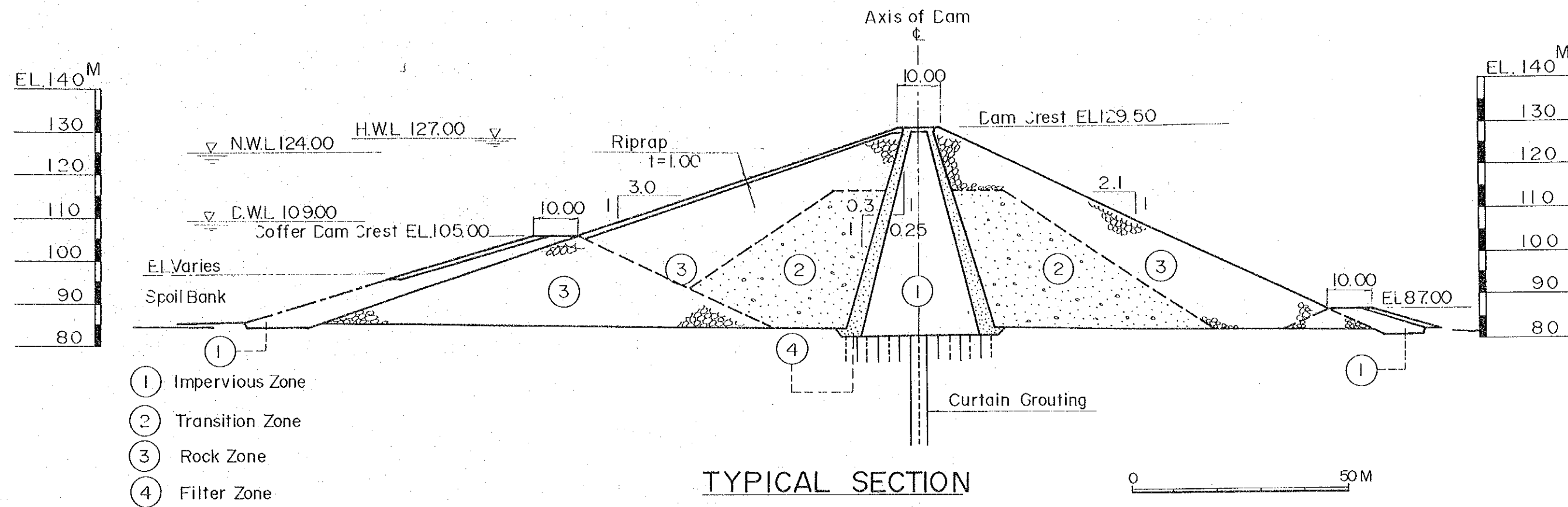


AJAY BAY

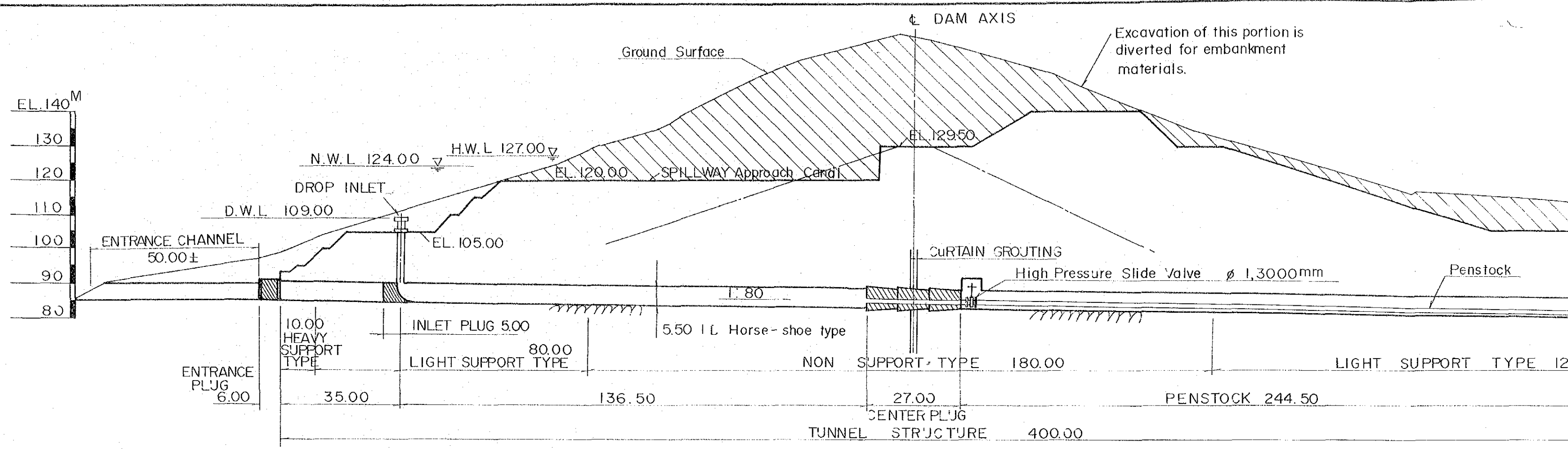


REPUBLIC OF THE PHILIPPINES NATIONAL IRRIGATION ADMINISTRATION ASUE RIVER BASIN AGRICULTURAL DEVELOPMENT PROJECT	
General Layout of Catipayan Dam	
JAPAN INTERNATIONAL COOPERATION AGENCY	
DWG. NO. 201	SHEET OF





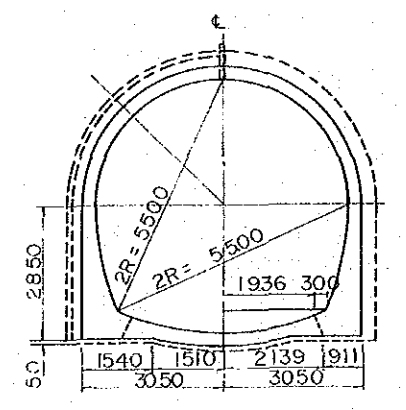
REPUBLIC OF THE PHILIPPINES NATIONAL IRRIGATION ADMINISTRATION ASUE RIVER BASIN AGRICULTURAL DEVELOPMENT PROJECT	
Typical Section of Catipayan Dam	
JAPAN INTERNATIONAL COOPERATION AGENCY	
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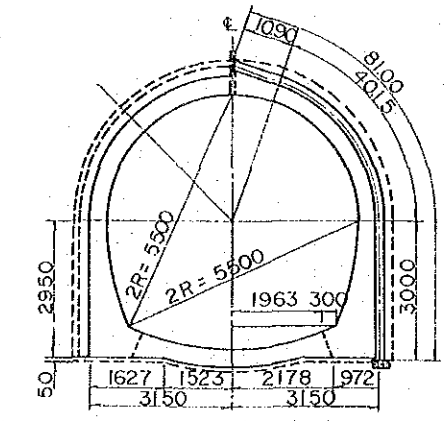
PROFILE OF DIVERSION AND OUTLET



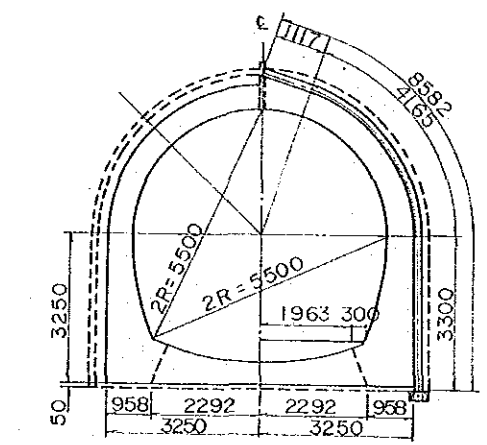
Non Support Type



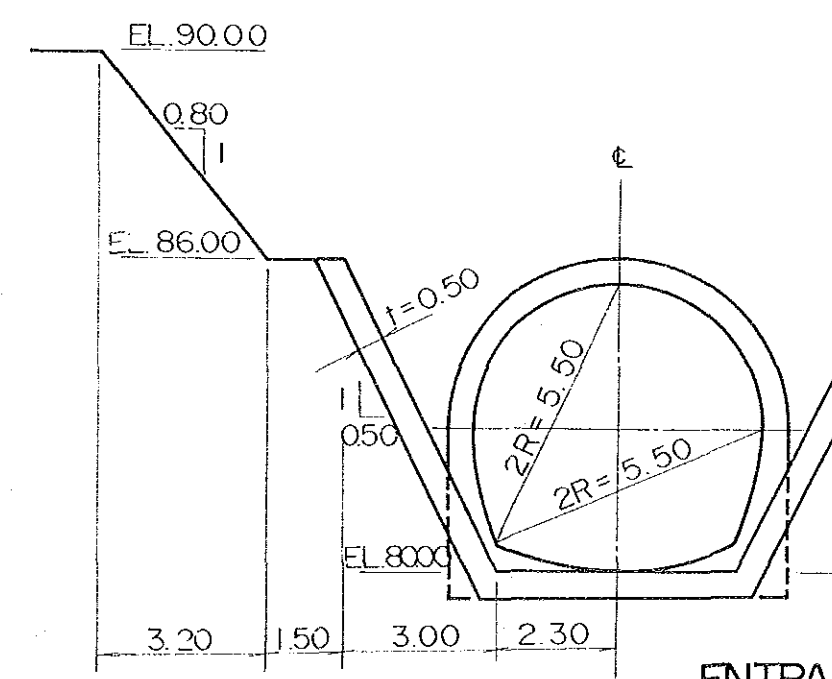
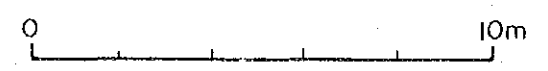
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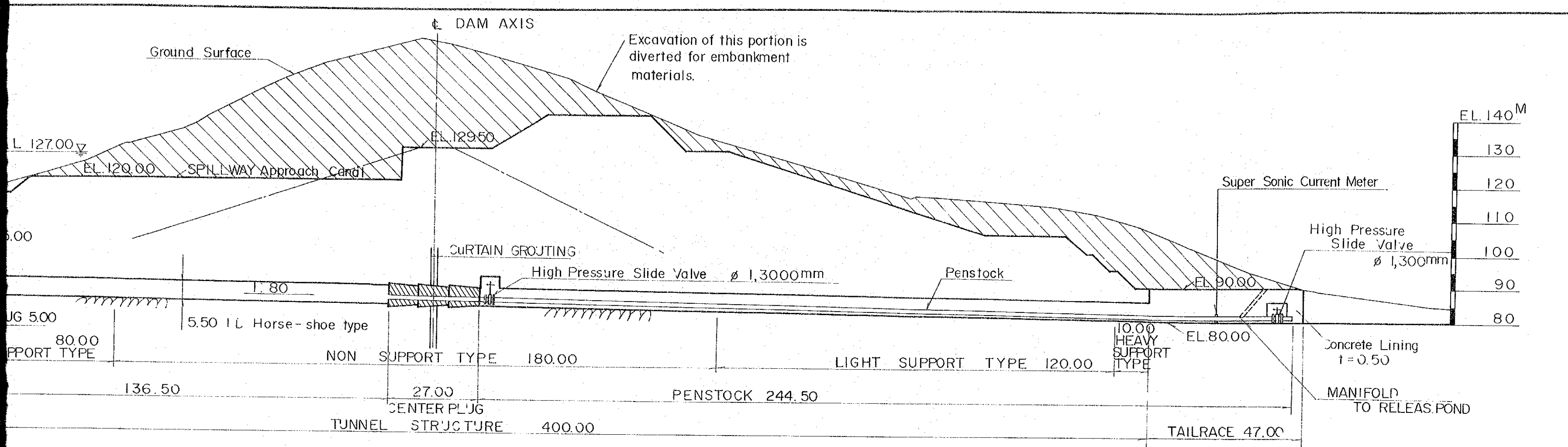


Heavy Support Type



TUNNEL TYPICAL SECTION



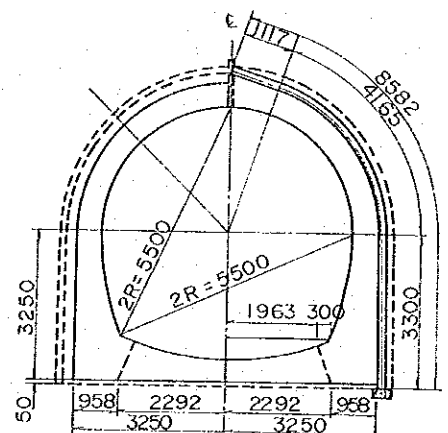
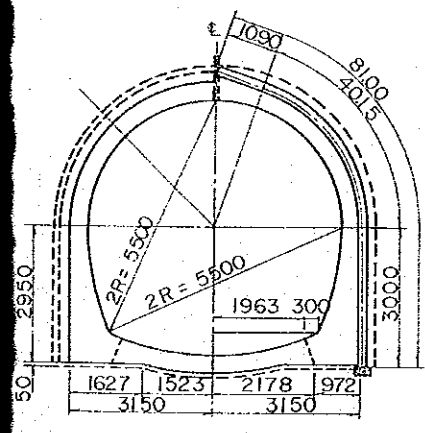


PROFILE OF DIVERSION AND OUTLET

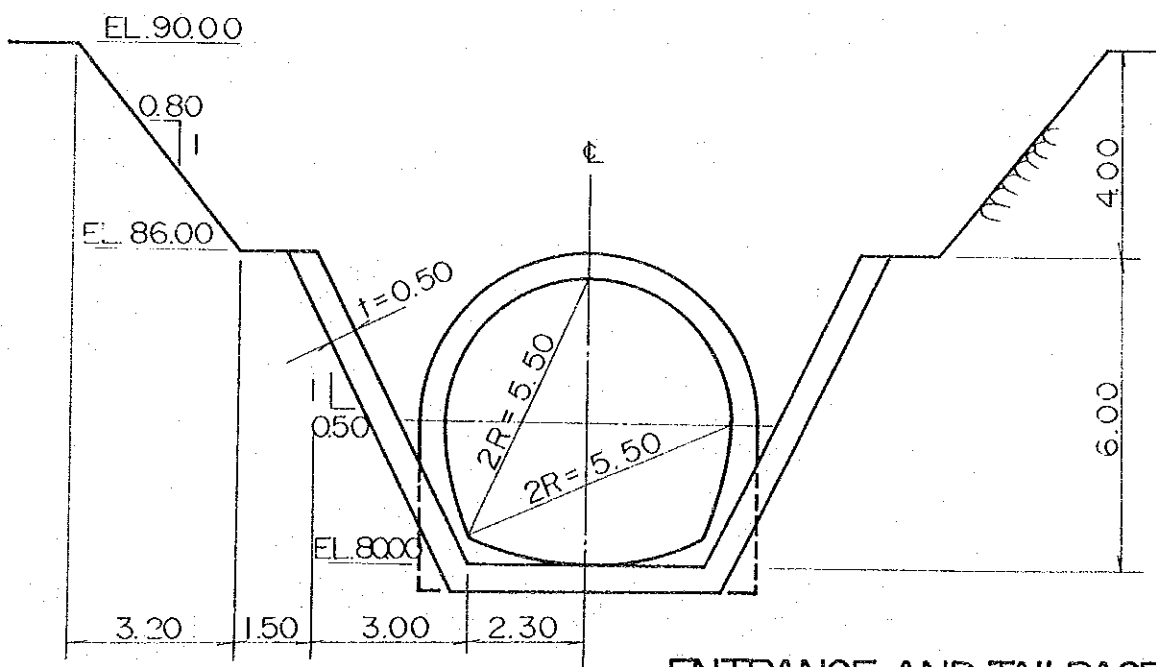


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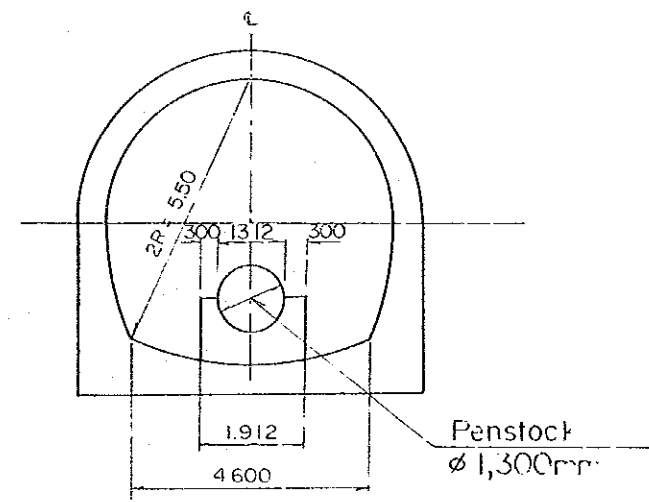
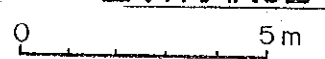
Heavy Support Type



TYPICAL SECTION

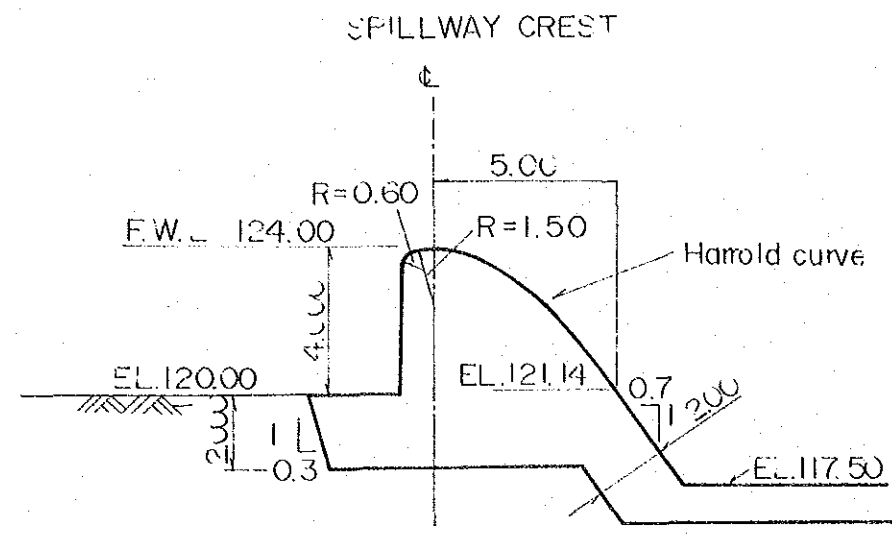


ENTRANCE AND TAILRACE SECTION

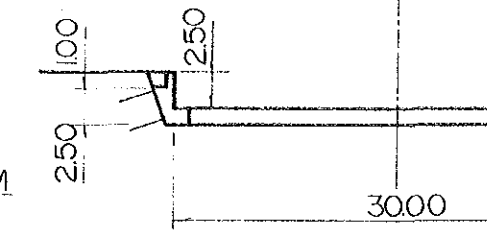
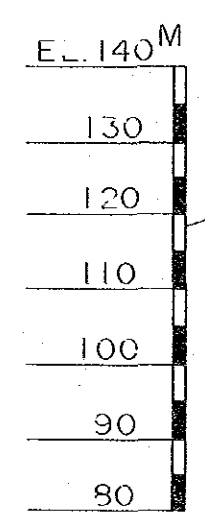
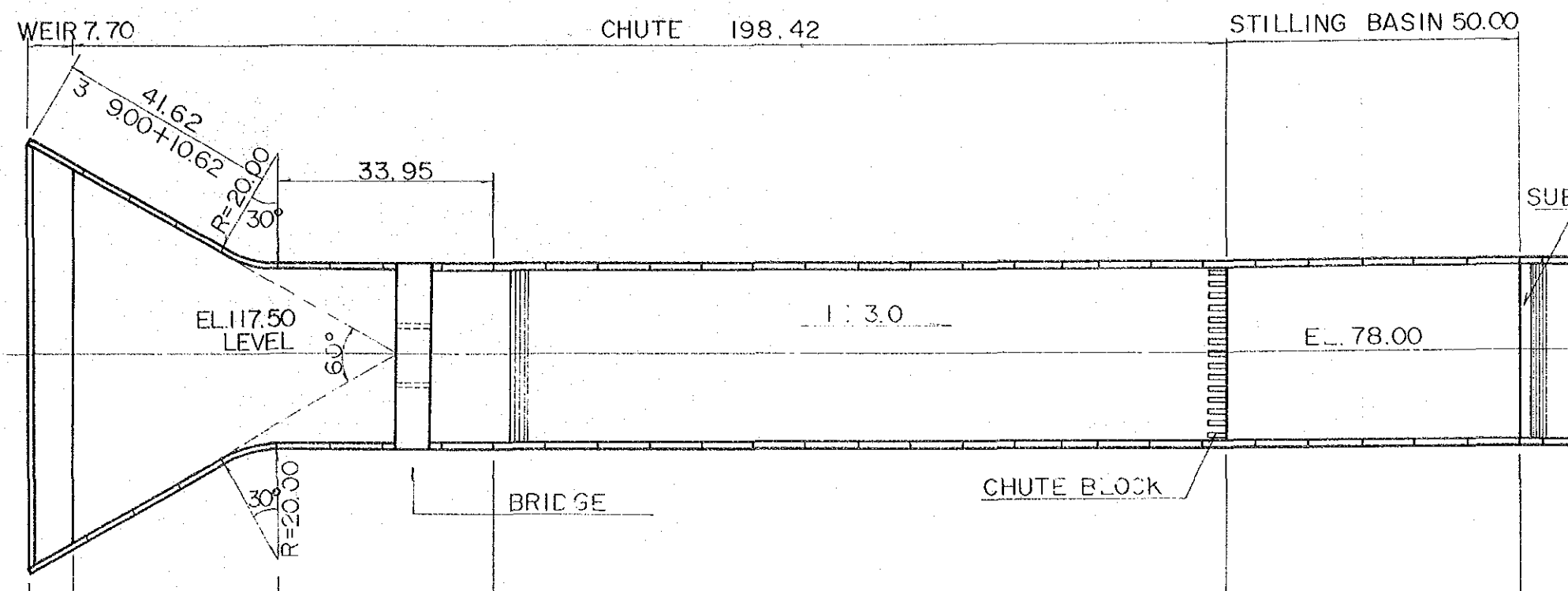


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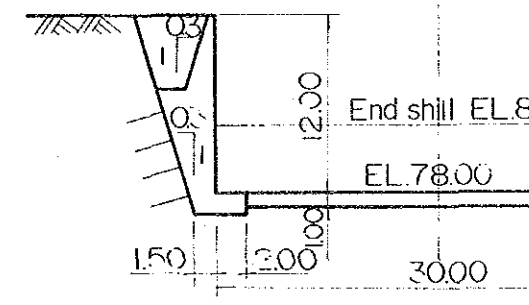
REPUBLIC OF THE PHILIPPINES NATIONAL IRRIGATION ADMINISTRATION ASUE RIVER BASIN AGRICULTURAL DEVELOPMENT PROJECT	
Profile of Spillway and Diversion Outline	
JAPAN INTERNATIONAL COOPERATION AGENCY	
DWG. NO. 203	SHEET OF



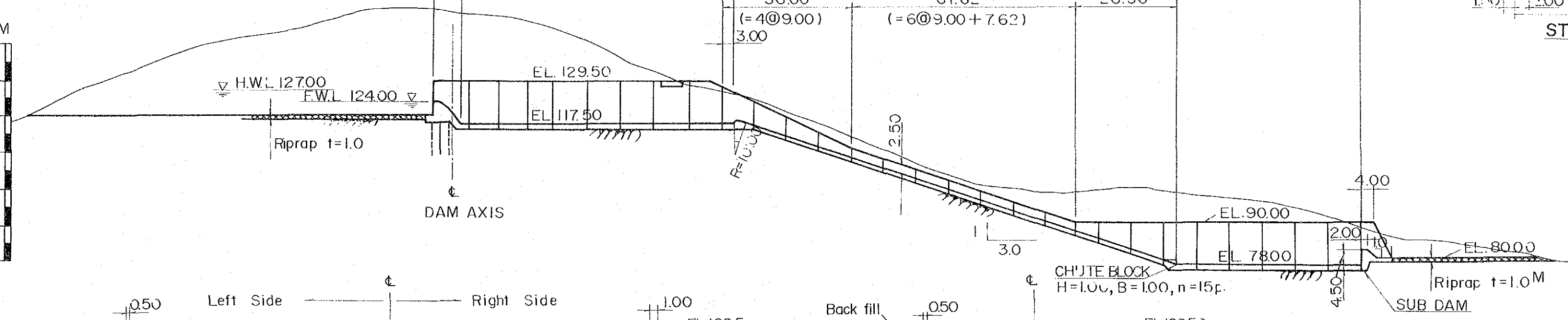
WEIR SECTION



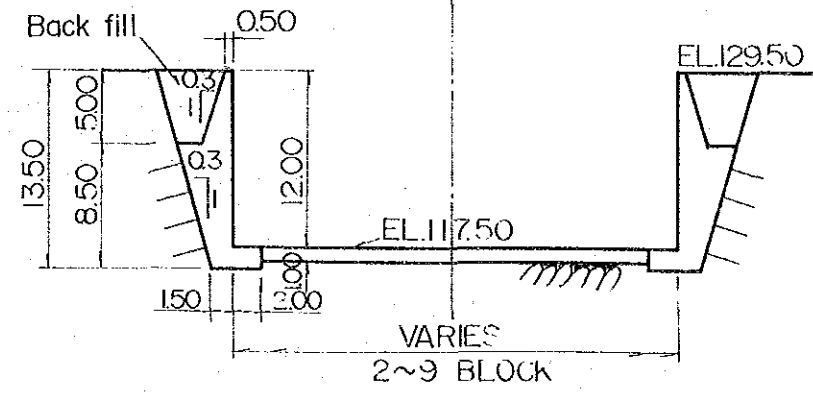
SLOPE SECTION



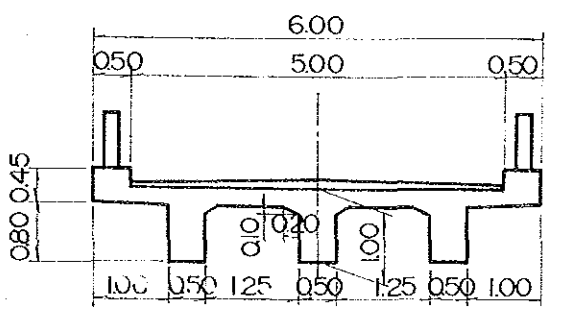
STILLING BASIN



CREST SECTION

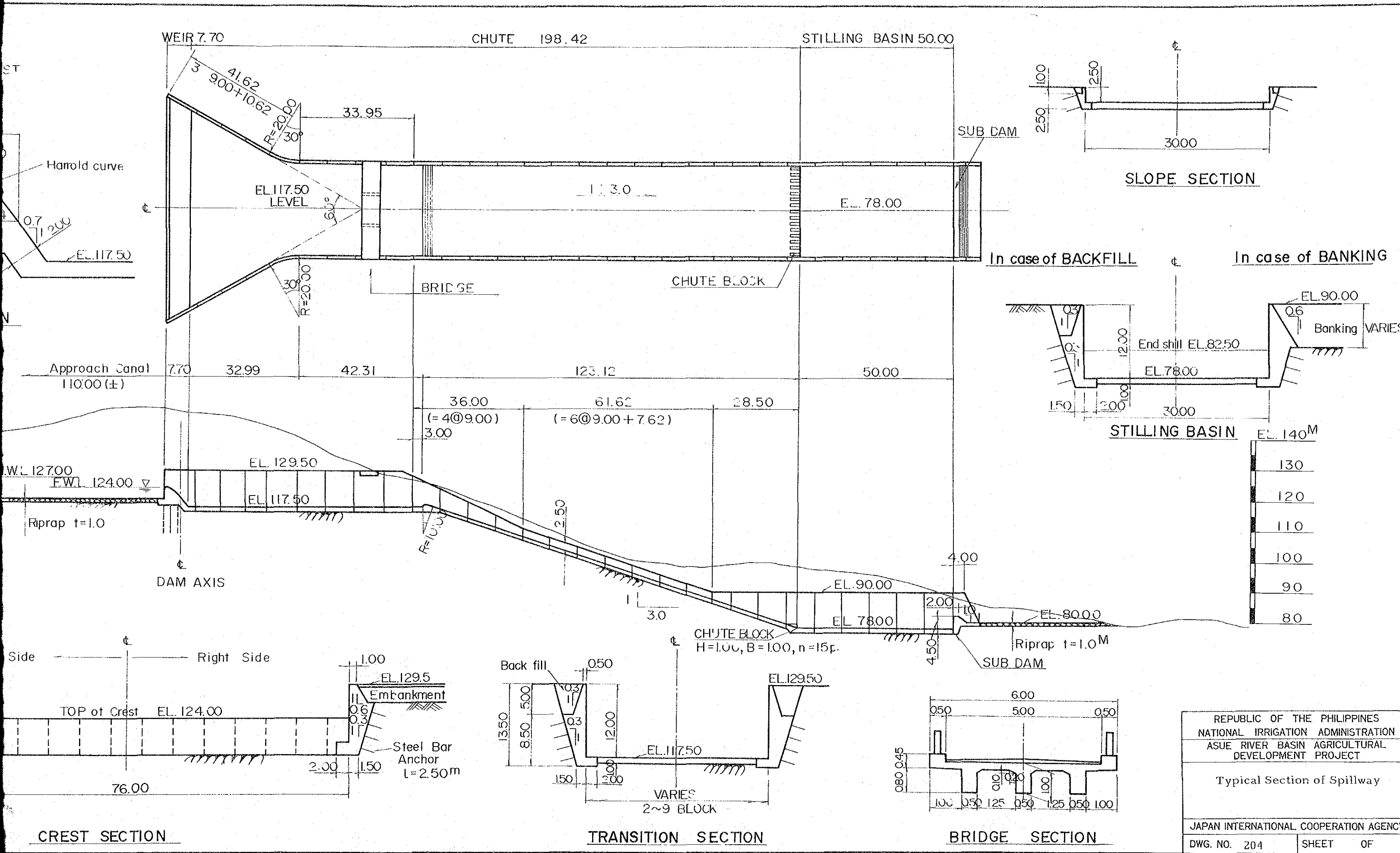


TRANSITION SECTION



BRIDGE SECTION

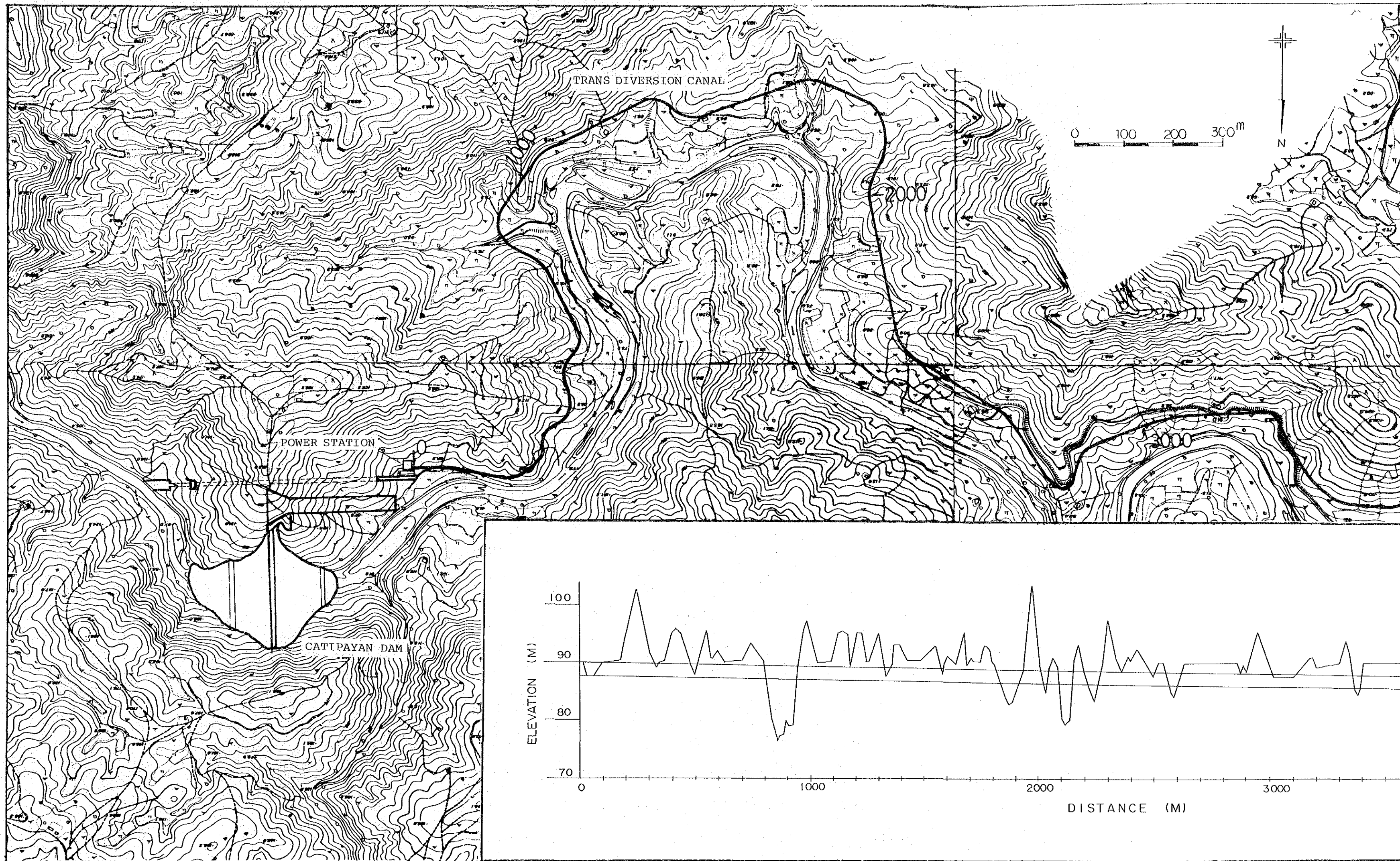
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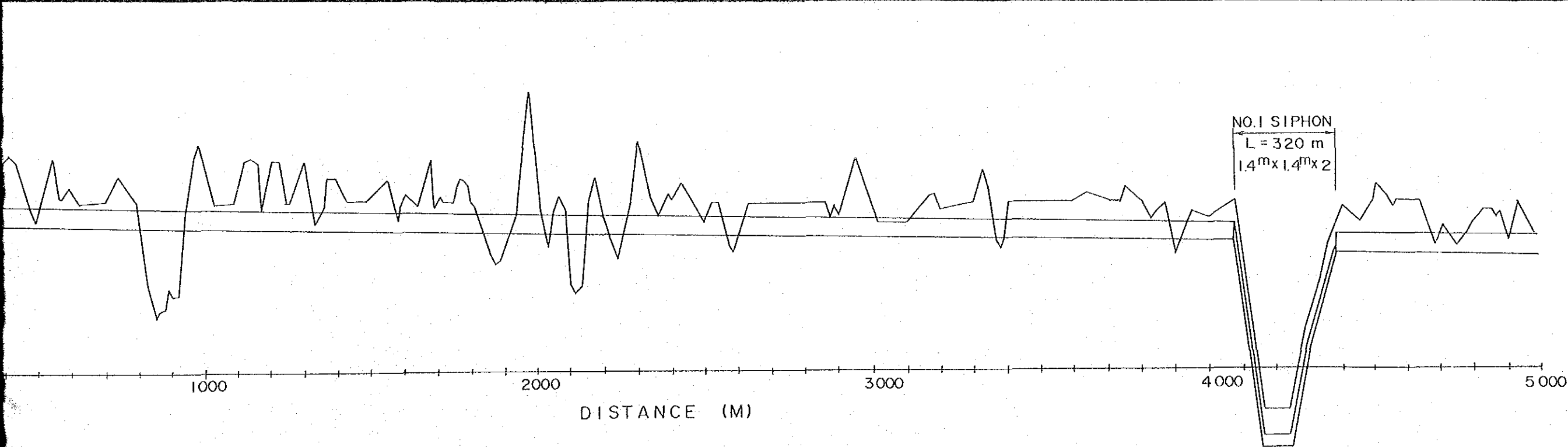
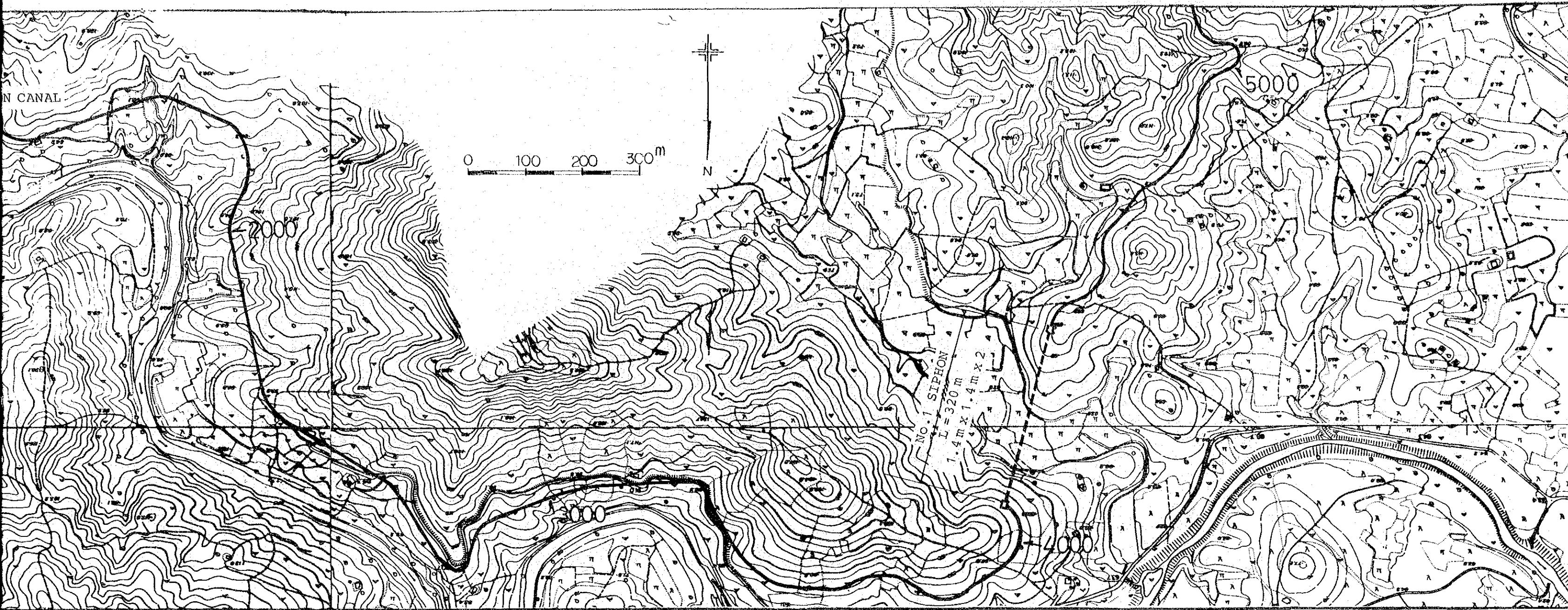


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 ASUE RIVER BASIN AGRICULTURAL  
 DEVELOPMENT PROJECT

Typical Section of Spillway

JAPAN INTERNATIONAL COOPERATION AGENCY  
 DWG. NO. 204 SHEET OF

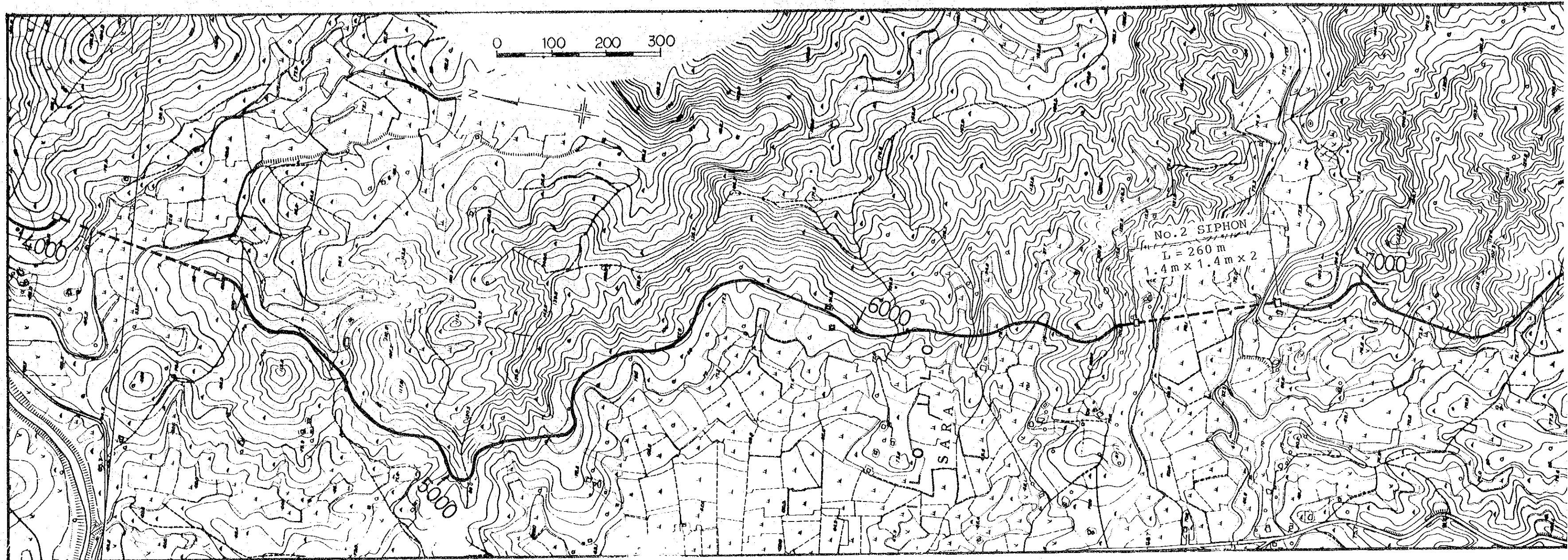




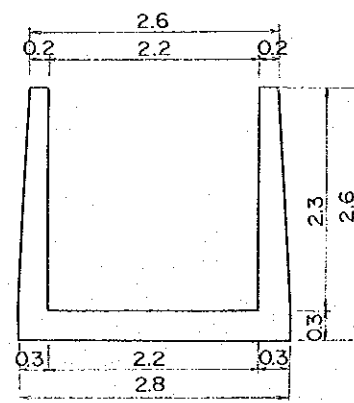
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 ASUE RIVER BASIN AGRICULTURAL  
 DEVELOPMENT PROJECT

Trans-Diversion Canal

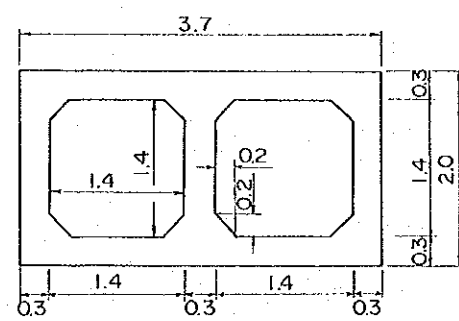
JAPAN INTERNATIONAL COOPERATION AGENCY  
 DWG. NO. 205 SHEET 1 OF 2



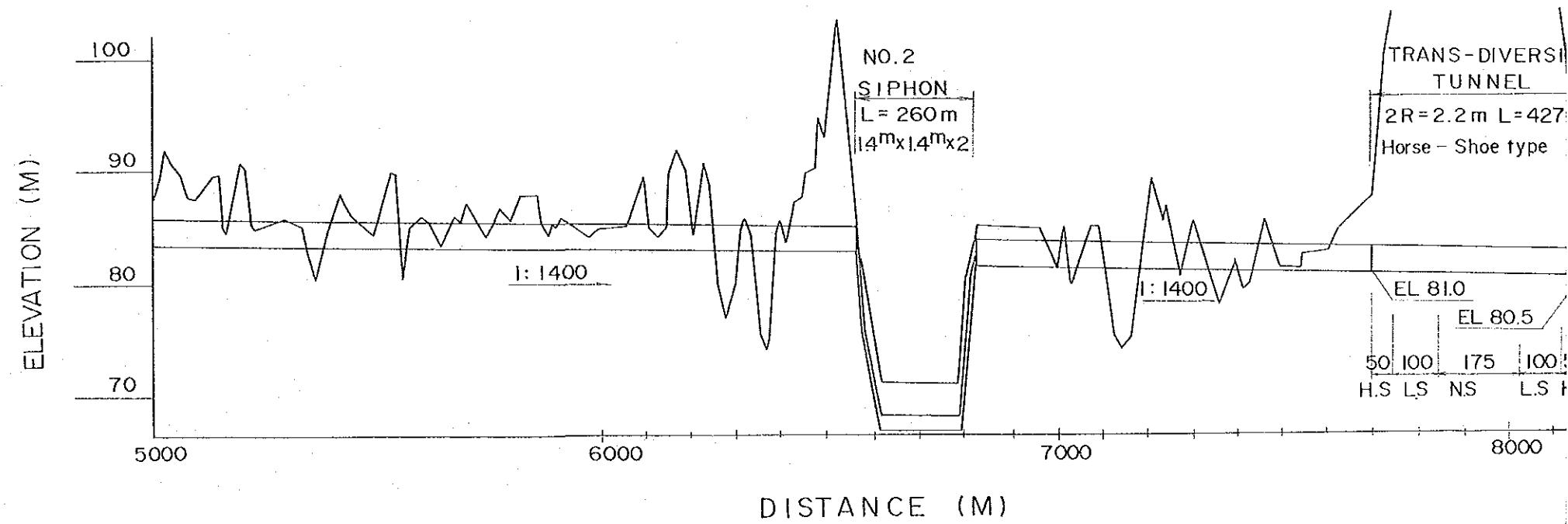
TYPICAL SECTION



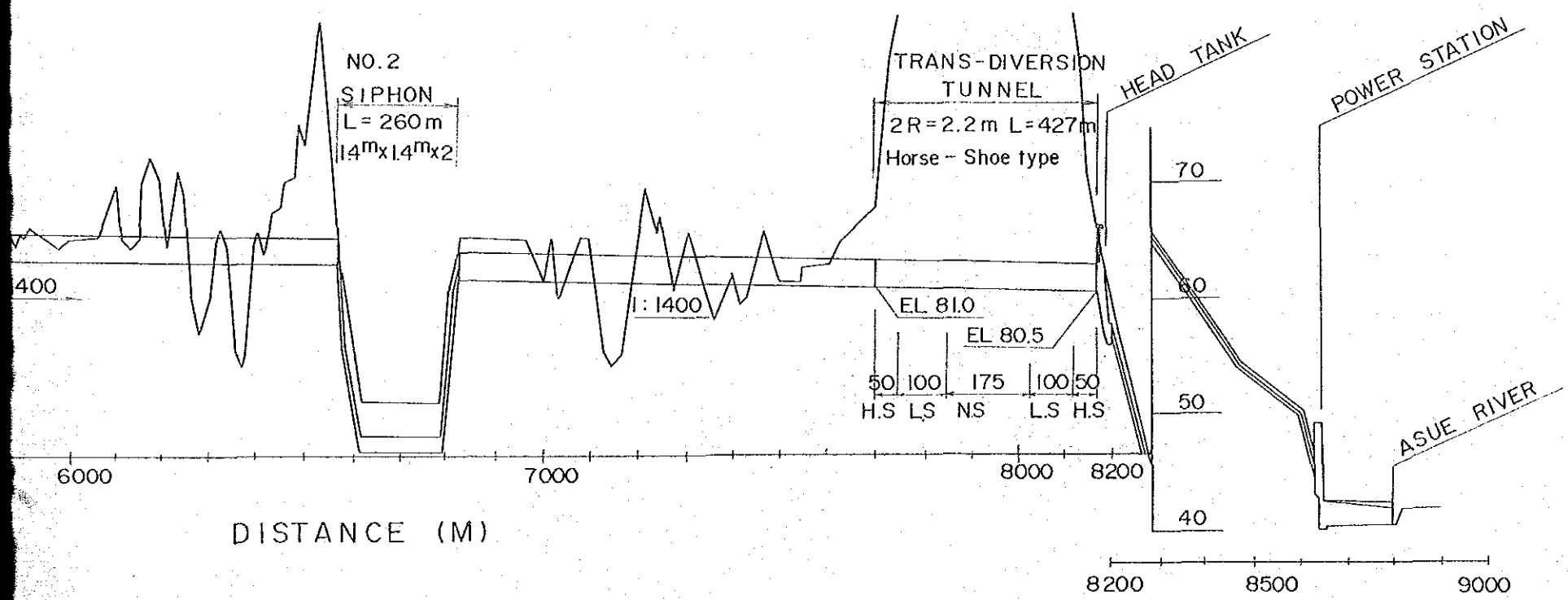
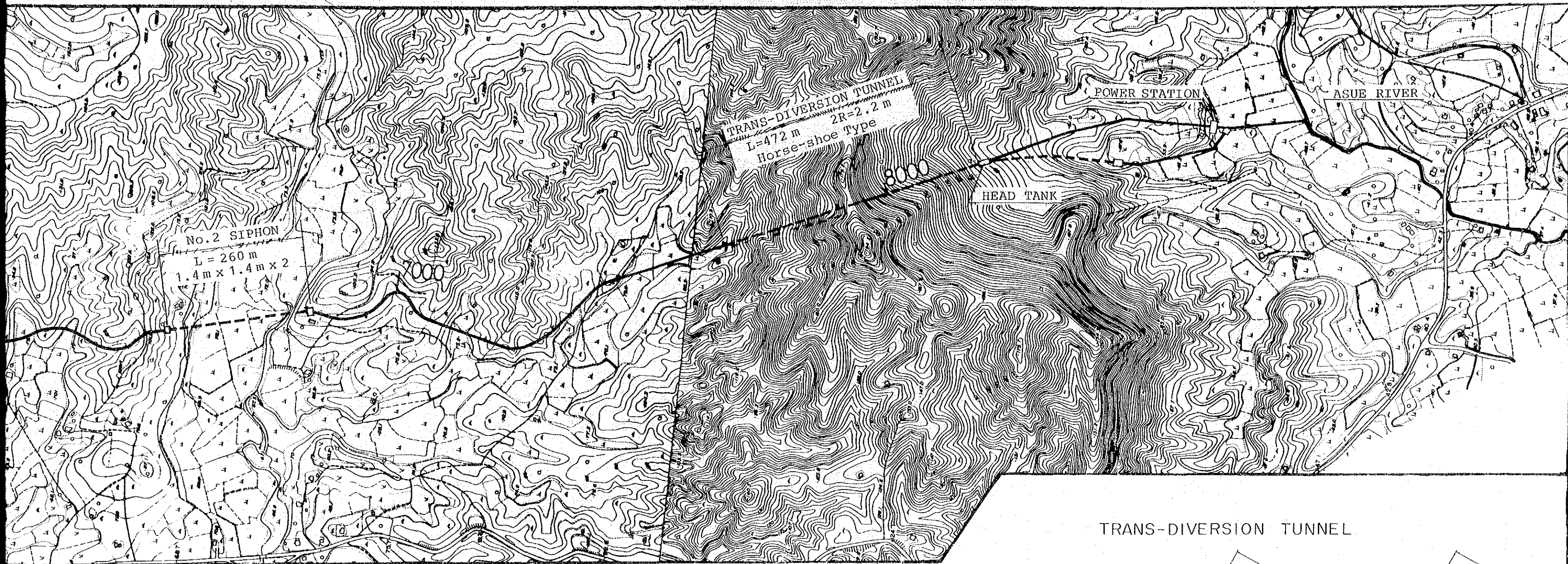
OPEN CANAL



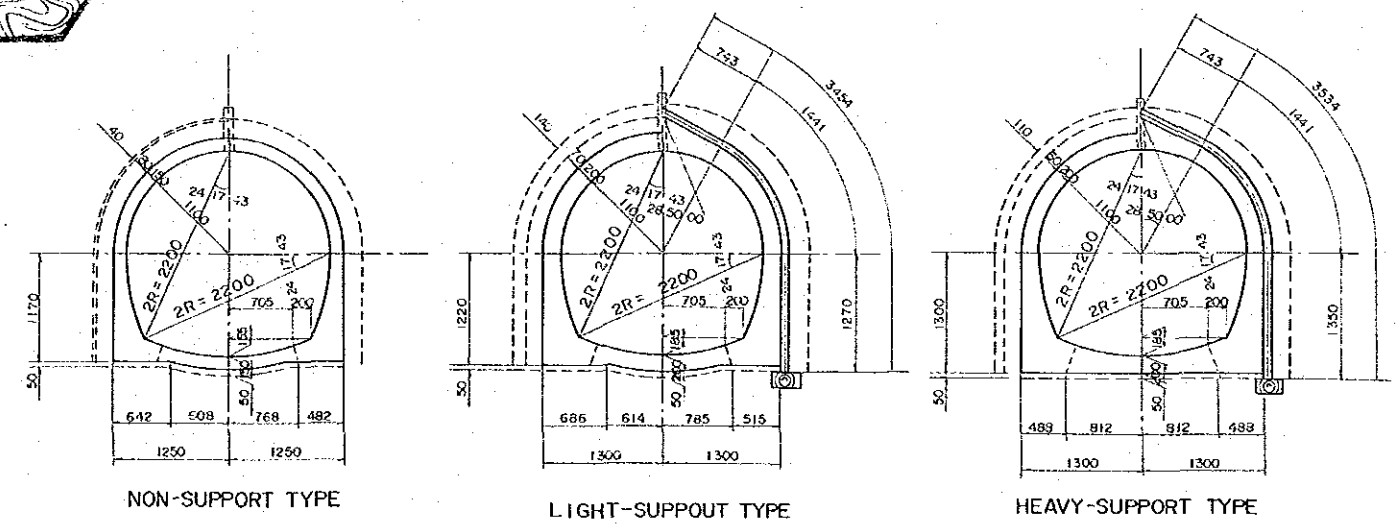
SIPHON



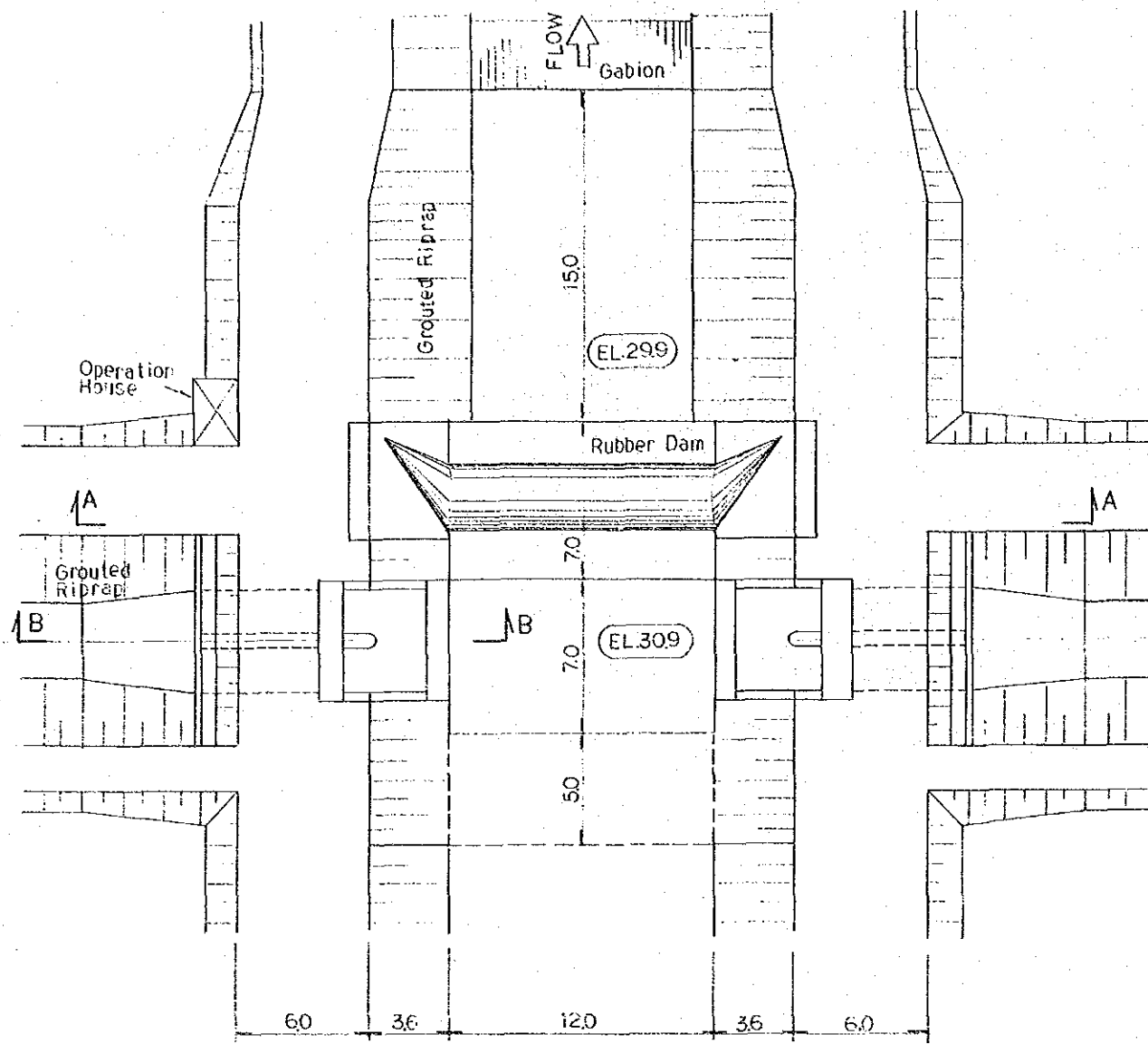




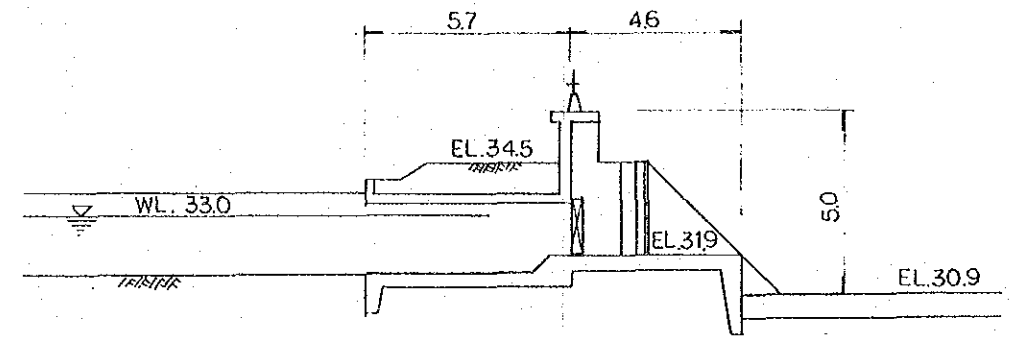
TRANS-DIVERSION TUNNEL



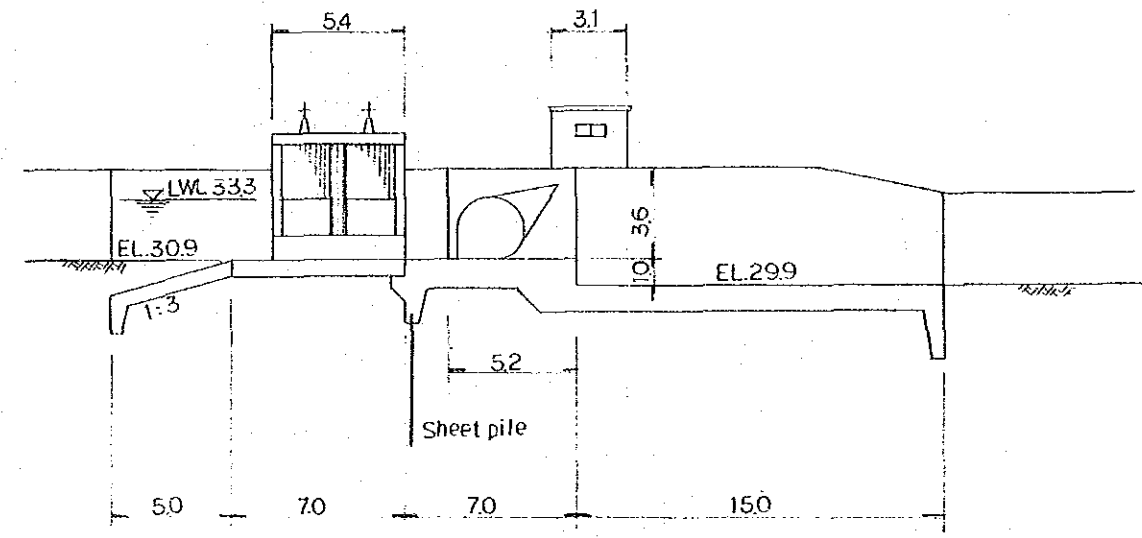
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Trans-Diversion Canal	
JAPAN INTERNATIONAL COOPERATION AGENCY	
DWG. NO. 205	SHEET 2 OF 2



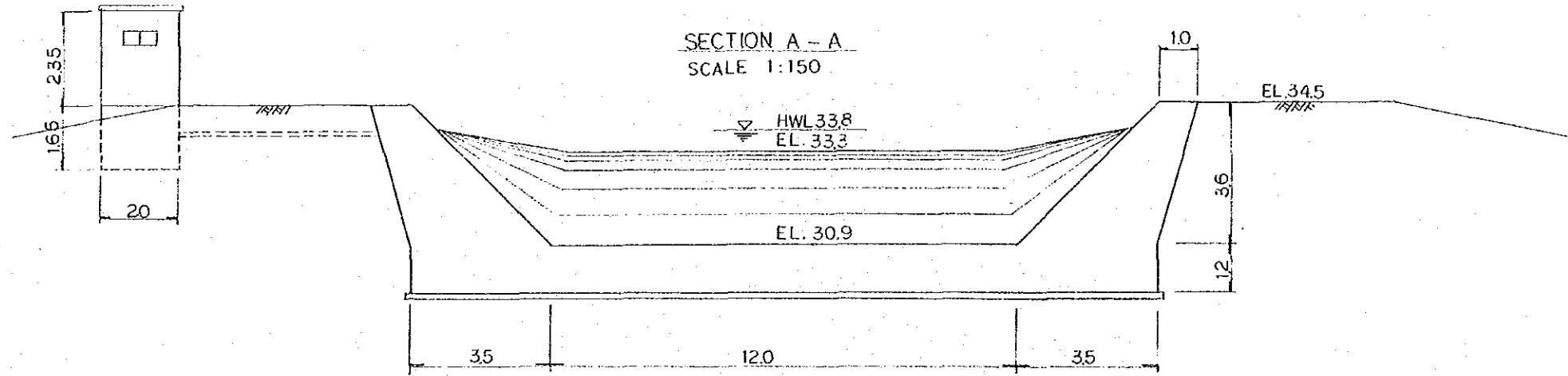
PLAN  
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SECTION B - B  
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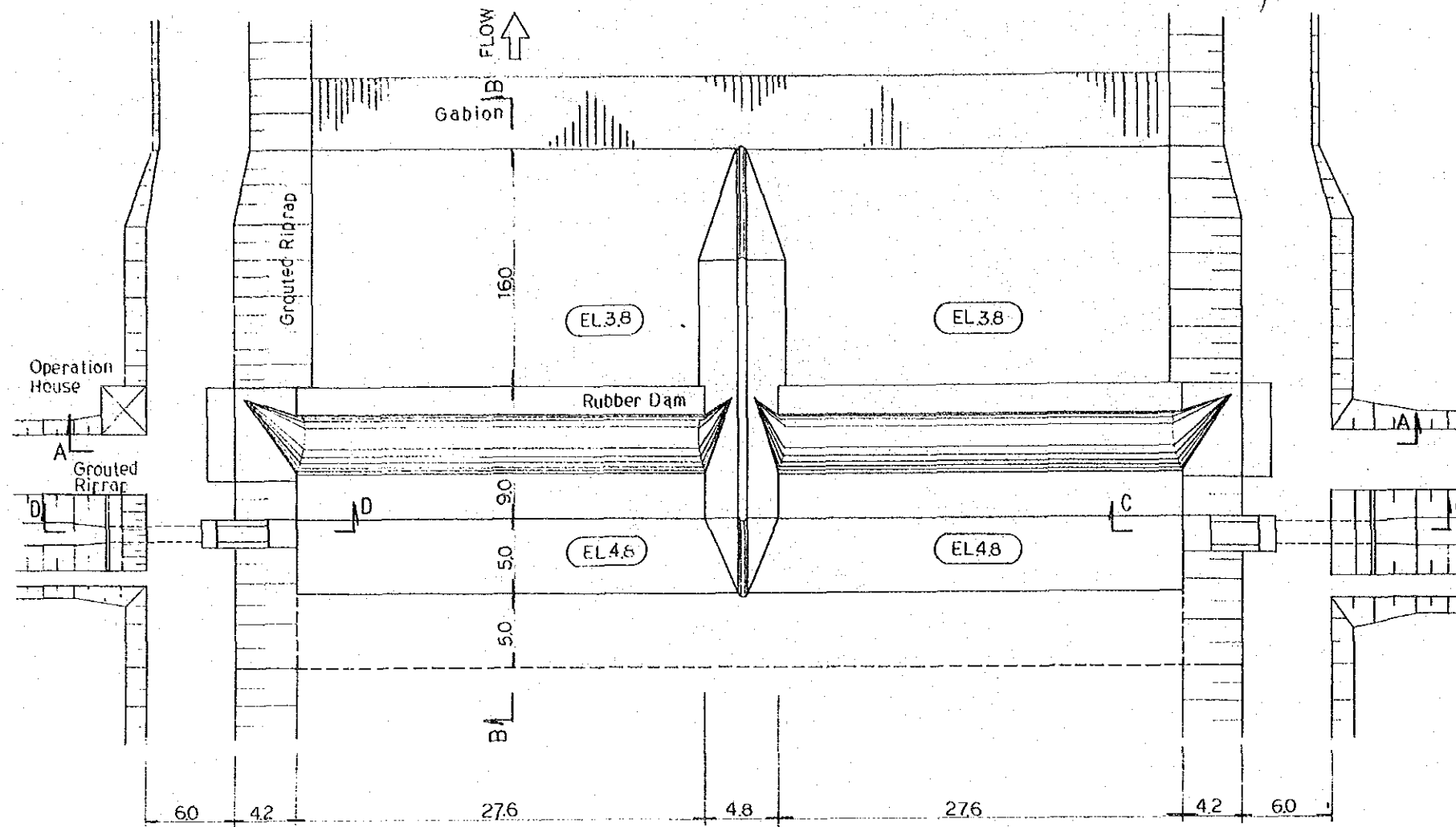


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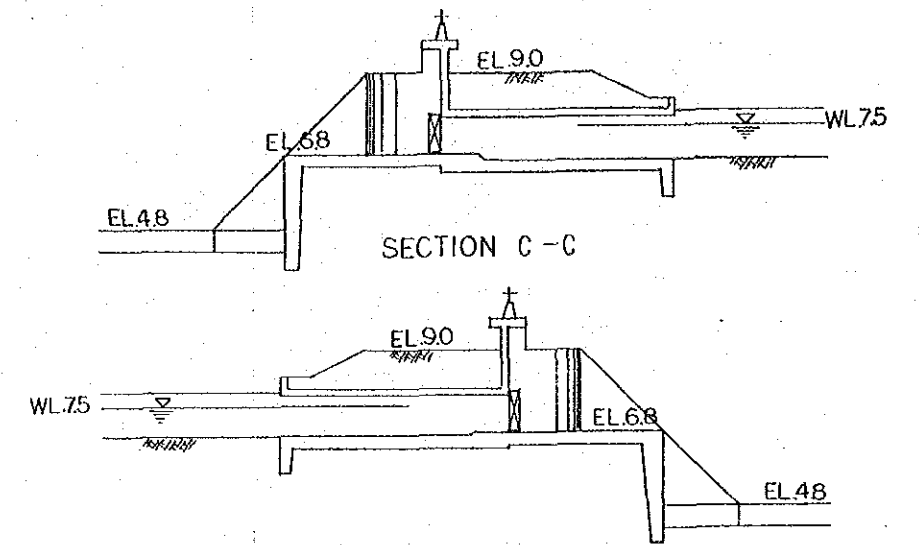


SECTION A - A  
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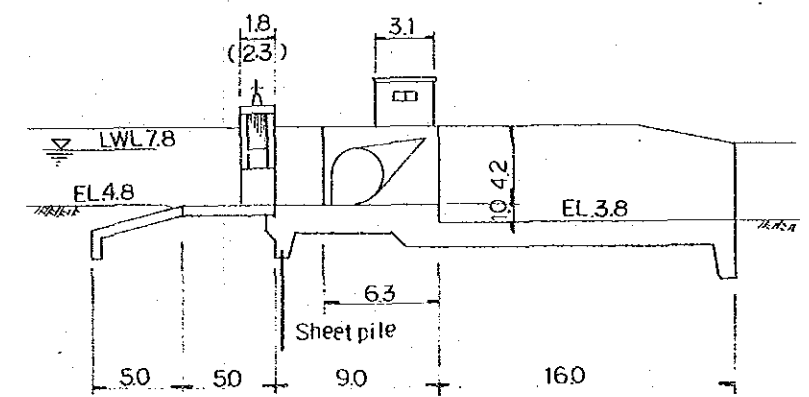
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Asue Diversion Dam	
JAPAN INTERNATIONAL COOPERATION AGENCY	
DWG. NO. 301	SHEET OF



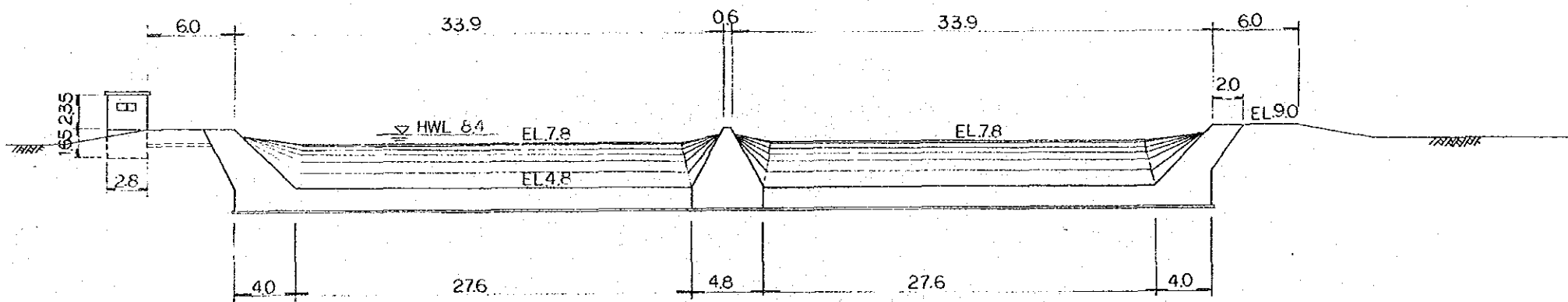
PLAN  
SCALE 1:400



SECTION C-C  
SECTION D-D  
SCALE 1:200

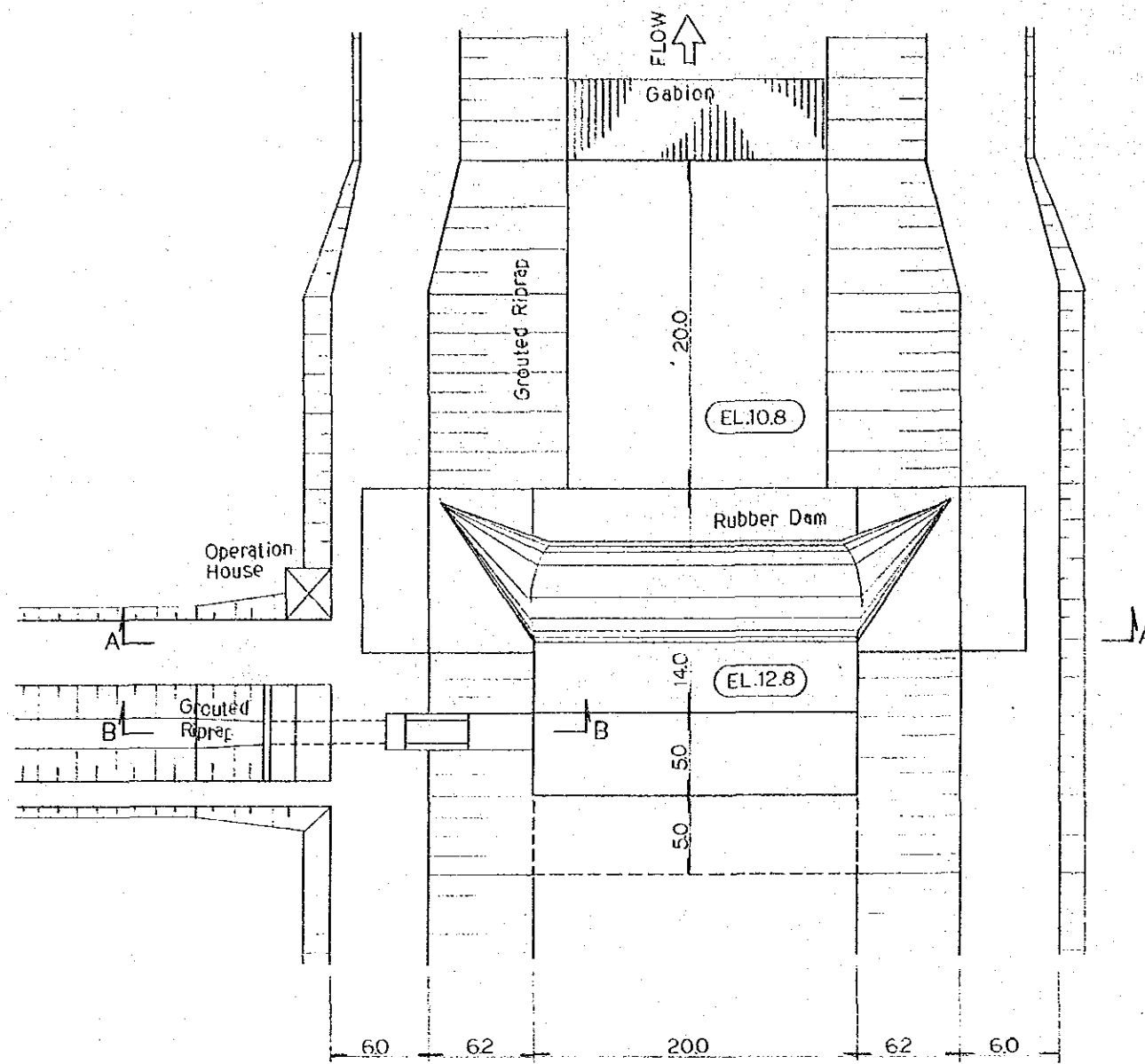


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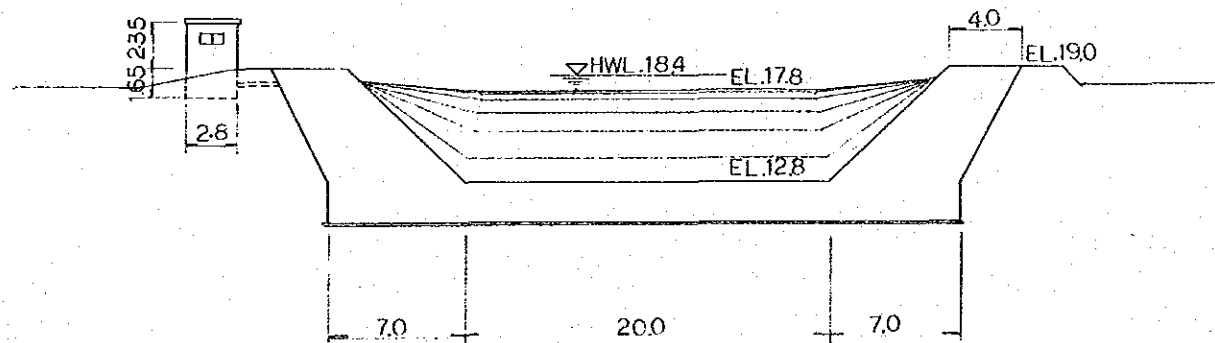


SECTION A-A  
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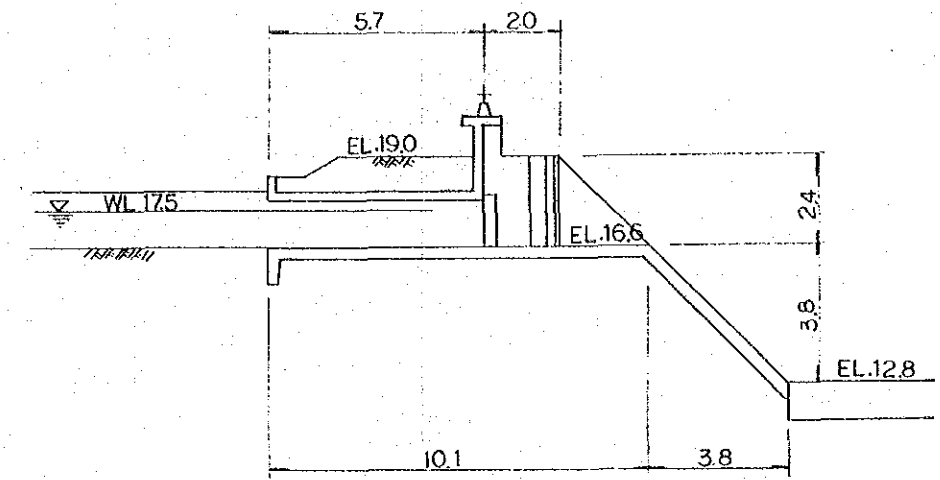
REPUBLIC OF THE PHILIPPINES NATIONAL IRRIGATION ADMINISTRATION ASUE RIVER BASIN AGRICULTURAL DEVELOPMENT PROJECT	
Bakabak Diversion Dam	
JAPAN INTERNATIONAL COOPERATION AGENCY	
DWG. NO. 302	SHEET OF



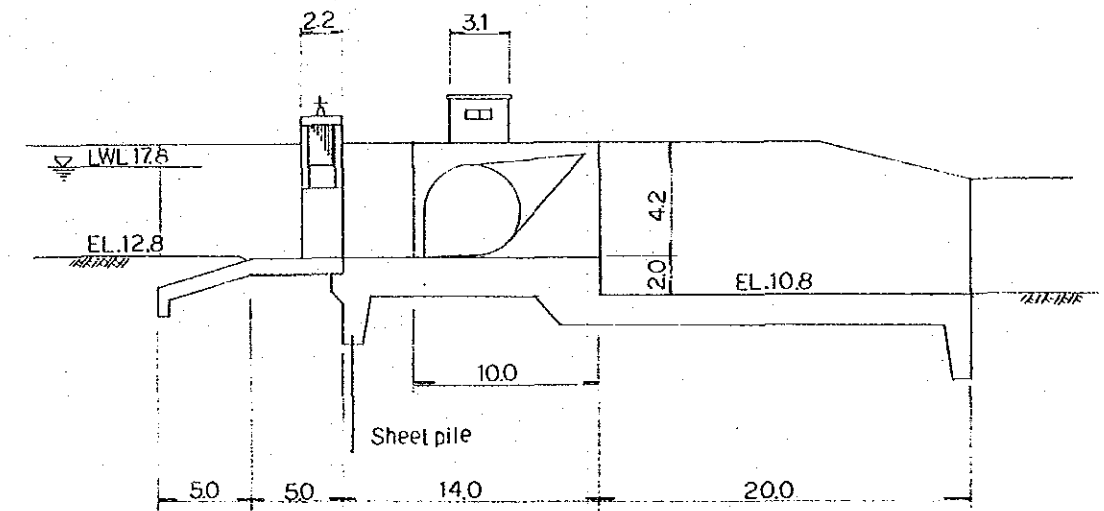
P L A N  
SCALE 1:400



SECTION A - A  
SCALE 1:400

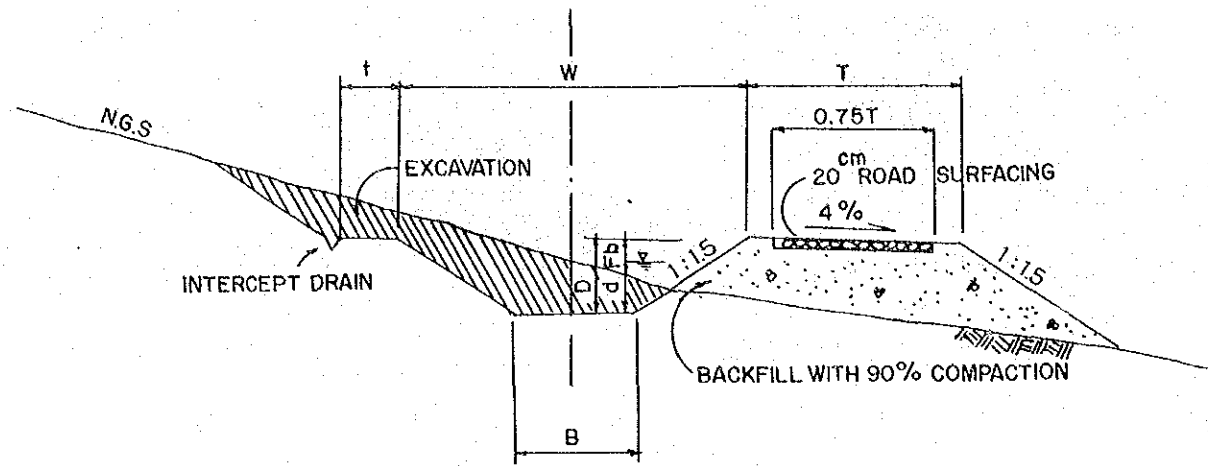


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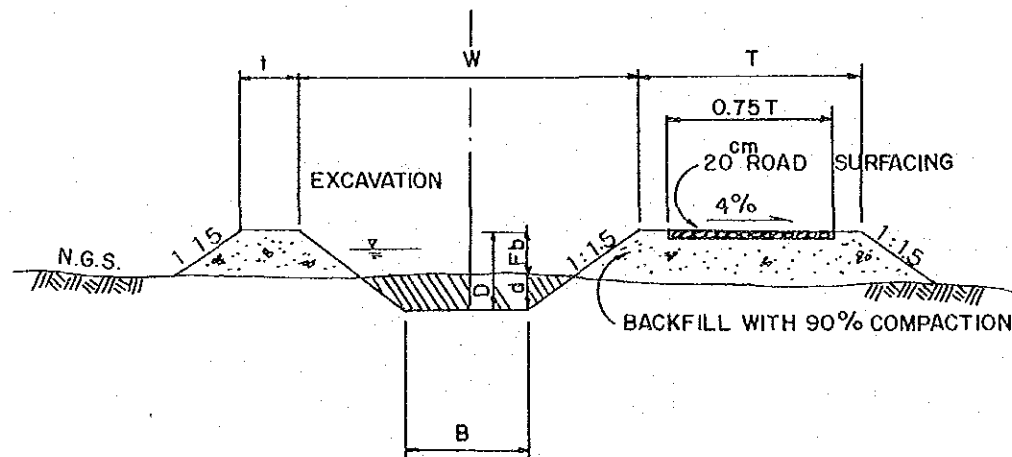


PROFILE  
SCALE 1:400

REPUBLIC OF THE PHILIPPINES NATIONAL IRRIGATION ADMINISTRATION ASUE RIVER BASIN AGRICULTURAL DEVELOPMENT PROJECT	
Gubaton Diversion Dam	
JAPAN INTERNATIONAL COOPERATION AGENCY	
DWG. NO. 303	SHEET OF



TYPICAL SECTION FOR INCLINED GROUND SURFACE



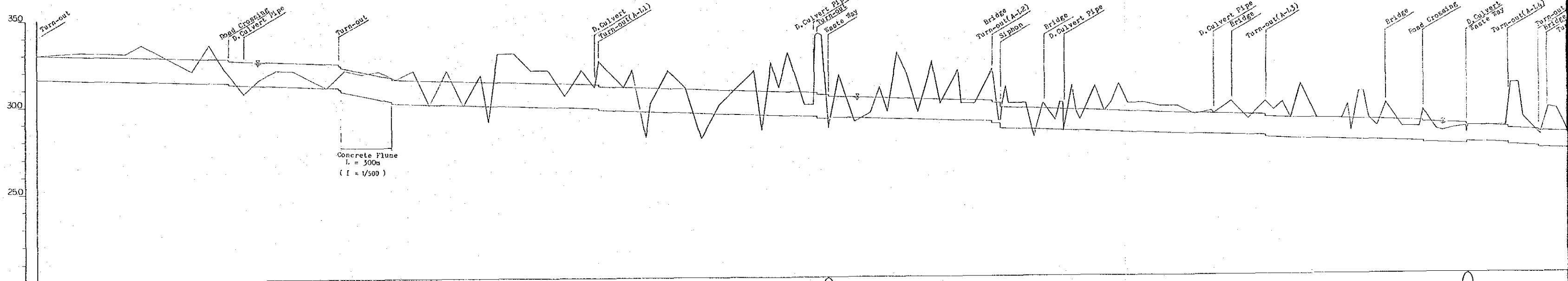
TYPICAL SECTION FOR GROUND SURFACE

DIMENSION OF IRRIGATION MAIN CANAL

Name	Discharge m <sup>3</sup> /s	B/d	B	d	Fb	D	I	t	T	Type <sup>1/</sup>
A-1	5.118	2.5	3.5	1.4	0.6	2.0	1/3,500	2.0	4.0	A
A-2	4.000	2.0	2.4	1.2	0.5	1.7	1/3,000	2.0	4.0	B
A-3	2.240	1.9	1.8	0.95	0.35	1.3	1/3,000	1.5	4.0	C
E-1	4.922	2.5	3.5	1.4	0.6	2.0	1/3,500	2.0	4.0	A
E-2	3.265	2.0	2.4	1.2	0.5	1.7	1/3,000	2.0	4.0	B
E-3	1.501	1.9	1.8	0.95	0.35	1.3	1/3,000	1.5	4.0	C
BR-1	1.251	1.9	1.8	0.95	0.35	1.3	1/3,000	1.5	4.0	C
BR-2	0.628	2.0	1.6	0.8	0.4	1.2	1/3,000	1.0	4.0	D
BL-1	0.800	2.0	1.6	0.8	0.4	1.2	1/3,000	1.0	4.0	D
G	1.067	1.9	1.8	0.95	0.35	1.3	1/3,000	1.5	4.0	C
SR	0.739									- Existing Canal -
SL	0.379									- Existing Canal -
Div(1)	1.510									- Existing Canal -
Div(2)	0.428	2.0	1.6	0.8	0.4	1.2	1/3,000	1.0	4.0	D

<sup>1/</sup> : Canals shown above are classified into four types.

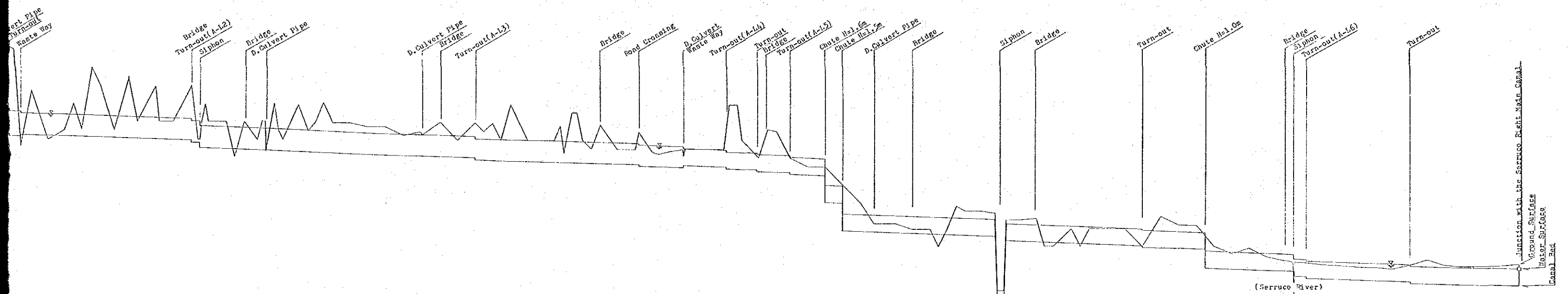
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NATIONAL IRRIGATION ADMINISTRATION	
ASUE RIVER BASIN AGRICULTURAL DEVELOPMENT PROJECT	
Typical Section of Irrigation Canal	
JAPAN INTERNATIONAL COOPERATION AGENCY	
DWG. NO. 401	SHEET OF



I = 1/3500

STA.	DIST.	LENG.	HQS.	CHSL.	HVEL.	GL.P.P.
BP	0.0	0.0	35.00	31.60	33.00	
No.1	1.000	1.000	33.50	31.31	32.71	
No.2	2.000	1.20	31.70	31.18	32.68	
No.3	3.000	6.50	31.80	30.89	32.29	
No.4	4.000	2.00	32.00	30.75	31.75	
No.5	5.000	80	31.60	30.59	31.29	
No.6	6.000	920	32.00	29.85	31.25	
No.7	7.000	300	32.40	29.74	31.14	
No.8	8.000	700	30.00	29.44	30.84	
No.9	9.000	570	34.10	29.28	30.58	
No.10	10.000	70	28.50	29.28	30.18	
No.11	11.000	360	29.50	29.14	30.34	
No.12	12.000	600	32.00	28.94	30.14	
No.13	13.000	50	29.00	28.52	29.72	
No.14	14.000	350	30.00	28.40	29.60	
No.15	15.000	1,000	30.00	28.07	29.27	
No.16	16.000	200	30.00	28.00	29.20	
No.17	17.000	800	28.50	27.65	28.85	
No.18	18.000	120	29.50	27.70	28.70	
No.19	19.000	250	28.00	27.41	28.51	
No.20	20.000	240	29.50	27.26	28.43	
No.21	21.000	180	28.10	27.22	28.17	

I = 1/3000



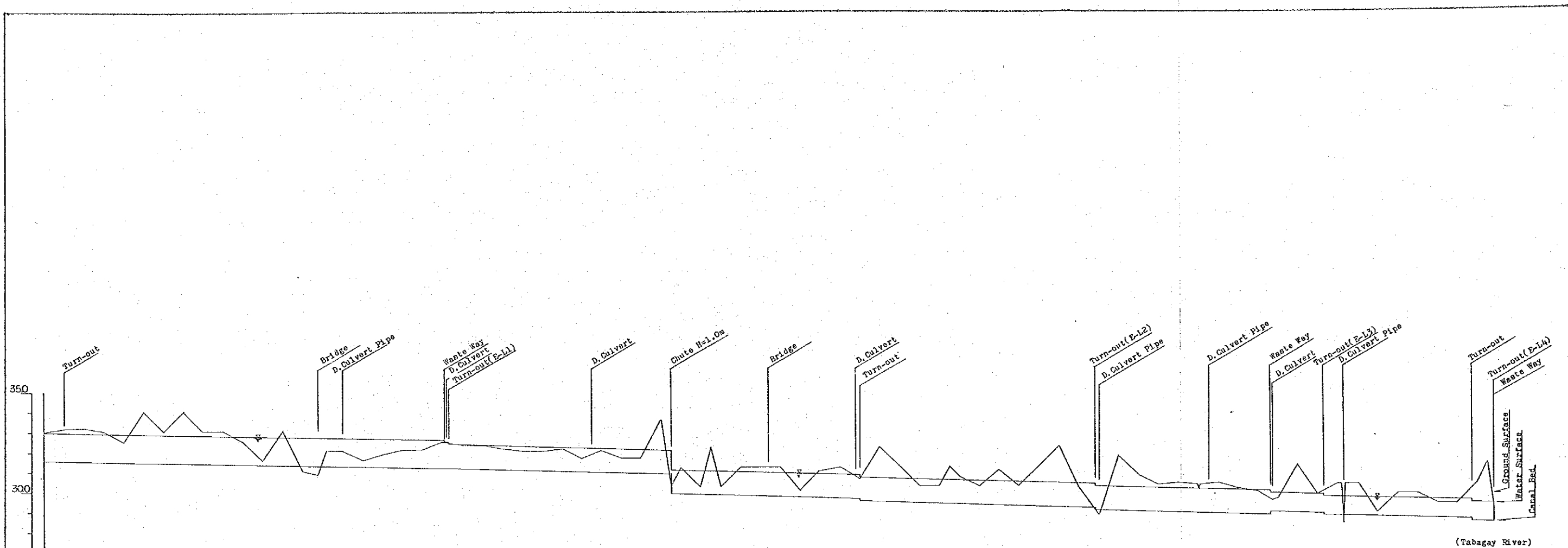
Stationing	1-1/3000		1-1/3000	
	Ground Surface	Water Surface	Ground Surface	Water Surface
No. 5 +840 4,640	360	29.14	30.24	29.16
No. 5.5 +860 5,600	600	28.94	30.14	29.26
No. 5.5 +850 5,650	50	28.92	29.72	29.16
No. 6 6,000	350	28.40	29.60	28.56
No. 7 7,000	1,000	28.07	29.27	28.07
No. 7 +200 7,200	200	28.00	29.10	28.00
No. 8 8,000	800	27.03	28.83	27.03
No. 8 +180 8,180	180	27.50	28.20	27.50
No. 8 +370 8,370	250	27.28	28.51	27.28
No. 8 +610 8,610	240	27.48	28.47	27.48
No. 8 +790 8,790	180	27.28	28.17	27.28
No. 8 +980 8,980	190	27.16	28.11	27.16
No. 10 +1,000 10,000	1,020	25.00	24.57	25.00
No. 11 +180 10,180	180	20.50	20.50	20.50
No. 11 +980 10,980	800	22.99	23.84	22.99
No. 11 +800 11,800	850	21.51	22.78	21.51
No. 11 +900 11,900	70	21.51	22.46	21.51
No. 12 +12,000	100	21.16	22.11	21.16
No. 12 +480 12,480	480	21.90	21.85	21.90
No. 13 +13,000	520	21.80	21.68	21.80
EP +13,090	90	21.90	21.65	21.90

REPUBLIC OF THE PHILIPPINES  
 NATIONAL IRRIGATION ADMINISTRATION  
 ASUE RIVER BASIN AGRICULTURAL  
 DEVELOPMENT PROJECT

Profile of Asue Main Canal

JAPAN INTERNATIONAL COOPERATION AGENCY

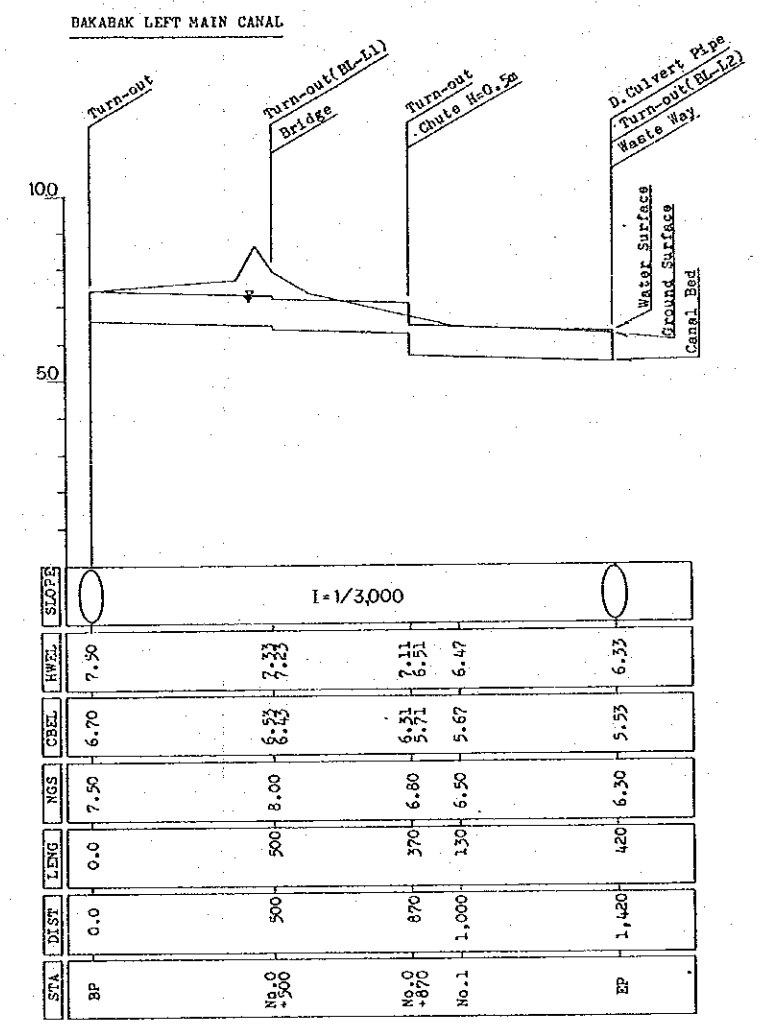
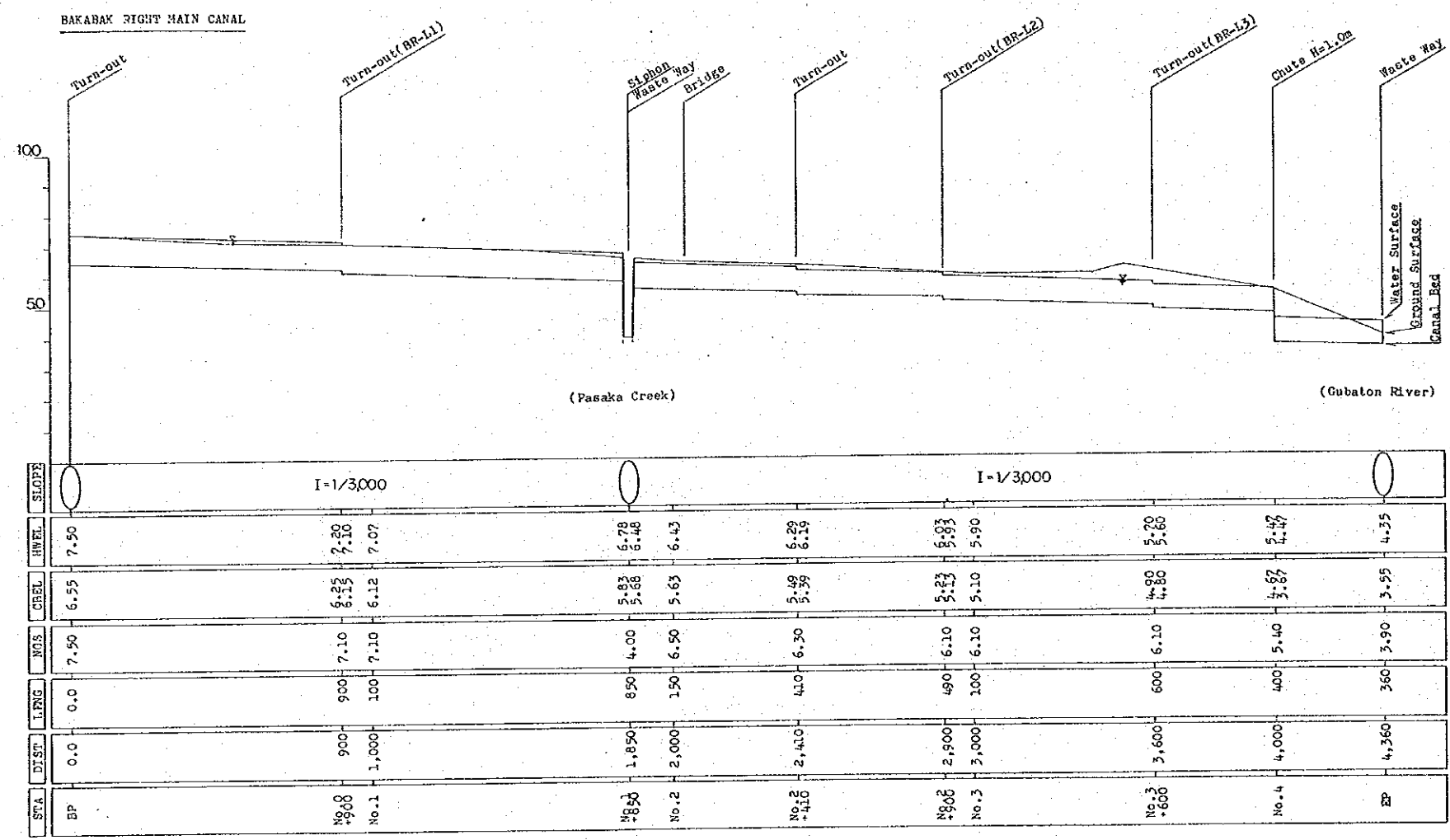
DWG. NO. 402 SHEET OF



STA	DIST	LENG	NGS	CBEL	HWEL	SLOPE
BP	0.0	0.0	33.00	31.60	33.00	I = 1/3500
No. 1	1.000	1.000	32.50	31.31	32.71	
No. 2	2.030	1.030	32.50	31.02	32.42	I = 1/3000
No. 3	3.000	970	31.50	30.70	31.90	
No. 4	4.000	850	31.00	29.37	30.57	I = 1/3000
No. 5	5.000	900	31.00	28.93	30.13	
No. 6	6.000	720	29.80	28.50	29.70	I = 1/3000
No. 7	7.000	570	29.00	28.22	29.17	
No. 8	8.000	170	28.70	28.16	29.11	I = 1/3000
EP	8.170	170	28.70	28.16	29.11	
	7.280	110	29.00	28.02	28.97	

REPUBLIC OF THE PHILIPPINES  
 NATIONAL IRRIGATION ADMINISTRATION  
 ASUE RIVER BASIN AGRICULTURAL  
 DEVELOPMENT PROJECT  
  
 Profile of Eastern Main Canal  
  
 JAPAN INTERNATIONAL COOPERATION AGENCY  
 DWG. NO. 403      SHEET      OF

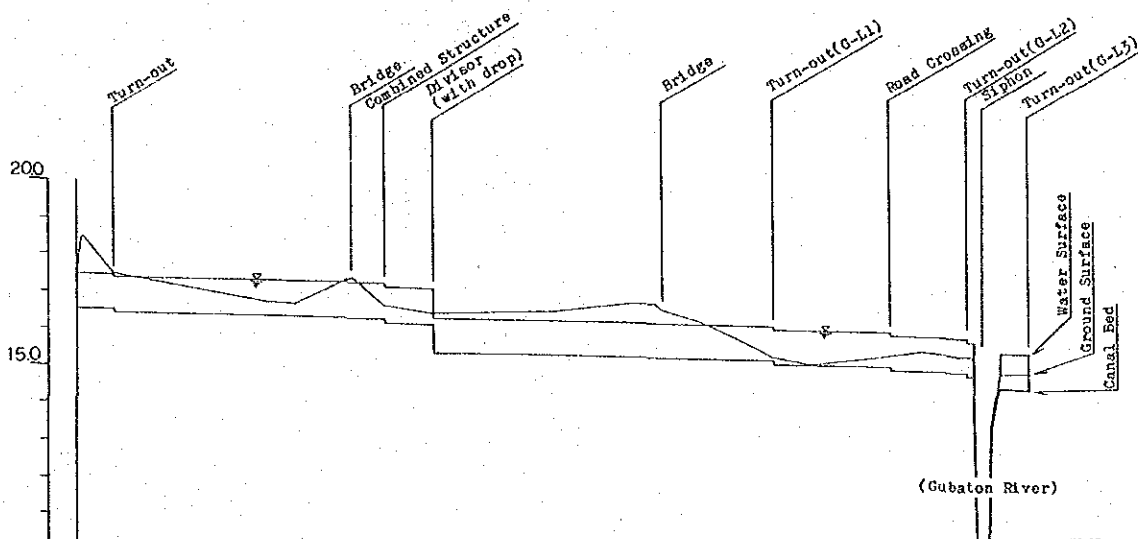




REPUBLIC OF THE PHILIPPINES  
 NATIONAL IRRIGATION ADMINISTRATION  
 ASUE RIVER BASIN AGRICULTURAL  
 DEVELOPMENT PROJECT

Profile of Bakbak Main Canal

JAPAN INTERNATIONAL COOPERATION AGENCY  
 DWG. NO. 404 SHEET OF



STA	WEST	LENG	NGS	CREC	HWEL	SLOPE
BP	0.0	0.0	17.50	16.55	17.50	○
No. 0 +200	100	100	17.50	16.52 16.42	17.47 17.37	
No. 1 +800	840	740	16.50	16.07 16.07	17.02 17.02	○
No. 1 +900	970	130	16.50	15.03 15.03	16.98 16.98	
No. 1 +900	1,900	970	15.00	14.82 14.82	15.87 15.77	○
No. 2 +2000	2,000	100	14.80	14.79	15.74	
No. 2 +2200	2,220	220	15.00	14.71 14.61	15.66 15.56	○
No. 2 +400 +450 +470	2,420 2,470	210 40	15.00 10.00	14.54 14.13	15.49 15.08	
EP	2,600	170	14.50	14.09	15.04	○

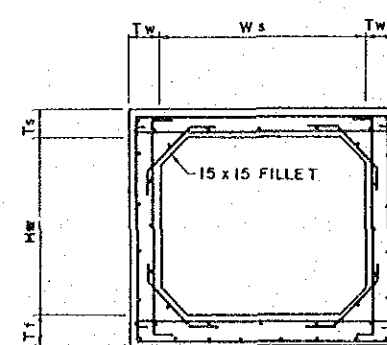
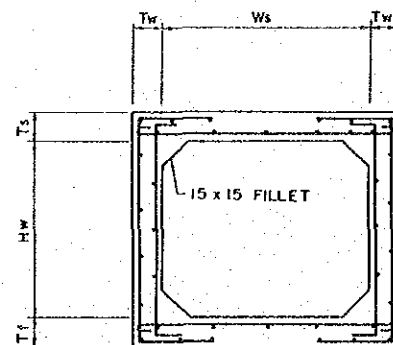
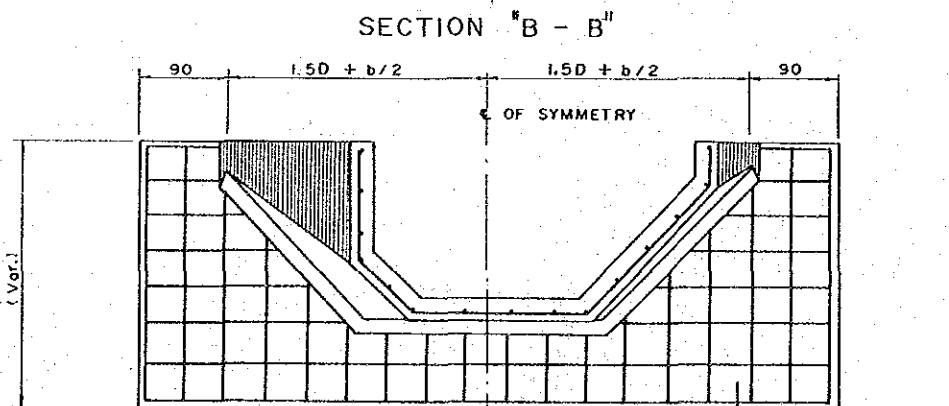
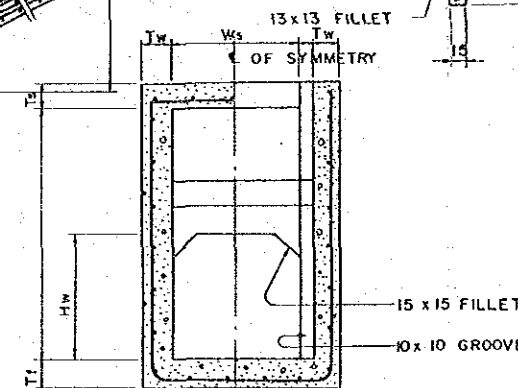
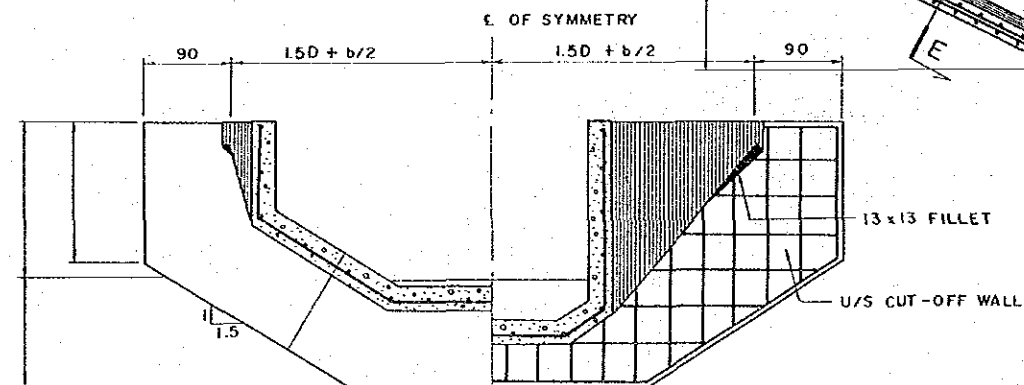
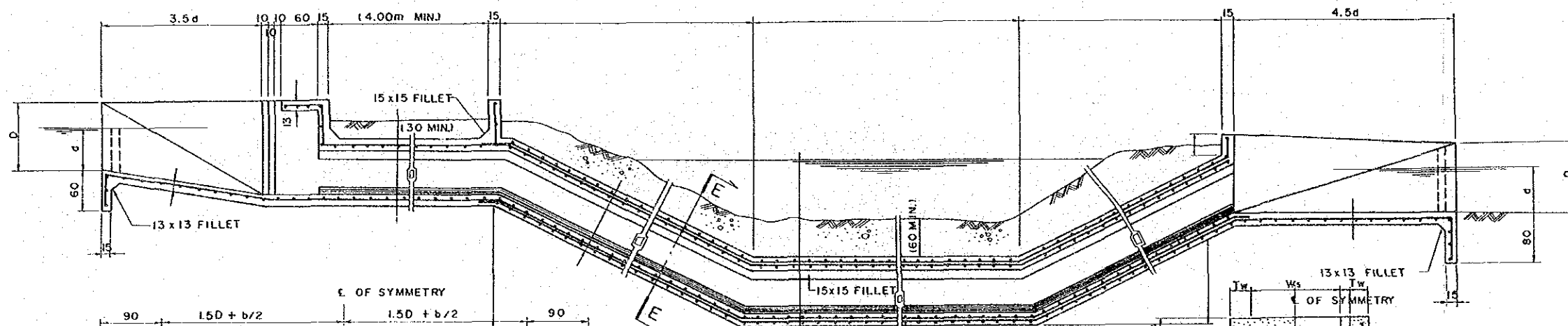
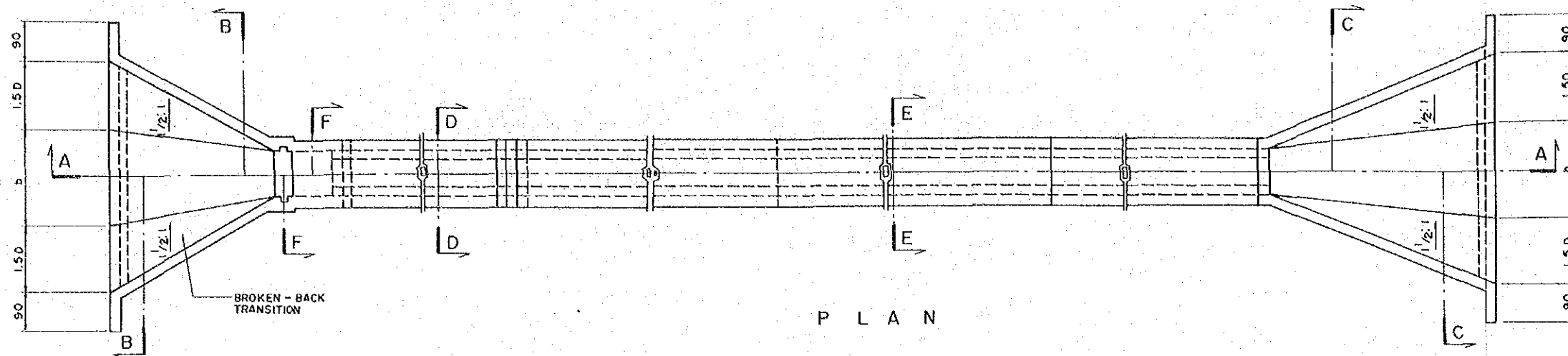
REPUBLIC OF THE PHILIPPINES  
NATIONAL IRRIGATION ADMINISTRATION  
ASUE RIVER BASIN AGRICULTURAL  
DEVELOPMENT PROJECT

Profile of Gubaton Main Canal

JAPAN INTERNATIONAL COOPERATION AGENCY

DWG. NO. 405

SHEET OF



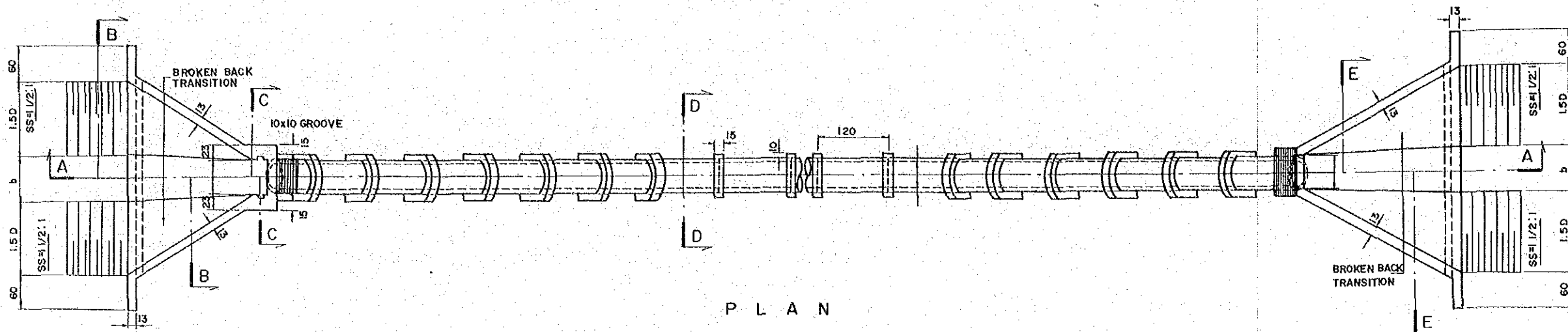
REPUBLIC OF THE PHILIPPINES  
 NATIONAL IRRIGATION ADMINISTRATION  
 ASUE RIVER BASIN AGRICULTURAL  
 DEVELOPMENT PROJECT

Inverted Box Siphon

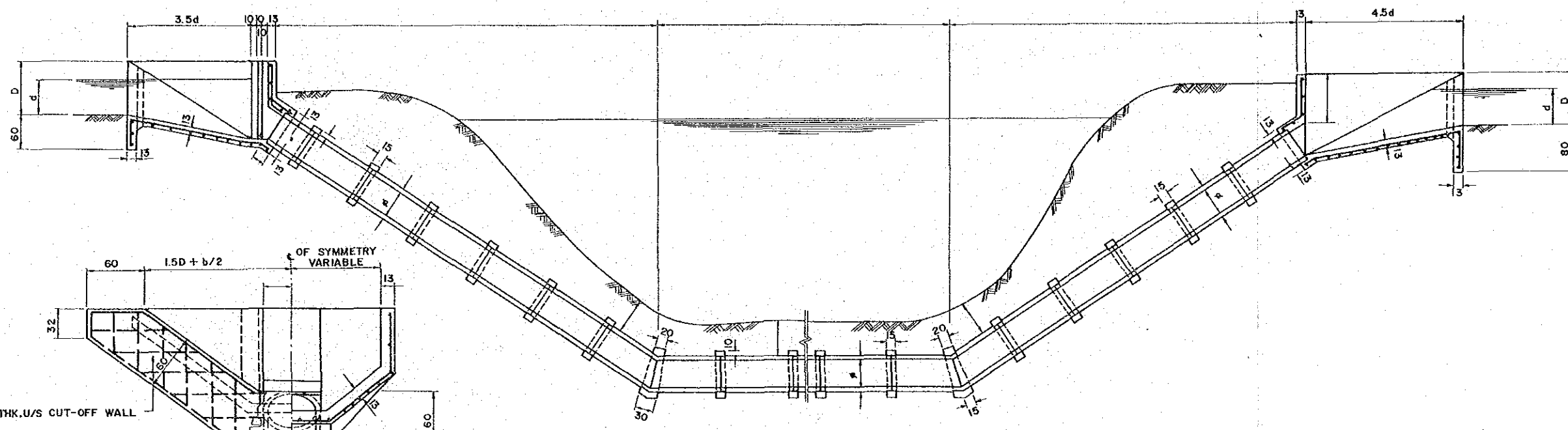
JAPAN INTERNATIONAL COOPERATION AGENCY

DWG. NO. 501

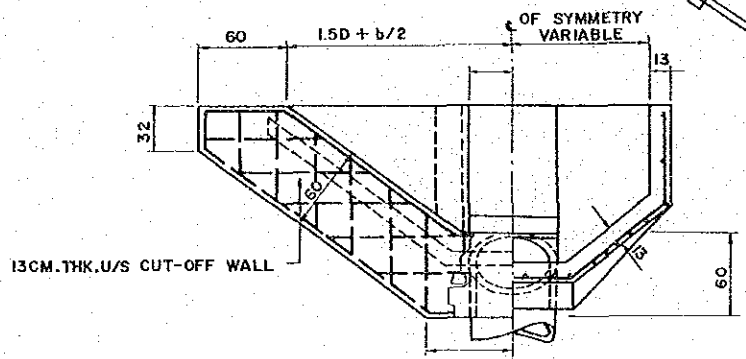
SHEET OF



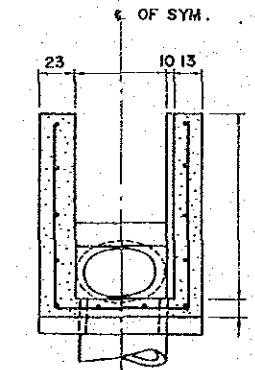
P L A N



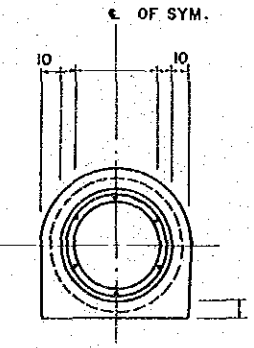
LONGITUDINAL SECTION "A - A"



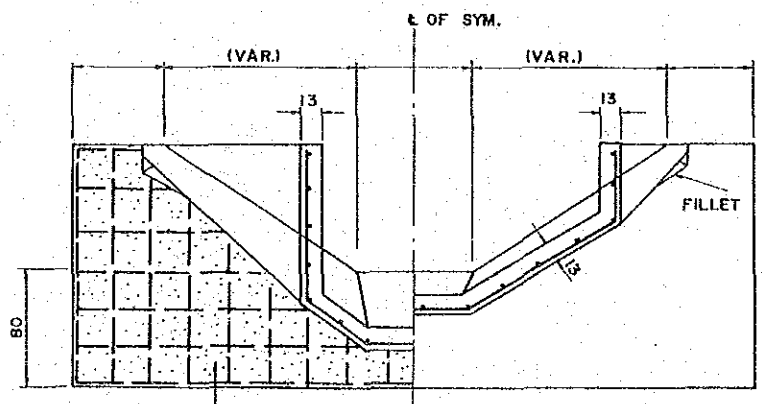
SECTION "B - B"



SECTION "C - C"

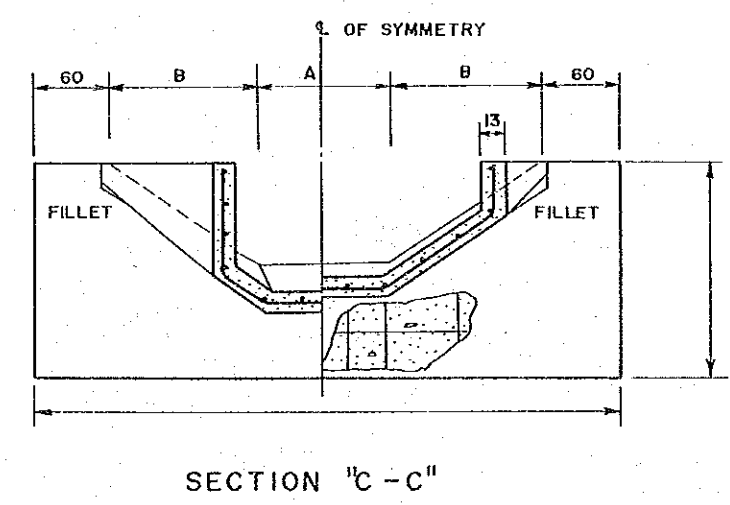
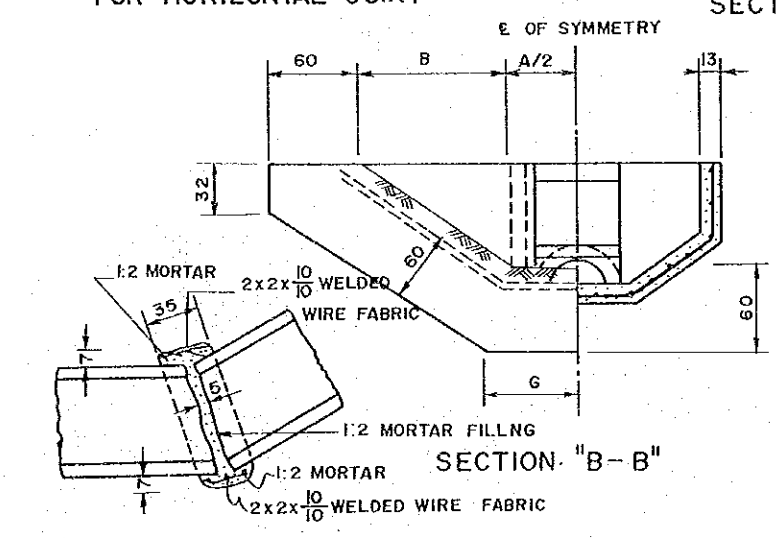
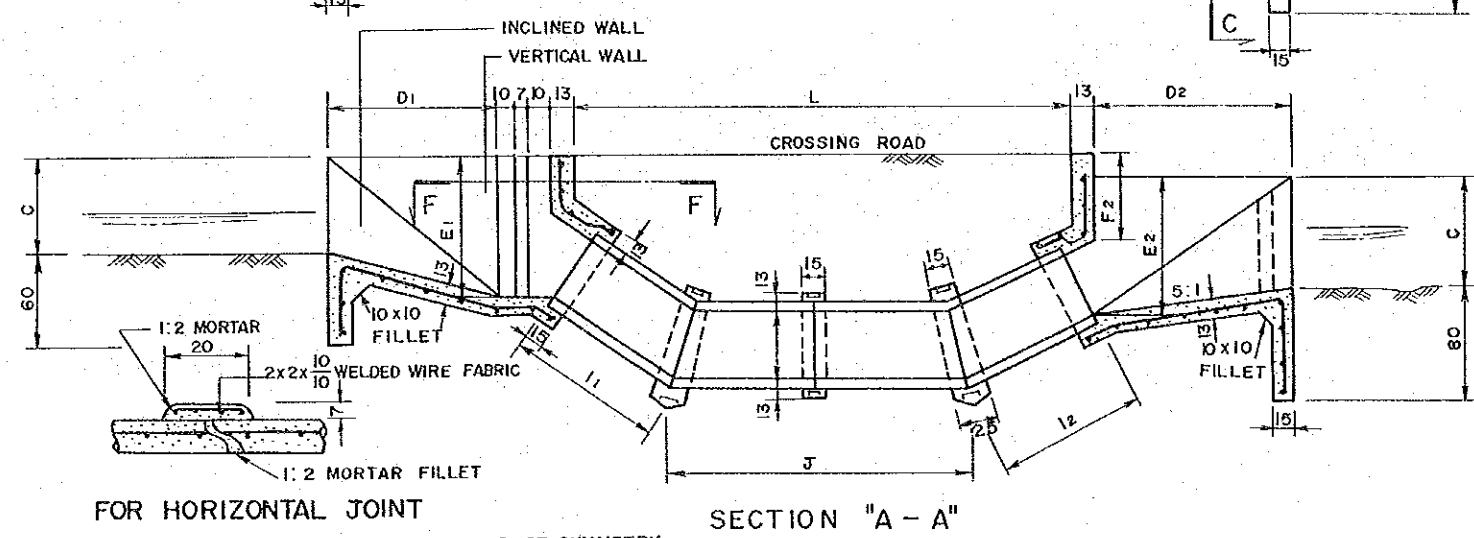
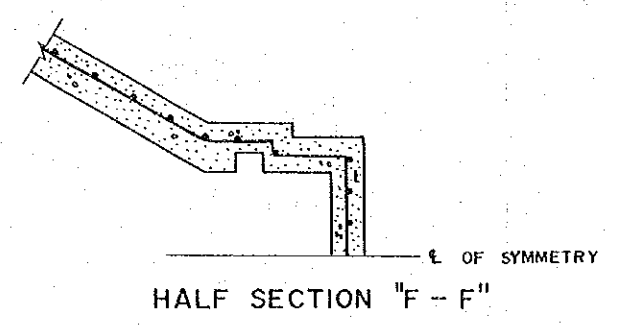
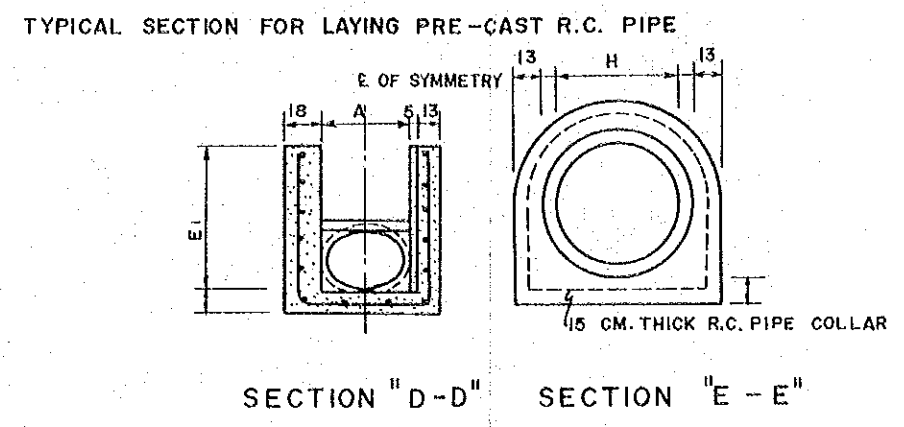
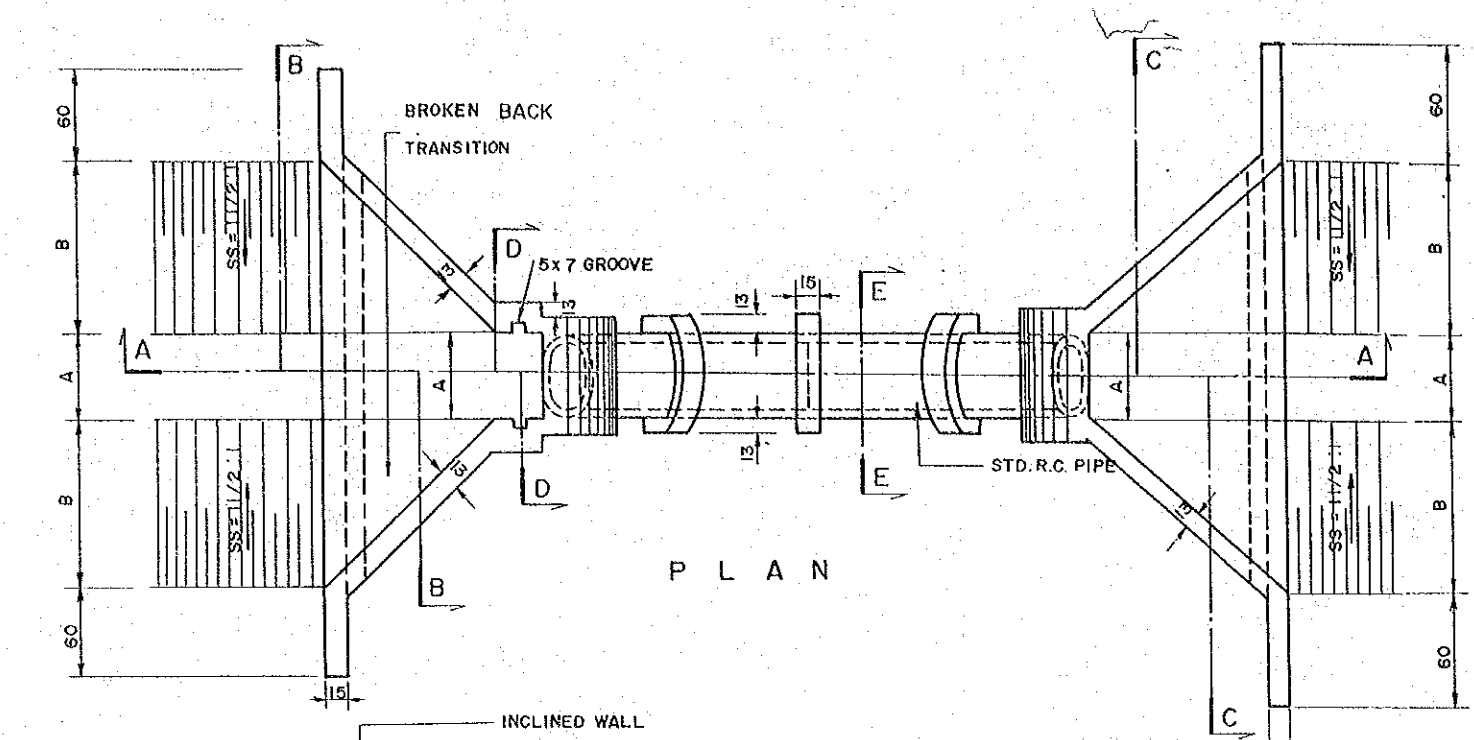


SECTION "D - D"

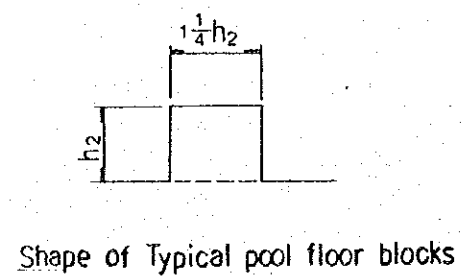
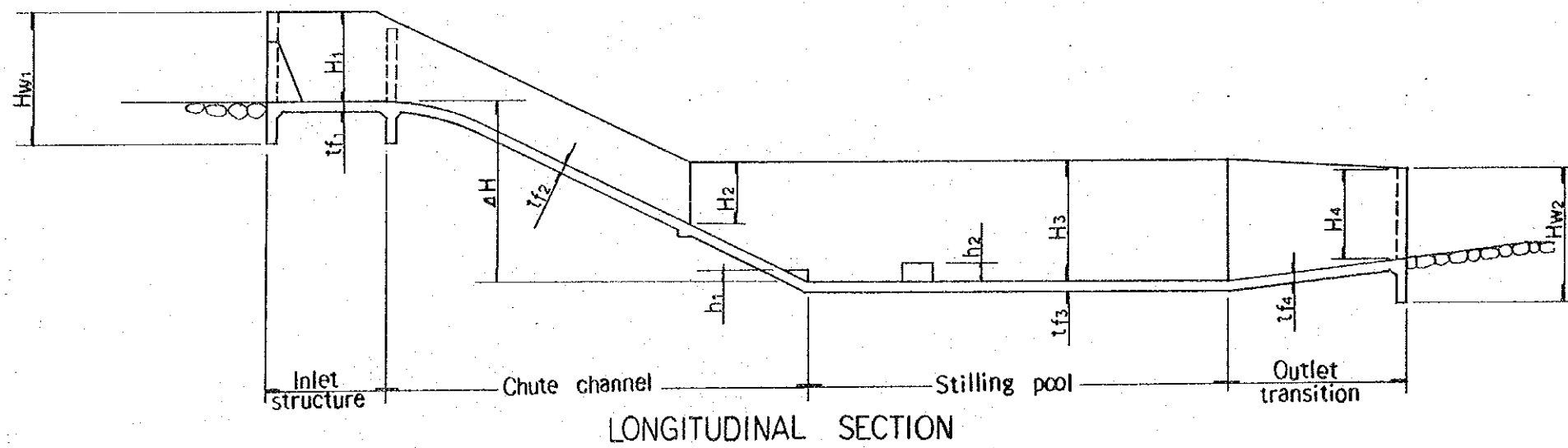
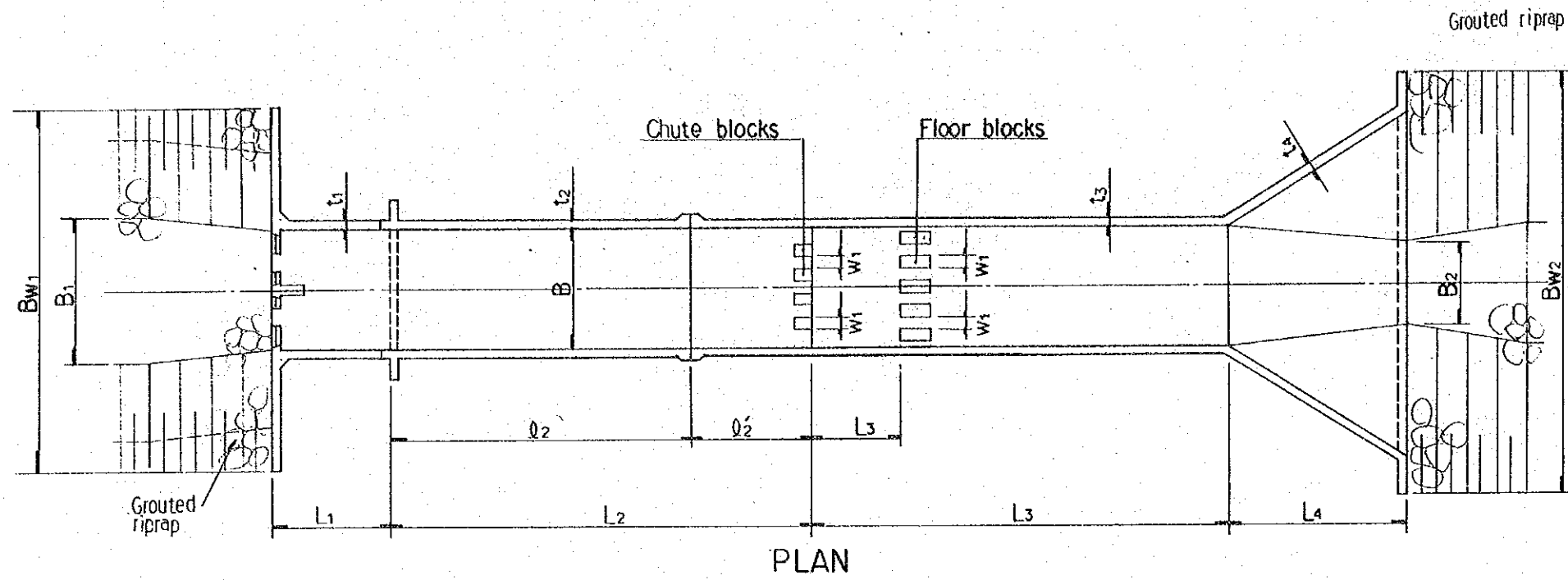


SECTION "E - E"

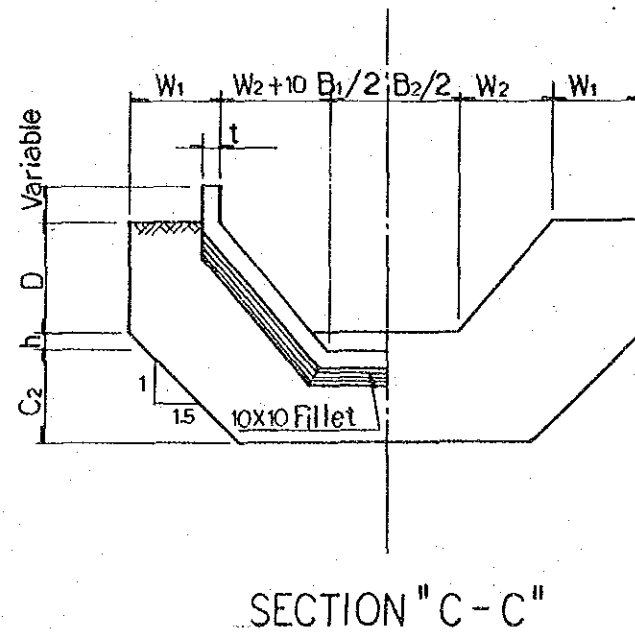
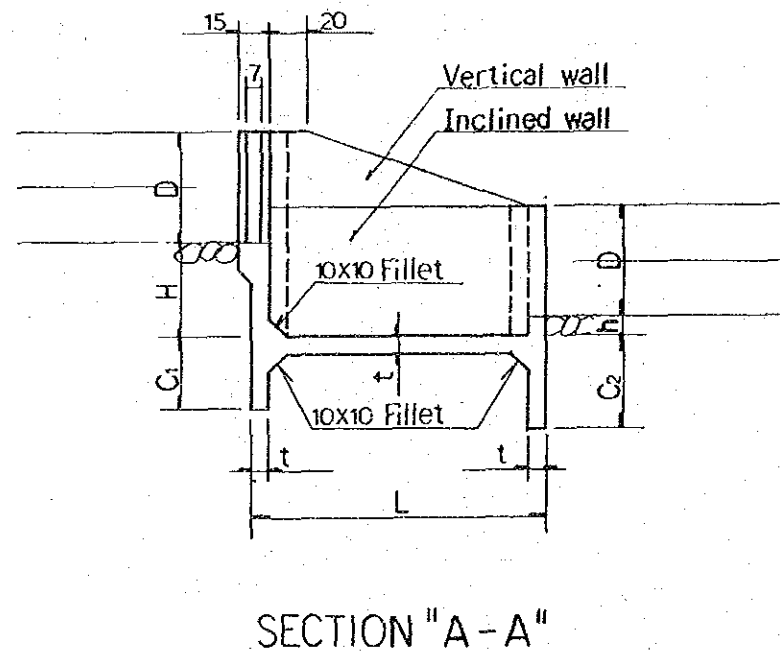
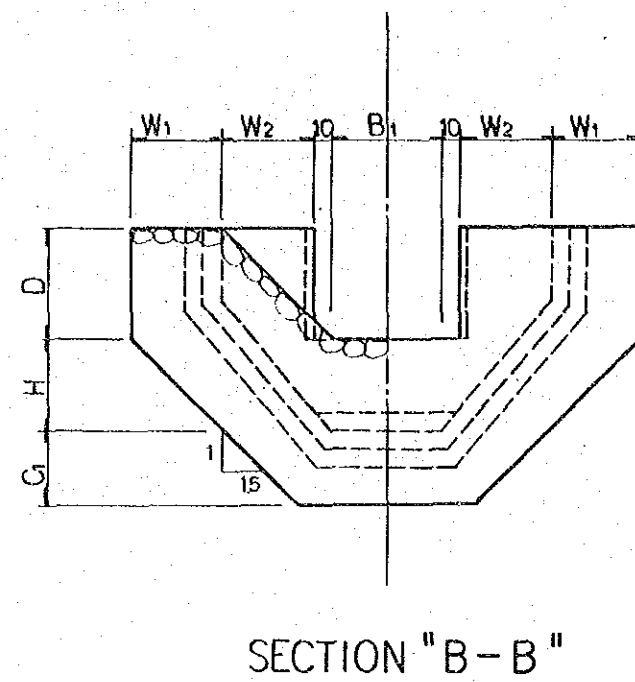
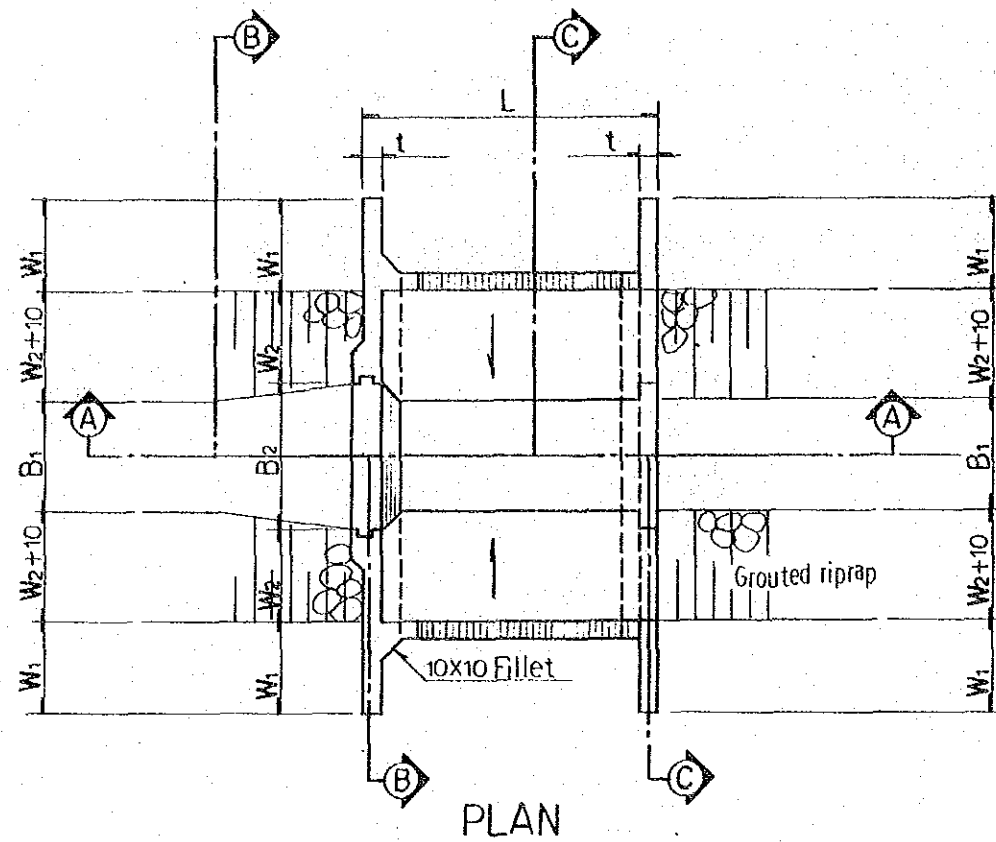
REPUBLIC OF THE PHILIPPINES NATIONAL IRRIGATION ADMINISTRATION ASUE RIVER BASIN AGRICULTURAL DEVELOPMENT PROJECT	
Inverted Pipe Siphon	
JAPAN INTERNATIONAL COOPERATION AGENCY	
DWG. NO. 502	SHEET OF



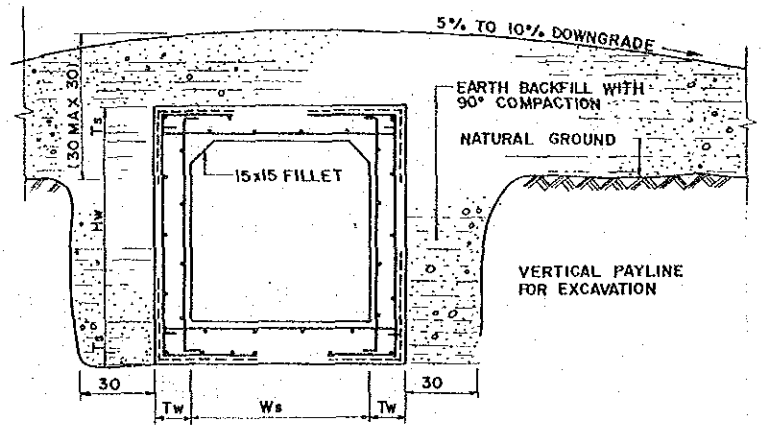
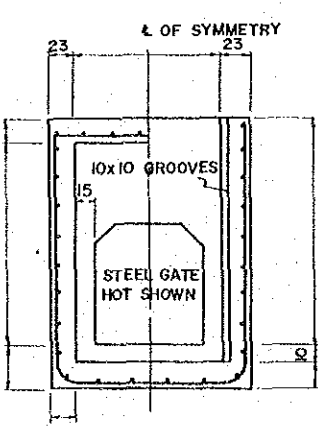
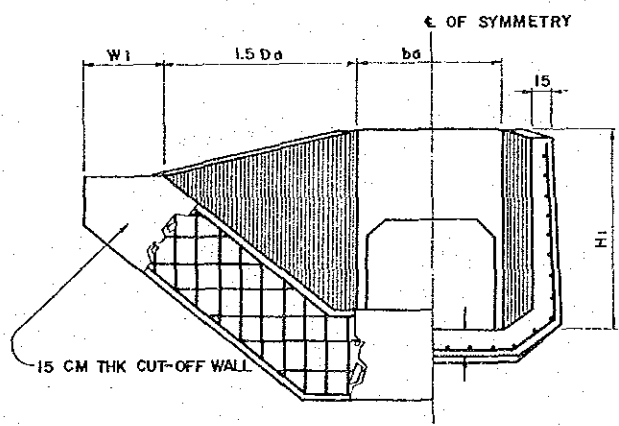
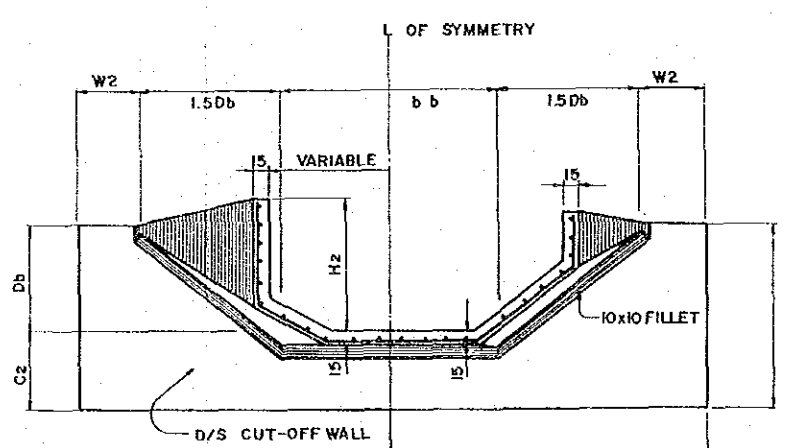
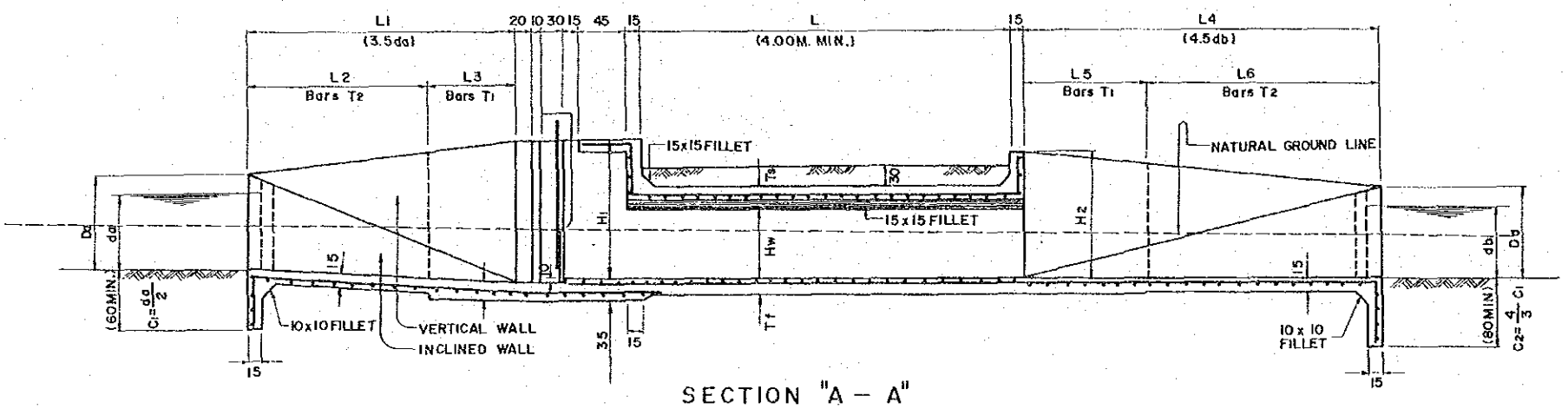
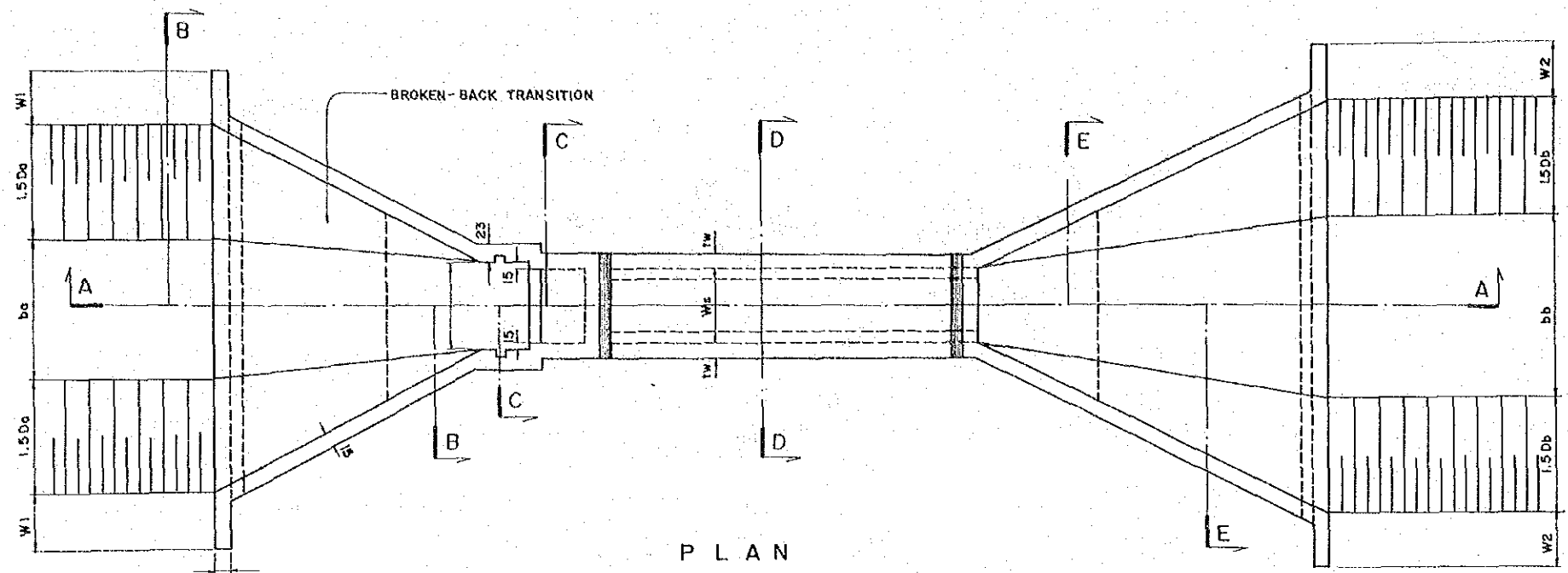
REPUBLIC OF THE PHILIPPINES NATIONAL IRRIGATION ADMINISTRATION ASUE RIVER BASIN AGRICULTURAL DEVELOPMENT PROJECT	
Pipe Road Crossing	
JAPAN INTERNATIONAL COOPERATION AGENCY	
DWG. NO. 503	SHEET OF



REPUBLIC OF THE PHILIPPINES NATIONAL IRRIGATION ADMINISTRATION ASUE RIVER BASIN AGRICULTURAL DEVELOPMENT PROJECT	
Chute	
JAPAN INTERNATIONAL COOPERATION AGENCY	
DWG. NO. 504	SHEET OF

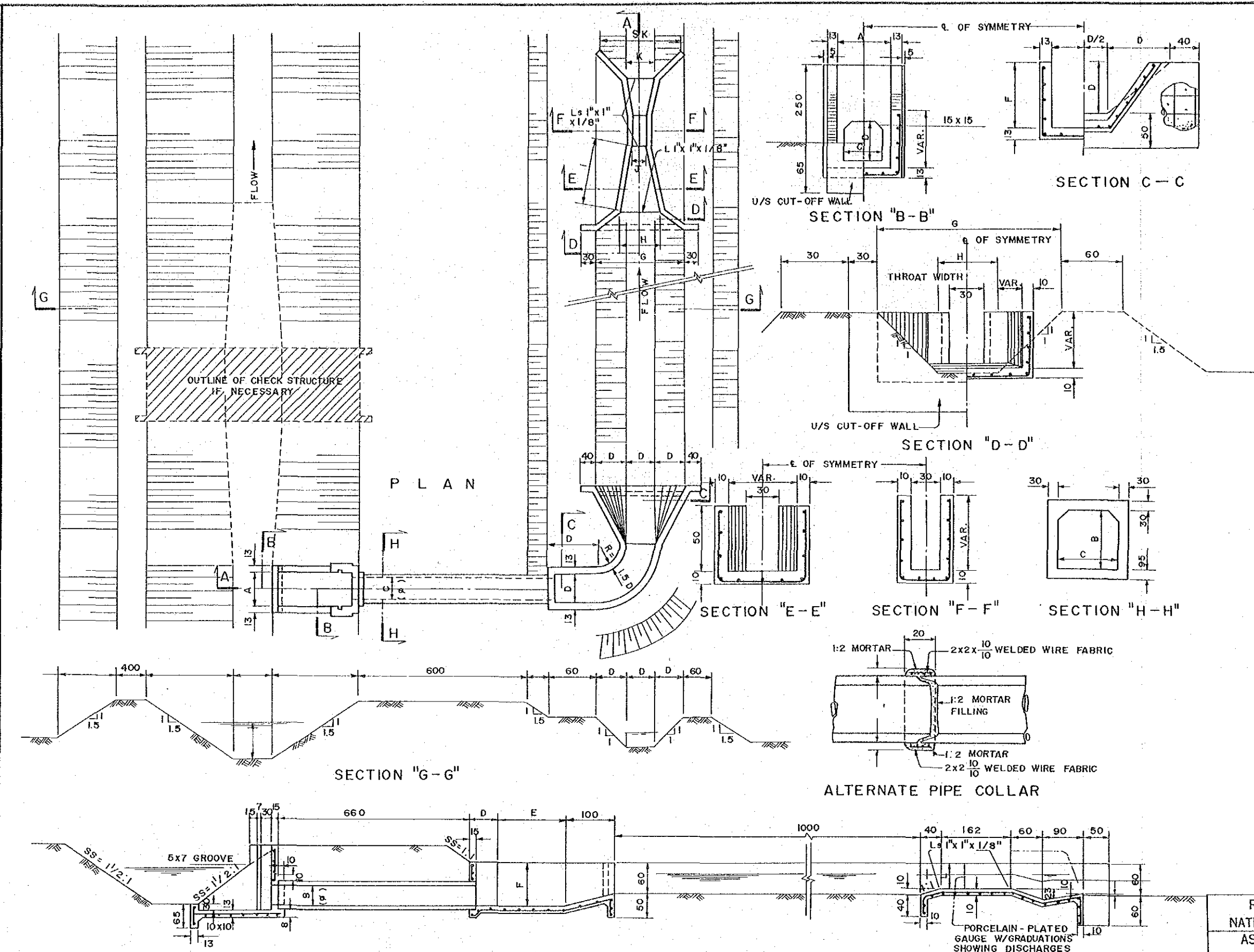


REPUBLIC OF THE PHILIPPINES NATIONAL IRRIGATION ADMINISTRATION ASUE RIVER BASIN AGRICULTURAL DEVELOPMENT PROJECT	
Vertical Drop	
JAPAN INTERNATIONAL COOPERATION AGENCY	
DWG. NO. 505	SHEET OF



REPUBLIC OF THE PHILIPPINES NATIONAL IRRIGATION ADMINISTRATION ASUE RIVER BASIN AGRICULTURAL DEVELOPMENT PROJECT	
Check	
JAPAN INTERNATIONAL COOPERATION AGENCY	
DWG. NO. 506	SHEET OF

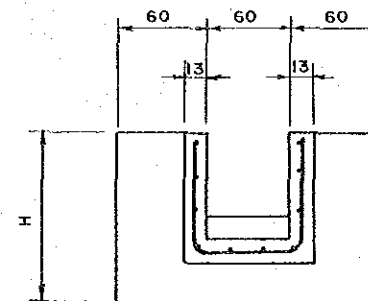
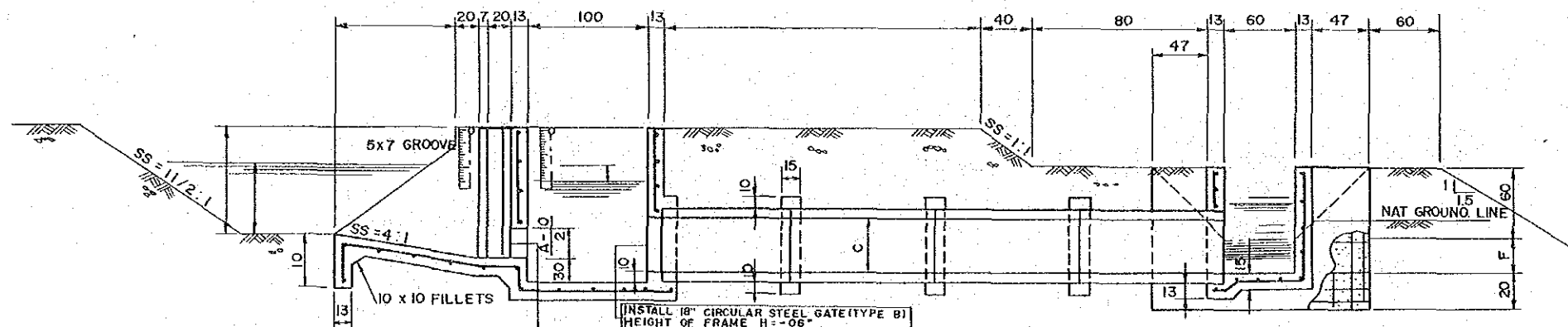
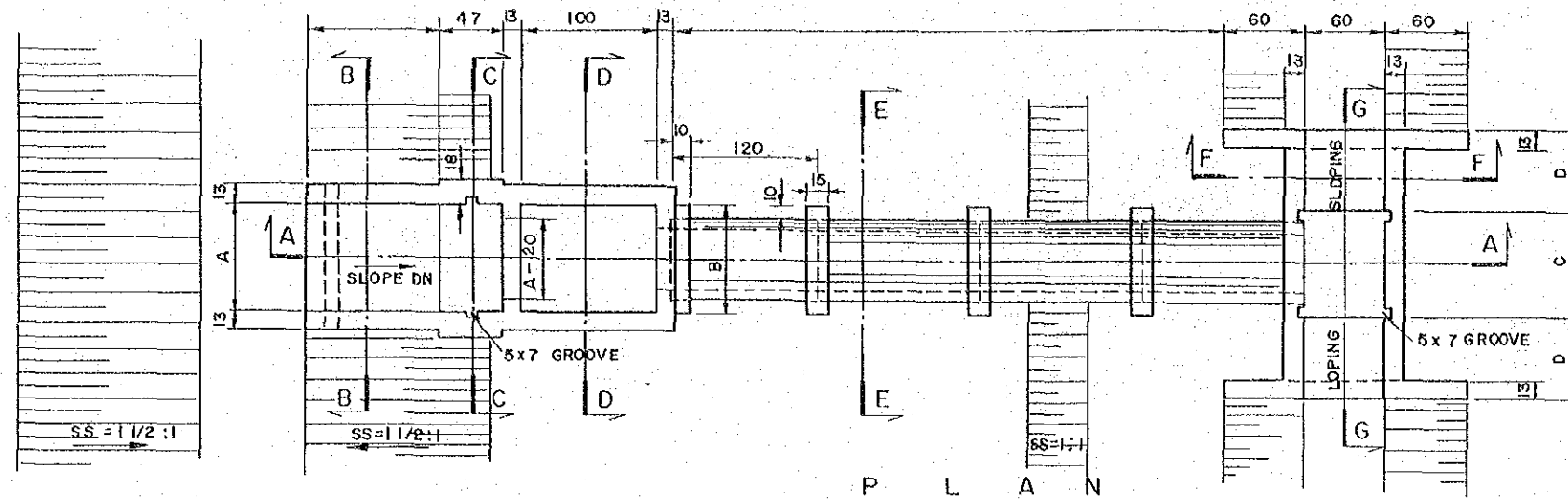




REPUBLIC OF THE PHILIPPINES  
 NATIONAL IRRIGATION ADMINISTRATION  
 ASUE RIVER BASIN AGRICULTURAL  
 DEVELOPMENT PROJECT

Head Gate and Parshall Flume

JAPAN INTERNATIONAL COOPERATION AGENCY

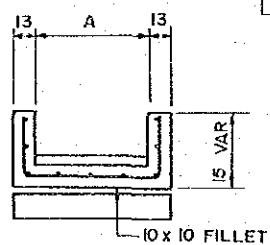


SECTION "F-F"

INSTALL 18" CIRCULAR STEEL GATE (TYPE B) HEIGHT OF FRAME H = 06"

INSTALL 24 x 14" RECTANGULAR STEEL GATE, HEIGHT OF FRAME, H = 4' - 00"

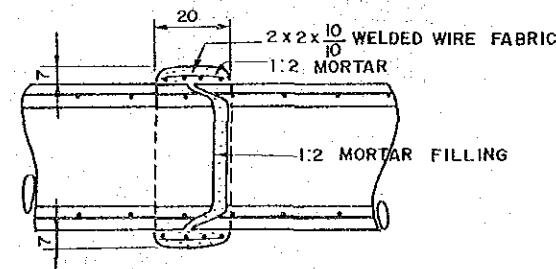
SECTION "A-A"



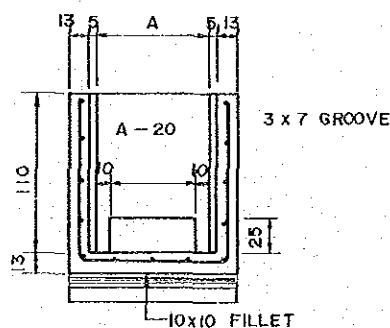
SECTION "B-B"



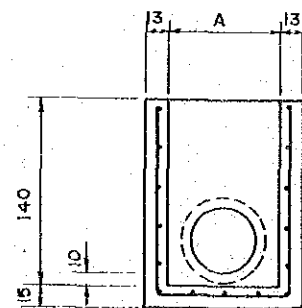
SECTION "E-E"



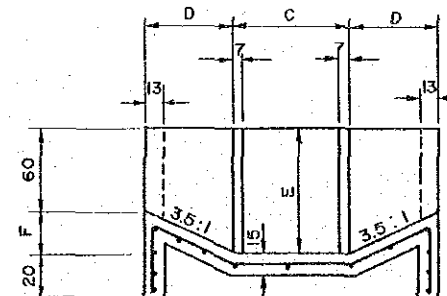
ALTERNATE PIPE COLLAR JOINT



SECTION "C-C"  
(WOODEN GATE NOT SHOWN)



SECTION "D-D"

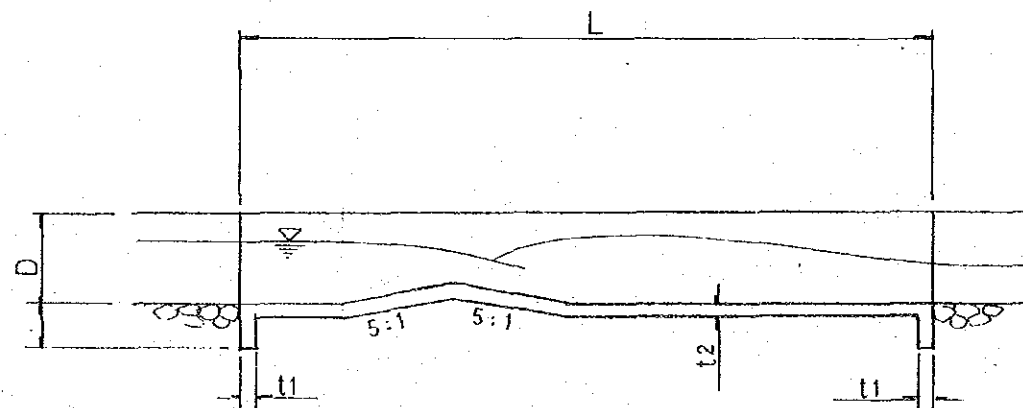
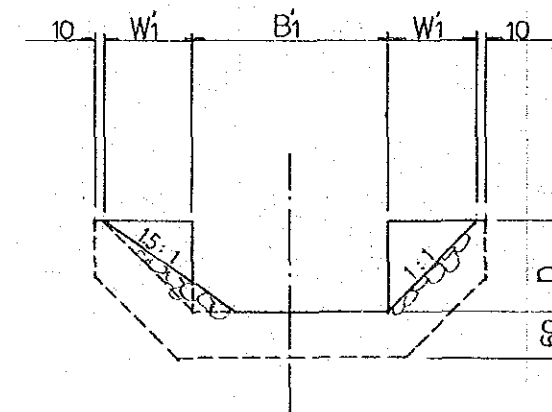
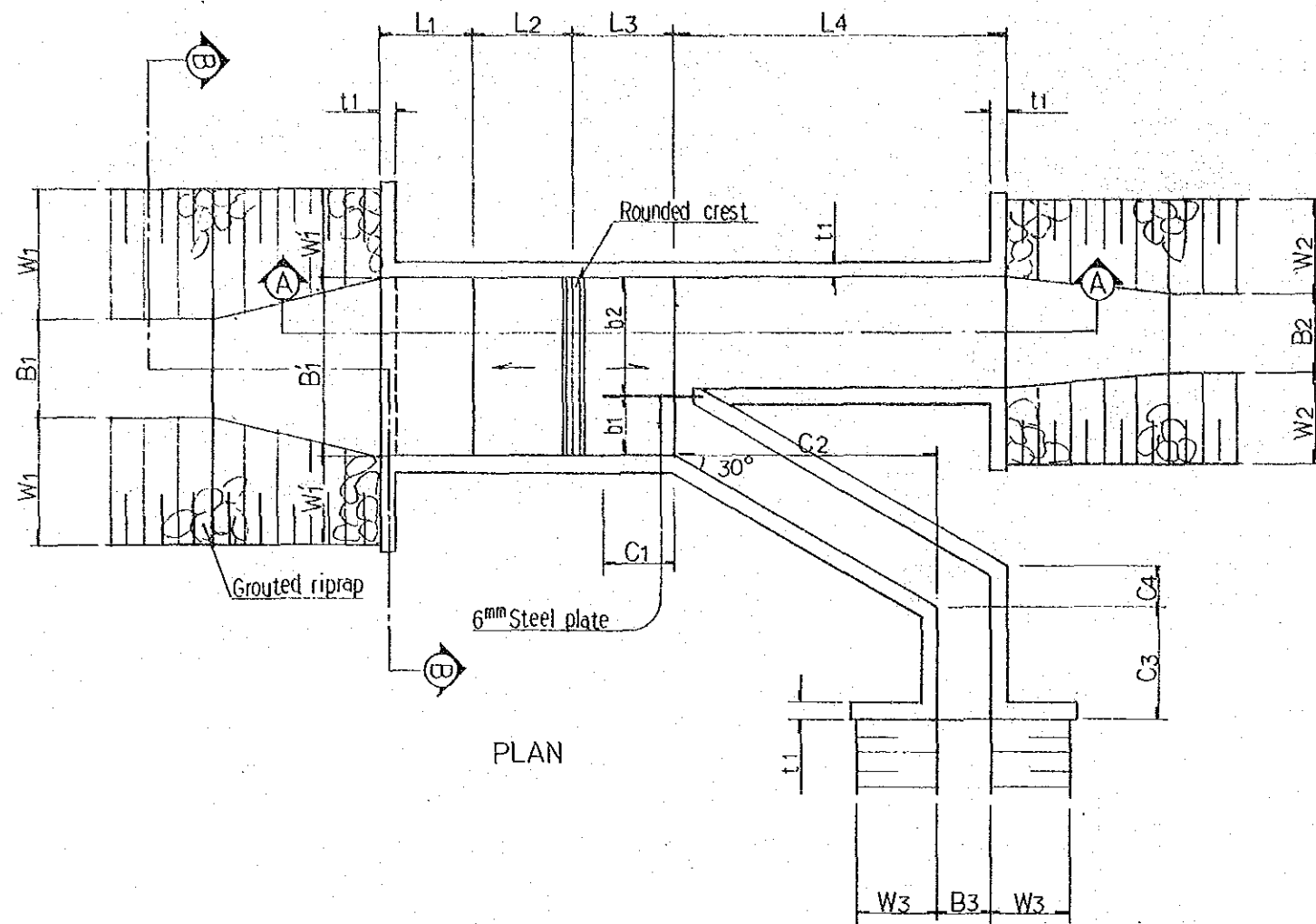


SECTION "G-G"

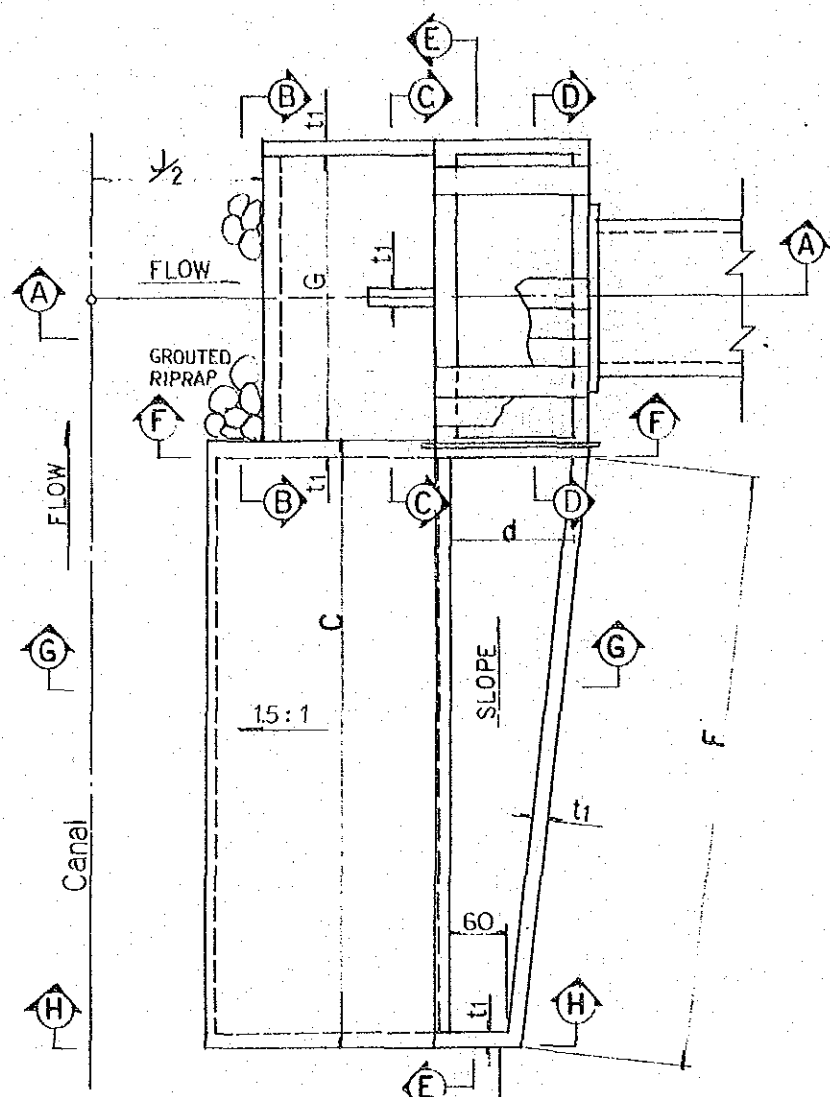
REPUBLIC OF THE PHILIPPINES  
NATIONAL IRRIGATION ADMINISTRATION  
ASUE RIVER BASIN AGRICULTURAL  
DEVELOPMENT PROJECT

Double Orifice

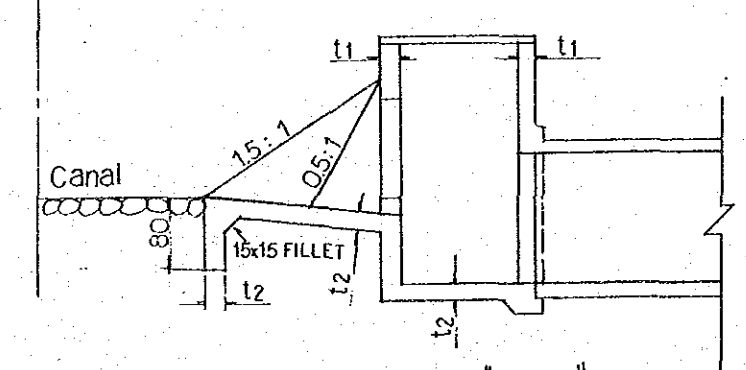
JAPAN INTERNATIONAL COOPERATION AGENCY  
DWG. NO. 508 SHEET OF



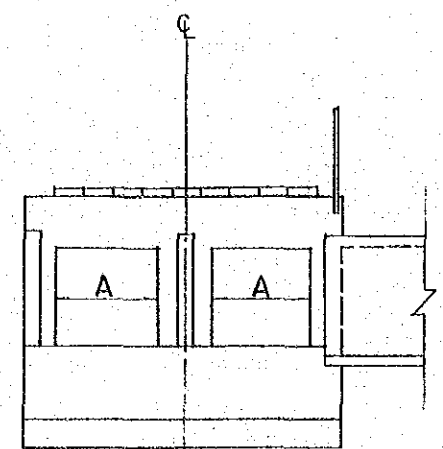
REPUBLIC OF THE PHILIPPINES NATIONAL IRRIGATION ADMINISTRATION ASUE RIVER BASIN AGRICULTURAL DEVELOPMENT PROJECT	
Fixed Proportional Divisor	
JAPAN INTERNATIONAL COOPERATION AGENCY	
DWG. NO. 509	SHEET OF



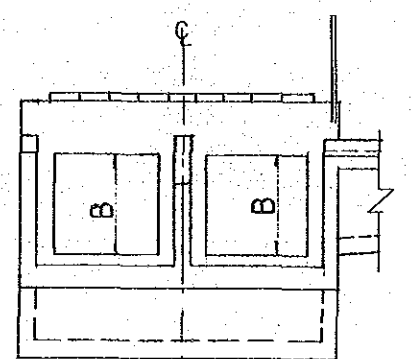
PLAN



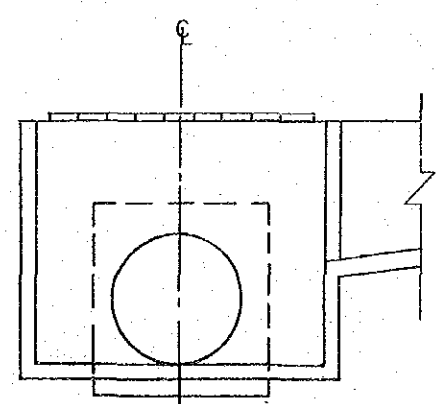
SECTION "A-A"



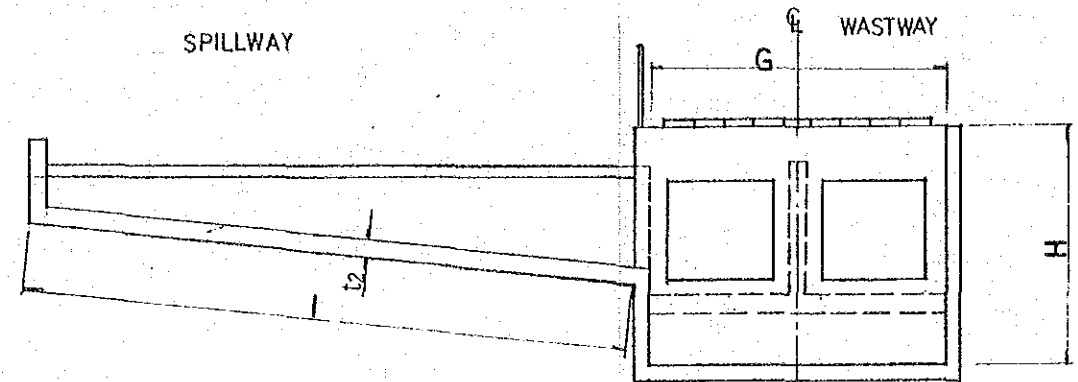
SECTION "B-B"



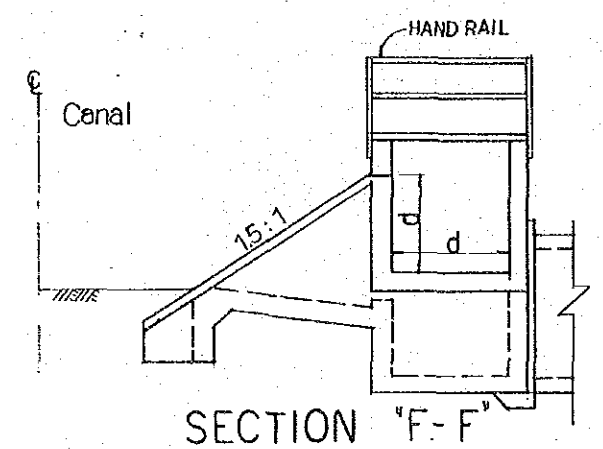
SECTION "C-C"



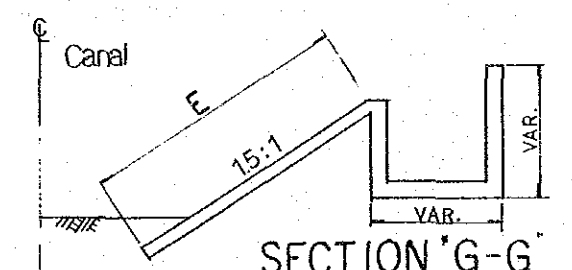
SECTION "D-D"



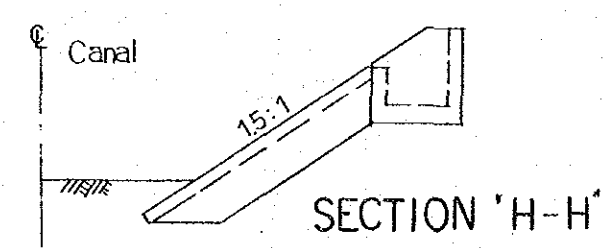
SECTION "E-E"



SECTION "F-F"

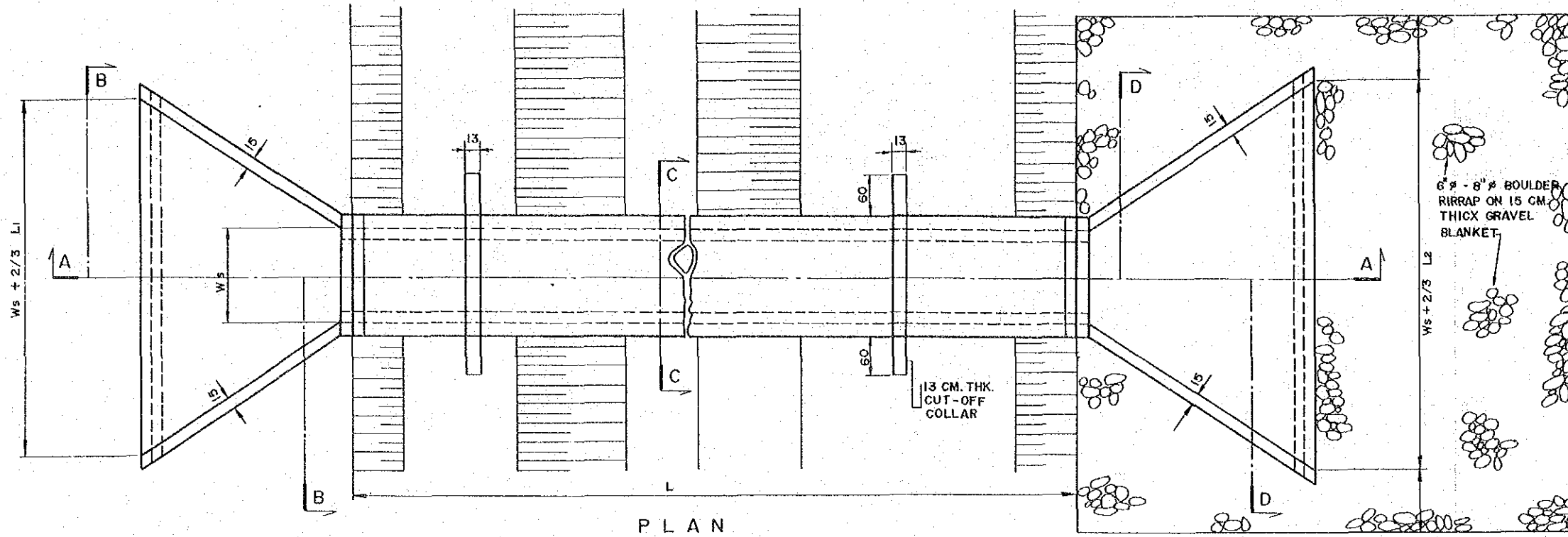


SECTION "G-G"

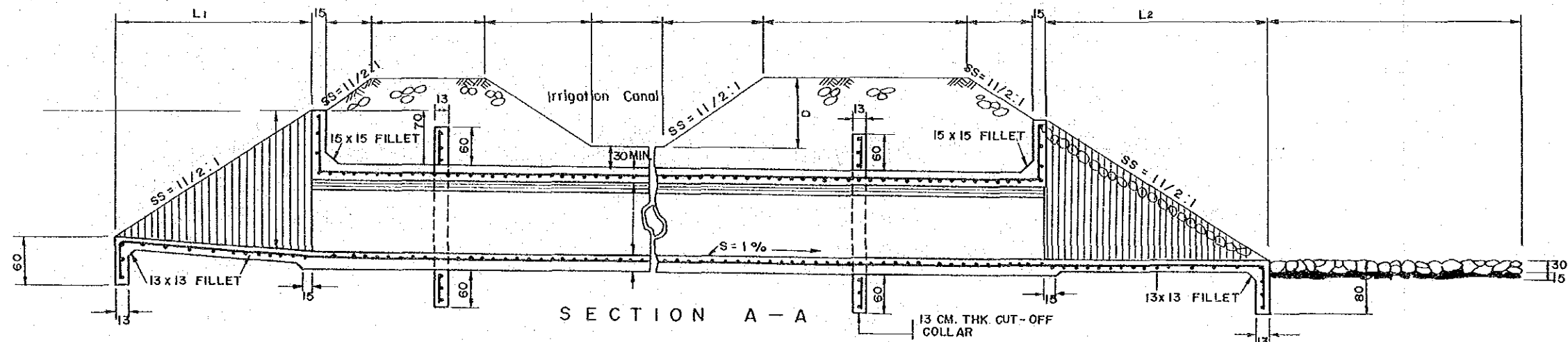


SECTION "H-H"

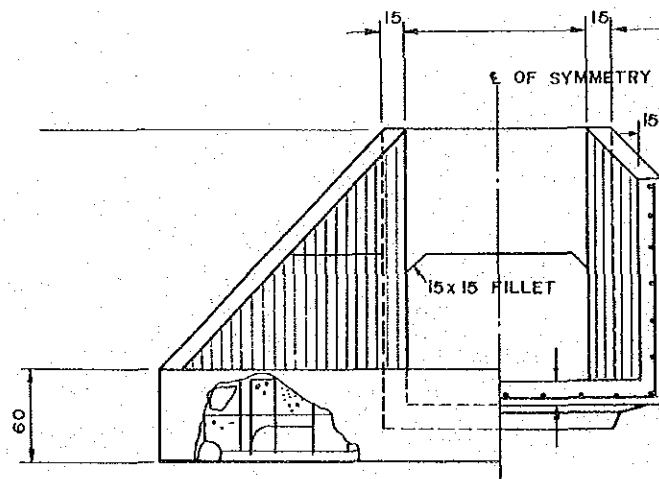
REPUBLIC OF THE PHILIPPINES NATIONAL IRRIGATION ADMINISTRATION ASUE RIVER BASIN AGRICULTURAL DEVELOPMENT PROJECT	
Waste Way	
JAPAN INTERNATIONAL COOPERATION AGENCY	
DWG. NO. 510	SHEET OF



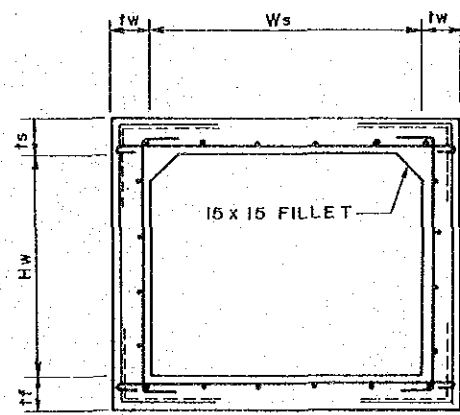
PLAN



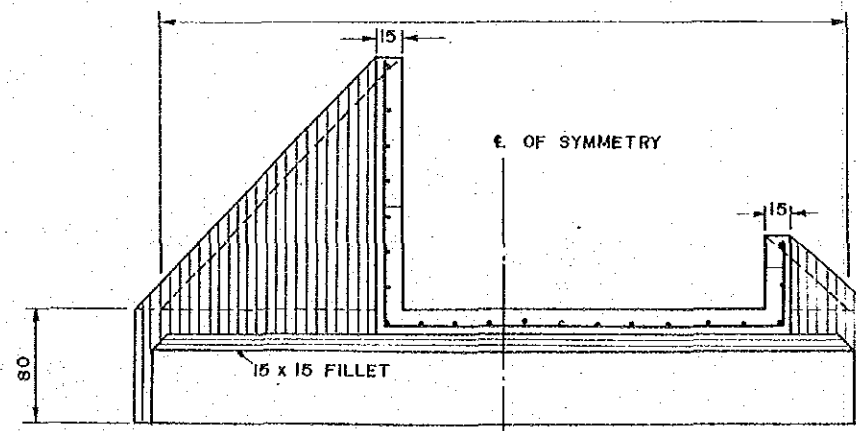
SECTION A - A



SECTION B - B

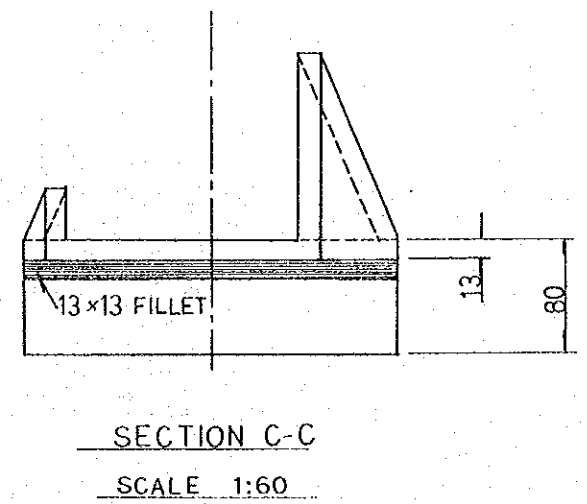
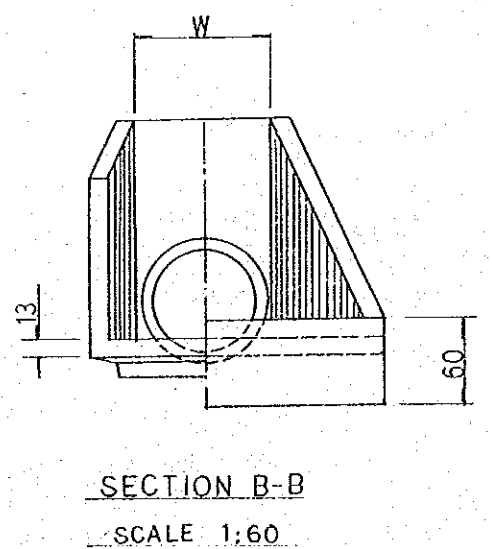
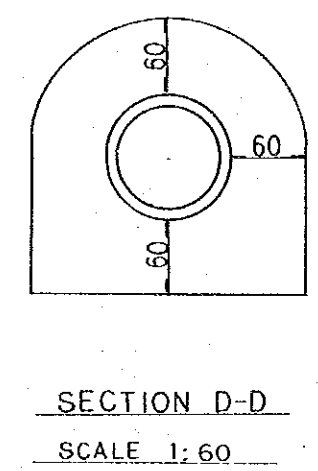
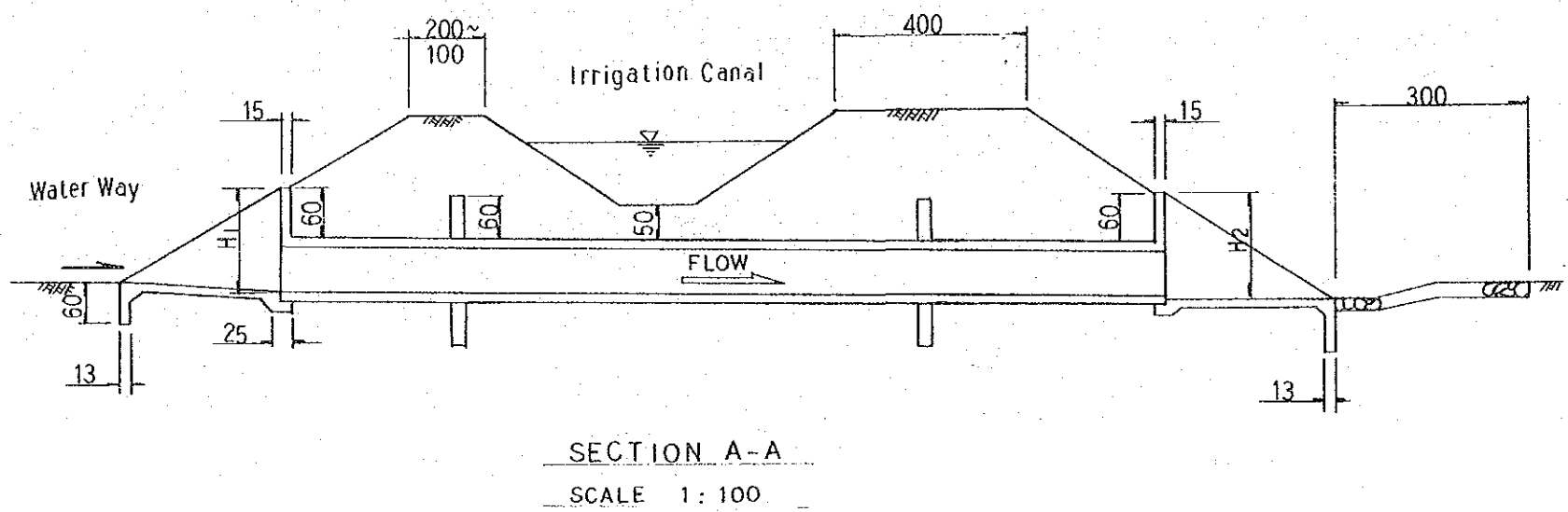
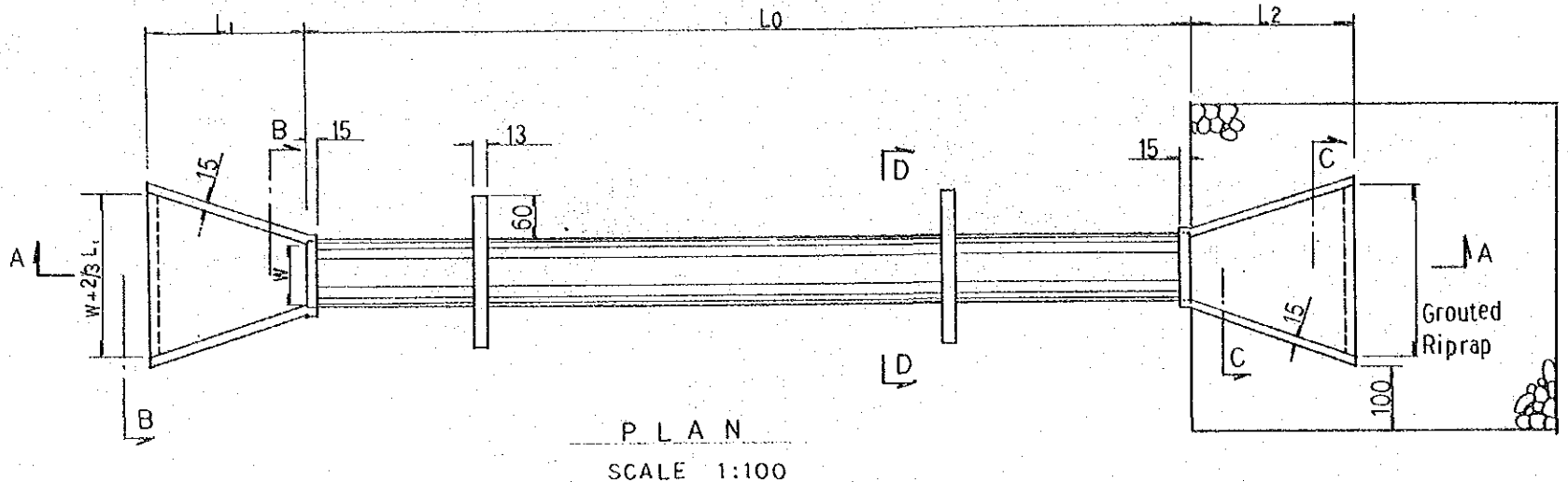


SECTION C - C

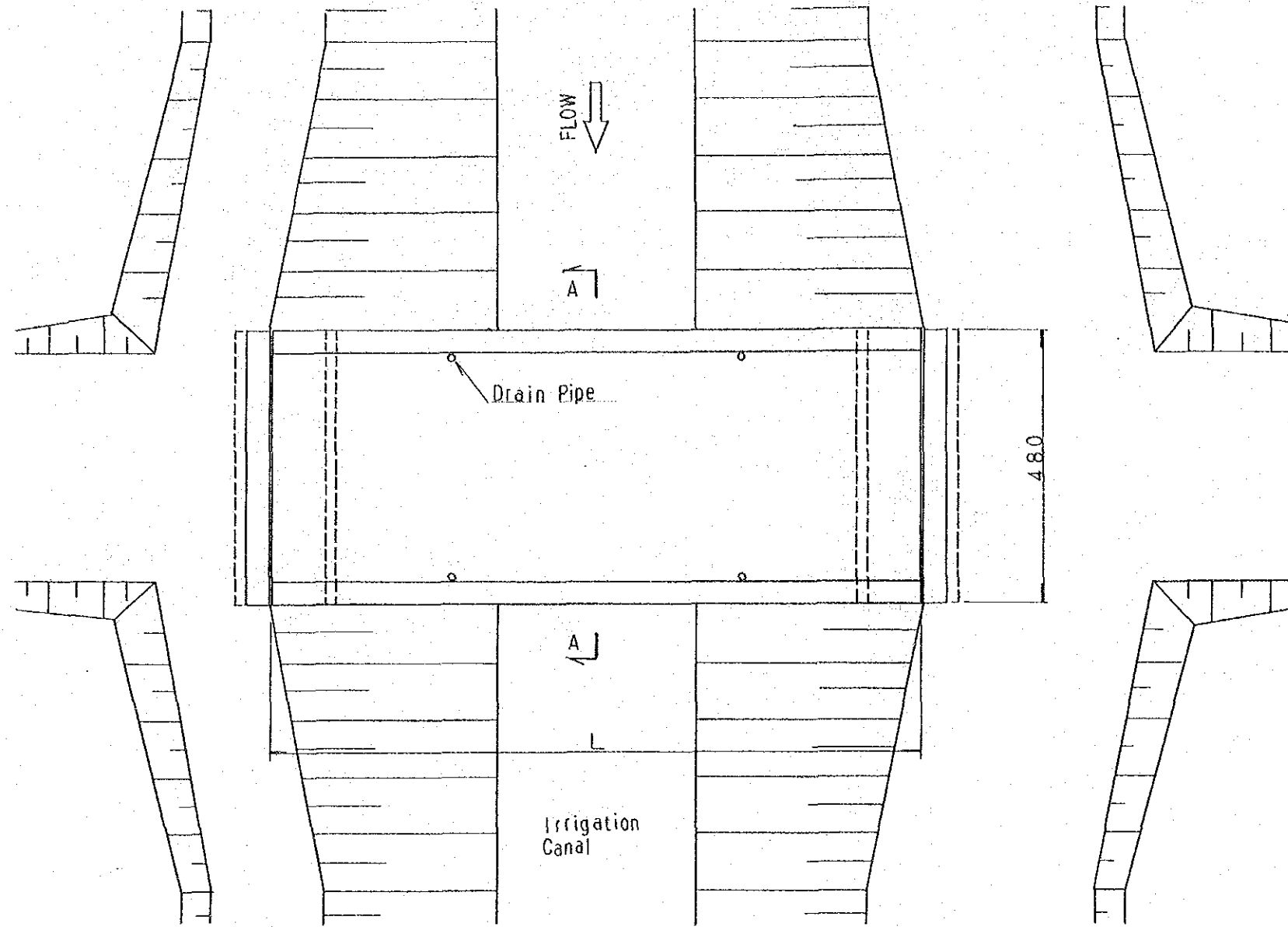


SECTION D - D

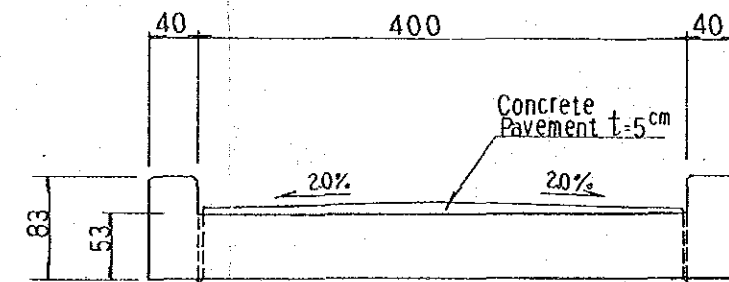
REPUBLIC OF THE PHILIPPINES NATIONAL IRRIGATION ADMINISTRATION ASUE RIVER BASIN AGRICULTURAL DEVELOPMENT PROJECT	
Drainage Culvert	
JAPAN INTERNATIONAL COOPERATION AGENCY	
DWG. NO. 511	SHEET OF



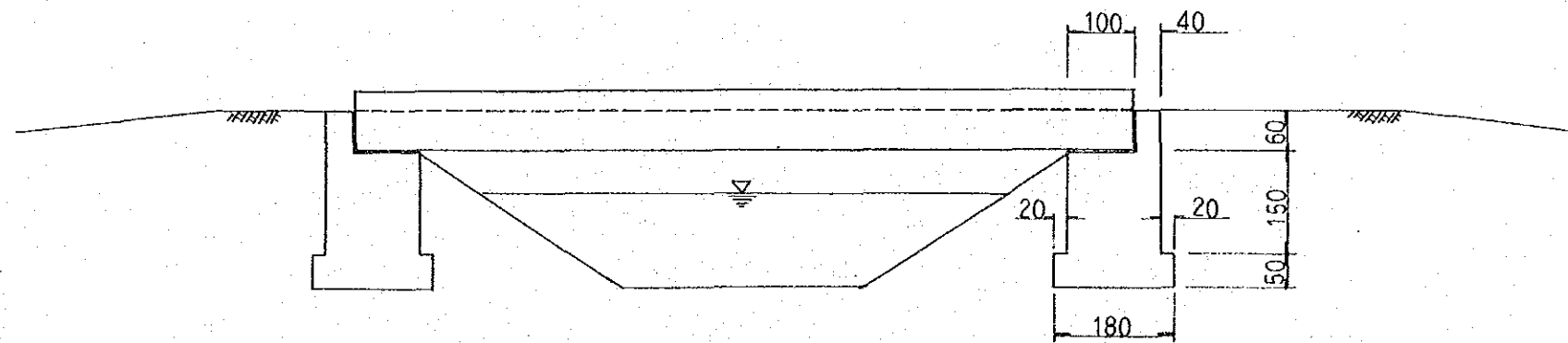
REPUBLIC OF THE PHILIPPINES NATIONAL IRRIGATION ADMINISTRATION ASUE RIVER BASIN AGRICULTURAL DEVELOPMENT PROJECT	
Drainage Culvert Pipe	
JAPAN INTERNATIONAL COOPERATION AGENCY	
DWG. NO. 512	SHEET OF



P L A N  
SCALE 1:100

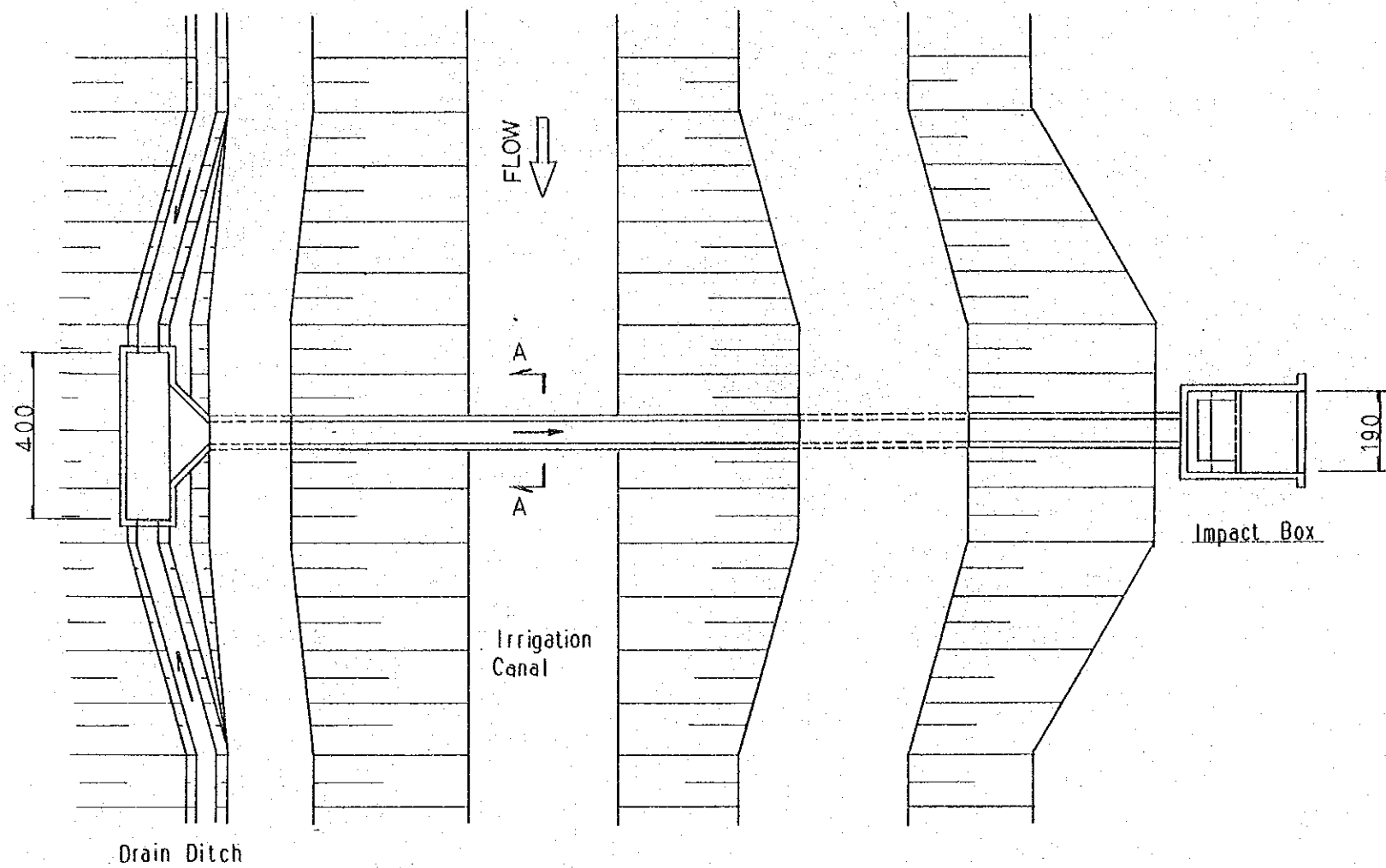


SECTION A - A  
SCALE 1:60

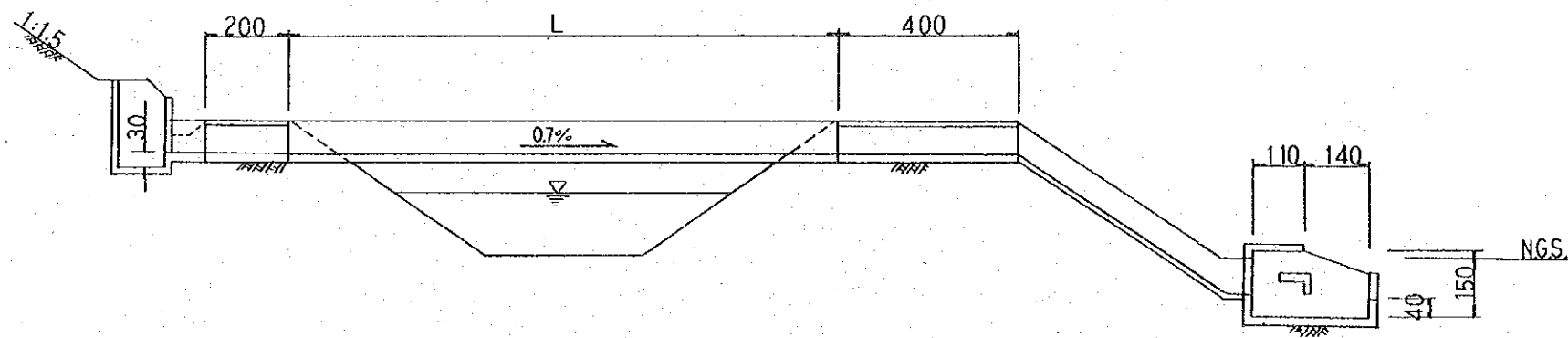


P R O F I L E  
SCALE 1:100

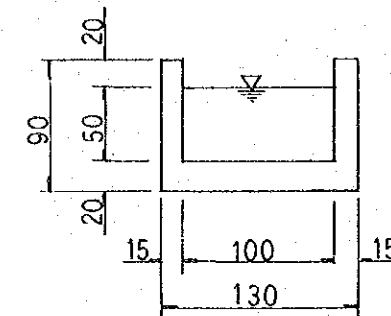
REPUBLIC OF THE PHILIPPINES NATIONAL IRRIGATION ADMINISTRATION ASUE RIVER BASIN AGRICULTURAL DEVELOPMENT PROJECT	
Bridge	
JAPAN INTERNATIONAL COOPERATION AGENCY	
DWG. NO. 513	SHEET OF



P L A N  
SCALE 1:150



P R O F I L E  
SCALE 1:150



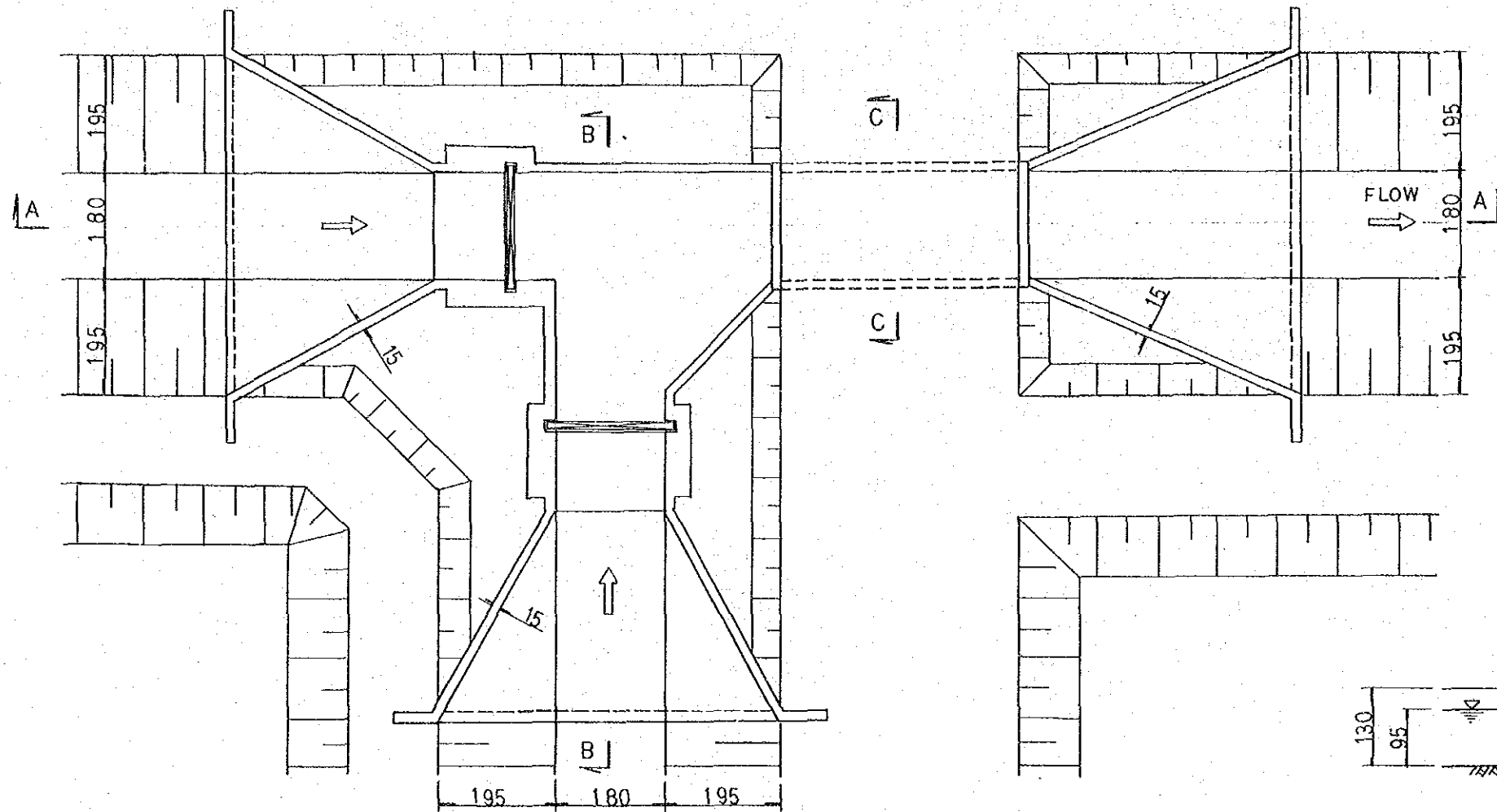
SECTION A - A

SCALE 1:50

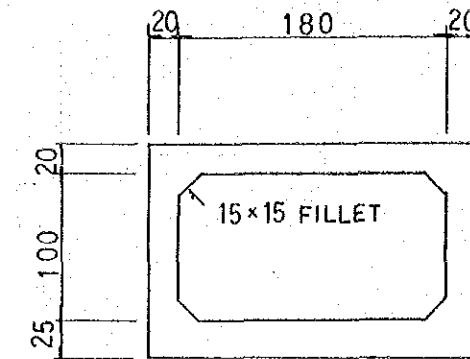
REPUBLIC OF THE PHILIPPINES NATIONAL IRRIGATION ADMINISTRATION ASUE RIVER BASIN AGRICULTURAL DEVELOPMENT PROJECT	
Overchute	
JAPAN INTERNATIONAL COOPERATION AGENCY	
DWG. NO. 514	SHEET OF



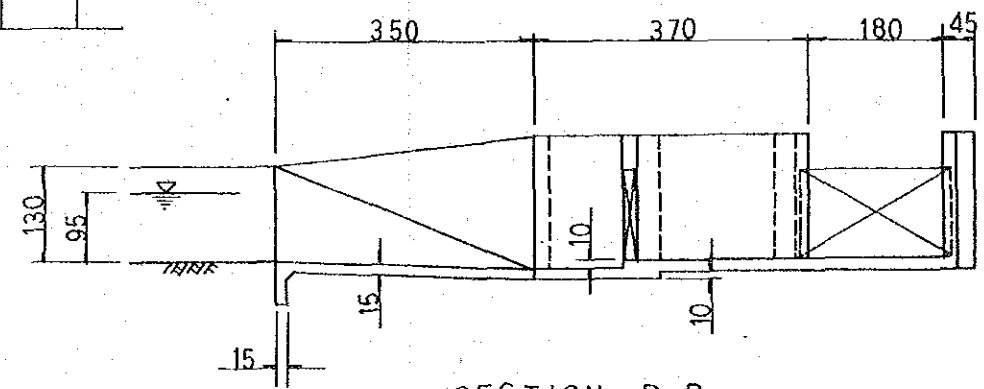
Service Road



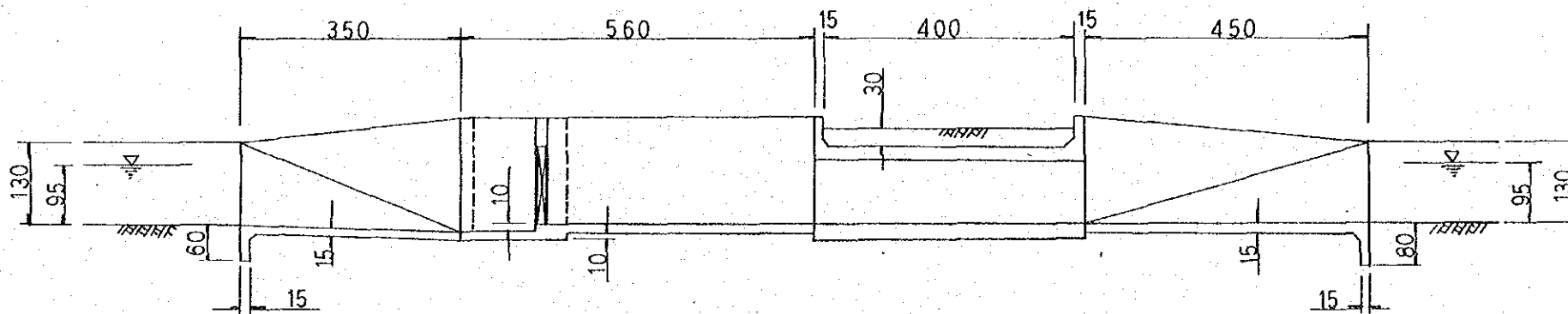
P L A N  
SCALE 1:100



SECTION C-C  
SCALE 1:50



SECTION B-B  
SCALE 1:100



SECTION A-A  
SCALE 1:100

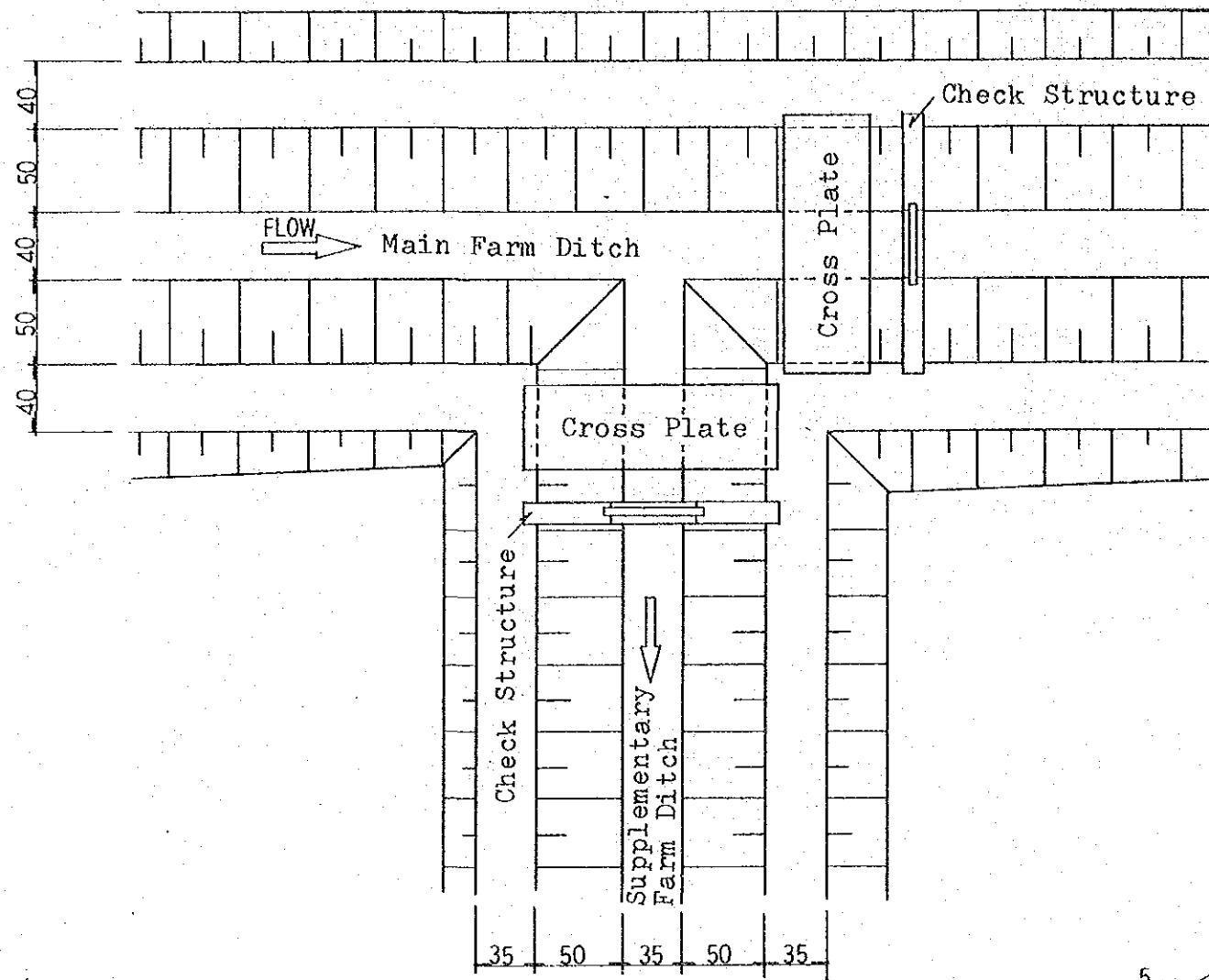
REPUBLIC OF THE PHILIPPINES  
NATIONAL IRRIGATION ADMINISTRATION  
ASUE RIVER BASIN AGRICULTURAL  
DEVELOPMENT PROJECT

Combined Structure

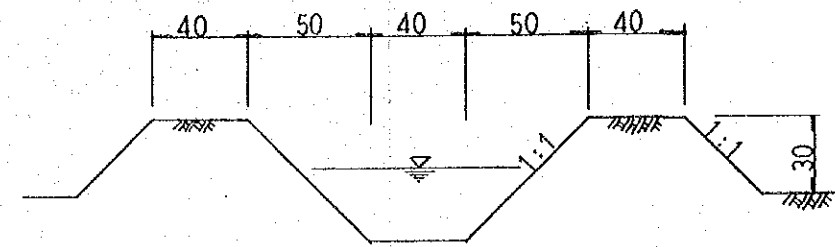
JAPAN INTERNATIONAL COOPERATION AGENCY

DWG. NO. 515

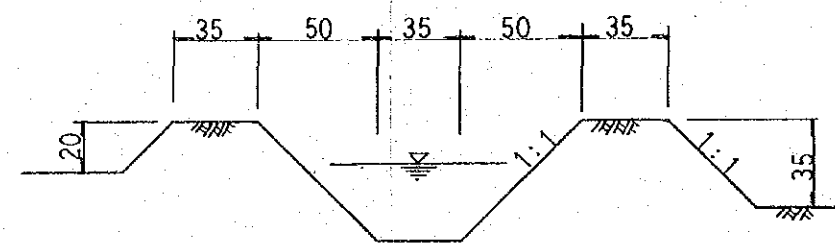
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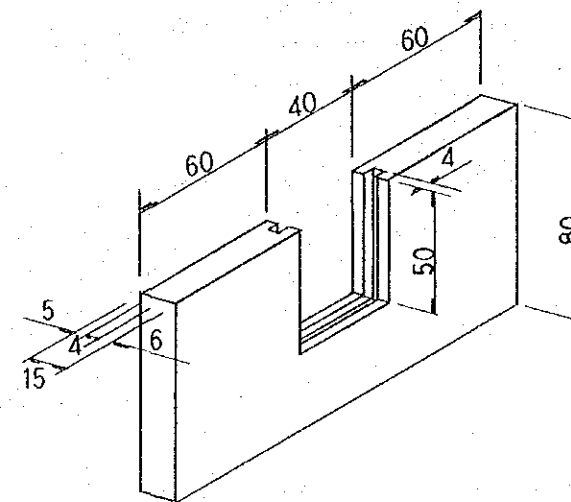
SCHEMATIC PLAN FOR DIVISION BOX



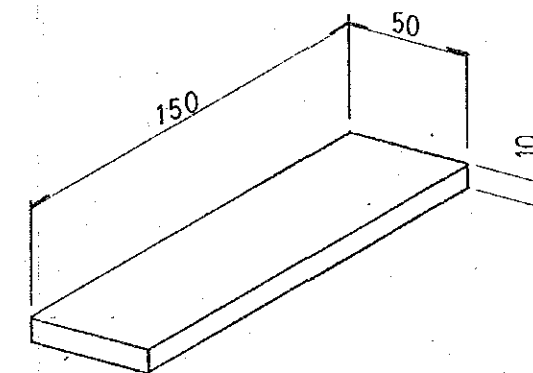
MAIN FARM DITCH (MFD)



SUPPLEMENTARY FARM DITCH (SFD)



DIMENSION OF CHECK STRUCTURE



DIMENSION OF CROSS PLATE

REPUBLIC OF THE PHILIPPINES NATIONAL IRRIGATION ADMINISTRATION ASUE RIVER BASIN AGRICULTURAL DEVELOPMENT PROJECT	
Typical Farm Ditch Section and Division Box	
JAPAN INTERNATIONAL COOPERATION AGENCY	
DWG. NO. 601	SHEET OF