

REPUBLIC OF THE PHILIPPINES
NATIONAL IRRIGATION ADMINISTRATION

**FEASIBILITY STUDY
ON
THE MATUNO RIVER DEVELOPMENT PROJECT**

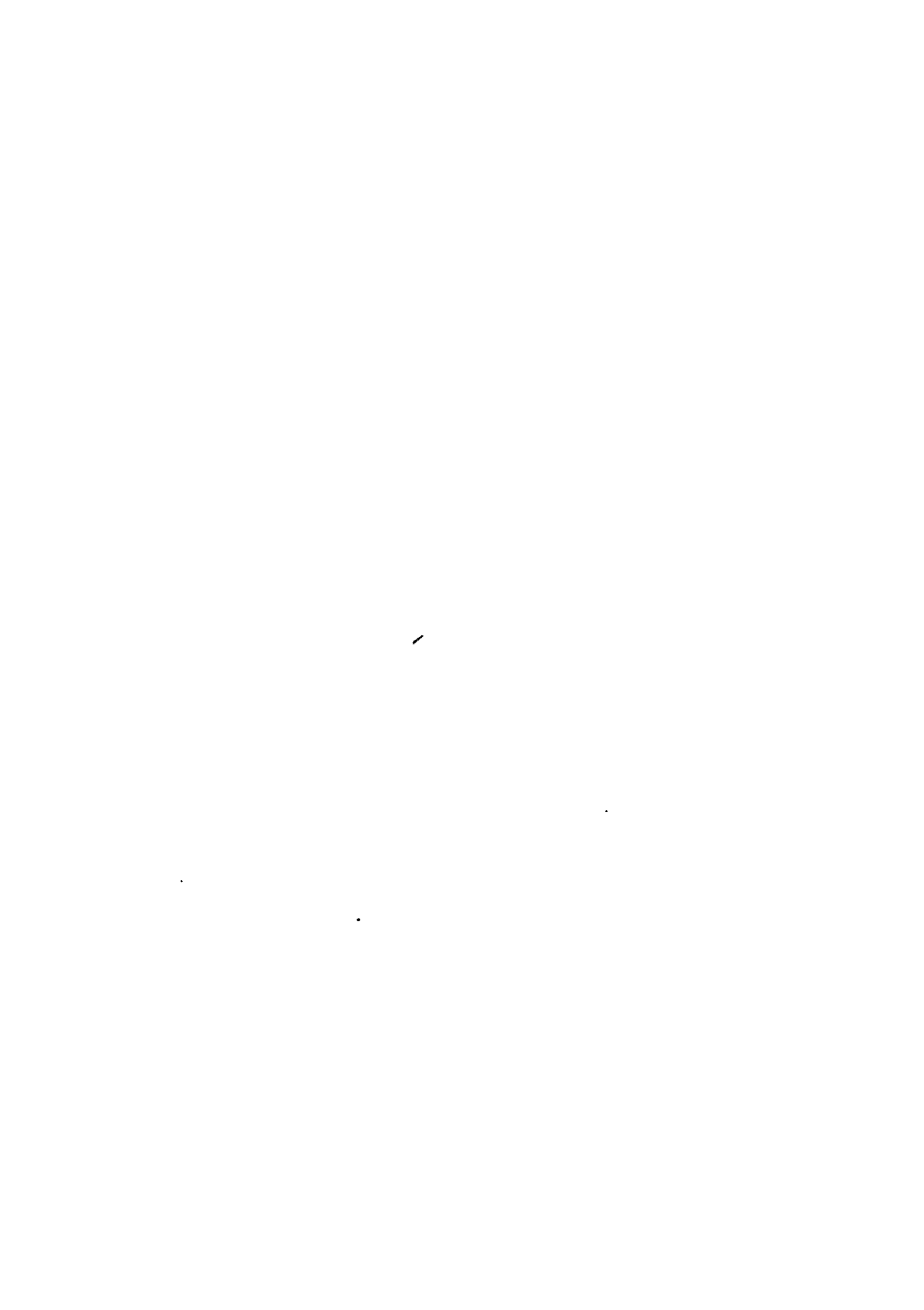
**VOLUME 4
DRAWINGS**

FEBRUARY 1984

JAPAN INTERNATIONAL COOPERATION AGENCY

AFT/MPN

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118
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REPUBLIC OF THE PHILIPPINES
NATIONAL IRRIGATION ADMINISTRATION

**FEASIBILITY STUDY
ON
THE MATUNO RIVER DEVELOPMENT PROJECT**

**VOLUME 4
DRAWINGS**

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FEBRUARY 1984

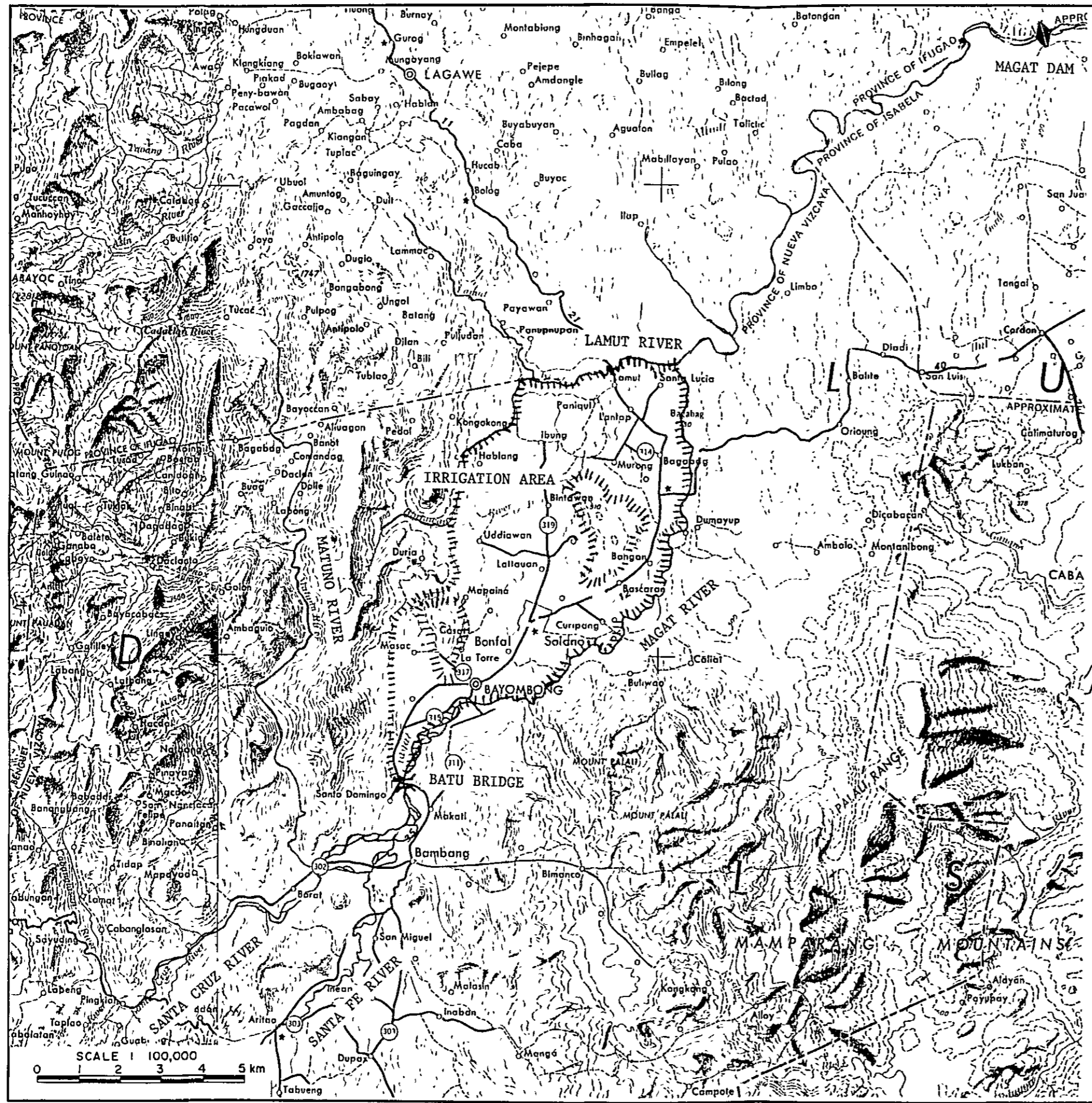
JAPAN INTERNATIONAL COOPERATION AGENCY

国際協力事業団	
受入 月日 '84. 8. 3	118
登録No. 10573	833
	AFT

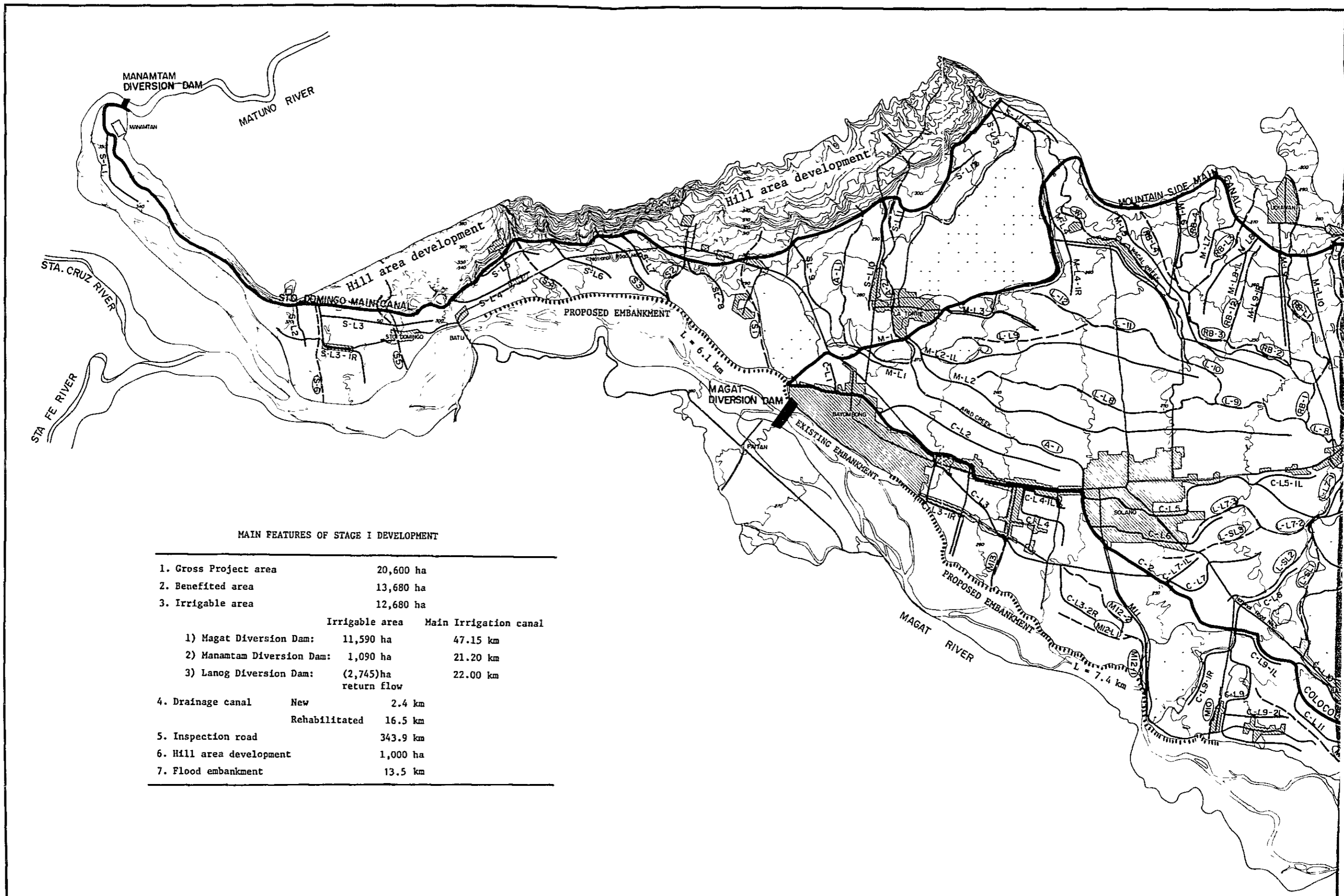
DRAWINGS

I. AGRICULTURE COMPONENT

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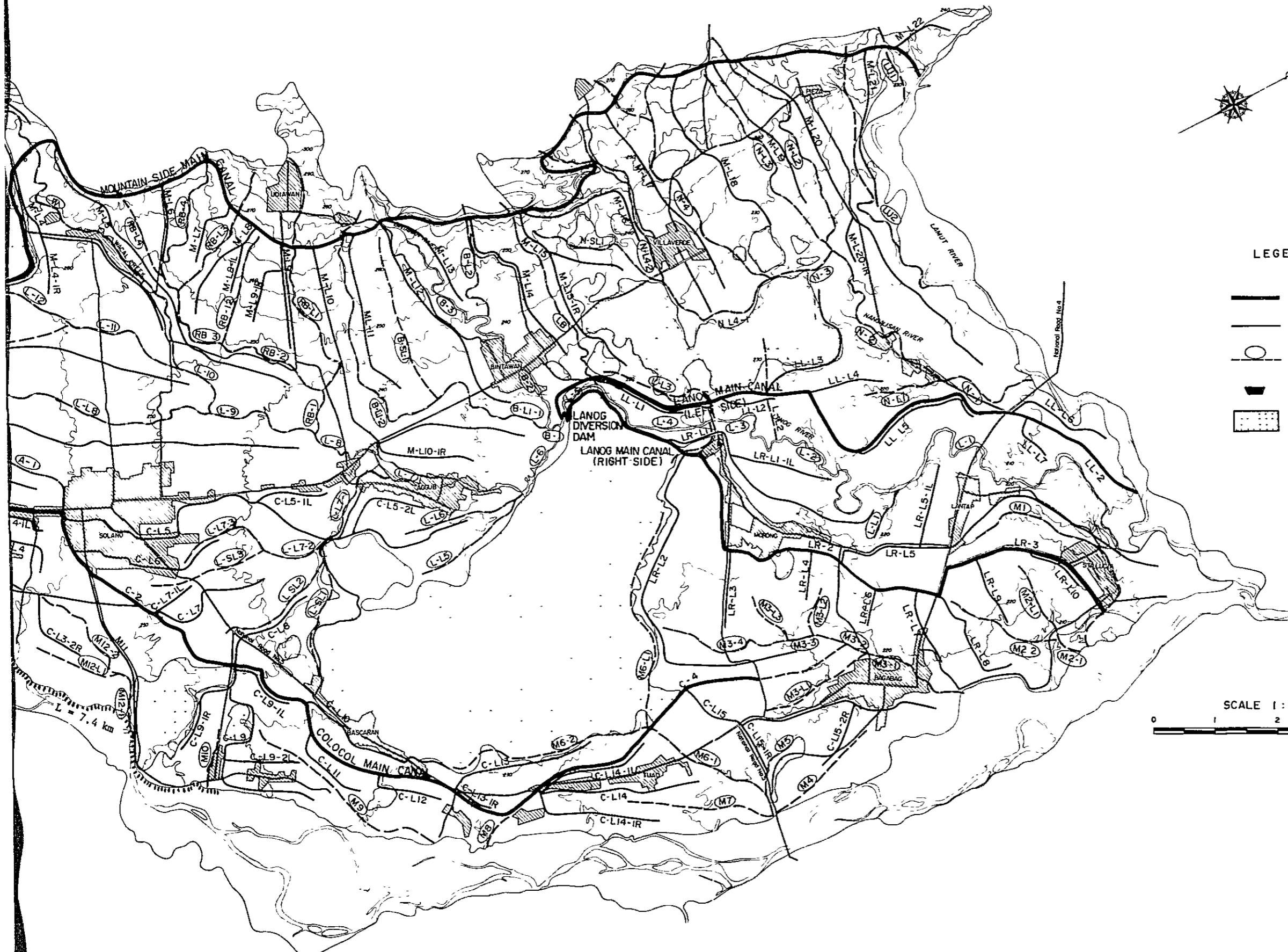


Republic of the Philippines NATIONAL IRRIGATION ADMINISTRATION MATUNO RIVER DEVELOPMENT PROJECT NUEVA VIZCAYA
LOCATION MAP
JAPAN INTERNATIONAL COOPERATION AGENCY DWG. NO. I - 101 SHEET OF








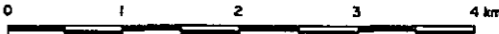
MAIN FEATURES OF STAGE I DEVELOPMENT

1. Gross Project area		20,600 ha
2. Benefited area		13,680 ha
3. Irrigable area		12,680 ha
	Irrigable area	Main Irrigation canal
1) Magat Diversion Dam:	11,590 ha	47.15 km
2) Manamtam Diversion Dam:	1,090 ha	21.20 km
3) Lanog Diversion Dam:	(2,745)ha return flow	22.00 km
4. Drainage canal	New	2.4 km
	Rehabilitated	16.5 km
5. Inspection road		343.9 km
6. Hill area development		1,000 ha
7. Flood embankment		13.5 km



LEGEND

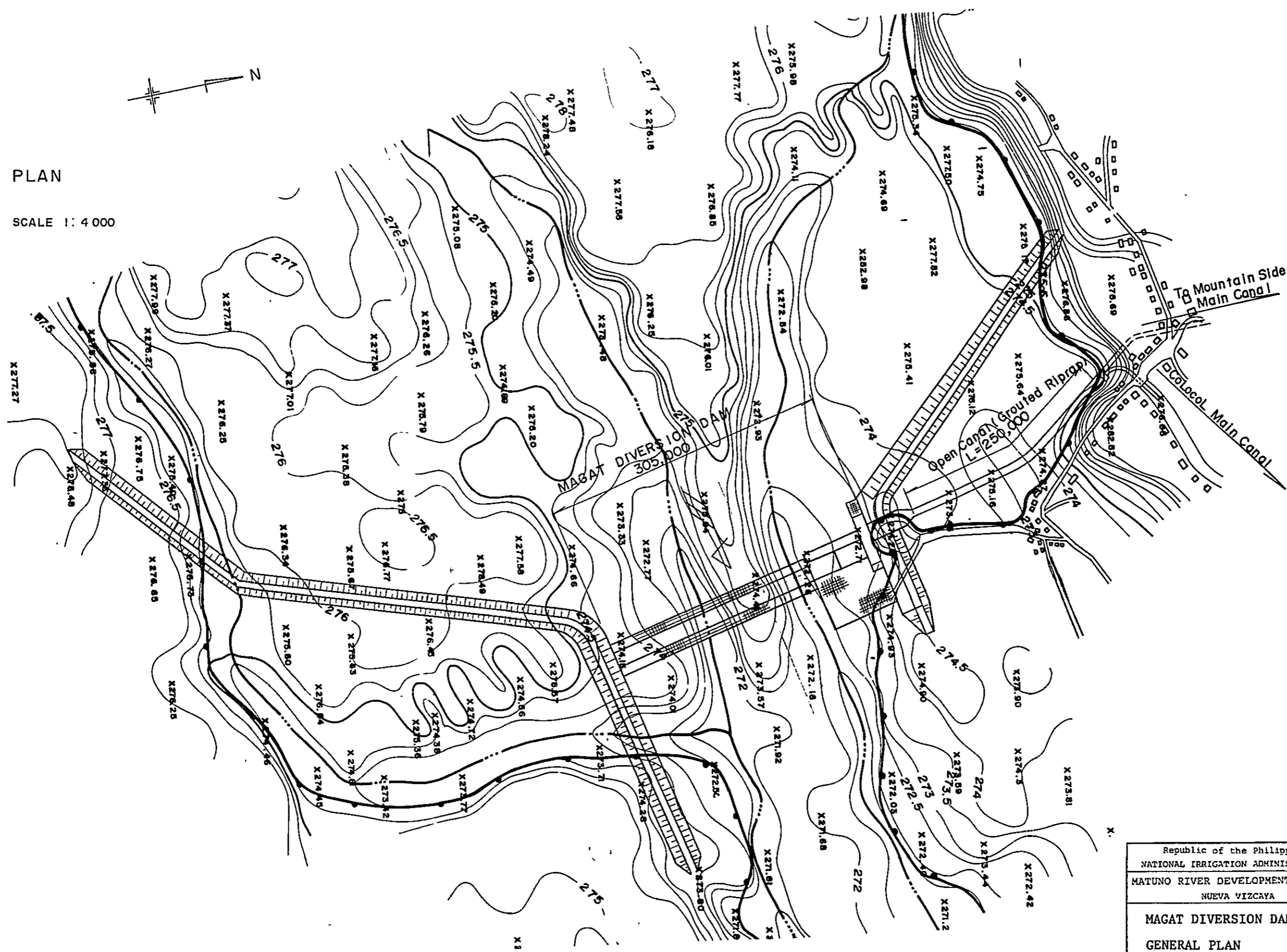
-  MAIN IRRIGATION CANAL
-  LATERAL IRRIGATION CANAL
-  RIVER, CREEK or DRAINAGE CANAL
-  DIVERSION DAM
-  ROCKY HILL

SCALE 1 : 60,000


Republic of the Philippines NATIONAL IRRIGATION ADMINISTRATION MATUNO RIVER DEVELOPMENT PROJECT NUEVA VIZCAYA
GENERAL LAYOUT
JAPAN INTERNATIONAL COOPERATION AGENCY DNG. NO. I - 102 SHEET OF

PLAN

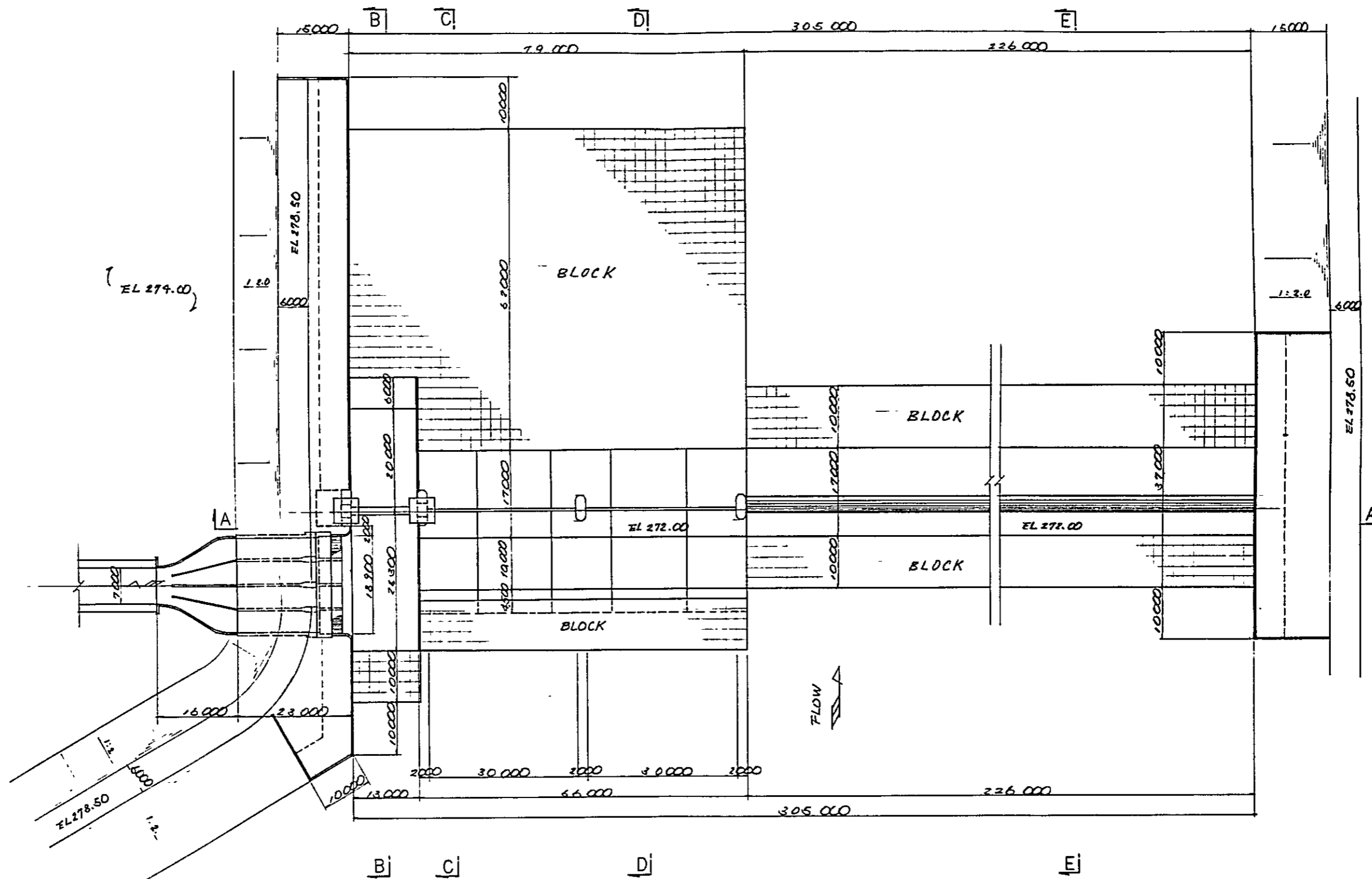
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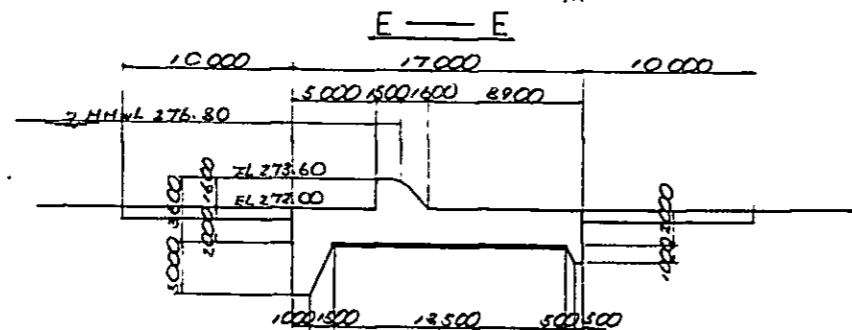
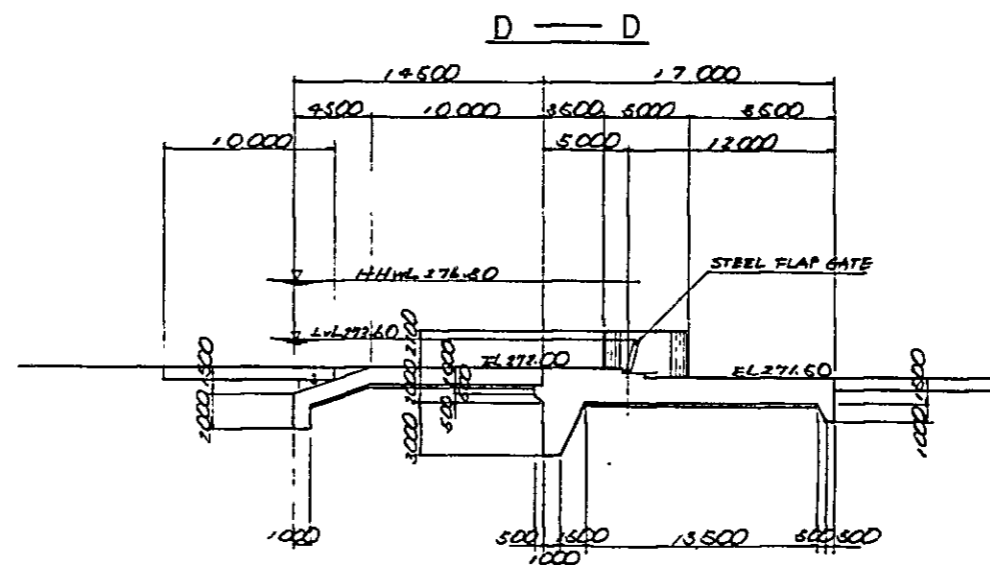
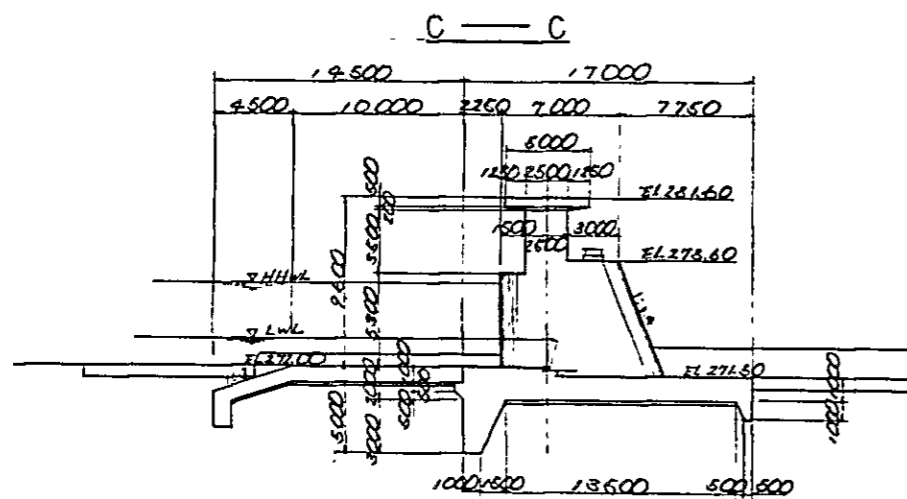
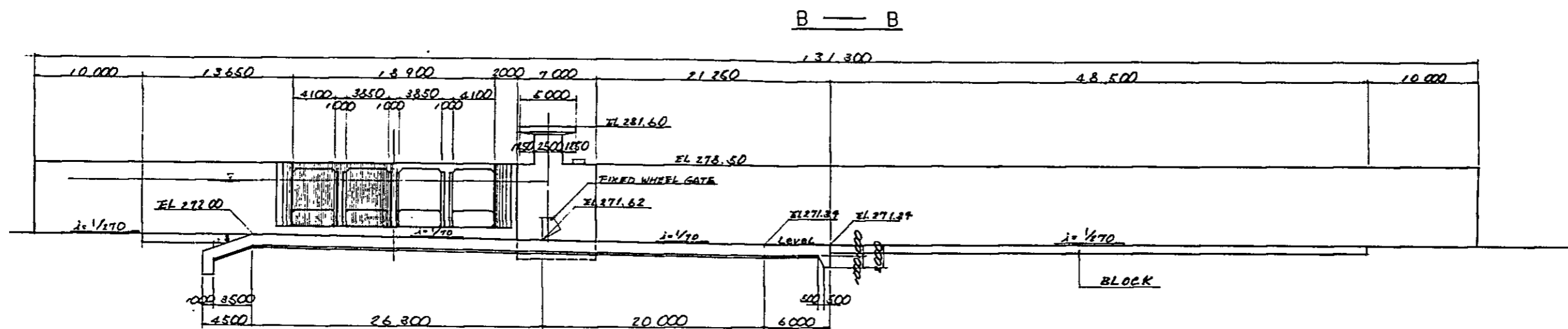
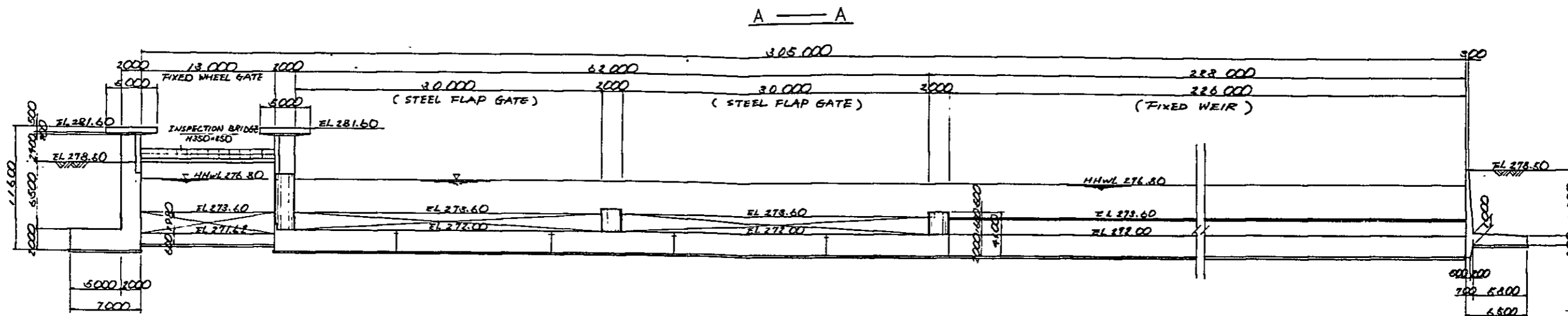
Republic of the Philippines	
NATIONAL IRRIGATION ADMINISTRATION	
MATUNO RIVER DEVELOPMENT PROJECT	
NUEVA VIZCAYA	
MAGAT DIVERSION DAM	
GENERAL PLAN	
JAPAN INTERNATIONAL COOPERATION AGENCY	
ENG. NO. I - 201	SHEET OF

PLAN

SCALE 1:800



Republic of the Philippines	
NATIONAL IRRIGATION ADMINISTRATION	
MATUNO RIVER DEVELOPMENT PROJECT	
NUEVA VIZCAYA	
PLAN	
MAGAT DIVERSION DAM	
JAPAN INTERNATIONAL COOPERATION AGENCY	
DWG. NO. I - 202	SHEET OF

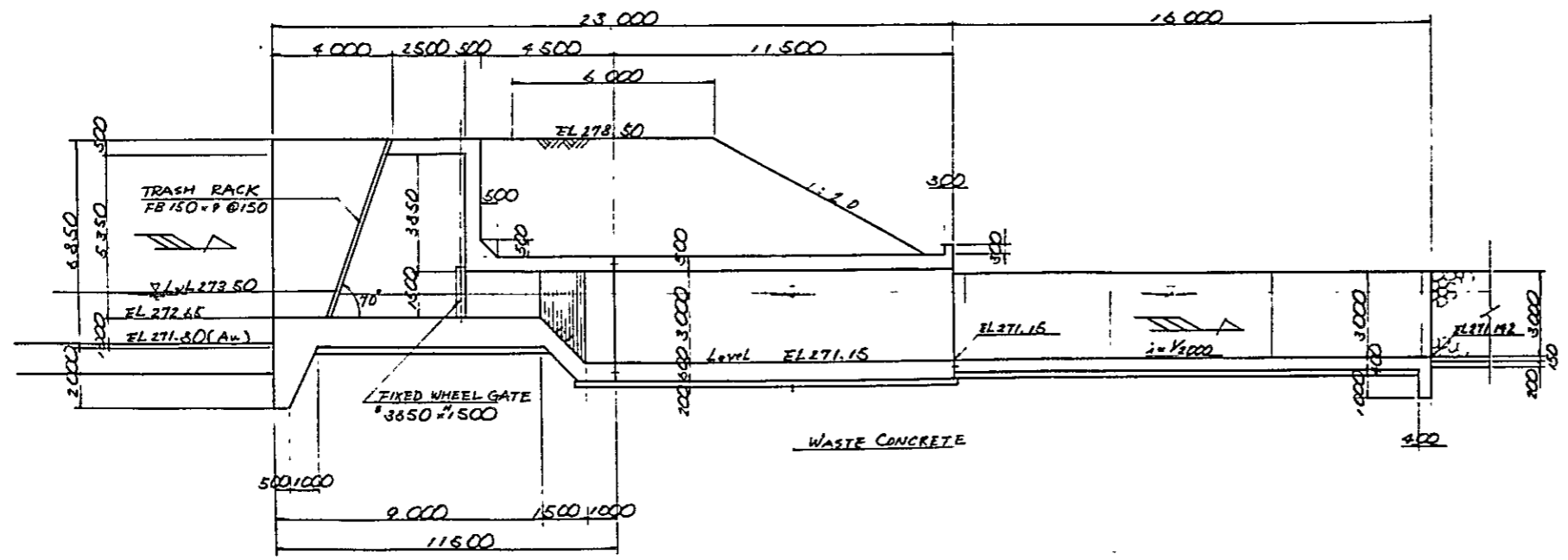
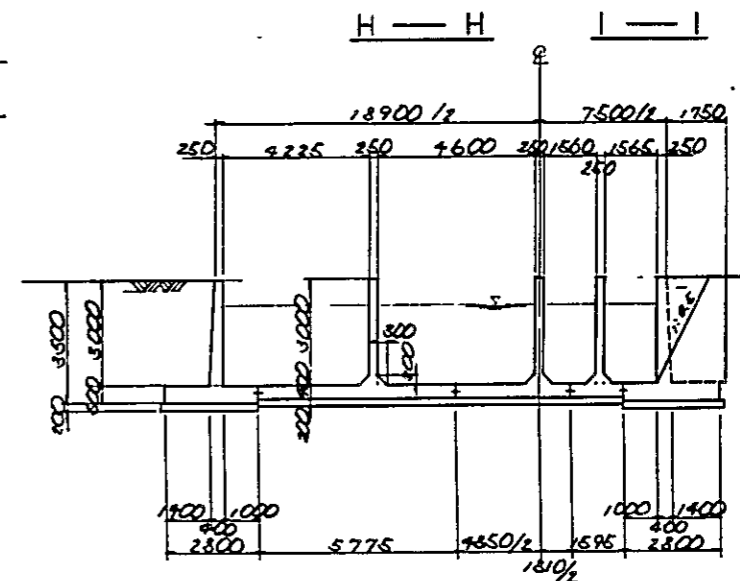
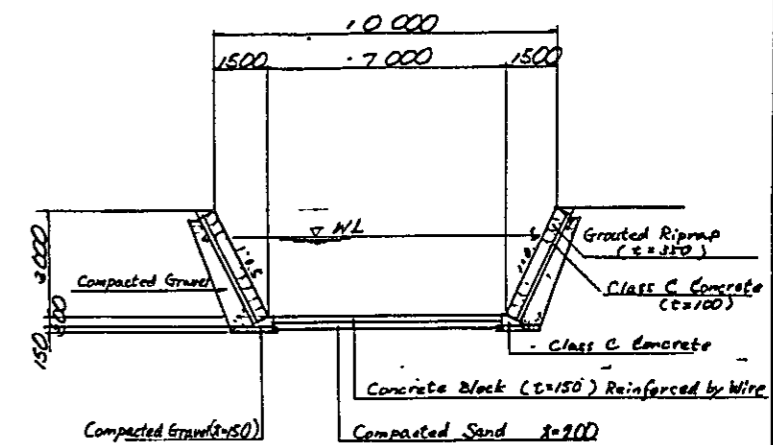
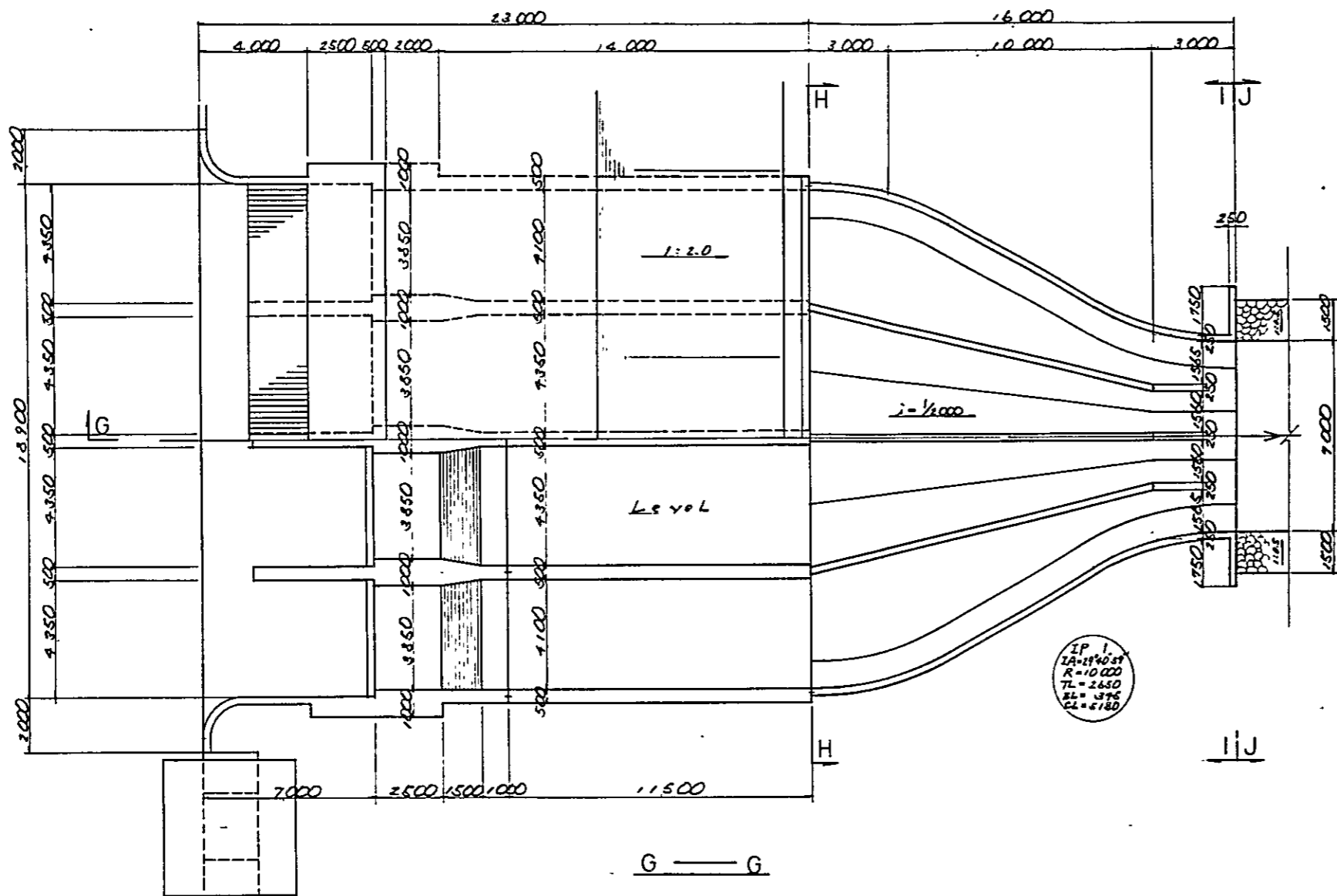


SCALE 1:400

Republic of the Philippines	
NATIONAL IRRIGATION ADMINISTRATION	
MATUNO RIVER DEVELOPMENT PROJECT	
NUEVA VIZCAYA	
SECTION	
MAGAT DIVERSION DAM	
JAPAN INTERNATIONAL COOPERATION AGENCY	
DWG. NO. I - 203	SHEET OF

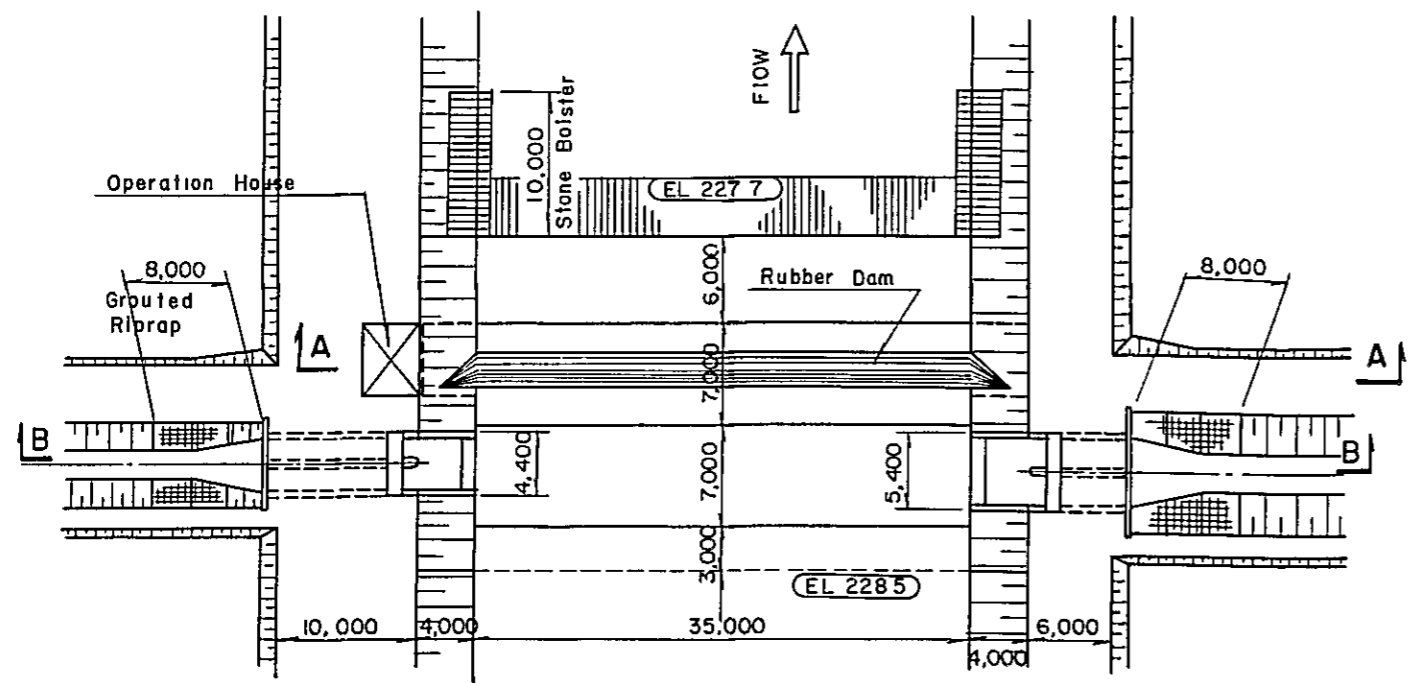
PLAN
SCALE 1:200

J — J

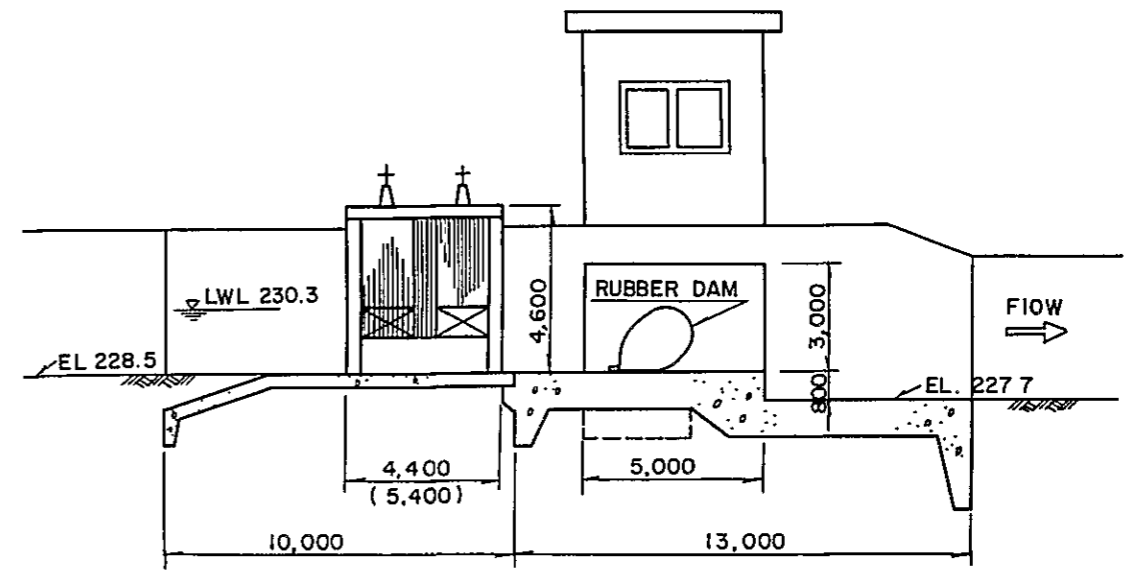


Republic of the Philippines
NATIONAL IRRIGATION ADMINISTRATION
MATUNO RIVER DEVELOPMENT PROJECT
NUEVA VIZCAYA
INTAKE STRUCTURE
MAGAT DIVERSION DAM
JAPAN INTERNATIONAL COOPERATION AGENCY
DWG. NO. I - 204 SHEET OF

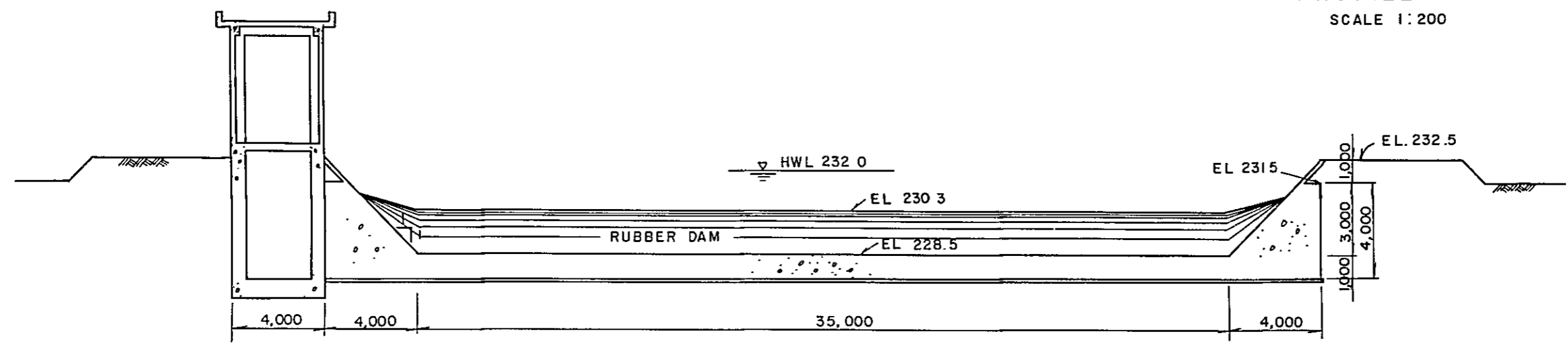
MAGAT RIVER



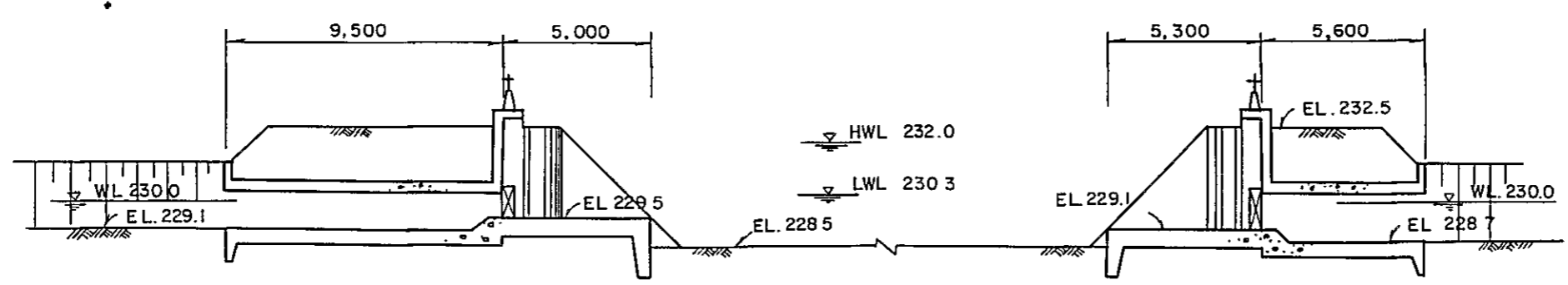
PLAN
SCALE 1:500



PROFILE
SCALE 1:200



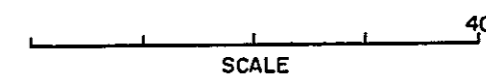
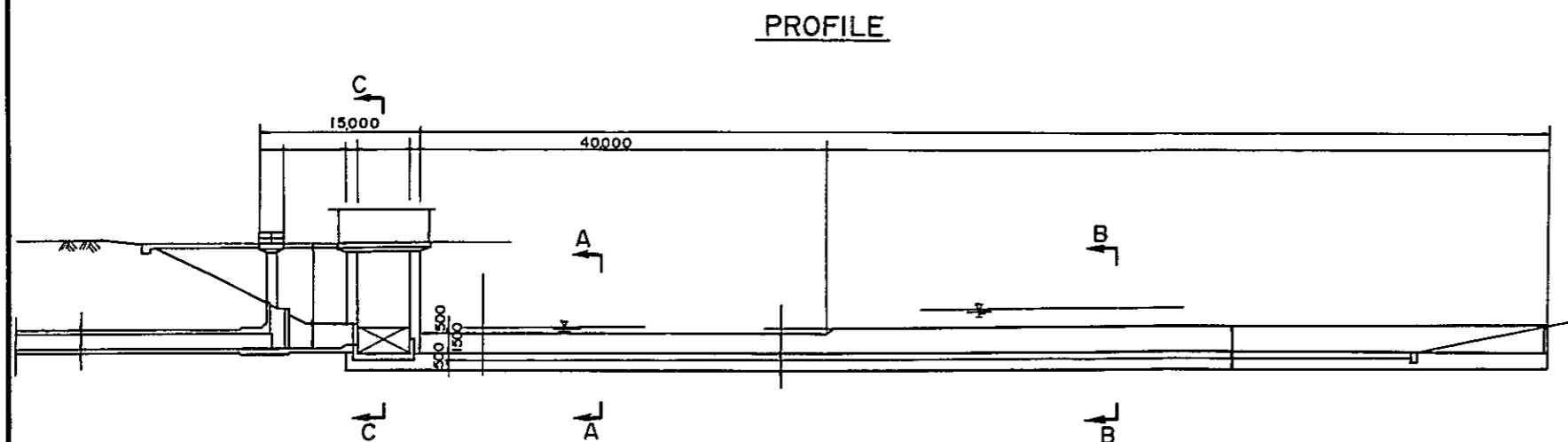
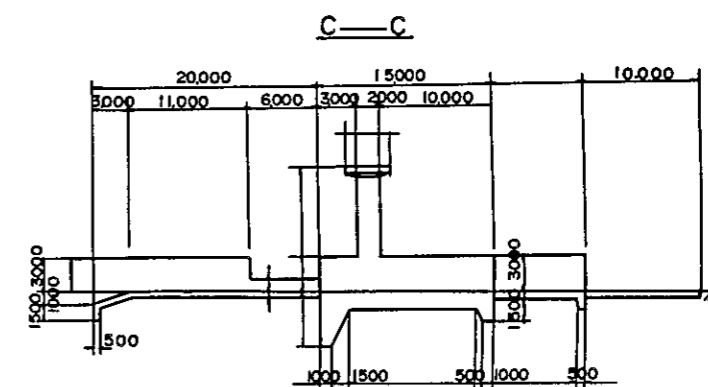
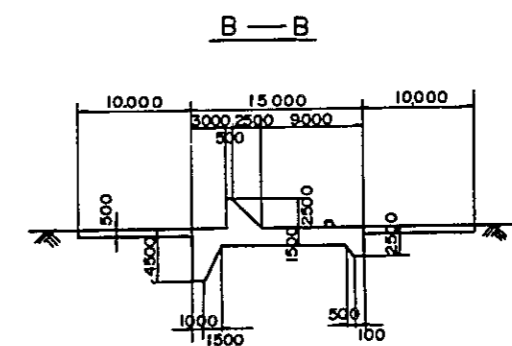
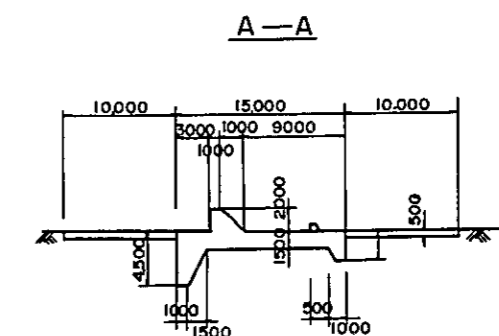
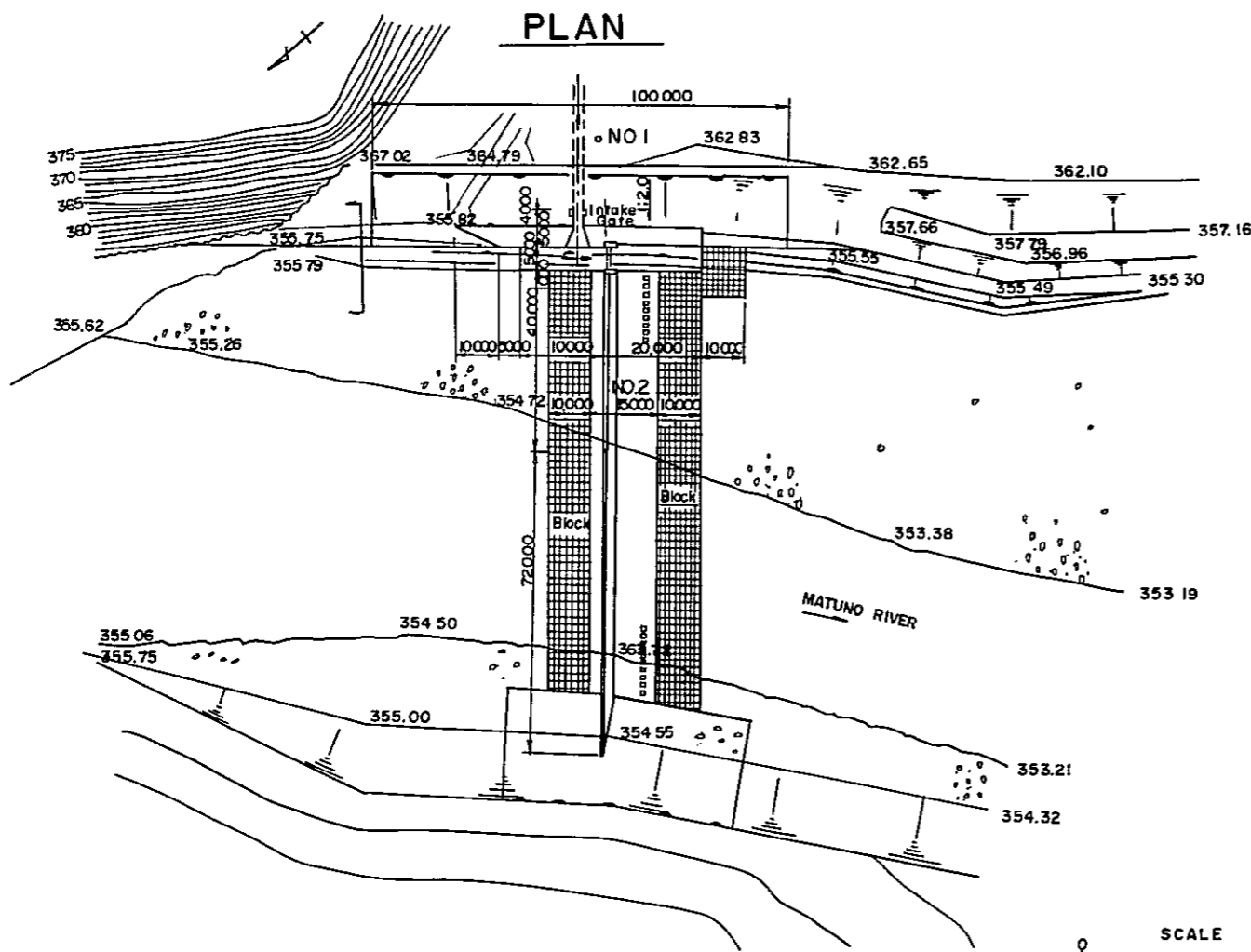
SECTION A-A
SCALE 1:200



SECTION B-B
SCALE 1:200

Republic of the Philippines NATIONAL IRRIGATION ADMINISTRATION MATUNO RIVER DEVELOPMENT PROJECT NUEVA VIZCAYA
LANOG DIVERSION DAM
JAPAN INTERNATIONAL COOPERATION AGENCY DWG. NO. I - 205 SHEET OF

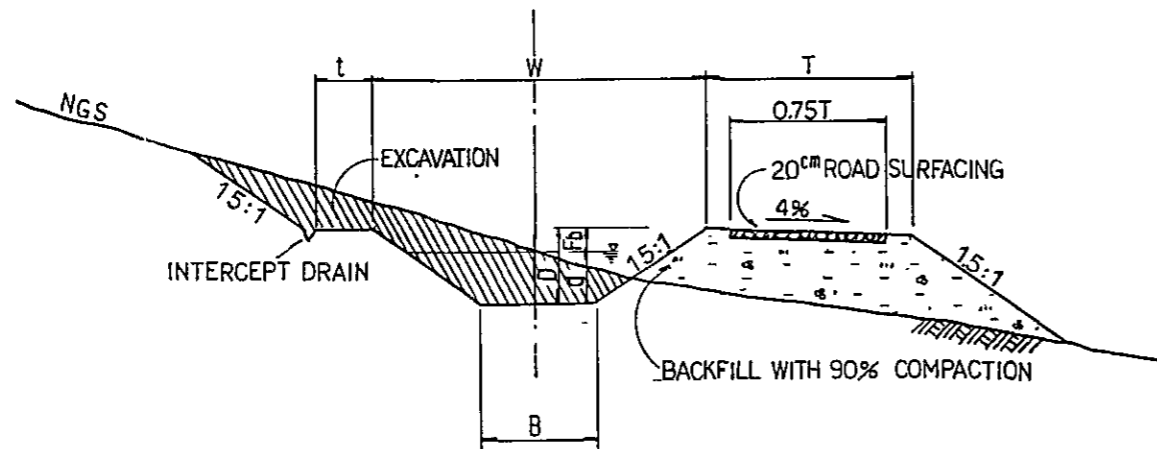
MANAMTAM INTAKE WEIR



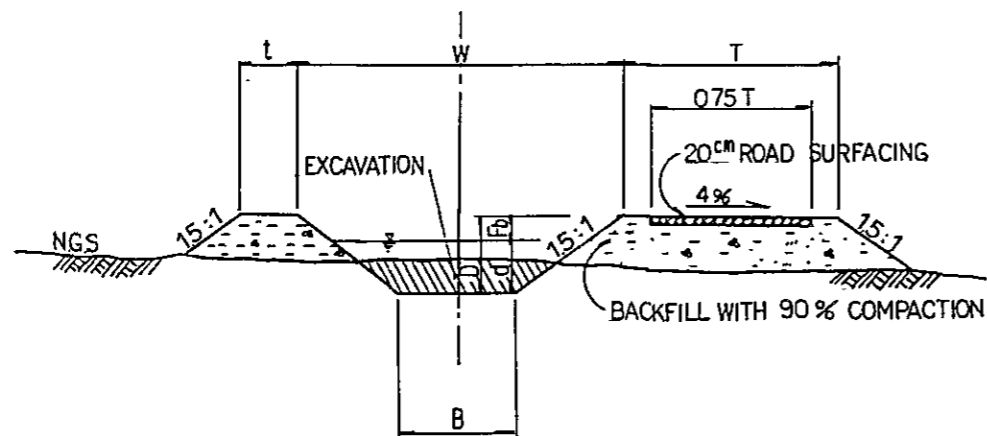
Republic of the Philippines NATIONAL IRRIGATION ADMINISTRATION MATUNO RIVER DEVELOPMENT PROJECT NUEVA VIZCAYA
MANAMTAM DIVERSION DAM
JAPAN INTERNATIONAL COOPERATION AGENCY DWG. NO. I - 206 SHEET OF

DIMENSION OF IRRIGATION CANAL

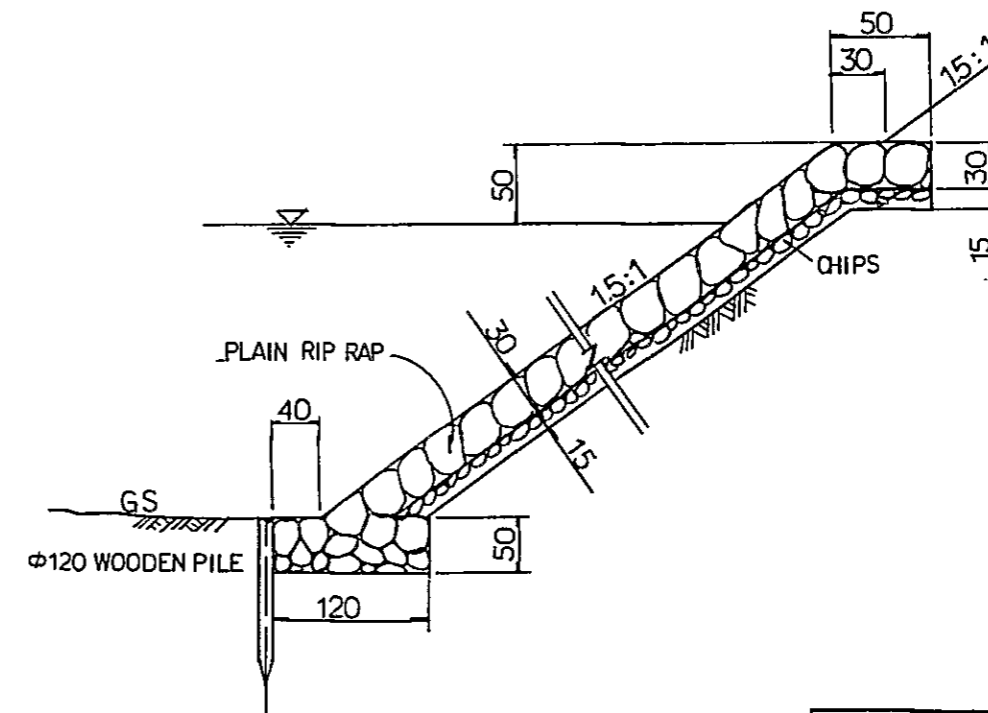
Name	Discharge	B/d	B	d	Fb	D	I	t	T
M-1	14.964	3.0	6.5	2.13	0.87	3.0	0.0002	4.0	6.0
M-2	12.576	3.0	6.0	2.0	0.80	2.8	0.0002	4.0	6.0
M-3	11.138	3.0	5.6	1.83	0.77	2.6	0.00025	4.0	6.0
M-4	4.032	2.5	3.3	1.33	0.57	1.9	0.00025	2.0	4.0
M-5	1.356	2.0	1.8	0.88	0.37	1.25	0.00033	1.5	4.0
C-1	6.440	2.5	4.0	1.57	0.63	2.2	0.00025	2.5	4.0
C-2	4.856	2.5	3.6	1.40	0.60	2.0	0.00025	2.0	4.0
C-3	3.304	2.0	2.5	1.24	0.51	1.75	0.00033	2.0	4.0
C-4	1.562	2.0	1.9	0.93	0.37	1.3	0.00033	1.5	4.0
LL-1	1.606	2.0	1.9	0.95	0.40	1.35	0.00033	1.5	4.0
LL-2	0.832	2.0	1.5	0.74	0.31	1.05	0.00033	1.0	4.0
LR-1	3.884	2.0	2.7	1.3	0.55	1.85	0.00033	2.0	4.0
LR-2	2.556	2.0	2.3	1.12	0.48	1.6	0.00033	1.5	4.0
LR-3	1.138	2.0	1.7	0.83	0.37	1.2	0.00033	1.5	4.0
S-1	2.180	2.0	2.2	1.05	0.45	1.5	0.00033	1.5	4.0
S-2	1.382	2.0	1.8	0.89	0.36	1.25	0.00033	1.5	4.0
S-3	0.422	2.0	1.2	0.57	0.23	0.8	0.00033	1.0	4.0



TYPICAL SECTION FOR INCLINED GROUND SURFACE

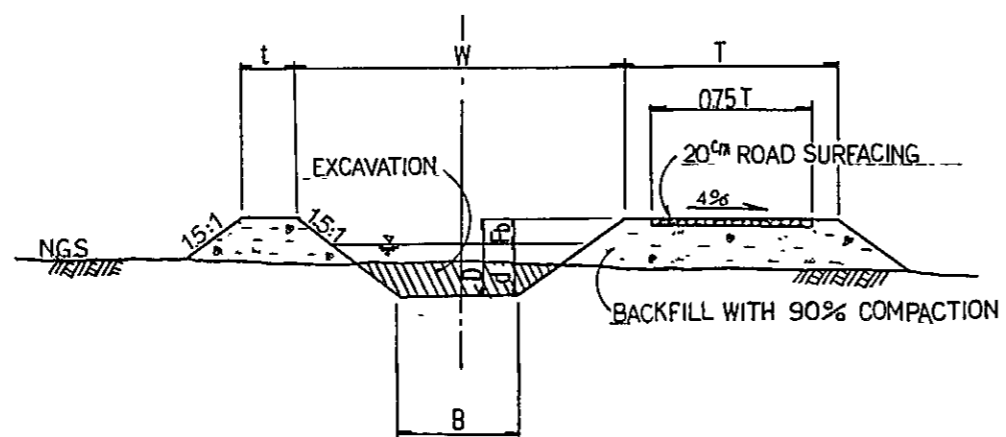


TYPICAL SECTION FOR FLAT GROUND SURFACE



GRAVEL PAVEMENT
(FOR CLOCOL MAIN CANAL)

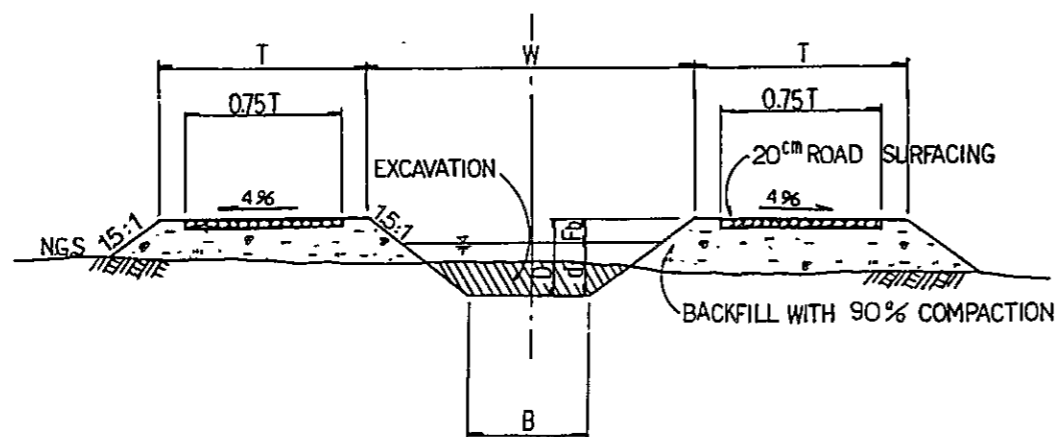
Republic of the Philippines	
NATIONAL IRRIGATION ADMINISTRATION	
MATUNO RIVER DEVELOPMENT PROJECT	
NUEVA VIZCAYA	
MAIN CANAL SECTION	
JAPAN INTERNATIONAL COOPERATION AGENCY	
DWG. NO. I - 301	SHEET OF



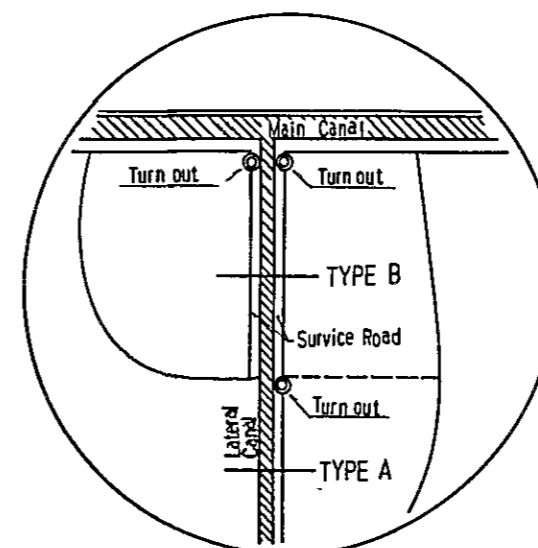
TYPICAL SECTION TYPE A

DIMENSION OF IRRIGATION CANAL

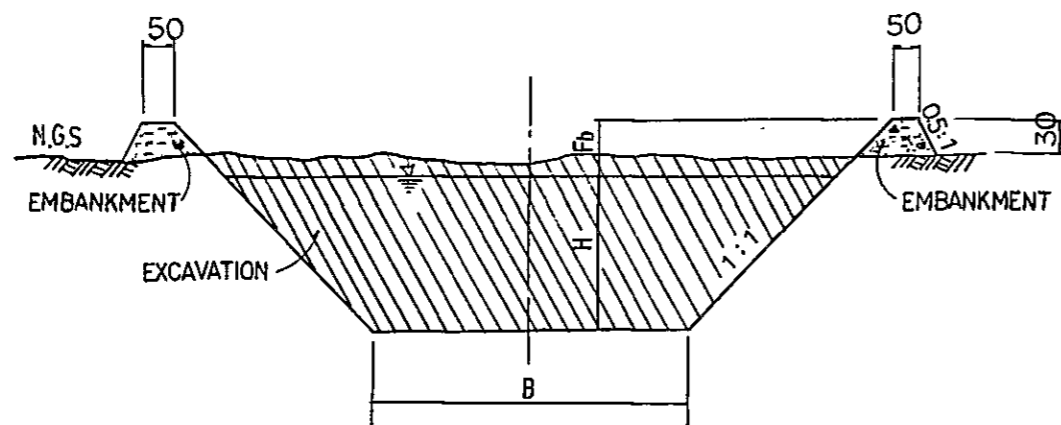
Type	B	D	I	t	T
A	1.5	1.2	0.00067	1.5	4.0
B	1.2	0.9	0.001	1.0	4.0
C	0.8	0.8	0.001	1.0	4.0
D	0.6	0.7	0.001	1.0	4.0



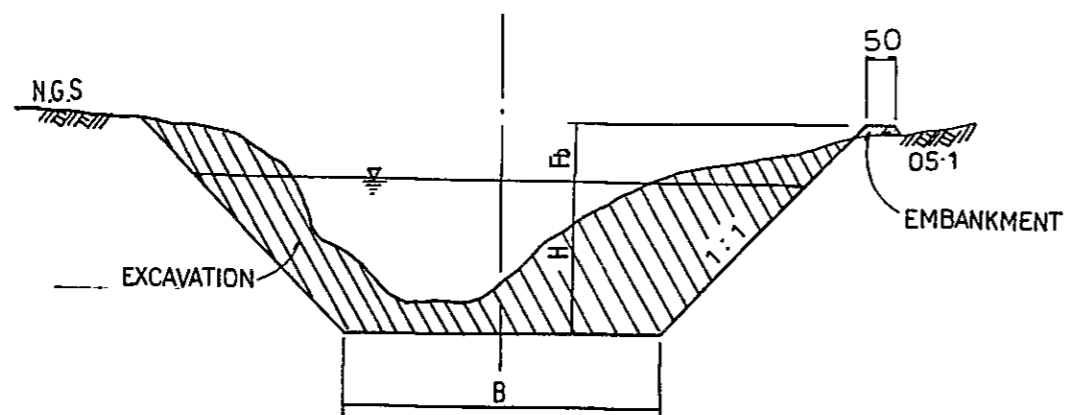
TYPICAL SECTION TYPE B



Republic of the Philippines NATIONAL IRRIGATION ADMINISTRATION
MATUNO RIVER DEVELOPMENT PROJECT NUEVA VIZCAYA
LATERAL CANAL SECTION
JAPAN INTERNATIONAL COOPERATION AGENCY
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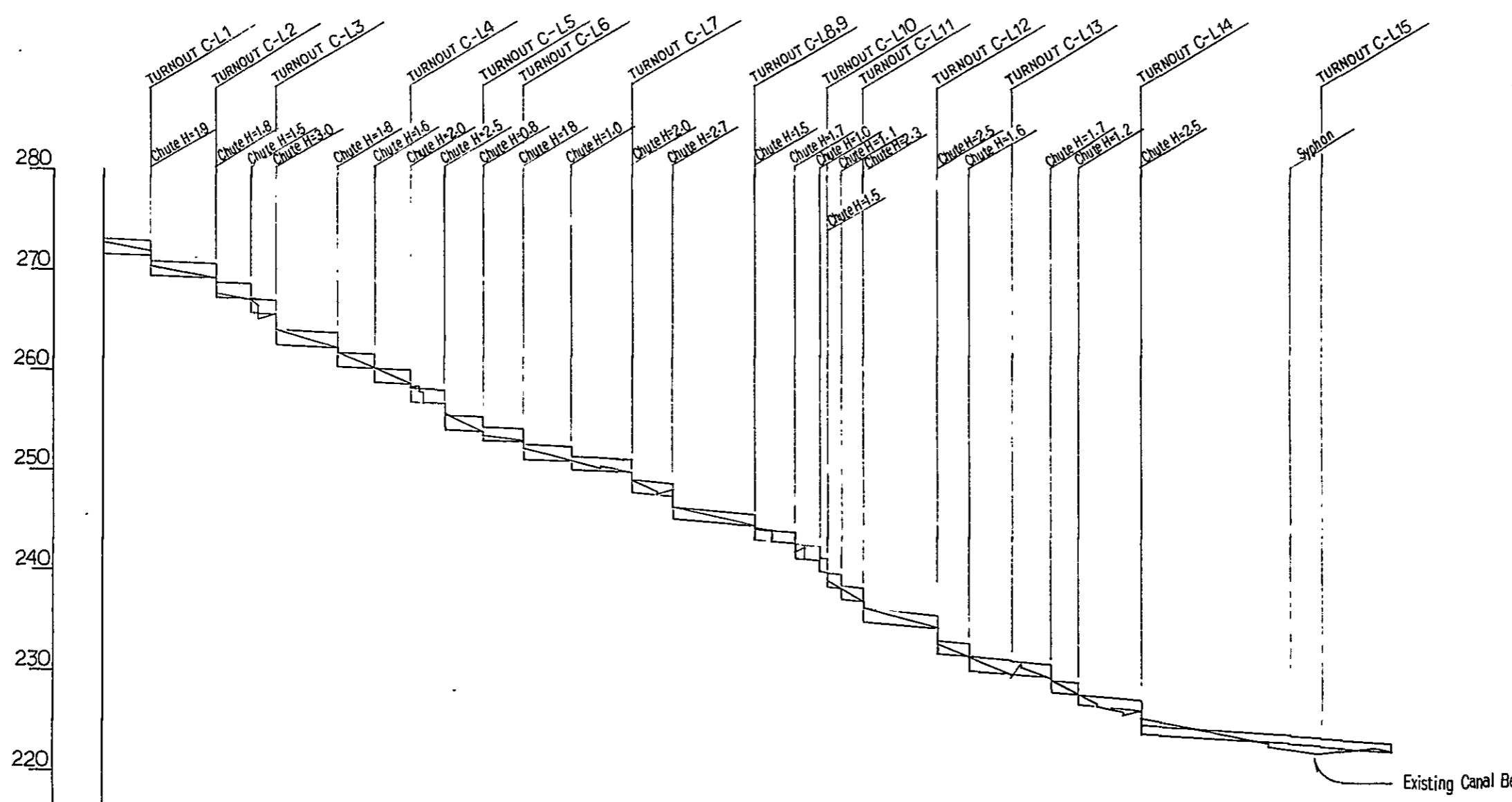
TYPICAL SECTION OF NEWLY CONSTRUCTED CANALS



TYPICAL SECTION OF IMPROVEMENT CANALS

DIMENSION OF DRAINAGE CANAL

Type	B (m)	H (m)	V (m/s)	I	Fb (m)
AA	8.0	3.0	1.1	0.00038	1.05
A	3.0	3.0	1.1	0.00060	1.05
B	2.1	2.5	1.0	0.00067	0.95
C	1.9	2.3	1.0	0.00075	0.90
D	1.5	1.8	1.0	0.0010	0.75
E	1.2	1.5	1.0	0.0013	0.60
F	1.1	1.3	1.0	0.0016	0.55
G	0.8	1.0	1.0	0.0023	0.40
H	0.7	0.8	1.0	0.0030	0.35

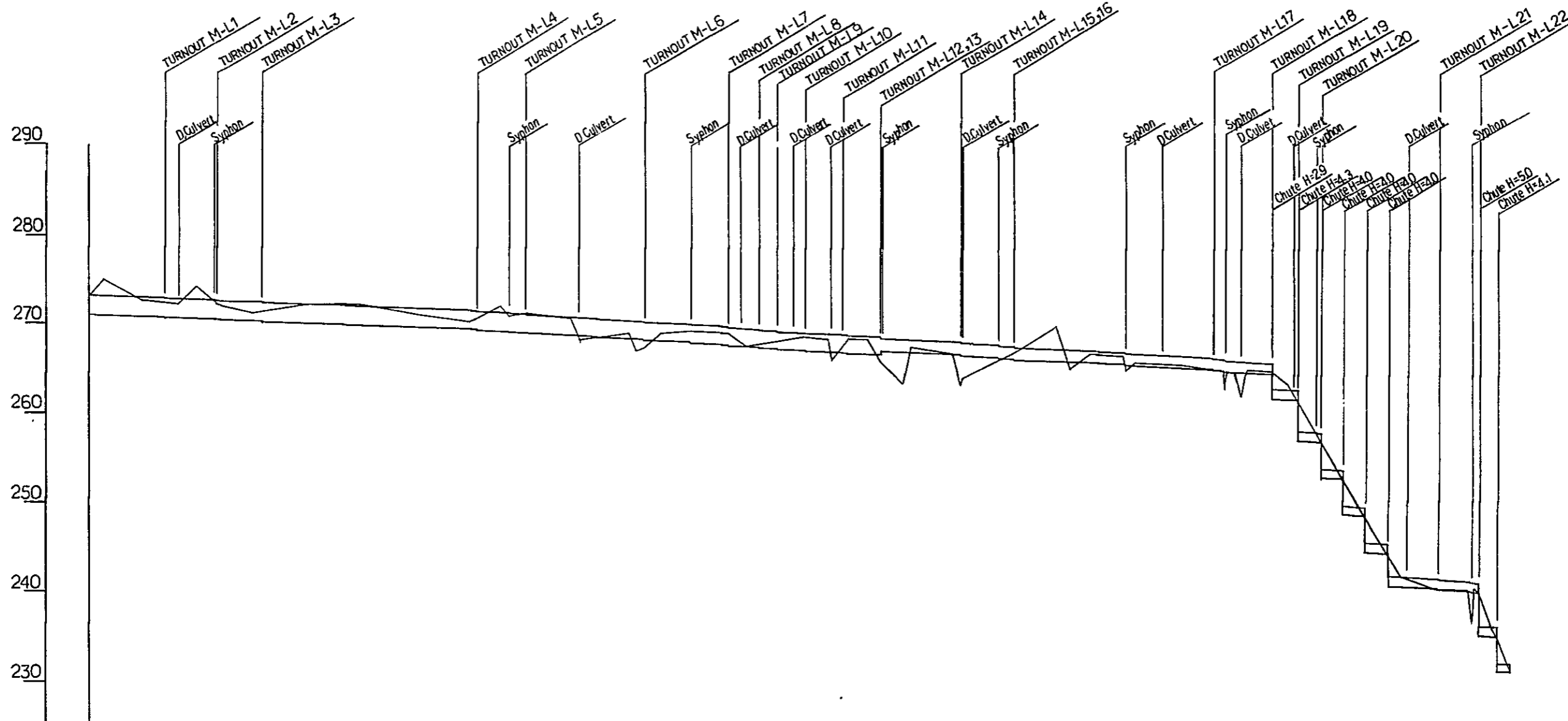


STA	DIST	LENG	NGS	CBEL	HVEL	SLOPE
BP	0.0	0.0	272.7	271.4	273.0	0.00025
N00	790	790	2712	2712	2726	0.00025
N01	1040	1830	2690	2690	2706	
N02	1020	2850	2676	2672	2688	
N05	2200	5050	2586	2581	2600	
N06	1160	6210	2536	2538	2552	0.00033
N06	680	6890	2534	2530	2544	
N06	680	6890	2529	2529	2543	
N06	680	6890	2521	2511	2525	
N06	1760	8650	2486	2489	2510	0.00033
N07	2000	10650	2443	2443	2455	
N07	2000	10650	2440	2428	2440	
N07	2000	10650	2443	2428	2440	
N011	1245	11895	2397	2397	2409	0.00033
N012	610	12505	2369	2369	2381	
N013	1240	13745	2342	2342	2354	
N013	1240	13745	2326	2317	2329	
N014	1155	14900	2297	2297	2309	0.00033
N016	1155	16055	2275	2275	2287	
N017	1000	17055	2260	2260	2269	
N019	2445	18500	2222	2227	2236	
N020	500	20000	2218	2225	2235	0.00033
N020	500	20000	2218	2224	2233	
EP	1100	21100	2220	2220	2229	

Republic of the Philippines
 NATIONAL IRRIGATION ADMINISTRATION
 MATUNO RIVER DEVELOPMENT PROJECT
 NUEVA VIZCAYA

**PROFILE OF
 COLOCOL MAIN CANAL**

JAPAN INTERNATIONAL COOPERATION AGENCY
 DWG. NO. I - 304 SHEET OF

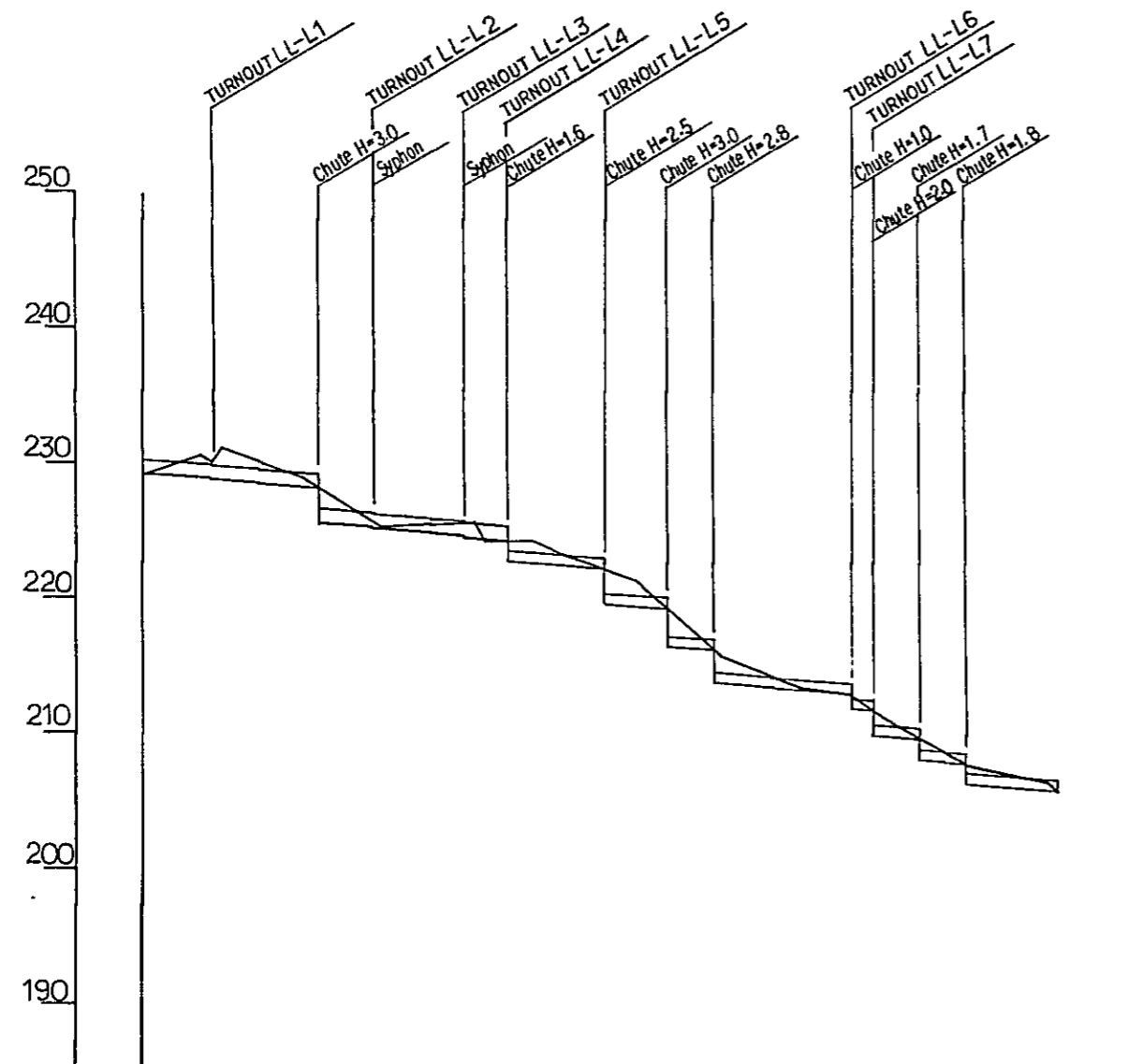


STA	DIST	LENG	NGS	CBEL	HWEL	SLOPE
B.P.	0.0	0.0	2730	2709	2730	0.0002
N01 +400	1400	1400	2720	2705	2727	0.0002
N02 +350	950	1610	2720	2704	2725	
N03 +150	800	2350	2720	2703	2725	
N07 +100	3950	7100	2705	2693	2713	0.00025
N08	900	7700	2712	2689	2708	
N010 +150	2150	9000	2680	2684	2702	
N011 +700	1550	10560	2680	2681	2700	0.00025
N012 +600	550	11700	2686	2676	2687	
N013 +600	700	11920	2670	2677	2699	
N014 +500	700	12250	2680	2676	2695	
N015 +900	1400	12600	2684	2675	2694	
N016 +900	1000	12900	2684	2674	2693	
N020 +300	3400	13100	2685	2672	2691	
N021 +650	1350	13600	2670	2670	2689	
N022 +150	500	14500	2658	2667	2686	
N023 +600	500	15900	2670	2669	2683	
N024 +750	2600	16500	2640	2667	2675	0.00033
N025 +550	800	16990	2646	2657	2670	
E.P.	500	16980	2659	2657	2665	
		20300	2650	2652	2665	
		20850	2620	2651	2664	
		21110	2612	2649	2662	
		21650	2649	2647	2660	
		22100	2615	2615	2658	
		22500	2570	2570	2656	
		22800	2570	2570	2653	
		24180	2402	2402	2641	
		24750	2402	2401	2640	
		25350	2350	2400	2639	
		25500	2350	2399	2636	
		26000	2307	2307	2616	

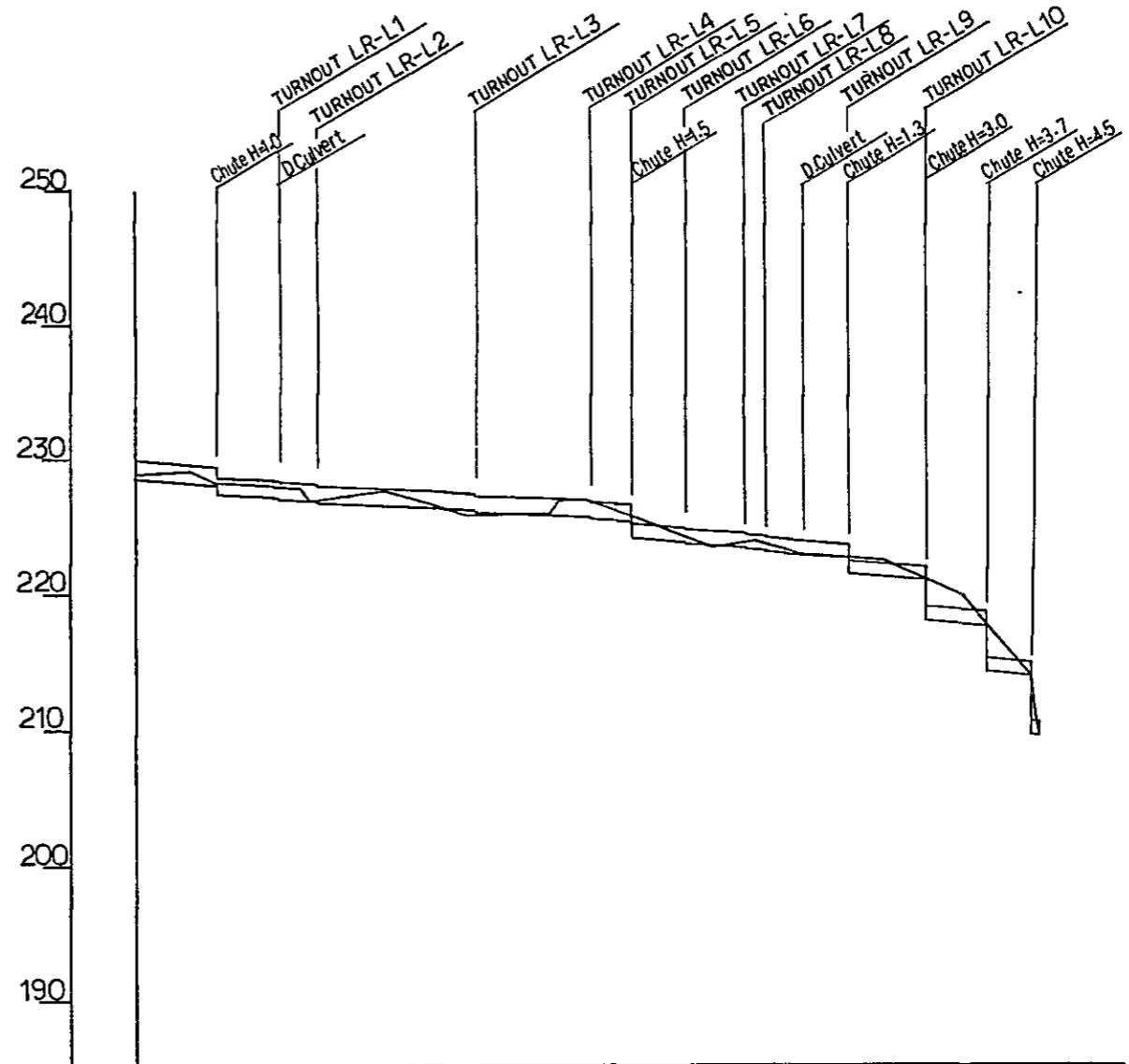
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 MATUNO RIVER DEVELOPMENT PROJECT
 NUEVA VIZCAYA

**PROFILE OF
 MOUNTAIN SIDE MAIN CANAL**

JAPAN INTERNATIONAL COOPERATION AGENCY
 DWG. NO. I - 305 SHEET OF

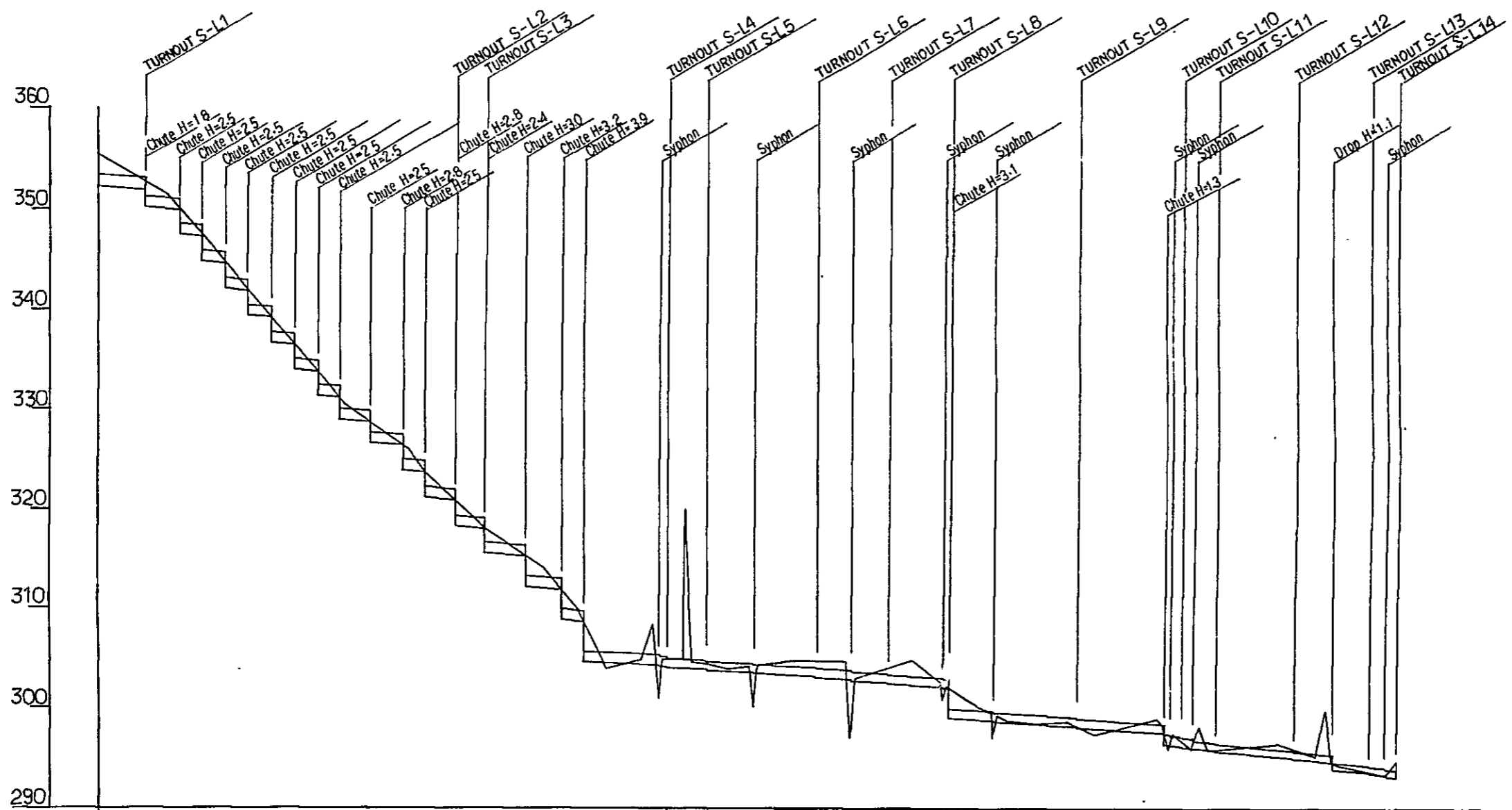


STA	DIST	LENG	NGS	CBEL	HWEL	SLOPE
BP	0.0	0.0	2290	2291	2300	0.00033
NO 0 +850	850	850	2300	2289 2287	2287 2286	
NO 2 +600	1950	2500	2256	2250 2248	2259 2257	
NO 3 +300	1100	3900	2255	2244 2242	2253 2251	
NO 4 +400	500	4400	2240	2240 2224	2249 2231	
NO 5 +600	1200	5600	2220	2220 2195	2227 2202	
NO 8 +600	3000	8600	2127	2127 2116	2134 2123	
+650	250	8850	2115	2096	2105	
EP	2250	11100	2054	2054	2061	0.00033



STA	DIST	LENG	NGS	CBEL	HWEL	SLOPE
BP	0.0	0.0	2290	2287	2300	0.00033
NO 1 +750	1750	1750	2280	2271 2270	2284 2283	
NO 2 +200	450	2200	2270	2269 2268	2282 2279	
NO 4 +100	1900	4100	2259	2251 2260	2272 2271	
NO 5 +500	1400	5500	2269	2256 2255	2267 2266	
NO 6 +600	500	6000	2260	2254 2259	2265 2247	
NO 6 +650	650	6650	2243	2237 2236	2245 2244	
NO 7 +600	700	7350	2239	2233 2232	2241 2240	
NO 7 +500	250	7600	2239	2231	2239	
NO 8 +500	450	8050	2228	2228 2215	2236 2223	
NO 8 +600	550	8600	2212	2182	2220	
NO 9 +550	950	9550	2212	2162	2190	
EP	1350	10900	2095	2095	2103	0.00033

Republic of the Philippines
 NATIONAL IRRIGATION ADMINISTRATION
 MATUNO RIVER DEVELOPMENT PROJECT
 NUEVA VIZCAYA
**PROFILE OF
 LANOG MAIN CANAL**
 JAPAN INTERNATIONAL COOPERATION AGENCY
 DWG. NO. I - 306 SHEET OF

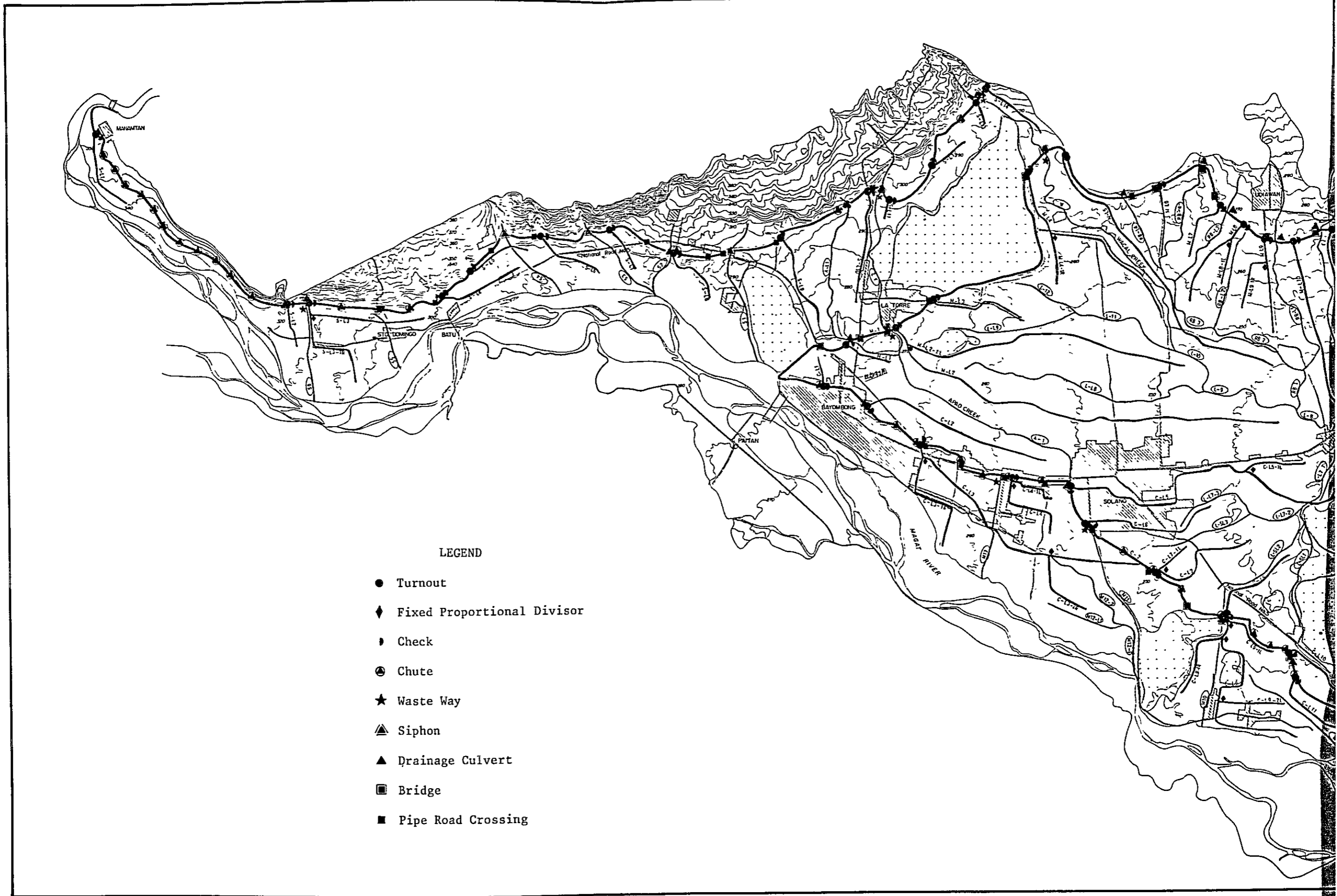


STA	BP	N00 +00	N01 +100	N02 +250	N03 +500	N04 +650	N05 +700	N06 +750	N07 +800	N08 +850	N09 +900	N10 +950	N11 +1000	N12 +1050	N13 +1100	N14 +1150	N15 +1200	N16 +1250	N17 +1300	N18 +1350	N19 +1400	N20 E.P.
DIST	0.0	700	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
LENG	0.0	700	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
INGS	3555	3530	3180	3160	3050	3045	3040	3035	3030	3025	3020	3015	3010	3005	2995	2985	2980	2975	2970	2965	2960	2955
CBEL	3525	3523	3182	3180	3155	3045	3044	3043	3042	3041	3040	3039	3038	3037	3036	3035	3034	3033	3032	3031	3030	3029
HVEL	3535	3533	3192	3190	3166	3056	3054	3052	3050	3049	3048	3047	3046	3045	3044	3043	3042	3041	3040	3039	3038	3037
SCOPE		0.00033										0.00033										

Republic of the Philippines
 NATIONAL IRRIGATION ADMINISTRATION
 MATUNO RIVER DEVELOPMENT PROJECT
 NUEVA VIZCAYA

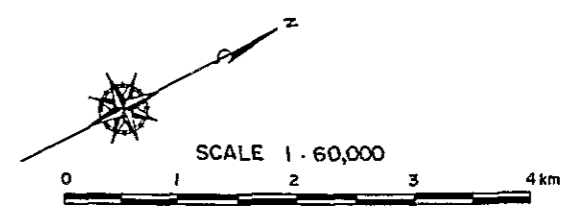
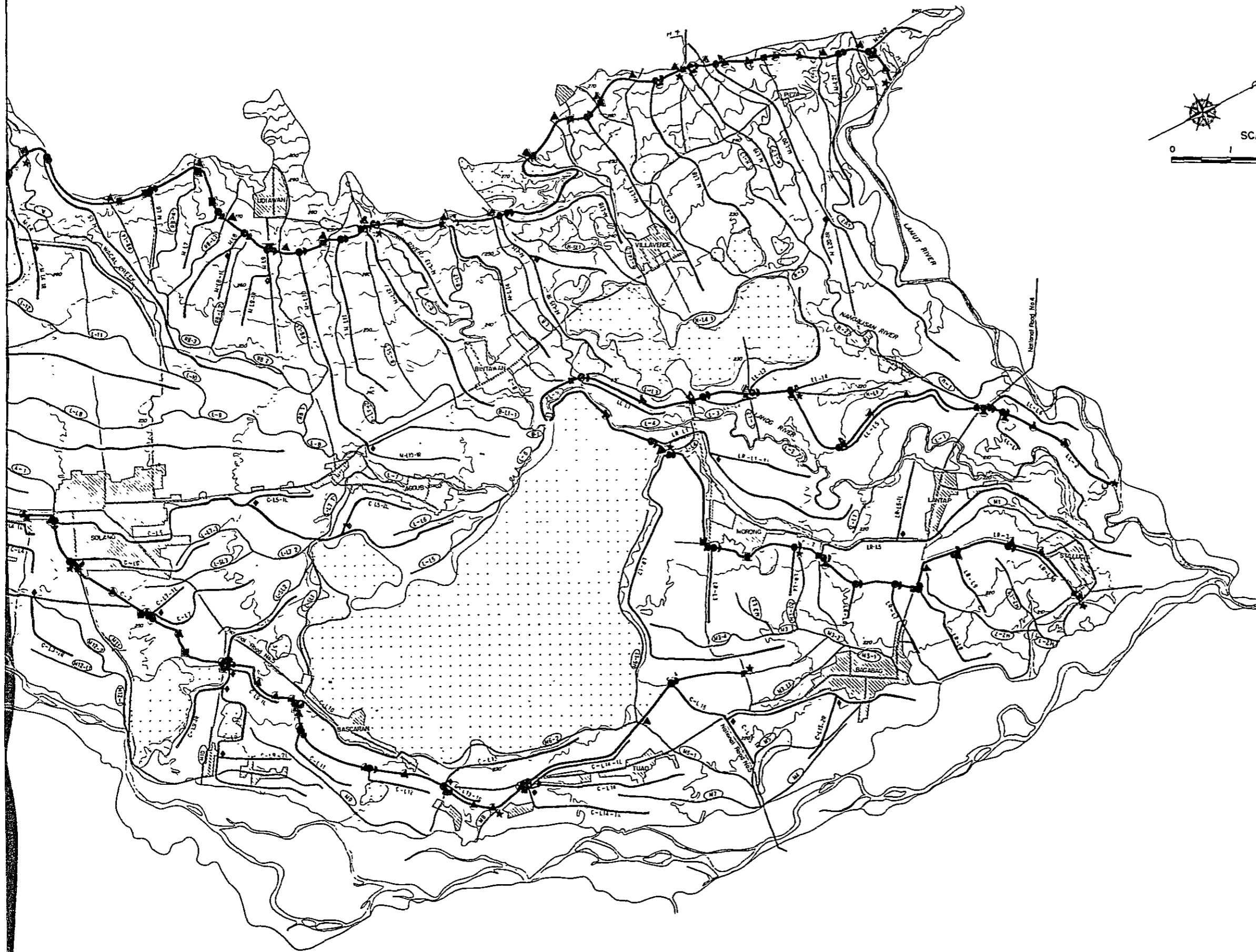
**PROFILE OF
 STO. DOMINGO MAIN CANAL**

JAPAN INTERNATIONAL COOPERATION AGENCY
 DWG. NO. I - 307 | SHEET OF

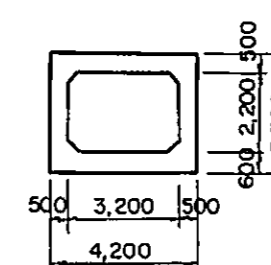
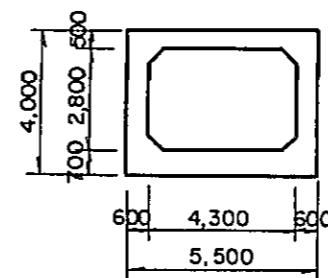
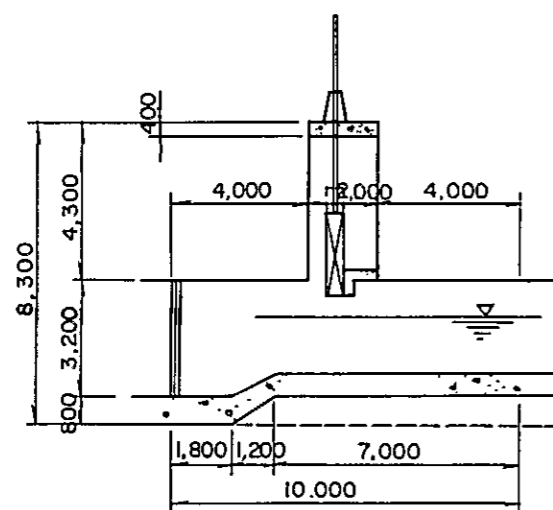
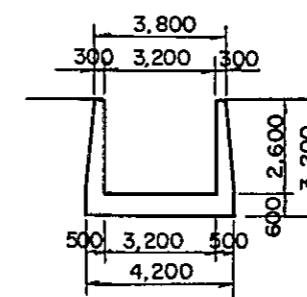
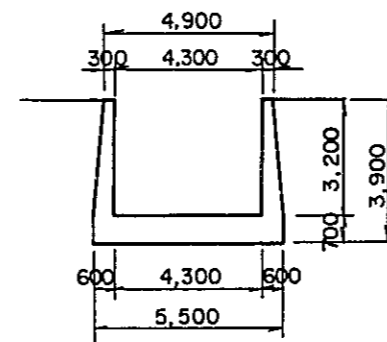
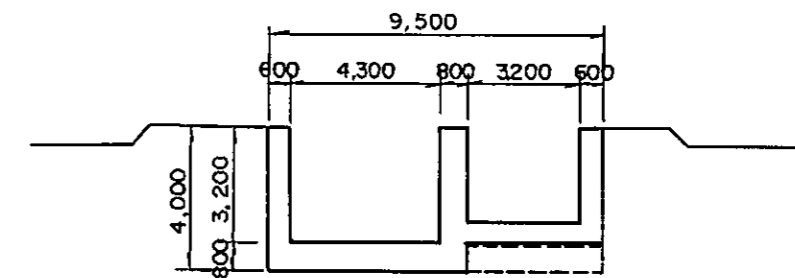
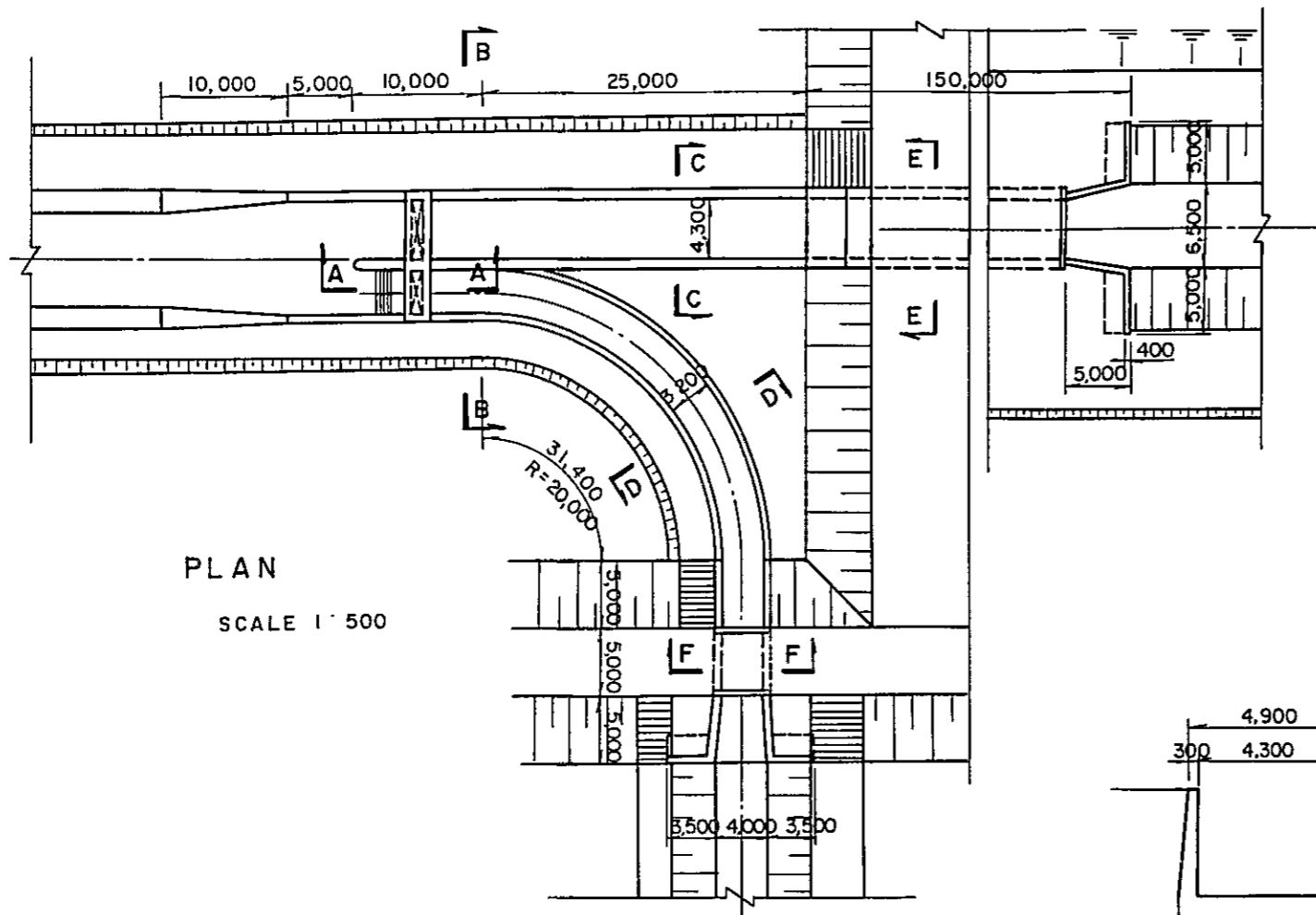


LEGEND

- Turnout
- ◆ Fixed Proportional Divisor
- ♣ Check
- ⊙ Chute
- ★ Waste Way
- ▲ Siphon
- ▲ Drainage Culvert
- Bridge
- Pipe Road Crossing

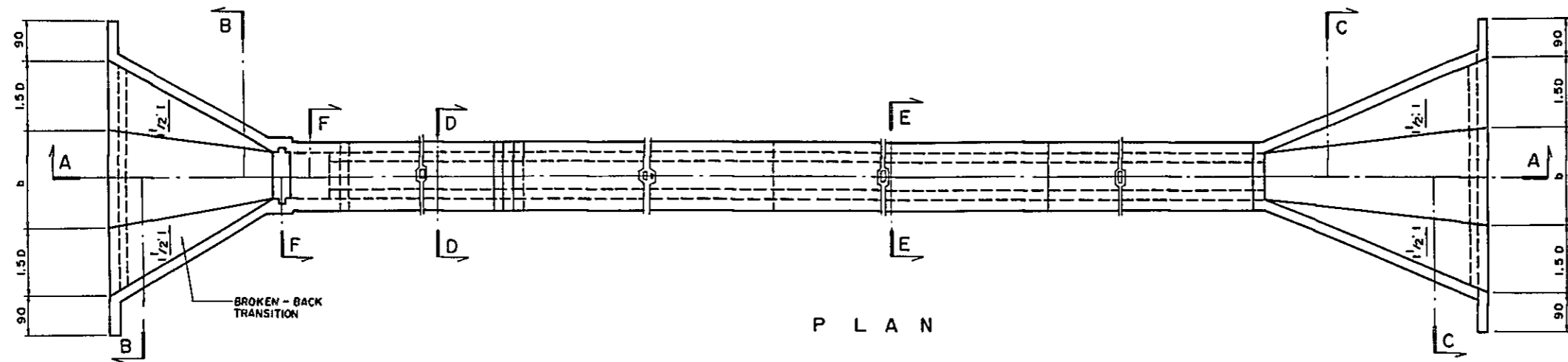


Republic of the Philippines NATIONAL IRRIGATION ADMINISTRATION MATUNO RIVER DEVELOPMENT PROJECT NUEVA VIZCAYA
LOCATION MAP OF CANAL RELATED STRUCTURES
JAPAN INTERNATIONAL COOPERATION AGENCY DWG. NO. I - 401 SHEET OF



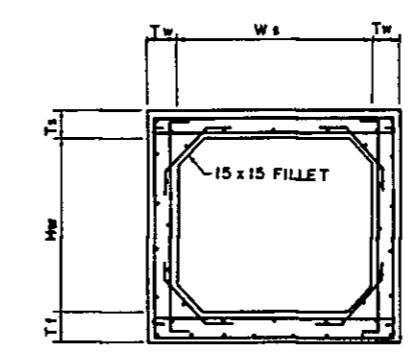
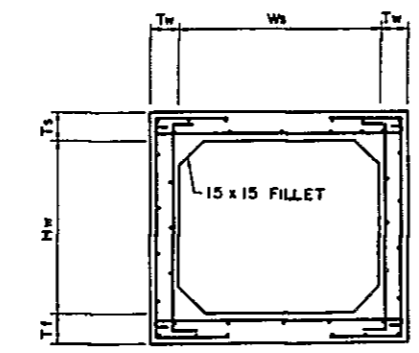
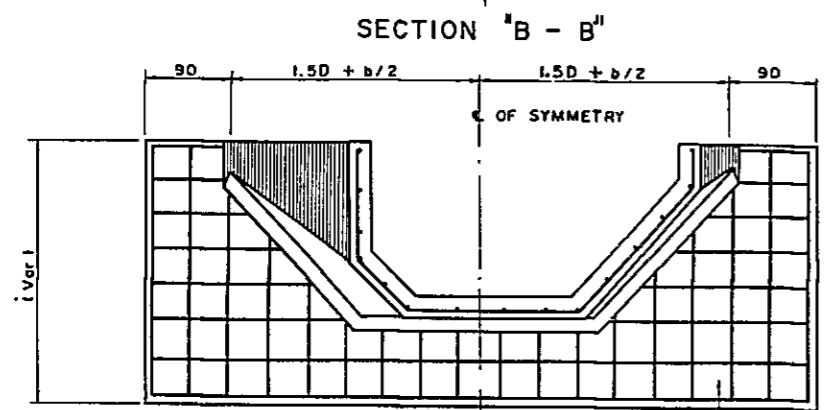
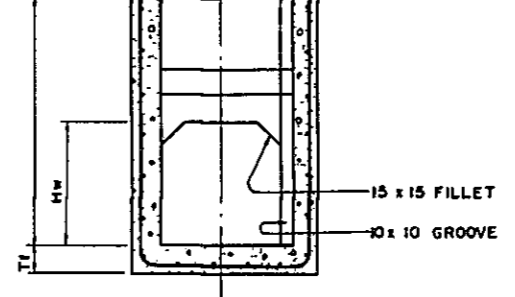
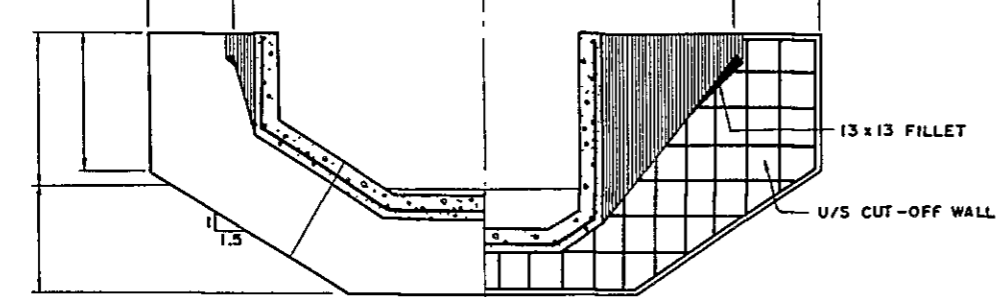
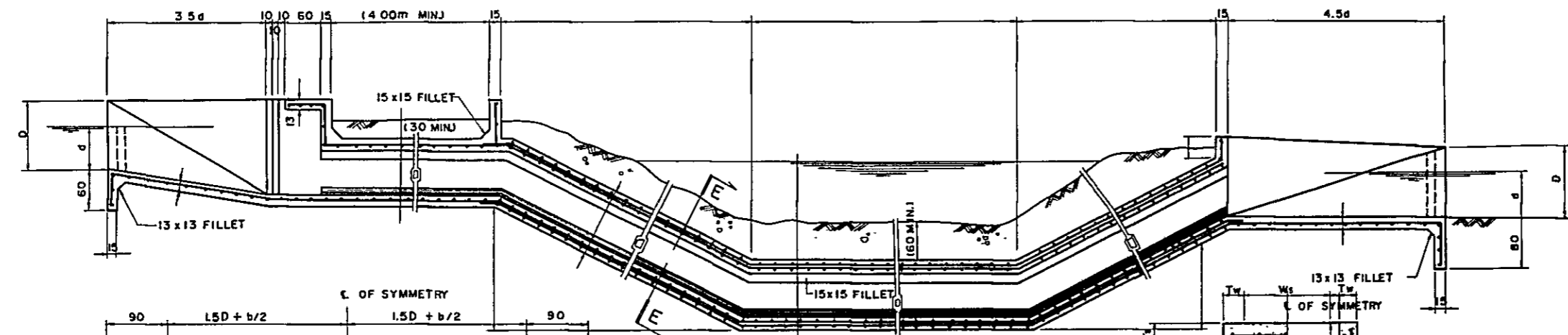
SCALE 1:200

Republic of the Philippines	
NATIONAL IRRIGATION ADMINISTRATION	
MATUNO RIVER DEVELOPMENT PROJECT	
NUEVA VIZCAYA	
COLOCOL - MOUNTAIN SIDE	
MAIN CANAL DIVISOR	
JAPAN INTERNATIONAL COOPERATION AGENCY	
DWG. NO. I - 402	SHEET OF



DIMENSION

elem	type	B	D
b (m)			
d (m)	Depend on		
D (m)	Candis		
Ws (m)		3.0	1.8
Hw (m)		2.0	1.2
ts (m)		0.30	0.30
tf (m)		0.35	0.35
tw (m)		0.30	0.30



SECTION "B - B"

SECTION "A - A"

SECTION "F - F"

SECTION "C - C"

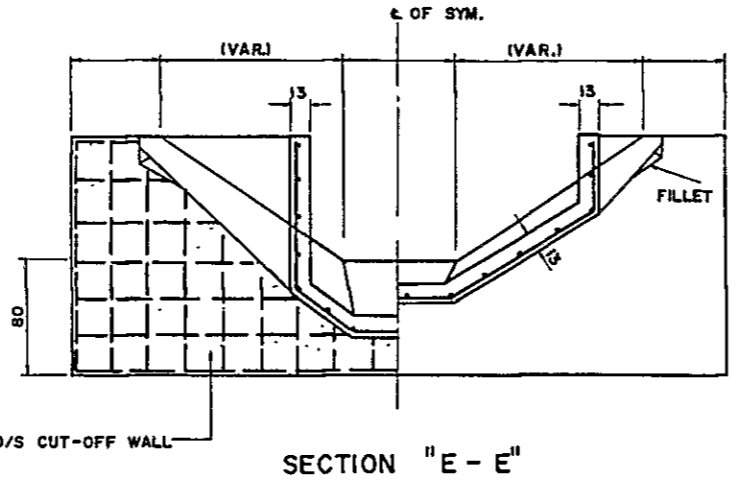
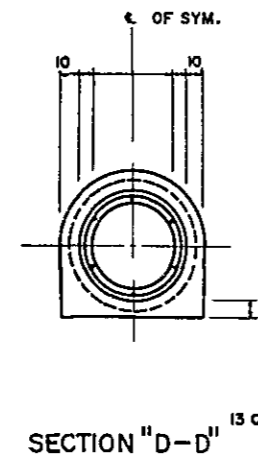
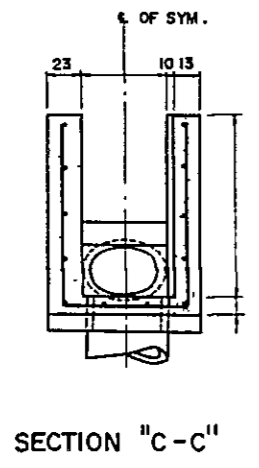
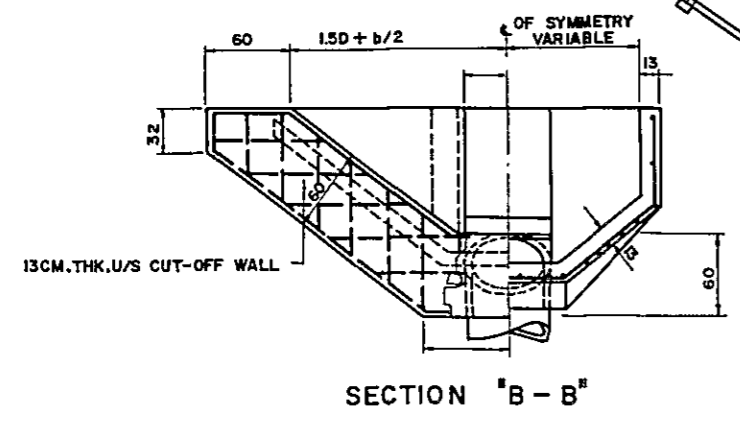
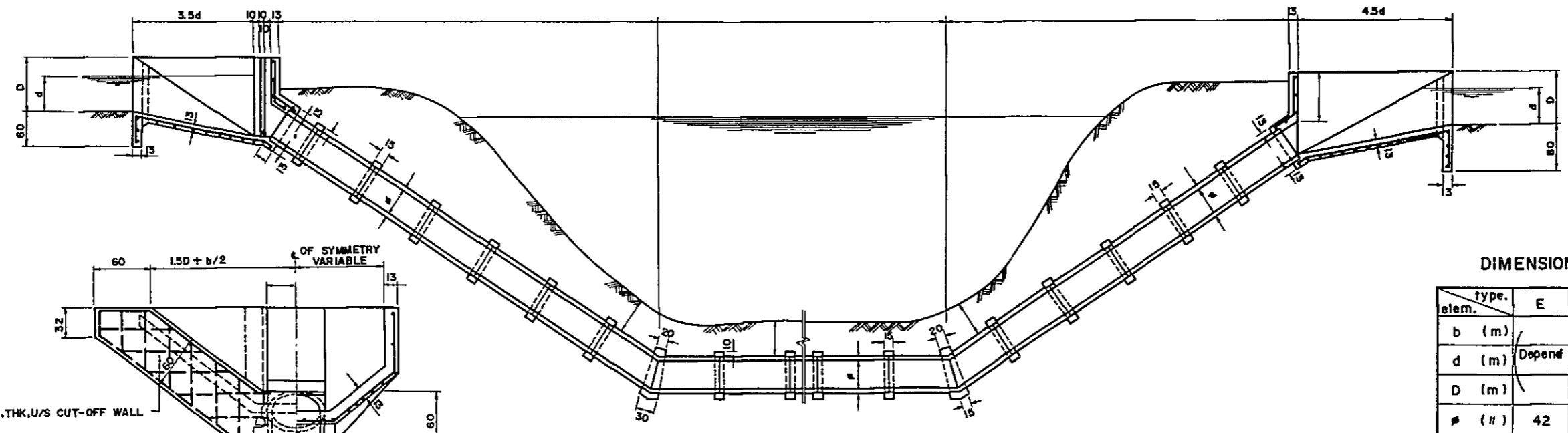
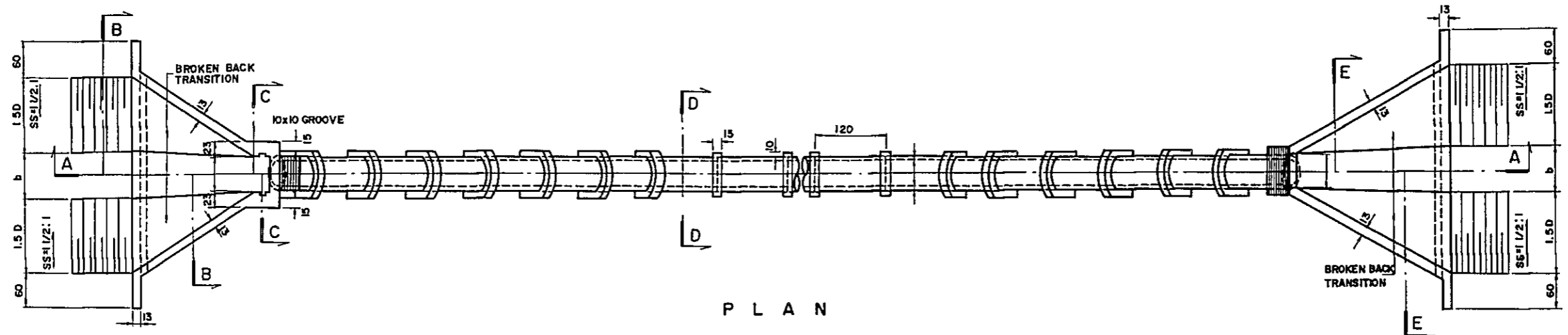
SECTION "D - D"

SECTION "E - E"

Republic of the Philippines
 NATIONAL IRRIGATION ADMINISTRATION
 MATUNO RIVER DEVELOPMENT PROJECT
 NUEVA VIZCAYA

INVERTED BOX SIPHON

 JAPAN INTERNATIONAL COOPERATION AGENCY
 DWG. NO. I - 403 | SHEET OF



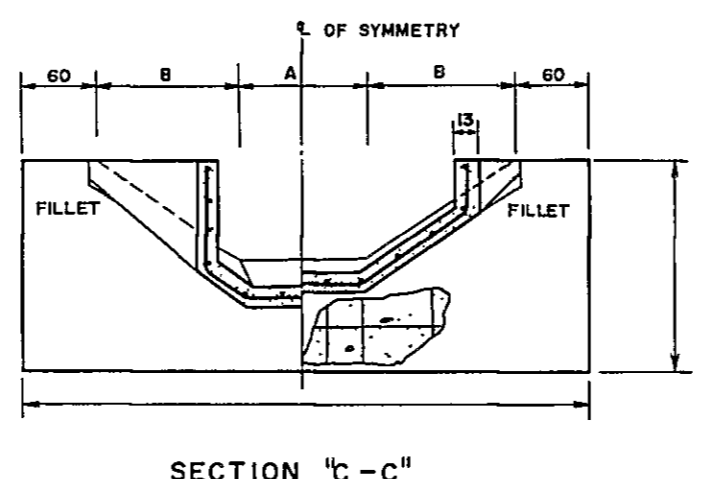
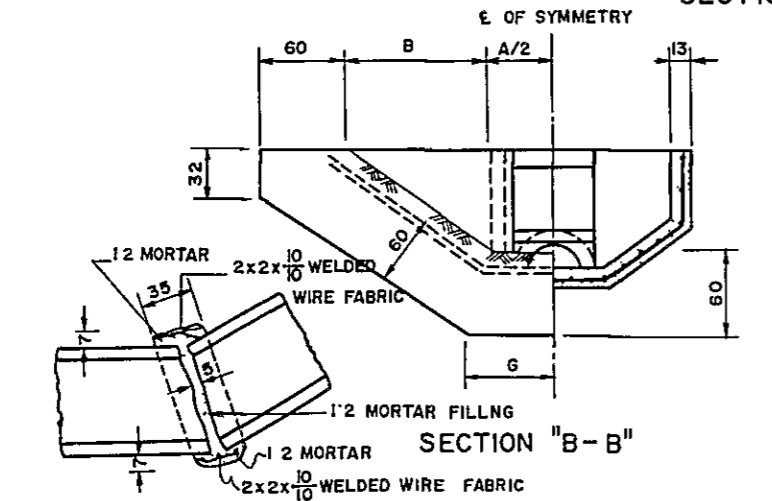
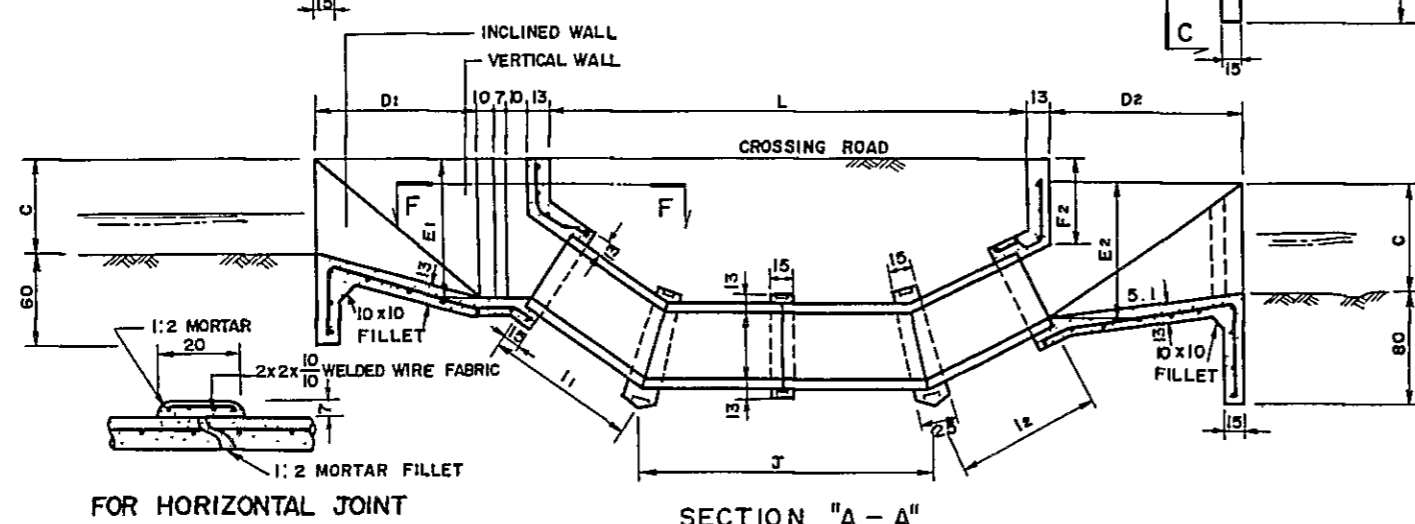
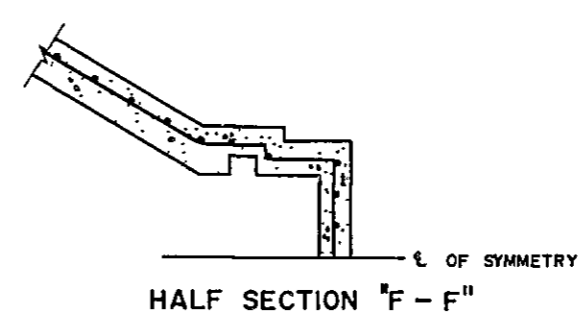
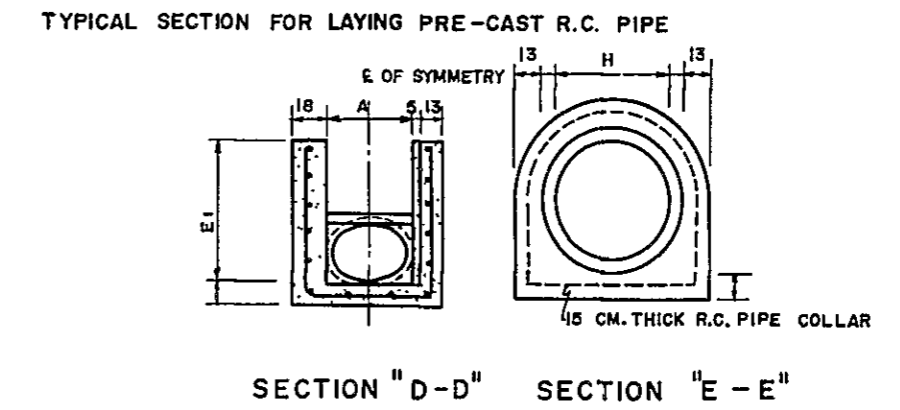
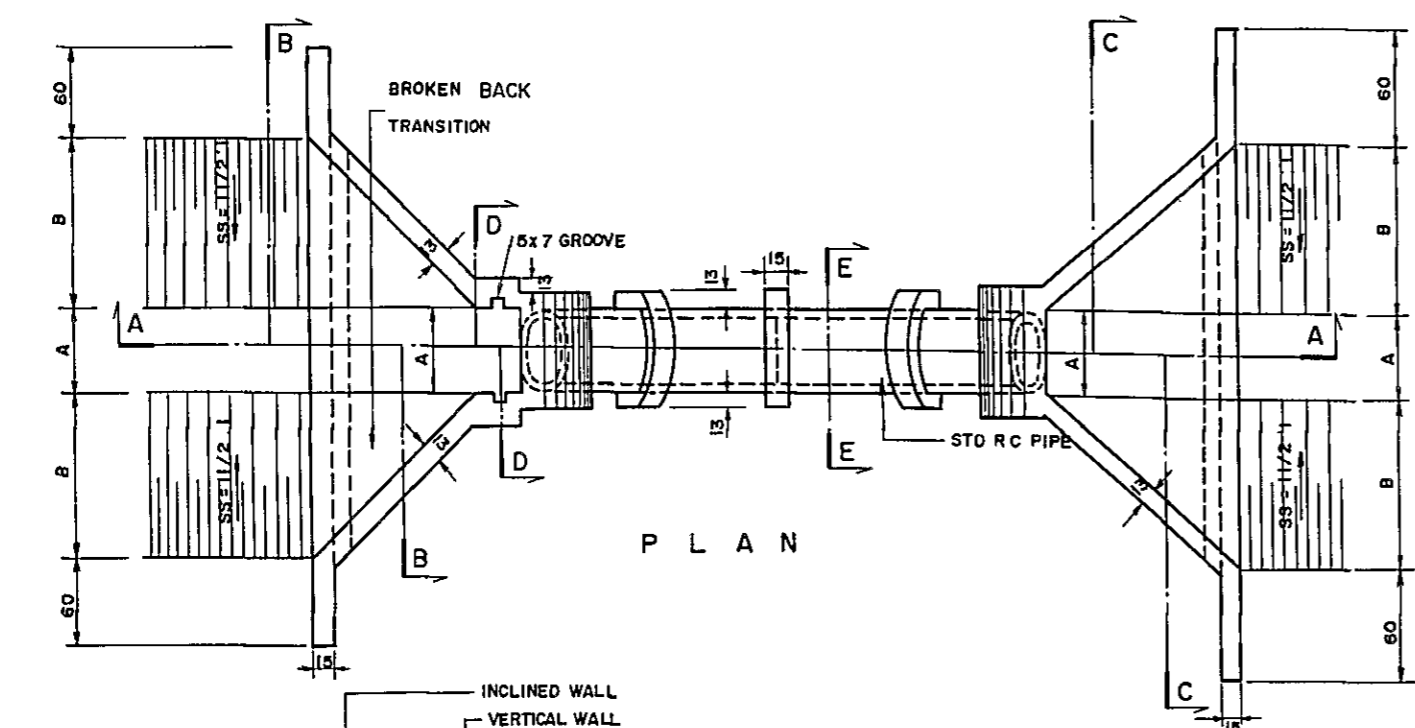
DIMENSION

type. elem.	E	F
b (m)	(Depend on Canals)	(Depend on Canals)
d (m)		
D (m)		
φ (")	42	30

Republic of the Philippines
 NATIONAL IRRIGATION ADMINISTRATION
 MATUNO RIVER DEVELOPMENT PROJECT
 NUEVA VIZCAYA

INVERTED PIPE SIPHON

JAPAN INTERNATIONAL COOPERATION AGENCY
 DWG. NO. I - 404 SHEET OF



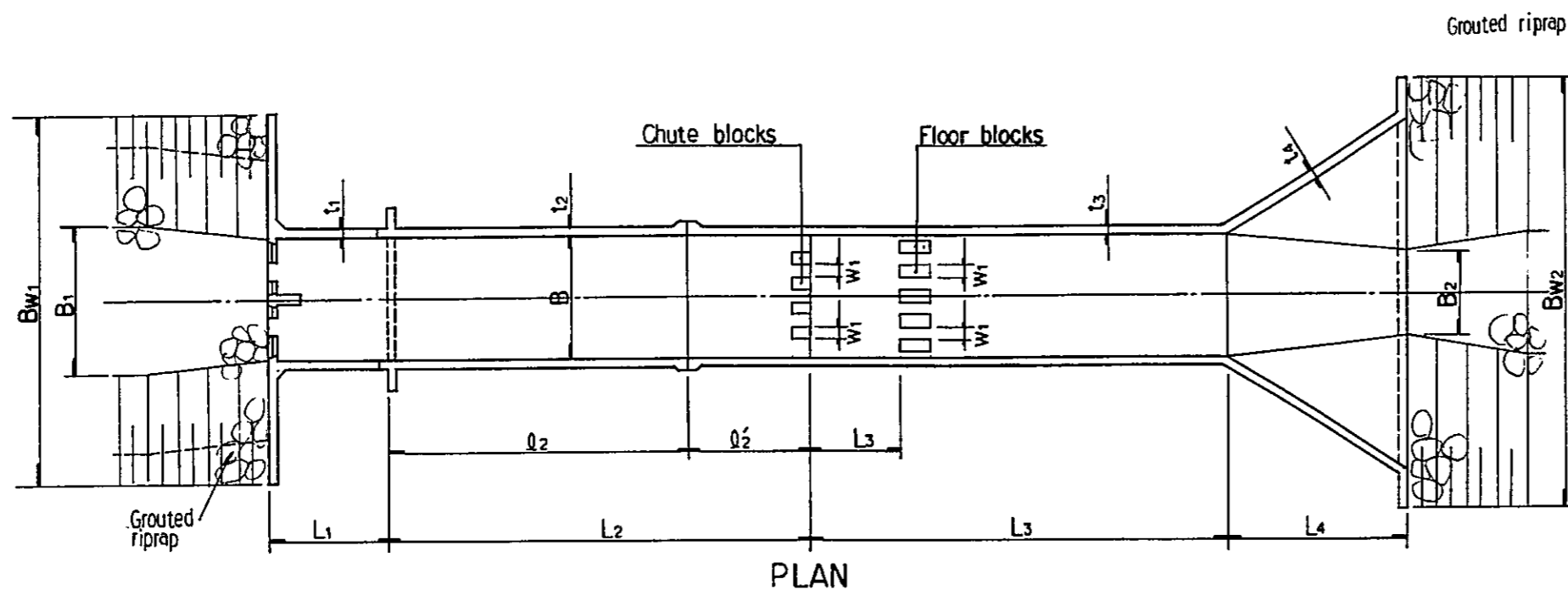
DIMENSION

elem	tyoe	E	F
A	(m)	1.5	1.0
B	(m)	1.8	1.2
C	(m)	1.2	0.8
D1	(m)	2.7	1.8
D2	(m)	3.0	2.0
E1	(m)	1.65	1.1
E2	(m)	1.7	1.15
F1	(m)	0.40	0.25
F2	(m)	0.50	0.35
G	(m)	0.93	0.62
H	(ϕ)	42	3.0
I1	(m)	2.0	2.0
I2	(m)	2.0	2.0
J	(m)	1.71	1.71
L	(m)	5.0	5.0

Republic of the Philippines
 NATIONAL IRRIGATION ADMINISTRATION
 MATUNO RIVER DEVELOPMENT PROJECT
 NUEVA VIZCAYA

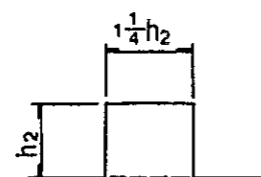
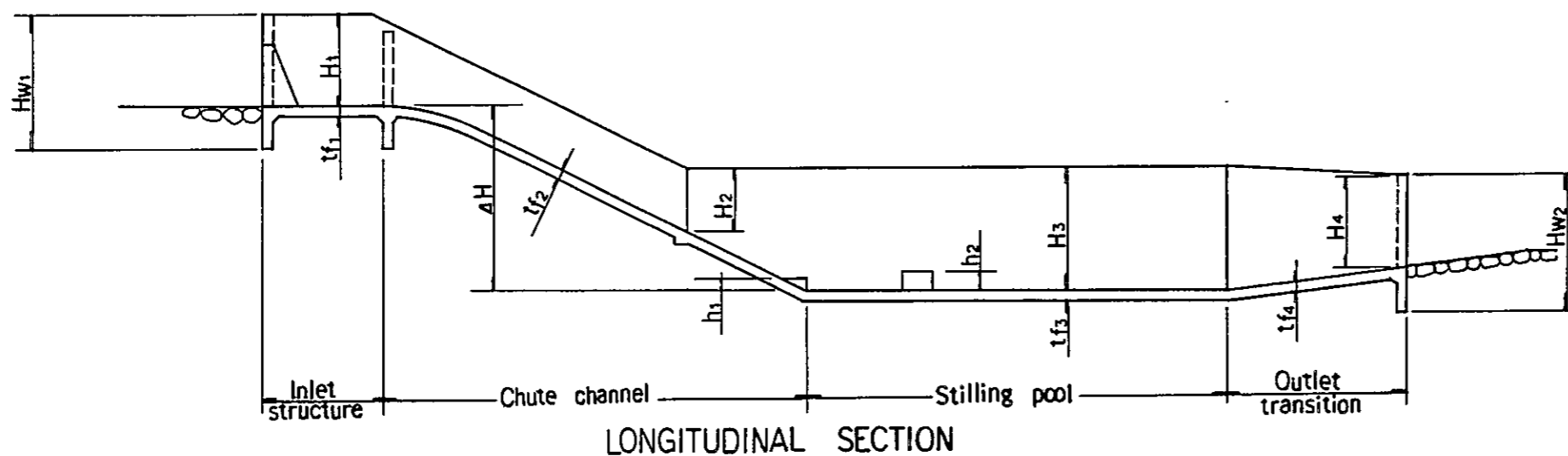
PIPE ROAD CROSSING

JAPAN INTERNATIONAL COOPERATION AGENCY
 DWG. NO. I - 405 SHEET OF



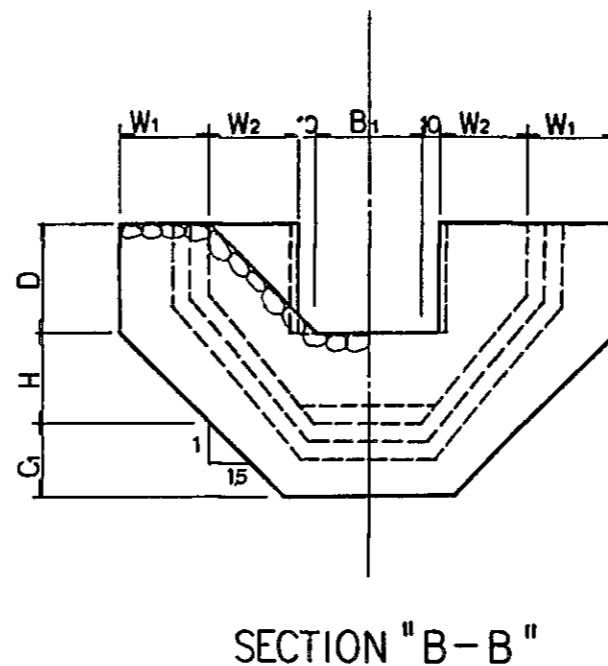
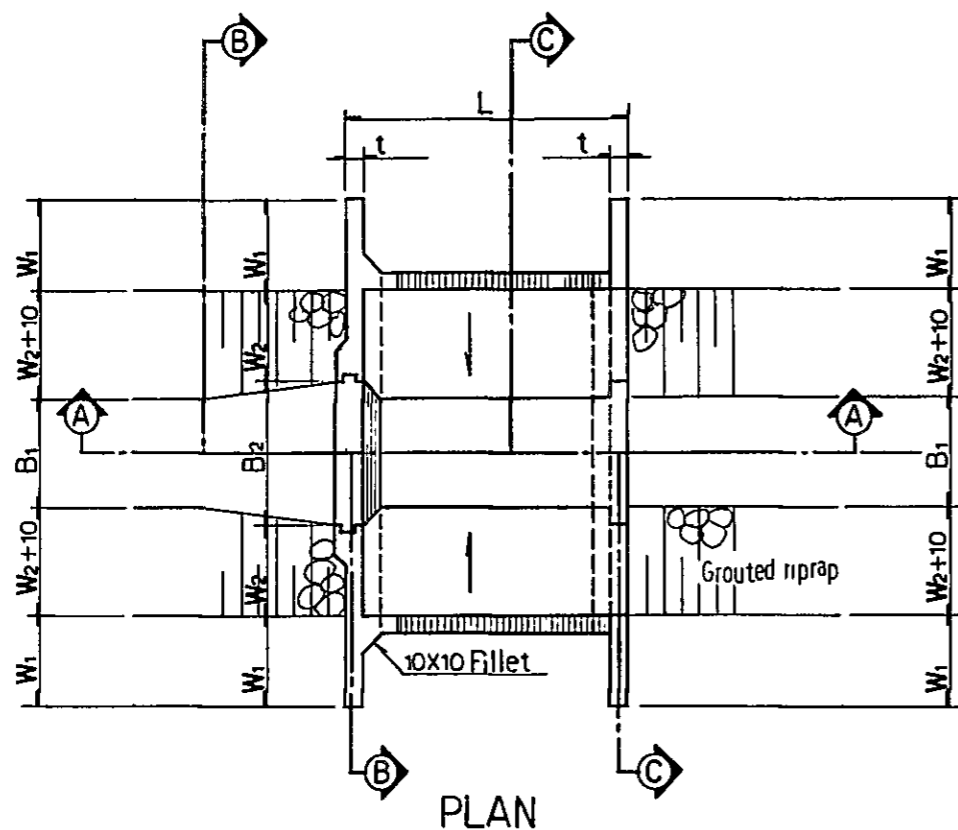
DIMENSION

elem. type	A	B	C	D	E	F
ΔH (m)	2.0	2.5	2.5	2.5	5.0	5.0
B (m)	6.0	4.5	3.0	2.5	2.0	1.5
B1 (m)	10.0	7.0	5.0	3.0	2.0	1.0
B2 (m)	4.8	3.6	2.4	2.0	1.6	1.2
H1-H4 (m)	2.9	2.7	2.3	1.8	1.3	1.0
h2 (m)	1.8	1.5	1.2	1.0	0.8	0.8
H3 (m)	3.0	2.6	2.2	1.8	1.7	1.5
L1 (m)	4.0	4.0	4.0	4.0	4.0	4.0
L2 (m)	4.0	5.0	5.0	5.0	10.0	10.0
L3 (m)	12.5	11.5	9.5	8.0	6.5	6.0
L4 (m)	6.0	4.5	3.0	3.0	3.0	3.0
Q2 (m)	1.6	2.8	3.0	3.4	8.2	8.6
Q2 (m)	2.4	2.2	2.0	1.6	1.8	1.4
Bw1 (m)						
Hw1 (m)	Depend on Canals					
Bw2 (m)						
Hw2 (m)						
t1 (m)	0.2	0.2	0.2	0.2	0.2	0.2
t2 (m)	0.2	0.2	0.2	0.2	0.2	0.2
t3 (m)	0.3	0.3	0.3	0.25	0.25	0.25
t4 (m)	0.3	0.3	0.3	0.25	0.25	0.25
t11 (m)	0.3	0.3	0.3	0.3	0.3	0.3
t12 (m)	0.3	0.3	0.3	0.3	0.3	0.3
t13 (m)	0.4	0.4	0.4	0.4	0.4	0.4
t14 (m)	0.3	0.3	0.3	0.3	0.3	0.3
h1 (m)	0.48	0.33	0.24	0.17	0.1	0.1
h2 (m)	0.55	0.48	0.39	0.31	0.26	0.24
w1 (m)	0.48	0.33	0.24	0.2	0.2	0.2



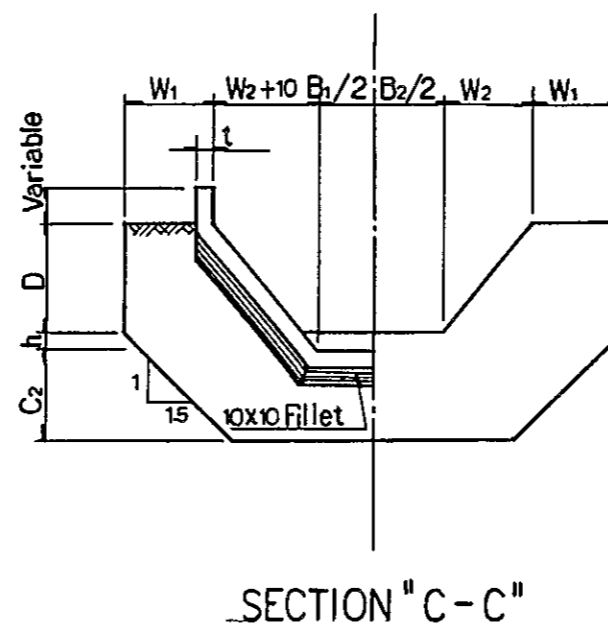
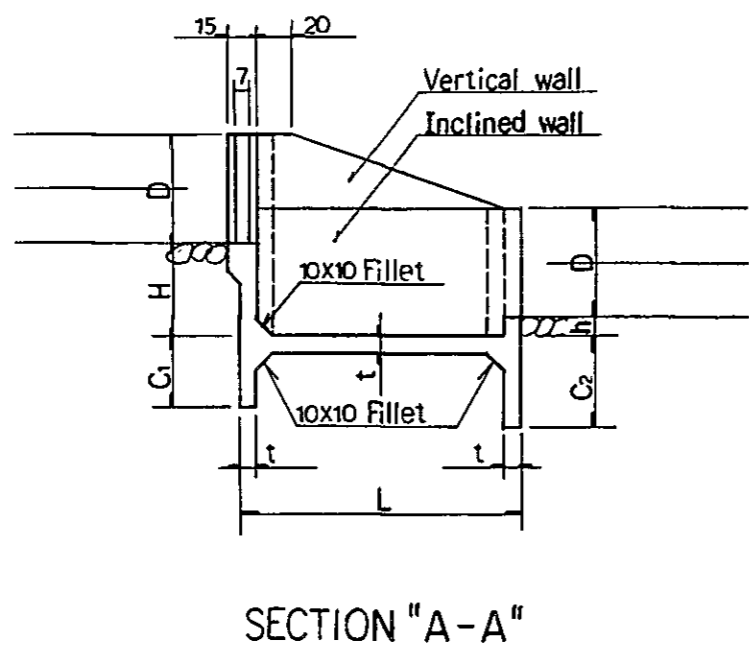
Shape of Typical pool floor blocks

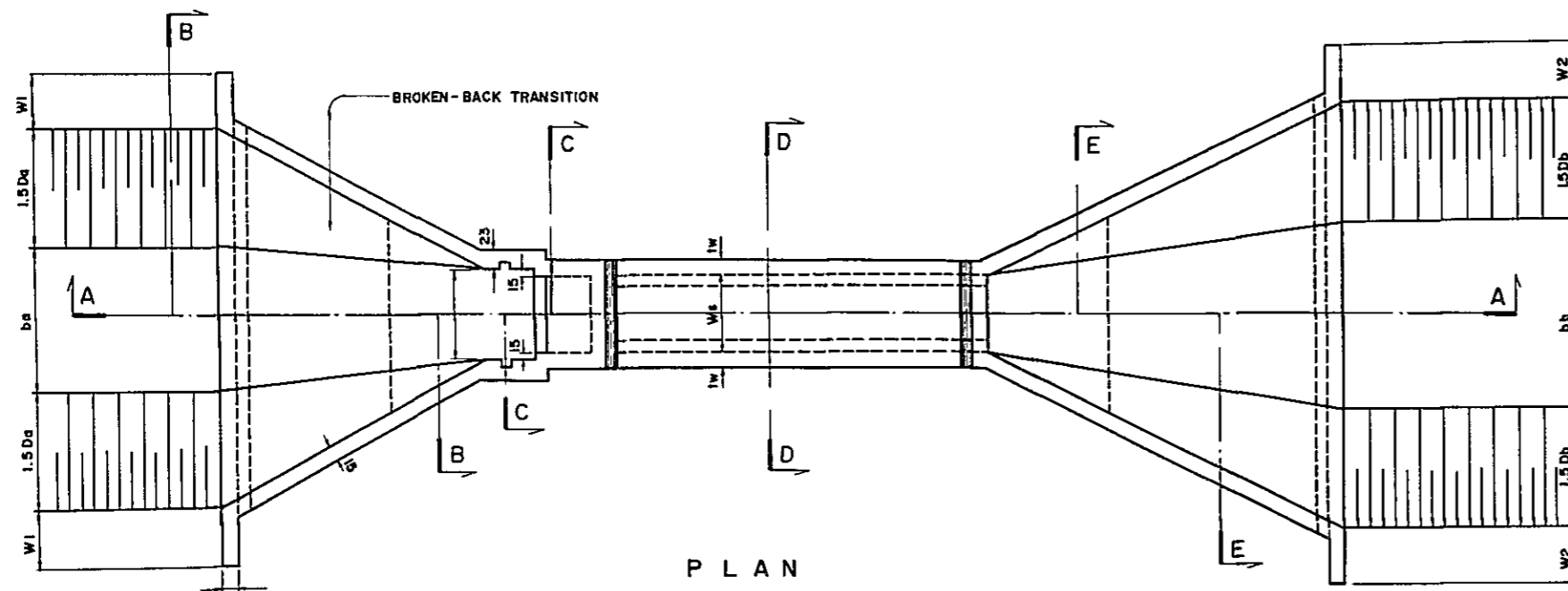
Republic of the Philippines NATIONAL IRRIGATION ADMINISTRATION MATUNO RIVER DEVELOPMENT PROJECT NUEVA VIZCAYA
CHUTE
JAPAN INTERNATIONAL COOPERATION AGENCY DWG. NO. I - 406 SHEET OF



DIMENSION

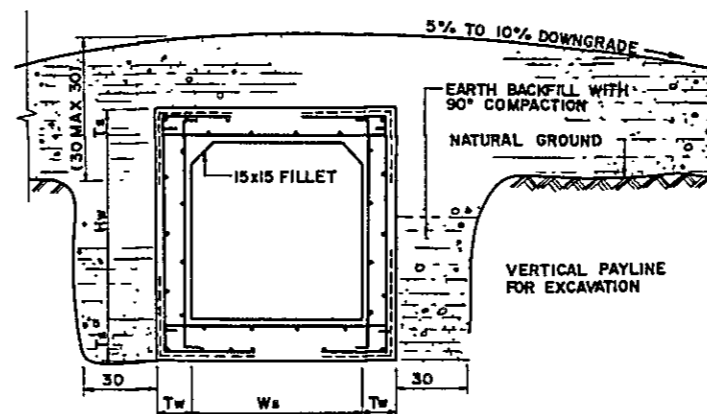
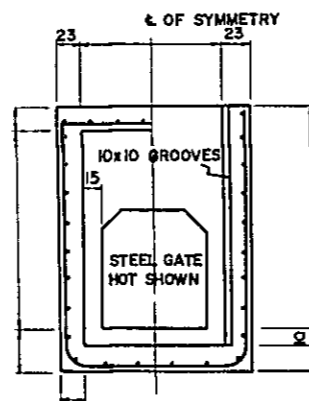
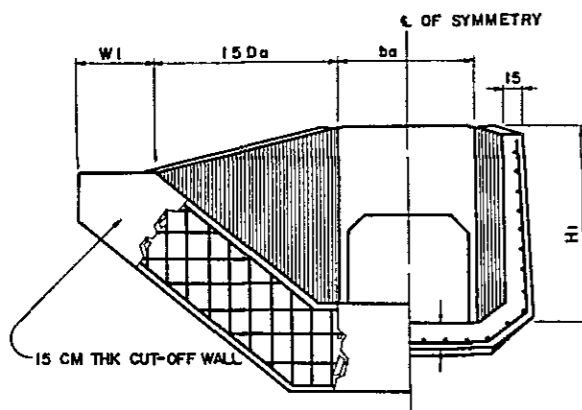
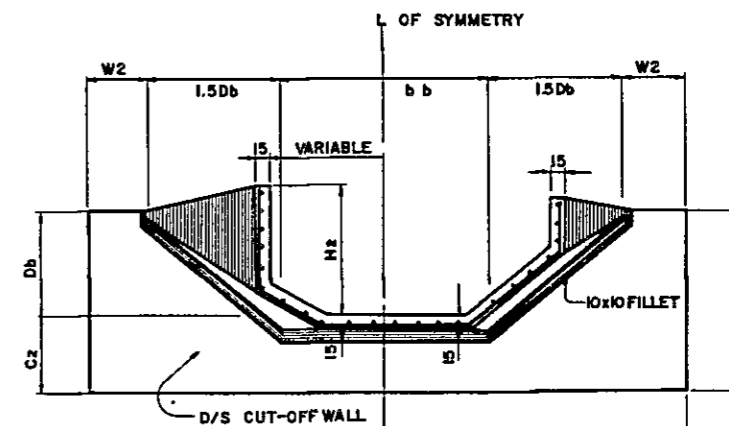
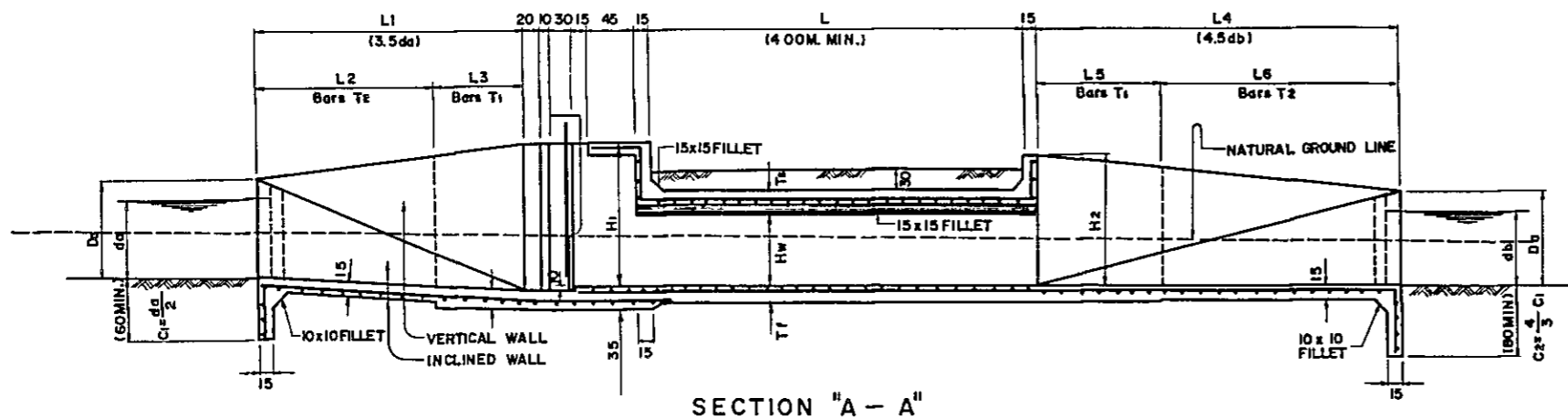
elem. type	A	B	C	D
L (m)	-	-	-	-
B ₁ (m)	1.50	1.20	0.80	0.60
B ₂ (m)	1.70	1.40	1.00	0.80
D (m)	1.20	0.90	0.80	0.70
H (m)	-	-	-	-
h (m)	-	-	-	-
W ₁ (m)	0.60	0.60	0.60	0.60
W ₂ (m)	1.70	1.25	1.10	0.95
C ₁ (m)	0.60	0.60	0.60	0.40
C ₂ (m)	0.80	0.80	0.80	0.45
t (m)	0.15	0.15	0.15	0.10





DIMENSION

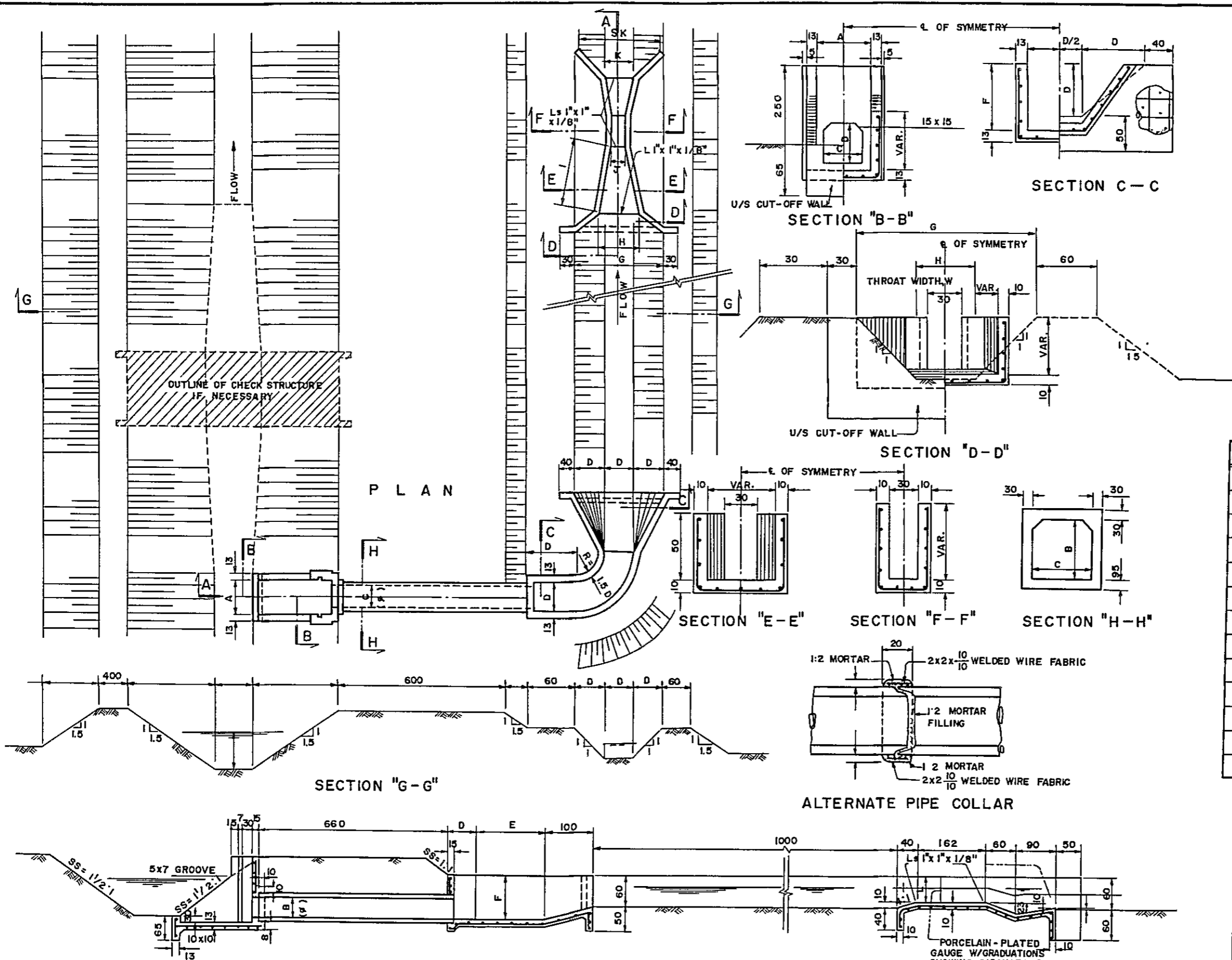
	A	B	C	D	E	F
Hw (m)	—	2.5	1.8	1.3	0.9	0.8
Ws (m)	—	2.5	1.8	1.3	0.9	0.8
Da (m)	—	2.7	2.3	1.8	1.3	1.0
Db (m)	—	2.7	2.3	1.8	1.3	1.0
ba (m)	—	7.0	5.0	3.0	2.0	1.0
bb (m)	—	7.0	5.0	3.0	2.0	1.0
C1 (m)	—	1.1	0.9	0.75	0.6	0.6
C2 (m)	—	1.5	1.2	1.0	0.8	0.8
L (m)	—	5.0	5.0	4.0	4.0	4.0
H1 (m)	—	3.7	3.0	2.5	2.1	2.0
H2 (m)	—	3.5	2.8	2.3	1.9	1.8
W1 (m)	—	1.1	0.9	0.75	0.6	0.6
W2 (m)	—	1.1	0.9	0.75	0.6	0.6
1a (m)	—	0.3	0.3	0.3	0.3	0.3
1w (m)	—	0.2	0.2	0.2	0.2	0.2
1f (m)	—	0.3	0.3	0.3	0.3	0.3
L1 (m)	—	7.7	6.3	5.25	3.5	2.45
L2 (m)	—	5.2	4.2	3.5	2.3	1.65
L3 (m)	—	2.5	2.1	1.75	1.2	0.8
L4 (m)	—	9.9	8.1	6.75	4.5	3.15
L5 (m)	—	3.3	2.7	2.25	1.5	1.05
L6 (m)	—	6.6	5.4	4.5	3.0	2.1



Republic of the Philippines
 NATIONAL IRRIGATION ADMINISTRATION
 MATUNO RIVER DEVELOPMENT PROJECT
 NUEVA VIZCAYA

CHECK

JAPAN INTERNATIONAL COOPERATION AGENCY
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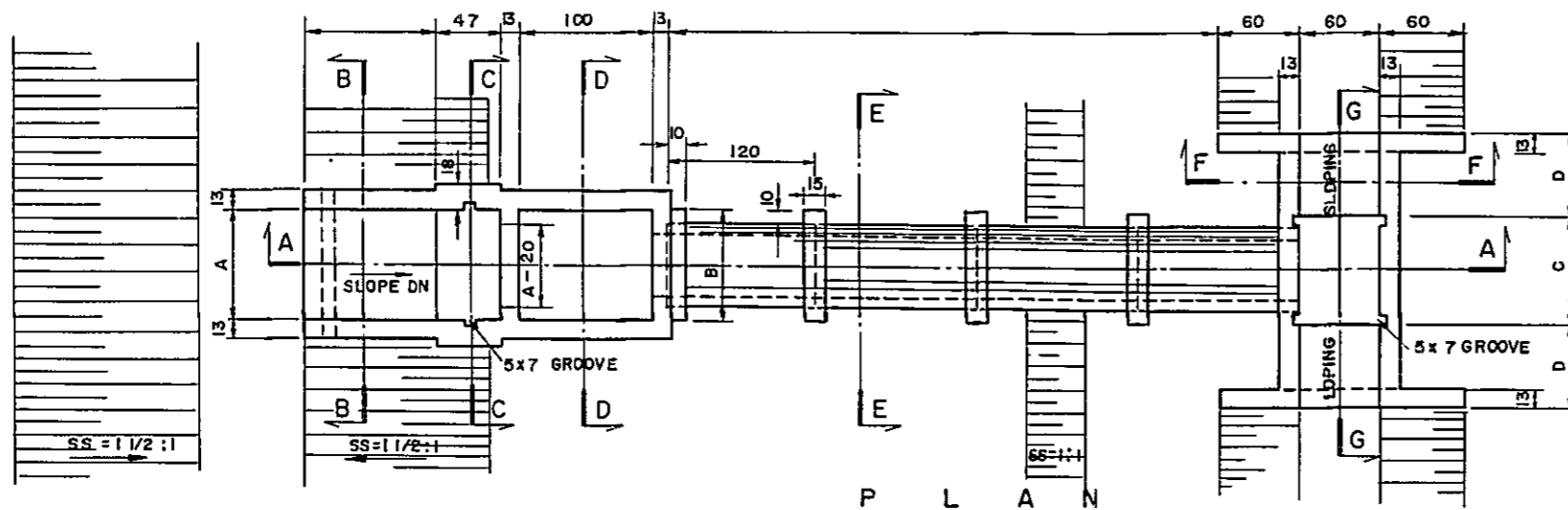
DIMENSION

elem	type	B	C
A	(m)	2.1	1.5
B	(m)	1.0	—
C	(m)	1.5	—
∅	(%)	—	42
D	(m)	1.5	1.5
E	(m)	3.53	3.53
F	(m)	1.7	1.7
G	(m)	4.5	4.5
H	(m)	1.8	1.8
I	(m)	1.93	1.93
J	(m)	0.75	0.75
K	(m)	1.5	1.5
L	(m)	1.0	1.0

Republic of the Philippines
 NATIONAL IRRIGATION ADMINISTRATION
 MATUNO RIVER DEVELOPMENT PROJECT
 NUEVA VIZCAYA

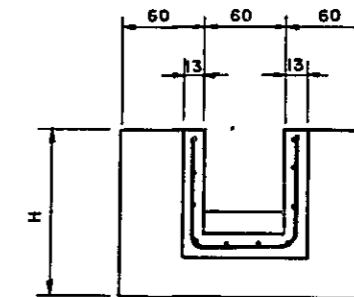
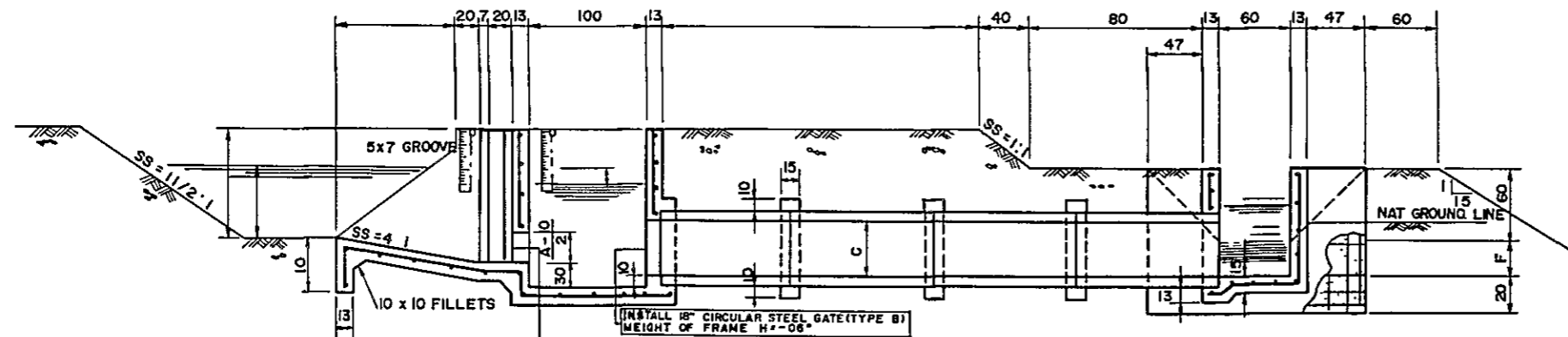
**HEAD GATE AND
 PARSHALL FLUME**

JAPAN INTERNATIONAL COOPERATION AGENCY
 DWG. NO. I - 409 SHEET OF

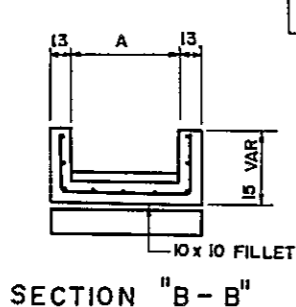


DIMENSION

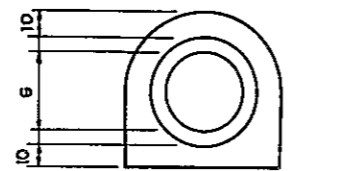
elem. \ type	A	B	C	D
A (m)	1.3	1.0	0.8	0.8
B (m)	1.3	0.96	0.78	0.62
C (m)	1.25	0.91	0.74	0.55
D (m)	2.32	1.27	0.92	0.22
E (m)	1.3	1.0	0.9	0.7
F (m)	0.7	0.4	0.3	0.1
G (m)	0.91	0.61	0.46	0.46 ~ 0.31
H (m)	1.5	1.2	1.1	0.9



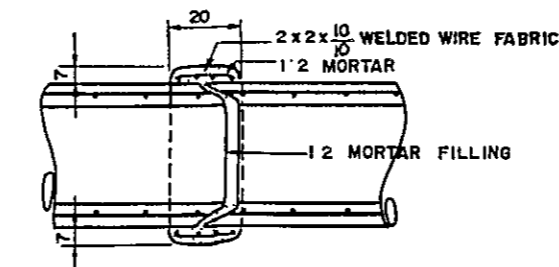
SECTION "F-F"



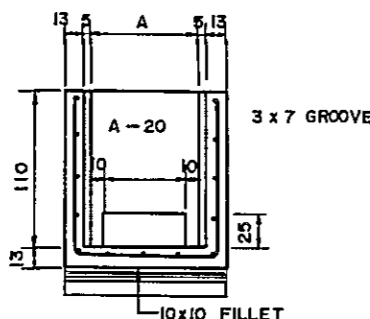
SECTION "B-B"



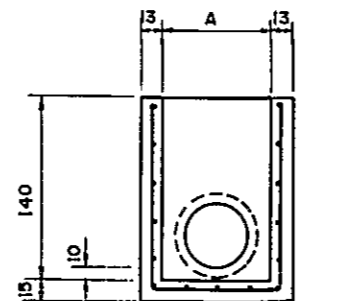
SECTION "E-E"



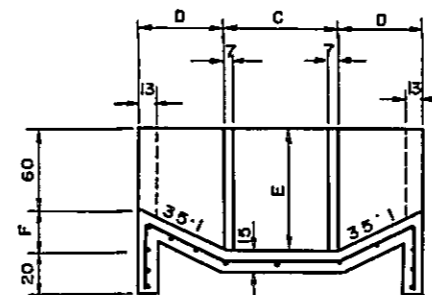
ALTERNATE PIPE COLLAR JOINT



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



SECTION "D-D"

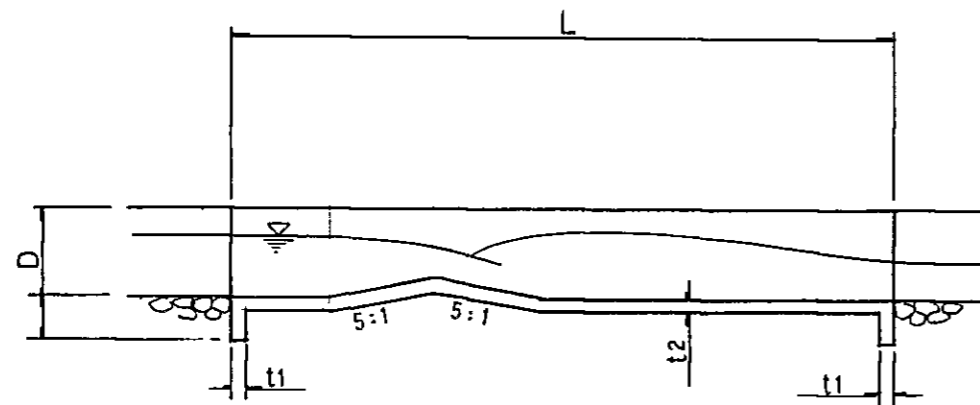
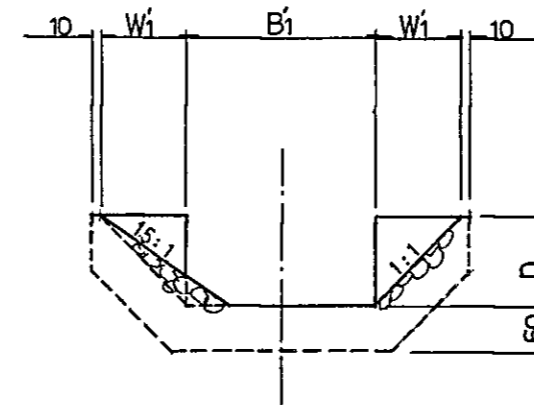
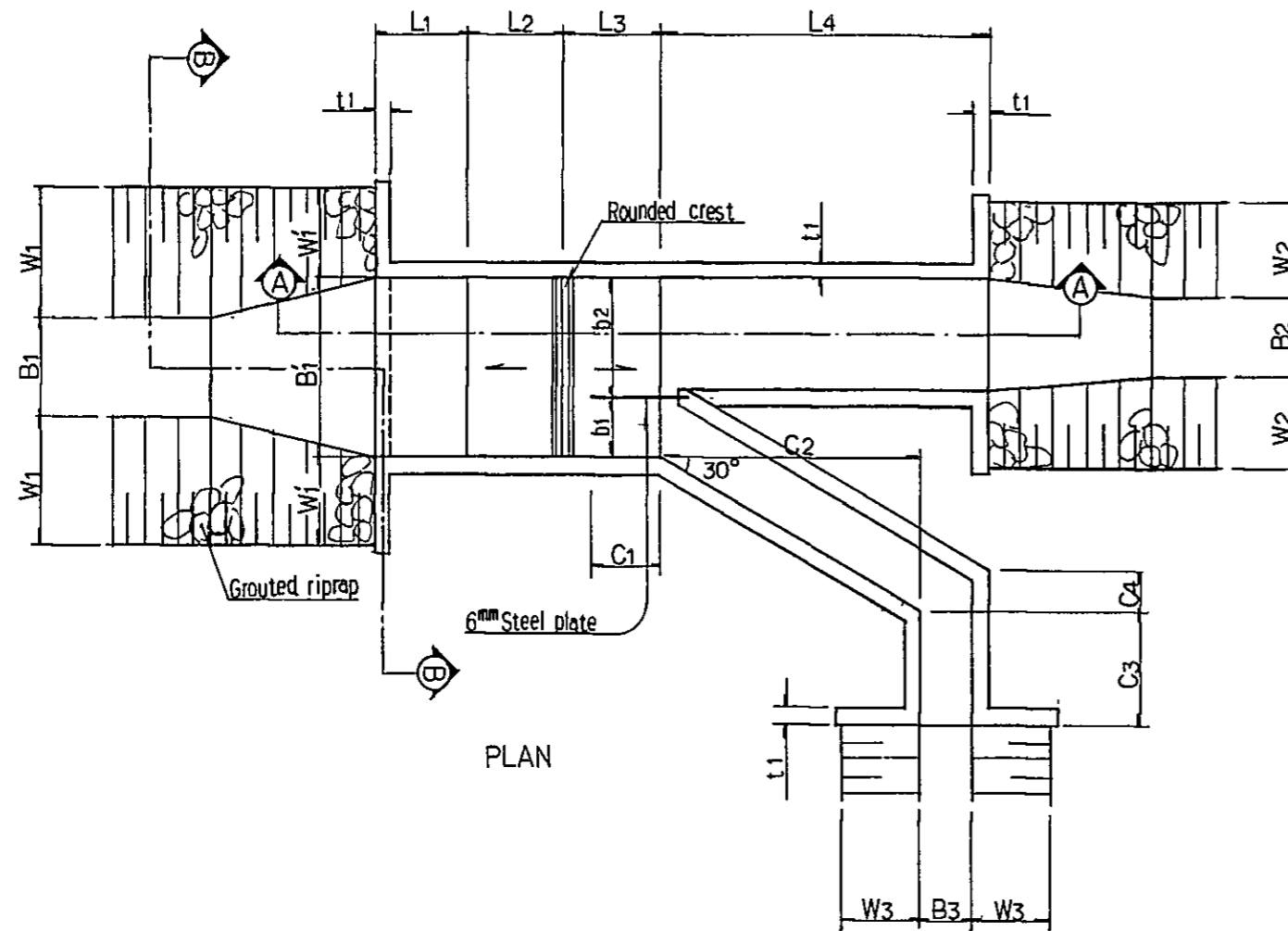


SECTION "G-G"

Republic of the Philippines
 NATIONAL IRRIGATION ADMINISTRATION
 MATUNO RIVER DEVELOPMENT PROJECT
 NUEVA VIZCAYA

DOUBLE ORIFICE

JAPAN INTERNATIONAL COOPERATION AGENCY
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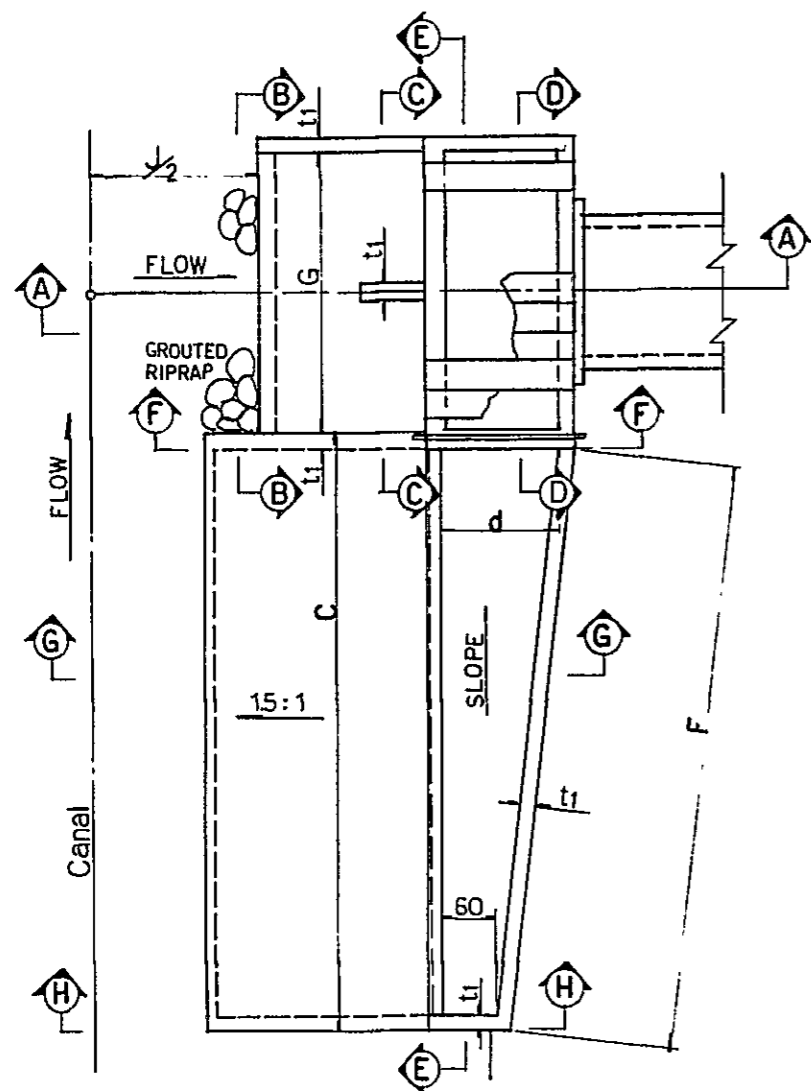
DIMENSION

Type	A	B	C
B1	1.5	1.2	0.8
B2	1.2	0.8	0.6
B3	0.8	0.6	0.6
B1'	2.7	2.1	1.6
W1	1.8	1.35	1.2
W2	1.35	1.2	1.05
W3	1.2	1.05	1.05
W1'	1.2	0.9	0.8
L1	1.4	1.2	1.0
L2	1.5	1.3	1.0
L3	1.5	1.3	1.0
L4	5.0	4.4	3.4
L	9.4	8.2	6.4
C1	1.0	0.85	0.7
C2	3.95	3.45	2.72
C3	1.67	1.46	1.15
C4	0.6	0.45	0.45
D	1.2	0.9	0.8
t1	0.25	0.25	0.25
t2	0.15	0.15	0.15
b1	—	—	—
b2	—	—	—

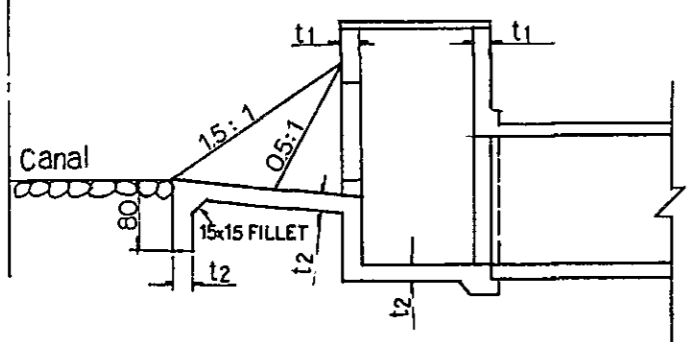
Republic of the Philippines
 NATIONAL IRRIGATION ADMINISTRATION
 MATUNO RIVER DEVELOPMENT PROJECT
 NUEVA VIZCAYA

FIXED PROPORTIONAL DIVISOR

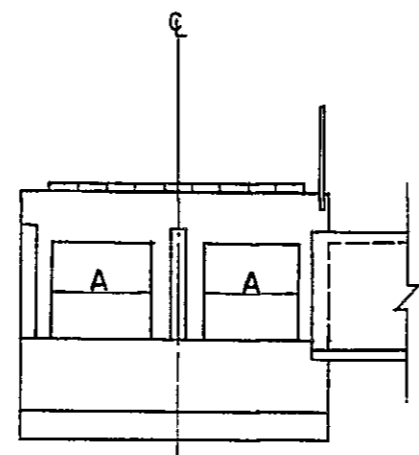
JAPAN INTERNATIONAL COOPERATION AGENCY
 DWG. NO. I - 411 SHEET OF



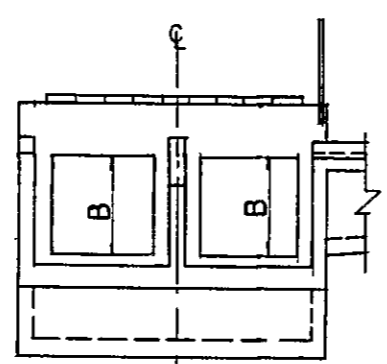
PLAN



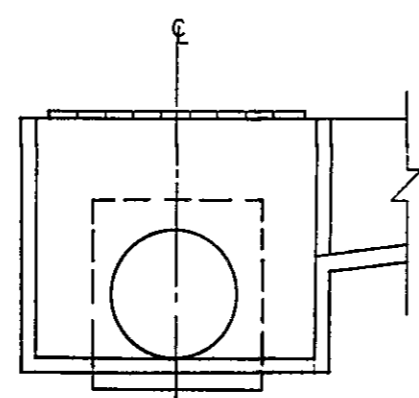
SECTION 'A-A'



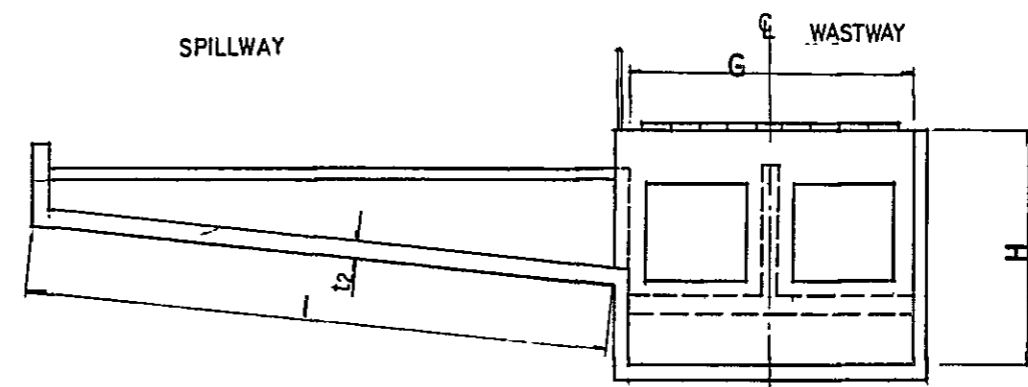
SECTION 'B-B'



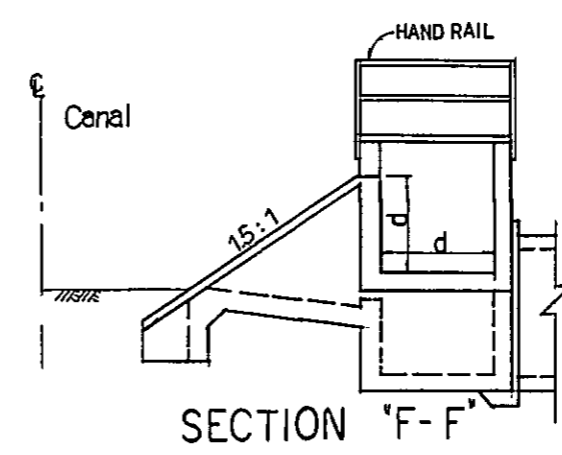
SECTION 'C-C'



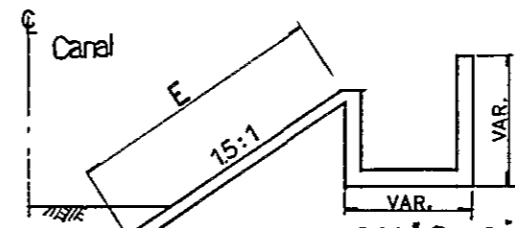
SECTION 'D-D'



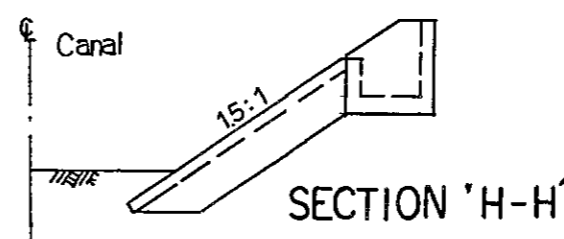
SECTION 'E-E'



SECTION 'F-F'



SECTION 'G-G'



SECTION 'H-H'

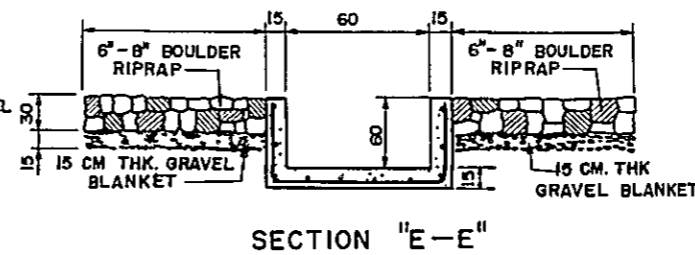
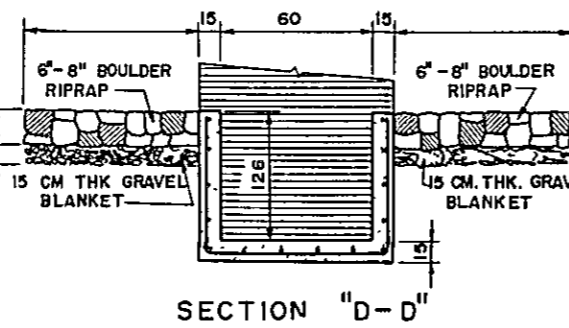
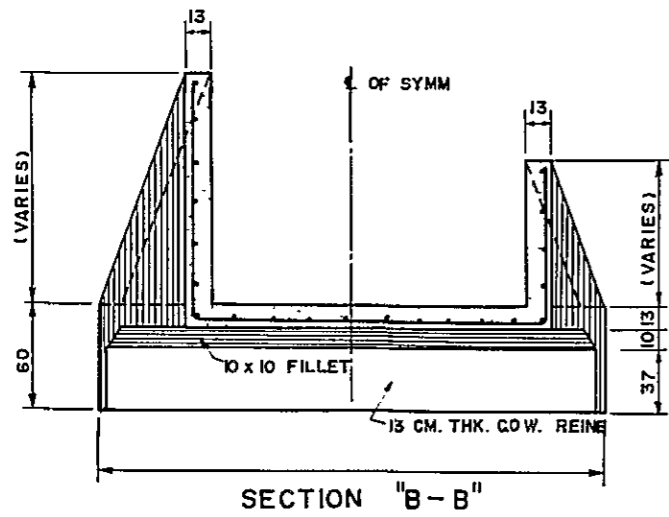
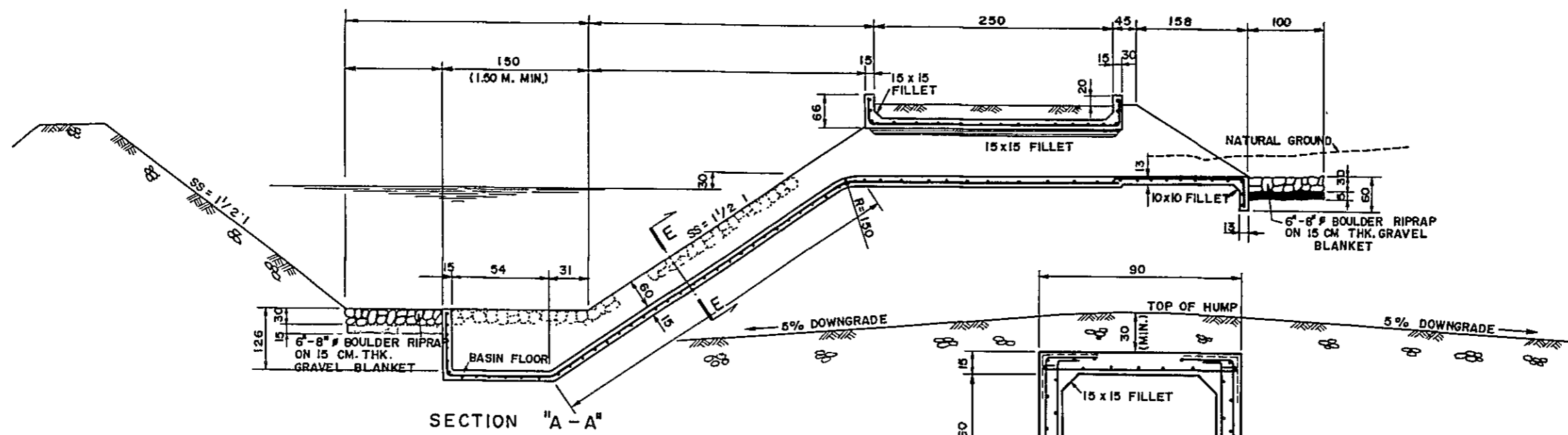
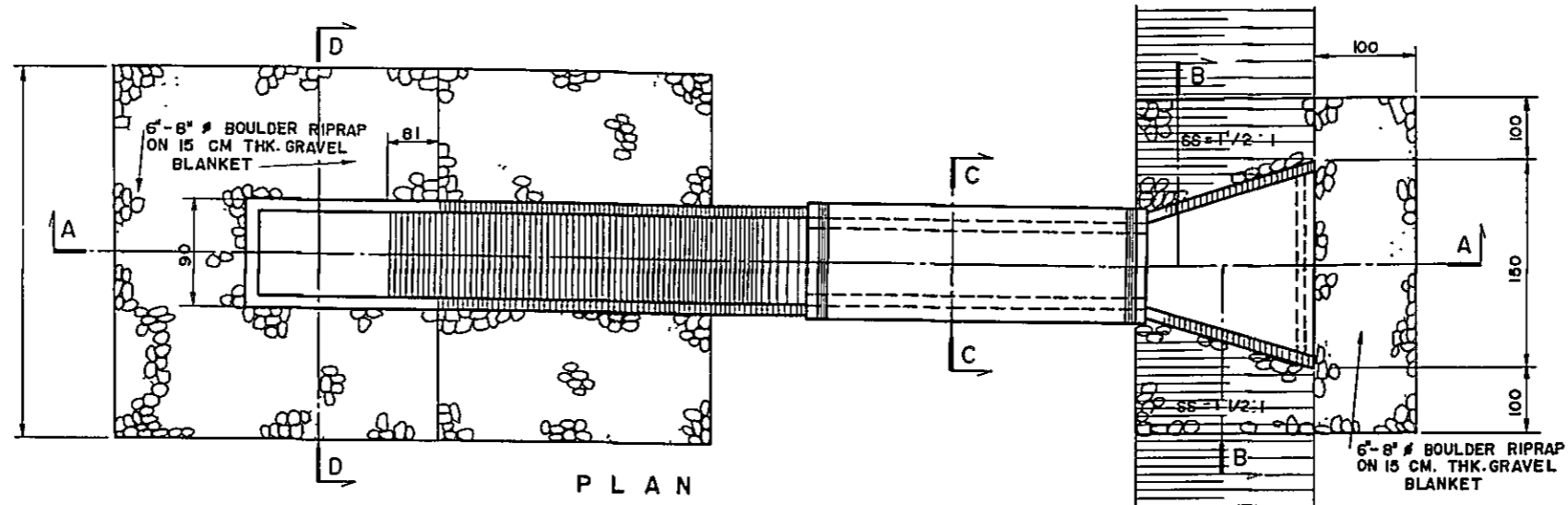
DIMENSION

elem. type	A	B	C	D	E	F
A (m)	2.5	2.0	2.0	1.5	1.0	0.8
B (m)	2.5	1.8	1.8	1.0	0.8	0.8
d (m)	2.4	2.3	1.9	1.5	1.0	0.7
C (m)	24.0	23.0	19.0	15.0	10.0	7.0
E (m)	5.2	5.0	4.3	3.6	3.0	2.4
F (m)	24.2	23.2	19.2	15.2	10.1	7.1
G (m)	5.7	4.7	2.4	1.9	1.4	1.2
H (m)	4.0	3.3	3.3	2.5	2.3	2.3
I (m)	26.4	25.3	20.9	16.5	11.0	7.7
J (m)	-	-	-	-	-	-
t1 (m)	0.2	0.2	0.2	0.15	0.15	0.15
t2 (m)	0.3	0.3	0.3	0.2	0.2	0.2

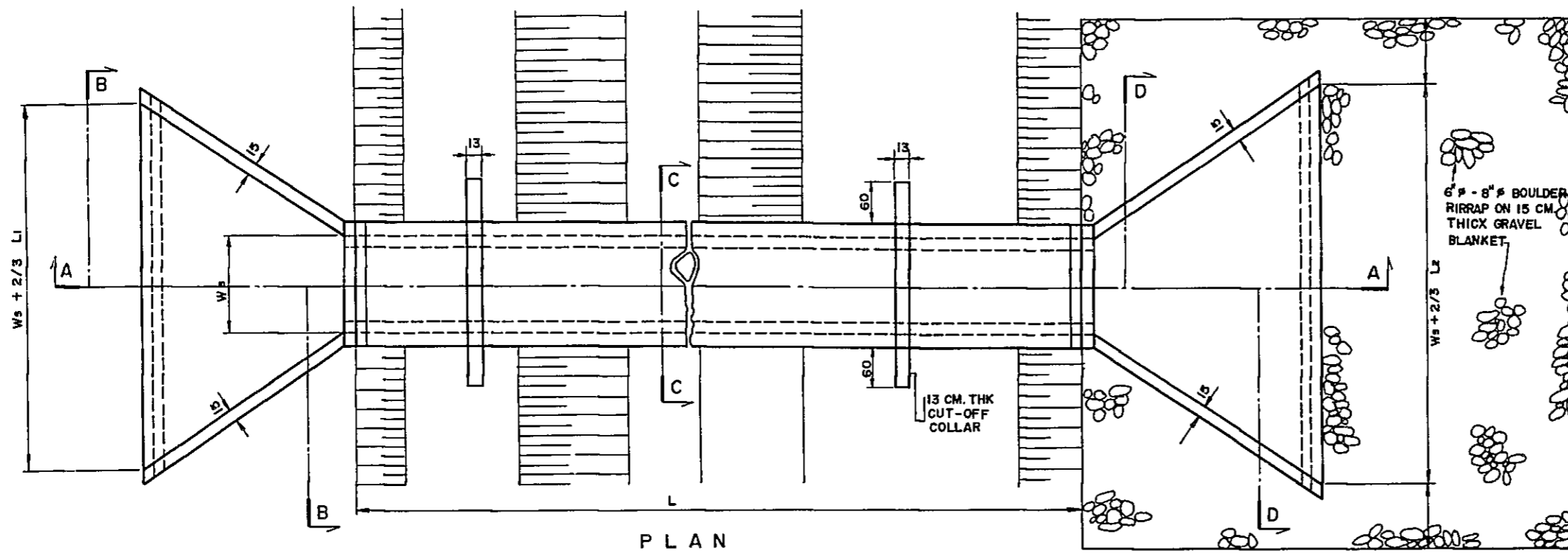
Republic of the Philippines
 NATIONAL IRRIGATION ADMINISTRATION
 MATUNO RIVER DEVELOPMENT PROJECT
 NUEVA VIZCAYA

WASTEWAY

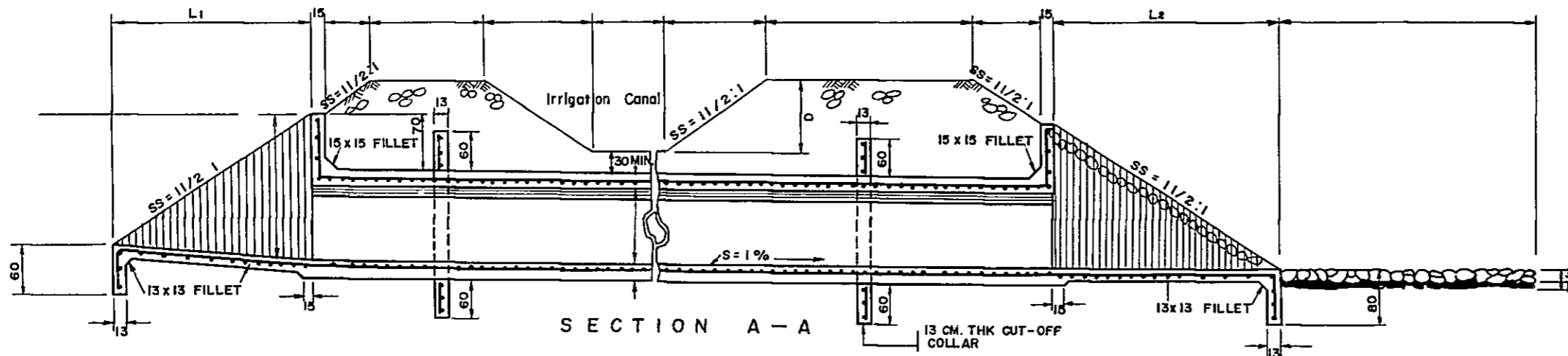
JAPAN INTERNATIONAL COOPERATION AGENCY
 DWG. NO. I - 412 SHEET OF



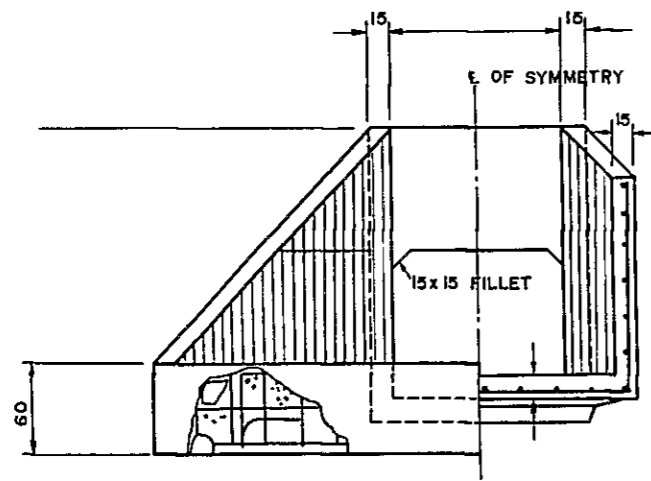
Republic of the Philippines NATIONAL IRRIGATION ADMINISTRATION MATUNO RIVER DEVELOPMENT PROJECT NUEVA VIZCAYA
DRAIN INLET
JAPAN INTERNATIONAL COOPERATION AGENCY DWG. NO. I - 413 SHEET OF



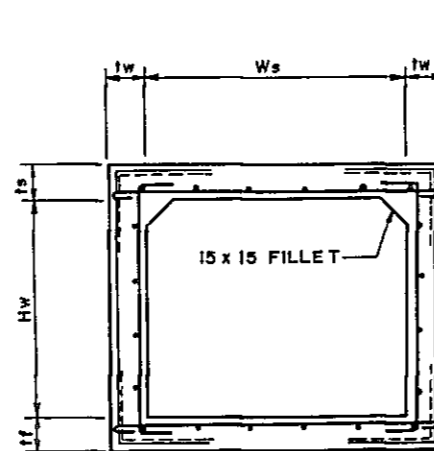
PLAN



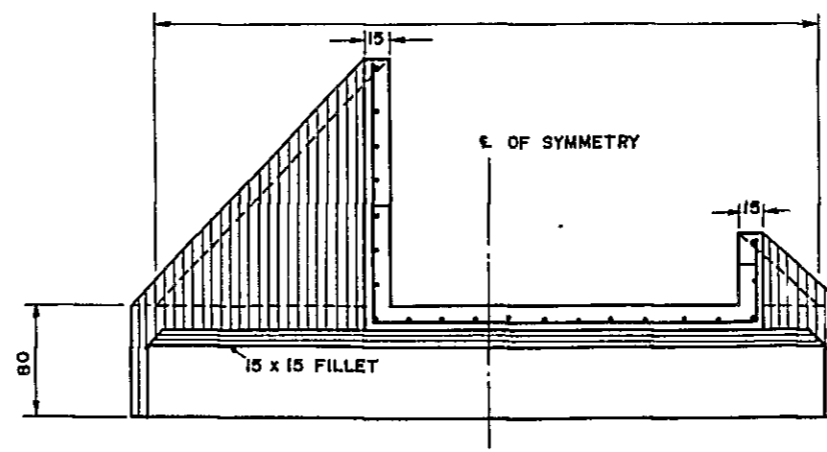
SECTION A - A



SECTION B - B



SECTION C - C



SECTION D - D

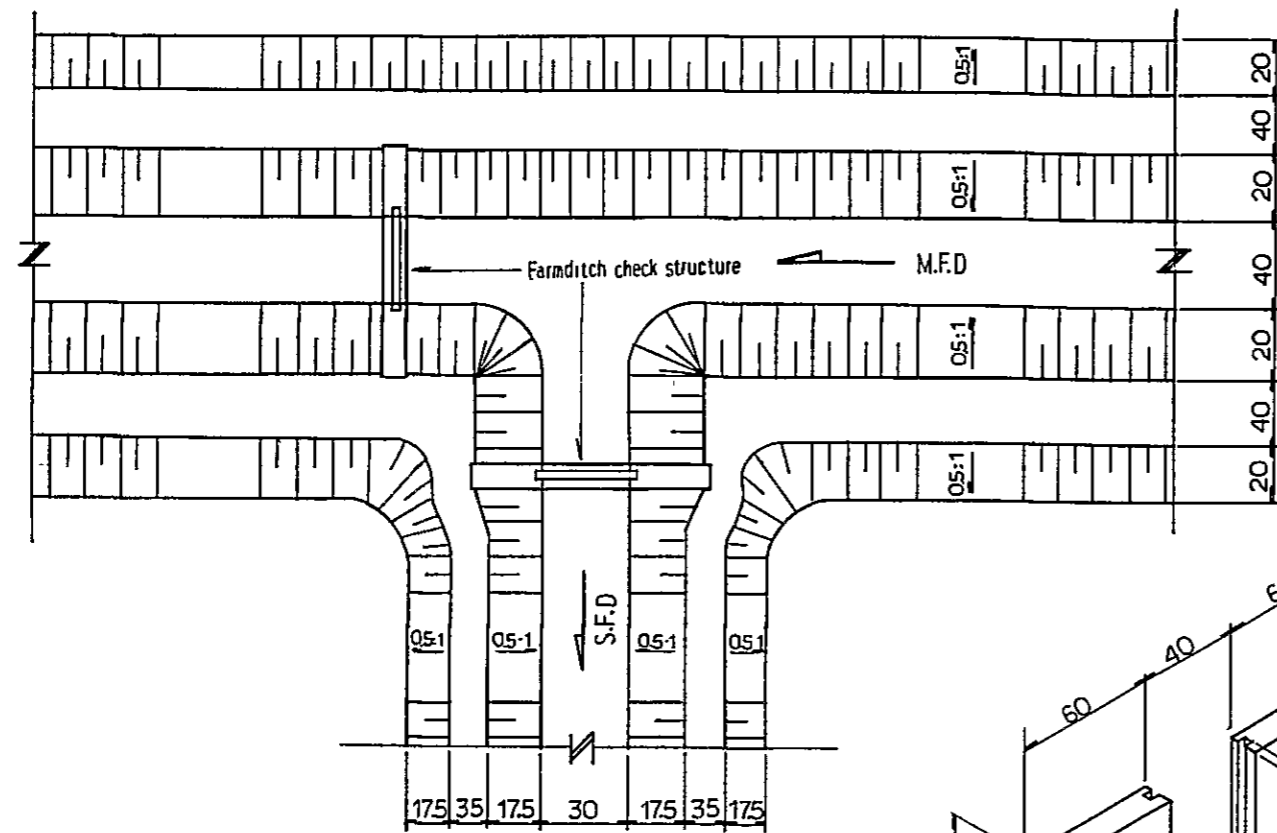
DIMENSION

elem. type	A	B	D	E
L (m)	32.0	30.0	19.0	14.0
L _i (m)	4.0	4.0	4.0	4.0
L _z (m)	4.0	4.0	4.0	4.0
W _s (m)	Depend on Canals			
H _w (m)	Depend on Canals			
t _s (m)	0.30	0.30	0.30	0.30
f _f (m)	0.30	0.30	0.30	0.30
t _w (m)	0.30	0.30	0.30	0.30

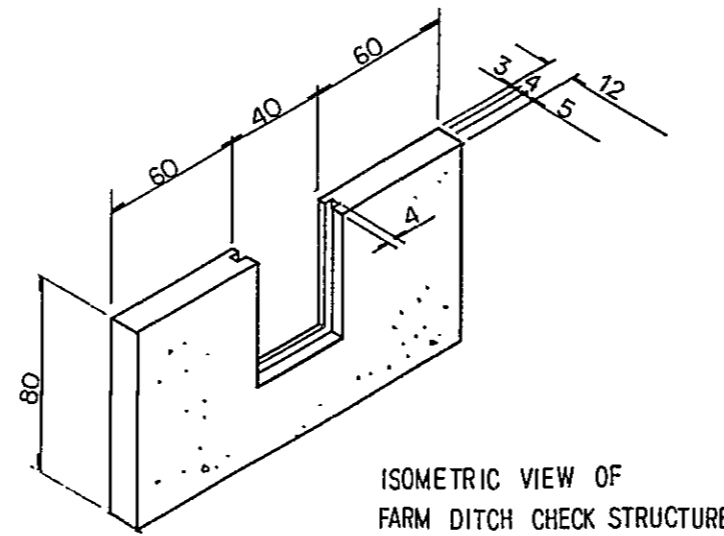
Republic of the Philippines
 NATIONAL IRRIGATION ADMINISTRATION
 MATUNO RIVER DEVELOPMENT PROJECT
 NUEVA VIZCAYA

DRAINAGE CULVERT

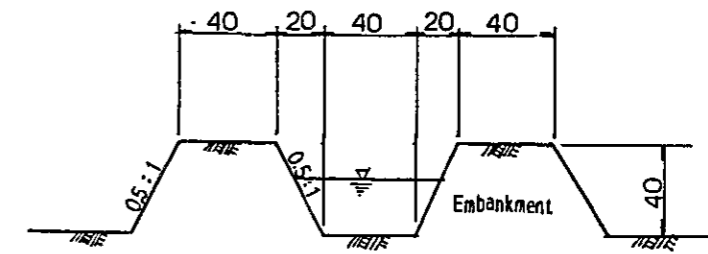
JAPAN INTERNATIONAL COOPERATION AGENCY
 DWG. NO. I - 414 SHEET OF



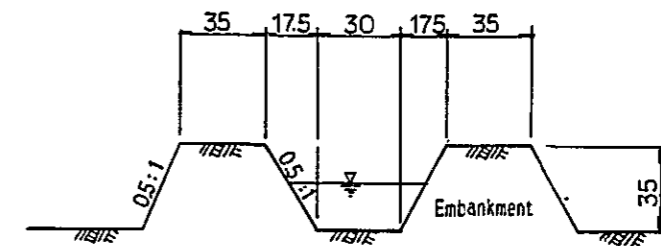
SCHMATIC PLAN FOR DIVISION BOX



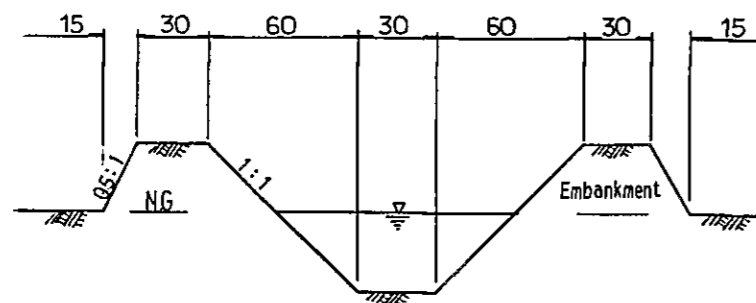
ISOMETRIC VIEW OF FARM DITCH CHECK STRUCTURE



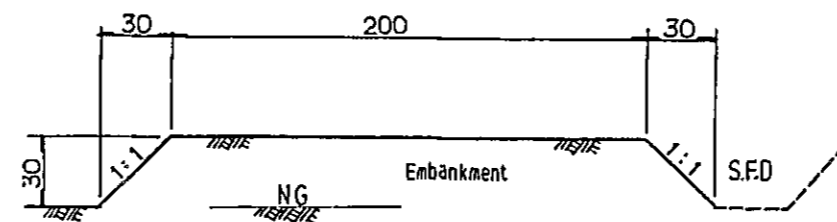
MAIN FARM DITCH (M.F.D)



SUPPLEMENTARY FARM DITCH (S.F.D)

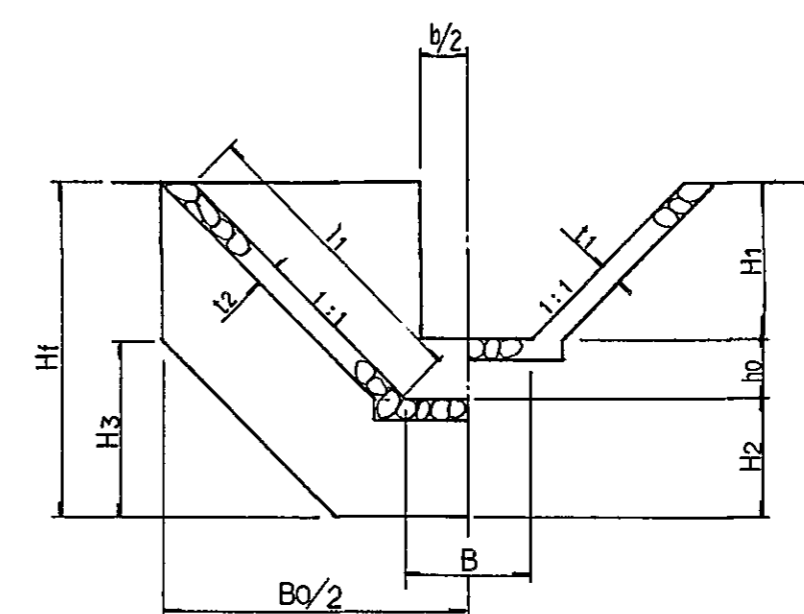
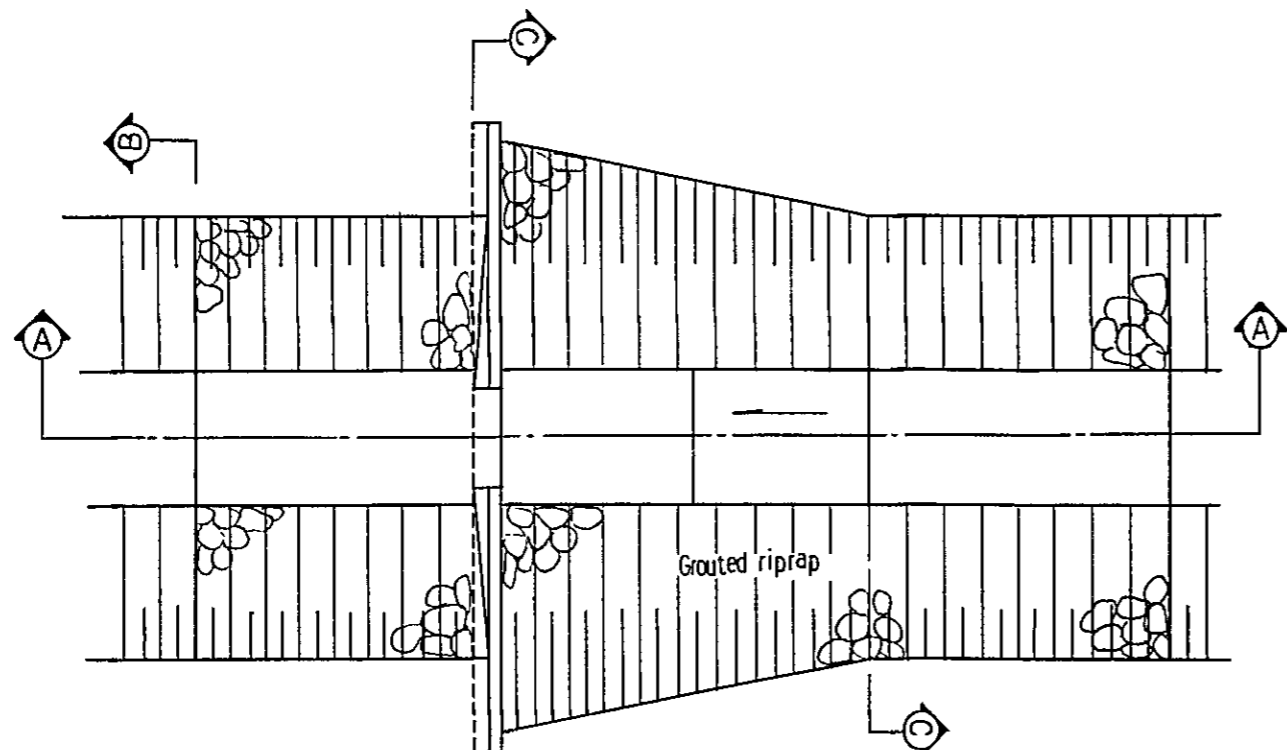


FARM DRAIN

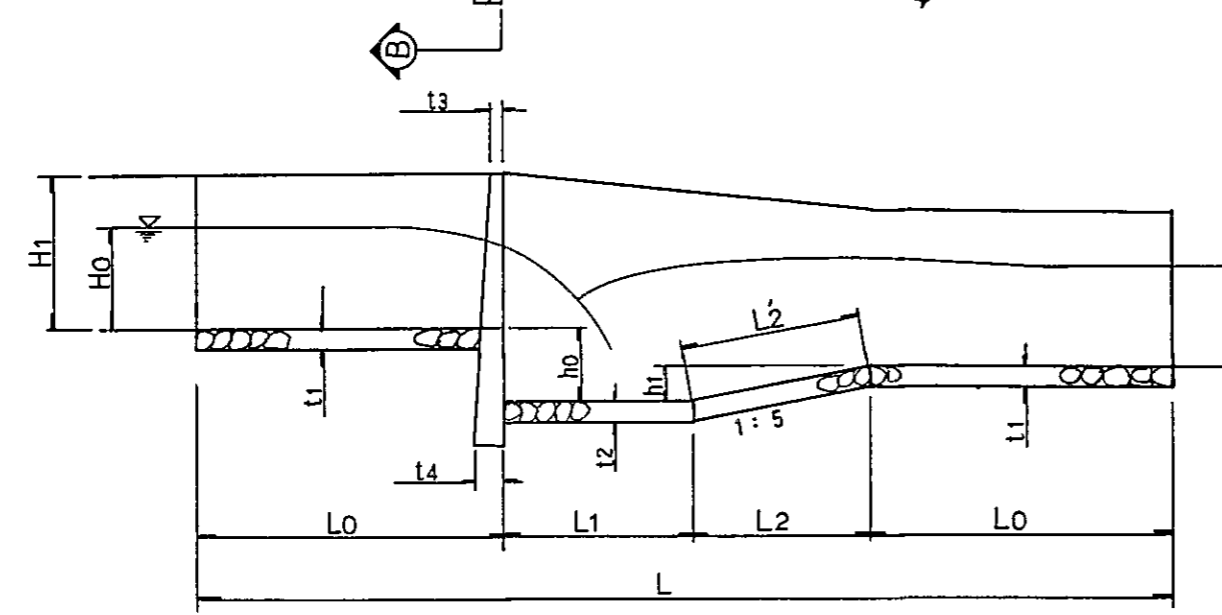


FARM ROAD

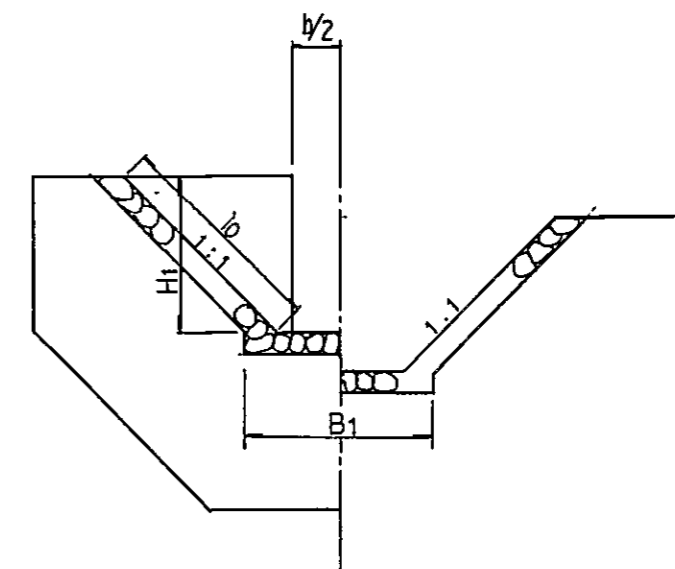
Republic of the Philippines	
NATIONAL IRRIGATION ADMINISTRATION	
MATUNO RIVER DEVELOPMENT PROJECT	
NUEVA VIZCAYA	
TYPICAL FARMDITCH SECTION AND DIVISION BOX	
JAPAN INTERNATIONAL COOPERATION AGENCY	
DWG. NO. I - 415	SHEET OF



SECTION "B - B"



SECTION "A - A"



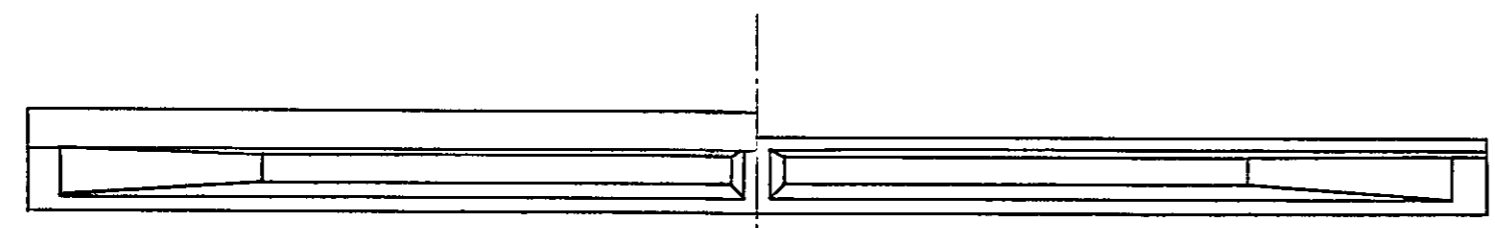
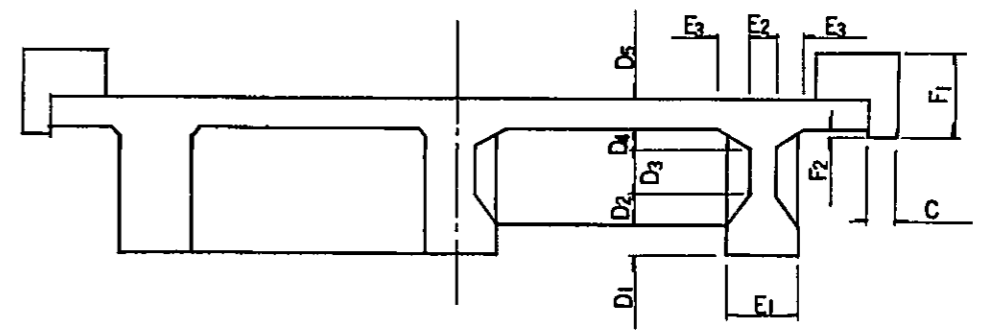
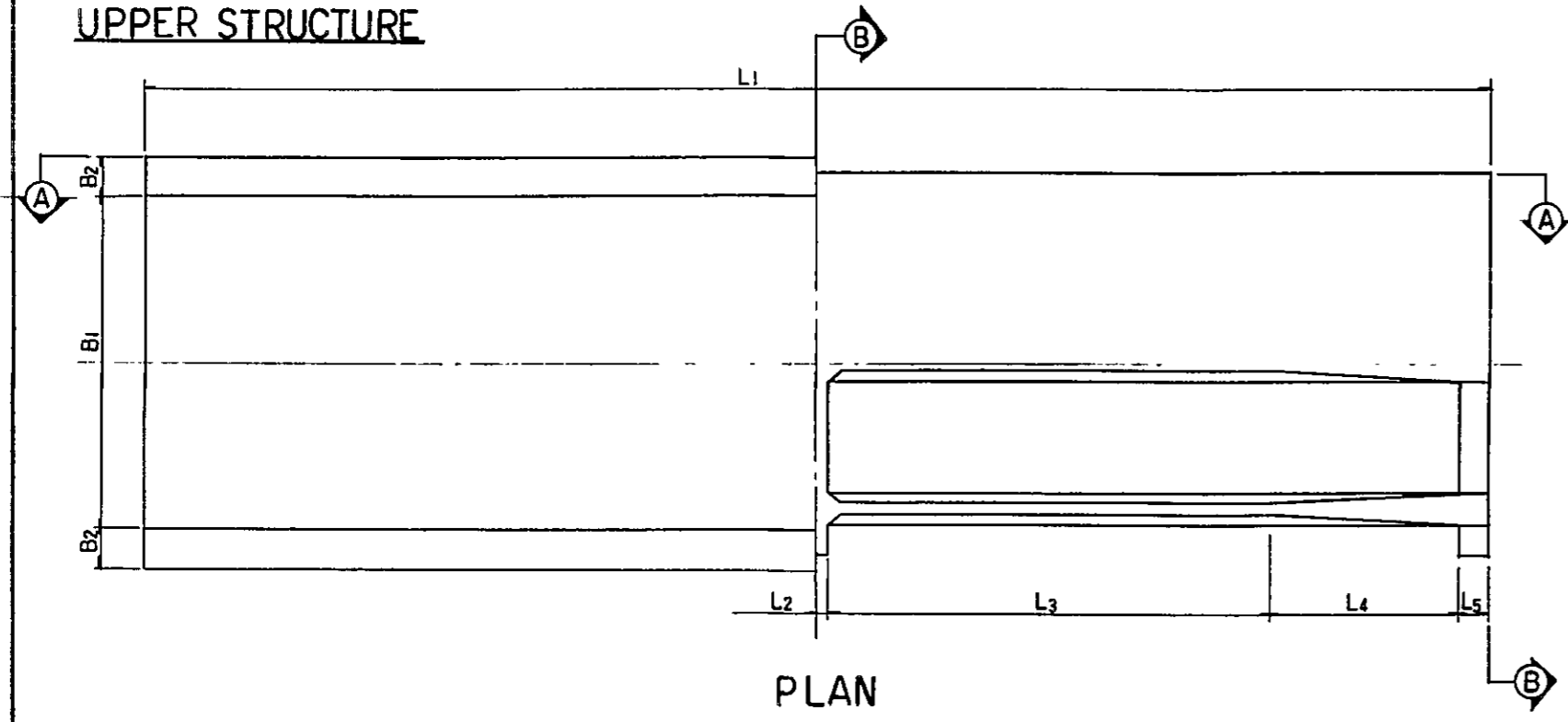
SECTION "C - C"

DIMENSION

Type	elem.	H0	H1	H2	H3	Hf	h0	h1	B	B0	B1	b	L0	L1	L2	L'2	L	l0	l1	t1	t2	t3	t4
AA		3.0	4.05	1.4	3.3	7.35	1.9	0.9	8.0	20.9	9.13	4.0	14.0	5.3	4.5	4.59	37.8	5.73	8.43	0.4	0.4	0.15	0.6
A		3.0	4.05	1.4	3.3	7.35	1.9	0.9	3.0	15.9	4.13	2.0	10.0	5.3	4.5	4.59	29.8	5.73	8.43	0.4	0.4	0.15	0.6
B		2.5	3.45	1.4	3.25	6.7	1.85	0.85	2.1	13.7	3.23	1.9	8.7	4.9	4.3	4.39	26.6	4.88	7.5	0.4	0.4	0.15	0.6
C		2.3	3.20	1.35	3.15	6.35	1.8	0.8	1.9	12.9	2.89	1.5	7.4	4.6	4.0	4.08	23.4	4.53	7.7	0.35	0.35	0.15	0.55
D		1.8	2.55	1.35	3.05	5.6	1.7	0.7	1.5	11.0	2.49	1.5	6.4	4.1	3.5	3.57	20.4	3.61	6.01	0.35	0.35	0.15	0.5
E		1.5	2.10	1.35	3.0	5.1	1.65	0.65	1.2	9.7	2.19	1.2	5.7	3.8	3.3	3.37	18.5	2.97	5.3	0.35	0.35	0.15	0.5
F		1.3	1.85	1.35	2.95	4.8	1.6	0.6	1.1	9.0	2.09	1.1	5.2	3.5	3.0	3.06	16.9	2.62	4.88	0.35	0.35	0.15	0.45
G		1.0	1.40	1.3	2.8	4.2	1.5	0.5	0.8	7.6	1.65	0.8	4.6	3.1	2.5	2.55	14.8	1.98	4.1	0.3	0.3	0.15	0.45
H		0.8	1.15	1.3	2.8	3.95	1.5	0.5	0.7	7.0	1.55	0.7	3.8	2.8	2.5	2.55	12.9	1.63	3.75	0.3	0.3	0.15	0.4

Republic of the Philippines
 NATIONAL IRRIGATION ADMINISTRATION
 MATUNO RIVER DEVELOPMENT PROJECT
 NUEVA VIZCAYA
DRAINAGE DROP
 JAPAN INTERNATIONAL COOPERATION AGENCY
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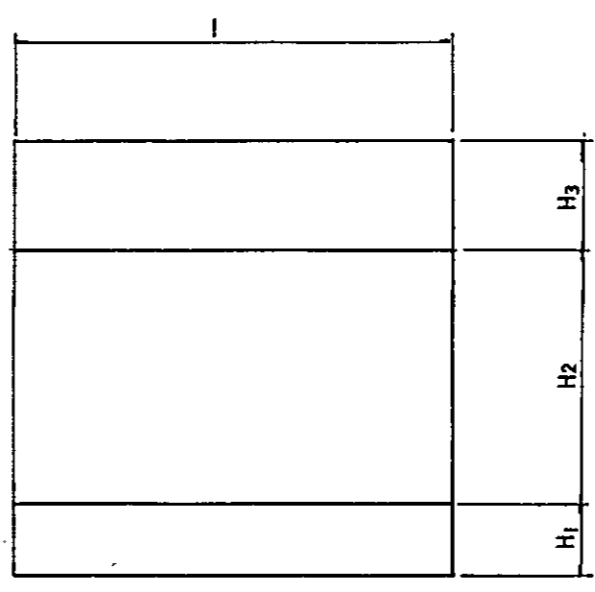
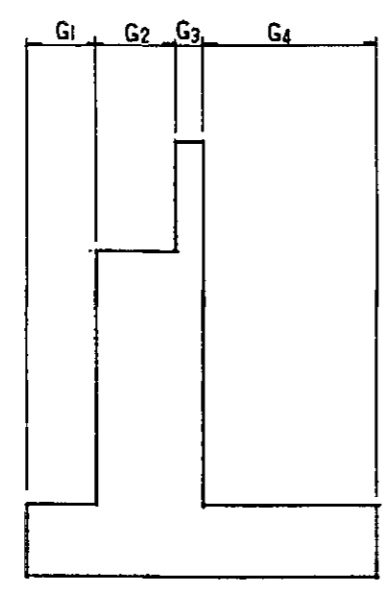
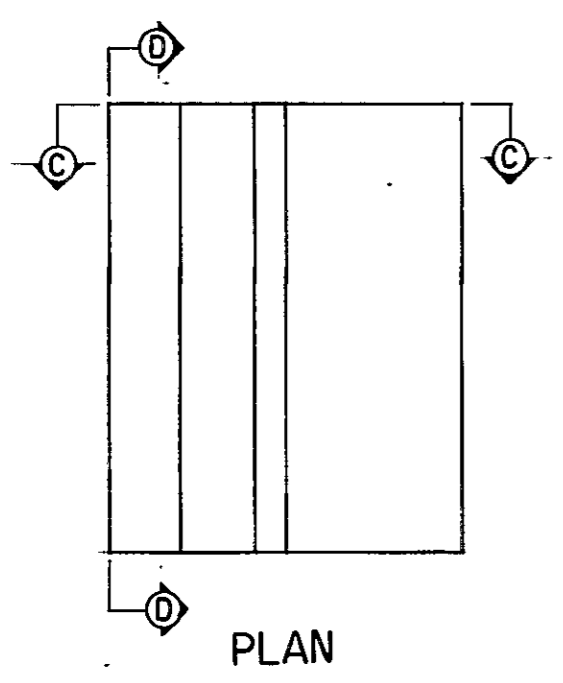
UPPER STRUCTURE



DIMENSION

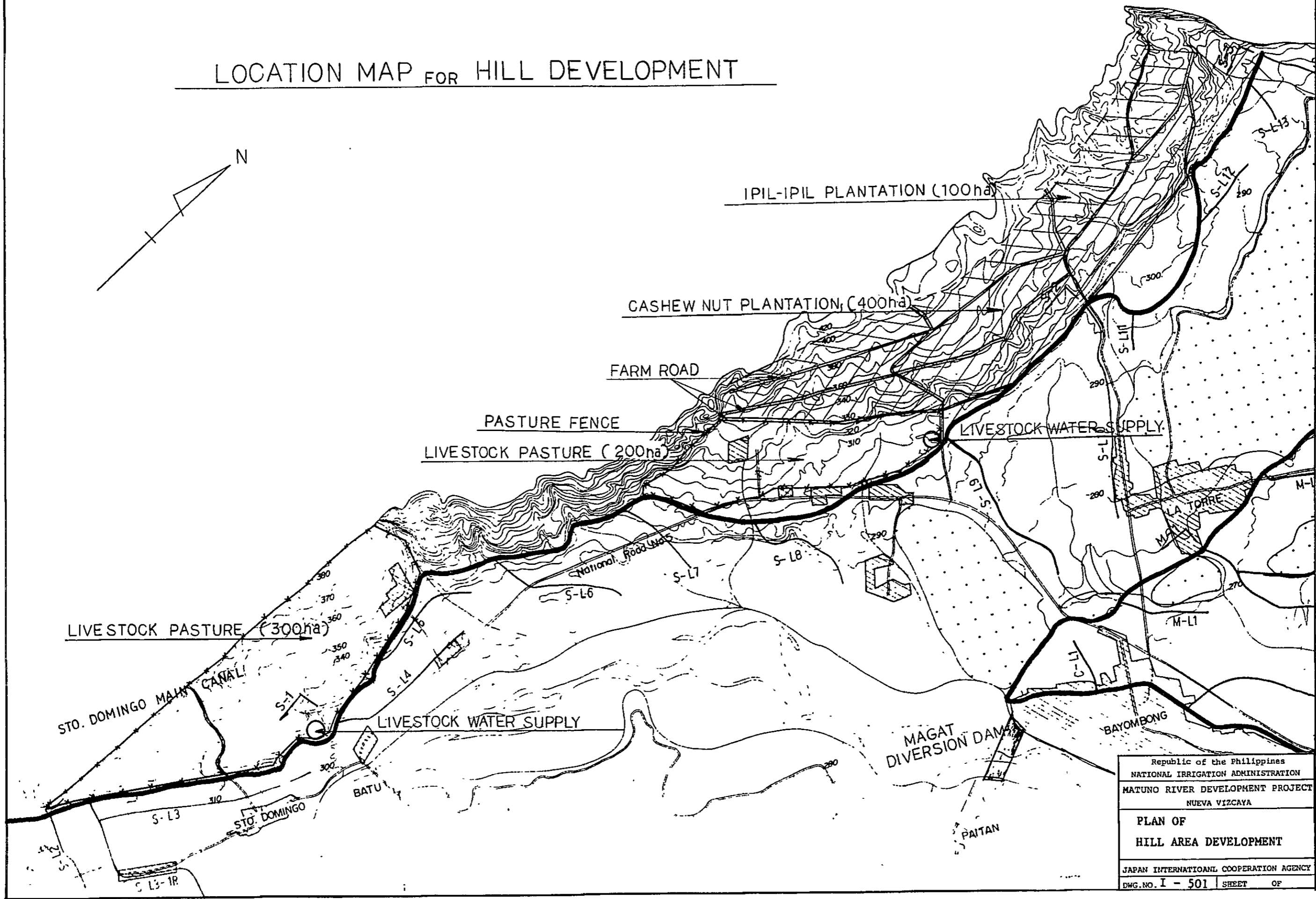
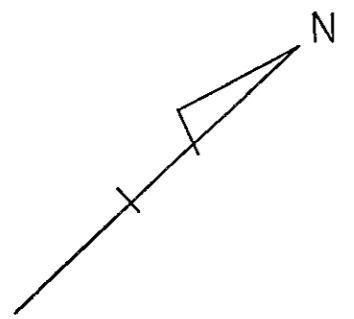
elem	type	A	B	C	D'
B1	(m)	50	—	—	—
B2	(m)	06	—	—	—
L1	(m)	190	15.5	12.0	8.5
L2	(m)	02	—	—	—
L3	(m)	605	—	—	—
L4	(m)	29	—	—	—
L5	(m)	035	—	—	—
C	(m)	02	—	—	—
D1	(m)	02	—	—	—
D2	(m)	0.21	—	—	—
D3	(m)	0.34	—	—	—
D4	(m)	0.1	—	—	—
D5	(m)	0.2	—	—	—
E1	(m)	0.5	—	—	—
E2	(m)	0.18	—	—	—
E3	(m)	0.3	—	—	—
F1	(m)	0.5	—	—	—
F2	(m)	0.05	—	—	—
G1	(m)	1.0	—	—	—
G2	(m)	1.1	—	—	—
G3	(m)	0.4	—	—	—
G4	(m)	2.5	—	—	—
H1	(m)	1.0	—	—	—
H2	(m)	3.5	—	—	—
H3	(m)	1.5	—	—	—
I	(m)	6.2	—	—	—

SUB STRUCTURE

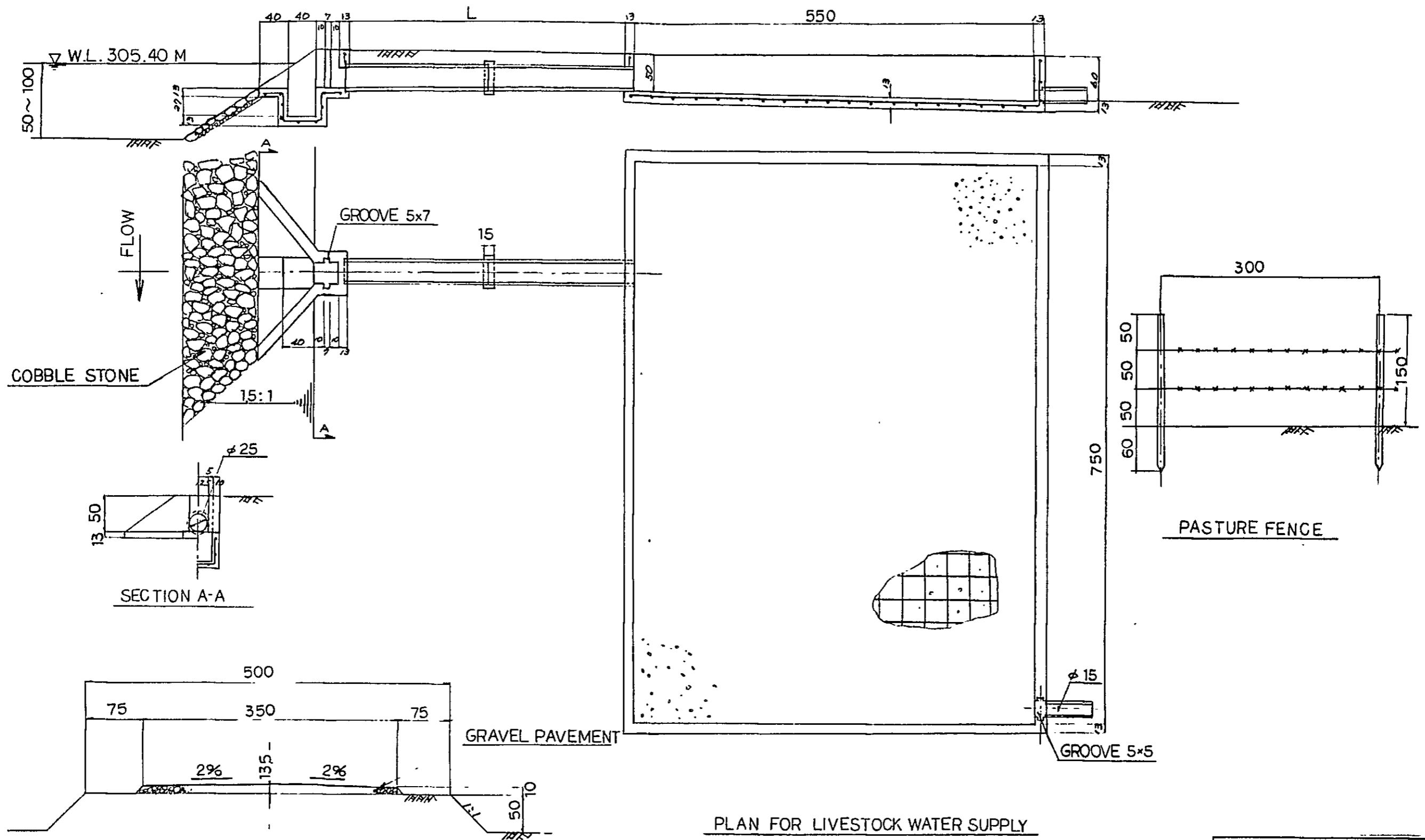


Republic of the Philippines	
NATIONAL IRRIGATION ADMINISTRATION	
MATUNO RIVER DEVELOPMENT PROJECT	
NUEVA VIZCAYA	
BRIDGE	
JAPAN INTERNATIONAL COOPERATION AGENCY	
DWG. NO. I - 417	SHEET OF

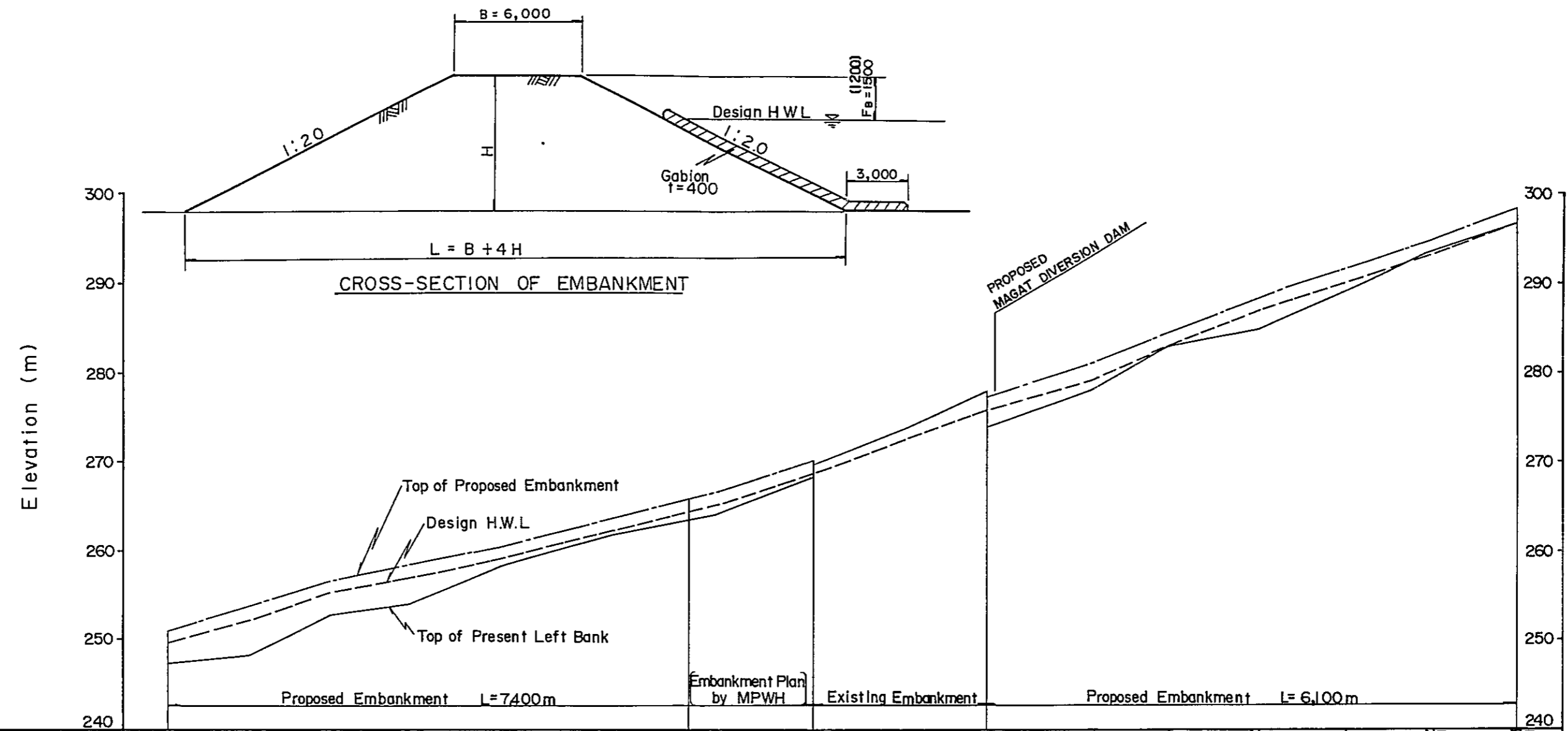
LOCATION MAP FOR HILL DEVELOPMENT



Republic of the Philippines NATIONAL IRRIGATION ADMINISTRATION MATUNO RIVER DEVELOPMENT PROJECT NUEVA VIZCAYA
PLAN OF HILL AREA DEVELOPMENT
JAPAN INTERNATIONAL COOPERATION AGENCY DWG. NO. I - 501 SHEET OF



Republic of the Philippines
NATIONAL IRRIGATION ADMINISTRATION
MATUNO RIVER DEVELOPMENT PROJECT
NUEVA VIZCAYA
HILL AREA DEVELOPMENT
RELATED STRUCTURES
JAPAN INTERNATIONAL COOPERATION AGENCY
DWG. NO. I - 502 SHEET OF



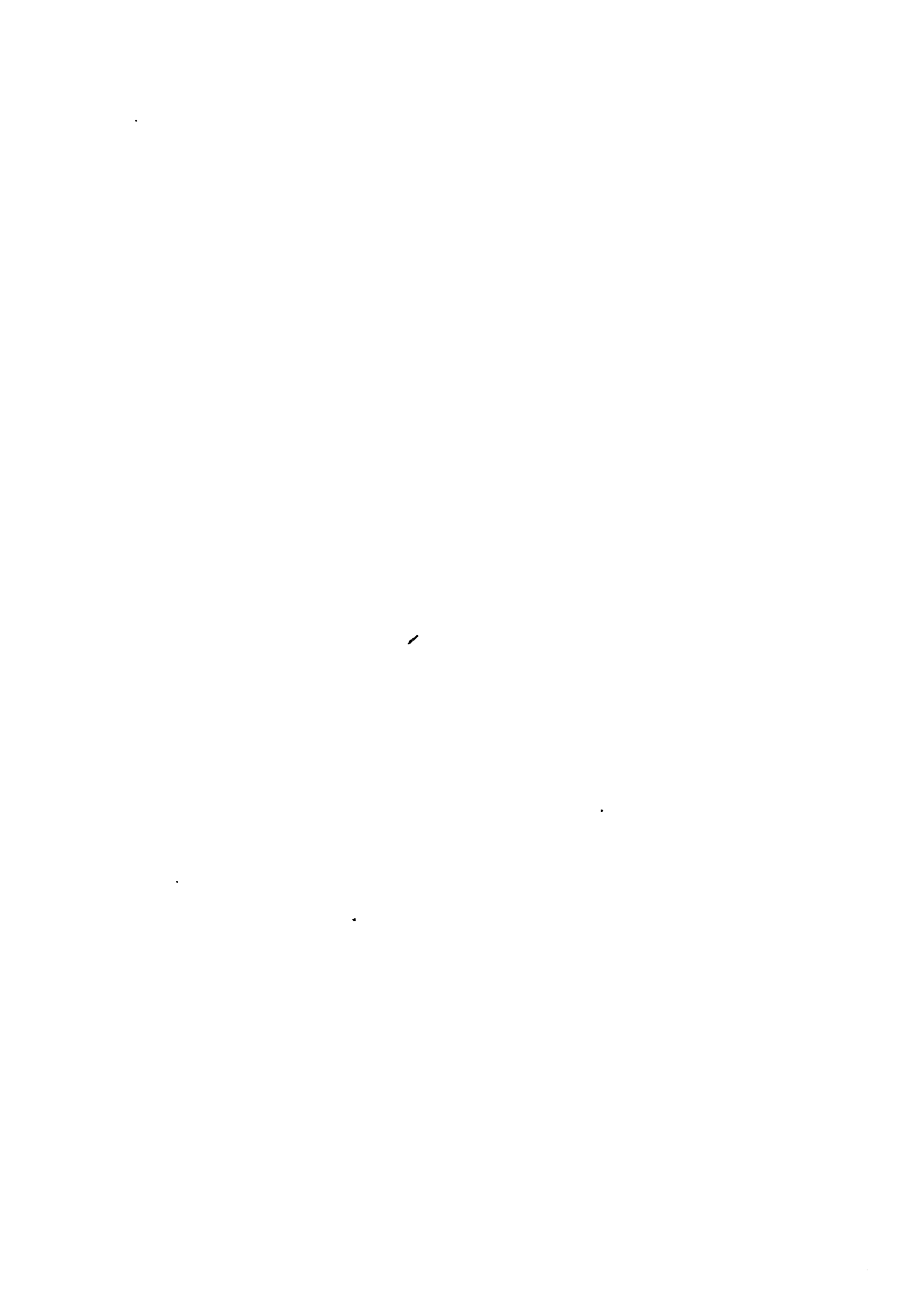
Height of Embankment (m)	3.25 (2.45)	5.36 (4.36)	4.10 (2.90)	4.19 (3.24)	2.14 (1.44)	1.87 (1.27)	2.53 (1.90)	1.82 (1.27)	3.27 (2.77)	2.84 (2.44)	1.46 (1.01)	3.52 (2.92)	2.40 (1.85)	0.92 (0.42)	1.93 (0.98)
Top of Proposed Embankment (EL.m)	251.10 (249.10)	253.90 (251.70)	256.70 (254.30)	258.55 (256.40)	260.40 (258.50)	262.10 (261.80)	266.13 (264.30)	270.35 (268.60)	274.40 (271.90)	280.90 (278.30)	284.75 (283.10)	288.60 (286.80)	291.55 (289.80)	294.50 (292.80)	298.55 (296.40)
Design H.W.L. (EL.m)	249.60 (249.10)	252.40 (251.70)	255.20 (254.30)	257.05 (256.40)	258.90 (258.50)	262.10 (261.80)	266.13 (264.30)	268.65 (268.60)	274.40 (271.90)	280.90 (278.30)	284.75 (283.10)	288.60 (286.80)	291.55 (289.80)	294.50 (292.80)	298.55 (296.40)
Top of Present Left Bank (EL.m)	247.86 (247.86)	248.54 (248.54)	252.60 (252.60)	254.36 (254.36)	258.26 (258.26)	261.73 (261.73)	263.60 (263.60)	268.53 (268.53)	272.40 (272.40)	278.06 (278.06)	283.29 (283.29)	285.06 (285.06)	289.15 (289.15)	293.56 (293.56)	296.62 (296.62)
Distance (m.)	0	900	1,820	2,770	3,800	5,060	6,000	7,400	8,430	9,450	10,630	11,530	12,530	13,570	14,530
Section No.	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9

∟ () for 10-Year Return Period Flood

Republic of the Philippines
 NATIONAL IRRIGATION ADMINISTRATION
 MATUNO RIVER DEVELOPMENT PROJECT
 NUEVA VIZCAYA

PROFILE OF EMBANKMENT

JAPAN INTERNATIONAL COOPERATION AGENCY
 DWG. NO. I - 601 SHEET OF

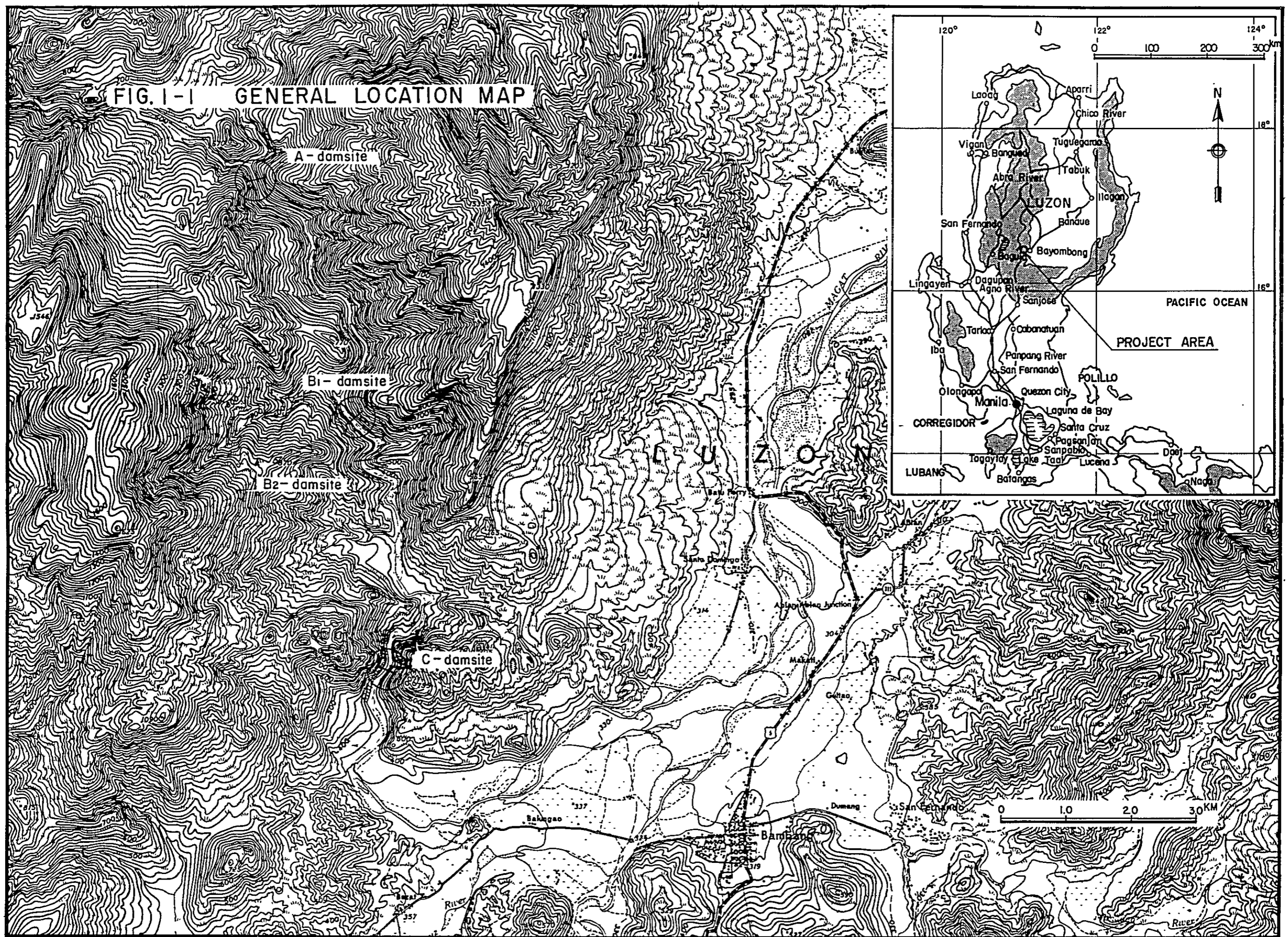


MATUNO RIVER DEVELOPMENT PROJECT

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FIG. I-1 GENERAL LOCATION MAP





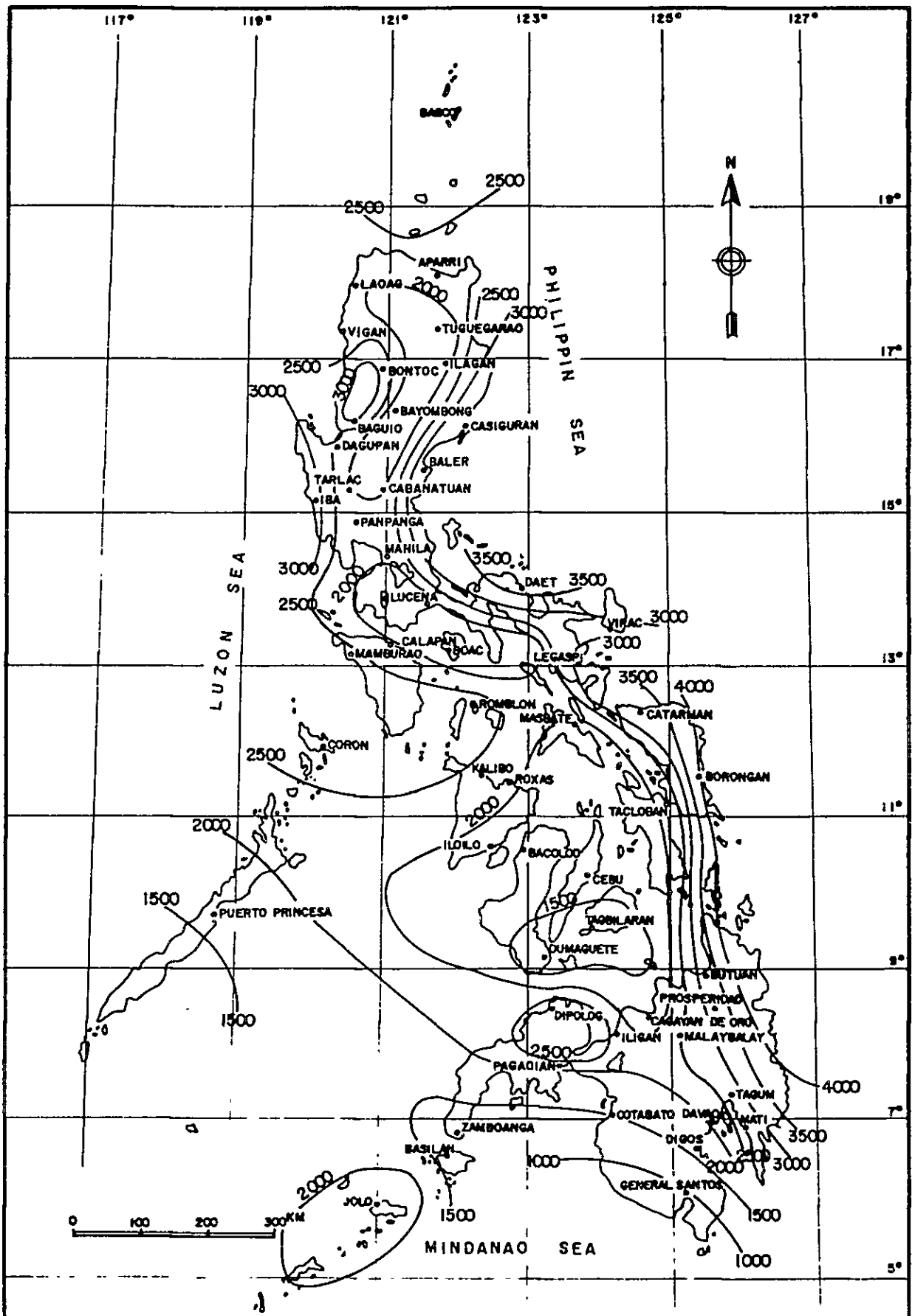
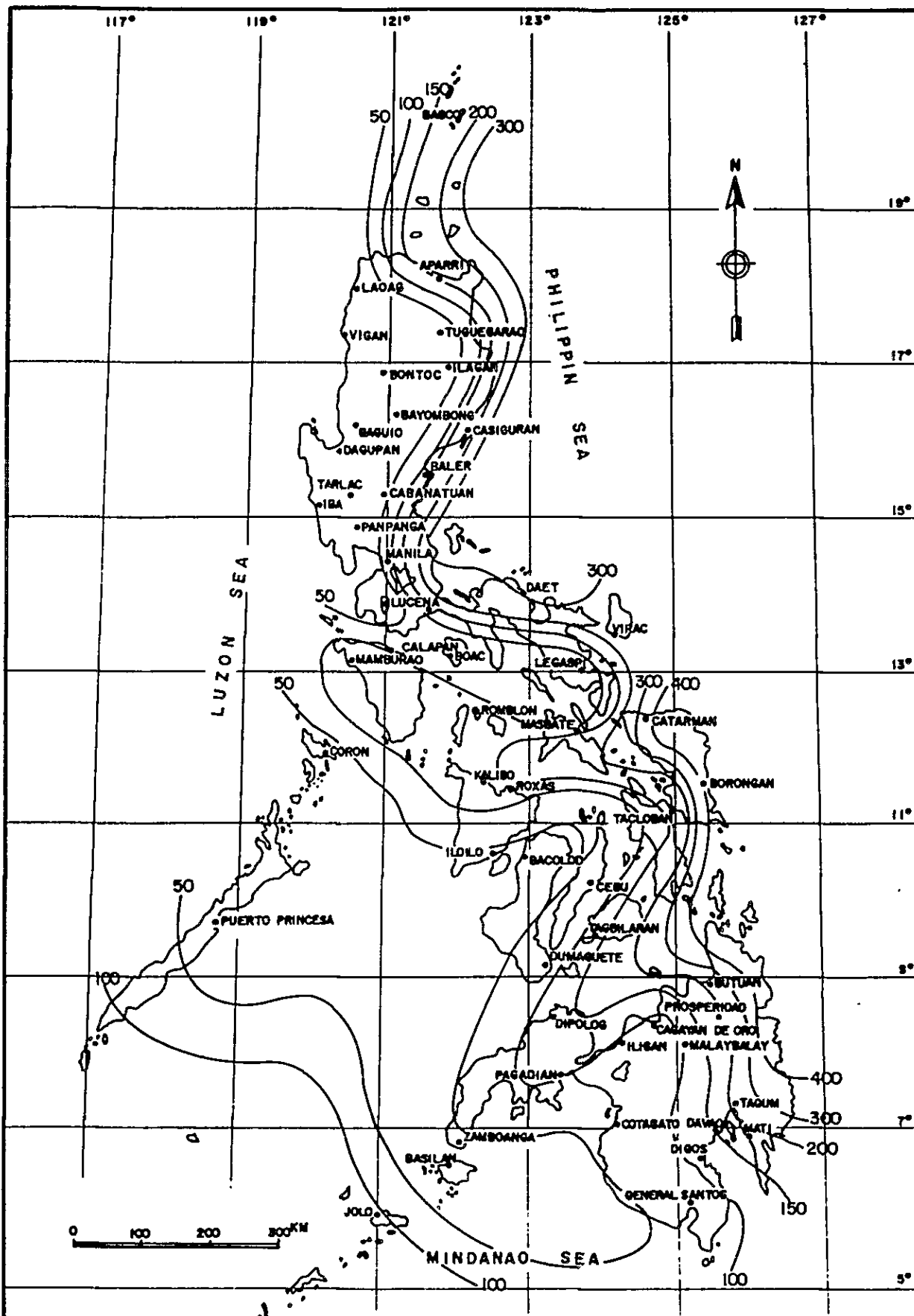
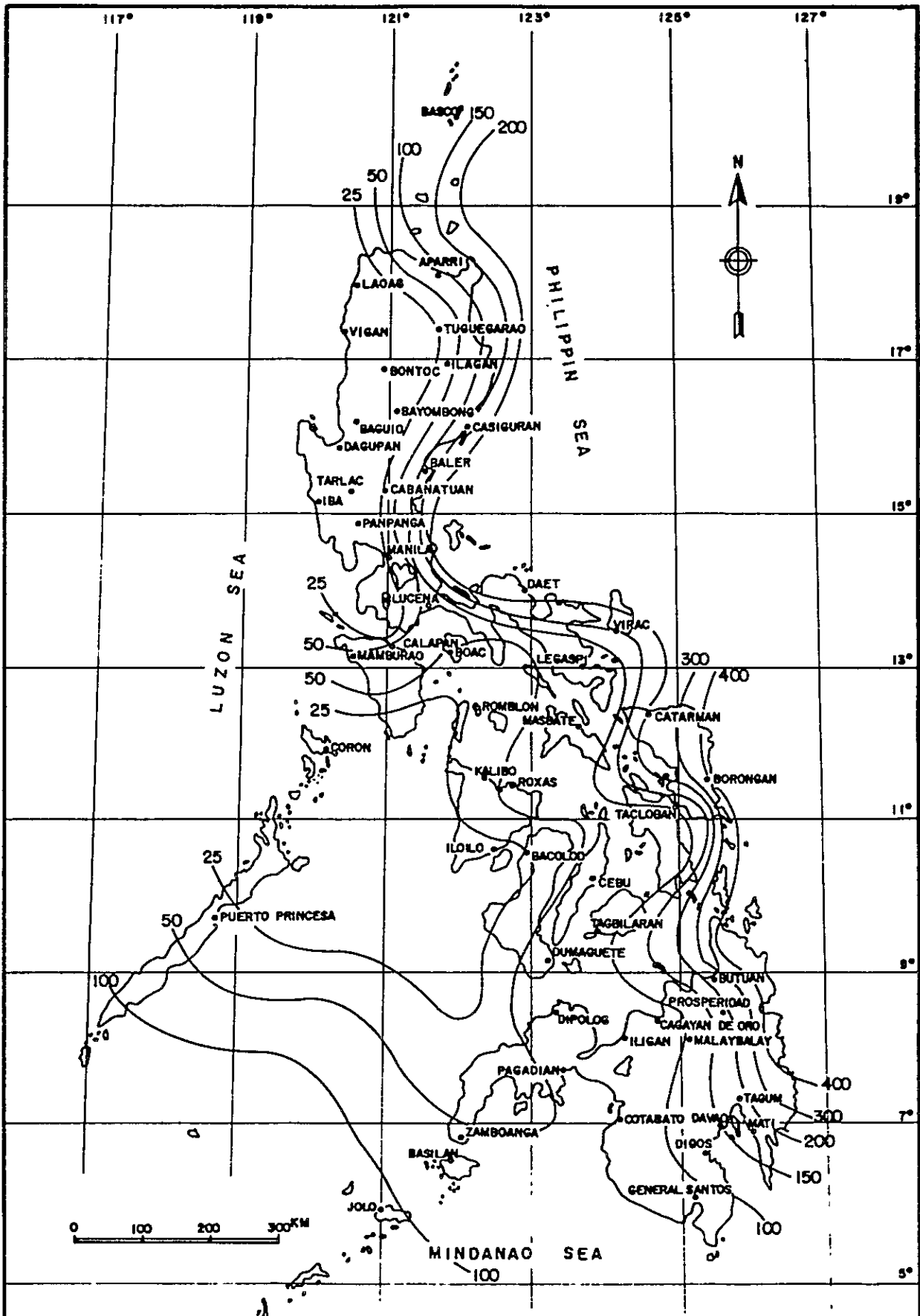


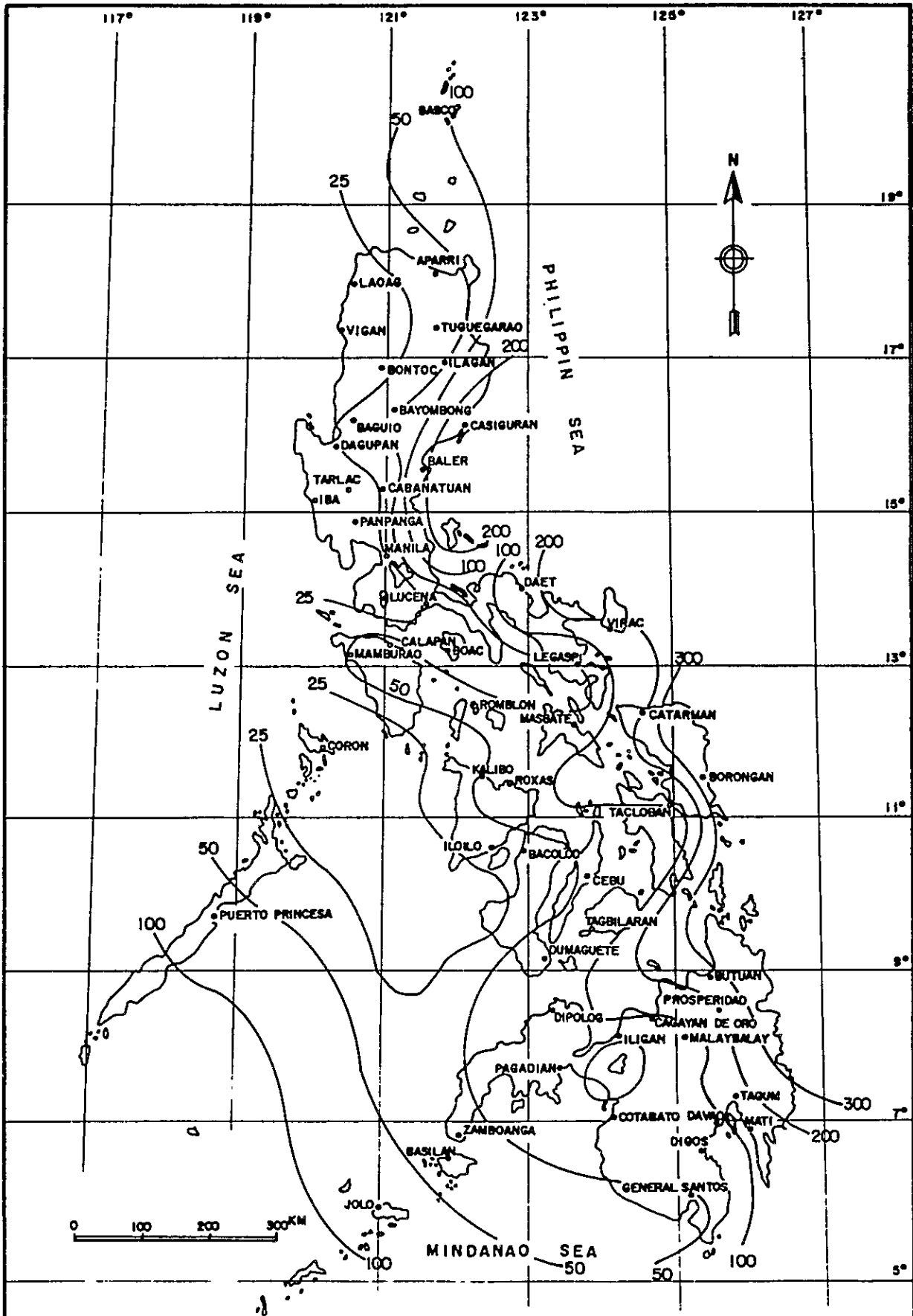
FIG. 1-2 ANNUAL NORMAL RAINFALL DISTRIBUTION IN THE PHILIPPINES



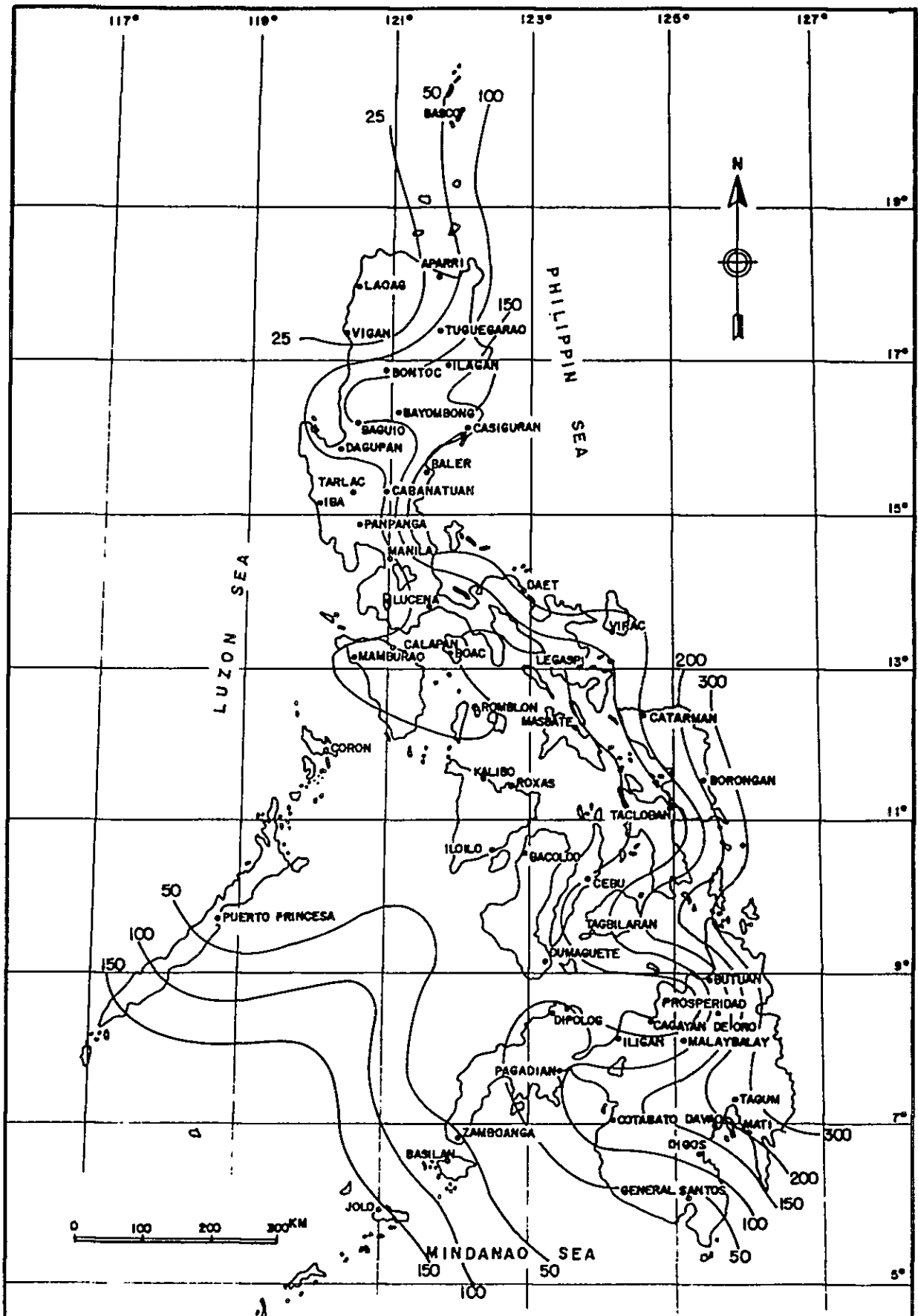
**FIG. I-3 MONTHLY NORMAL RAINFALL DISTRIBUTION
IN THE PHILIPPINES (MILLIMETERS)
JANUARY 1951 - 1970**



**FIG. I-4 MONTHLY NORMAL RAINFALL DISTRIBUTION
IN THE PHILIPPINES (MILLIMETERS)
FEBRUARY 1951 - 1970**



**FIG. I-5 MONTHLY NORMAL RAINFALL DISTRIBUTION
IN THE PHILIPPINES (MILLIMETERS)
MARCH 1951 - 1970**



**FIG. I-6 MONTHLY NORMAL RAINFALL DISTRIBUTION
IN THE PHILIPPINES (MILLIMETERS)**

APRIL 1951 - 1970

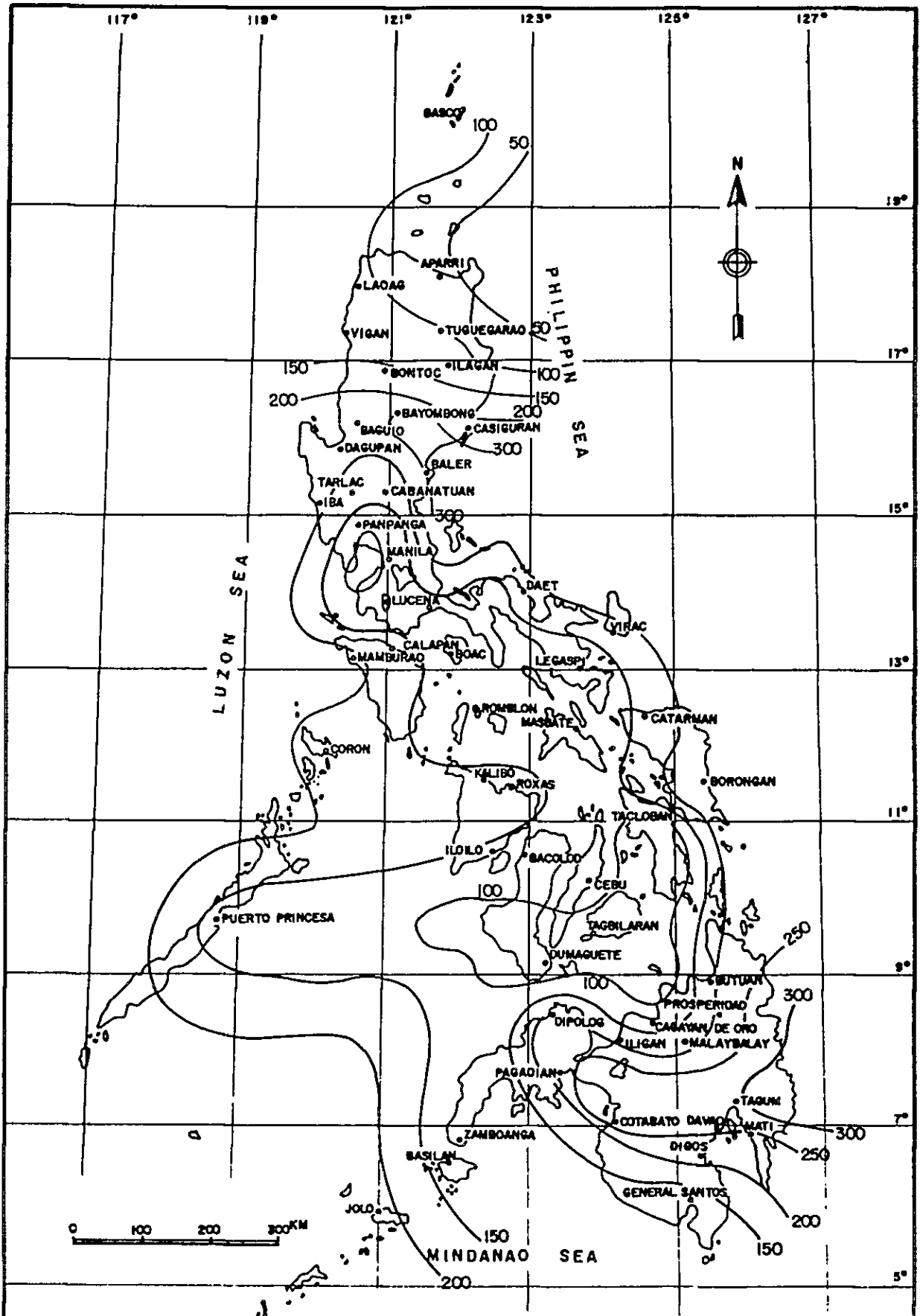
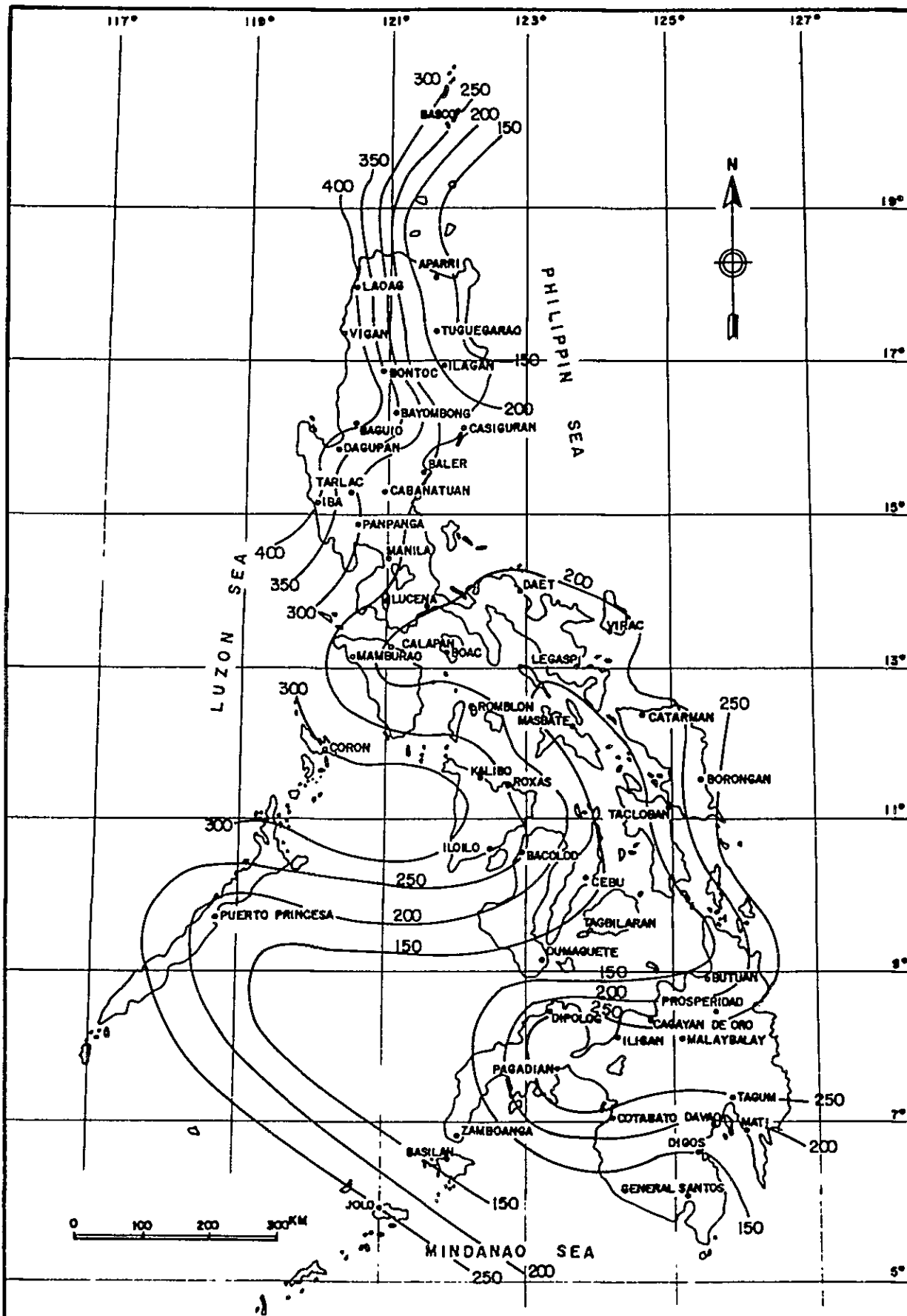


FIG. I-7 MONTHLY NORMAL RAINFALL DISTRIBUTION
IN THE PHILIPPINES (MILLIMETERS)
MAY 1951 - 1970



**FIG. I-8 MONTHLY NORMAL RAINFALL DISTRIBUTION
IN THE PHILIPPINES (MILLIMETERS)
JUNE 1951 - 1970**

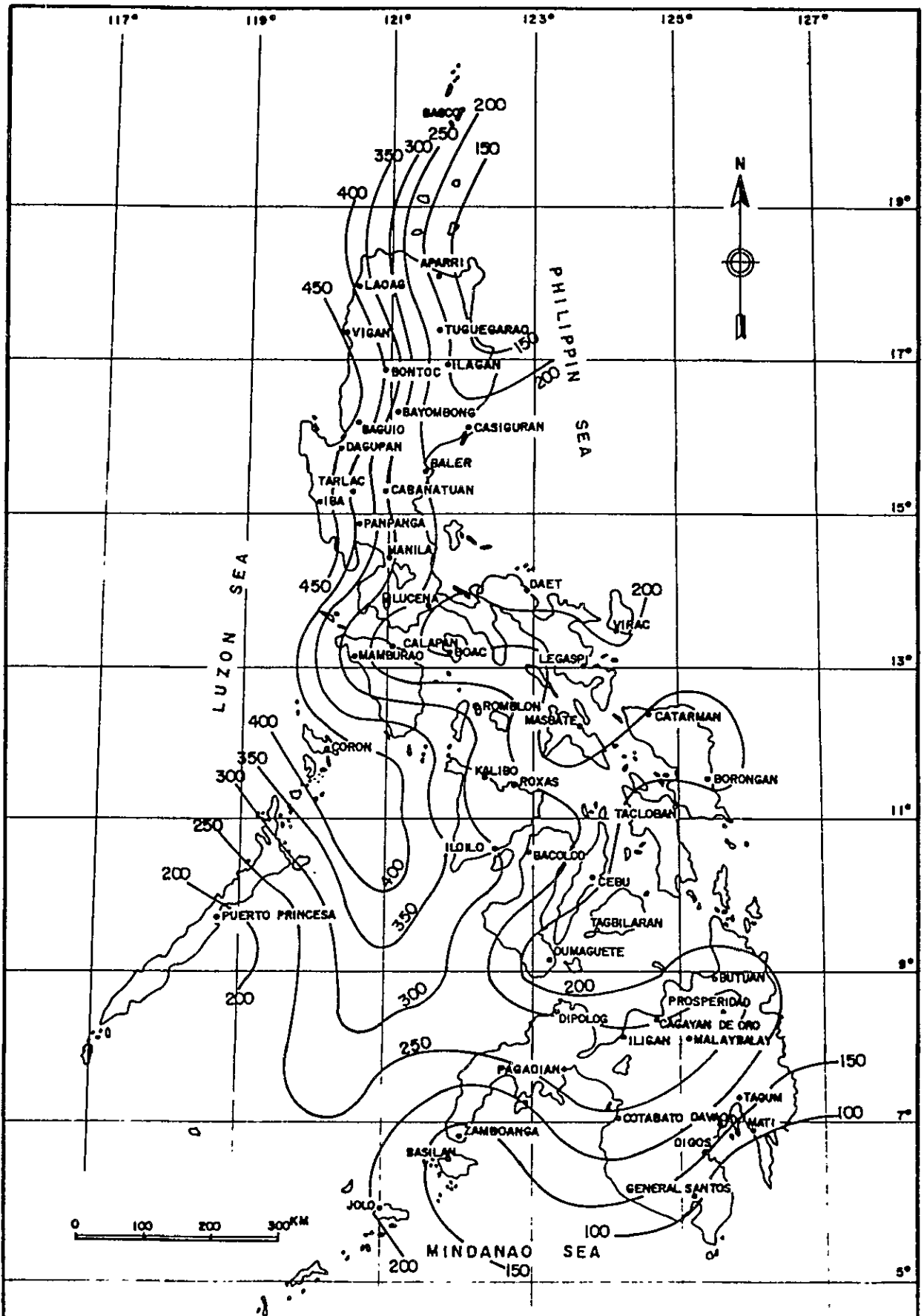


FIG. I-9 MONTHLY NORMAL RAINFALL DISTRIBUTION IN THE PHILIPPINES (MILLIMETERS) JULY 1951 - 1970

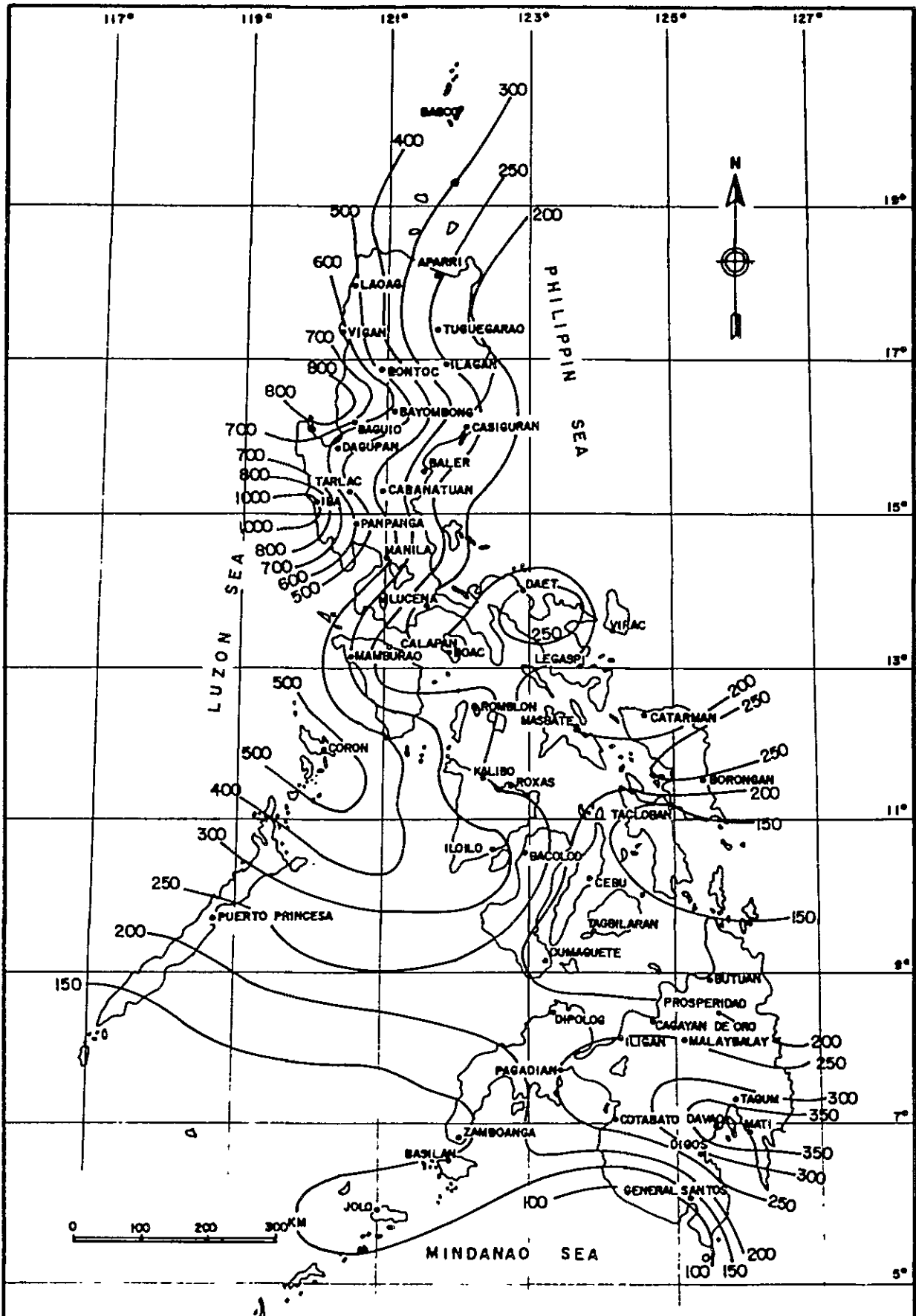
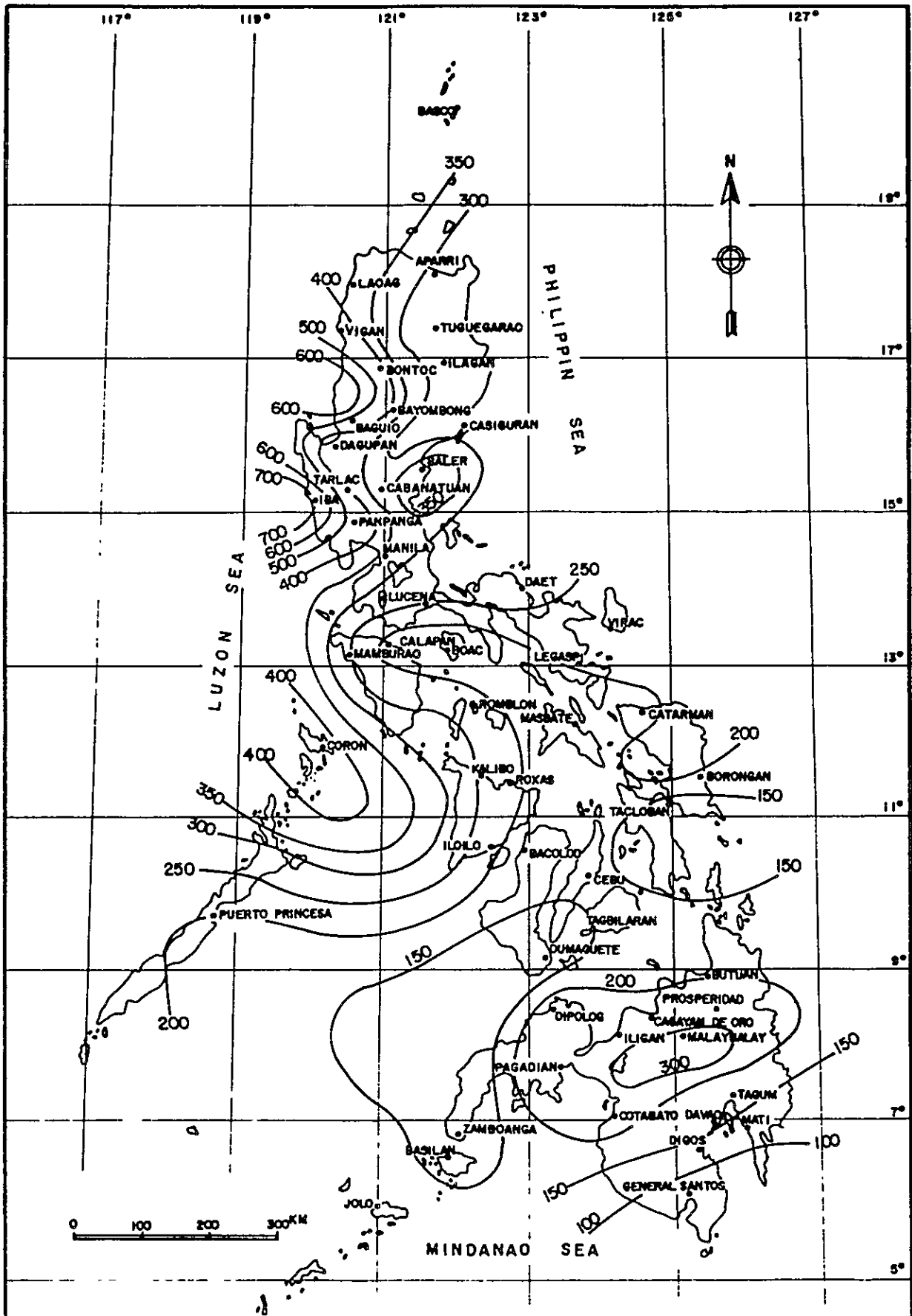
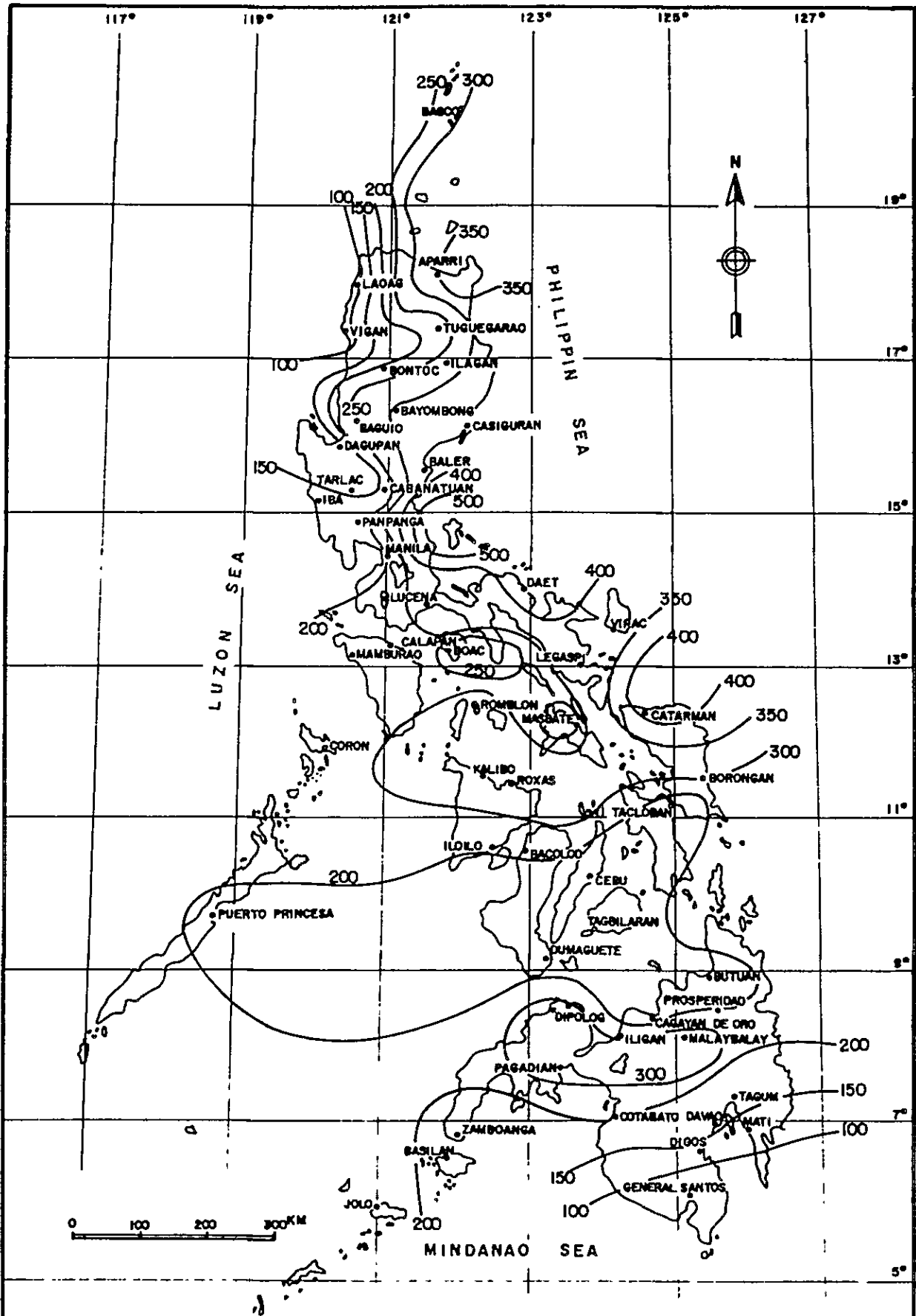


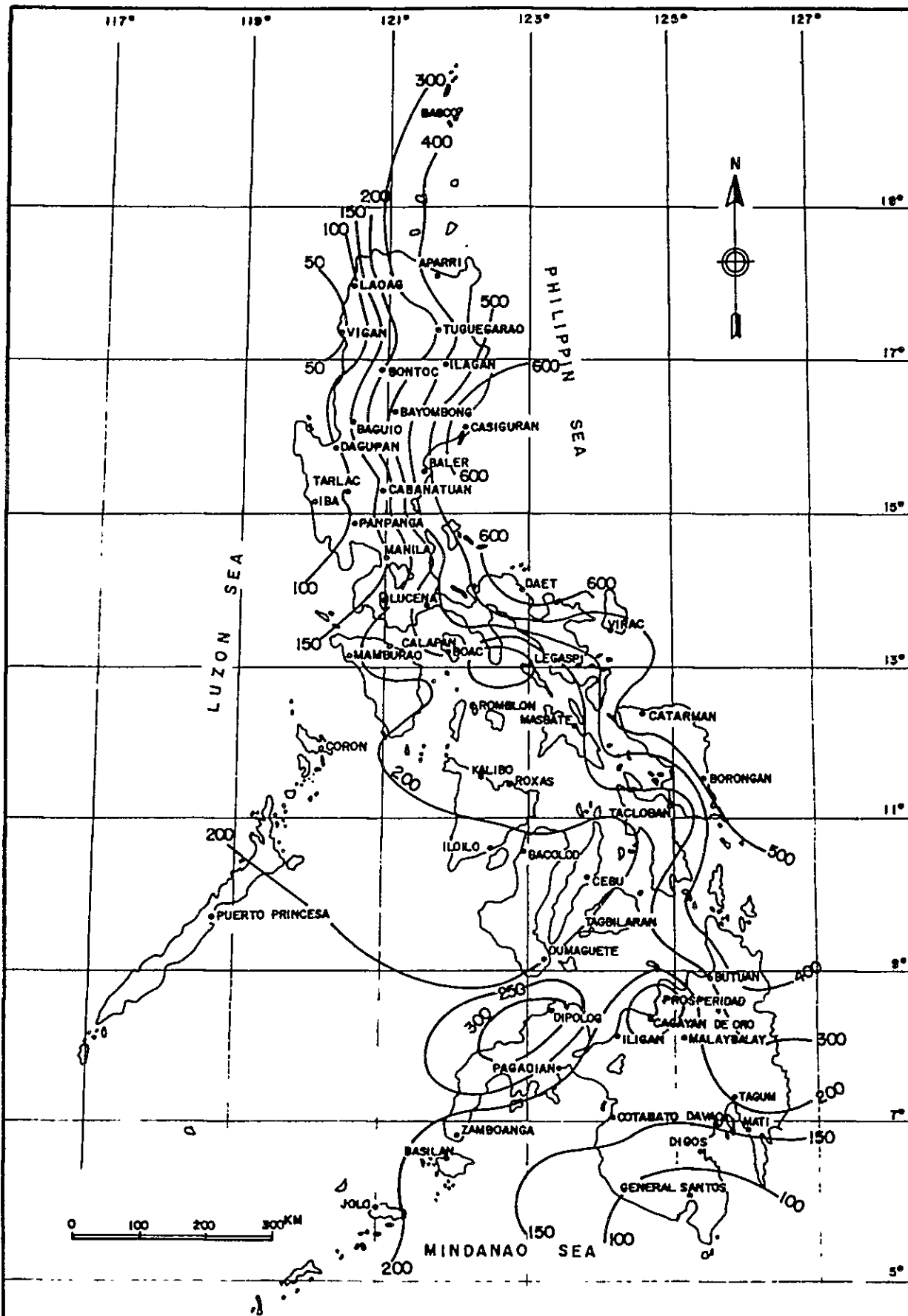
FIG. I-10 **MONTHLY NORMAL RAINFALL DISTRIBUTION**
IN THE PHILIPPINES (MILLIMETERS)
AUGUST 1951 - 1970



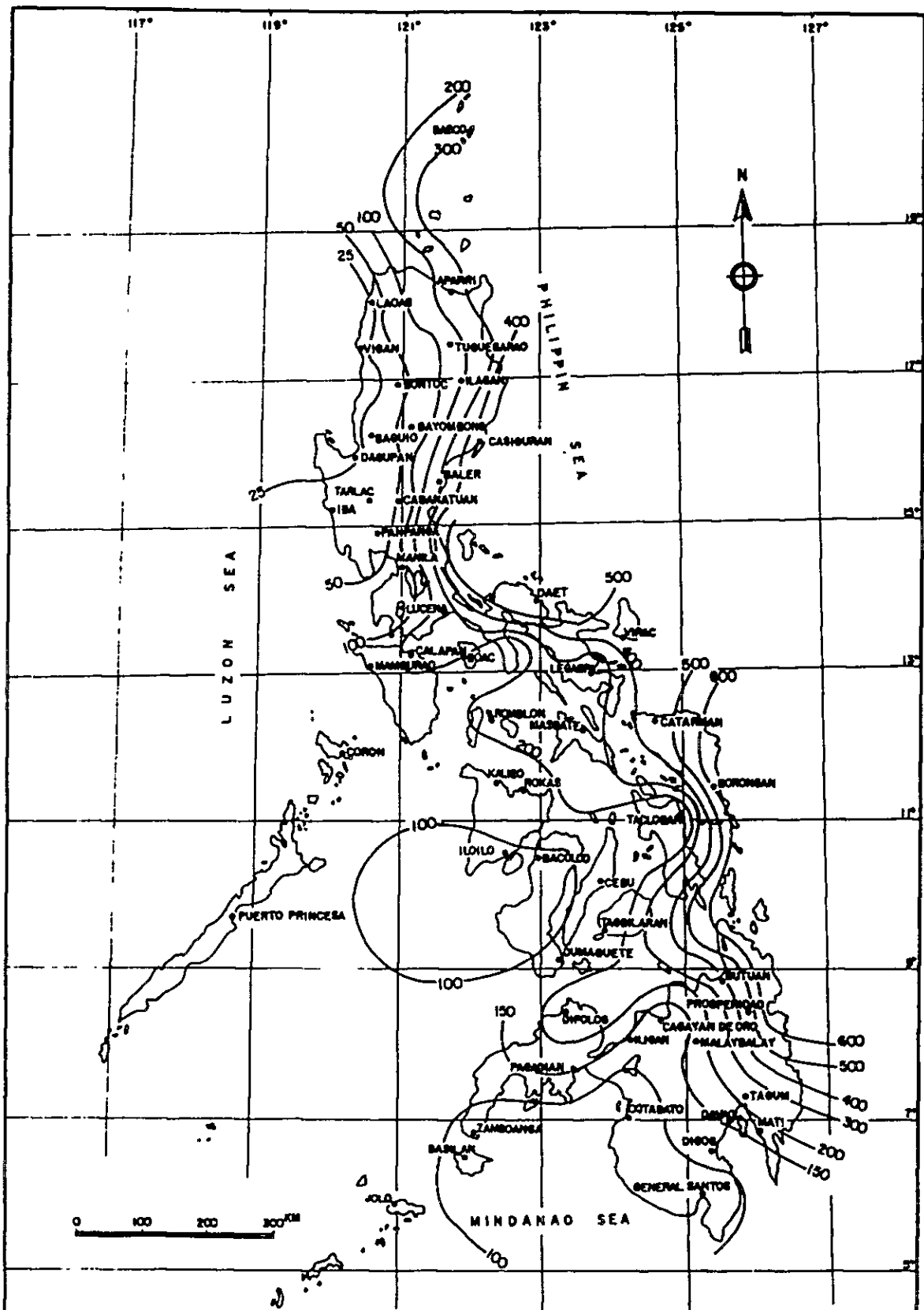
**FIG. I-II MONTHLY NORMAL RAINFALL DISTRIBUTION
IN THE PHILIPPINES (MILLIMETERS)
SEPTEMBER 1951 - 1970**



**FIG. 1-12 MONTHLY NORMAL RAINFALL DISTRIBUTION
IN THE PHILIPPINES (MILLIMETERS)
OCTOBER 1951 - 1970**



**FIG. I-13 MONTHLY NORMAL RAINFALL DISTRIBUTION
IN THE PHILIPPINES (MILLIMETERS)
NOVEMBER 1951 - 1970**



**FIG. I-14 MONTHLY NORMAL RAINFALL DISTRIBUTION
IN THE PHILIPPINES (MILLIMETERS)
DECEMBER 1951-1970**

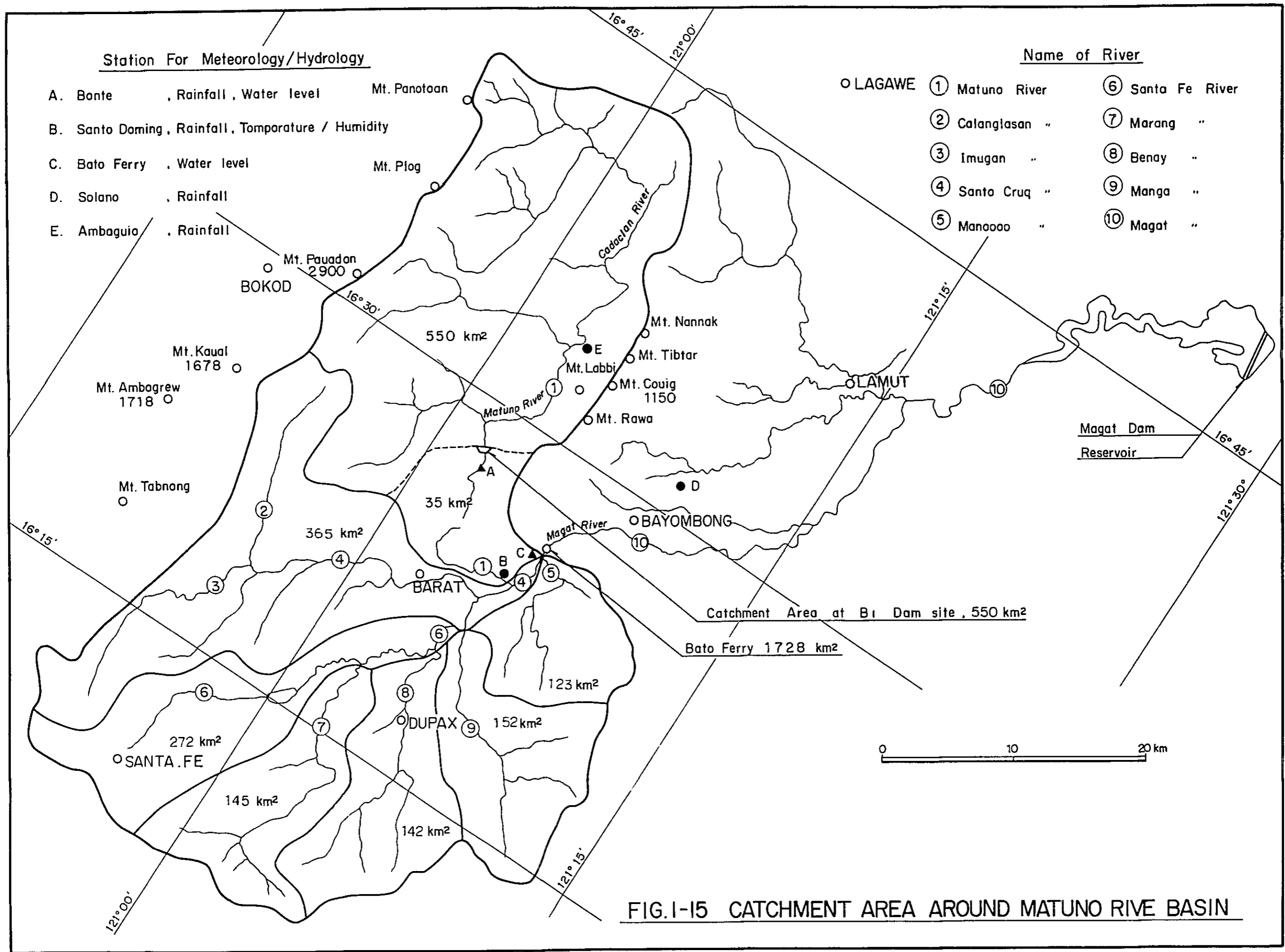


FIG.1-15 CATCHMENT AREA AROUND MATUNO RIVE BASIN

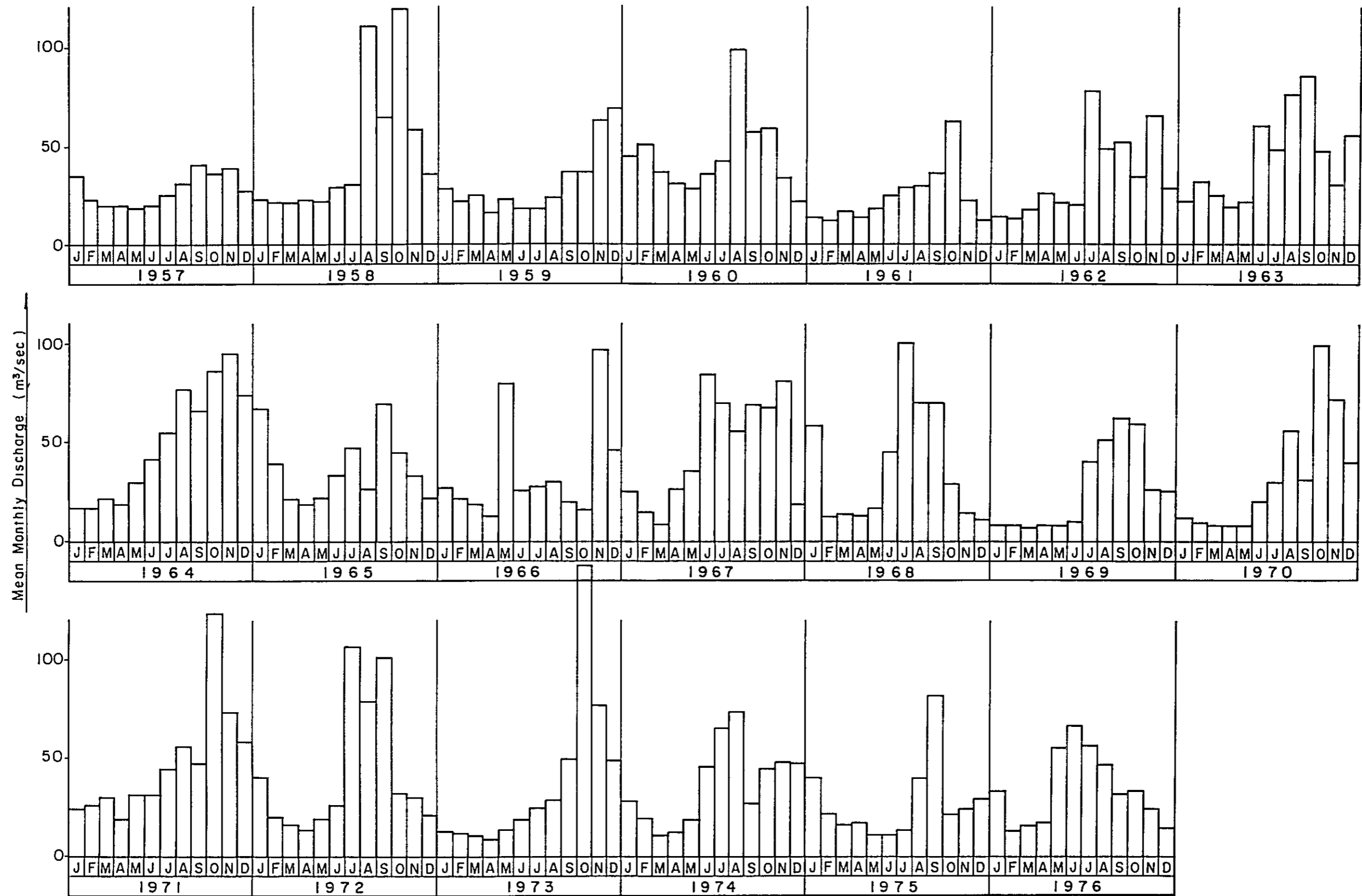


FIG. I-16 REVISED MONTHLY DISCHARGE AT BI DAMSITE

FIG. 2-1 LAYOUT OF B₁ DAM AND POWER STATION

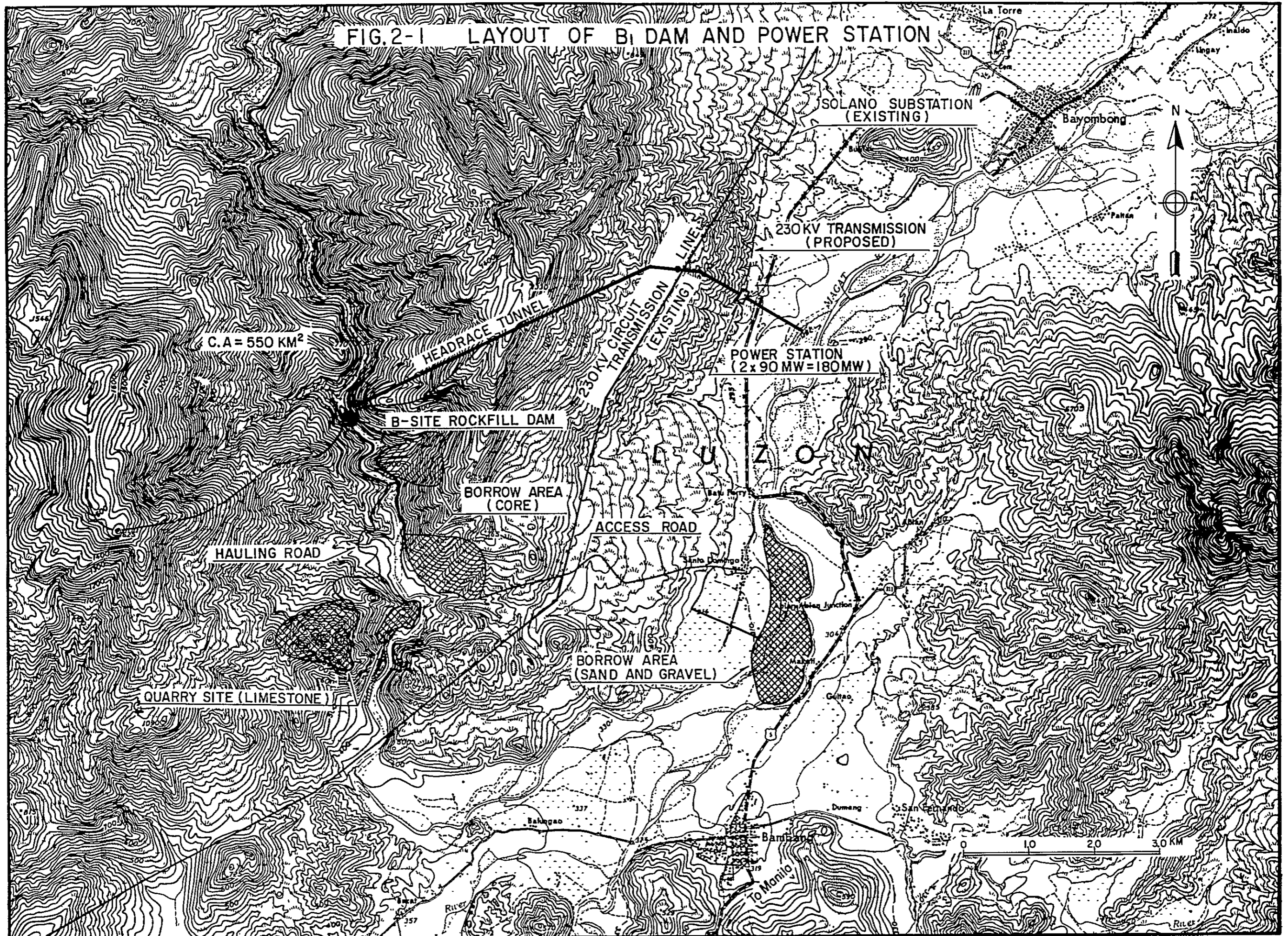
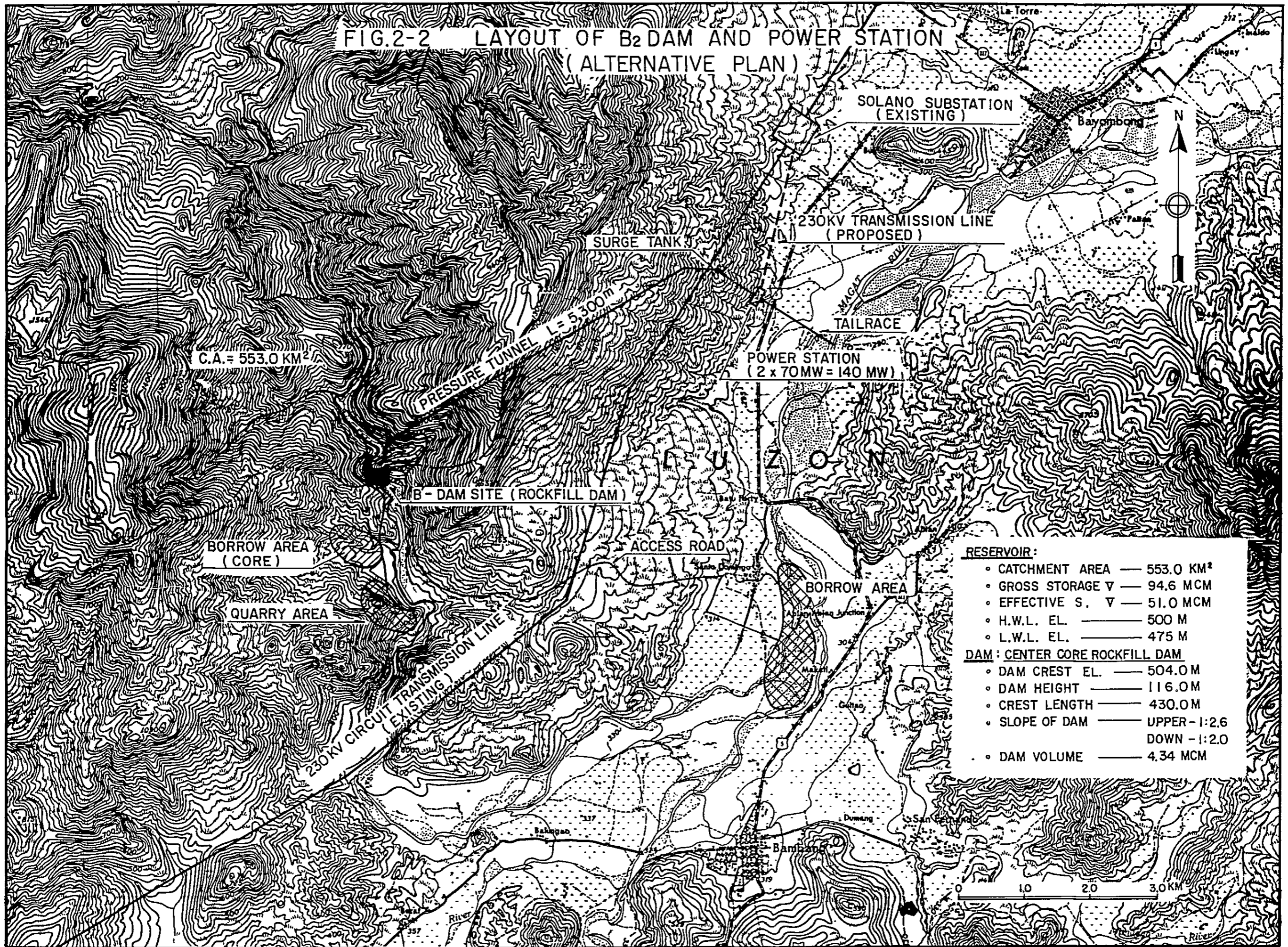


FIG.2-2 LAYOUT OF B₂ DAM AND POWER STATION
(ALTERNATIVE PLAN)



C.A. = 553.0 KM²

PRESSURE TUNNEL L = 5,300M

POWER STATION
(2 x 70MW = 140 MW)

B - DAM SITE (ROCKFILL DAM)

BORROW AREA
(CORE)

QUARRY AREA

ACCESS ROAD

BORROW AREA

230KV CIRCUIT TRANSMISSION LINE
(EXISTING)

SOLANO SUBSTATION
(EXISTING)

230KV TRANSMISSION LINE
(PROPOSED)

TAILRACE

RESERVOIR:

- CATCHMENT AREA — 553.0 KM²
- GROSS STORAGE ∇ — 94.6 MCM
- EFFECTIVE S. ∇ — 51.0 MCM
- H.W.L. EL. — 500 M
- L.W.L. EL. — 475 M

DAM: CENTER CORE ROCKFILL DAM

- DAM CREST EL. — 504.0 M
- DAM HEIGHT — 116.0 M
- CREST LENGTH — 430.0 M
- SLOPE OF DAM — UPPER - 1:2.6
DOWN - 1:2.0
- DAM VOLUME — 4.34 MCM

0 1.0 2.0 3.0 KM

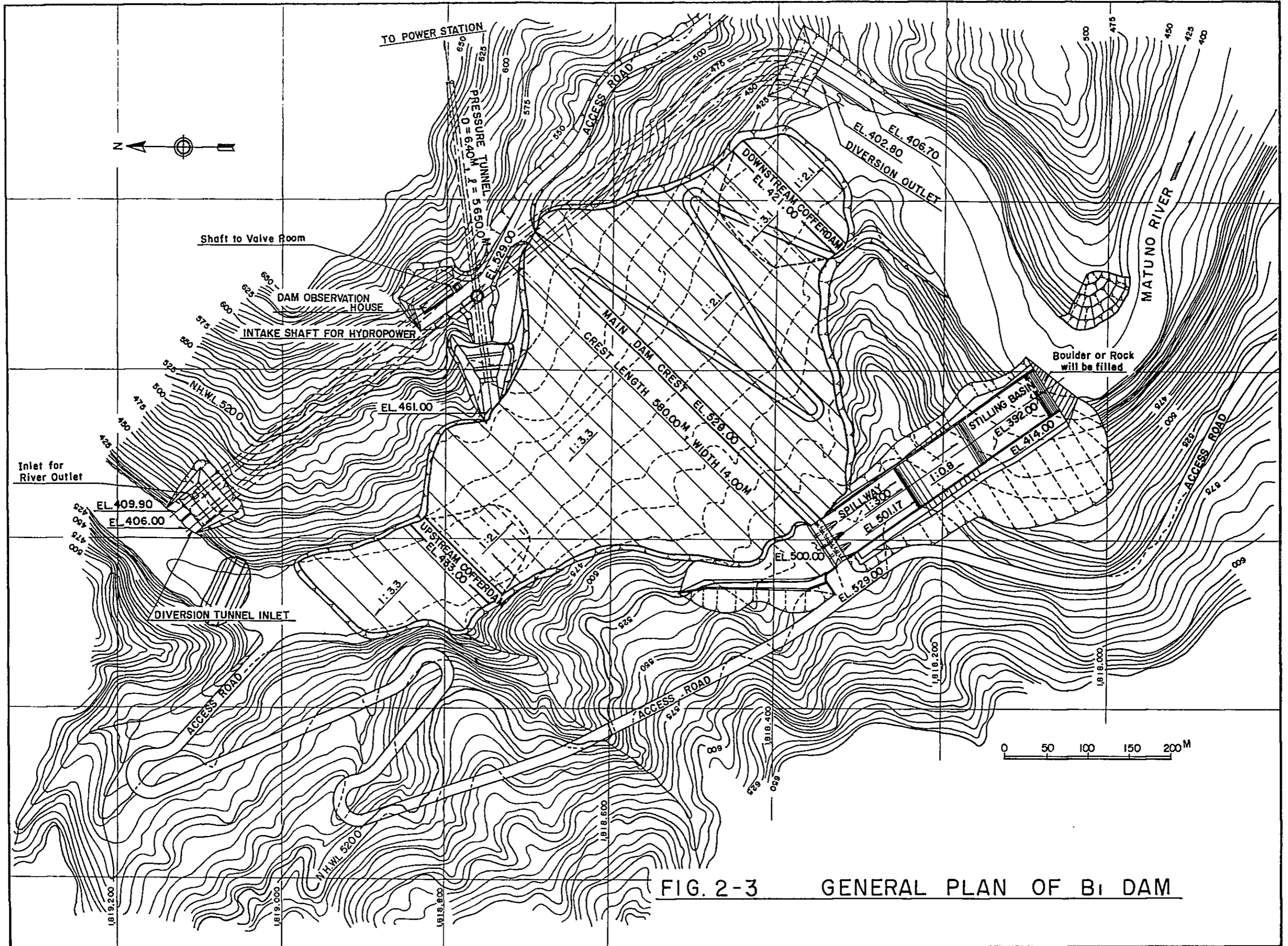


FIG. 2-3 GENERAL PLAN OF BI DAM

PROFILE OF 'BI' HIGH DAM
(ROCKFILL WITH CENTER CORE ZONE)

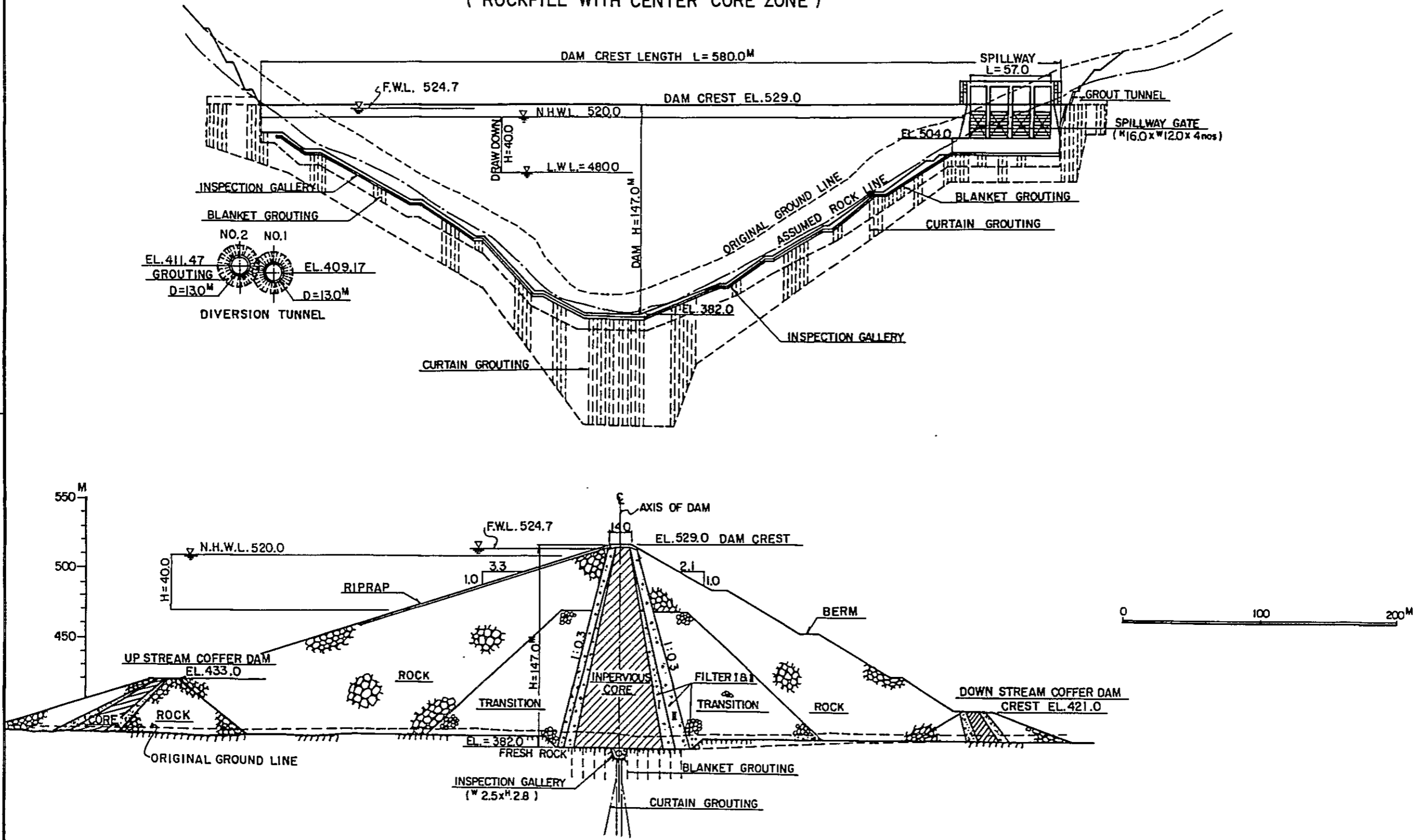


FIG. 2-4 TYPICAL CROSS SECTION AND PROFILE

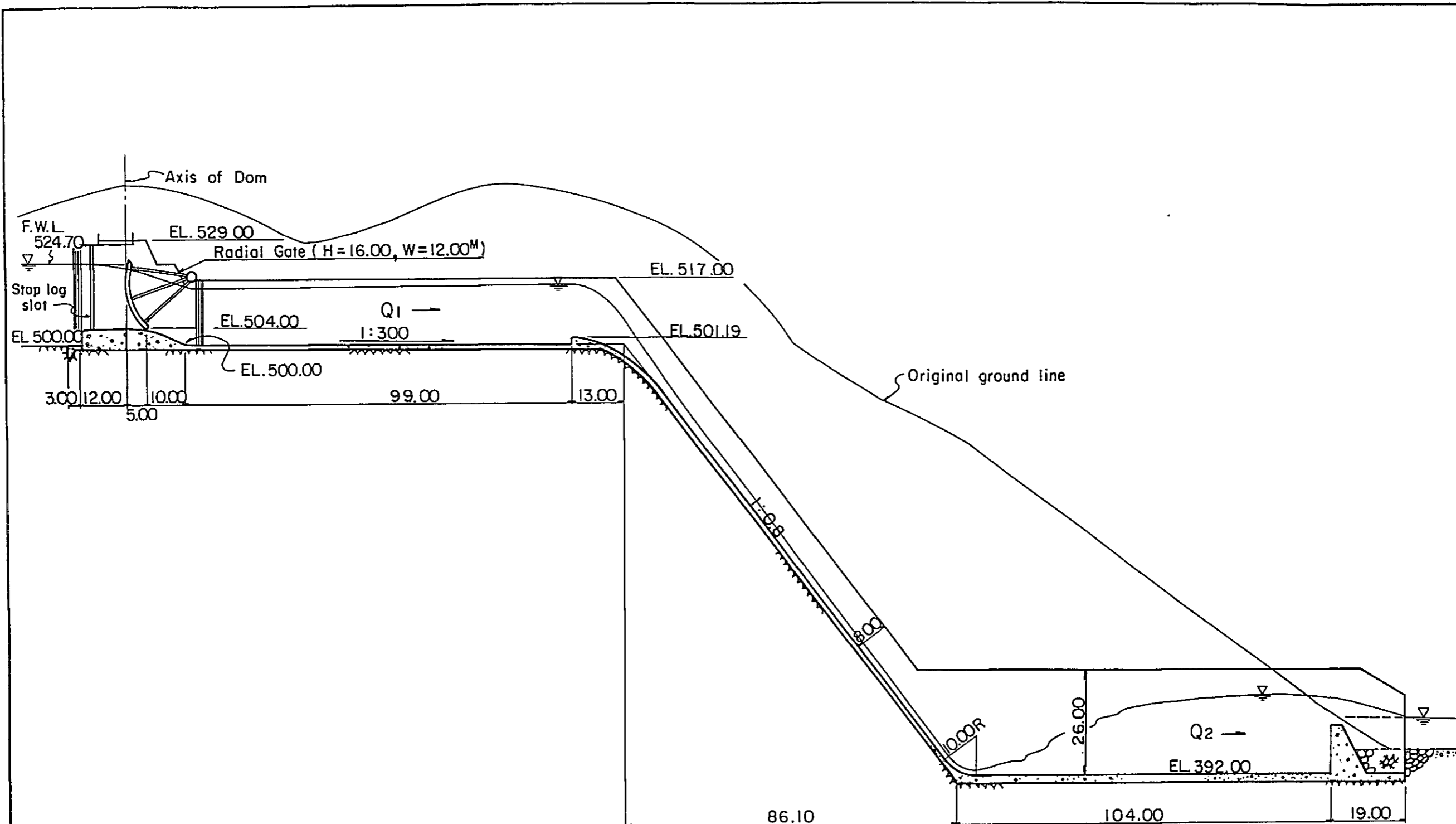
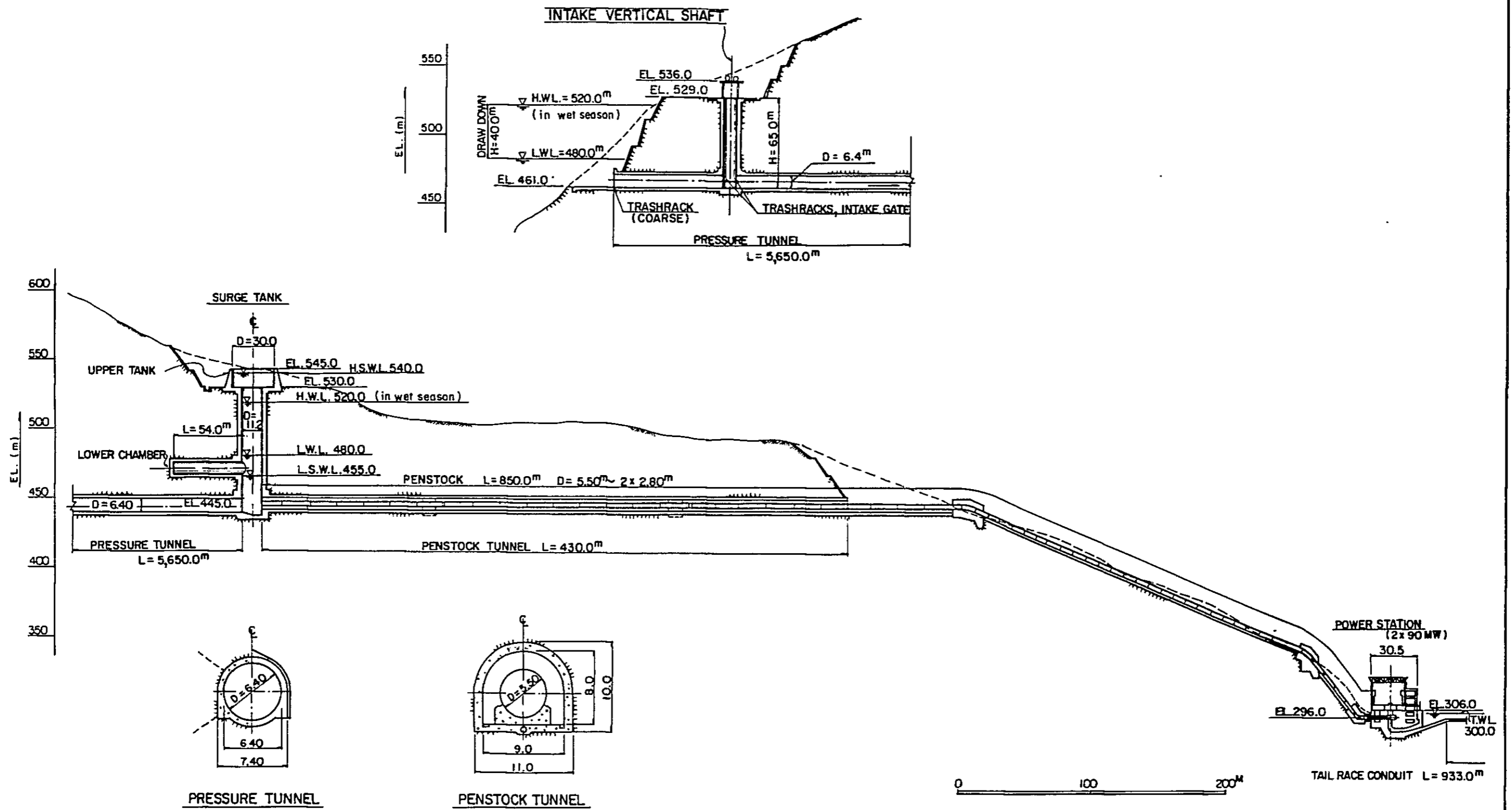
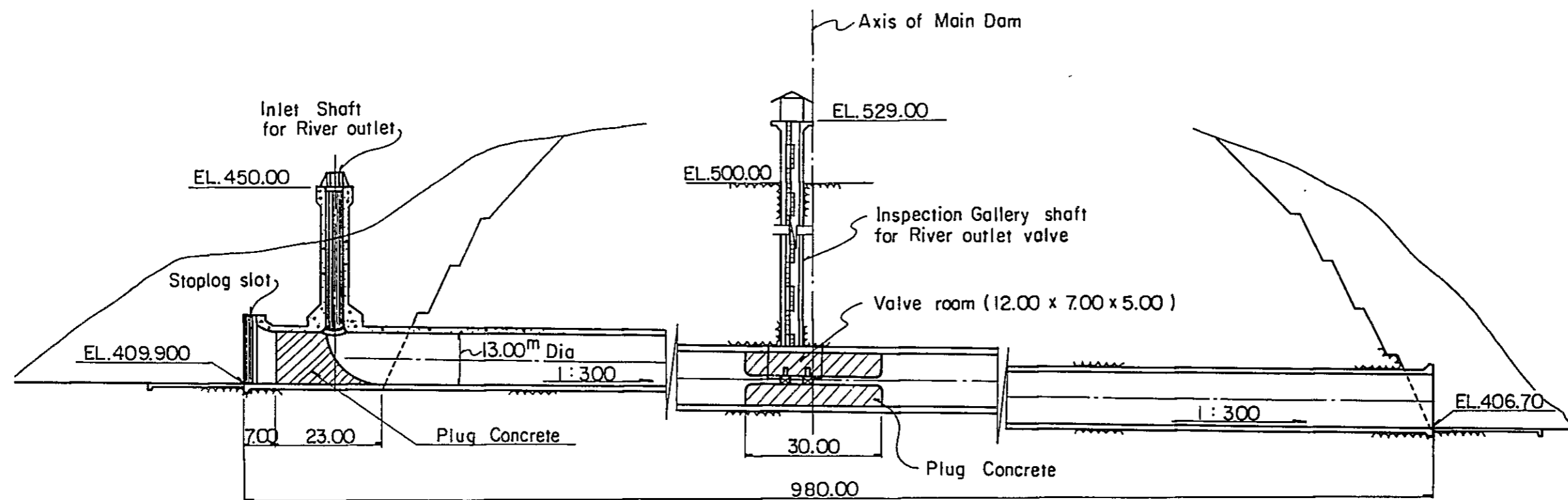


FIG. 2-5 LONGITUDINAL SECTION OF SPILLWAY

FIG. 2-6 LONGITUDINAL SECTION OF PRESSURE TUNNEL AND PENSTOCK





Note; No.2 diversion tunnel will be re-used as river outlet after completion of dam construction.

FIG. 2-7 LONGITUDINAL SECTION OF RIVER OUTLET

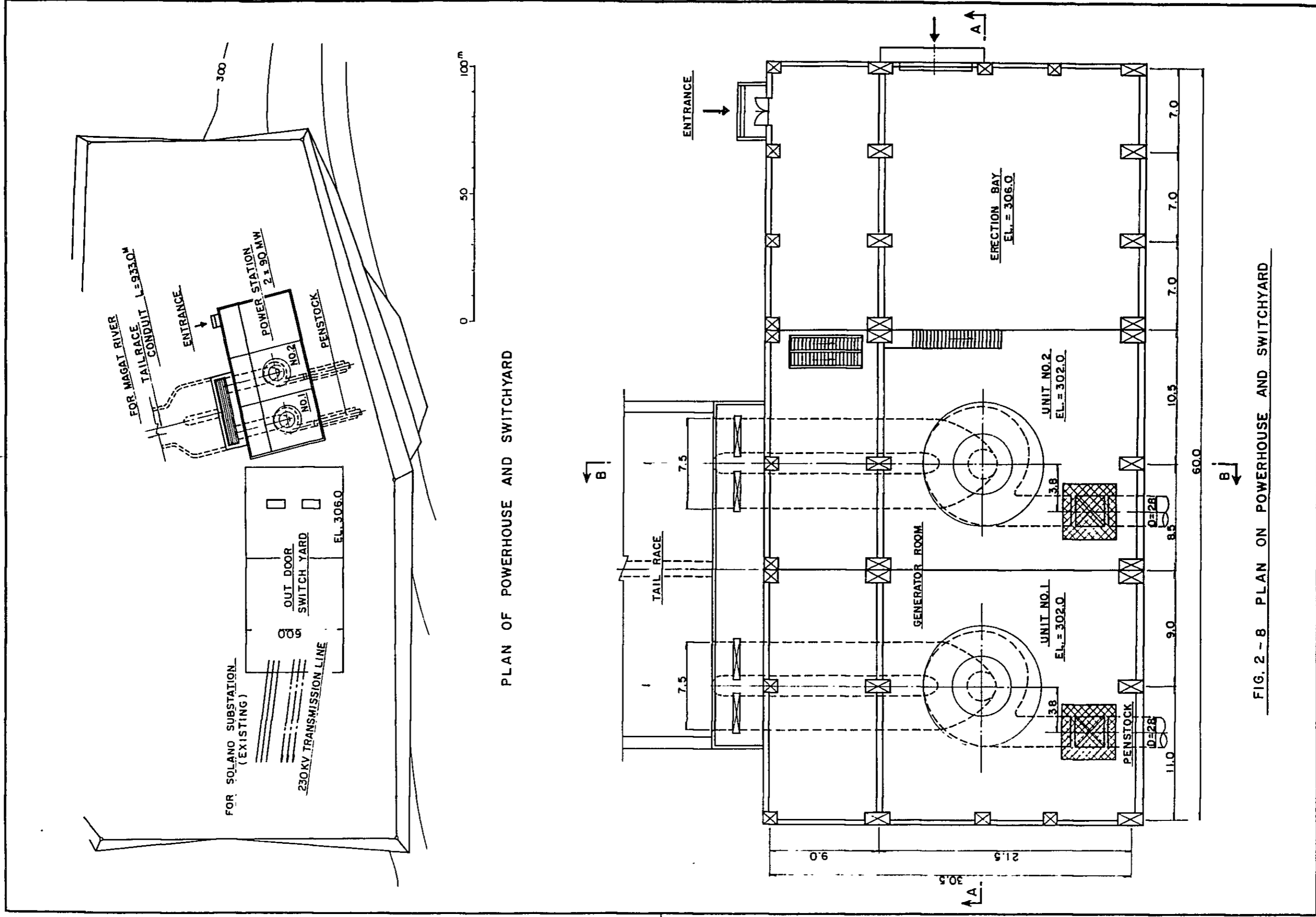
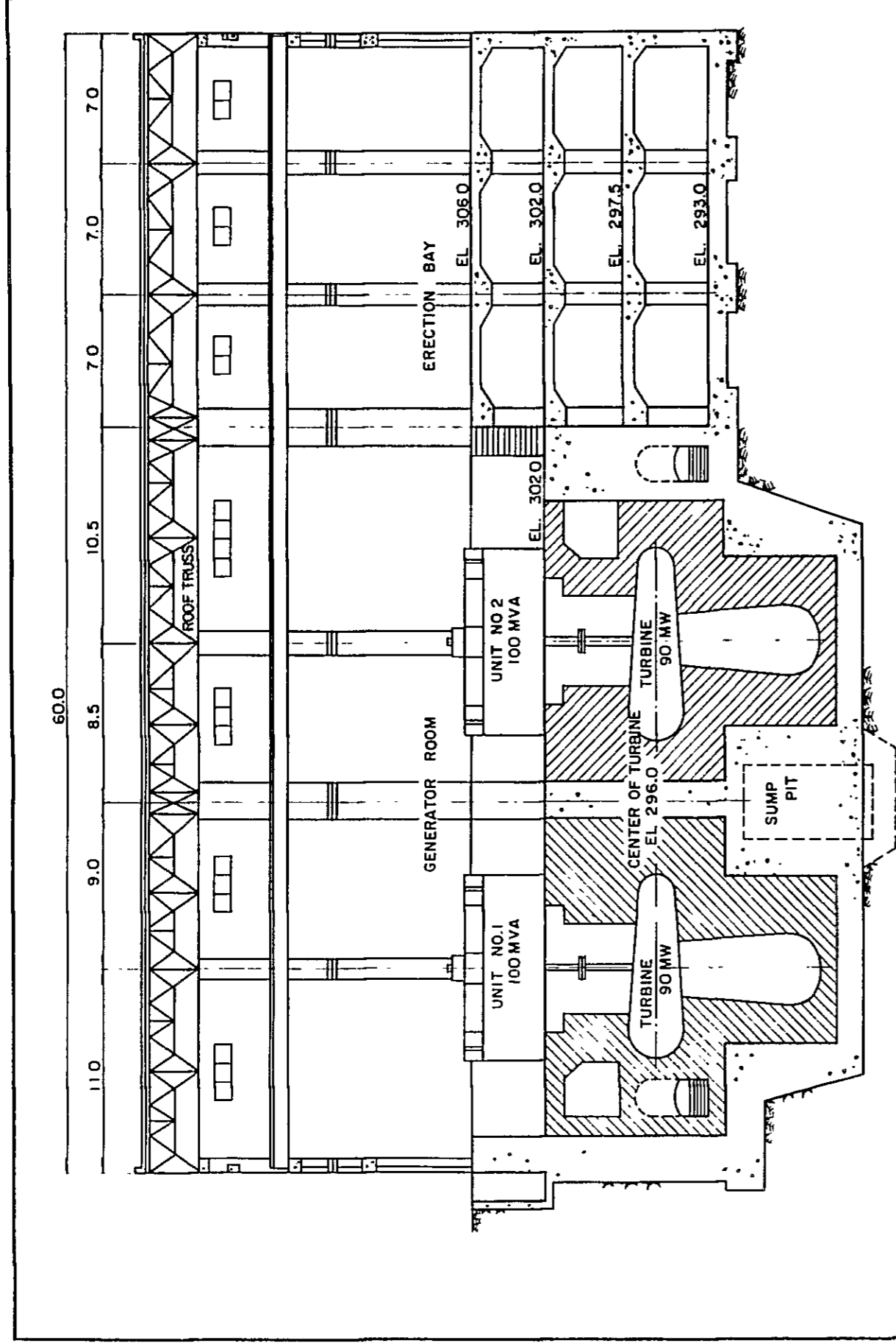
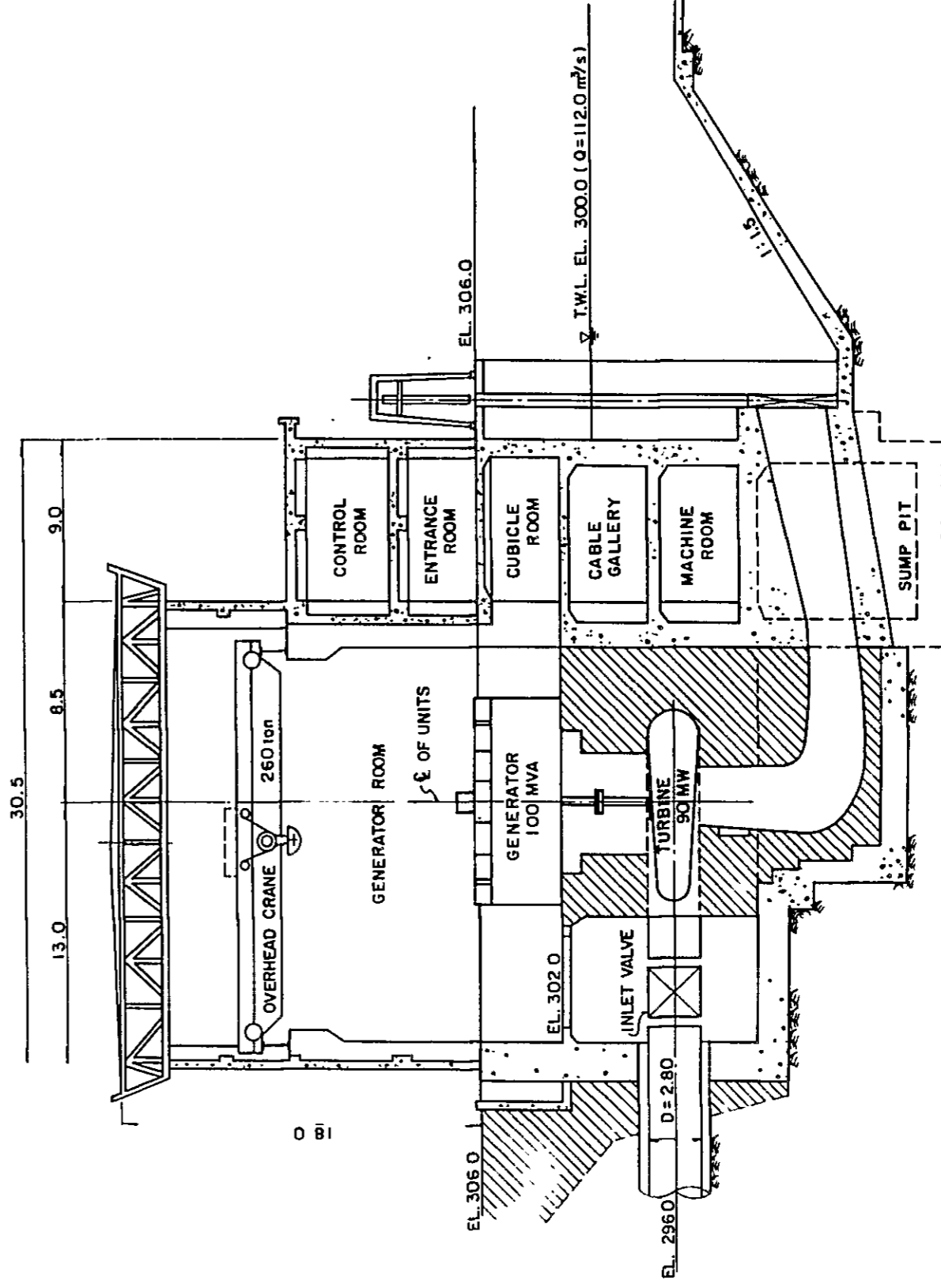


FIG. 2 - B PLAN ON POWERHOUSE AND SWITCHYARD



LONGITUDINAL SECTION (SECTION A-A)

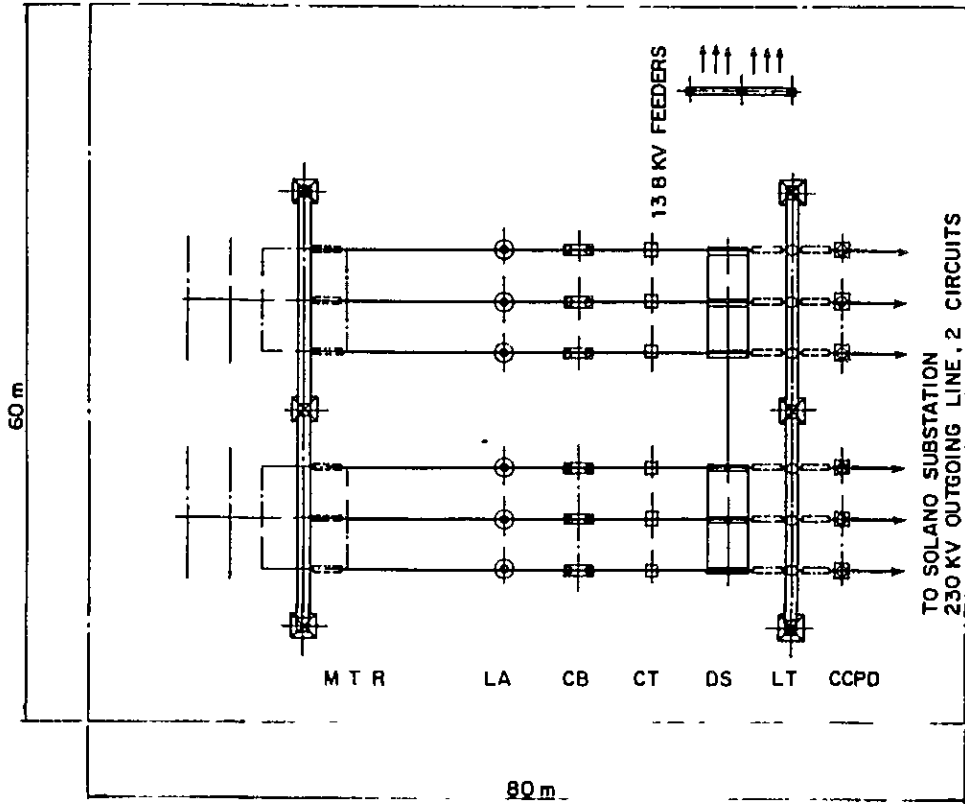


TRANSVERSE SECTION (SECTION B-B)
 CROSS SECTION OF POWERHOUSE

FIG.2-9



**MATUNO POWER STATION
OUTDOOR SWITCHYARD**



SOLANO SUBSTATION

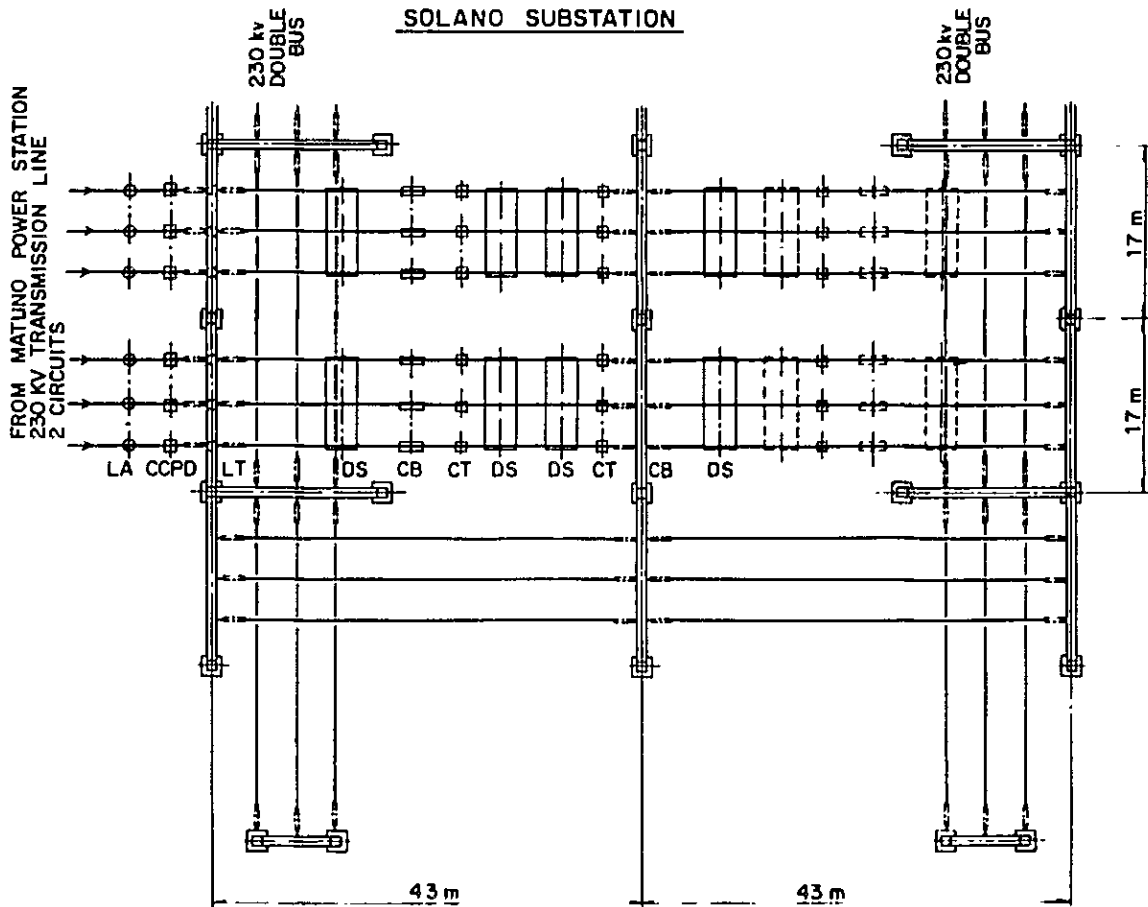


FIG. 2-10 ARRANGEMENT OF OUTDOOR SWITCHYARD

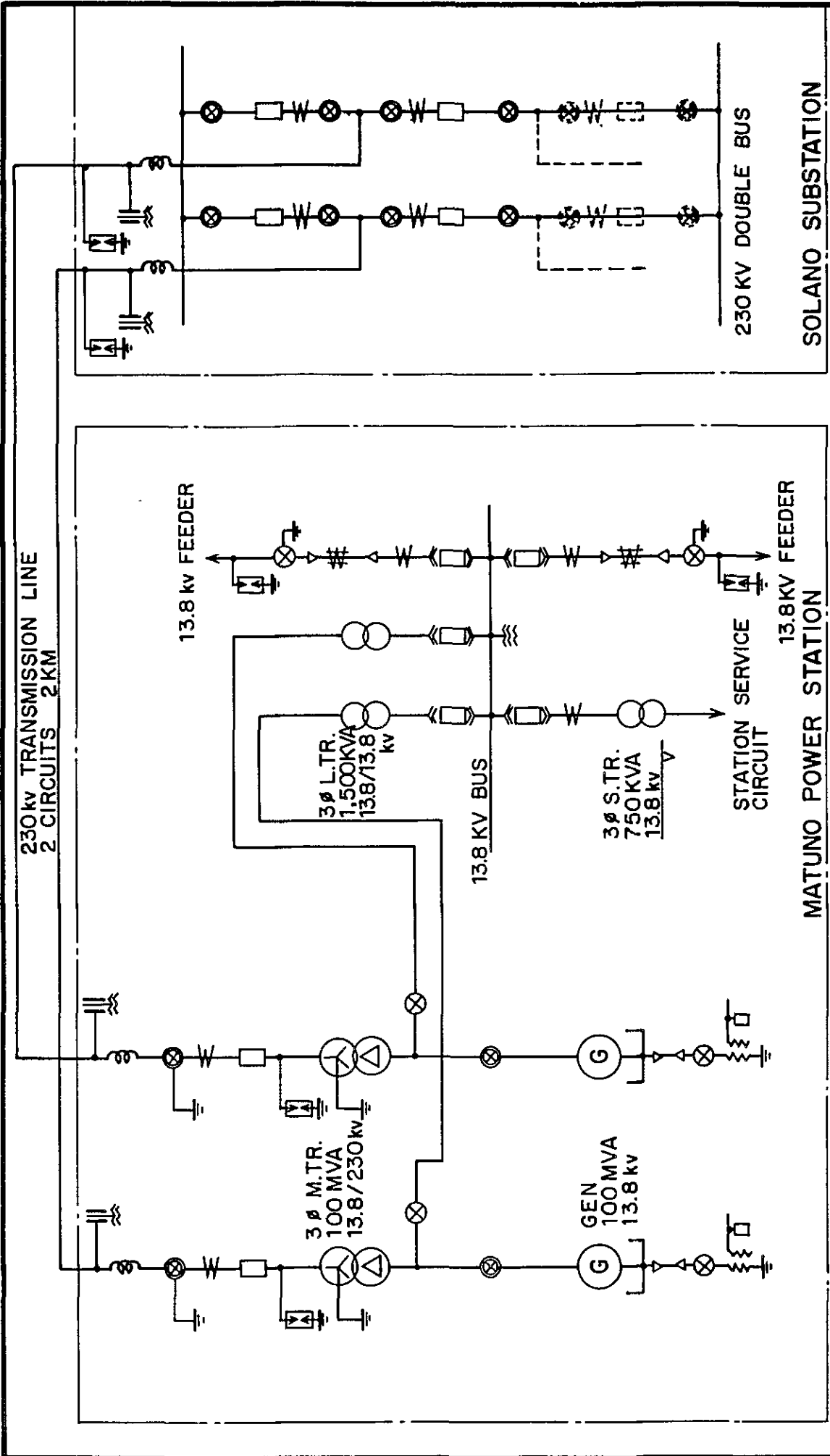


FIG. 2-11 SKELETON CONNECTION DIAGRAM

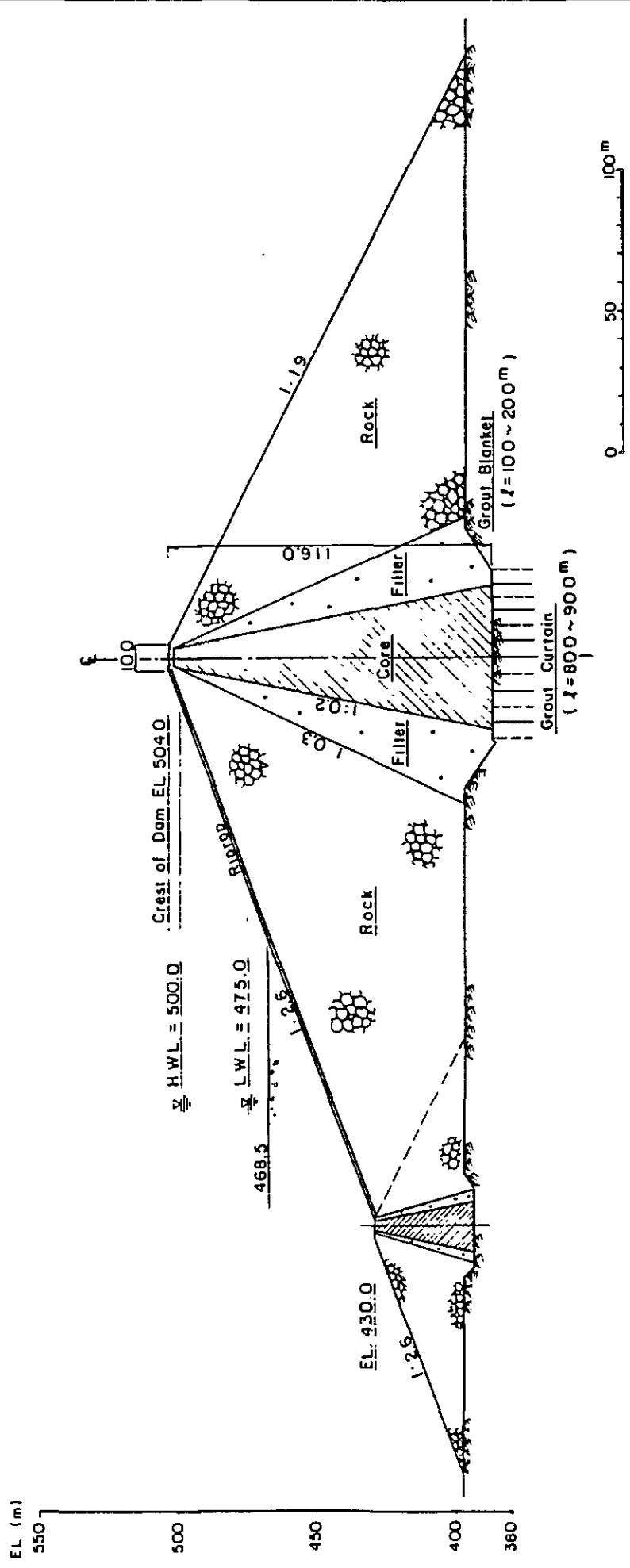
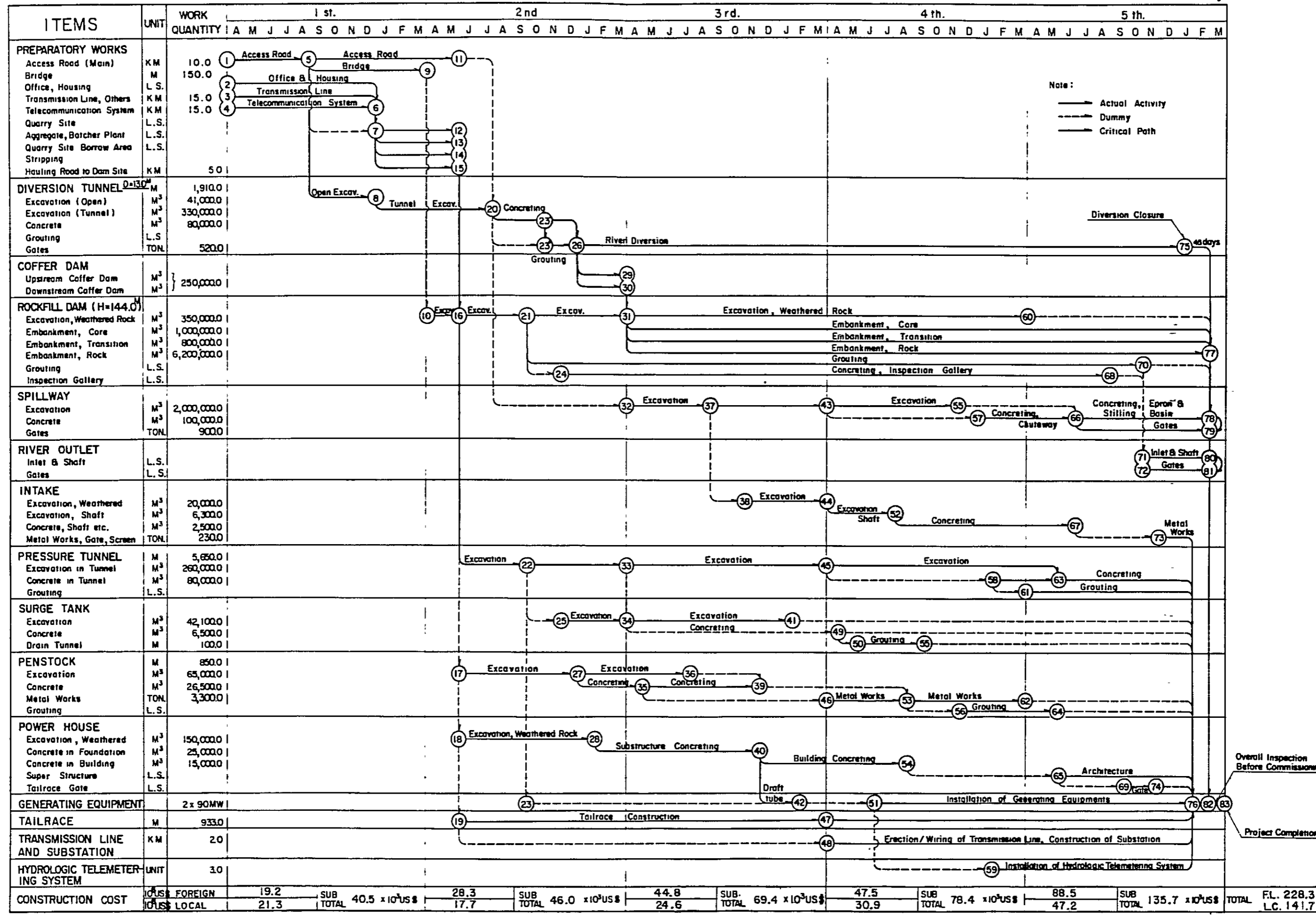


FIG. 2-12 TYPICAL SECTION OF B₂ DAM

FIG.3-1 CONSTRUCTION TIME SCHEDULE OF B1 HIGH DAM AND POWER STATION ON MATUNO PROJECT

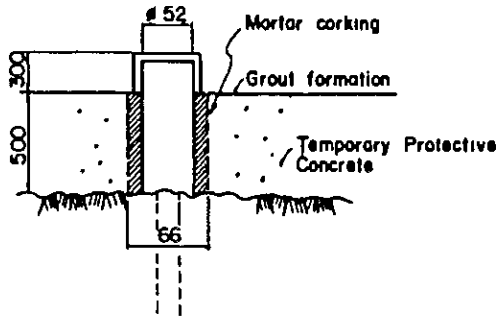
(At Price level of May 1983)



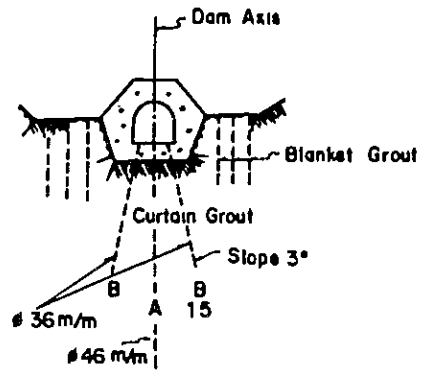
Note:
 — Actual Activity
 - - - Dummy
 — Critical Path

Overall Inspection Before Commissioning
 Project Completion





Working D.W.G of Grout Nipple



Sketch of Grout gallery

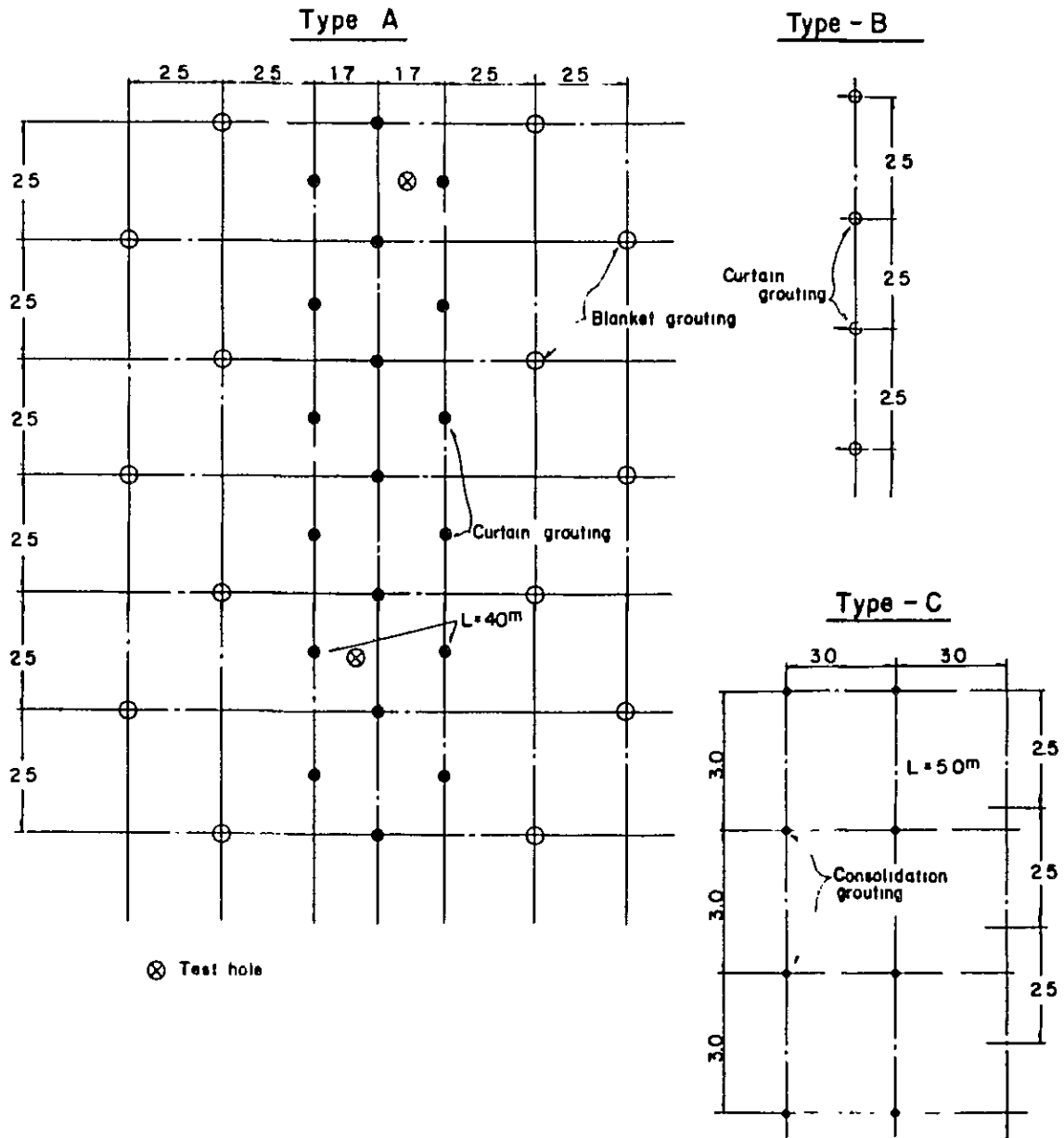


FIG. 3-2 GROUT HOLE ARRANGEMENT

JICA