

Table-4 WIND SPEED

Station: Vientiane											Unit: (m/s)	
Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1976	1.5	1.5	2.0	1.3	1.3	1.2	1.3	1.2	1.3	1.4	1.7	1.2
1977	1.6	1.9	1.8	1.8	1.8	1.7	1.5	1.5	1.8	1.5	1.7	1.3
1978	1.8	1.7	1.7	1.8	1.9	1.7	1.7	1.6	1.8	1.3	1.3	1.5
1979	1.5	1.4	1.4	2.1	2.1	1.4	1.4	0.5	0.6	0.5	0.7	0.6
1980	1.6	1.7	1.8	3.3	3.6	1.7	1.8	1.6	1.9	1.4	1.3	1.4
1981	1.4	1.5	1.5	1.6	1.8	1.6	1.9	1.8	1.5	1.8	1.8	1.9
1982	1.3	1.7	1.6	1.7	1.8	1.7	2.0	1.8	2.0	1.5	1.6	1.8
1983	1.7	1.3	2.0	1.4	2.5	2.0	1.8	1.4	1.5	1.7	1.6	1.6
1984	1.8	2.2	1.8	2.2	2.3	2.8	2.3	2.5	1.7	1.6	1.7	1.5
1985	1.6	1.8	2.1	2.4	1.7	1.8	1.9	2.4	1.7	1.8	1.3	1.5
Average	1.6	1.6	1.6	1.5	2.1	1.8	1.8	1.6	1.6	1.5	1.5	1.4

Table-5 EVAPORATION

Station: Vientiane											Unit: (mm/day)	
Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1973	145.0	166.0	196.0	204.4	175.1	136.6	108.5	113.9	111.2	126.1	112.0	124.0
1974	117.0	124.6	137.7	157.4	163.5	119.7	129.4	107.8	112.4	136.5	113.2	111.2
1975	95.0	120.3	129.2	192.8	103.9	102.8	-	104.6	115.7	130.9	122.0	107.0
1976	113.5	111.5	135.6	121.4	105.2	144.3	104.0	108.9	106.2	129.3	-	-
1977	99.2	118.0	129.6	142.5	146.7	156.1	126.1	100.7	131.3	126.0	121.5	108.1
1978	116.6	92.6	131.1	141.6	139.8	121.5	115.6	102.5	102.9	131.6	121.7	116.7
1979	114.7	105.0	134.2	155.1	126.2	116.9	143.3	114.0	107.9	132.0	135.8	125.5
1980	107.3	115.7	152.6	134.0	106.5	77.6	84.5	106.2	90.6	130.0	138.0	134.0
1981	129.0	119.3	152.1	149.7	137.1	107.3	103.5	124.7	106.0	123.3	118.0	116.0
1982	114.0	105.1	111.3	114.8	130.3	114.9	103.9	76.6	85.5	113.2	120.2	94.8
1983	96.1	99.7	122.5	168.6	148.6	102.4	112.3	80.6	86.6	103.7	102.5	93.2
1984	101.5	127.3	148.5	142.2	110.4	101.1	83.0	80.7	79.6	94.1	117.3	114.0
1985	106.8	104.2	137.4	149.8	120.5	80.2	106.7	99.4	109.7	119.4	115.5	112.0
Average	112.0	116.1	139.8	151.9	131.8	114.0	110.1	101.6	103.5	122.8	131.2	113.0

Table-6 SUNSHINE HOUR

Station: Vientiane											Unit: (hr/day)	
Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1980	8.4	6.7	5.4	7.3	7.3	4.2	3.9	4.6	4.1	7.6	8.3	8.7
1981	9.1	7.4	6.7	6.4	6.1	3.9	4.2	4.6	6.4	5.1	6.7	7.8
1982	8.3	6.6	5.7	7.1	7.6	5.3	3.9	3.0	4.2	7.3	8.3	8.1
1983	6.8	8.2	7.5	7.6	7.4	6.2	5.9	4.8	5.9	6.1	7.8	8.2
1984	8.4	7.5	6.7	7.6	7.0	5.4	5.1	4.6	7.0	6.5	7.8	8.9
1985	8.1	7.0	8.2	7.2	6.4	4.1	5.2	3.2	6.6	7.0	7.7	7.5
Average	8.2	7.2	6.7	7.2	7.0	4.9	4.7	4.1	5.7	6.6	7.8	8.2

Table-7 WATER LEVEL OF NAM NGUM RIVER

River: Nam Ngum		Station: Tha Ngon		C.A.: 16,500 km ²		Unit: m						
Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1971	3.34	3.04	2.92	2.63	2.75	5.19	10.55	13.66	12.34	7.18	5.03	4.02
1972	3.74	3.37	3.27	3.24	3.06	4.26	7.20	12.93	11.49	8.02	5.48	4.21
1973	3.71	3.43	3.28	3.24	3.52	5.14	10.02	11.45	15.79	9.67	5.58	4.38
1974	3.63	3.34	3.25	3.31	3.62	4.74	6.73	10.25	11.58	7.91	5.64	4.04
1975	3.48	3.15	3.44	3.19	3.74	7.53	10.79	13.70	15.17	9.40	6.16	4.45
1976	3.84	3.52	3.18	2.76	3.68	5.77	7.28	10.91	10.97	9.89	7.29	4.54
1977	3.49	3.36	5.77	5.29	4.08	3.93	7.25	9.18	10.56	5.86	4.27	3.44
1978	3.23	2.94	3.10	3.19	4.84	8.15	12.34	15.26	13.26	7.46	4.39	3.33
1979	4.39	4.93	4.89	4.92	5.58	7.02	7.58	8.56	11.24	6.57	5.22	4.62
1980	4.11	4.43	4.47	4.68	5.18	7.69	9.19	12.45	13.61	7.73	5.62	5.14
1981	5.06	5.09	4.97	4.27	5.71	7.86	13.37	14.36	12.97	10.43	5.99	5.28
1982	4.93	4.72	4.97	5.17	5.14	6.02	8.11	11.11	11.17	10.52	5.89	5.23
1983	5.00	4.90	4.94	4.92	4.57	5.19	8.29	11.69	11.28	7.65	6.14	5.18
1984	5.04	4.95	4.52	4.37	5.28	6.24	10.53	10.90	10.21	8.14	5.91	5.65
Average	4.07	3.94	4.42	3.94	3.94	6.05	9.23	11.89	12.26	8.32	5.62	4.25

Table-8 WATER DISCHARGE OF NAM NGUM RIVER

River: Nam Ngum		Station: Tha Ngon		C.A.: 16,500 km ²		Unit: m ³ /sec						
Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1971	214	189	180	158	183	422	1,242	2,160	1,672	715	382	274
1972	251	215	207	205	179	304	705	1,894	1,435	769	452	323
1973	256	221	209	219	222	396	1,163	1,498	2,781	1,132	445	316
1974	241	213	206	211	239	359	626	1,191	1,561	775	447	284
1975	226	207	197	201	254	738	1,371	2,013	2,656	1,141	517	338
1976	262	238	209	174	246	479	676	1,322	1,270	1,143	676	339
1977	227	216	460	393	299	283	690	1,041	1,236	479	317	226
1978	205	191	194	199	369	769	1,692	2,730	1,838	737	332	220
1979	359	357	363	369	445	617	722	945	1,450	594	401	326
1980	290	321	326	330	400	744	1,187	1,746	2,039	745	455	391
1981	385	388	374	321	479	779	2,062	2,368	2,174	1,288	515	407
1982	370	350	376	395	377	530	812	1,445	1,311	1,320	477	401
1983	391	368	372	370	335	416	864	1,472	1,405	790	510	397
1984	382	373	317	315	408	507	1,336	1,294	1,202	838	479	447
Average	283	275	285	276	317	525	1,082	1,651	1,716	890	458	335

Table-9 RESULT OF PADDY CUTTING SURVEY IN THA NGON FARM, NOV. 1986

Code No.	Variety	No. of hill/m ²	No. of panicle/m ²	No. of total grains/hill	No. of ripened grains/hill	No. of unripened grains/hill	% of ripened grains/hill	Weight of ripened grains/hill in 14% of MC (gr)	Weight of 1,000 grains in 14% of MC (gr)	Field/ha	No. of ripened grains/m ²	Weight of ripened grains/panicle (gr)	No. of ripened grains/panicle
1	LR-16	28	5	450	349	101	77.6	10.8	30.9	2.27	9,772	2.16	69.8
2	LR-16	36	6	479	394	85	82.3	13.4	34.0	3.62	14,184	2.23	65.7
3	LR-16	33	5	279	255	24	91.4	8.7	34.1	2.15	8,415	1.74	51.0
4	LR-16	34	6	303	228	75	75.2	6.6	29.7	1.68	7,752	1.10	38.0
5	7-8-9	26	9	925	667	258	72.1	10.9	23.8	3.10	17,342	1.77	74.0
6	7-8-9	28	6	653	449	204	68.8	9.5	21.1	2.00	12,572	1.58	74.8
7	7-8-9	26	7	519	285	234	54.9	7.5	26.3	1.46	7,410	1.07	40.7
8	7-8-9	23	7	485	302	183	62.3	6.6	21.9	1.14	6,946	0.94	43.1
9	7-8-9	32	6	664	541	123	81.5	18.0	33.2	4.32	17,312	3.00	90.2
(10)	Local	11	22	2,173	1,882	291	86.6	43.9	23.3	3.62	20,702	2.00	85.5
11	LR-16	35	7	775	529	246	68.3	13.2	25.0	3.47	18,515	1.89	75.6
12	LR-16	32	5	602	443	159	73.6	15.2	34.0	3.65	14,176	3.04	88.6
13	LR-16	35	6	518	347	171	67.0	9.3	27.3	2.44	12,145	1.55	57.8
14	LR-16	38	5	449	315	134	70.2	7.6	24.1	2.17	11,970	1.52	63.0
15	Local	18	8	601	334	267	55.6	12.0	35.9	1.62	6,012	1.50	41.8
16	Local	17	9	1,040	655	385	63.0	21.6	33.0	2.75	11,135	2.40	72.8
17	Dodeng	19	9	281	182	99	64.8	7.7	42.3	1.10	3,458	0.86	20.2
18	LR-16	41	6	458	276	182	60.3	9.7	35.1	2.98	11,316	1.62	46.0
\bar{x}		28.4	7.4	385.4	69.9	30.1	69.9	30.1	30.1	2.47	11,201	1.76	59.6

Note: Sample number (10) does not include in this analysis of yield components due to special local variety.

Table - 10 RESULT OF WATER QUALITY ANALYSIS (1/5)

1. Place of sampling : Tha Ngon Restaurant (State Enterprise), Tha Ngon Village
2. Sampler : Member of the Basic Design Study Team of the Tha Ngon Rehabilitation and Rural Development Project
3. Sampling date of water : November 12, 1986
4. Weather : Fine
5. Water temperature : —
6. Tester : The Laboratory of Food Hygiene, Tokyo Kenbikyoin

TEST RESULTS

DESCRIPTIONS	STANDARDS IN LAOS	RESULTS
1) Turbidity	2.0	12
2) Colour	≤ 5	24
3) Odor	None	—
4) Taste	None	—
5) pH Value	5.8 — 8.6	7.2
6) Total Hardness	≤ 300	161
7) Nitrite Nitrogen (ppm)	} ≤ 10	0.36
8) Nitrate nitrogen (ppm)		
9) Iron (ppm)	≤ 0.3	—
10) Copper (ppm)	≤ 1	—
11) Zinc (ppm)	≤ 1.0	—
12) Chlorine (ppm)	≤ 200	3.2
13) Potassium Permanganate Consumed (ppm)	≤ 10	1.4
14) Cyanide (ppm)	None	—
15) Mercury (ppm)	None	—
16) Organophosphonate (ppm)	None	—
17) Manganase (ppm)	≤ 0.3	—
18) Lead (ppm)	≤ 0.1	—
19) Hexavalent Chromium (ppm)	≤ 0.05	—
20) Arsenic (ppm)	≤ 0.05	—
21) Fluoride (ppm)	≤ 0.8	—
22) Anion Active Substances (ppm)	≤ 0.5	—
23) Cadmium (ppm)	≤ 0.01	—
24) Bacterial Count	≤ 100	33,120
25) Coliform Group	None	Positive

Table - 10 RESULT OF WATER QUALITY ANALYSIS (2/5)

1. Place of sampling : Animal Feed Industries (State Enterprise), Tha Ngon Village
2. Sampler : Member of the Basic Design Study Team of the Tha Ngon Rehabilitation and Rural Development Project
3. Sampling date of water : November 12, 1986
4. Weather : Fine
5. Water temperature : —
6. Tester : The Laboratory of Food Hygiene, Tokyo Kenbikyoin

TEST RESULTS

DESCRIPTIONS	STANDARDS IN LAOS	RESULTS
1) Turbidity	2.0	0
2) Colour	≤ 5	1
3) Odor	None	—
4) Taste	None	—
5) pH Value	5.8 — 8.6	7.2
6) Total Hardness	≤ 300	204
7) Nitrite Nitrogen (ppm)	} ≤ 10	0.13
8) Nitrate nitrogen (ppm)		
9) Iron (ppm)	≤ 0.3	0.12
10) Copper (ppm)	≤ 1	—
11) Zinc (ppm)	≤ 1.0	—
12) Chlorine (ppm)	≤ 200	3.2
13) Potassium Permanganate Consumed (ppm)	≤ 10	1.4
14) Cyanide (ppm)	None	—
15) Mercury (ppm)	None	—
16) Organophosphonate (ppm)	None	—
17) Manganase (ppm)	≤ 0.3	—
18) Lead (ppm)	≤ 0.1	—
19) Hexavalent Chromium (ppm)	≤ 0.05	—
20) Arsenic (ppm)	≤ 0.05	—
21) Fluoride (ppm)	≤ 0.8	—
22) Anion Active Substances (ppm)	≤ 0.5	—
23) Cadmium (ppm)	≤ 0.01	—
24) Bacterial Count	≤ 100	44,320
25) Coliform Group	None	Positive

Table - 10 RESULT OF WATER QUALITY ANALYSIS (3/5)

1. Place of sampling : Pig Multiplication Center (State Enterprise), Lat Khouay Village
2. Sampler : Member of the Basic Design Study Team of the Tha Ngon Rehabilitation and Rural Development Project
3. Sampling date of water : November 12, 1986
4. Weather : Fine
5. Water temperature : —
6. Tester : The Laboratory of Food Hygiene, Tokyo Kenbikyoin

TEST RESULTS

DESCRIPTIONS	STANDARDS IN LAOS	RESULTS
1) Turbidity	2.0	8
2) Colour	≤ 5	16
3) Odor	None	—
4) Taste	None	—
5) pH Value	5.8 — 8.6	6.7
6) Total Hardness	≤ 300	276
7) Nitrite Nitrogen (ppm)	} ≤ 10	0.45
8) Nitrate nitrogen (ppm)		
9) Iron (ppm)	≤ 0.3	0.21
10) Copper (ppm)	≤ 1	—
11) Zinc (ppm)	≤ 1.0	—
12) Chlorine (ppm)	≤ 200	27.6
13) Potassium Permanganate Consumed (ppm)	≤ 10	1.4
14) Cyanide (ppm)	None	—
15) Mercury (ppm)	None	—
16) Organophosphonate (ppm)	None	—
17) Manganase (ppm)	≤ 0.3	—
18) Lead (ppm)	≤ 0.1	—
19) Hexavalent Chromium (ppm)	≤ 0.05	—
20) Arsenic (ppm)	≤ 0.05	—
21) Fluoride (ppm)	≤ 0.8	—
22) Anion Active Substances (ppm)	≤ 0.5	—
23) Cadmium (ppm)	≤ 0.01	—
24) Bacterial Count	≤ 100	49,120
25) Coliform Group	None	Positive

Table 10. RESULT OF WATER QUALITY ANALYSIS (4/5)

1. Place of sampling : Private Shallow Well, Tha Ngon Village
2. Sampler : Member of the Basic Design Study Team of the Tha Ngon Rehabilitation and Rural Development Project
3. Sampling date of water : November 12, 1986
4. Weather : Fine
5. Water temperature : --
6. Tester : The Laboratory of Food Hygiene, Tokyo Kenbikyoin

TEST RESULTS

DESCRIPTIONS	STANDARDS IN LAOS	RESULTS
1) Turbidity	2.0	0
2) Colour	≤ 5	1
3) Odor	None	--
4) Taste	None	--
5) pH Value	5.8 - 8.6	3.8
6) Total Hardness	≤ 300	--
7) Nitrite Nitrogen (ppm)	} ≤ 10	10.55
8) Nitrate nitrogen (ppm)		
9) Iron (ppm)	≤ 0.3	--
10) Copper (ppm)	≤ 1	--
11) Zinc (ppm)	≤ 1.0	--
12) Chlorine (ppm)	≤ 200	19.7
13) Potassium Permanganate Consumed (ppm)	≤ 10	1.3
14) Cyanide (ppm)	None	--
15) Mercury (ppm)	None	--
16) Organophosphonate (ppm)	None	--
17) Manganase (ppm)	≤ 0.3	--
18) Lead (ppm)	≤ 0.1	--
19) Hexavalent Chromium (ppm)	≤ 0.05	--
20) Arsenic (ppm)	≤ 0.05	--
21) Fluoride (ppm)	≤ 0.8	--
22) Anion Active Substances (ppm)	≤ 0.5	--
23) Cadmium (ppm)	≤ 0.01	--
24) Bacterial Count	≤ 100	3,180
25) Coliform Group	None	Negative

Table - 10 RESULT OF WATER QUALITY ANALYSIS (5/5)

1. Place of sampling : Private Shallow Well, Oudom Phol village
2. Sampler : Member of the Basic Design Study Team of the Tha Ngon Rehabilitation and Rural Development Project
3. Sampling date of water : November 12, 1986
4. Weather : Fine
5. Water temperature : --
6. Tester : The Laboratory of Food Hygiene, Tokyo Kenbikyoin

TEST RESULTS

DESCRIPTIONS	STANDARDS IN LAOS	RESULTS
1) Turbidity	2.0	3
2) Colour	≤ 5	1
3) Odor	None	—
4) Taste	None	—
5) pH Value	5.8 — 8.6	4.3
6) Total Hardness	≤ 300	—
7) Nitrite Nitrogen (ppm)	} ≤ 10	—
8) Nitrate nitrogen (ppm)		
9) Iron (ppm)	≤ 0.3	—
10) Copper (ppm)	≤ 1	—
11) Zinc (ppm)	≤ 1.0	—
12) Chlorine (ppm)	≤ 200	3.2
13) Potassium Permanganate Consumed (ppm)	≤ 10	1.6
14) Cyanide (ppm)	None	—
15) Mercury (ppm)	None	—
16) Organophosphonate (ppm)	None	—
17) Manganase (ppm)	≤ 0.3	—
18) Lead (ppm)	≤ 0.1	—
19) Hexavalent Chromium (ppm)	≤ 0.05	—
20) Arsenic (ppm)	≤ 0.05	—
21) Fluoride (ppm)	≤ 0.8	—
22) Anion Active Substances (ppm)	≤ 0.5	—
23) Cadmium (ppm)	≤ 0.01	—
24) Bacterial Count	≤ 100	2,240
25) Coliform Group	None	Positive

Table - 11 POTENTIAL EVAPOTRANSPIRATION (PENMAN METHOD)

	Unit	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
T mean	°C	22.1	24.5	27.0	29.2	28.8	28.5	27.9	27.9	27.7	26.4	23.7	21.6
RH mean	%	71	68	63	67	76	81	83	83	83	80	73	71
ea	m bar	26.6	30.8	35.7	40.6	39.6	39.0	37.6	37.6	37.2	34.4	29.3	25.8
ed	m bar	18.9	20.9	22.5	27.2	30.1	31.5	31.2	31.2	30.9	27.6	21.4	18.3
ea-ed	m bar	7.7	9.9	13.2	13.4	9.5	7.5	6.4	6.4	6.3	6.8	7.9	7.5
U	Km/day	135	135	135	127	178	152	152	135	135	127	127	118
$f(u)=0.27(1+U/100)$		0.63	0.63	0.63	0.61	0.75	0.68	0.68	0.63	0.63	0.61	0.61	0.59
I-W		0.29	0.26	0.24	0.22	0.23	0.23	0.23	0.23	0.23	0.25	0.27	0.30
W		0.71	0.74	0.76	0.78	0.77	0.77	0.77	0.77	0.77	0.75	0.73	0.70
Ra	mm/day	11.6	13.0	14.6	15.6	16.1	16.1	16.1	15.8	14.9	13.6	12.0	11.1
Rns	mm/day	5.4	5.6	5.8	6.3	6.3	5.2	5.2	4.9	5.4	5.4	5.4	5.2
f (T)		15.0	15.4	16.0	16.4	16.4	16.3	16.2	16.2	16.1	15.8	15.3	14.9
f (ed)		0.14	0.14	0.13	0.11	0.10	0.09	0.09	0.09	0.10	0.11	0.14	0.15
f (n/N)		0.76	0.68	0.60	0.62	0.59	0.43	0.42	0.39	0.52	0.61	0.72	0.77
Rn \bar{f}	mm/day	1.7	1.5	1.3	1.1	0.9	0.6	0.6	0.6	0.8	1.0	1.5	1.7
$Rn=Rns-Rn\bar{f}$	mm/day	3.7	4.1	4.5	5.2	5.3	4.6	4.5	4.3	4.6	4.4	3.9	3.4
RHmax	%	99	97	95	96	98	98	99	99	98	98	97	98
U	m/sec	1.6	1.6	1.6	1.5	2.1	1.8	1.8	1.6	1.6	1.5	1.5	1.4
C		1.01	1.02	1.03	1.04	1.02	1.00	1.00	1.00	1.01	1.02	1.02	1.02
ETC	mm/day	4.1	4.8	5.6	6.1	5.9	4.7	4.5	4.2	4.5	4.4	4.2	3.8
	mm/month	127	134	174	183	183	141	140	130	135	136	126	118

Table-12 IRRIGATION WATER REQUIREMENT(WET SEASON)

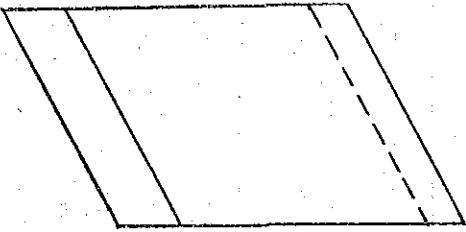
		Wet Season							
		MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
									
		MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
(1) ET	(mm)	-	141	140	130	135	136		
(2) CF		-	1.2	1.3	1.4	1.3	1.3		
(3) (1)x(2)	(mm)	-	169	182	182	176	177		
(4) P	(mm)	-	90	93	93	90	93		
(5) ER	(mm)	-	168	180	178	138	50		
(6) (3)+(4)-(5)	(mm)	-	91	95	97	128	220		
(7) AF		-	0.21	0.84	1.00	0.92	0.33		
(8) (6)x(7)	(mm)	-	19	80	97	118	73		
(9) PW	(mm)	18	125	37	-	-	-		
(10) NW	(mm)	24	16	-	-	-	-		
(11) FWR (8)+(9)+(10)	(mm)	42	160	117	97	118	73		
(12) DW (11)/E	(mm)	70	267	195	162	197	122		
	(lit/sec/ha)	0.26	1.03	0.73	0.60	0.76	0.46		

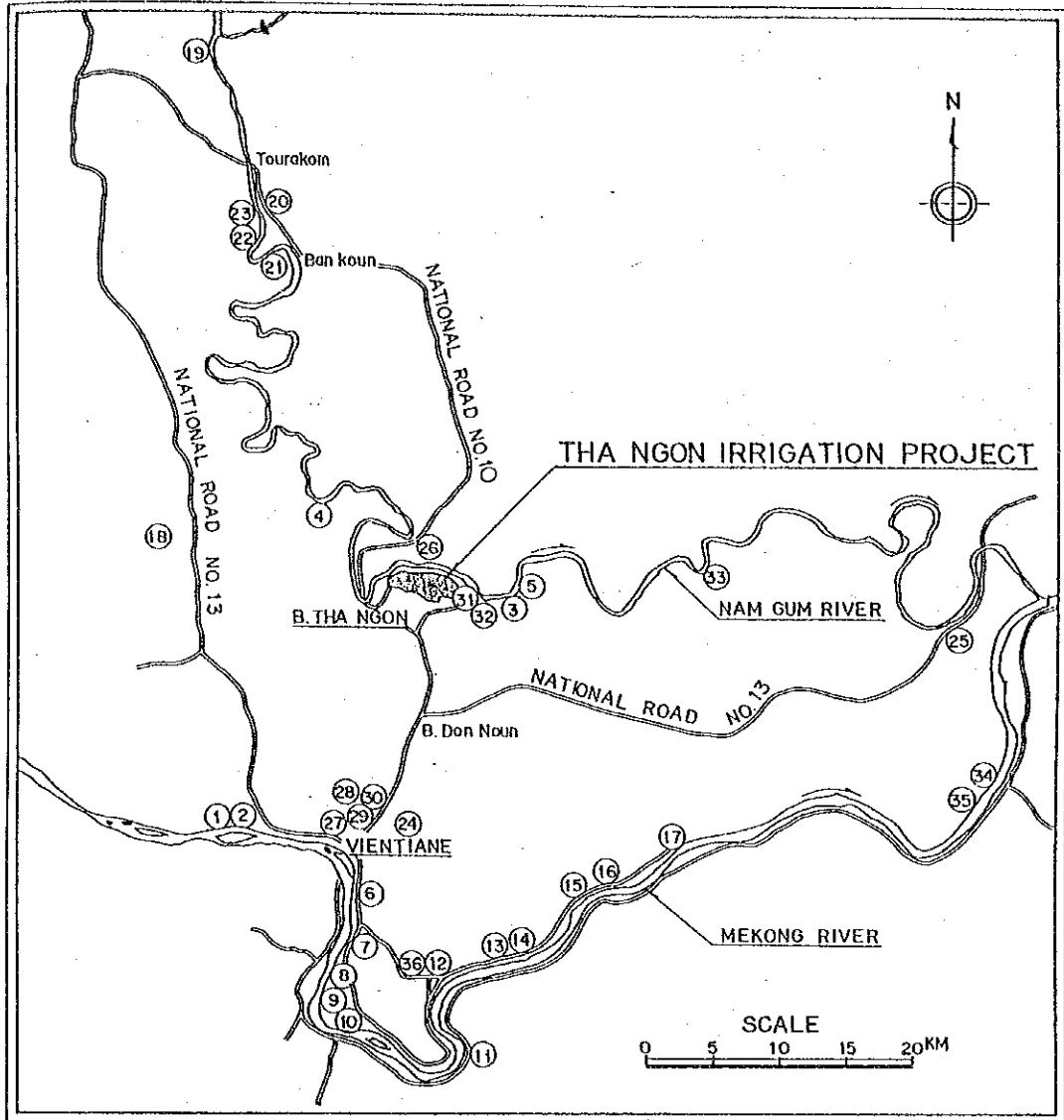
Table -13 IRRIGATION WATER REQUIREMENT(DRY SEASON)

		Dry Season						
		NOV	DEC	JAN	FEB	MAR	APR	MAY
		NOV	DEC	JAN	FEB	MAR	APR	MAY
(1)	ET (mm)	-	118	127	134	174	183	183
(2)	CF	-	1.1	1.2	1.3	1.3	1.2	1.1
(3)	(1)x(2) (mm)	-	130	152	174	226	220	201
(4)	P (mm)	-	93	93	84	93	90	93
(5)	ER (mm)	-	0	0	5	30	56	153
(6)	(3)+(4)-(5) (mm)	-	223	245	253	289	254	141
(7)	AF	-	0.08	0.67	1.00	0.99	0.54	0.02
(8)	(6)x(7) (mm)	-	18	164	253	286	137	3
(9)	PW (mm)	5	112	83	-	-	-	-
(10)	NW (mm)	13	27	-	-	-	-	-
(11)	FWR (8)+(9)+(10) (mm)	18	157	247	253	286	137	3
(12)	DW (11)/E (mm)	30	262	412	422	477	228	5
(lit/sec/ha)		0.12	0.98	1.54	1.74	1.78	0.88	0.02

Table-14 ESTIMATED COST OF DISTRIBUTION LINE
FROM THE IRRIGATION PUMPING STATION
TO THE THA SOM MO VILLAGE

NO.	DESCRIPTIONS	Q'TY	COST (Kip)	
			UNIT	AMOUNT
A. MATERIAL COST				
1.	End pole w/accessories	2 sets	33,533	67,066
2.	Ordinary pole w/accessories	52 sets	28,177	1,465,204
3.	Angle (small) pole w/accessories	4 sets	41,784	167,136
4.	Angle (large) pole w/accessories	1 set	50,243	50,243
5.	Conductors, ACSR 70 mm ² /12	11,025 m	121	1,334,025 (3,083,674)
6.	Miscellaneous Materials (2% of 1 to 5)	L.S.	-	61,674
	Sub-total:			3,145,348
B. INSTALLATION COST				
1.	Tractor & trailer, 20 t (8 trips)	8 days	9,615	76,920
2.	Ordinary truck, 3 t	20 days	2,621	52,420
3.	Truck Crane, 16 t	4 days	16,631	66,524
4.	Crane w/auger for pole install. (4 poles/day)	20 days	8,503	170,060
5.	Labour, grade 1	60 M/D	334	20,040
6.	Labour, grade 2	200 M/D	292	58,400
7.	Labour, grade 3	200 M/D	257	51,400 (495,764)
8.	Miscellaneous mat. & tools (2% of 1 to 4)	L.S.	-	7,318
	Sub-total:			503,082
Total:				Kip 3,648,430

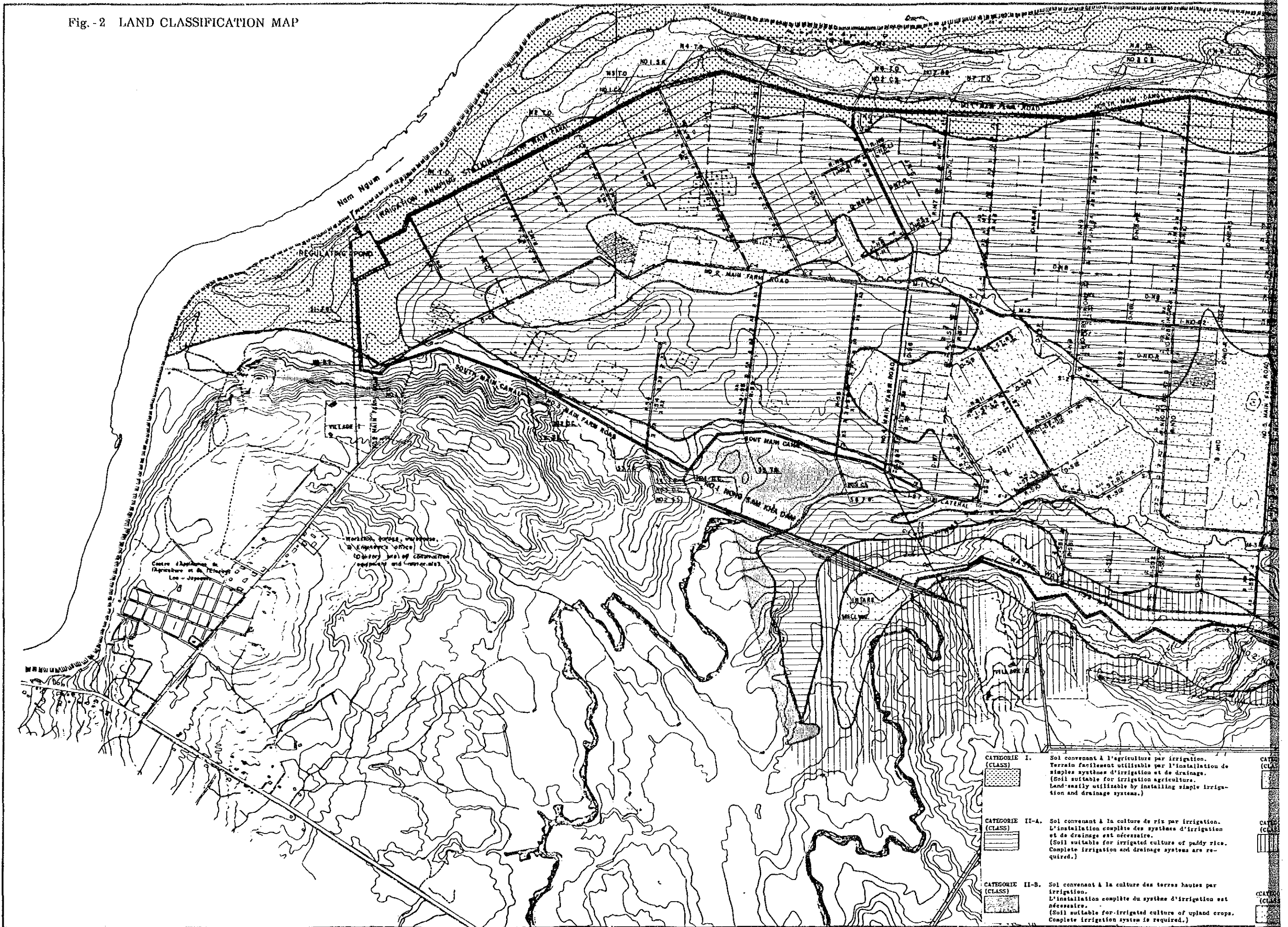
Fig. -1 IRRIGATION PROJECT IN VIENTIAN PLAIN

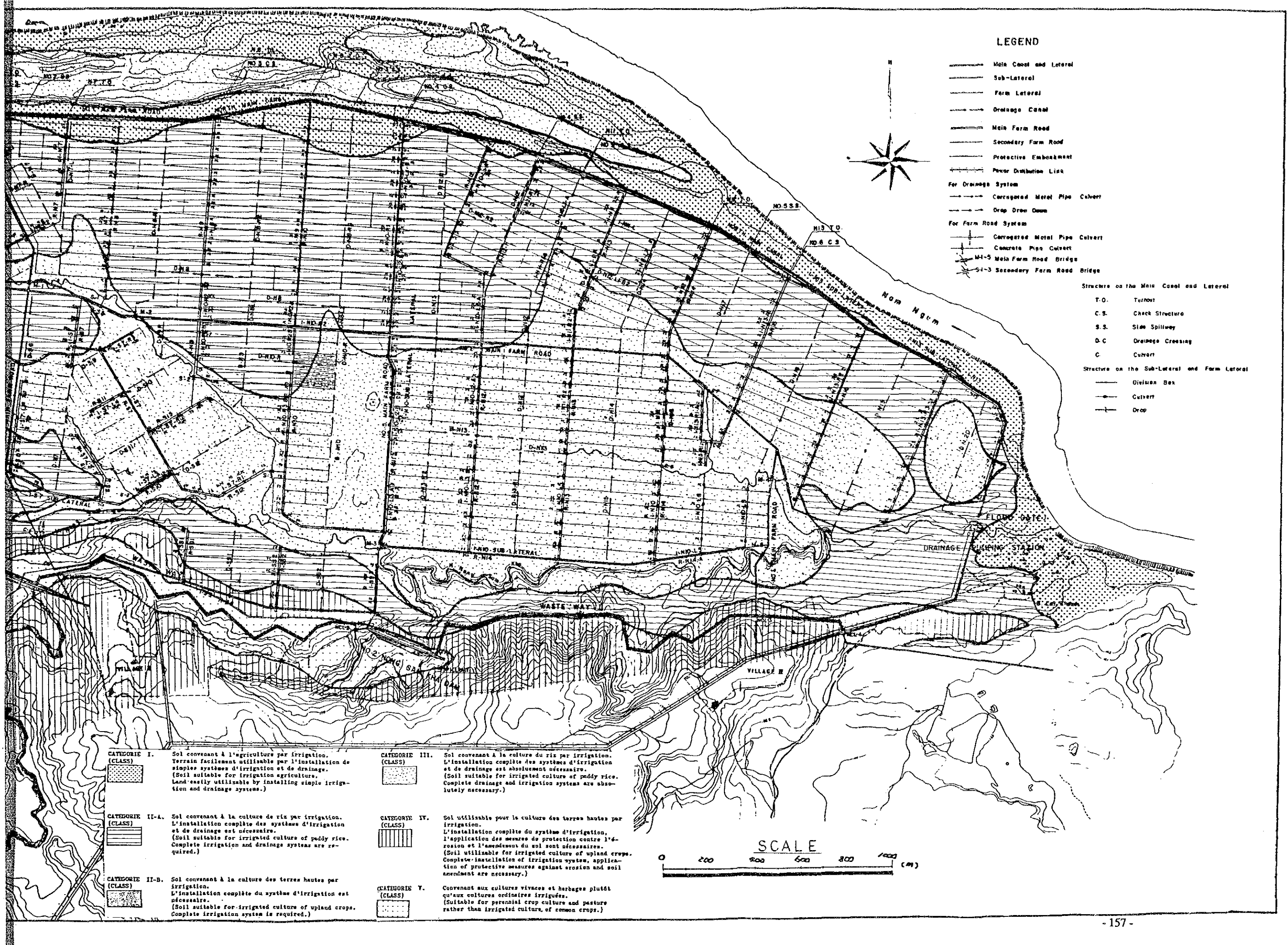


No.	Project	Irrigation Area (ha)	Irrigation System	Supporting Country	Construction period	Realization	No.	Project	Irrigation Area (ha)	Irrigation System	Supporting Country	Construction period	Realization
1	KAO LEO I	1,000	Pump	Australia	1982	constructed	19	THA LAY	400	Pump	Australia	Under Construction	
2	KAO LEO II	150	-	Holland	1978	-	20	PAK KONGSUNG	300	Pump	IDN	1985	planning
3	DONG BANG	400	-	Australia	1982	-	21	TIENG KHAM	300	-	-	1985	-
4	YOUNG TAI	200	-	IDA	Under Construction		22	PANCHENG	450	-	Holland	Under Construction	
5	MAI HOE	210	-	-	1981	constructed	23	BAH CHENG	300	Pump	Australia	Under Construction	
6	YUANG KHAM	670	-	Australia	1982	-	24	HA KHOUA	300	-	LAO P.D.R.	1984	constructed
7	CHIKHONG	115	-	Holland	1979	-	25	BAH PHOU	300	-	-	Under Construction	
8	KENG KHAM	160	-	-	1979	-	26	BAT KHAM	300	-	-	Under Construction	
9	HAO KHAM	113	-	-	1979	-	27	HONG KHAM	300	-	-	1984	constructed
10	MOH KHAM	180	-	-	1982	-	28	CHONG KHAM	300	-	-	1983	-
11	SATHONG	80	-	-	1979	-	29	HONG KHAM II	1,097	-	-	1981	-
12	MAHAI	300	-	Quarter II	1979	-	30	HONG KHAM I	140	-	-	1983	-
13	Ka. 19	400	-	Holland	1979	-	31	YAT KHOUA I	60	-	-	1983	-
14	THA DEVA	65	-	-	1979	-	32	YAT KHOUA II	100	-	-	1983	-
15	THA PHA	400	-	-	1979	-	33	MAHONG	200	-	-	1983	-
16	VITHONG	303	-	-	1979	-	34	MAH MAO	350	-	-	1984	-
17	SIMPHOU	300	-	-	1979	-	35	MAH NIO	160	-	-	1984	-
18	MAH KHAM	7,000	Earth Dam	LAO P.D.R.	Under Construction		36	HONG YONG	300	-	-	1981	-

II Quarter : Non Government
Source : Department of Irrigation, MIFIC

Fig. -2 LAND CLASSIFICATION MAP





LEGEND

- Main Canal and Lateral
- Sub-Lateral
- Farm Lateral
- Drainage Canal
- Main Farm Road
- Secondary Farm Road
- Protective Embankment
- Power Distribution Line
- For Drainage System**
- Corrugated Metal Pipe Culvert
- Drop Draw Dam
- For Farm Road System**
- Corrugated Metal Pipe Culvert
- Concrete Pipe Culvert
- M-5 Main Farm Road Bridge
- S-3 Secondary Farm Road Bridge

- Structure on the Main Canal and Lateral**
- T.O. Turnout
 - C.S. Check Structure
 - S.S. Side Spillway
 - D.C. Drainage Crossing
 - C. Culvert
- Structure on the Sub-Lateral and Farm Lateral**
- Division Box
 - Culvert
 - Drop

CATEGORIE I. (CLASS)
 Sol convenant à l'agriculture par irrigation. Terrain facilement utilisable par l'installation de simples systèmes d'irrigation et de drainage. (Soil suitable for irrigation agriculture. Land easily utilisable by installing simple irrigation and drainage systems.)

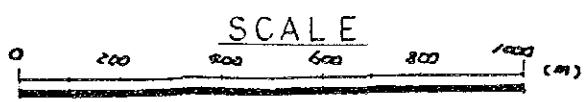
CATEGORIE II-A. (CLASS)
 Sol convenant à la culture de riz par irrigation. L'installation complète des systèmes d'irrigation et de drainage est nécessaire. (Soil suitable for irrigated culture of paddy rice. Complete irrigation and drainage systems are required.)

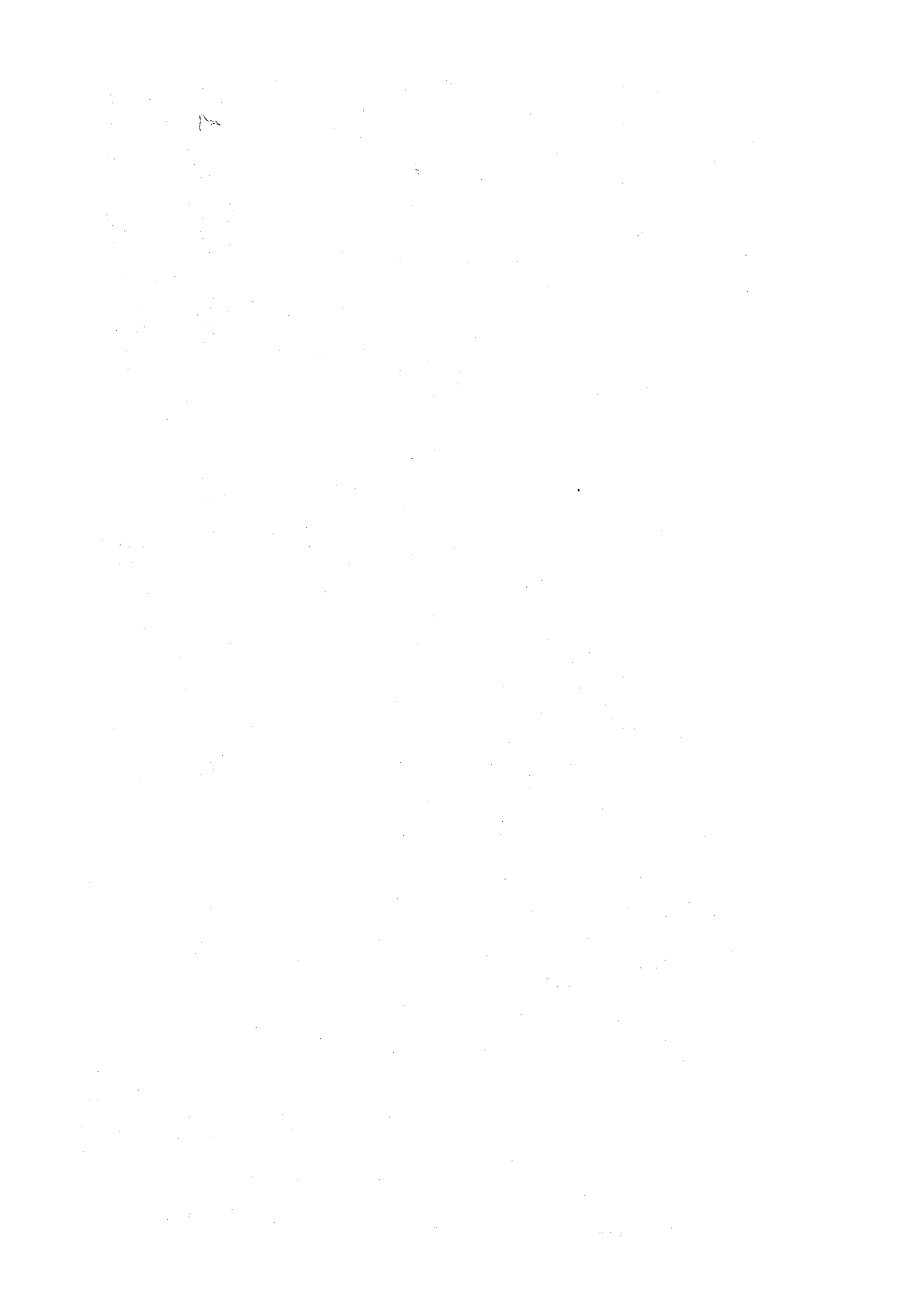
CATEGORIE II-B. (CLASS)
 Sol convenant à la culture des terres hautes par irrigation. L'installation complète du système d'irrigation est nécessaire. (Soil suitable for irrigated culture of upland crops. Complete irrigation system is required.)

CATEGORIE III. (CLASS)
 Sol convenant à la culture du riz par irrigation. L'installation complète des systèmes d'irrigation et de drainage est absolument nécessaire. (Soil suitable for irrigated culture of paddy rice. Complete drainage and irrigation systems are absolutely necessary.)

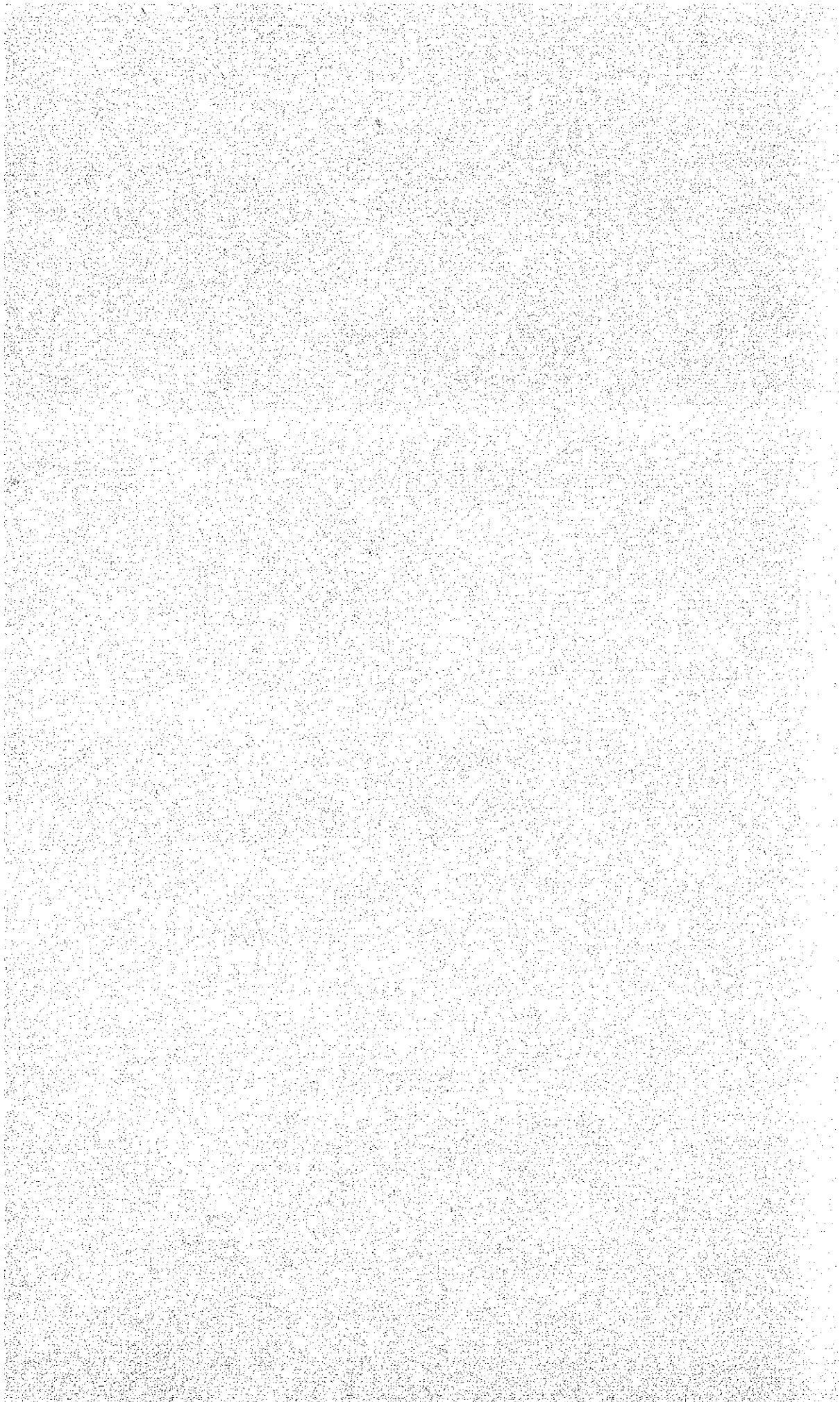
CATEGORIE IV. (CLASS)
 Sol utilisable pour la culture des terres hautes par irrigation. L'installation complète du système d'irrigation, l'application des mesures de protection contre l'érosion et l'amendement du sol sont nécessaires. (Soil utilisable for irrigated culture of upland crops. Complete installation of irrigation system, application of protective measures against erosion and soil amendment are necessary.)

CATEGORIE V. (CLASS)
 Convenant aux cultures vivaces et herbages plutôt qu'aux cultures ordinaires irriguées. (Suitable for perennial crop culture and pasture rather than irrigated culture of common crops.)





ATTACHMENTS



MEMBER OF STUDY TEAM

1. Mission for Basic Design

Shinsuke OTA	Team Leader Ministry of Agriculture, Forestry and Fisheries
Ryuji MATSUNAGA	Coordinator Japan International Cooperation Agency
Isao AKIZUKI	Irrigation & Drainage Planning Engineer Nippon Koei Co., Ltd.
Shigeyuki TANAKA	Irrigation & Drainage Design Engineer Nippon Koei Co., Ltd.
Kenji SETO	Mechanical Engineer Nippon Koei Co., Ltd.
Atsuya SAISHO	Agro-infrastructural Engineer Nippon koei Co., Ltd.
Kisaku YAMADA	Agro-economist Nippon Koei Co., Ltd.
Hiroshi OKABE	Construction Planner Nippon Koei Co., Ltd.

2. Mission for Explanation of Draft Final Report

Hiroshi MANABE	Team Leader Ministry of Foreign Affairs
Isao AKIZUKI	Irrigation & Drainage Planning Engineer Nippon Koei Co., Ltd.

ITINERARY OF STUDY TEAM

1. Basic Design Study

(From October 24 to November 23, 1986)

No.	Date	Description
1.	Oct. 24 (Fri)	Departure from Tokyo for Bangkok of Messrs Ota, Matsunaga, Akizuki, Tanaka, Seto, Saisho and Yamada, and stay in Bangkok
2.	Oct. 25 (Sat)	Departure from Bangkok and arrival at Vientiane
3.	Oct. 26 (Sun)	Internal meeting and marketing survey
4.	Oct. 27 (Mon)	Explanation of Inception Report at MAFIC
5.	Oct. 28 (Tue)	Visit to the Kao Lio Pump Irrigation Scheme Reconnaissance to the Tha Ngon Irrigation Scheme
6.	Oct. 29 (Wed)	Courtesy call to State Planning Committee and Embassy of Japan. Discussion on the Minutes at MAFIC (Ota, Matsunaga, Akizuki) Field survey (Tanaka, Seto, Saisho, Yamada)
7.	Oct. 30 (Thu)	Signing of Minutes of Discussions (Ota, Matsunaga, Akizuki) Field survey and data collection (Tanaka, Seto, Saisho, Yamada)
8.	Oct. 31 (Fri)	Visit to Embassy of Japan for reporting (Ota, Matsunaga) Data collection and field survey (Akizuki and others)
9.	Nov. 1 (Sat)	Departure from Vientiane for Bangkok (Ota, Matsunaga) Field survey and data collection (Akizuki and others)
10.	Nov. 2 (Sun)	Departure from Bangkok for Tokyo (Ota, Matsunaga) Data analysis at Vientiane (Akizuki and others)

No.	Date	Description
11.	Nov. 3 (Mon)	Data collection at Vientiane (Akizuki) Field survey (Tanaka, Seto, Saisho, Yamada)
12.	Nov. 4 (Tue)	Discussion with deputy director of Planning Department (Akizuki) Field survey and data collection (Tanaka, Seto, Saisho, Yamada)
13.	Nov. 5 (Wed)	Discussion with director of Irrigation Department (Akizuki) Field survey and data collection (Tanaka, Seto, Saisho, Yamada)
14.	Nov. 6 (Thu)	Data collection at Vientiane (Akizuki, Tanaka, Saisho) Field survey (Seto, Yamada)
15.	Nov. 7 (Fri)	Data collection at Vientiane (Akizuki, Yamada) Field survey (Tanaka, Seto, Saisho)
16.	Nov. 8 (Sat)	Data collection at Vientiane (Akizuki) Field survey (Tanaka, Seto, Saisho, Yamada)
17.	Nov. 9 (Sun)	Data analysis and internal meeting
18.	Nov. 10 (Mon)	Field survey
19.	Nov. 11 (Tue)	Field survey
20.	Nov. 12 (Wed)	Interim meeting with MAFIC
21.	Nov. 13 (Thu)	Departure from Vientiane for Bangkok (Seto, Yamada) Data collection at Vientiane (Akizuki, Tanaka, Saisho)
22.	Nov. 14 (Fri)	Departure from Bangkok for Tokyo (Seto, Yamada) Field survey and data collection (Akizuki, Tanaka, Saisho)
23.	Nov. 15 (Sat)	Data collection from State Contractor
24.	Nov. 16 (Sun)	Data analysis
25.	Nov. 17 (Mon)	Data analysis at MAFIC (Akizuki, Tanaka) Field survey (Saisho)

No.	Date	Description
26.	Nov. 18 (Tue)	Field survey for borrow pit area
27.	Nov. 19 (Wed)	Explanation of preliminary plan at the project site to officials of Embassy of Japan, MAFIC and Vientiane Prefecture
28.	Nov. 20 (Thu)	Data collection at Vientiane
29.	Nov. 21 (Fri)	Final meeting at MAFIC Reporting to Embassy of Japan
30.	Nov. 22 (Sat)	Departure from Vientiane for Bangkok
31.	Nov. 23 (Sun)	Departure from Bangkok for Tokyo

2. Explanation of Draft Final Report

(From January 14 to January 23, 1987)

No.	Date	Description
1.	Jan. 14 (Wed)	Departure from Tokyo for Bangkok of Messrs Manabe and Akizuki
2.	Jan. 15 (Thu)	Departure from Bangkok for Vientiane Courtesy call to Embassy of Japan and Vientiane Prefecture
3.	Jan. 16 (Fri)	Courtesy call to Ministry of Foreign Affairs Courtesy call to MAFIC and submission of draft final report
4.	Jan. 17 (Sat)	Explanation of the draft final report at MAFIC
5.	Jan. 18 (Sun)	Internal meeting
6.	Jan. 19 (Mon)	Discussion with MAFIC and signing of Minutes of Discussions
7.	Jan. 20 (Tue)	Departure from Vientiane for Bangkok (Manabe) Discussion with MAFIC (Akizuki)
8.	Jan. 21 (Wed)	Discussion with MAFIC (Akizuki)
9.	Jan. 22 (Thu)	Departure from Vientiane for Bangkok (Akizuki)
10.	Jan. 23 (Fri)	Departure from Bangkok for Tokyo

LIST OF COLLECTED DATA

1. Map

- (1) Topographic map on a scale of 1 to 10,000 6 sheets
(made in 1967/68)
- (2) Aerial photo map on a scale of 30,000 6 sheets
(shot in 1981)

2. National Development Plan and Statistics

- (1) 10 Years of Socio-economic Development in The Lao People's Democratic Republic, State Planning Committee, Vientiane 1985
- (2) Lao People's Democratic Republic, Country Economic Memorandum, July 15, 1986, World Bank
- (3) Lao People's Democratic Republic, Peace, Independence, Unity, Socialism, Report on the Economic and Social Situation, Development Strategy and Assistance Needs, Geneva, April 1986, Volume I and Volume II
- (4) Report on Development Co-operation, Lao PDR 1985, United Nations Development Programme, Vientiane, July 1986

3. Meteo-hydrological Data

- (1) Daily rainfall
Vientiane : 1971 - 1985
Tha Ngon : 1971 - 1985
- (2) Monthly data (Temperature, relative humidity, evaporation, wind speed, sunshine)
Vientiane : 1971 - 1985
- (3) Daily water level and discharge
Tha Ngon : 1971 - 1985

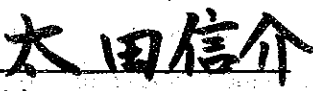
MINUTES OF DISCUSSIONS
ON
THE BASIC DESIGN STUDY
FOR
THE THA NGON REHABILITATION AND RURAL DEVELOPMENT PROJECT
IN
LAO PEOPLE'S DEMOCRATIC REPUBLIC

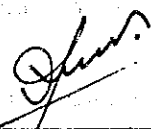
In response to the request of the Government of Lao People's Democratic Republic, the Government of Japan decided to conduct a basic design study on the Tha Ngon Rehabilitation and Rural Development Project (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA"). JICA sent to Laos the Study Team headed by Mr. Shinsuke Ota from October 24, 1986 to November 23, 1986.

The Team had a series of discussions on the Project with the officials concerned of the Government of Lao People's Democratic Republic headed by Mr. Alom Thavonesouk, Deputy Director of planning Department, the Ministry of Agriculture, Forestry, Irrigation and Cooperatives, and conducted a field survey.

As a result of the study, both parties agreed to recommend to their respective Governments that the major points of understanding reached between them, attached herewith, should be examined towards the realization of the Project.

Vientiane, October 30, 1986


Shinsuke Ota
Leader of Study Team

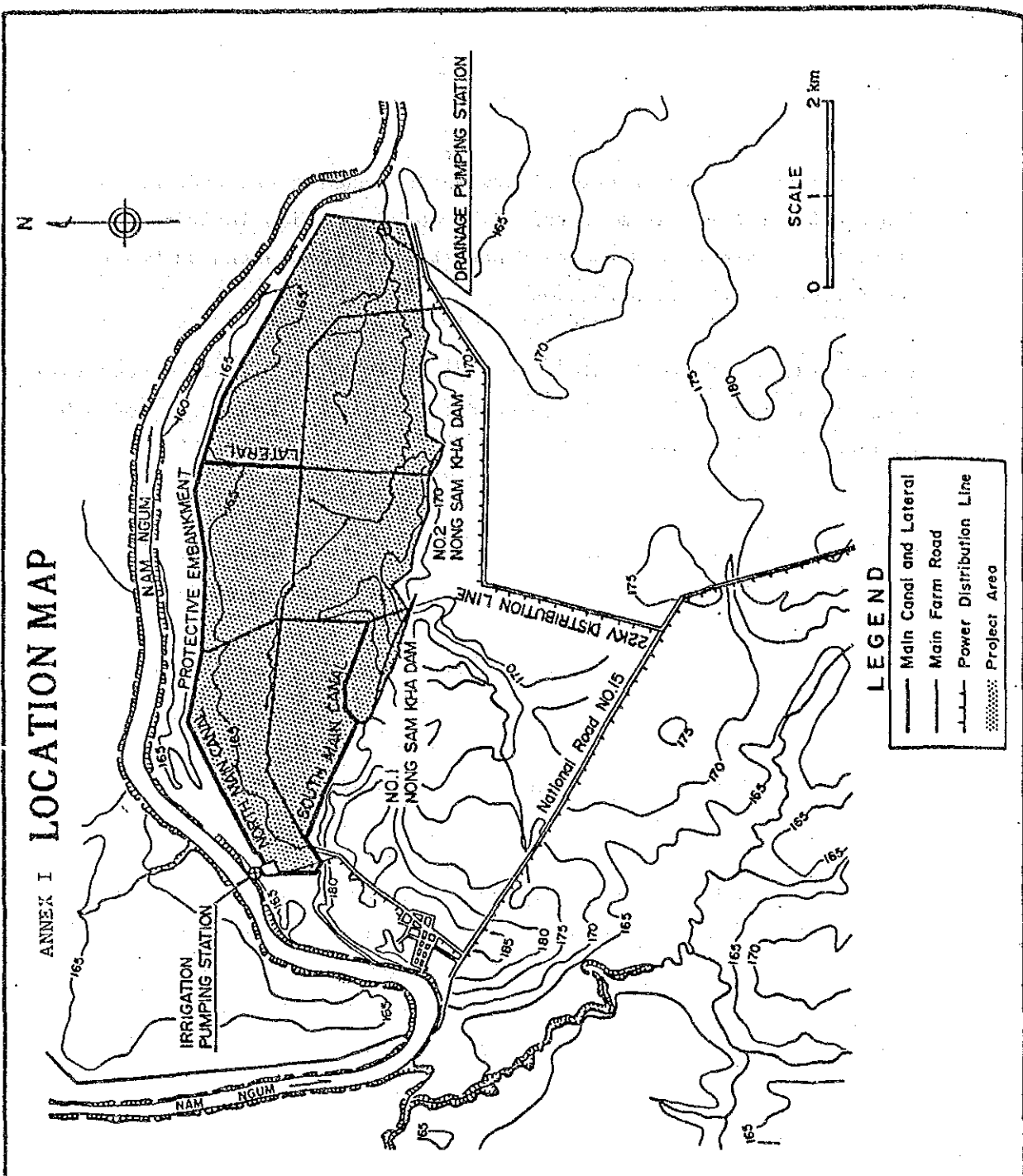

Alom Thavonesouk
Leader of the Lao Team
Ministry of Agriculture, Forestry,
Irrigation and Cooperatives

ATTACHMENT

1. The objective of the Project is to develop the prospective rural area through the rehabilitation of irrigation and drainage system in the Tha Ngon irrigation scheme and improvement of rural infrastructures around the scheme, and to contribute to the similar development of small and medium scale irrigation scheme integrated with the rural development in the Vientiane plain as a pilot project.
2. The site of the Project is located at about 25 km north from Vientiane, the capital of Lao People's Democratic Republic as shown Annex I.
3. The main concept of the Project will be:
 - (1) To increase and stabilize yield and production of rice through proper rehabilitation of irrigation and drainage system and introduction of sufficient operation and maintenance of the system,
 - (2) To increase farmer's income through establishment of the rice processing and storage facilities which contributes to improvement of rice quality, and
 - (3) To improve and stabilize the social welfare through the supply of sufficient and qualified water to the rural populace and improvement of rural road.
4. The Ministry of Agriculture, Forestry, Irrigation and Cooperatives is responsible for the administration and execution of the Project.
5. The Study Team will convey to the Government of Japan the desire of the Government of Lao People's Democratic Republic that the Government of Japan takes necessary measures to cooperate in implementation of the Project and to provide the rehabilitation of irrigation and drainage facilities and improvement of rural infrastructures listed in Annex II within the scope of Japanese economic cooperation program in grant form.

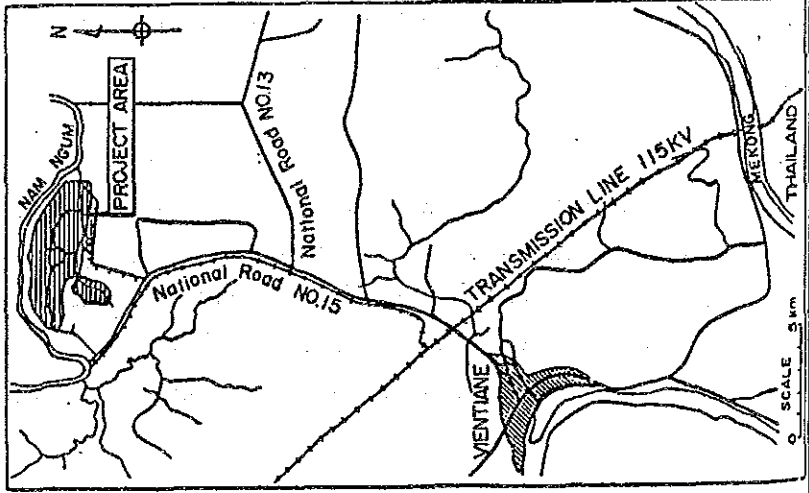
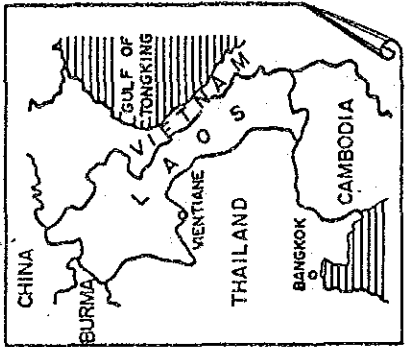
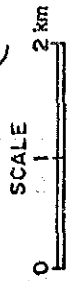
6. The Government of Lao People's Democratic Republic has understood Japan's Grant Aid System explained by the Team which includes a principle of use of a Japanese Consultant Firm and Japanese General Contractor for the construction.
7. The Government of Lao People's Democratic Republic will take necessary measures listed in Annex III on condition that the Grant Aid would be extended to the Project.

ANNEX I LOCATION MAP



LEGEND

- Main Canal and Lateral
- Main Farm Road
- Power Distribution Line
- ▨ Project Area



ANNEX II MAIN WORKS REQUESTED BY THE GOVERNMENT
OF LAO PEOPLE'S DEMOCRATIC REPUBLIC
FOR GRANT AID OF JAPAN

1. Rehabilitation of Irrigation and Drainage Facilities
 - (1) Irrigation pumping station
 - (2) Regulating pond
 - (3) Main and lateral irrigation canals
 - (4) Drainage canals
 - (5) Drainage pumping station
 - (6) No.1 Nong Sam Kha dam
 - (7) Supply of operation and maintenance equipment and spare parts

2. Rural Development Works
 - (1) Farm roads
 - (2) Rice mill plant and store house
 - (3) Water supply system

ANNEX III ARRANGEMENT TO BE UNDERTAKEN BY
THE GOVERNMENT OF LAO PEOPLE'S
DEMOCRATIC REPUBLIC

- (1) To secure the lands for the proposed rice processing and storage facilities.
- (2) To clear and reclaim the above lands as required before start of the construction.
- (3) To provide electricity distribution line to the proposed processing and storage facility sites.
- (4) To bear commissions to a Japanese foreign exchange bank for the banking services based upon the Banking Arrangement.
- (5) To exempt and to take necessary measures for custom clearance of the materials and equipment brought for the Project at the port of disembarkation.
- (6) To accord Japanese nationals whose services may be required in connection with the supply of the products and services under the verified contracts such facilities as may be necessary for their entry into the Lao People's Democratic Republic and stay therein for the performance of their work.
- (7) To maintain and use properly and effectively the facilities constructed and equipment purchased under the grant aid.
- (8) To bear all the expenses other than those to be borne by the grant aid necessary for construction of facilities as well as for transportation and installation of the equipment.

MINUTES OF DISCUSSIONS
ON
THE DRAFT FINAL REPORT OF THE BASIC DESIGN STUDY
FOR
THE THA NGON REHABILITATION AND RURAL DEVELOPMENT PROJECT
IN
LAO PEOPLE'S DEMOCRATIC REPUBLIC

The Government of Japan sent, through the Japan International Cooperation Agency (JICA), the Basic Design Study Team to Lao People's Democratic Republic from January 14 to January 23, 1987 to present and explain the Draft Final Report of the Basic Design Study on the Tha Ngon Rehabilitation and Rural Development Project.

After a series of discussions between the Basic Design Study Team and the authorities concerned of Lao People's Democratic Republic, both sides confirmed the results attached herewith (See ATTACHMENT).

Vientiane, January 19, 1987



Hiroshi MANABE
Leader of Study Team



Alom THAVONESOUK
Leader of the Lao Team
Ministry of Agriculture, Forestry,
Irrigation and Cooperatives

ATTACHMENT

1. Both sides reconfirmed the Minutes of Discussions which were mutually agreed and signed on October 30, 1986.
2. The Lao side agreed, in principle, to the basic design proposed in the Draft Final Report.
3. The Lao side understood Japan's Grant Aid System and the following arrangements to be undertaken by the Lao side for realization of the Project:
 - (1) To secure the lands for the proposed rice processing and storage facilities and the rural water supply systems,
 - (2) To clear and reclaim the above lands as required before start of the construction,
 - (3) To extend the electric power line to the prospective rice processing and storage facility site in the Tha Som Mo village by the beginning of October, 1987,
 - (4) To provide the electricity for pumps, free of charge, to supply the water to the paddy fields in the dry season and the fish pond during the construction period,
 - (5) To provide temporarily the lands for construction of temporary canals to supply the irrigation water to the paddy fields in the dry season during the construction period,
 - (6) To provide temporarily the lands for the site office, motor pool, precast concrete factory, etc. during the construction period, and
 - (7) To carry out the rehabilitation works for on-farm facilities by using O & M equipment supplied under the grant aid of Japan in parallel with the works to be done under the Project.

4. The Lao side agreed to make his efforts to the followings:
- (1) to organize the Tha Ngon Project Office and to secure the project staffs as recommended in the Draft Final Report,
 - (2) to reorganize the Tha Ngon Operation and Maintenance Office and to secure the operation and maintenance staffs as recommended in the Draft Final Report,
 - (3) to secure the annual budget for the above Operation and Maintenance Office as recommended in the Draft Final Report,
 - (4) to train the operation and maintenance staff and farmers,
 - (5) to check and maintain periodically the equipment and instruments for irrigation and drainage pump stations, rice processing facilities, and the rural water supply system as well as the operation and maintenance equipment supplied under the grant aid, and
 - (6) to operate and maintain properly the irrigation and drainage facilities, farm roads, etc..
5. The Lao side expressed to the Study Team his desire that the Government of Japan is requested to extend the following cooperation for proper operation and maintenance of the Project in future:
- (1) to despatch an electrical and mechanical engineer, an irrigation engineer and an agronomist to the project site, and
 - (2) to train the Laotian engineer in Japan.

Construction Schedule

from EN	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Item																										
Signing of Exchange Note	▲				▽																					
Consultant Contract	▲				▽																					
Detailed Design																										
Preparation of Tender Documents																										
Tendering																										
Evaluation and Construction Contract																										
Construction																										
1. Phase I																										
(1) Pump Equipment																										
(2) Gate																										
(3) O/M Equipment																										
a) Group-1																										
b) Group-2																										
(4) Civil Works																										
a) Earthworks and lining																										
b) Structure																										
2. Phase II																										
(1) North Main Canal																										
a) Earthworks and lining																										
b) Structure																										
c) Gate																										
(2) Farm Road																										
(3) Rice Processing and Storage Facilities																										
a) Rice mill plant																										
b) Civil works																										
c) Building works																										
(4) Rural Water Supply System																										
a) Tube well																										
b) Pipe line																										
c) Elevated tank and pump																										

LIST OF OFFICIALS CONCERNED AND COUNTERPART PERSONNEL

1. Officials Concerned

Mr. Khamsing Xaya Korn	Vice Minister of MAFIC
Mr. Kou Chansia	Director of Planning Department, MAFIC
Mr. Langsy Xayvisith	Director of Irrigation Department, MAFIC
Mr. Sombath Chounlamany	Director of Department No.2, Ministry of Foreign Affairs
Mr. Thongphachanh Sonnasinh	Director of International Economic Relationship Department, State Planning Committee
Mr. Holady	Director of Foreign Currency Department, Ministry of Finance
Mr. He Dhounvixay	Director, Irrigation Construction Company No.1
Mr. Vongphachanh Vongsykeo	Director, Irrigation Construction Company No.2
Mr. Chanthavong Malayphet	General Director, Stage Enterprise for Construction & Shipping
Mr. Khampong Sourinphomy	Chief of Agricultural Division, Vientiane Prefecture
Mr. Khongkousol Khamhoung	Director, State Enterprise for Operation & Maintenance
Dr. Teruo Kamihigashi	Councillor, Embassy of Japan
Mr. Katsuyoshi Tamura	Second Secretary, Embassy of Japan

2. Counterpart Personnel

Mr. Alom Thavonsouk	Deputy Director of Planning Department, MAFIC
Mr. Vankham Thammachak	Deputy Director of Survey & Design Office for Irrigation
Mr. Anousith Many	Chief of Service Planning Irrigation, Irrigation Department, MAFIC
Mr. Sisamay Khotrhotha	Director of Laboratory, Department of Agriculture, MAFIC
Mr. Sichanh thaoung Kindavong	Chief-adjoint of Service Agricultural Production Plan, Planning Department, MAFIC
Mr. Souvanh Thammavongsa	Section Chief Survey & Design Office for Irrigation
Mr. Nou Khouasakoun	Section Chief of Soil & Hydrogeology, Survey & Design Office for Irrigation

Country Data

ATTACHMENT-7

I. Basic Index

1. Name of country : Lao People's Democratic Republic
- Capital of country : Vientiane
- Population : 150,000 (in 1985)
- Independence of country : December 2, 1975

2. Land and Population (in 1985)

- | | | |
|----------------------------|---|---------------------------------|
| Area | : | <u>236,800 km²</u> |
| Population | : | <u>3,584,803</u> |
| Density of population | : | <u>15 person/km²</u> |
| Growth rate of population | : | <u>2.9%</u> |
| Ratio of urban population | : | <u>15%</u> |
| Average span of human life | : | <u>45 years</u> |

3. Form of Government

Democratic republican government under the Lao People's Revolution Party

4. Religion

Buddhism

5. Language

Laotian

6. Race

Thai lineage (60%), Protenesia lineage, Chinese lineage

7. Education

- | | | |
|------------------------------------|---|-------------------------|
| Literacy rate (15 - 45 years) | : | <u>98.75% (in 1985)</u> |
| Enrollment ratio of primary school | : | <u>89.5% (in 1980)</u> |

8. Currency

- | | | |
|---------------|---|------------------------------------|
| Currency | : | <u>Kip</u> |
| Exchange rate | : | <u>US\$1 = Kip 34,65 (in 1985)</u> |

9. Climate and Topography

Lao PDR is a land-locked country with an area of 236,800 km². The country is bordered by Vietnam in the east, Kampuchea in the south, Thailand in the west and Burma and China to the north. About 80% of the country is mountainous ranging in height between 200 to 3,000 m. The climate is tropical monsoon and is characterized by two pronounced seasons, the wet season from May to October and the dry season from November to April. The cultivation of paddy is mainly made in the lowland areas along the Mekong river and its tributaries.

II. Socio-economic Index

1. Gross Domestic Product (GDP) in 1985

GDP	: <u>US\$ 489 million</u>
Per Capita Income	: <u>US\$135</u>
Annual Growth Rate	: <u>5% (1980 - 1985)</u>

2. Structure of GDP

Agriculture	: <u>62%</u>
Industry	: <u>5.9%</u>
Services	: <u>32.1%</u>

3. Composition of Official Export

	(US\$ million)				
	1981	1982	1983	1984	1985 (est.)
(1) Exports to the Convertible Area	<u>16.9</u>	<u>27.8</u>	<u>27.8</u>	<u>30.1</u>	<u>34.8</u>
Coffee	-	-	1.6	0.6	0.7
Electric power	10.8	23.9	24.0	25.2	27.4
Logs and wood products	5.1	3.5	1.7	3.7	5.6
Other exports	1.0	0.4	0.5	0.6	1.1
(2) Exports to the Nonconvertible Area	<u>6.2</u>	<u>12.2</u>	<u>13.0</u>	<u>15.0</u>	<u>12.8</u>
Coffee	3.1	8.1	6.9	8.1	2.9
Logs and wood products	-	0.5	1.3	1.3	3.0
Tin and gypsum	1.6	2.6	3.7	4.0	4.2
Other exports	1.5	1.0	1.1	1.6	2.8
Total Official Exports	<u>23.1</u>	<u>40.0</u>	<u>40.8</u>	<u>45.1</u>	<u>47.6</u>

Composition of Official Import

	(US\$ million)				
	1981	1982	1983	1984	1985 (est.)
(1) Nonaid Imports from the Convertible Area	<u>36.2</u>	<u>44.0</u>	<u>52.1</u>	<u>35.4</u>	<u>29.7</u>
Rice and other food	2.0	5.6	6.3	4.0	1.0
Petroleum products	12.9	13.8	14.0	10.8	10.4
Machinery and raw materials	-	15.9	16.0	10.3	7.8
Other official imports	21.3	8.7	11.0	5.3	9.7
Private imports	-	-	4.8	4.9	0.8
(2) Nonaid Imports from the nonconvertible Area	<u>13.8</u>	<u>30.2</u>	<u>40.2</u>	<u>62.0</u>	<u>70.8</u>
(3) Imports Under Aid Programs	<u>59.5</u>	<u>58.0</u>	<u>57.3</u>	<u>56.5</u>	<u>62.8</u>
Convertible area	15.5	29.7	24.2	15.9	19.0
Nonconvertible area	44.0	28.3	33.1	40.6	43.8
Total Imports	<u>109.5</u>	<u>132.2</u>	<u>149.4</u>	<u>153.9</u>	<u>163.3</u>
Convertible area	51.7	73.7	76.3	51.3	48.7
Nonconvertible area	57.8	58.5	73.1	102.6	114.6

Source: Lao PDR, Country Economic Memorandum, July 15, 1986, World Bank

4. Labor Force (1985)

Labor force: 1.6 million

5. Inflation Rate

(Unit: %)				
1981-1981	1982-1982	1982-1983	1983-1984	1984-1985
34	70	63	27	90

Source: Lao PDR, Country Economic Memorandum, July 15, 1985 World Bank

6. Balance of Payments

	(Unit: US\$ million)				
	1981	1982	1983	1984	1985 (est.)
Trade balance	-86.4	-92.2	-108.6	-108.8	-115.7
Exports	23.1	40.0	40.8	45.1	47.6
Imports	109.5	132.2	149.4	153.9	163.3
Services	-6.3	-7.1	-12.5	-5.5	-7.6
Balance of transfers	23.5	31.0	25.4	28.9	28.0
Current account	-69.2	-68.3	-95.7	-85.4	-95.3
Capital account	51.4	60.2	76.5	89.6	99.0
Errors and omissions	13.2	3.8	31.1	-7.0	-
Overall balance	-4.6	-4.3	11.9	-2.8	3.7

Source: Lao PDR, Country Economic Memorandum, July 15, 1986, World Bank

7. International Reserves

	(Unit: US\$ million)				
	1981	1982	1983	1984	1985 (June)
Gold	0.60	0.60	0.60	0.60	0.60
Foreign exchange	12.09	7.62	18.70	10.52	16.15
SDRs	0.65	0.05	0.14	0.01	0.03
Gross reserves	<u>13.34</u>	<u>8.27</u>	<u>19.44</u>	<u>11.13</u>	<u>16.78</u>
External liquid liabilities	-15.06	-14.27	-13.55	-9.99	-4.74
Net official reserves	-1.72	-6.00	5.89	1.14	12.04

Source: Lao PDR, Country Economic Memorandum, July 15, 1986, World bank

8. Debt Service Ratio

	(Unit: %)				
	1981	1982	1983	1984	1985 (Projected)
Convertible area	27.9	13.6	16.4	25.9	36.9
Nonconvertible area	1.0	13.3	4.4	12.6	18.8
Total debt service ratio	22.6	13.5	13.2	22.3	33.2

Source: Lao PDR, Country Economic Memorandum, July 15, 1985, World Bank

9. Trade to Japan

	(Unit: US\$ million)			
	1981	1982	1983	1984
Exports (timber)	3.79	1.16	2.36	0.63
Imports (Machinery, iron goods)	8.95	9.79	15.23	5.17

Source: Statistics of Japanese Custom

10. Consolidated Government Budget

	(Unit: Kip million)					
	1980	1981	1982	1983	1984	1985 (est.)
Revenue	748	989	2,755	3,496	4,948	6,143
Expenditure	1,028	1,028	2,259	2,945	4,126	5,439
Current Surplus	-280	-39	496	551	822	704
Capital Expenditure	749	928	3,216	3,750	4,258	5,035
Overall Deficit	-1,029	-967	-2,720	-3,199	-3,436	-4,331
Financing (External resources)	1,029	967	2,720	3,199	3,436	4,331

source: Lao PDR, Country Economic Memorandum, July 15, 1986, World Bank

III. Development Index

1. National Development Plan

(1) Past national development plan

Three-Year Plan	1978 - 1980
First Five-Year Plan	1981 - 1985

Through the above development plans, the country has been involved in a policy of developing its agriculture and timber resources. The goal is i) to become self-sufficient in basic food commodities and to have a surplus of certain agricultural products for export, ii) to develop commerce with the aim of exchange between city and countryside, in order gradually to bring the farmers into the cash nexus, and iii) to go beyond the backward state of the existing traditional economy through the growth of commerce and communications.

The principal objectives of the first Five-Year Plan were the followings:

- to increase agricultural and forestry production so as to provide enough food for consumption and to increase exports of timber,
- to increase industrial production,
- to improve the economic basic infrastructure by expanding internal transport and constructing route 9 to reach the port of Da Nang in Vietnam; developing the distribution network for electricity; and improving the capacity to maintain equipment and capital,
- to improve the internal distribution of goods,
- to increase the number of state enterprises and state controlled cooperatives so as to consolidate the leading role of the socialist sector in the economy,
- to increase, through taxation, exports and foreign aid, the mobilization of resources for investment,
- to expand the education and training system and improve the health system, and
- to improve economic management and organization.

The annual achievements and the targets of the first Five-Year Plan (1981-1985) is shown as follows.

	(Annual growth rate in percentage)	
	Plan targets 1980-85	Estimated 1980-84
Agriculture	4.2	4.7
Industry of which:	17.0	-1.6
Electricity	...	1.3
Mining	...	5.8
Manufacturing	...	-7.5
Construction	...	23.0
Transport and communications	13.1	7.2
Commerce	11.8	4.4
Other (housing, etc.)	...	3.5
Net material product	7.0	5.0

Source: Lao PDR, Country Economic Memorandum, July 15, 1986, World Bank

(2) Current national development plan

Second Five-Year Plan 1986-1990

The development priorities are oriented as follows:

- (i) acceleration of development and exports to achieve food self-sufficiency, reduced non-food imports and improvement of balance of payments (export of agricultural, timber, mining, energy and industrial products, particularly to convertible countries),

- (ii) improvement of transportation and communication sectors, and
- (iii) strengthening of management and development of human resources.

The measures required to reach the above priority objectives are shown below:

(i) Economic measures

- better use of the existing equipment and infrastructures, upgrading them if necessary,
- selection of small scale and high-return projects,
- increased and systematic use of measures to stimulate production (price and service supports to benefit state, cooperative and private producers),
- diversified and increased production, particularly in agriculture, and
- better utilization of local raw materials for the development of agro-industries and the wood industry.

(ii) Financial measures

- stabilization and reduction of the budget deficit by limiting the least essential expenses and by increasing certain fiscal and semi-fiscal revenues, and
- improvement of the balance of trade and the balance of payments by promoting exports.

(iii) Measures to control inflation

- reduction of expansion in the money supply,
- control of the debt levels of the public sector,
- increase of the domestic share in the national revenue assigned to savings, and
- change of the price and subvention policy.

(iv) Measures to planning capabilities and management of the economy

- establishment of a viable statistical apparatus,
- development of the coordination of economic policy and external aid,
- improvement of capacities for selection, execution and evaluation of projects,
- rationalization of administrative structures and state enterprises, and

- rationalization of the functional framework of the private sector.

2. National Budget and Investment Cost

National budget (January to December in 1985)

<u>Revenue</u>		<u>Expenditure</u>	
Nontax revenue	Kip 1,238 million	Current expenditure	Kip 5,439 million
Tax revenue	Kip 1,905 million	Capital expenditure	Kip 5,035 million
External resources	Kip 4,331 million		
Total	Kip 10,474 million	Total	Kip 10,474 million

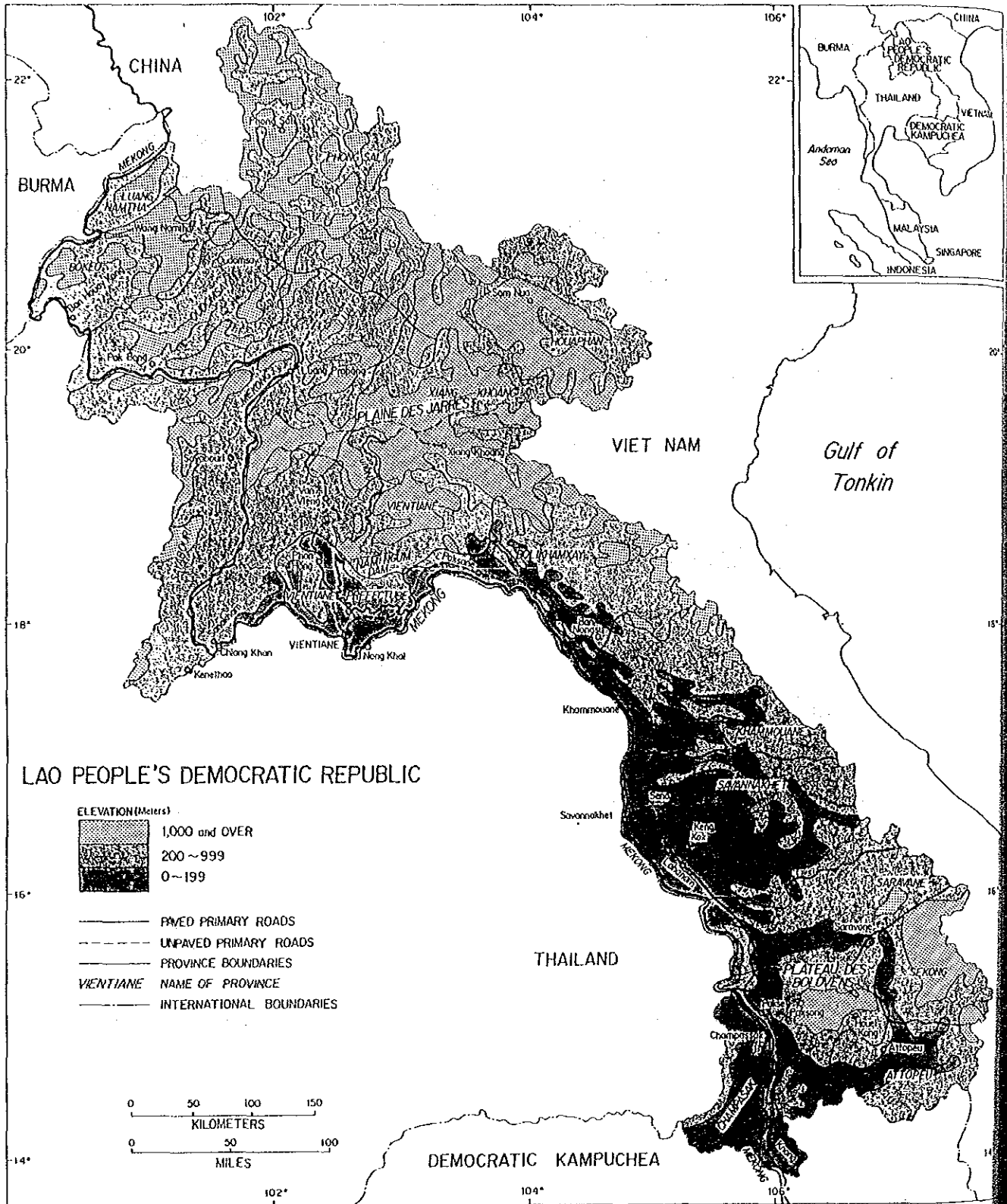
Investment cost

Investment costs of projects identified for the 1986-90 period is shown as follows.

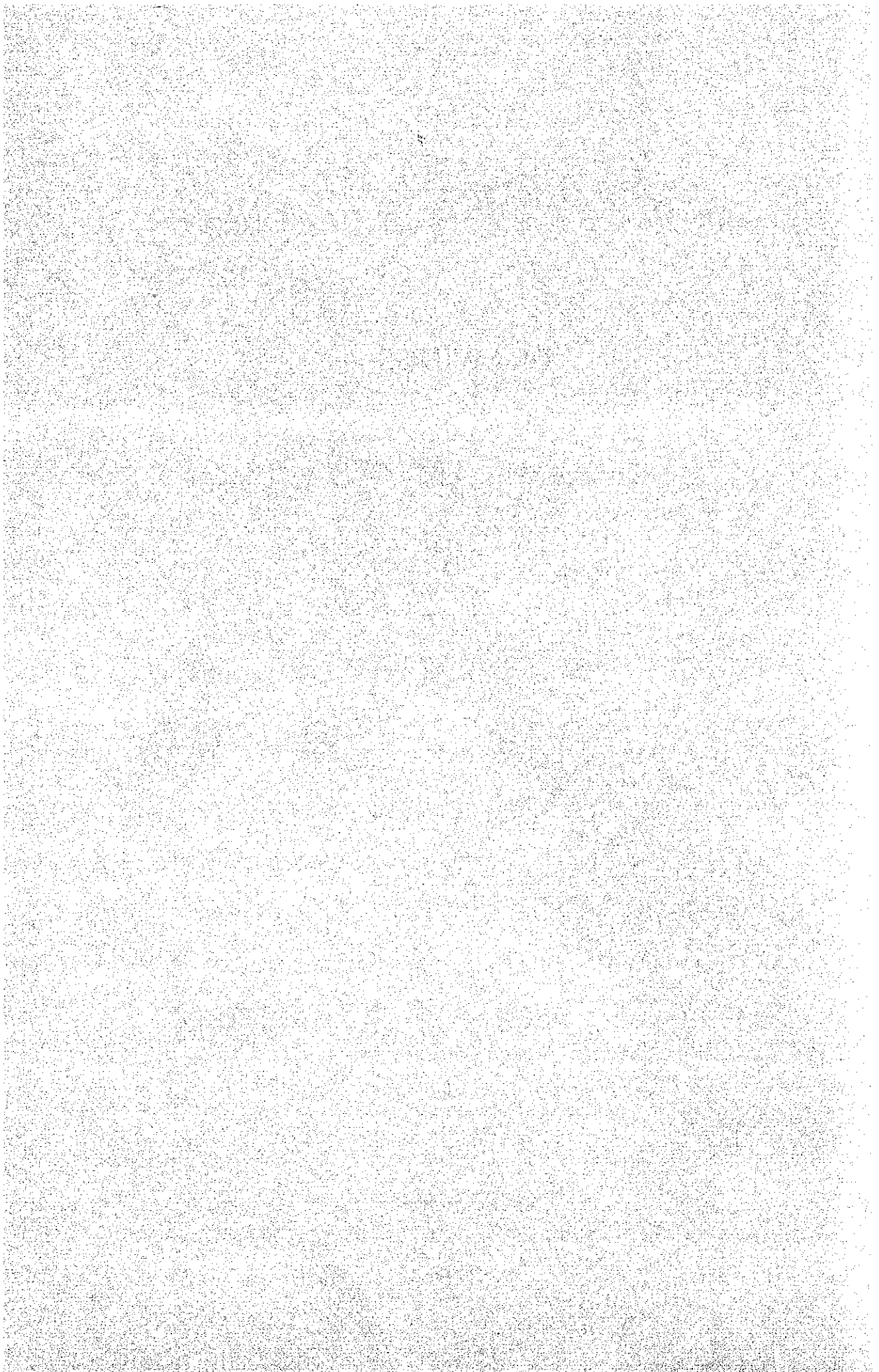
	Investment Cost in 1985 prices (US\$ 106)	Percentage
A. Agriculture	127.0	34.7
- Rainfed rice and other crops	185.0	5.1
- Livestock and fisheries	27.5	7.5
- Irrigation	70.6	19.3
- Training and others	10.4	2.8
B. Industry, Mines and Energy	77.2	21.1
- Manufacturing	9.7	2.7
- Forestry	n.a.	n.a.
- Mining	n.a.	n.a.
- Energy	66.6	18.2
- Others	0.9	0.2
C. Transport and Telecommunications	106.0	29.0
D. Commerce	13.4	3.7
E. Housing and Water Supply	14.8	4.0
F. Education	13.9	3.8
G. Health	13.2	3.6
Total	365.5	100.0

Sources: Lao PDR, Country Economic Memorandum, July 15, 1986, World Bank

IV General Map of Lao PDR



DRAWINGS

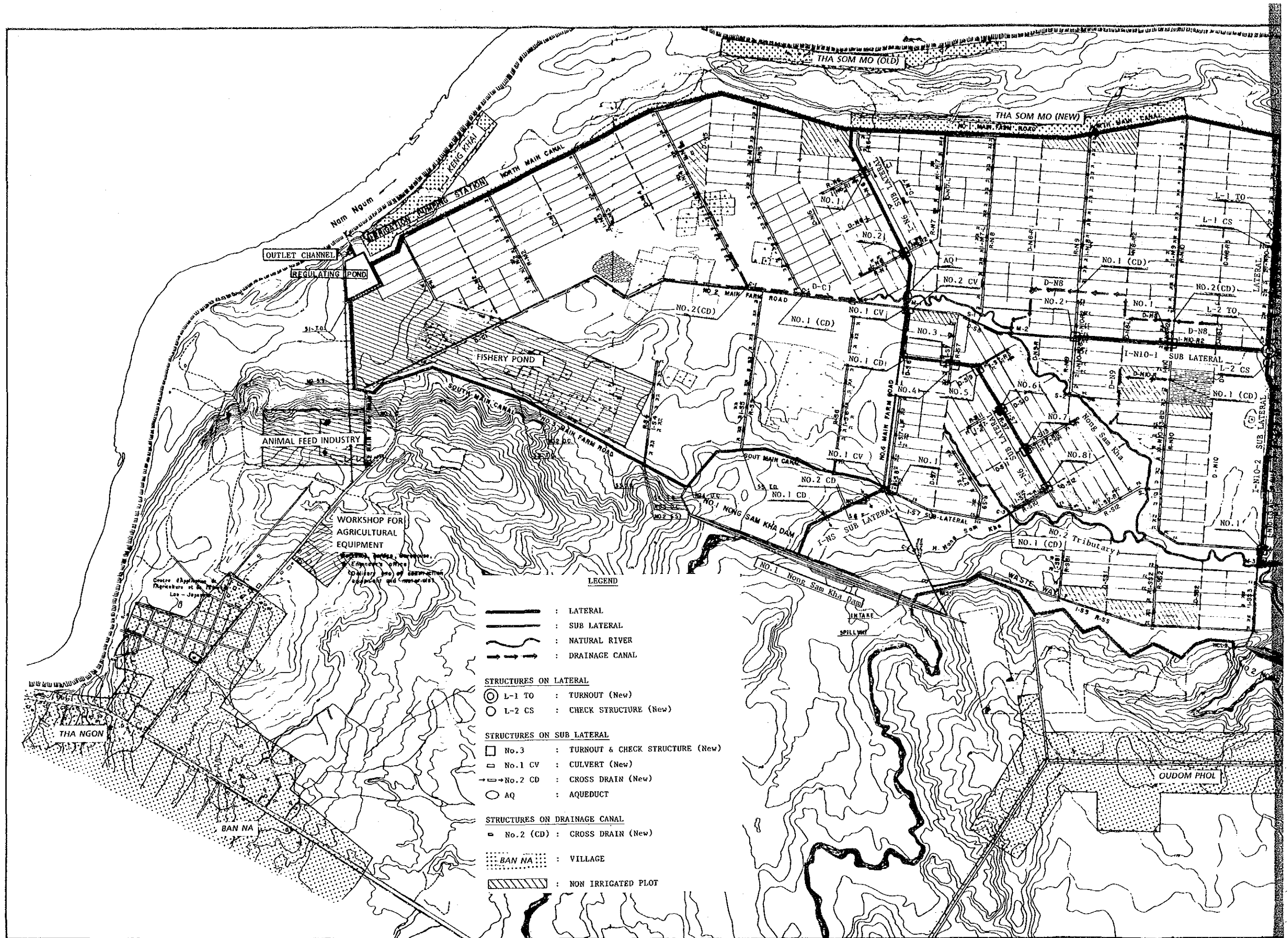


LIST OF DRAWINGS (1/2)

NO.	DRAWING NO.	TITLE
1	0001	GENERAL LAYOUT (PHASE I)
2	0002	GENERAL LAYOUT (PHASE II)
3	1001	IRRIGATION PUMP STATION : GENERAL ARRANGEMENT
4	1002	IRRIGATION PUMP STATION : PANELS
5	1003	IRRIGATION PUMP STATION AND REGULATING POND : PUMP OUTLET AND HEADRACE, OUTLET OF INTAKE FOR NORTH MAIN CANAL
6	1004	IRRIGATION PUMP STATION : OPERATION HOUSE (1/3)
7	1005	IRRIGATION PUMP STATION : OPERATION HOUSE (2/3)
8	1006	IRRIGATION PUMP STATION : OPERATION HOUSE (3/3)
9	1007	PUMP STATIONS : LIGHTING FIXTURE
10	2001	NORTH MAIN CANAL : PROFILE (1/3)
11	2002	NORTH MAIN CANAL : PROFILE (2/3)
12	2003	NORTH MAIN CANAL : PROFILE (3/3)
13	2004	LATERAL AND SUB-LATERAL : PROFILE
14	3001	NORTH MAIN CANAL : TURNOUT/GAUGING STAFF
15	3002	NORTH MAIN CANAL : FOOT PATH BRIDGE AND SIDE SPILLWAY
16	3003	NORTH MAIN CANAL AND LATERAL : CANAL LINING AND WASHING STEP
17	3004	NORTH MAIN CANAL AND LATERAL : CONCRETE BLOCK AND JOINT FOR CANAL LINING
18	3005	NORTH MAIN CANAL AND LATERAL : CHECK STRUCTURE
19	3006	LATERAL : L-2 TURNOUT
20	3007	SUB-LATERAL : TURNOUT & CHECK STRUCTURE
21	3008	SUB-LATERAL : CULVERT, AQUEDUCT/STEEL GATE FOR TURNOUT & CHECK STRUCTURE
22	4001	DRAINAGE PUMP STATION : GENERAL ARRANGEMENT
23	4002	DRAINAGE PUMP STATION : PANELS
24	4003	DRAINAGE PUMP STATION : OPERATION HOUSE (1/2)
25	4004	DRAINAGE PUMP STATION : OPERATION HOUSE (2/2)
26	5001	NONG SAM KHA RIVER : PROFILE (1/4)
27	5002	NONG SAM KHA RIVER : PROFILE (2/4)
28	5003	NONG SAM KHA RIVER : PROFILE (3/4)
29	5004	NONG SAM KHA RIVER : PROFILE (4/4)
	D-N12	: PROFILE

LIST OF DRAWINGS (2/2)

NO.	DRAWING NO.	TITLE
30	5005	NO.1 TRIBUTARY : PROFILE
31	6001	NO.1 AND NO.2 RURAL ROAD : PROFILE
32	7001	CROSS DRAIN (1/2)
33	7002	CROSS DRAIN (2/2)
34	7003	GATES AND HOISTS
35	8001	INTAKE FOR I-NS SUB-LATERAL ON NO.1 NONG SAM KHA DAM
36	9001	RURAL WATER SUPPLY SYSTEM : GENERAL LAYOUT
37	10001	RICE MILL AND STORAGE FACILITIES (1/3)
38	10002	RICE MILL AND STORAGE FACILITIES (2/3)
39	10003	RICE MILL AND STORAGE FACILITIES (3/3)



LEGEND

- : LATERAL
- : SUB LATERAL
- : NATURAL RIVER
- : DRAINAGE CANAL

STRUCTURES ON LATERAL

- ⊙ L-1 TO : TURNOUT (New)
- L-2 CS : CHECK STRUCTURE (New)

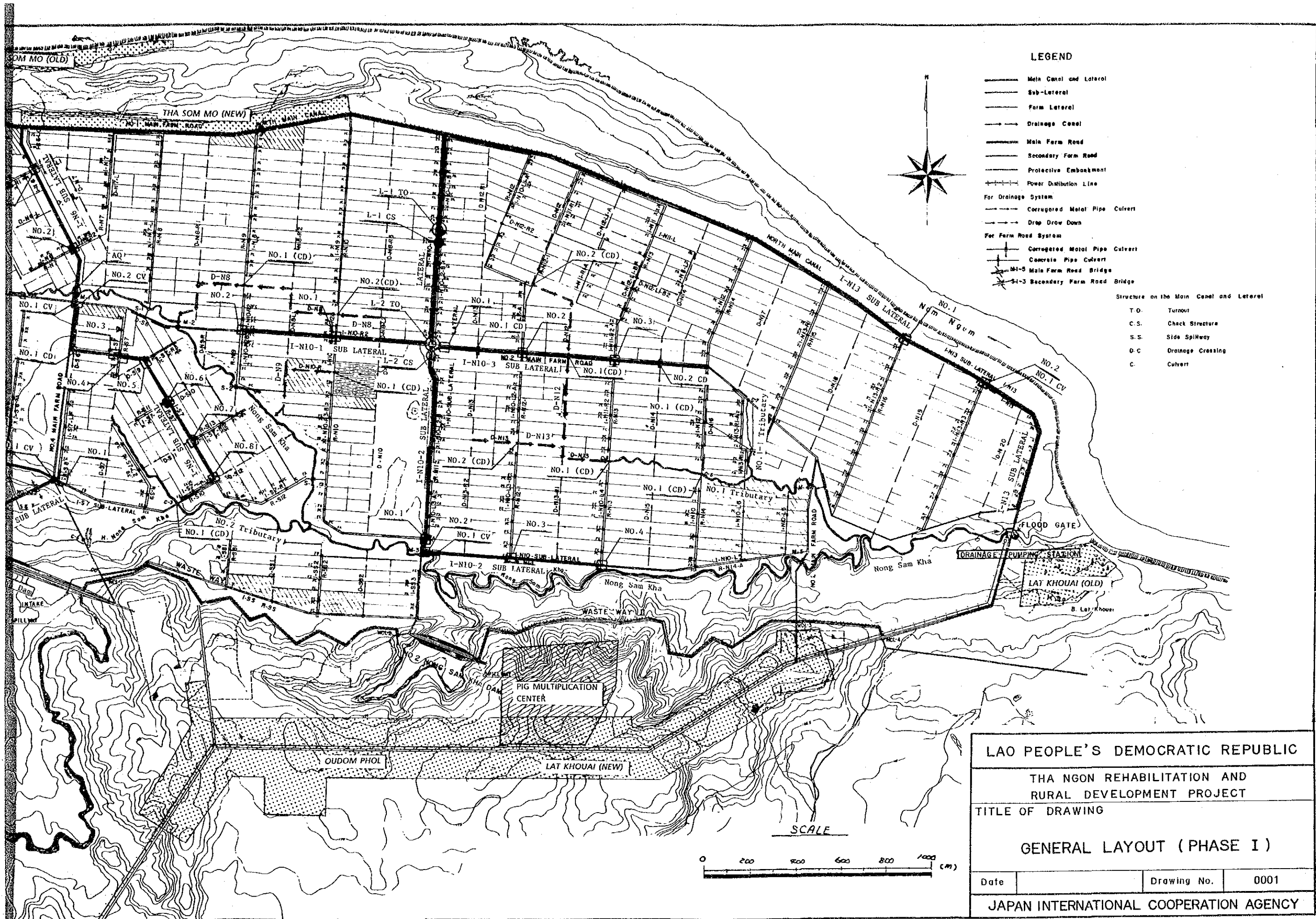
STRUCTURES ON SUB LATERAL

- No. 3 : TURNOUT & CHECK STRUCTURE (New)
- ▢ No. 1 CV : CULVERT (New)
- No. 2 CD : CROSS DRAIN (New)
- AQ : AQUEDUCT

STRUCTURES ON DRAINAGE CANAL

- ▢ No. 2 (CD) : CROSS DRAIN (New)

- ⋯ BAN NA : VILLAGE
- ▨ : NON IRRIGATED PLOT



LEGEND

- Main Canal and Lateral
- Sub-Lateral
- Farm Lateral
- Drainage Canal
- Main Farm Road
- Secondary Farm Road
- Protective Embankment
- Power Distribution Line
- For Drainage System
 - Corrugated Metal Pipe Culvert
 - Drop Down
- For Farm Road System
 - Corrugated Metal Pipe Culvert
 - Concrete Pipe Culvert
 - M-3 Main Farm Road Bridge
 - S-3 Secondary Farm Road Bridge

- Structure on the Main Canal and Lateral
- T.O. Turnout
 - C.S. Check Structure
 - S.S. Side Spillway
 - D.C. Drainage Crossing
 - C. Culvert

LAO PEOPLE'S DEMOCRATIC REPUBLIC

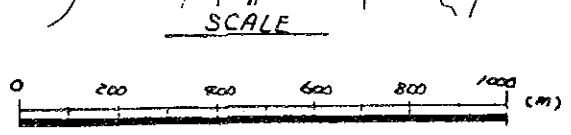
THA NGON REHABILITATION AND RURAL DEVELOPMENT PROJECT

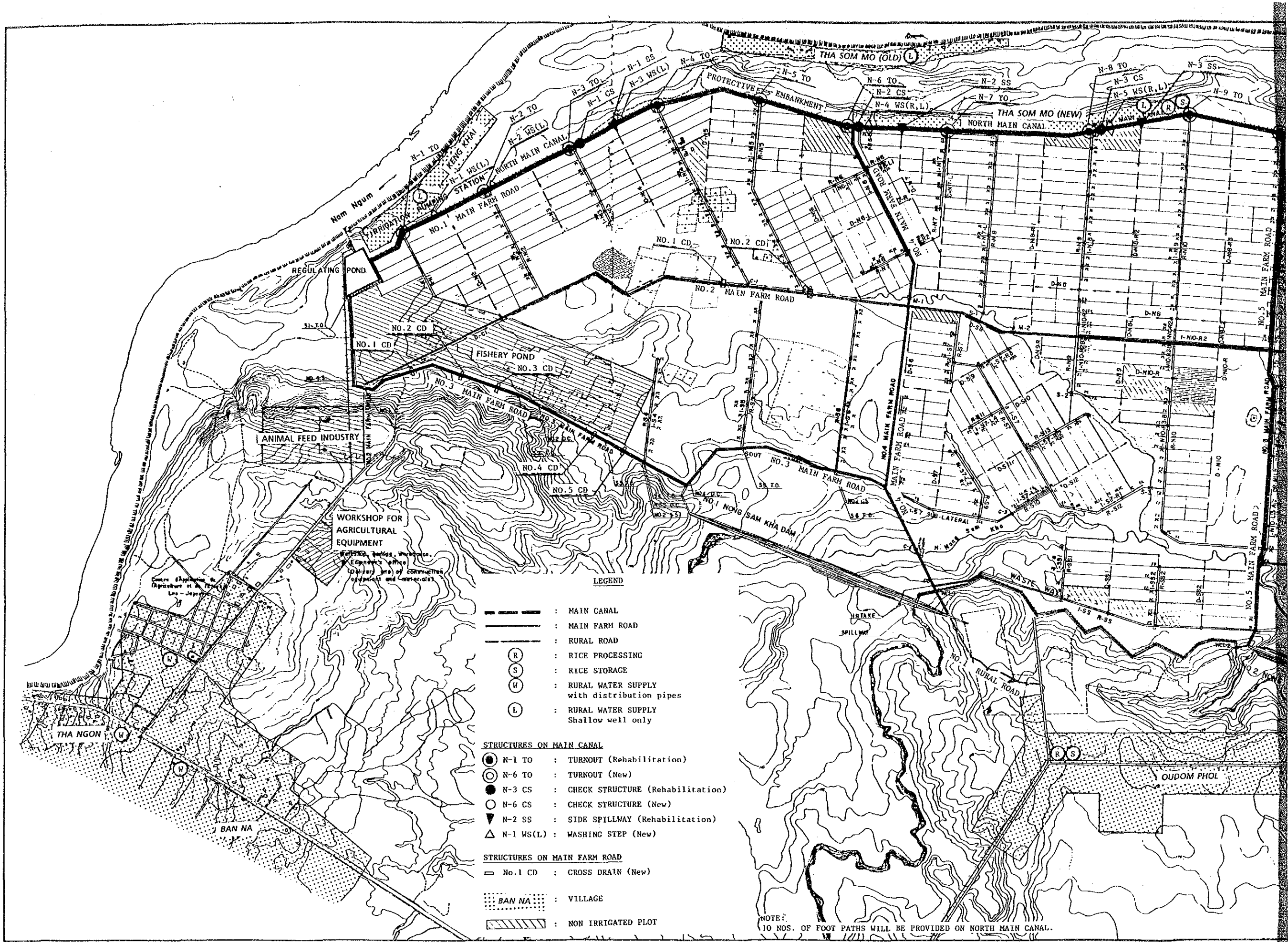
TITLE OF DRAWING

GENERAL LAYOUT (PHASE I)

Date _____ Drawing No. 0001

JAPAN INTERNATIONAL COOPERATION AGENCY





LEGEND

- : MAIN CANAL
- : MAIN FARM ROAD
- : RURAL ROAD
- (R) : RICE PROCESSING
- (S) : RICE STORAGE
- (W) : RURAL WATER SUPPLY with distribution pipes
- (L) : RURAL WATER SUPPLY Shallow well only

STRUCTURES ON MAIN CANAL

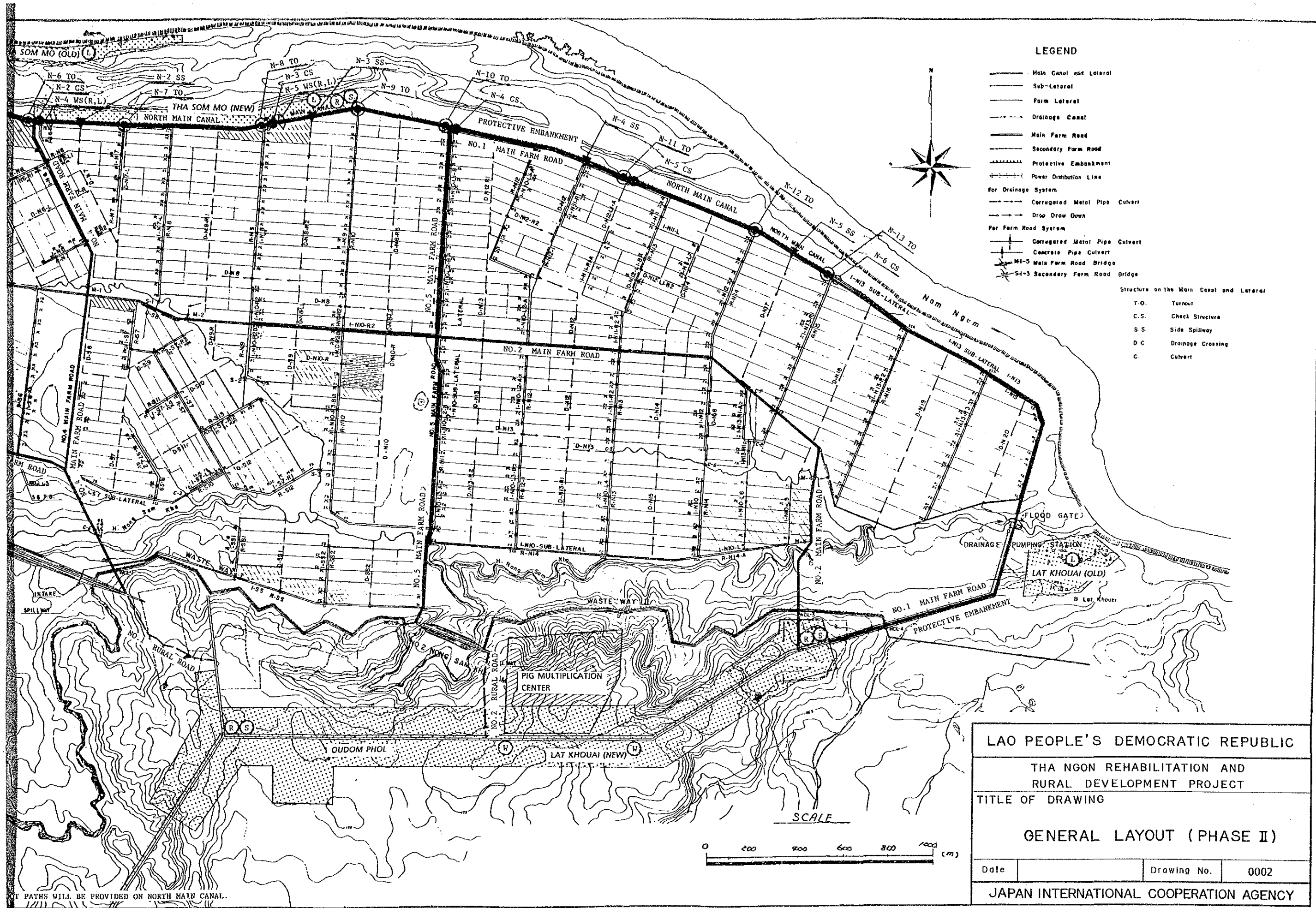
- N-1 TO : TURNOUT (Rehabilitation)
- N-6 TO : TURNOUT (New)
- N-3 CS : CHECK STRUCTURE (Rehabilitation)
- N-6 CS : CHECK STRUCTURE (New)
- ▼ N-2 SS : SIDE SPILLWAY (Rehabilitation)
- △ N-1 WS(L) : WASHING STEP (New)

STRUCTURES ON MAIN FARM ROAD

- ▬ No.1 CD : CROSS DRAIN (New)

- ▨ BAN NA : VILLAGE
- ▨ : NON IRRIGATED PLOT

NOTE:
10 NOS. OF FOOT PATHS WILL BE PROVIDED ON NORTH MAIN CANAL.



- LEGEND**
- Main Canal and Lateral
 - Sub-Lateral
 - Farm Lateral
 - Drainage Canal
 - Main Farm Road
 - Secondary Farm Road
 - Protective Embankment
 - Power Distribution Line
- For Drainage System**
- Corrugated Metal Pipe Culvert
 - Drop Down
- For Farm Road System**
- Corrugated Metal Pipe Culvert
 - Concrete Pipe Culvert
 - M-1-5 Main Farm Road Bridge
 - S-1-5 Secondary Farm Road Bridge
- Structure on the Main Canal and Lateral**
- T.O. Turnout
 - C.S. Check Structure
 - S.S. Side Spillway
 - D.C. Drainage Crossing
 - C. Culvert

LAO PEOPLE'S DEMOCRATIC REPUBLIC

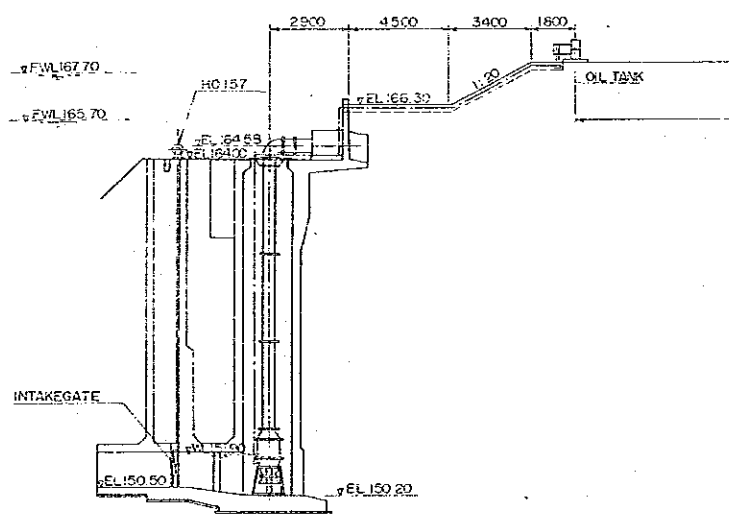
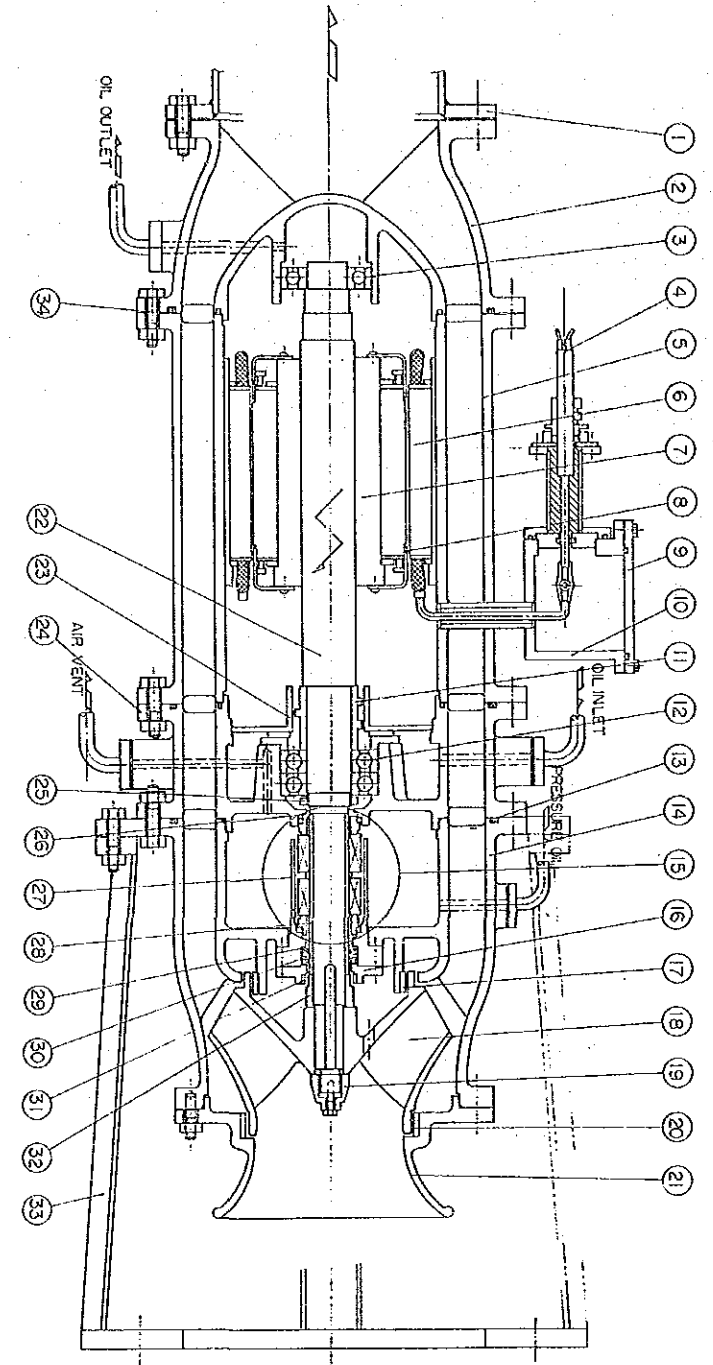
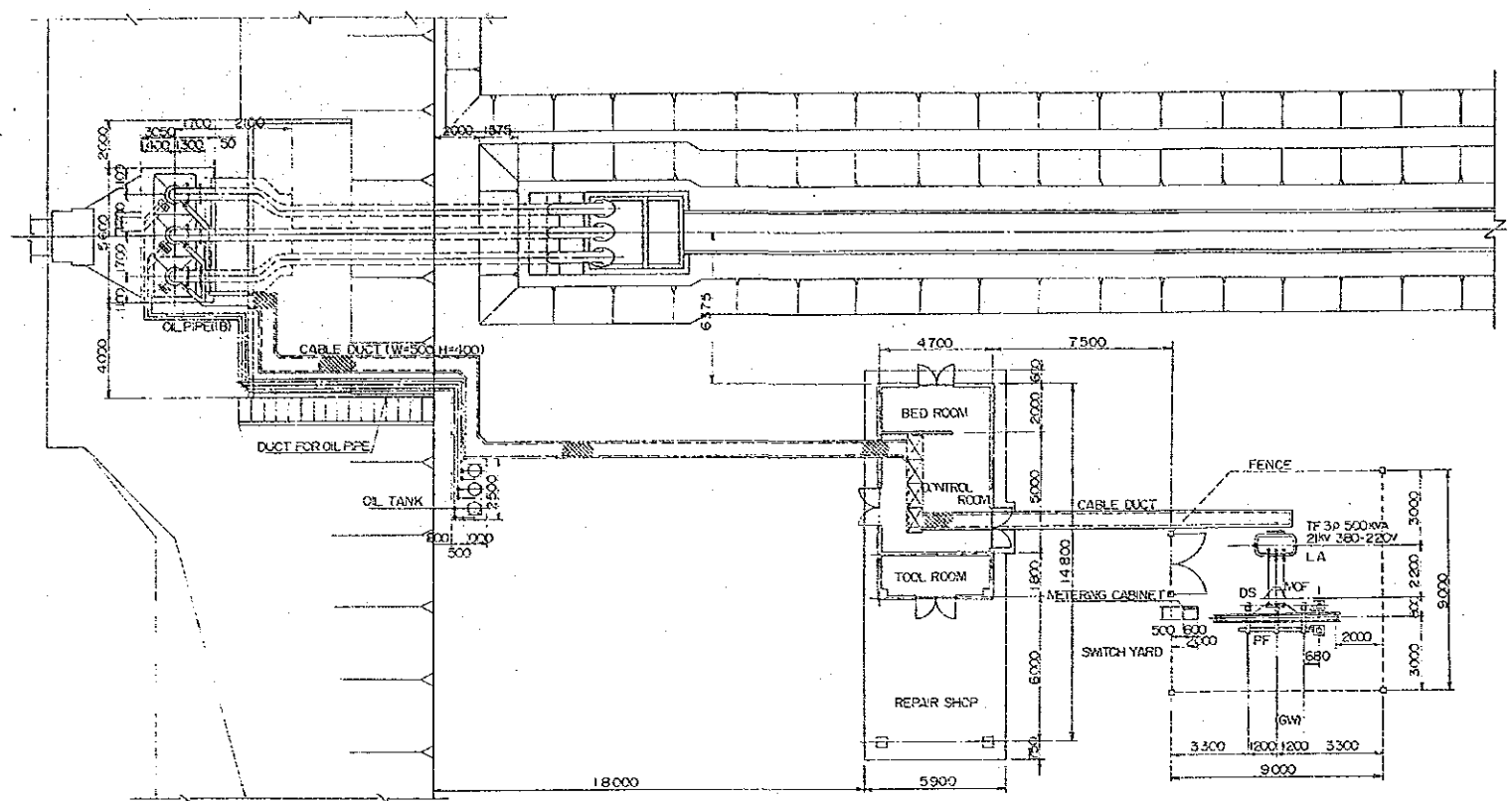
THA NGON REHABILITATION AND RURAL DEVELOPMENT PROJECT

TITLE OF DRAWING

GENERAL LAYOUT (PHASE II)

Date	Drawing No.	0002
JAPAN INTERNATIONAL COOPERATION AGENCY		

AT PATHS WILL BE PROVIDED ON NORTH MAIN CANAL.



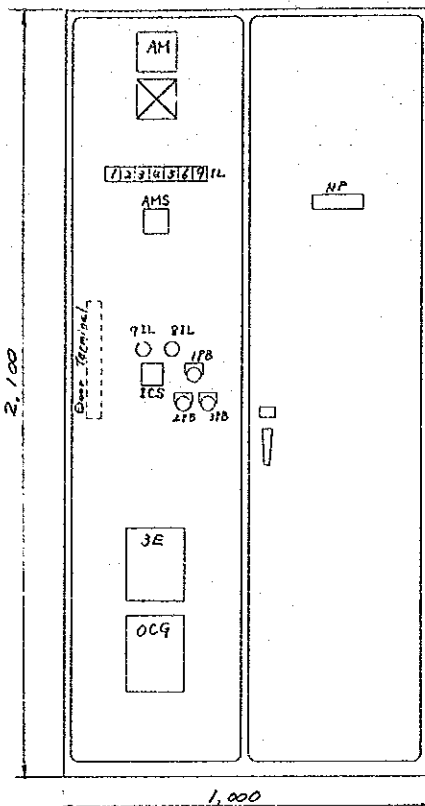
PARTS LIST

PART NAME	MATERIALS	PART NAME	MATERIALS	PART NAME	MATERIALS
1 DELIVERY PIPE	SS 41	13 PACKING	Hycar OR15	25 BALL NUT	S25C
2 MOTOR TOP COVER	FC 20	14 PUMP CASING	FC 20	26 PACKING	Hycar OR15
3 BALL BEARING	NO. 6314	15 MECHANICAL SEAL	SPECIAL	27 SEAL CASE	SUS 52
4 CABLE	CHLOROPRENE CARBIDE CABLE	16 SEAL COVER	SUS 52	28 SEAL LINER	SUS 27 HGT PLATING
5 MOTOR CASE	SS 41	17 BALANCE RING	SCS 2	29 OIL SEAL	SYNTHETIC RUBBER
6 STATOR		18 IMPELLER	SC 46	30 DUST SEAL	SYNTHETIC RUBBER
7 ROTOR		19 IMPELLER NUT	SUS 52	31 SEAL RING	SUS 27 STELLITE WELDING
8 END RING COVER	SUS 27	20 SUCTION RING	SCS 2	32 SLINGER	SUS 27 STELLITE WELDING
9 TERMINAL COVER	SS 41	21 BELL MOUTH	FC 20	33 PUMP BASE	SS41
10 TERMINAL CASE	SS 41	22 SHAFT	S35C	34 BOLT AND NUT	S25 C
11 SCREW	SS 41	23 BEARING COVER	SUS 27		
12 BALL BEARING	NO. 7320 DF	24 MOTOR BOT TOM COVER	FC 20		

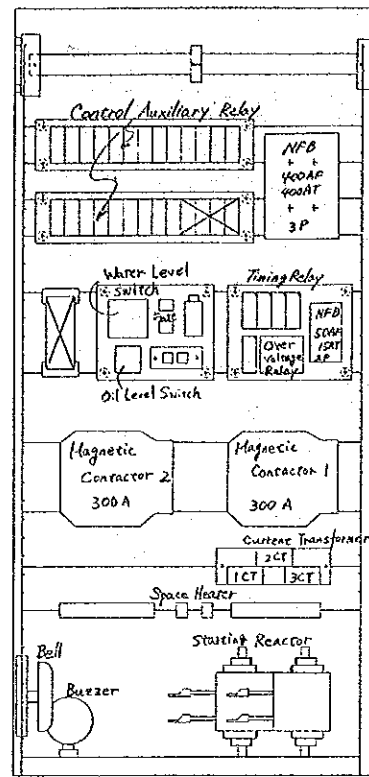
DESIGN DATA	
DIAMETER	500 MM
TOTAL HEAD	19 M
CAPACITY	32.4 M ³ /MIN
SPEED	970 RPM
MOTOR	135 KW

LAO PEOPLE'S DEMOCRATIC REPUBLIC		
THA NGON REHABILITATION AND RURAL DEVELOPMENT PROJECT		
TITLE OF DRAWING		
IRRIGATION PUMP STATION		
GENERAL ARRANGEMENT		
Date	Drawing No.	1001
JAPAN INTERNATIONAL COOPERATION AGENCY		

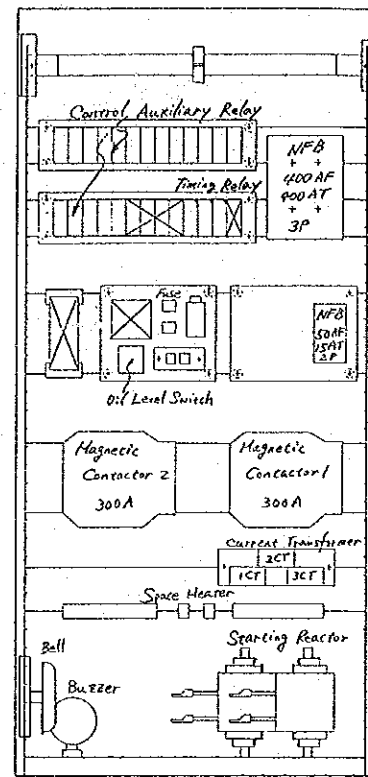
W 1,000 H 2,100 D 600



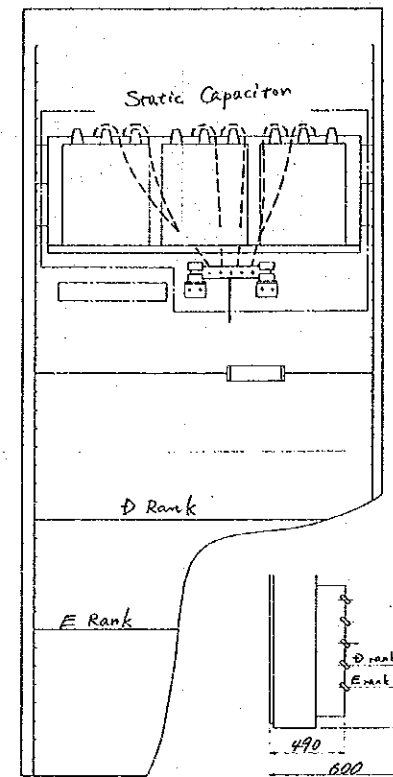
FRONT VIEW (DOOR)
Control Panel Nos. 1, 2 & 3



FRONT VIEW (IN DOOR)
Control Panel No. 1



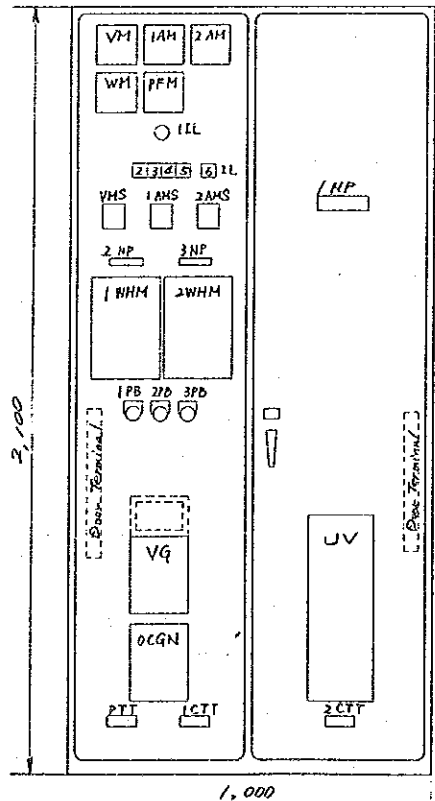
FRONT VIEW (IN DOOR)
Control Panel Nos. 2 & 3



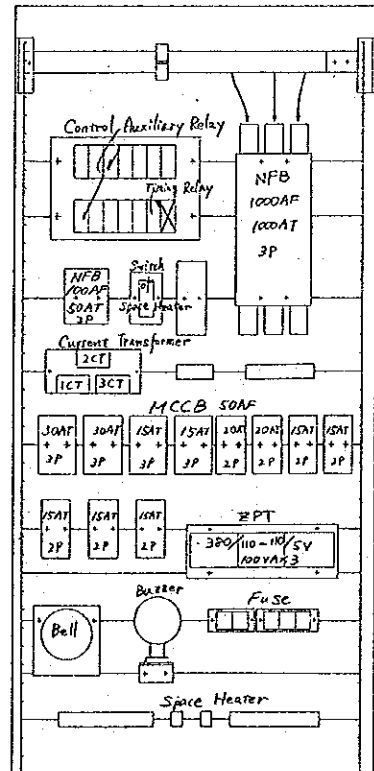
REAR VIEW (IN DOOR)
Control Panel Nos. 1, 2 & 3

Code	Description	Rating
NP	Name plate	
1 IL	Lamp for 3E tripping	110V 2W Red
2 IL	" NFB tripping	" "
3 IL	" High water level	" "
4 IL	" Grounding	" "
5 IL	" Low water level	" Orange
6 IL	" Low level oil	" "
7 IL	" Stop	" Green
8 IL	" Run	" Red
9 IL	" Spare	" Orange
AM	AC Ammeter	300/5A 1.5 class
AMS	Switch for ammeter	3P Transfer
ICS	Control switch	Stop → 0 → Start
1PB	Push button for double reset	
2PB	" bell stop	
3PB	" buzzer stop	
3E		5A 50/60 Hz
OCG		0.5A 50Hz

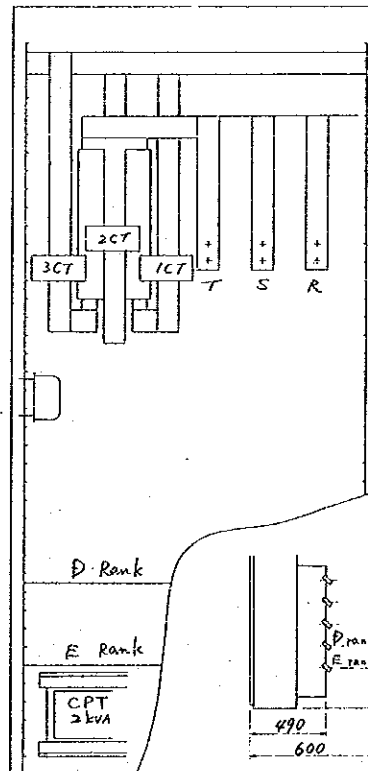
W 1,000 H 2,100 D 600



FRONT VIEW (DOOR)
Distribution Panel



FRONT VIEW (IN DOOR)
Distribution Panel



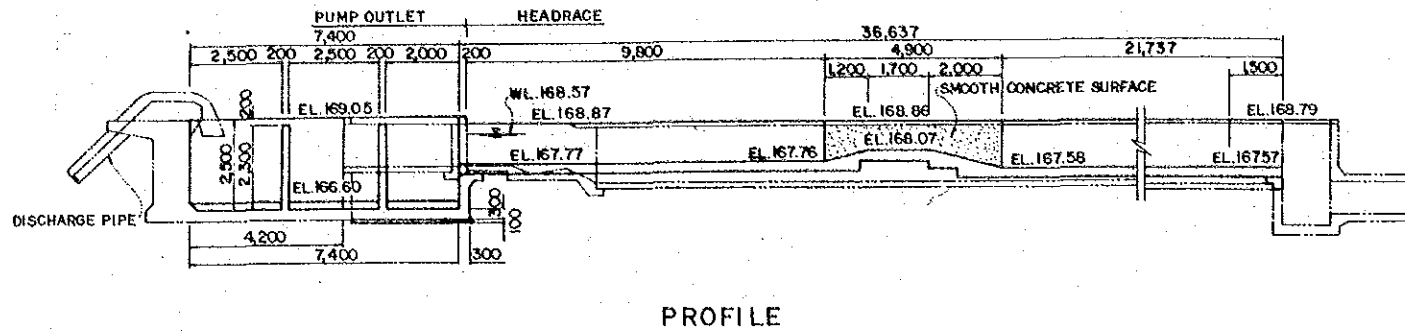
REAR VIEW (IN DOOR)
Distribution Panel

Code	Description	Rating
1NP	Name plate	
2NP	Name plate	HAIN
3NP	Name plate	STATION
1 IL	Lamp for power source	110V 2W White
2 IL	" under voltage	" Red
3 IL	" NFB tripping	" "
4 IL	" high temperature of cables	" "
5 IL	" grounding	" "
6 IL	" open phase of P.S.	" White
VM	AC Voltmeter	518/150V 1.5 class
VMS	Switch for voltmeter	3P transfer
1AH	AC Ammeter	1000/5A 1.5 class
2AH	"	75/5A 1.5 class
1AMS	Switch for ammeter	3P transfer
2AMS	"	"
PFM	3P Power factor meter	110V/15A/50P 1.5 class
WM	3P Wattmeter	PT 220V CT 1000/5A
1WHM	3P Watt-hour meter	
2WHM	"	
1PB	Push button for bell stop	
2PB	" buzzer stop	
3PB	" trouble reset	
UV	Under voltage relay	
OVG	Over voltage ground relay	
OCGN	Over current ground relay	
PTT	Test terminal for voltage	
CTT	" purpose	

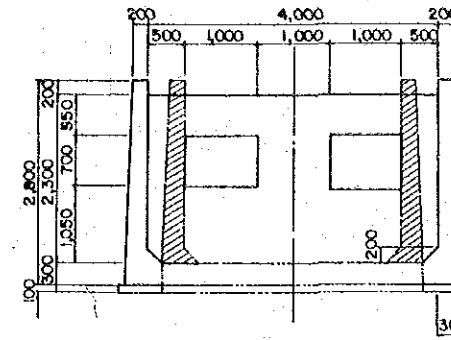
LAO PEOPLE'S DEMOCRATIC REPUBLIC
THA NGON REHABILITATION AND
RURAL DEVELOPMENT PROJECT
TITLE OF DRAWING
IRRIGATION PUMP STATION
PANELS

Date _____ Drawing No. 1002
JAPAN INTERNATIONAL COOPERATION AGENCY

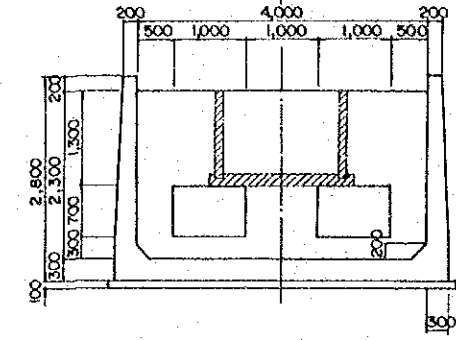
PUMP OUTLET AND HEADRACE



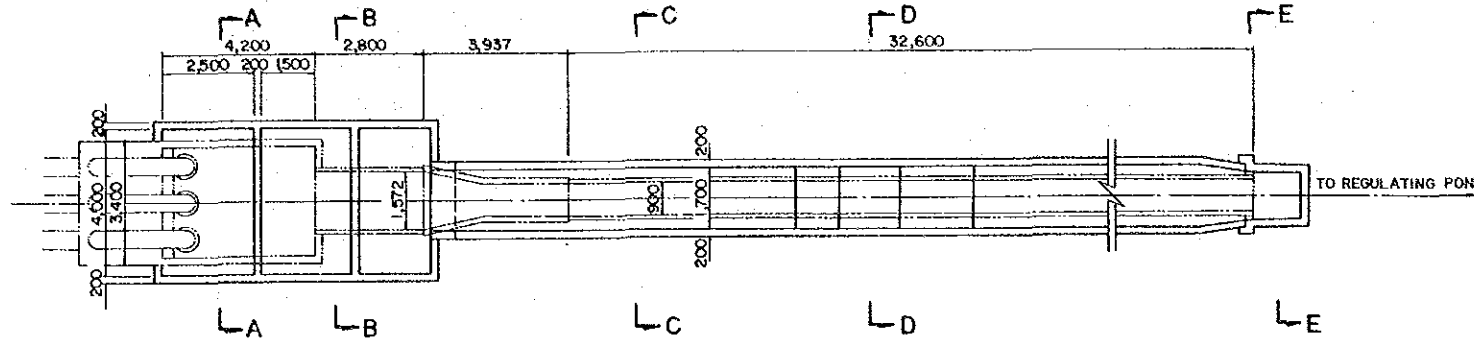
PROFILE



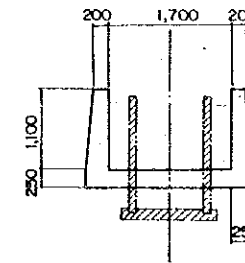
SECTION A-A



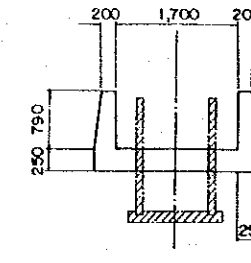
SECTION B-B



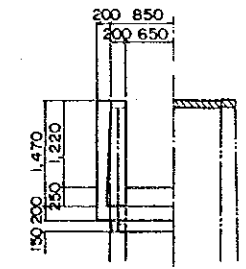
PLAN



SECTION C-C

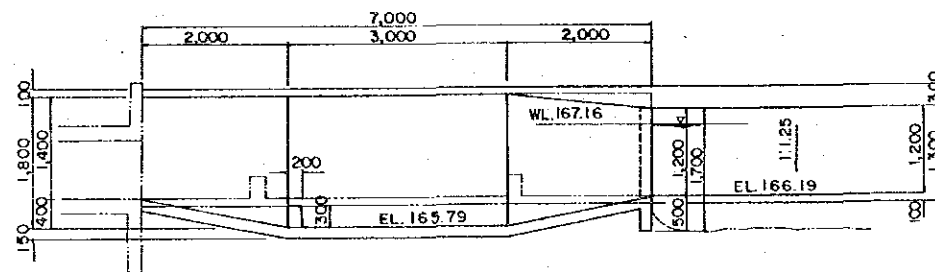


SECTION D-D

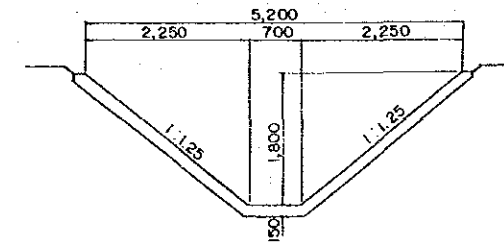


SECTION E-E

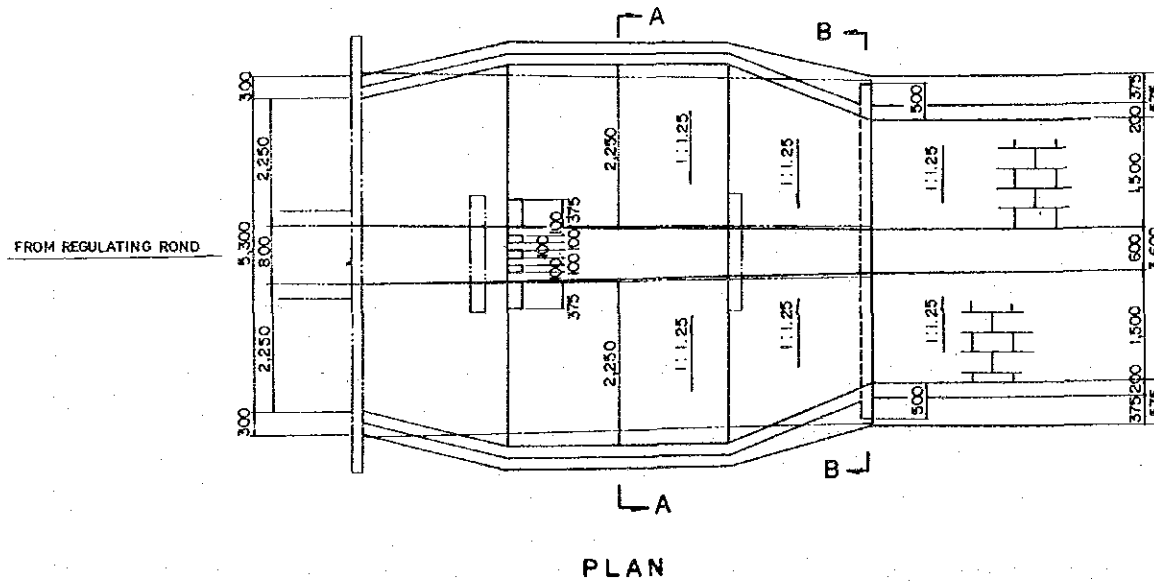
OUTLET OF INTAKE FOR NORTH MAIN CANAL



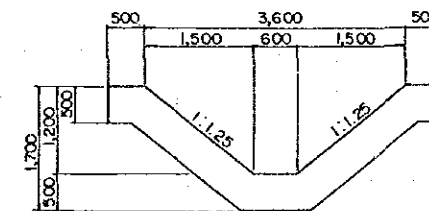
PROFILE



SECTION A-A



PLAN

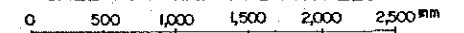


SECTION B-B

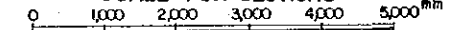
LEGEND :

- — — — — : EXISTING STRUCTURE
- ▨ : EXISTING STRUCTURE TO BE DEMOLISHED
- ▨ : RAISING ON EXISTING STRUCTURE

SCALE FOR PLANS AND PROFILES

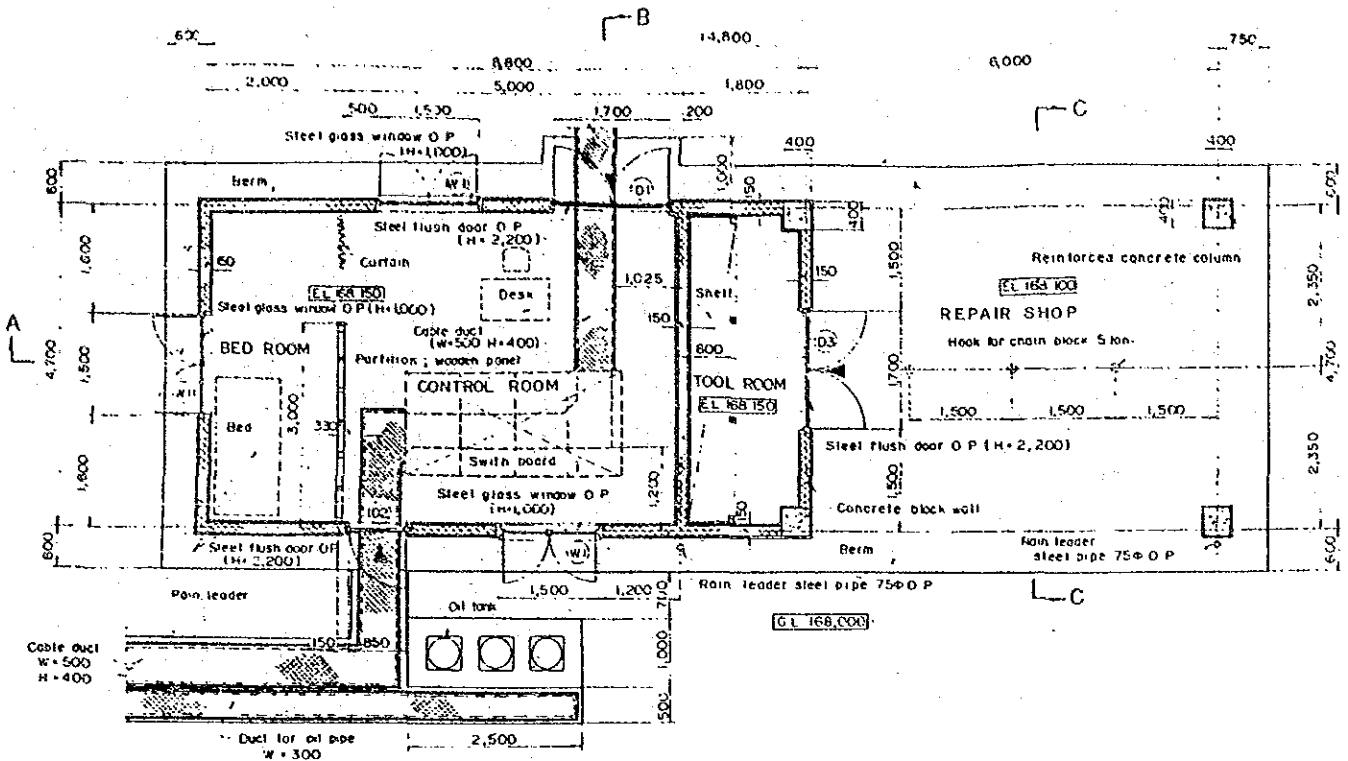


SCALE FOR SECTIONS



LAO PEOPLE'S DEMOCRATIC REPUBLIC		
THA NGON REHABILITATION AND RURAL DEVELOPMENT PROJECT		
TITLE OF DRAWING IRRIGATION PUMP STATION AND REGULATING POND PUMP OUTLET AND HEADRACE, OUTLET OF INTAKE FOR NORTH MAIN CANAL		
Date	Drawing No	1003
JAPAN INTERNATIONAL COOPERATION AGENCY		

REPAIRING OF CONTROL HOUSE (1)

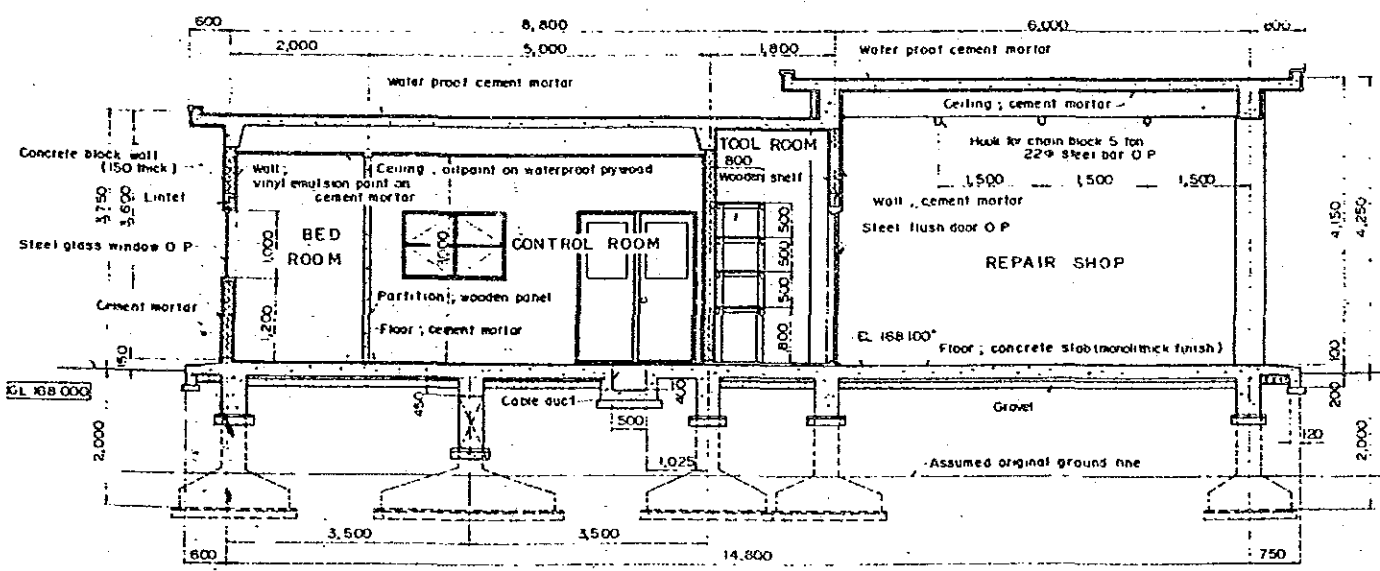
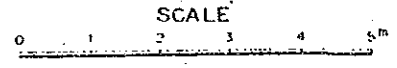


PLAN (Building area 69.56 m²)

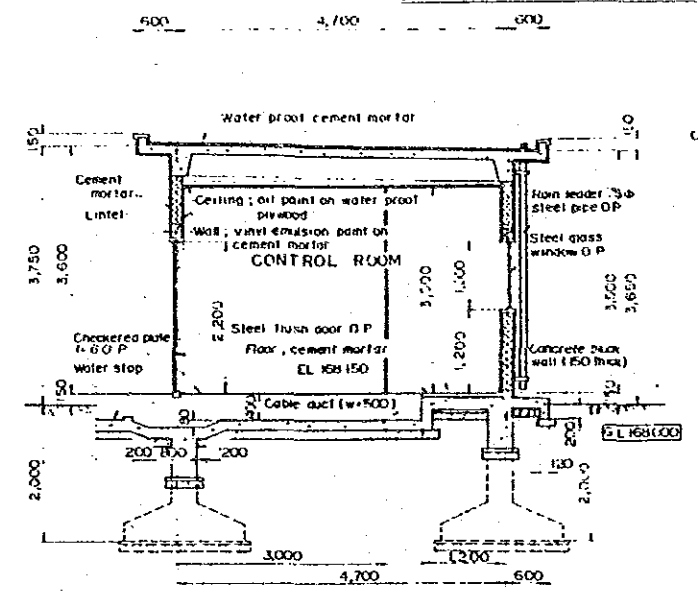
SCHEDULE OF FINISH

EXTERIOR FINISH				
ROOF	Water proof cement mortar			
WALL	Cement mortar	Repainting		
WAINSCOT	Cement mortar			
BERM	Concrete slab (monolithic finish)			
INTERIOR FINISH				
	FLOOR	SKIRTING	WALL	CEILING
CONTROL ROOM	Cement mortar	Cement mortar	Vinyl emulsion paint on cement mortar	Oil paint on waterproof plywood (4mm thick)
BED ROOM	Cement mortar	Cement mortar	Vinyl emulsion paint on cement mortar	Oil paint on waterproof plywood (4mm thick)
TOOL ROOM	Cement mortar	Cement mortar	Cement mortar	Cement mortar
REPAIR SHOP	Concrete slab (monolithic finish)	Cement mortar	Cement mortar	Cement mortar

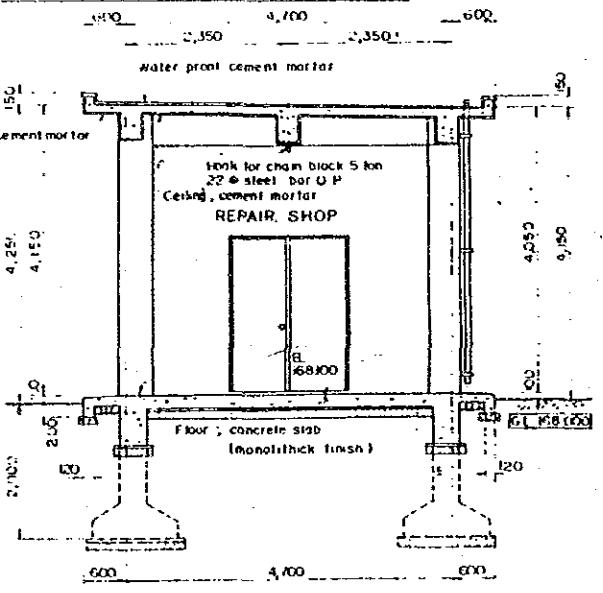
- Item of repairing as follows.
1. Repainting of exterior and interior wall.
 2. Renew and painting of ceiling.
 3. Renew of door and window.
 4. Renew of lighting fixture.



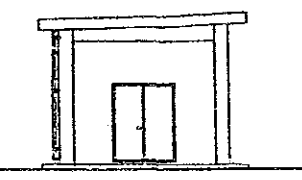
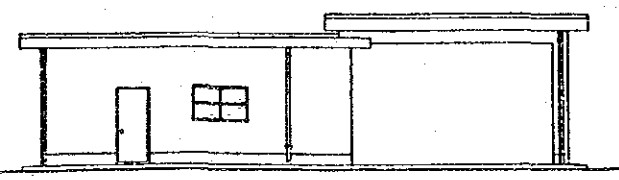
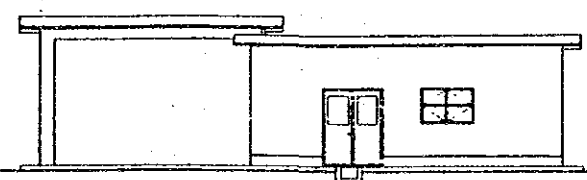
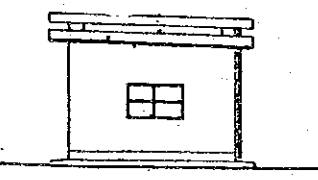
SECTION A-A



SECTION B-B



SECTION C-C

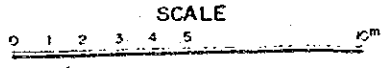


RIGHT SIDE ELEVATION

FRONT ELEVATION

REAR ELEVATION

LEFT SIDE ELEVATION



LAO PEOPLE'S DEMOCRATIC REPUBLIC

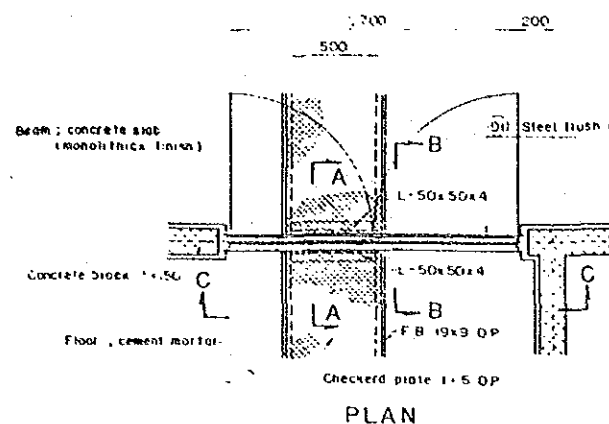
THA NGON REHABILITATION AND RURAL DEVELOPMENT PROJECT

TITLE OF DRAWING

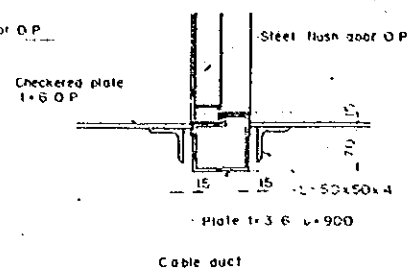
IRRIGATION PUMP STATION OPERATION HOUSE (1/3)

Date: _____ Drawing No. 1004

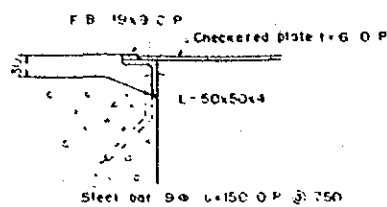
JAPAN INTERNATIONAL COOPERATION AGENCY



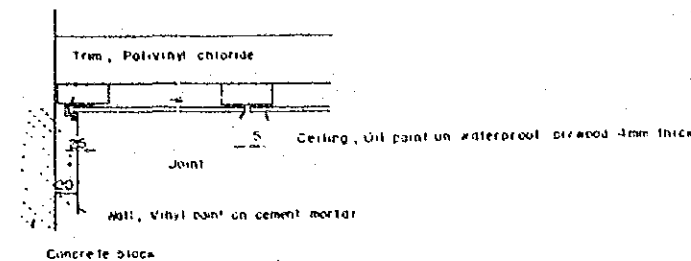
PLAN



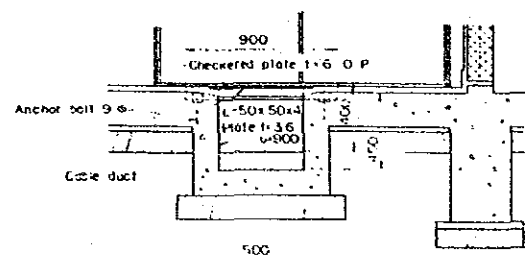
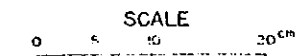
SECTION A-A



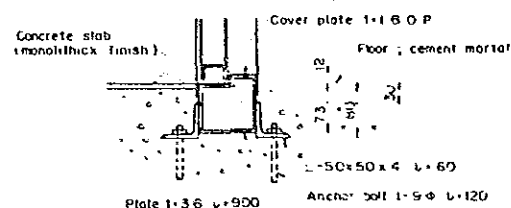
DETAIL OF CABLE DUCT



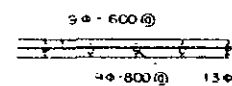
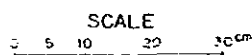
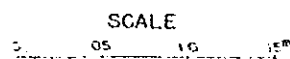
DETAIL OF CEILING



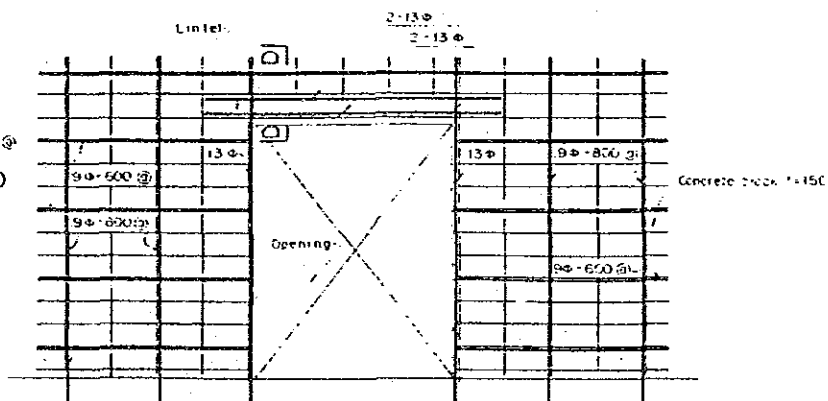
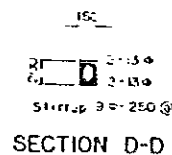
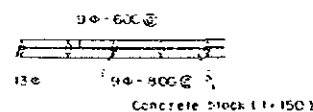
SECTION C-C



SECTION B-B

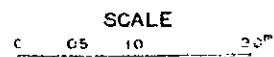


PLAN



ELEVATION

CONCRETE BLOCK WALL BAR ARRANGEMENT



LIST OF DOOR & WINDOW

Mark	(1) Steel flush door	(2) Steel flush door	(3) Steel flush door	(4) Steel glass window
Quantity	1 no	1 no	1 no	1 nos
Dimension	1,700 x 2,200	850 x 2,200	1,700 x 2,200	1,500 x 1,000
Hardware	Hinge, Cylinder lock, Door bolt, Stop	Hinge, Cylinder lock, Door bolt, Stop	Hinge, Cylinder lock, Door bolt, Stop	Fastener, Adjuster
Glass	Sheet glass 3mm thick		Sheet glass 3mm thick	Sheet glass 3mm thick
Painting	Oil paint fin	Oil paint fin	Oil paint fin	Oil paint fin
Form	1,700 2,200 Renew	850 2,200 Renew	1,700 2,200 Renew	1,500 1,000 Renew for alum. window

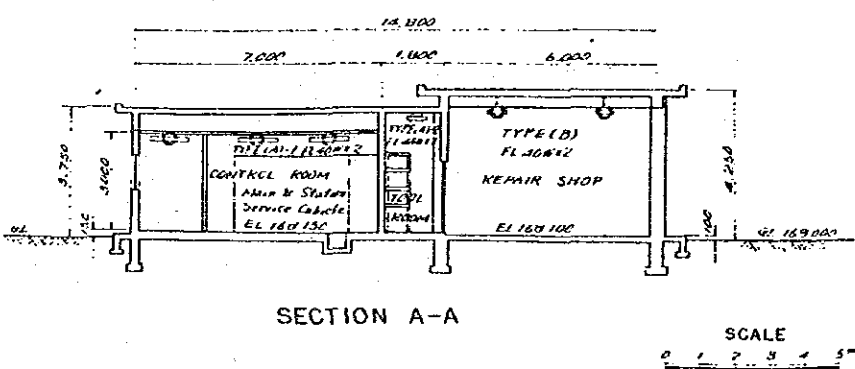
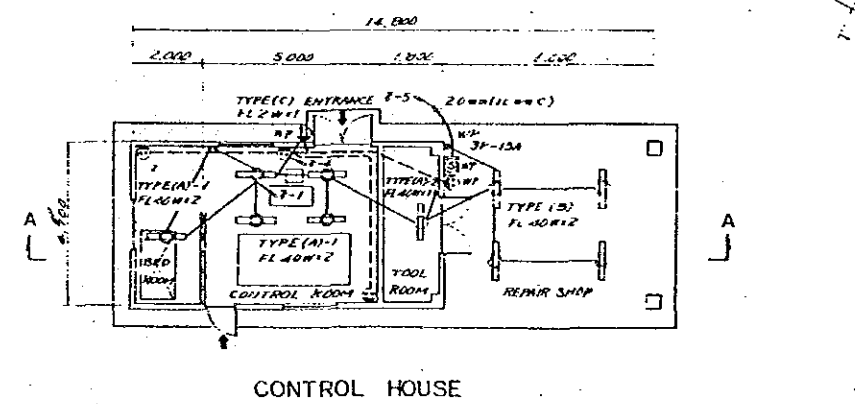
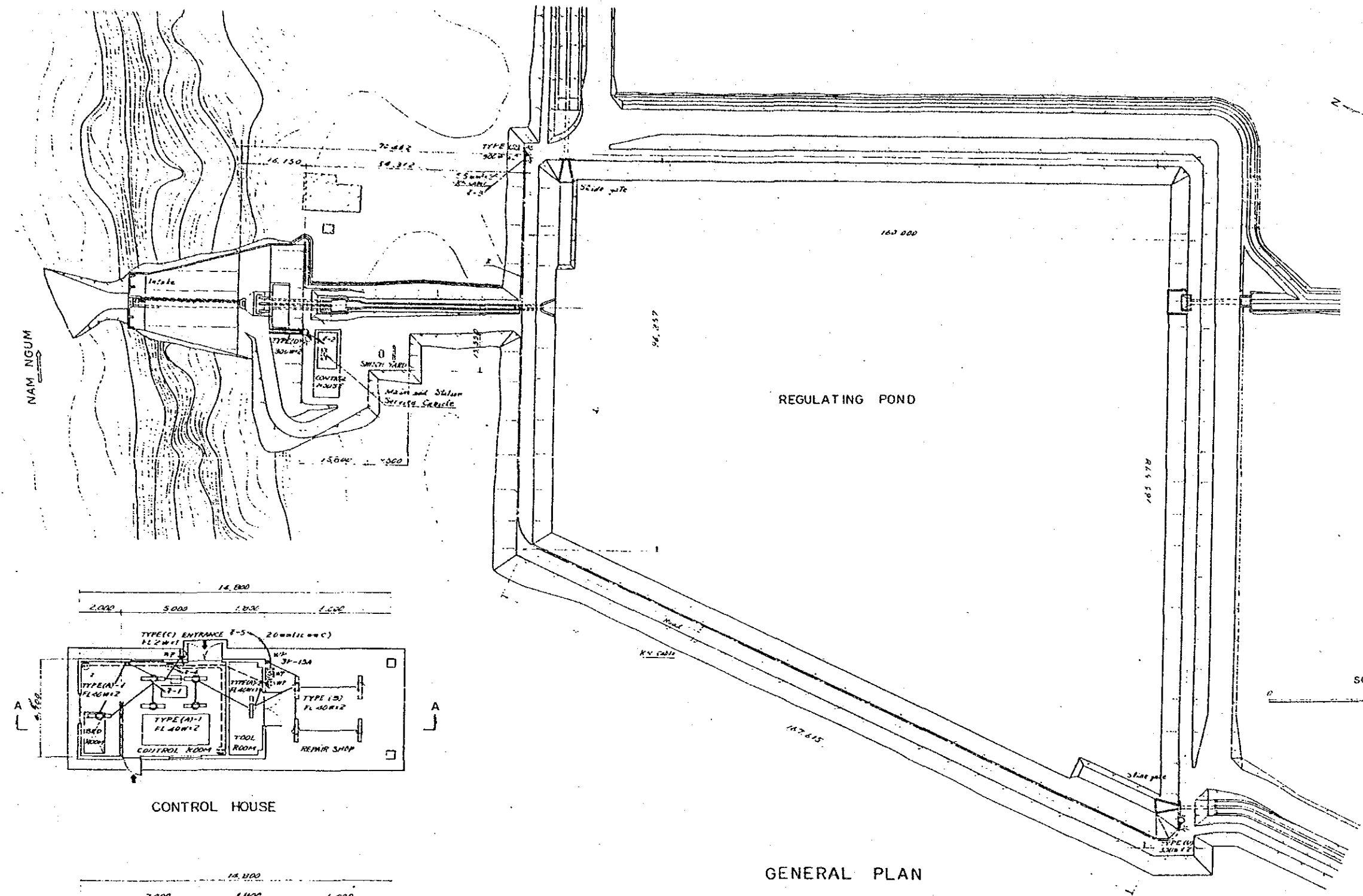
LAO PEOPLE'S DEMOCRATIC REPUBLIC

THA NGON REHABILITATION AND RURAL DEVELOPMENT PROJECT

TITLE OF DRAWING
IRRIGATION PUMP STATION
OPERATION HOUSE (2/3)

Date Drawing No. 1005

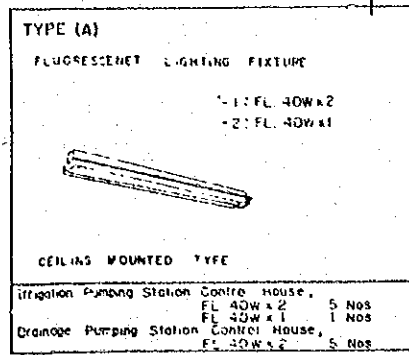
JAPAN INTERNATIONAL COOPERATION AGENCY



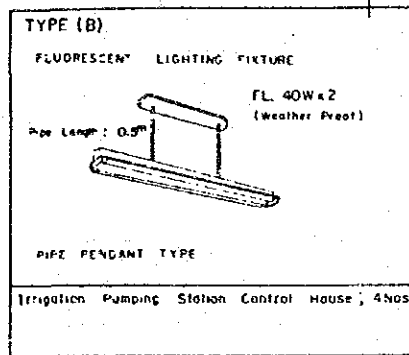
Lighting fixture for housing shall be renew.

LAO PEOPLE'S DEMOCRATIC REPUBLIC		
THA NGON REHABILITATION AND RURAL DEVELOPMENT PROJECT		
TITLE OF DRAWING		
IRRIGATION PUMP STATION OPERATION HOUSE (3/3)		
Date	Drawing No.	1006
JAPAN INTERNATIONAL COOPERATION AGENCY		

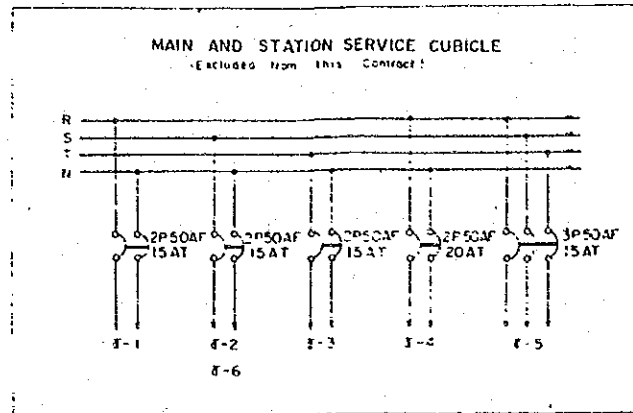
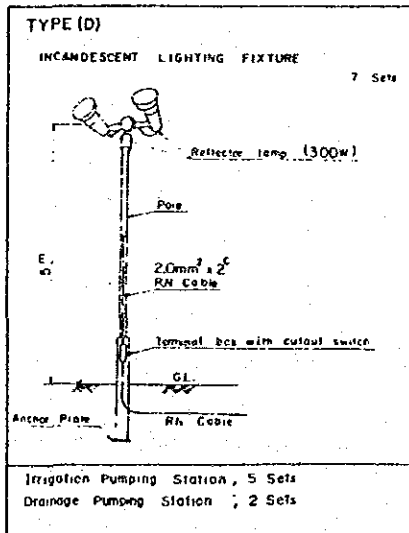
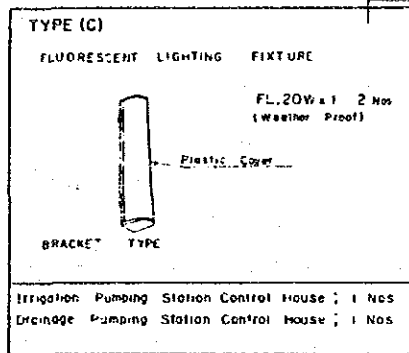
Renew as same type.



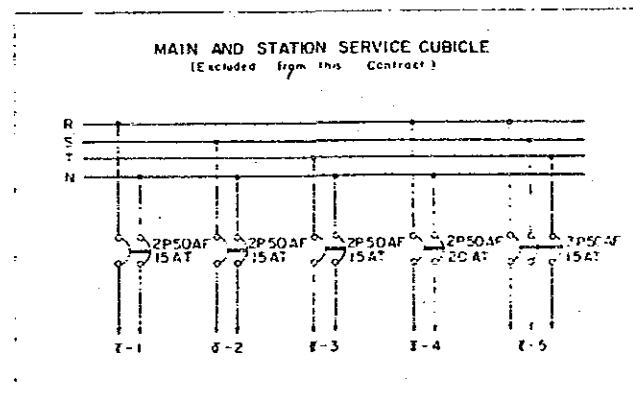
Renew as same type.



Renew as same type.



IRRIGATION PUMPING STATION



DRAINAGE PUMPING STATION

SYMBOL	DESCRIPTION
	Fluorescent lighting fixture with two lamps.
	Fluorescent lighting fixture with one lamp.
	Bracket type fluorescent lighting fixture (vertical mounting).
	Reflector type incandescent lighting fixture.
	Convenience outlet, 15A, 2-pin wall mounted (weather proof type).
	Weather proof convenience outlet, 15A, 2-pin wall mounted.
	Tumbler switch, 10A, 1-way (weather proof type).
	Safety switch, 3P, 15A, 300V (weather proof type).
	Concealed piping in the ceiling or wall.
	Concealed piping in the floor.
	Under ground cabling or cable duct - (RN cable).

MOUNTING HEIGHT

Mounting height is as follows, unless otherwise noted on the drawings.

- (1) Convenience outlet (wall mounted type) : 30 cm above the floor to the top
- (2) Safety switch : 140 cm above the floor to the top
- (3) Tumbler switch : 120 cm above the floor to the top
- (4) Bracket light : 250 cm above the floor to the top

NOTE :

- (1) All conduits shall be of rigid steel.
- (2) Conduit and wire shall be 16mm φ and 16mm² 2-wire respectively, unless otherwise noted on the drawings.
- (3) RN cable shall be 600V, 2.0mm² 2-core, rubber insulated, chloroprene sheathed cable unless otherwise noted on the drawings.
- (4) Rated voltage of lighting fixtures shall be 220 V, 50Hz, single phase.

LAO PEOPLE'S DEMOCRATIC REPUBLIC

THA NGON REHABILITATION AND RURAL DEVELOPMENT PROJECT

TITLE OF DRAWING

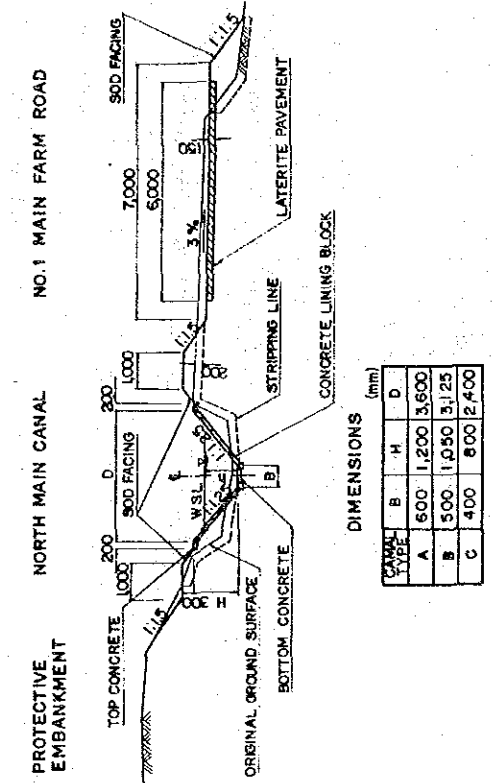
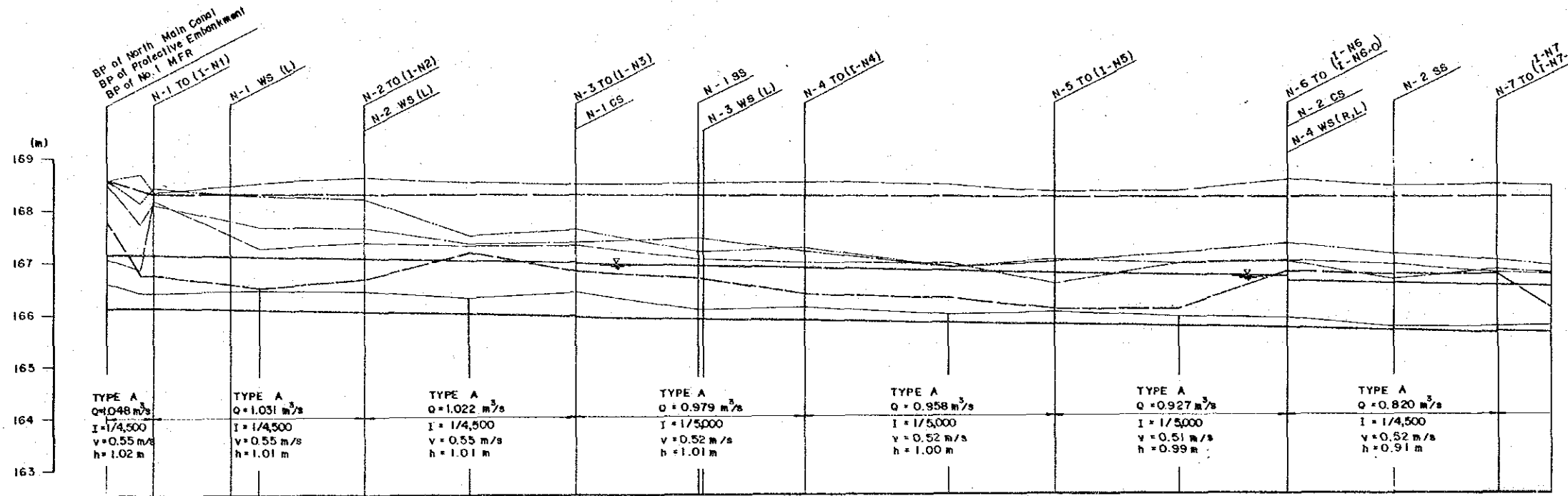
PUMP STATIONS
 LIGHTING FIXTURE

Date Drawing No. 1007

JAPAN INTERNATIONAL COOPERATION AGENCY

NOTE : 1) 10 NOS. OF FOOT PATH BRIDGE SHALL BE PROVIDED ON NORTH MAIN CANAL.

2) EXISTING PROTECTIVE EMBANKMENT AND ROAD WILL NOT BE CUT IF THEIR ELEVATIONS ARE HIGHER THAN THE PROPOSED ONES.



STATION NO.	GROUND SURFACE ELEVATION				PROPOSED ELEVATION				ACCUMULATED DISTANCE	DISTANCE	CURVE	
	RIGHT BANK	LEFT BANK	BASE	ROAD	PROTECTIVE EMBANKMENT	CANAL BASE	WATER SURFACE	ROAD				PROTECTIVE EMBANKMENT
0	168.36	168.46	166.39	167.04	168.53	166.14	167.16	167.80	168.57	0.00	0.00	IP1 1A=12°25'
1	168.14	167.72	166.40	166.82	168.88	166.19	167.15	166.75	168.30	63.30	63.30	
2	168.42	168.10	166.40	168.20	168.34	166.19	167.14	166.75	168.30	89.80	24.50	
+150.20												
3	168.25	167.56	166.45	167.25	168.50	166.09	167.10	166.90	168.29	240.00	150.20	
4	168.18	167.64	166.44	167.35	168.60	166.04	167.05	166.65	168.28	302.60	207.80	
5	167.48	167.32	166.29	167.29	168.50	166.00	167.01	167.15	168.27	707.60	205.00	
6	167.60	167.35	166.40	167.30	168.46	165.95	166.96	166.80	168.26	910.40	202.80	
7	167.16	167.42	166.05	167.02	168.47	165.88	166.89	166.63	168.25	1100.40	240.00	
8	167.24	167.16	166.10	166.95	168.50	165.84	166.85	166.35	168.24	1333.80	193.40	
9	166.86	166.87	165.96	166.94	168.44	165.79	166.79	166.25	168.22	1633.70	279.90	IP2 1A=30°35'
10	166.96	167.00	166.00	166.54	168.30	165.76	166.75	166.05	168.21	1833.20	203.50	
11	167.12	166.91	165.90	166.94	168.30	165.71	166.70	166.05	168.20	2081.50	242.30	
12	167.30	166.96	165.89	166.96	168.52	165.68	166.67	166.75	168.19	2266.50	205.00	
13	167.10	166.82	165.88	166.90	168.39	165.64	166.55	166.70	168.18	2492.50	206.00	
14	166.98	166.80	165.70	166.74	168.71	165.59	166.50	166.70	168.17	2695.30	202.80	
+104.70										2800.00	104.70	IP3 1A=11°50'

LEGEND

- PROPOSED PROTECTIVE EMBANKMENT
- ROAD SURFACE
- WATER SURFACE
- CANAL BASE
- EXISTING PROTECTIVE EMBANKMENT
- LEFT BANK OF CANAL
- RIGHT BANK
- ROAD SURFACE
- CANAL BASE
- N-1 TO (I-N1) NAME OF TURNOUT (BRANCH CANAL)
- N-3 CS CHECK STRUCTURE
- N-2 SS SIDE SPILLWAY
- N-3 WS(L) WASHING STEP

SCALE
0 100 200 300 400 500M

LAO PEOPLE'S DEMOCRATIC REPUBLIC

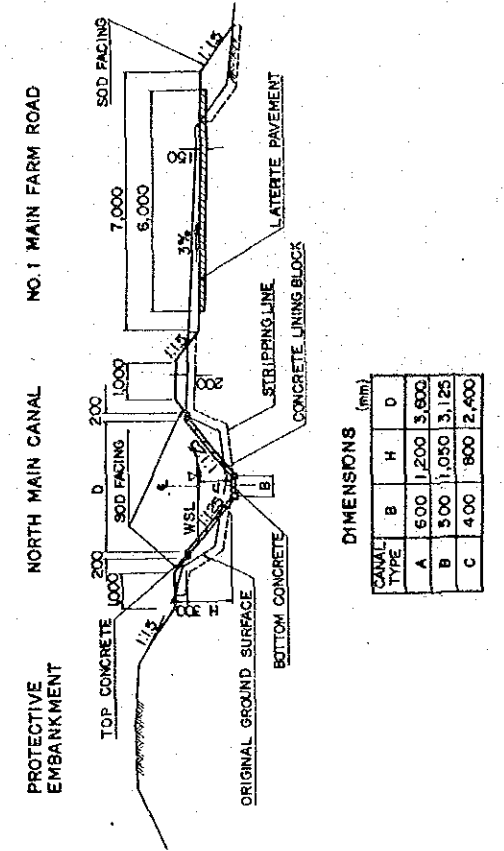
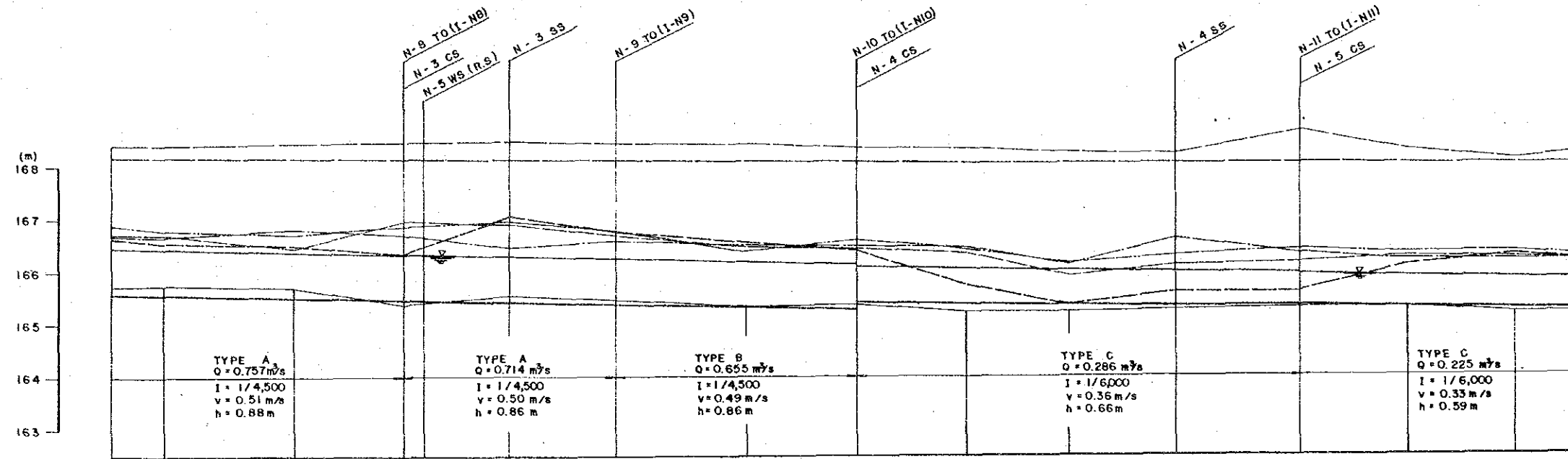
THA NGON REHABILITATION AND RURAL DEVELOPMENT PROJECT

TITLE OF DRAWING
NORTH MAIN CANAL PROFILE (1/3)

Date _____ Drawing No. 2001

JAPAN INTERNATIONAL COOPERATION AGENCY

- NOTE : 1) 10 NOS. OF FOOT PATH BRIDGE SHALL BE PROVIDED ON NORTH MAIN CANAL.
- 2) EXISTING PROTECTIVE EMBANKMENT AND ROAD WILL NOT BE CUT IF THEIR ELEVATIONS ARE HIGHER THAN THE PROPOSED ONES.



CANAL TYPE	DIMENSIONS (mm)		
	B	H	D
A	600	1,200	3,600
B	500	1,050	3,125
C	400	900	2,400

STATION NO.	PROPOSED ELEVATION					GROUND SURFACE ELEVATION					ACCUMULATED DISTANCE	DISTANCE	CURVE		
	PROTECTIVE EMBANKMENT	ROAD	CANAL WATER SURFACE	CANAL BASE	PROTECTIVE EMBANKMENT	ROAD	CANAL LEFT BANK	CANAL RIGHT BANK	PROTECTIVE EMBANKMENT	ROAD				CANAL LEFT BANK	CANAL RIGHT BANK
104.70	168.17	166.65	166.47	165.59	168.41	166.72	166.73	166.88	168.41	166.72	166.73	166.88	2,800.00	104.70	
15	168.16	166.55	166.45	165.57	168.40	166.71	166.66	166.78	168.40	166.71	166.66	166.78	2,902.00	102.00	
16	168.15	166.50	166.40	165.52	168.45	166.45	166.80	166.70	168.45	166.45	166.80	166.70	3,152.10	250.10	
17	168.14	166.35	166.35	165.47	168.45	166.95	166.70	166.85	168.45	166.95	166.70	166.85	3,358.70	206.60	
+40.00	168.14	166.29	166.32	165.46	168.45	166.94	166.65	166.87	168.45	166.94	166.65	166.87	3,398.70	40.00	
18	168.13	167.05	166.28	165.42	168.46	166.90	166.45	166.94	168.46	166.90	166.45	166.94	3,564.70	166.00	
19	168.12	166.75	166.24	165.38	168.44	166.68	166.58	166.76	168.44	166.68	166.58	166.76	3,770.60	203.90	
20	168.11	166.55	166.18	165.32	168.41	166.48	166.50	166.36	168.41	166.48	166.50	166.36	4,021.50	250.90	
21	168.09	166.40	166.14	165.28	168.35	166.43	166.48	166.59	168.35	166.43	166.48	166.59	4,230.60	209.10	
22	168.08	165.75	166.07	165.41	168.34	166.35	166.47	166.43	168.34	166.35	166.47	166.43	4,438.70	208.10	
23	168.07	165.35	166.03	165.37	168.26	165.92	166.12	166.15	168.26	165.92	166.12	166.15	4,636.30	197.60	
24	168.06	165.60	166.00	165.34	168.22	166.11	166.61	166.27	168.22	166.11	166.61	166.27	4,841.70	205.40	
25	168.05	165.60	165.98	165.35	168.68	166.17	166.33	166.40	168.68	166.17	166.33	166.40	5,079.50	237.80	
26	168.04	166.10	165.91	165.32	168.30	166.27	166.21	166.33	168.30	166.27	166.21	166.33	5,286.20	206.70	
27	168.03	166.30	165.87	165.28	168.12	166.25	166.20	166.35	168.12	166.25	166.20	166.35	5,491.20	205.00	
+108.60	168.03	166.20	165.85	165.26	168.24	166.20	166.19	166.29	168.24	166.20	166.19	166.29	5,600.00	108.60	

LEGEND

- PROPOSED PROTECTIVE EMBANKMENT
- ROAD SURFACE
- WATER SURFACE
- CANAL BASE
- EXISTING PROTECTIVE EMBANKMENT
- LEFT BANK OF CANAL
- RIGHT BANK
- ROAD SURFACE
- CANAL BASE
- N-1 TO (I-N1) NAME OF TURNOUT (BRANCH CANAL)
- N-3 CS CHECK STRUCTURE
- N-2 SS SIDE SPILLWAY
- N-3 WS(L) WASHING STEP

SCALE

0 100 200 300 400 500M

LAO PEOPLE'S DEMOCRATIC REPUBLIC

THA NGON REHABILITATION AND RURAL DEVELOPMENT PROJECT

TITLE OF DRAWING

NORTH MAIN CANAL PROFILE (2/3)

Date _____ Drawing No. 2002

JAPAN INTERNATIONAL COOPERATION AGENCY