C. LIST OF ATTENDANCE OF MEETING

C-1 BASIC DEISGN STUDY STAGE

DATE : September 3, 1991 - 9:30 AM
PLACE : DPWH

Mr. Conrado D. Escobar	Project Manager I
Mr. Tomas L. Buen	Project Manager II
Mr. Rogelio A. Flores	Project Director, PMO-Rural Water Supply and SWIM

DATE : September 3, 1991 - 2:00 PM
PLACE : NIA

Mr. Sumio Oishi	Sr. Irrigation & Drainage Engineer
Dr. Jose Galvez	Asst. Administrator, NIA
Mr. Isidro R. Digal	PDD, Manager, NIA

DATE : September 3, 1991 - 3:00 PM
PLACE : DA

Ms. Lourdes G. Faustino	Agri. Development Specialist
Mr. Juanito G. Odejar	Chief, Project Development
Mr. Teofilo S. Mojica	Regional Coordinator - R-IV
Mr. Arturo J. Dancel	Asst. Secretary - Regional Operations Divisions, DA

DATE : September 4, 1991 - 8:30 AM
PLACE : NEDA Central Office

Mr. Paulo Rodelio M. Halili	EDS I
Ms. Josefina U. Esguerra	OIC, Asst. Director
Ms. Corazon C. Garcia	Supervising EDS, NEDA-PMS

DATE : September 4, 1991 - 2:00 PM
PLACE : NEDA Region IV

Gov. Pedro O. Medalla, Jr.	RDC IV Chairman
Mr. Buenaventura C. Go-Soco, Jr.	Regional Director
Mr. Carlito M. Rufo, Jr.	EDS II
Mr. Bernardo Atienza	EDS I
Mr. Fidel T. Udarbe	Sr. Econ. Development Specialist
Ms. Erlinda C. Creencia	Sr. Econ. Development Specialist
Ms. Liberty A. Abellon	Supvg. Econ. Development Specialist
Mr. Oscar D. Balbastro	CEDS
Mr. Alejandro C. Villarino	Supvg. Econ. Development Specialist
Mr. Edilberto R. Ramirez	CEDS

DATE : September 4, 1991 - 4:30 PM
PLACE : Presidential Management Staff Building
Malacañang

Mr. Hilario Tibay	Assistant Director
Mr. Mario Asuncion	Prov'l. Desk Officer
Mr. Libby Bayadog	Presidential Staff Officer
Mr. Danilo Encinas	Director - Luzon South Directorate

DATE : September 5, 1991 - 9:30 AM
PLACE : Provincial Capitol

Mr. Luisito M. Reyes	Provincial Governor
Mr. Respicio A. Javier	Vice President Marinduque State College
Mr. Marcial R. Dayot	Prov'l. Irrigation Engineer
Mr. Conrado D. Escobar	PMO RWS/SWIM
Mr. Sonny R. Bugarin	Prov'l. Governor Office
Mr. Liberato M. Urgasan	Prov'l. Agriculturist
Mr. Alexander D. Palmero	Prov'l. Planning and Development Coordinator
Mr. Honorio M. Salazar	DPWH-Highway Dist. Engr.

DATE : September 5, 1991 - 1:30 AM
PLACE : Provincial Capitol

Mr. Luisito M. Reyes	Provincial Governor
Mr. Alexander D. Palmero	Prov'l. Planning and Development Coordinator
Mr. Liberato M. Urgasan	Prov'l. Agriculturist
Mr. Godofredo R. Sadiua	Provincial Engineer
Mr. Reynaldo M. Ringor	Asst. Provincial Engineer
Mr. Rolando S. Josue	Const. & Maint. Foreman
Mr. Respicio A. Javier	Vice-Presdient Marinduque State College
Mr. Felipe H. Sanchez	Prov'l. Agr'l. Officer, DA
Mr. Pablo M. Boter	Sr. Agriculturist, DA
Mr. Juanito B. Odipe	Chief, Proj. Development DA, Reg. IV
Mr. Marcial R. Dayot	Prov'l. Irrig. Engr., NIA
Mr. Menandro M. Maderazo	Asst. Prov'l. Irrig. Engr., NIA
Mr. Honorio M. Salazar	District Engineer, DPWH
Mr. Ruben L. Mapacpac	Architect II, DPWH
Mr. Rizal J. Malapote	Engineer II, DPWH
Mr. Conrado D. Escobar	Project Manager I, DPWH

DATE : September 6, 1991 - 3:00 PM
PLACE : Provincial Office

Mr. Ruben L. Mapacpac	Architect, DPWH
Mr. Godofredo R. Sadiua	Provincial Engineer, PEO
Mr. Reynaldo M. Ringor	Asst. Prov'l. Engineer, PEO
Mr. Juanito G. Odejar	Chief, Proj. Dev., DA
Mr. Felipe H. Sanchez	Prov'l. Agr'l. Officer, DA
Mr. Respicio A. Javier	Vice-Presdient Marinduque State College
Mr. Alexander D. Palmero	Prov'l. Planning and Development Coordinator

DATE : September 9, 1991 - 9:00 AM
PLACE : Provincial Capitol

Mr. Luisito M. Reyes	Provincial Governor
Mr. Menandro M. Maderazo	Asst. Prov'l. Irrig. Engr.
Mr. Rolando S. Josue	Const. & Maint. Engineer
Mr. Reynaldo M. Ringor	Asst. Prov'l. Engineer
Mr. Godofredo R. Sadiua	Provincial Engineer
Mr. Respicio A. Javier	Vice President, Marinduque State College
Mr. Felipe H. Sanchez	Prov'l. Agr'l. Officer, DA
Mr. Alexander D. Palmero	Prov'l. Planning and Development Coordinator
Mr. Roy R. Rodriguez	Chief, Proj. Packaging, DA
Ms. Lourdes G. Faustino	Sr. Agriculturist, DA
Mr. Teofilo S. Mojica	Regional Coordinator, DA
Mr. Juanito G. Odejar	Chief, Project Development
Mr. Ruben L. Mapacpac	Architect, DPWH
Mr. Sonny Bugarin	RSI Prov'l. Gov. Office

DATE : September 10, 1991 - 2:00 PM
PLACE : NEDA Region-IV (Joint Meeting)

Mr. Sumio Oishi	JICA Consultant, NIA
Mr. Makoto Kashiwaya	Asst. Res. Representative JICA, Philippine Office
Mr. Yukiharu Koso	Team Leader, JICA
Mr. Eiji Inui	Team Member, JICA
Mr. Hiroshi Kondo	Team Member, JICA
Mr. Luisito M. Reyes	Governor, Marinduque
Ms. Violeta S. Corpus	Sr. EDS, NEDA-PMS
Ms. Corazon C. Garcia	Supvg. EDS, NEDA-PMS Central Office
Mr. Buenaventura Go-Soco, Jr.	Reg'l. Dir., NEDA-IV
Mr. Fidel T. Udarbe	Sr. Econ. Dev't. Specialist NEDA-IV
Mr. Bernard Atienza	EDS I, NEDA-IV
Mr. Carlito M. Rofo, Jr.	EDS II, NEDA-IV
Ms. Liberty A. Abellon	Supvg. EDS, NEDA IV
Mr. Oscar D. Balbastro	CEDS, NEDA IV
Mr. Isidro Digal	Manager, PDD, NIA
Mr. Conrado I. Gonzales	OIC-Reg'l. Dir., DA-Reg. IV
Mr. Arsenio A. Fortin	Chief, Reg'l. Operation, DA
Mr. Juanito G. Odejar	Chief, Proj. Dev., DA-Reg. IV
Mr. Conrado D. Escobar	Proj. Mgr., PMD RWS/SWIM, DPWH

OTHER MEMBERS:

Mr. Roy R. Rodriguez	Chief Project Packaging IADCCO, DA
Dr. Segundo C. Serrano	Director, Agricultural Training Institute, DA
Dr. Pablo T. Tamesis	Asst. Director, Agricultural Training Institute, DA
Dr. Erlinda P. Sevilla	Section Chief of Seed Testing Laboratory Series, BPI-DA
Dr. Shoichi Tokudome	Soil Scientist, JICA Technical Cooperation, Soil Research and Development Center Project, Bu. of Soils and Water Management, DA

Mr. Fortunato R. Abrenilla	Director, NEDA-IV
Mr. George P. Mangaliman	Planning Officer II Prov'l. Agricultural Office DA Marinduque
Ms. Erlinda R. Paez	Planning Officer I Prov'l. Agricultural Office DA Marinduque
Ms. Luq D. Pedernal	Asst. Prov'l. Agriculturist *Administrator of Provincial* Training Center, Provincial Government, Marinduque
Mr. Doinico F. Gabay	Provincial Environment and Natural Resources Officer DENR, Marinduque
Mr. Librado Alilio	Provincial Statiscian, BAS, DA, Marinduque
Mr. Mayda Narito	Public Information Officer NCSO, Marinduque
Mr. Benjo R. Buenviaje	Vice Mayor of Sta. Cruz Marinduque
Mr. Ben Cordero Lim	Mayor of Torrijos Marinduque
Mr. Luna Eulogio R. Marinque	Municipal Planning and Development Coordinator Municipality of Boac
Mr. George G. Preccaro	Waterworks and Equip. Maintenance Supervisor Municipality of Sta. Cruz
Dr. Virgilio M. Go	Medical Specialist III Provincial Health Office Boac, Marinduque
Mr. Roberto L. del Prado	Mun. Dev't. Coordinator Mogpog, Marinduque
Mr. Felix B. Monsanto	Asst. District Engineer DPWH, Marinduque

C - 2 DRAFT REPORT EXPLANATION

(1) Embassy of Japan

Mr. Yugo MATUDA	First Secretary
Mr. Fumio KIKUCHI	Deputy Resident Representative

(2) JICA

Mr. Masatoka IIJIMA	In charge

(3) NEDA IV

Mr. B. Go, Soco For.	R.O. - NEDA IV
Mr. Oskar D. Balbaster	EDD, NEDA IV
Mr. Liverty A. Abehhon	EDD, NEDA IV
Mr. Probl T. Uoarve	EDD, NEDA IV
Mr. Bernato Atienza	EDD, NEDA IV
Mr. Larlito Rufo, JR	EDD, NEDA IV

(4) NIA

Mr. Sumio Oishi	JICA Consultant

(5) BPWH

Mr. Moriki WAKABAYASHI	JICA Consultant
Mr. Rozelio A. Flores	P.D.
Ms. Helen G. MarvillaPM 0 I	
Mr. Conado D. Escobar	PM - I
Mr. Tomas L. Buen	PM

(6) Provincial Government of Marinduque

Mr. Luisito M. Reyes	Provincial Governor
Mr. Alexander D. Palmero	Prov'l Planning and Development Coordinator
Mr. Felipe H. Sanchez	Prov'l Agriculture Officer
Mr. Herminiano Echiverri	Prov'l Agrarian Reform Office
Mr. Godofredo. r. Sadiua	Provincial Engineer, PEO
Mr. Reynaldo M. Ringor	Asst. Prov'l Engineer, PEO
Mr. Rolando S. Josue	Const. & Maint. Engineer. PEO
Mr. Respicio A. Javier	Vice President, Marinduque State College
Mr. Marcial R. Dayot	Provincial Irrigation Engineer, NIA

D. MINUTES OF DISCUSSION

D-1 BASIC DESIGN STUDY STAGE

MINUTES OF DISCUSSION
BASIC DESIGN STUDY ON THE PROJECT FOR
MARINDUQUE AGRICULTURAL DEVELOPMENT AND PROMOTION

REPUBLIC OF THE PHILIPPINES

Based on the results of the Preliminary Study, the Japan International Cooperation Agency (JICA) decided to conduct a Basic Design Study on the Project for Marinduque Agricultural Development and Promotion (hereinafter referred to as "the Project").

JICA sent to the Philippines a study team, which is headed by Mr. Yukiharu Koso, Deputy Director, Design Division, Agricultural Structure Improvement Bureau, MAFF and is scheduled to stay in the country from September 2 to October 11, 1991.

The team held discussions with the officials concerned of the Government of the Philippines and conducted a field survey at the study area.

In the course of discussions and field survey, both parties have confirmed the main items described on the attached sheets. The team will proceed to further works and prepare the Basic Design Study report.

Manila, September 10, 1991

MR. YUKIHARU KOSO
Leader
Basic Design Study Team
JICA

GOVERNOR LUISITO M. REYES
Province of Marinduque
Philippines

ATTY. BUENAVENTURA C. GO-SOCO, JR.
Regional Director for Region IV
National Economic Development Authority
Philippines

ATTACHMENT

1. Objective

The objective of the Project is to develop rural areas and promote agriculture in the Province of Marinduque.

2. Project site

The site of the Project is Marinduque main island. (Site map is attached as Annex I)

3. Executive Agency

The Provincial Government of Marinduque is responsible for the administration and the execution of the Project, with the support of NEDA, DPWH, NIA and DA. (Implementation Organization Chart is attached as Annex II.)

4. Necessary items for the realization of the Project requested by the Government of the Philippines

After discussions with the Basic Design Study Team, the following items were judged necessary for the realization of the Project:

(1) Construction of Tambangan Irrigation dam, which includes main canal, lateral canal and village road.

(2) Improvement of Tawiran Communal Irrigation System.

(3) Improvement of Laon-Mataas na Bayan Communal Irrigation System.

(4) Construction of Sta. Cruz Village Water Supply System which includes the installation of pipeline from Tambangan Irrigation dam to reservoir tank in Sta. Cruz.

(5) Construction of Torrijos Village Water Supply System which includes the installation of pipeline from the spring water source in Brgy. Tigwi to the reservoir tank in Torrijos.

(6) Reinforcement of the Marinduque Agricultural Development and Promotion Farm.

However, the final items of the Project will be decided after further studies

6. Grant Aid Program extended by Japan

(1) The Government of the Philippines has understood the system of Japan's Grant Aid program explained by the Team.

(2) The Government of the Philippines will take necessary measures, described in Annex III, for smooth implementation of the Project on condition that the Grant Aid assistance by the Government of Japan is extended to the Project.

7. Further schedule

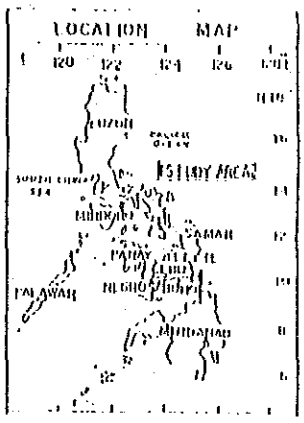
(1) JICA will prepare the draft report in English and dispatch a mission in order to explain its contents around January 1992.

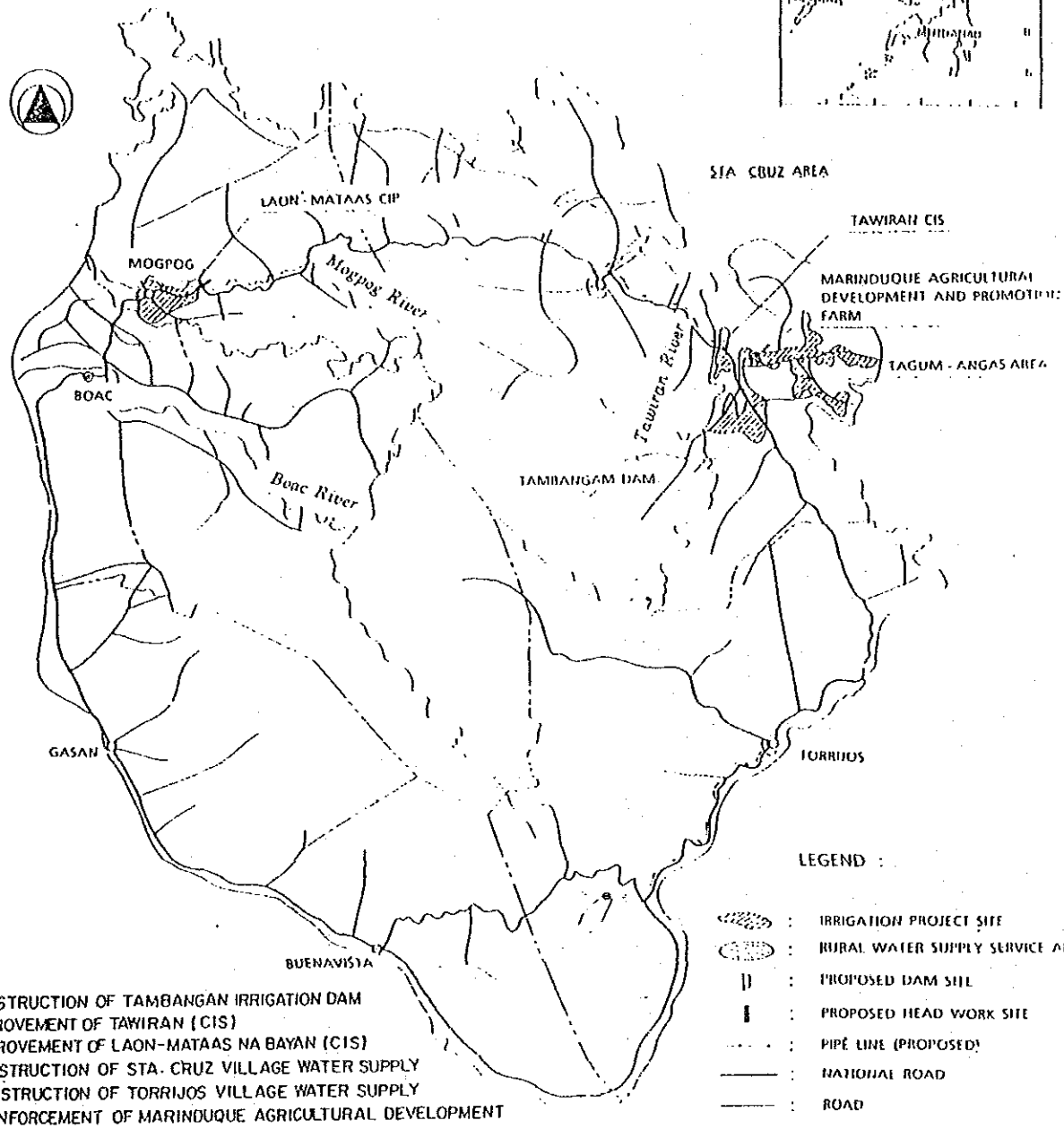
(2) In case that the contents of the report is accepted in principle the final report and send to the Government of the Philippines by March 1992.

ANNEX I

GENERAL PLAN

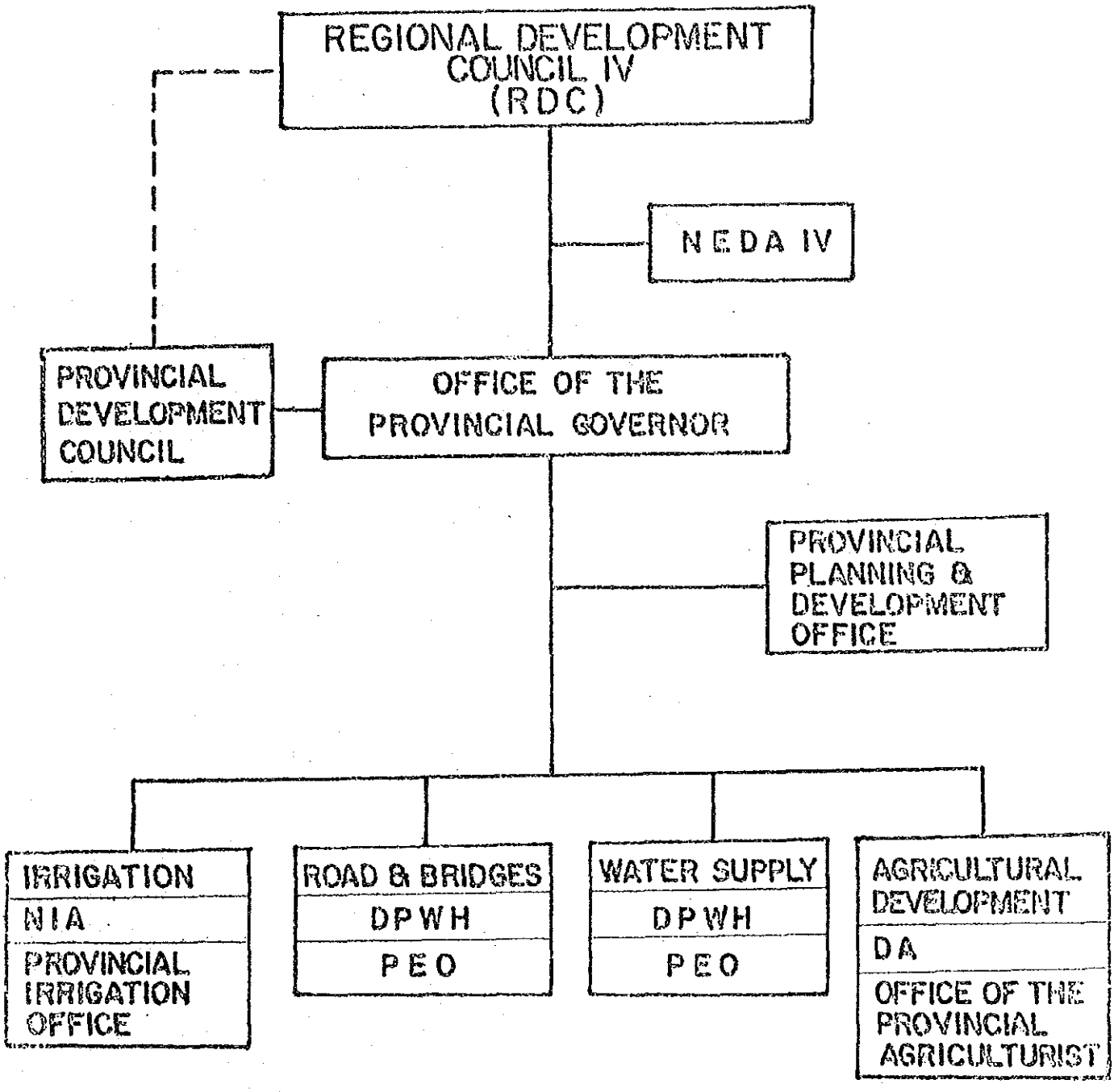
MARINDUQUE AGRICULTURAL DEVELOPMENT AND PROMOTION PROJECT (MADDP)





1. CONSTRUCTION OF TAMBANGAN IRRIGATION DAM
2. IMPROVEMENT OF TAWIRAN (CIS)
3. IMPROVEMENT OF LAON-MATAAS NA BAYAN (CIS)
4. CONSTRUCTION OF STA. CRUZ VILLAGE WATER SUPPLY
5. CONSTRUCTION OF TORRIJOS VILLAGE WATER SUPPLY
6. REINFORCEMENT OF MARINDUQUE AGRICULTURAL DEVELOPMENT AND PROMOTION FARM

IMPLEMENTATION ORGANIZATION



Annex III

Undertakings by the government of Republic of the Philippines

1. To provide data and information necessary for the Project.

2. To provide the land for temporary site office, warehouse and stock yard during the implementation period.

3. To ensure speedy unloading, tax exemption, custom clearance at the port of disembarkation and prompt inland transportation, of products purchased for the Project.

4. To accord Japanese nationals whose services may be required in connection with the supply of the products and the services under the verified contracts such facilities as may be necessary for their entry into the Philippines and stay therein for the performance of their work.

5. To exempt Japanese nationals involved in the Project from customs duties, internal taxes and other fiscal levies which may be imposed in the Philippines with respect to the supply of equipment/machines and services under the verified contracts.

6. To bear commissions to the Japanese foreign exchange bank for the banking services based upon the Banking Arrangement.

7. To bear all expenses, other than those to be borne by the Grant Aid necessary for the execution of the Project.

8. To assign exclusive counter part engineers/technicians, for the Project.

9. To maintain and use properly and effectively that the facilities constructed and equipment purchased under the Grant.

D-2 RAFT REPORT EXPLANATION

MINUTES OF DISCUSSIONS
ON
THE BASIC DESIGN STUDY ON THE PROJECT
FOR
MARINDUQUE AGRICULTURAL DEVELOPMENT AND PROMOTION
IN
THE REPUBLIC OF THE PHILIPPINES
(CONSULTATION ON DRAFT REPORT)

In September 1992, the Japan International Cooperation Agency (JICA) dispatched a basic design study team on the Project for Marinduque Agricultural Development and Promotion (hereinafter referred to as "the Project") to the Republic of the Philippines and has prepared a draft report on study, through discussions with the officials concerned of the Government of Philippines, the field survey on the Project site, and technical examination on the results in Japan.

In order to explain the components of the draft report to the Government of the Philippines as well as to consult with Philippines side on the contents of the report, JICA sent an explanation team to Philippines which was headed by Mr. Yukiharu Koso, Deputy Director, Design Division, Agricultural Structure Improvement Bureau, MAFF, and scheduled to stay in the country from March 5 to 12, 1992.

As a result of discussions, both sides confirmed the main items as described on the attached sheets.

Boac, March 10, 1992

MR. YUKIHARU KOSO
Leader
Draft Report Explanation Team
JICA

GOVERNOR LUISITO M. REYES
Province of Marinduque
Philippines

ATTY. BUENAVENTURA C. GO-SOCO, JR.
Regional Director for Region IV
National Economic Development Authority
Philippines

ATTACHMENT

1. Components of Draft Report

The Government of the Philippines has agreed and accepted in principle the components of the Draft Report proposed by the team.

2. Japan's Grant Aid System

(1) The Government of the Philippines has understood the system of Japan's Grant Aid explained by the team.

(2) The Government of the Philippines will take the necessary measures, described in Annex I, for smooth implementation of the Project on condition that the Grant Aid assistance by the Government of Japan is extended to the Project.

3. Further schedule

The team will make the Final Report in accordance with the confirmed items, and send it to the Government of the Philippines by April, 1992.

4. Land Preparation of the Project Site

The Government of the Philippines has assured the team of the completion of the land acquisition of the Project site by October, 1992.

5. Budget and Personnel Allocations

The Government of the Philippines has confirmed that the budget and personnel required for the Project will be appropriately allocated and assigned for proper and effective operation of the Project.

Annex I

Undertakings by the Government of Republic of the Philippines

1. To secure the land necessary for the construction of the Project facilities and to clear the site.

2. To provide the land for temporary site office, warehouse and stock yard during the implementation period.

3. To ensure speedy unloading, tax exemption, custom clearance of products purchased under the Grant at the port of disembarkation.

4. To accord Japanese nationals whose services may be required in connection with the supply of the products and the services under the Verified Contracts such facilities as may be necessary for their entry into the Philippines and stay therein for the performance of their work.

5. To exempt Japanese nationals involved in the Project from customs duties, internal taxes and other fiscal levies which may be imposed in Philippines with respect to the supply of equipment/machines and services under the Verified Contracts.

6. To bear commissions to the Japanese foreign exchange bank for the banking services based upon the Banking Arrangement.

7. To bear all expenses, other than those to be covered by the Grant Aid necessary for the execution of the Project.

8. To provide proper arrangements for the construction, such as water supply, electricity, drainage of the Project.

9. To assign exclusive counterpart engineers/technicians, for the Project.

10. To maintain and use properly and effectively that the facilities constructed and equipment purchased under the Grant.

JICA/L:

APPENDIX E. ATTACHED TABLES AND FIGURES

E. 1 TABLE

E. 2 FIGURES

TABLE E-1 SEISMIC ANALYSIS BY DR. OKAMOTO'S FORMULA

工事名 (PROJECT NAME)	:	マンゲラケ (MAPP)
工事場所 (LOCATION)	:	ケンバンガン
構造物位置 (緯度=LATITUDE)	:	13.33 (分・秒は小数表示)
構造物位置 (経度=LONGITUDE)	:	122.07 (西より)
データ収集年 (YEARS)	:	1907 ~ 1991 85 年間
採用データ数 (D. NOS)	:	95 個

番号 NO.	生起日 DATE (M. D. Y6桁)	緯度 LAT.	経度 LON.	マグニチュード MG.	距離 DIST. (Km)	加速度 ACC. (GAL)	データ比較 NO./T
1	41807	13.50	123.00	7.4	101.16	119.4	0.0118
2	40842	13.60	121.90	7.7	116.18	118.7	0.0235
3	41807	14.00	123.00	7.6	121.12	106.9	0.0353
4	82037	14.50	121.50	7.5	137.73	93.2	0.0471
5	42971	13.00	122.30	6.0	49.91	82.9	0.0588
6	21974	13.91	122.12	6.1	57.87	76.8	0.0706
7	60539	13.50	121.30	6.6	84.04	70.5	0.0824
8	52036	13.50	121.50	6.0	62.75	61.9	0.0941
9	50841	14.00	123.00	6.8	121.12	53.6	0.1059
10	90276	13.58	122.34	5.2	35.98	51.7	0.1176
11	32119	13.00	123.00	6.5	109.36	44.9	0.1294
12	110541	12.50	123.00	6.9	140.87	44.9	0.1412
13	20735	13.50	122.80	6.0	79.77	42.1	0.1529
14	52526	12.50	122.00	6.3	90.08	41.8	0.1647
15	102866	14.00	123.20	6.8	139.55	40.3	0.1765
16	61961	13.00	121.60	5.8	75.25	35.7	0.1882
17	82033	13.90	121.00	6.6	123.38	35.0	0.2000
18	112268	13.20	122.60	5.5	60.99	34.7	0.2118
19	42572	13.40	120.60	7.0	169.54	33.8	0.2235
20	92076	14.00	121.00	6.6	133.82	33.6	0.2353
21	20670	12.68	122.08	5.9	89.94	28.8	0.2471
22	61528	12.50	121.50	6.2	116.40	25.5	0.2588
23	10678	12.84	121.66	5.4	65.75	25.4	0.2706
24	102356	13.50	120.50	6.8	169.97	25.3	0.2824
25	71690	15.66	121.26	7.7	268.82	22.9	0.2941
26	81566	13.28	121.36	5.5	77.63	21.4	0.3059
27	31070	12.63	122.14	5.6	86.33	19.7	0.3176
28	22472	13.70	121.50	5.3	70.52	19.4	0.3294
29	12448	10.50	122.00	8.2	320.88	18.0	0.3412
30	52272	12.72	122.43	5.5	83.92	17.9	0.3529
31	13176	14.00	122.00	5.2	68.13	17.8	0.3647
32	61069	13.20	121.50	5.1	65.06	16.8	0.3765
33	42975	12.60	121.60	6.7	101.32	15.6	0.3882
34	20670	12.69	121.93	5.3	70.16	14.7	0.4000
35	61490	11.33	122.17	7.0	228.91	14.7	0.4118
36	102175	12.80	121.20	5.8	114.52	13.4	0.4235
37	20958	13.00	121.80	5.9	123.38	13.0	0.4353
38	81762	12.00	121.50	6.3	166.11	11.2	0.4471
39	20570	12.69	122.22	6.1	79.37	10.2	0.4588
40	61528	11.50	121.60	6.7	218.63	9.8	0.4706
41	31215	12.00	124.00	7.0	259.30	9.6	0.4824
42	82071	13.70	121.10	5.5	110.25	8.4	0.4941
43	71561	14.00	121.00	5.8	133.92	8.2	0.5059
44	41991	13.80	121.04	5.5	120.17	7.8	0.5176
45	111325	13.00	125.00	7.3	319.34	7.5	0.5294
46	71162	11.90	122.10	6.1	165.42	7.5	0.5412
47	102576	13.00	121.00	5.6	123.38	7.1	0.5529
48	51790	13.37	121.23	5.1	90.73	6.9	0.5647
49	92276	13.70	120.80	6.8	141.39	6.8	0.5765
50	31640	14.50	120.00	6.8	265.23	6.8	0.5882
51	92237	12.00	123.50	6.5	218.29	6.5	0.6000
52	20538	14.00	124.00	6.5	219.13	6.4	0.6118
53	71859	15.50	120.50	7.0	289.13	6.3	0.6235
54	50172	13.40	121.20	5.1	93.95	6.2	0.6353
55	42772	13.40	120.80	6.7	137.14	6.1	0.6471
56	102175	11.66	121.65	6.3	197.31	6.1	0.6588
57	72571	12.30	123.70	6.4	213.59	5.6	0.6706
58	43072	13.50	120.60	5.9	169.20	5.5	0.6824
59	30759	11.90	122.50	6.8	269.32	5.5	0.6941
60	62168	13.38	123.04	5.2	104.75	5.3	0.7059
61	42672	13.40	120.90	5.6	126.34	5.3	0.7176
62	42672	13.10	121.00	5.4	119.94	5.1	0.7294
63	51272	13.40	121.00	5.3	115.55	4.7	0.7412
64	70264	13.00	124.50	6.7	265.94	4.6	0.7529
65	21972	12.83	121.31	5.1	102.95	4.5	0.7647
66	102175	11.71	121.75	6.1	189.66	4.4	0.7765
67	41976	13.70	120.80	6.6	141.39	4.3	0.7882
68	31264	13.64	121.07	5.2	111.49	4.2	0.8000
69	62167	12.76	123.00	5.3	123.01	3.7	0.8118
70	82976	12.96	121.84	5.2	117.00	3.5	0.8235
71	52872	12.90	121.10	5.2	118.02	3.4	0.8353
72	112173	13.45	121.92	5.1	113.58	3.1	0.8471
73	80368	12.35	122.41	5.2	121.14	3.1	0.8588
74	120764	12.10	122.30	5.5	145.33	3.0	0.8706
75	112634	14.90	120.00	6.3	233.55	3.0	0.8824
76	60633	14.00	120.00	6.3	233.55	3.0	0.8941
77	81873	11.50	121.50	5.1	208.01	3.0	0.9059
78	11472	13.40	121.00	5.1	115.55	2.9	0.9176
79	201266	14.57	122.17	5.3	131.42	2.8	0.9294
80	42672	13.30	120.70	6.5	148.27	2.8	0.9412
81	101774	13.50	120.70	6.5	148.44	2.8	0.9529
82	43072	13.20	120.70	6.5	149.43	2.7	0.9647
83	40770	15.78	121.71	6.5	268.12	2.7	0.9765
84	102274	13.40	120.50	6.7	169.54	2.6	0.9882
85	42672	13.40	120.90	6.2	126.34	2.6	1.0000
86	62461	13.36	123.22	5.1	124.22	2.2	1.0118
87	41270	15.08	122.01	5.8	187.70	2.1	1.0235
88	50576	14.00	121.00	6.2	133.92	2.0	1.0353
89	72642	11.50	124.50	6.8	335.96	2.0	1.0471
90	10570	13.78	120.71	5.4	153.10	1.9	1.0588
91	51373	13.03	120.75	6.3	145.01	1.8	1.0706
92	51887	13.40	123.20	5.0	122.03	1.8	1.0824
93	42672	13.40	120.80	6.2	137.14	1.8	1.0941
94	100875	13.70	120.40	5.7	183.58	1.8	1.1059
95	102275	11.65	121.67	6.8	197.91	1.7	1.1176

TABLE E-2 COMPARATIVE ESTIMATION OF DESIGN FLOOD

Step	Method	Description	Max.Discharge	Remarks
The Prime	Creager's Formula (C=75) (*1)	$Q_{max} = 46\,CA^{(0.894A^{-0.048})}$	724 cu.m/sec or 22.3 cu.m/sec/sq.km	Q : in cu.ft/sec A : in sq. mile (12.55)
Verif. 1	B. P. W.H's Empirical Flood Formula (Rare)	$Q_{max} = \frac{150 \cdot A}{\sqrt{A}+13}$	723 cu.m/sec or 22.2 cu.m/sec/sq.km	A : Catchment Area 32.5 sq.km
Verif. 2	Rational Method (R. P = 1,000 yrs)	$Q_{max} = \frac{1}{3.6} f \cdot I_t \cdot A$ With the Rainfall data at Tayabas 1949~90 (1970, 1989 lacking)	687 cu.m/sec or 21.1 cu.m/sec/sq.km	$f = 0.8 \quad r_t = f \cdot I_t$ $I_t = R/24 \cdot (24/T)^{0.6}$ $= 556.0/24 \cdot (24/2.25)^{0.6}$ $= 95.9$ mm/ha (*2) $T = 290 \cdot A^{0.22} \cdot r_t^{-0.35}$ $\doteq 135$ min $= 2.25$ hr (*3)
Verif. 3	From Traces of Historic Floods at Damsite.	Typhoon "Herming" at Aug. 13, 1987 (*4)	252 cu.m/sec or 7.75 cu.m/sec/sq.km	Daily Rainfall is 286 mm/day

Note : *1. C = 75 is particularly applied because of small scale of dam.
*2. Mononobe's Formula
*3. Fukushima & Kadoya's Formula
*4. This data was obtained by the survey of Flood Traces at Tambangan Damsite (Sep, 1991)

TABLE E-3 NUMBER OF STAFF BY ROOM

Branch		No.	Room	No. of Staff by Room
1. Project Director		1	Building of Training and Administration	1
2. Training				
(1) Chief		1	Building of Training and Administration	1
(2) Training Specialist	(3)	5	〃	(3) 5
(3) Training Assistant		1	〃	1
(4) Audio Visual Eqpt. Operator		1	〃	1
Sub-Total	(3)	8	〃	(3) 8
3. Research				
(1) Chief		1	〃	1
(2) Researcher	(1)	3	〃	(1) 3
Sub-Total	(1)	4		(1) 4
4. Administrative				
(1) Chief		1	〃	1
(2) Accountant		1	〃	1
(3) Budget Staff		1	〃	1
(4) Cashier		1	〃	1
(5) Typist		2	〃	2
(6) Mechanic		1	Wearhouse and Repair Shop	1
(7) Helper Mechanic		1	〃	1
(8) Electrician		1	〃	1
(9) Store Keeper		1	Wearhouse and Farming Space	1
(10) Tractor Operator		2		-
(11) Watchman		5		-
(12) Driver	(1)	2		-
(13) Farm Laborers		10		-
(14) Security Guard		2		-
Sub-total		31		10
Total	(5)	44		(5) 23

Note: 1. The total staff inclusive of Project Director, whom the provincial Governor will be assigned amount to 45 persons.

2. The number of staff in the parenthesis are included in the total staff, who will stay two to three days a week for the time being. However, they will become full time staff of the Farm.

TABLE E-4 CALCULATION OF TRANSPIRATION BY PENMAN METHOD

Item	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
W	0.74	0.75	0.76	0.77	0.77	0.77	0.77	0.76	0.77	0.76	0.76	0.75
Rns	4.0	5.0	6.1	6.4	5.8	5.0	5.0	4.7	4.5	4.5	4.4	3.6
f (T)	13.2	13.4	13.7	13.8	13.8	13.8	13.8	13.8	13.7	13.5	13.3	13.1
f(ed)	0.14	0.11	0.11	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.11
f(n/N)	0.42	0.55	0.64	0.64	0.55	0.42	0.42	0.37	0.37	0.42	0.46	0.37
Rnl	0.8	0.8	1.0	0.9	0.8	0.6	0.6	0.5	0.5	0.6	0.6	0.5
Rn	3.2	4.2	5.1	5.5	5.0	4.4	4.4	4.2	4.0	3.9	3.8	3.1
1-W	0.26	0.25	0.24	0.23	0.23	0.23	0.23	0.24	0.23	0.24	0.24	0.25
f(u)	0.65	0.65	0.84	0.84	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.84
ea	32.3	33.2	35.1	37.8	39.2	38.3	37.2	35.9	36.8	36.1	35.5	33.0
ed	20.3	28.2	27.7	29.5	30.6	31.0	30.7	30.7	30.5	30.4	29.8	27.3
ea-ed	2.0	5.0	7.4	8.3	8.6	7.3	6.5	5.2	6.3	5.7	5.7	5.7
W × Rn	2.73	3.15	3.88	4.24	3.85	3.39	3.39	3.19	3.08	2.96	2.89	2.33
(1-W)×(f(u) ×(ea-ed)	0.34	0.81	1.49	1.60	1.29	1.09	0.97	0.81	0.94	0.89	0.89	1.20
Eto	3.1	4.0	5.4	5.8	5.1	4.5	4.4	4.0	4.0	3.9	3.8	3.5

TABLE E-5 CONSUMPTIVE USE OF RICE

(Unit : mm/day)

		PADDY (Wet)		PADDY (Dray)	
		Coeficient	ETPo	Coeficient	ETPo
DEC	I				
	II				
	III			0.28	0.98
JAN	I			0.55	1.70
	II			0.83	2.57
	III			1.10	3.41
FEB	I			1.10	4.40
	II			1.10	4.40
	III			1.10	4.40
MAR	I			1.06	5.72
	II			1.02	5.51
	III			0.99	5.35
APR	I			0.72	4.18
	II			0.48	2.78
	III			0.24	1.39
MAY	I				
	II				
	III				
JUN	I				
	II				
	III	0.28	1.26		
JUL	I	0.55	2.42		
	II	0.83	3.65		
	III	1.10	4.84		
AUG	I	1.10	4.40		
	II	1.10	4.40		
	III	1.10	4.40		
SEP	I	1.06	4.24		
	II	1.02	4.08		
	III	0.99	3.96		
OCT	I	0.72	2.81		
	II	0.48	1.87		
	III	0.24	0.94		

TABLE E - 6 CROP COEFFICIENT OF UPLAND CROPS

		Egg Plant	Corn	Peanut	Tomato	Mung Bean
DEC	I					0.13
	II				0.06	0.29
	III				0.19	0.52
JAN	I				0.33	0.78
	II				0.51	0.92
	III				0.69	1.02
FEB	I				0.83	1.05
	II				0.94	1.00
	III				1.01	0.86
MAR	I				0.99	0.60
	II				0.82	0.34
	III				0.56	0.12
APR	I				0.31	
	II				0.09	
	III					
MAY	I		0.13			
	II		0.25			
	III		0.40			
JUN	I	0.07	0.59	0.13		
	II	0.15	0.70	0.15		
	III	0.24	0.84	0.40		
JUL	I	0.35	0.96	0.59		
	II	0.48	1.03	0.71		
	III	0.62	1.05	0.84		
AUG	I	0.76	0.78	0.96		
	II	0.81	0.51	1.02		
	III	0.86	0.25	0.98		
SEP	I	0.77		0.71		
	II	0.66		0.45		
	III	0.53		0.20		
OCT	I	0.39				
	II	0.25				
	III	0.12				

TABLE E - 7 CONSUMPTIVE USE OF UPLAND CROPS

(Unit : mm/day)

		Egg Plant	Corn	Peanut	Tomato	Mung Bean
DEC	I					0.46
	II				0.21	1.02
	III				0.57	1.82
JAN	I				1.02	2.42
	II				1.58	2.82
	III				2.14	3.16
FEB	I				3.32	4.20
	II				3.76	4.00
	III				4.04	3.44
MAR	I				5.35	3.24
	II				4.43	1.84
	III				3.02	0.65
APR	I				1.08	
	II				0.52	
	III					
MAY	I		0.66			
	II		1.28			
	III		2.04			
JUN	I	0.32	2.66	0.59		
	II	0.68	3.15	0.68		
	III	1.08	3.78	1.80		
JUL	I	1.54	4.22	2.60		
	II	2.11	4.53	3.12		
	III	2.73	4.62	3.70		
AUG	I	3.04	3.12	3.84		
	II	3.24	2.04	4.08		
	III	3.44	1.00	3.92		
SEP	I	3.08		2.84		
	II	2.64		1.80		
	III	2.12		0.80		
OCT	I	1.52				
	II	0.98				
	III	0.47				

TABLE E-8 CALCULATION OF DESIGN DISCHARGE OF CANAL

	Name of Crop	Proposed Area	JAN			FEB			MAR			APR			MAY			JUN			JUL			AUG			SEP			OCT			NOV			DEC			Total
			I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	
Water Requirement (mm)	Paddy(wet)																			1.26	3.65	4.84	4.40	4.40	4.40	4.40	4.24	4.08	3.96	2.81	1.87	0.94							
	Paddy(dry)		1.70	2.57	3.41	4.40	4.40	4.40	5.72	5.51	5.35	4.18	2.78	1.39																							0.98	
	Vegitable																	3.2	6.8	10.8	15.4	21.1	30.0	30.4	32.4	37.8	30.8	26.4	21.2	15.2	9.8	5.2							296.5
	Corn														6.6	12.8	22.4	26.6	31.5	37.8	42.2	45.3	50.8	31.2	20.4	11.0													338.6
	Peanut																	5.9	6.8	18.0	26.0	31.2	40.7	39.4	40.8	43.1	28.4	18.0	8.0										305.3
	Fruit Veg.		10.2	15.8	23.5	33.2	37.6	32.3	53.5	44.3	33.2	18.0	2.6																							1.1	6.3	311.6
	Mung Bean		24.2	28.2	34.6	42.0	40.0	27.5	32.4	18.4	7.2																									4.6	10.2	20.0	289.5
	Root Crop		15.5	15.5	17.1	20.0	20.0	16.0	27.0	27.0	29.2	29.0	29.0	29.0	25.5	25.5	28.1	22.5	22.5	22.5	22.0	22.0	24.2	20.0	20.0	22.0	20.0	20.0	20.0	19.5	19.5	21.5	19.0	19.0	19.0	17.5	17.5	19.3	782.9
Water Requirement (1,000 cu.m)	Paddy(wet)	480																96.0	192.0	314.9	429.6	385.9	288.9	211.2	211.2	232.3	203.5	195.8	190.1	134.9	89.8	49.4							3,226.6
	Paddy(dry)	408	285.6	235.4	202.0	179.5	179.5	143.6	233.4	224.8	240.3	170.5	113.4	56.7																						81.6	163.2	256.2	2,765.8
	Vegitable	30																1.0	2.0	3.2	4.6	6.3	9.0	9.1	9.7	11.3	9.2	7.9	6.3	4.6	2.9	1.6							89.0
	Corn	60													4.0	7.7	13.4	16.0	18.9	22.7	25.3	27.2	30.5	18.7	12.2	6.6													203.2
	Peanut	30																1.8	2.0	5.4	7.9	9.4	12.2	11.5	12.2	12.9	8.5	5.4	2.4										91.7
	Fruit Veg	90	9.2	14.2	21.2	29.9	33.8	29.1	48.2	39.9	29.9	16.2	2.3																							1.0	5.7	280.4
	Mung Bean	30	7.3	8.5	10.4	12.6	12.0	8.3	9.7	5.5	2.2																									1.3	3.1	6.0	86.9
	Root Crop	30	4.7	4.7	5.1	6.0	6.0	4.8	8.1	8.1	8.8	8.7	8.7	8.7	7.7	7.7	8.4	6.8	6.8	6.8	6.6	6.6	7.3	6.0	6.0	6.6	6.0	6.0	6.0	5.9	5.9	6.5	5.7	5.7	5.7	5.3	5.3	5.8	234.3
	Total		306.7	262.7	238.7	228.0	231.4	185.7	299.3	278.3	281.1	195.4	124.5	65.4	11.6	15.3	21.8	121.4	221.7	353.0	474.0	435.4	348.9	256.6	251.4	269.8	227.3	215.2	204.8	145.3	98.6	57.5	5.7	5.7	5.7	88.2	172.5	273.7	6,978.3
Water Demand to Dam (MCM)			0.479	0.411	0.373	0.356	0.362	0.290	0.468	0.435	0.439	0.305	0.194	0.102	0.018	0.018	0.034	0.190	0.346	0.551	0.741	0.680	0.545	0.401	0.393	0.422	0.355	0.336	0.320	0.227	0.154	0.090	0.009	0.009	0.009	0.138	0.270	0.428	
Water Requirement per ha (ℓ/sec/ha)			0.88	0.76	0.62	0.65	0.67	0.67	0.86	0.80	0.73	0.56	0.36	0.19	0.03	0.03	0.06	0.35	0.64	1.01	1.36	1.25	0.91	0.74	0.72	0.70	0.65	0.62	0.59	0.42	0.28	0.15	0.02	0.02	0.02	0.25	0.50	0.71	

TABLE E-9 RESULT OF LUGEON/PERMEABILITY TEST

Result of Lugeon/Permeability Test at Proposed Damsille

Hole No. (stage)	Testing Section (m)	to (m)	Geolgical Facies	Description	k (cm/sec)	Lu'*1	Pc*2 (Kg/cm)
AB1(1)	0.0	5.0	Gravel	Greyish Gavel/sand	7.43E-02	-	>0.35
(2)	0.0	10.0	Gravel	Greyish Gavel/sand	2.34E-04	-	>0.29
(3)	0.0	15.0	Gravel	Gravel/reddish sand	1.15E-04	-	>0.32
AB2(1)	2.0	5.0	Silt/An	Grey silt/W.Andesite	1.35E-04	11.6	>3.41
(2)	5.0	10.0	An	Weathered Andesite	3.11E-04	24.8	>3.66
(3)	10.0	15.0	An	Weathered Andesite	4.63E-04	35.8	>3.84
BB1(1)	3.0	5.0	Silt/An	Grey silt/W.Andesite	1.23E-04	11.7	>3.46
(2)	5.0	10.0	An	Weathered Andesite	1.61E-04	12.4	>3.61
(3)	10.0	15.0	An	Weathered Andesite	2.23E-04	17.2	>3.86
BB2(1)	3.0	5.0	Silt/An	Grey silt/W.Andesite	1.33E-04	12.6	>3.46
(2)	5.0	10.0	An	Weathered Andesite	1.64E-04	12.6	>3.61
(3)	10.0	15.0	An	Weathered Andesite	2.24E-04	17.3	>3.78
BB3(1)	0.0	5.0	Gravel	Greyish Gavel/sand	1.75E-04	-	>0.56
(2)	0.0	10.0	Gravel	Greyish Gavel/sand	8.84E-05	-	>0.71
(3)	0.0	15.0	Gravel	Greyish Gavel/sand	4.45E-05	-	>1.91
BB4(1)	1.0	5.0	An	Weathered Andesite	9.39E-05	7.6	>3.36
(2)	5.0	10.0	An	Andesite(D-CM)	7.38E-05	5.7	>3.91
(3)	10.0	15.0	An	Andesite(D-CM)	5.86E-05	4.5	>4.16
BB5(1)	2.0	5.0	An	Weathered Andesite	8.02E-05	6.9	>3.41
(2)	5.0	10.0	An	Andesite(CL,CM)	1.67E-04	12.9	>3.51
(3)	10.0	15.0	An	Andesite(CL,CM)	3.09E-04	23.9	>3.96
BB6(1)	0.0	5.0	Gravel	Greyish Gavel/sand	9.31E-02	-	>0.32
(2)	0.0	10.0	Gravel	Greyish Gavel/sand	6.87E-02	-	>0.32
(3)	0.0	15.0	Gravel	Greyish Gavel/sand	4.34E-02	-	>0.32
(5)	18.0	23.0	An	Andesite(CL,CM)	9.66E-05	7.5	>3.30
BB7(1)	0.0	5.0	Gravel	Greyish Gavel/sand	2.56E-03	-	>0.24
(2)	6.5	10.0	An	Weathered Andesite	3.75E-04	31.2	>3.18
(3)	10.0	15.0	An	Weathered Andesite	4.95E-04	38.2	>3.85
BB8(1)	0.0	5.0	Silt/Sand	Silt,Sand and Gravel	2.69E-03	-	>0.29
(2)	0.0	10.0	Gravel	Greyish Gavel/sand	1.72E-03	-	>0.30
(3)	0.0	15.0	Gravel	Greyish Gavel/sand	1.26E-03	-	>0.30
BB9(1)	0.0	5.0	clay/silt	stiff clay with silt	-	-	>0.55
(2)	0.0	10.0	Gravel/An	Cobble/W. Andesite	2.43E-04	-	>0.28
(3)	10.0	15.0	An	Weathered Andesite	3.27E-04	25.2	>3.46
BB10(1)	2.5	5.0	Silt/An	silt & Weathered An.	1.58E-04	14.2	>3.43
(2)	5.0	10.0	An	Weathered Andesite	1.58E-04	12.2	>3.71
(3)	10.0	15.0	An	Weathered Andesite	2.79E-04	21.5	>3.91

Note*1:Lu' shows the "converted Lugeon value" in the case of 10 Kg/cm2 water head.
Note*2:Pc shows the "critical pressure" to a resistance of geological facies.

Result of Lugeon/Permeability Test at Leon Matas Site

Hole No. (stage)	Testing Section (m)	to (m)	Geolgical Facies	Description	k (cm/sec)
LM1(1)	0.0	5.0	Sand	Greyish Sand/Gavel	6.82E-03
(2)	0.0	10.0	Gravel	Greyish Gavel	5.01E-03
LM(1)	0.0	5.0	Sand	Greyish Sand/Gavel	2.65E-03
(2)	5.0	10.0	Gravel	Greyish Gavel	2.16E-03

TABLE E-10 LIST OF CONSTRUCTION MATERIALS FOR DAM

MATERIAL	LOCATION	BORROW AREA	QUANTITY	SOIL CLASSIFICATION	DISTANCE FROM DAM SITE	LABORATORY TEST
Impermeable Material	Left ridge	A	90,000m³	GC, CH, SC, CL	0.2～1.0 km	Physical test(2),Dynamic test(2)
	Construction road ～ Left ridge	C	160,000m³	SC, ML, CL, GM, CH	0.5～1.2 km	Physical test(4),Dynamic test(2)
Semi-permeable Material	Left ridge	A	abundance	ML, GM	0.2～1.0 km	Physical test(3),Dynamic test(3)
	Right ridge	C	abundance	ML, GM	0.5～1.2 km	Dynamic test(1)
	River floor	D	abundance	ML, SM, GW, GM	～0.8 km	Physical test(2)
Filter material Aggregate	River floor	D	abundance	ML, SM, GW, GM	～0.8 km	Physical test(2),Dynamic test(2)
	Mogpog river	—	abundance	ML, SM, GW, GM	30 km	- No test -
Rirap material	River floor	D	abundance	ML, SM, GW, GM	～0.8 km	- No test -
	Mogpog river	—		ML, SM, GW, GM	30 km	Physical test(2),Dynamic test(2)

Tab. LABORATORY TEST RESULTS (Dynamic Tests)

No	Sample name / Location depth	soil description	Class Field USCS	moist.	Gs	INITIAL STATE for Dynamic Tests ρd	ωo	e	Sr	(ωF-ωo)	Permisbility k cm/s	Consolidation Cc	Cv cm²	Triaxial compression UU	CU	CD	Unconfind qu kgf/cm²
[1]	TP-1 1.10~3.00	Clayey sand with gravel - brown	SC	18	2.78	1.780	14.0	0.560	89.3	(4.0)	2.1e-6	0.20	1.3e-3	2.00 16°	0.60 17°		
[2]	TP-2 0.35~1.65	Clayey gravel with sand -reddish brown	GC	11	2.71	1.810	12.5	0.496	60.1	(-1.5)	1.0e-5						
[3]	TP-2 2.70~3.10	Sandy silt traces of siltstone - brown	ML	25	2.68	1.422	21.0	0.883	75.9	(4.0)						0.89 24°	
[4]	TP-3 0.40~1.40	Clayey gravel with sand - brown	GC	13	2.65	1.890	12.4	0.401	86.0	(0.6)	9.8e-6					0.70 21°	
[5]	TP-3 2.95~4.10	Silt with sand - yellowish brown	ML	34	2.65	1.469	23.8	0.802	112.3	(10.2)	1.8e-6			1.40 20°	0.44 24°	0.45 13°	
[6]	TP-4 0.40~1.35	Clayey gravel with sand - brown	GC	11	2.71	1.810	12.2	0.496	60.1	(-1.2)	1.0e-5					0.78 26°	
[7]	TP-4 2.80~3.80	Sandy silt - brown	ML	28	2.57	1.534	24.3	0.674	106.8	(3.7)						0.56 19°	
[C]	TP-14 1.80~3.00	Well-graded gravel with silts and sand - gray				2.164	8.3				1.2e-5						
[G]	TP-21 1.60~2.80	Clayey sand with gravel	SC	11	2.66	1.620	18.0	0.640	45.7	(-7.0)	1.9e-6	0.24	5.0e-1	2.00 23°	0.54 25°	0.50 24°	
[H]	TP-22 1.00~5.00	Silt with sand - reddish brown	ML	29	2.63	1.474	27.6	0.782	97.5	(1.4)	1.0e-6	0.24	1.0e-3	1.80 15°	0.60 19°		
[P]	DownStrm Outcrop	Well-graded gravel with sand & silt - gray	GW-GM			2.172	8.1				1.2e-5						
[Q]	BB-2																23.
[R]	BB-4																32.

Tab. LABORATORY TEST RESULTS

No	Location depth	soil description	Specific Gravity			% Passing		% Retained			%finer	CONSISTENCY		Classi-	Field	COMPACTION TEST			
			Gs (Gg)	Ga	Gb	#No. 4	#200	G	S	M	C (F)	LL	IP	fication	moisture	ρmax	ωopt	Sr	ωF-ωopt
1	[1] TP-1 1.10~3.00	Clayey sand with gravel - brown	2.78			74.0	33.0	26.0	41.0	15.0	18.0	42.0	22.0	SC	18.%	1.780	14.0	89.3	(4.0)
2	[2] TP-2 0.35~1.65	Clayey gravel with sand -reddish brown	2.71			50.0	26.0	50.0	24.0	12.0	14.0	39.0	21.0	GC	11.%	1.810	12.5	60.1	(-1.5)
3	[3] TP-2 2.70~3.10	Sandy silt traces of siltstone - brown	2.68			95.0	64.0	5.0	31.0	50.0	14.0			ML	25.%	1.422	21.0	75.9	(4.0)
4	[4] TP-3 0.40~1.40	Clayey gravel with sand - brown	2.65			43.0	27.0	57.0	16.0	11.0	16.0	41.0	21.0	GC	13.%	1.890	12.4	86.0	(0.6)
5	[5] TP-3 2.95~4.10	Silt with sand - yellowish brown	2.65			98.0	72.0	2.0	26.0	61.0	11.0			ML	34.%	1.469	23.8	112.3	(10.2)
6	[6] TP-4 0.40~1.35	Clayey gravel with sand - brown	2.71			50.0	23.0	50.0	27.0	11.0	12.0	32.0	18.0	GC	11.%	1.810	12.2	60.1	(-1.2)
7	[7] TP-4 2.80~3.80	Sandy silt - brown	2.57			100.0	65.0	.0	35.0	51.0	14.0			ML	28.%	1.534	24.3	106.8	(3.7)
8	[8] TP-5 0.75~1.90	fat clay with sand - grayish brown	2.67			96.0	85.0	4.0	11.0	27.0	58.0	61.0	25.0	CH	32.%				
9	[9] TP-11 0.20~3.40		2.75	2.62	2.55	47.0	3.0	53.0	44.0		{ 3.0}								
10	[A] TP-12 0.80~3.50		2.73	2.60	2.53	41.0	2.0	59.0	39.0		{ 2.0}								
11	[B] TP-13 0.70~3.20		2.72	2.60	2.54	46.0	2.0	54.0	44.0		{ 2.0}								
12	[C] TP-14 1.80~3.00	Well-graded gravel with silts and sand - gray				49.0	9.0	51.0	40.0		{ 9.0}					2.164	8.3	.0	
13	[D] TP-17 0.7~1.70	Sandy silt -grayish brown	2.72			100.0	67.0	.0	33.0	57.0	10.0			ML	19.%				
14	[E] TP-18 1.90~4.50		2.83			100.0	98.0	.0	2.0	95.0	3.0			ML	24.%				
15	[F] TP-20 1.20~3.90	Silty sand with siltstone - light brown	2.71			80.0	37.0	20.0	44.0	25.0	11.0			SM	19.%	1.540	19.5	67.9	(-.5)
16	[G] TP-21 1.60~2.80	Clayey sand with gravel	2.66			75.0	47.0	25.0	28.0	18.0	29.0	53.0	24.0	SC	11.%	1.620	18.0	45.7	(-7.0)
17	[H] TP-22 1.00~5.00	Silt with sand - reddish brown	2.63			99.0	74.0	1.0	25.0	62.0	12.0	48.0	32.0	ML	29.%	1.474	27.6	97.5	(1.4)
18	[I] TP-23 0.10~0.70	Sandy lean clay - reddish brown	2.70			95.0	68.0	5.0	27.0	23.0	45.0	40.0	21.0	CL	19.%				
19	[J] TP-23 0.70~2.10	Silty grabel with sand - dark brown	2.65			61.0	42.0	39.0	19.0	24.0	18.0			GM	7.%	2.025	10.5	60.4	(-3.5)
20	[K] TP-24 0.20~1.40	Fat clay with sand - reddish brown	2.69			98.0	71.0	2.0	27.0	31.0	40.0	50.0	25.0	CH	20.%				
21	[L] TP-27 0.10~0.70	Gravally lean clay with sand - reddish brown	2.70			75.0	54.0	25.0	21.0	24.0	30.0	45.0	22.0	CL	16.%				
22	[M] TP-28 0.25~1.40	Silty gravel with sand - reddish	2.72			39.0	22.0	61.0	17.0	12.0	10.0	39.0	26.0	GM	12.%				
23	[N] MOGPOG S~1					30.0	1.0	70.0	29.0		{ 1.0}								
24	[O] MOGPOG S~2					54.0	11.0	46.0	43.0		{ 11.0}								
25	[P] DownStrm Outcrop	Well-graded gravel with snd & silt - gray				40.0	5.0	60.0	35.0	3.0	2.0			GW-GM		2.172	8.1	.0	
26	[Q] BB-2																		
27	[R] BB-4																		

TABLE E-12 SOIL MECHANICAL DATA OF DAM BODY

Item	Symbol	Unit	Core Zone	Random Zone	Filter Zone
Specific Gravity	G	-	2.69	2.60	2.60
Moisture Content	W	%	18.0	8.0	8.0
Dry Density	γd	ton/cu.m	1.52	1.95	1.95
West Density	γt	"	1.79	2.10	2.10
Saturated Density	γsat	"	1.95	2.20	2.20
Submerged Density	γsub	"	0.95	1.20	1.20
Void Ratio	e	-	0.770	0.333	0.333
Cohesion	c	ton/sq.m	5.0	0	0
I. F. A	Φ	degree	17.0	35.0	35.0
Permeability Ratio	k	cm/s	1×10^{-5}	1×10^{-4}	1×10^{-3}

TABLE E-13 SLOPE STABILITY ANALYSIS

(CASE-3) K=0.150 WL= 30.300

X (M)	Y (M)	R (M)	CL (TON/M)	NTAN (TON/M)	T (TON/M)	F.S.
-70.00	90.00	77.00	104.235	59.424	84.532	1.936
-70.00	100.00	87.00	146.417	67.539	107.113	1.997
-70.00	110.00	97.00	188.818	77.944	133.423	1.999
-70.00	120.00	107.00	220.673	95.145	164.873	1.916
-70.00	130.00	117.00	272.343	111.711	199.875	1.921
-60.00	70.00	57.00	183.847	70.071	130.494	1.946
-60.00	80.00	67.00	212.454	85.399	160.500	1.856
-60.00	90.00	77.00	245.798	103.230	196.644	1.775
-60.00	100.00	87.00	311.293	118.002	237.699	1.806
-60.00	110.00	97.00	335.034	134.180	271.965	1.725
-60.00	120.00	107.00	268.445	193.517	303.016	1.525
-60.00	130.00	117.00	184.603	283.381	334.812	1.398
-50.00	40.00	27.00	160.594	59.754	112.932	1.951
-50.00	50.00	37.00	192.224	78.339	150.719	1.795
-50.00	60.00	47.00	226.703	97.287	191.756	1.690
-50.00	70.00	57.00	201.100	159.289	241.164	1.494
-50.00	80.00	67.00	203.944	224.154	295.475	1.449
-50.00	90.00	77.00	162.609	301.743	344.411	1.348
-50.00	100.00	87.00	117.589	387.743	388.414	1.301
-50.00	110.00	97.00	104.584	460.513	424.954	1.330
-50.00	120.00	107.00	100.023	522.828	452.649	1.376
-50.00	130.00	117.00	100.126	578.345	473.853	1.432
-40.00	40.00	27.00	104.821	176.150	184.098	1.526
-40.00	50.00	37.00	104.566	249.545	260.532	1.359
-40.00	60.00	47.00	129.170	332.296	338.250	1.364

TABLE E-13 SLOPE STABILITY ANALYSIS

(CASE-3) K=0.150 WL= 30.300

X (M)	Y (M)	R (M)	CL (TON/M)	NTAN (TON/M)	T (TON/M)	F.S.
-40.00	70.00	57.00	98.217	427.797	404.182	1.301
-40.00	80.00	67.00	74.718	520.314	455.334	1.307
-40.00	90.00	77.00	80.151	594.652	489.917	1.377
-40.00	100.00	87.00	80.094	664.291	513.640	1.449
-40.00	110.00	97.00	79.593	723.682	530.150	1.515
-40.00	120.00	107.00	79.891	778.166	541.917	1.583
-40.00	130.00	117.00	79.942	827.148	550.257	1.648
-30.00	40.00	27.00	83.625	355.472	301.463	1.457
-30.00	50.00	37.00	66.308	480.896	405.741	1.349
-30.00	60.00	47.00	57.524	595.207	474.983	1.374
-30.00	70.00	57.00	56.783	693.009	513.529	1.460
-30.00	80.00	67.00	60.774	773.523	536.081	1.556
-30.00	90.00	77.00	65.935	840.083	549.680	1.648
-30.00	100.00	87.00	65.599	898.728	558.067	1.728
-30.00	110.00	97.00	65.161	952.442	563.141	1.807
-30.00	120.00	107.00	70.291	995.118	566.109	1.882
-30.00	130.00	117.00	70.261	1036.831	567.547	1.951
-20.00	40.00	27.00	36.542	565.857	402.946	1.495
-20.00	50.00	37.00	39.266	711.542	471.497	1.592
-20.00	60.00	47.00	43.072	823.456	502.793	1.723
-20.00	70.00	57.00	52.589	906.208	518.730	1.848
-20.00	80.00	67.00	51.821	977.674	527.305	1.952
-20.00	90.00	77.00	51.750	1039.235	531.882	2.051
-20.00	100.00	87.00	56.499	1087.742	534.148	2.142
-10.00	40.00	27.00	34.909	750.041	378.536	2.074

TABLE E-13 SLOPE STABILITY ANALYSIS

(CASE-3) K=0.150 WL= 30.300

X (M)	Y (M)	R (M)	CL (TON/M)	NTAN (TON/M)	T (TON/M)	F.S.
-10.00	50.00	37.00	36.172	887.057	414.376	2.228
-10.00	60.00	47.00	34.124	988.904	432.267	2.367
-10.00	70.00	57.00	38.512	1065.700	442.726	2.494
-10.00	80.00	67.00	43.092	1126.659	449.251	2.604
F.S.MIN						
-50.00	100.00	87.00	117.589	387.743	388.414	1.301

*** UPSTREAM SIDE WITH FULL WATER LEVEL ***

(CASE-3) K=0.150 WL= 30.300

CRITICAL CIRCLE

X (M)	Y (M)	R (M)	CL (TON/M)	NTAN (TON/M)	T (TON/M)	F.S.
-55.00	95.00	82.00	262.552	180.437	285.811	1.550
-55.00	100.00	87.00	231.173	218.864	306.215	1.470
-55.00	105.00	92.00	202.309	256.146	326.369	1.405
-50.00	95.00	82.00	141.944	343.078	367.090	1.321
-50.00	100.00	87.00	117.589	387.743	388.414	1.301
-50.00	105.00	92.00	104.198	428.024	407.914	1.305
-45.00	95.00	82.00	85.177	499.506	445.400	1.313
-45.00	100.00	87.00	89.502	531.422	461.606	1.345
-45.00	105.00	92.00	89.924	564.377	475.376	1.376

****
CRITICAL SLIP CIRCLE AND ITS COMPONENT
****

X (M)	Y (M)	R (M)	CL (TON/M)	NTAN (TON/M)	T (TON/M)	F.S.
-50.00	100.00	87.00	117.589	387.743	388.414	1.301

DAM KIBAN - MEN ; (-70.0 13.0) (70.0 13.0)

TABLE E-13 SLOPE STABILITY ANALYSIS

(CASE-3) K=0.150 WL= 30.300

X (M)	Y (M)	R (M)	CL (TON/M)	NTAN (TON/M)	T (TON/M)	F.S.
10.00	40.00	27.00	19.003	823.633	310.425	2.714
10.00	50.00	37.00	21.523	954.483	340.509	2.866
10.00	60.00	47.00	25.826	1048.247	358.957	2.992
10.00	70.00	57.00	35.960	1117.134	372.135	3.099
10.00	80.00	67.00	34.329	1174.635	382.019	3.165
20.00	40.00	27.00	26.759	689.600	391.200	1.831
20.00	50.00	37.00	24.728	832.720	443.540	1.933
20.00	60.00	47.00	20.878	937.728	464.061	2.066
20.00	70.00	57.00	25.522	1016.355	473.289	2.201
20.00	80.00	67.00	23.999	1080.274	478.743	2.307
20.00	90.00	77.00	29.073	1131.589	482.087	2.408
30.00	40.00	27.00	0.0	494.999	338.287	1.463
30.00	50.00	37.00	29.392	634.454	435.213	1.525
30.00	60.00	47.00	22.982	750.193	486.609	1.589
30.00	70.00	57.00	20.144	843.540	511.359	1.689
30.00	80.00	67.00	25.103	917.670	523.117	1.802
30.00	90.00	77.00	23.963	979.391	528.444	1.899
30.00	100.00	87.00	28.983	1030.355	530.973	1.995
30.00	110.00	97.00	33.773	1074.263	532.081	2.082
30.00	120.00	107.00	33.356	1115.477	532.467	2.158
30.00	130.00	117.00	38.359	1148.733	532.194	2.231
40.00	40.00	27.00	0.0	304.951	219.361	1.390
40.00	50.00	37.00	0.0	408.823	303.716	1.346
40.00	60.00	47.00	29.875	513.585	387.163	1.404
40.00	70.00	57.00	29.814	611.635	445.690	1.439

TABLE E-13 SLOPE STABILITY ANALYSIS

(CASE-3) K=0.150 WL= 30.300

X (M)	Y (M)	R (M)	CL (TON/M)	NTAN (TON/M)	T (TON/M)	F.S.
40.00	80.00	67.00	26.870	696.634	483.633	1.496
40.00	90.00	77.00	24.941	770.040	506.846	1.568
40.00	100.00	87.00	23.822	832.906	520.741	1.645
40.00	110.00	97.00	23.404	888.314	528.909	1.724
40.00	120.00	107.00	28.334	933.810	533.738	1.803
40.00	130.00	117.00	33.424	973.649	536.605	1.877
50.00	40.00	27.00	0.0	146.205	106.827	1.369
50.00	50.00	37.00	0.0	206.862	155.914	1.327
50.00	60.00	47.00	0.0	275.975	211.802	1.303
50.00	70.00	57.00	0.0	353.815	274.761	1.288
50.00	80.00	67.00	18.074	436.634	339.928	1.338
50.00	90.00	77.00	33.283	511.332	390.116	1.396
50.00	100.00	87.00	31.386	581.461	427.875	1.432
50.00	110.00	97.00	29.954	644.834	455.046	1.483
50.00	120.00	107.00	23.423	705.536	474.451	1.536
50.00	130.00	117.00	28.700	754.356	488.180	1.604
60.00	40.00	27.00	0.0	30.847	22.113	1.395
60.00	50.00	37.00	0.0	54.891	40.645	1.350
60.00	60.00	47.00	0.0	87.900	66.955	1.313
60.00	70.00	57.00	0.0	129.950	100.842	1.289
60.00	80.00	67.00	0.0	181.066	142.224	1.273
60.00	90.00	77.00	0.0	241.259	191.064	1.263
60.00	100.00	87.00	3.307	310.034	246.683	1.270
60.00	110.00	97.00	28.157	375.312	296.098	1.363
60.00	120.00	107.00	29.913	436.322	336.399	1.386

TABLE E-13 SLOPE STABILITY ANALYSIS

(CASE-3) K=0.150 WL= 30.300

X (M)	Y (M)	R (M)	CL (TON/M)	NTAN (TON/M)	T (TON/M)	F.S.
60.00	130.00	117.00	35.083	492.876	368.650	1.432
70.00	70.00	57.00	0.0	3.076	2.215	1.389
70.00	80.00	67.00	0.0	13.813	10.150	1.361
70.00	90.00	77.00	0.0	36.614	28.290	1.294
70.00	100.00	87.00	0.0	69.406	54.810	1.266
70.00	110.00	97.00	0.0	111.727	89.248	1.252
70.00	120.00	107.00	0.0	163.409	131.418	1.243
70.00	130.00	117.00	3.064	223.058	179.541	1.259
F.S.MIN 70.00	120.00	107.00	0.0	163.409	131.418	1.243

*** DOWNSTREAM SIDE WITH FULL WATER LEVEL ***

(CASE-3) K=0.150 WL= 30.300

CRITICAL CIRCLE

X (M)	Y (M)	R (M)	CL (TON/M)	NTAN (TON/M)	T (TON/M)	F.S.
65.00	115.00	102.00	3.165	269.858	215.967	1.264
65.00	120.00	107.00	15.458	300.989	239.803	1.320
65.00	125.00	112.00	27.201	330.000	261.552	1.366
70.00	115.00	102.00	0.0	136.406	109.376	1.247
70.00	120.00	107.00	0.0	163.409	131.418	1.243
70.00	125.00	112.00	0.0	192.726	155.364	1.240
75.00	115.00	102.00	0.0	35.528	28.241	1.258
75.00	120.00	107.00	0.0	52.346	41.910	1.249
75.00	125.00	112.00	0.0	71.702	57.696	1.243

****
CRITICAL SLIP CIRCLE AND ITS COMPONENT
****

X (M)	Y (M)	R (M)	CL (TON/M)	NTAN (TON/M)	T (TON/M)	F.S.
70.00	125.00	112.00	0.0	192.726	155.364	1.240

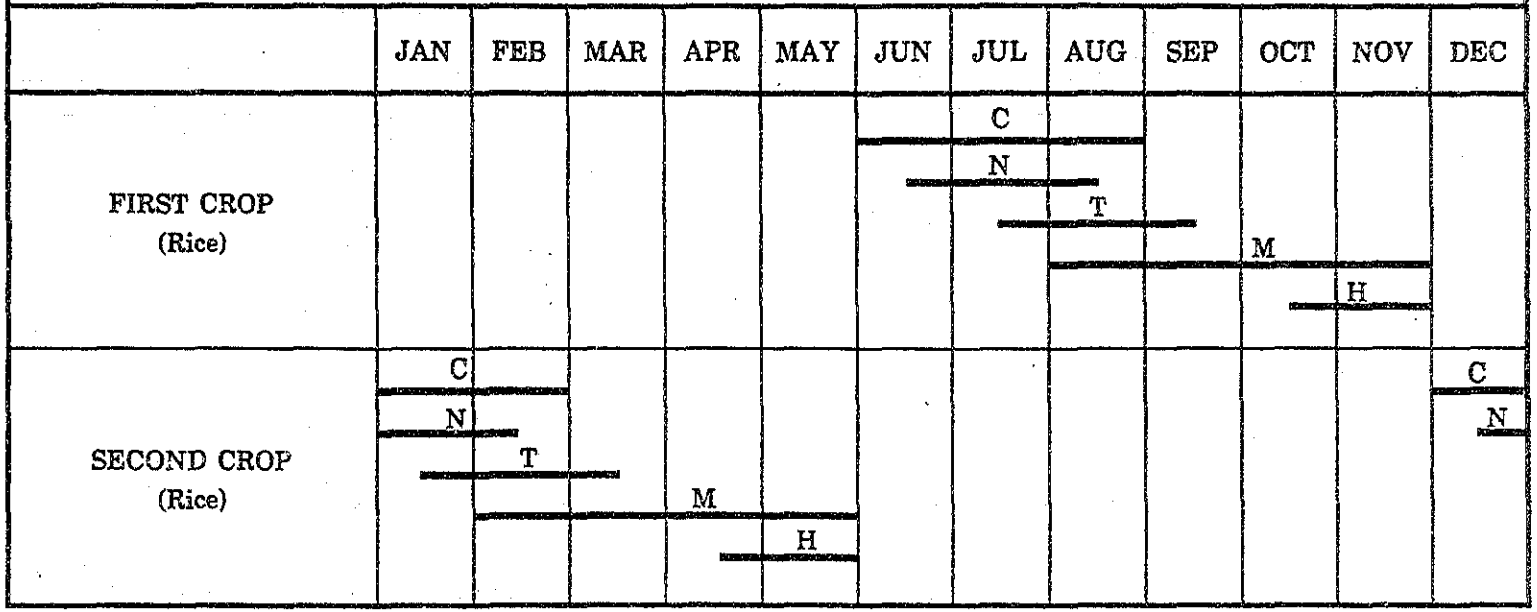
DAM KIBAN - MEN ; (-70.0 13.0) (70.0 13.0)

TABLE E - 14 PROPOSED CROPPING SCHEDULE

PROJECT / LOCATION ; LAON - MATAAS NA BAYAN CIP, MOGPOG, MARINDUQUE ANNEX "A"

FIGURE I

PROPOSED CROPPING SCHEDULE



C - CULTIVATION N - NURSERY T - TRANSPLANTING M - MANAGEMENT H - HARVEST

TABLE E - 15 ESTIMATED AREA ACCORDING TO AVAILABLE WATER SUPPLY

DIVERSION REQUIREMENT (mm)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	232	364	412	300	25	-	-	180	-	2		
CROPPED AREA Wet Season (ha.) Dry Season (ha.)			70 has.						175 has.			
DIVERSION REQUIREMENT MCM	0.162	0.254	0.288	0.21	0.017	-	-	0.315	-	0.0035		
WATER SUPPLY (MCM)	0.52	0.285	0.289	0.219	0.20	0.296	0.306	0.347	0.258	0.248	0.405	0.469
CRITICAL YEAR 1/												
RATIO OF WATER SUPPLY AND D.R.	3.20	1.12	1.0	1.04	11.76	-	-	1.10	-	-	70.85	

$$\text{CROPPING INTERNSITY} = \frac{70 + 175}{175} \times 100 = 140\,\%$$

1/ Monthly flowa with 80 % probality of occurance.
Limit of Irrigable area as per topo survey = 175 has.

TABLE E-16 COMPUTATION OF MAXIMUM PROBABLE FLOOD

Case	Period of Occurrence of Probable Rainfall	Probable Rainfall	Frequency of Flood					
			Twice a Year		Once a Year		Once Two Years	
			R	Q	R	Q	R	Q
1	Each Moth (Mr. by way of example)	$R = 18.191 \cdot x^{-0.5040}$ (Mar.)	12.8	5.8	18.2	9.1	25.8	14.1
2	Most Dry Season (Feburary ~ April)	$R = 38.658 \cdot x^{-0.4693}$	27.9	15.6	38.5	23.4	53.5	35.3 ≒36
3	Dry Season (December ~May)	$R = 75.786 \cdot x^{-0.4519}$	55.4	37.1	75.8	55.1≒56	103.7	82.0
4	Yearly (January ~ December)	$R = 165.62\text{-}67.595 \cdot Ln \cdot x$	118.8	97.3	165.6	148.3	212.5	203.3≒204

Note: R : Probable Rainfall (mm/day)

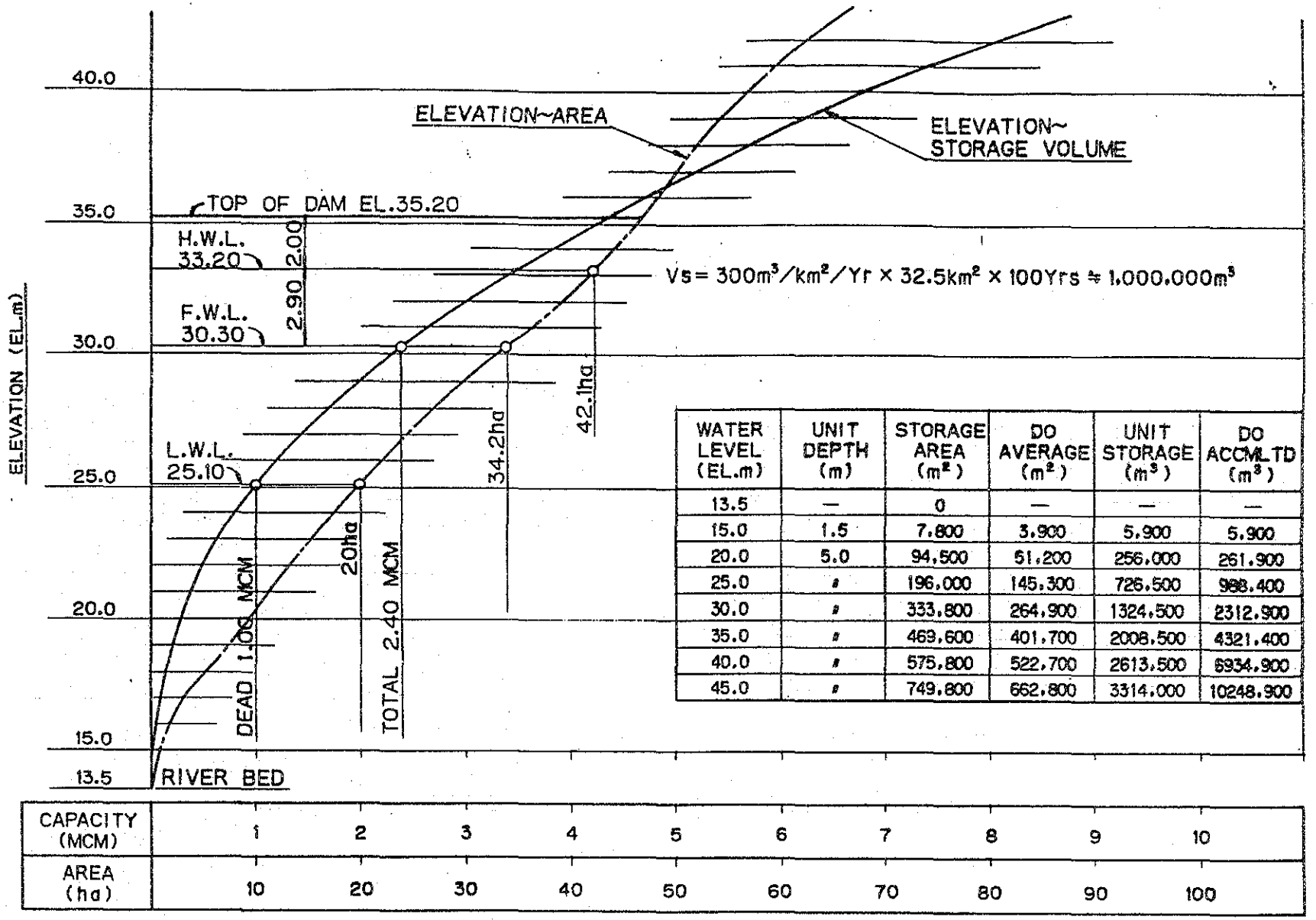
X : Frequency, Twice a year : $x = 2$, Once Two Year : $x = 0.5$

Q : Maximum Probable Flood at the Damsite:

Q is computed from the following equation that is derived from the relationship of Kadoya's formula and Mononobe's formula.

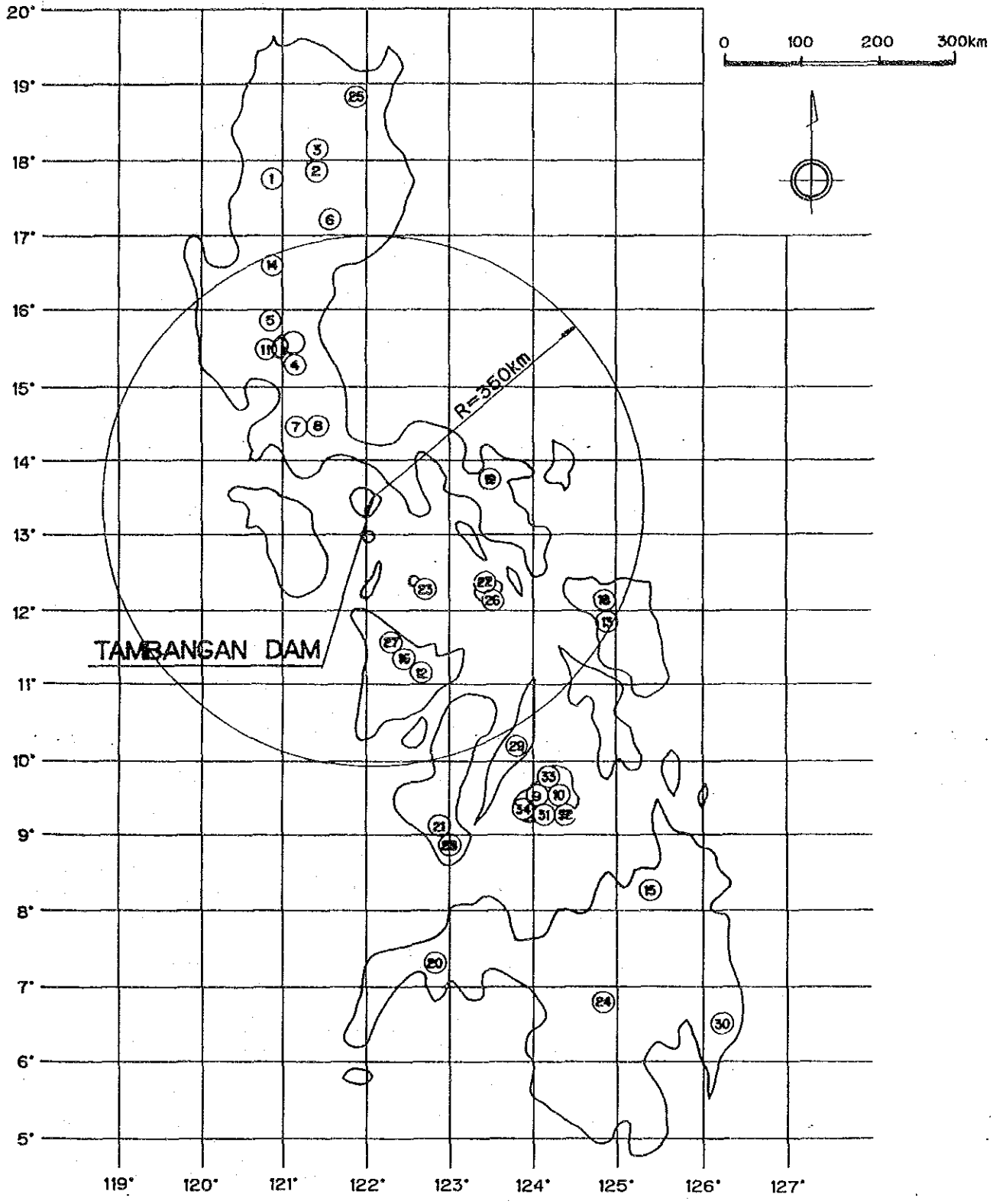
$Q = 0.230 \cdot R^{12.66}$ (m^3/s)

FIGURE E-1 H-V CURVE OF DAM



WATER LEVEL (EL.m)	UNIT DEPTH (m)	STORAGE AREA (m²)	DO AVERAGE (m²)	UNIT STORAGE (m³)	DO ACCMLTD (m³)
13.5	—	0	—	—	—
15.0	1.5	7,800	3,900	5,900	5,900
20.0	5.0	94,500	51,200	256,000	261,900
25.0	〃	196,000	145,300	726,500	988,400
30.0	〃	333,800	264,900	1324,500	2312,900
35.0	〃	469,600	401,700	2008,500	4321,400
40.0	〃	575,800	522,700	2613,500	6934,900
45.0	〃	749,800	662,800	3314,000	10248,900

FIGURE E - 2 LOCATION OF DAM



LOCATION OF TAMBANGAN DAM
LATITUDE : 13.40°
LONGITUDE : 122.07°

FIGURE E - 3 FREQUENCY DISTRIBUTION OF SEISMIC FORCE AT DAM SITE

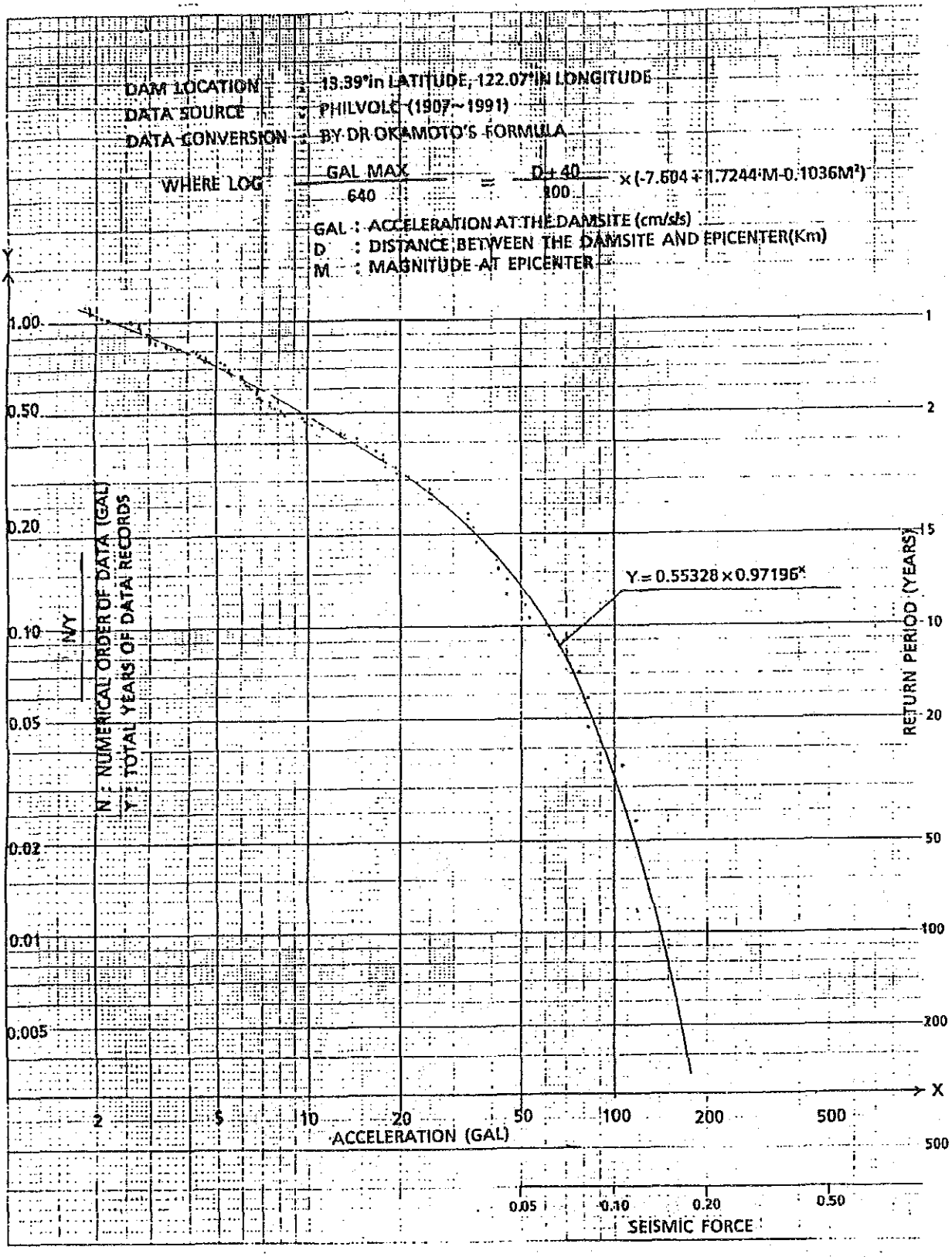
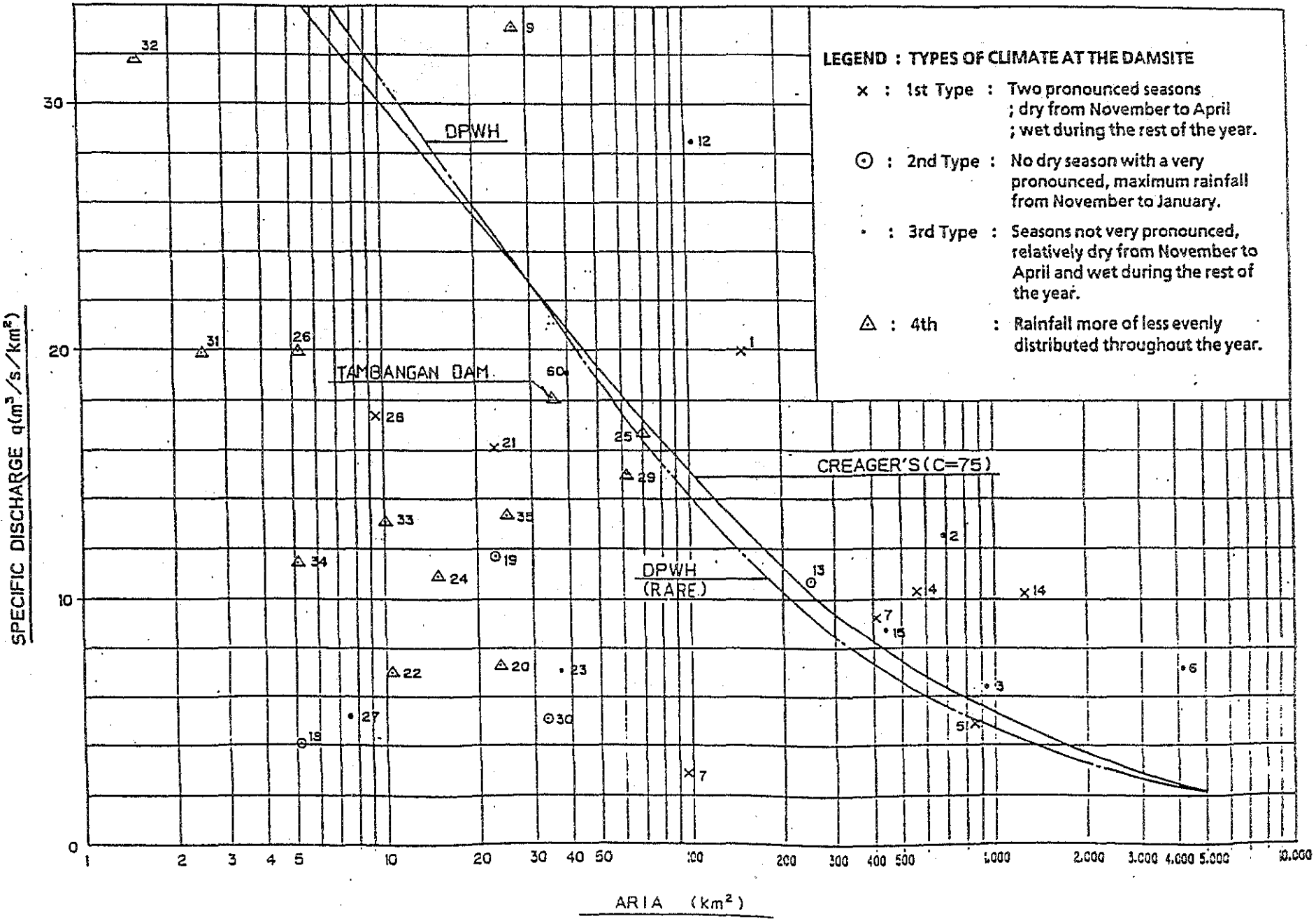


FIGURE E - 4 RELATION CURVE BETWEEN FLOOD AND SPECIFIC DISCHARGE



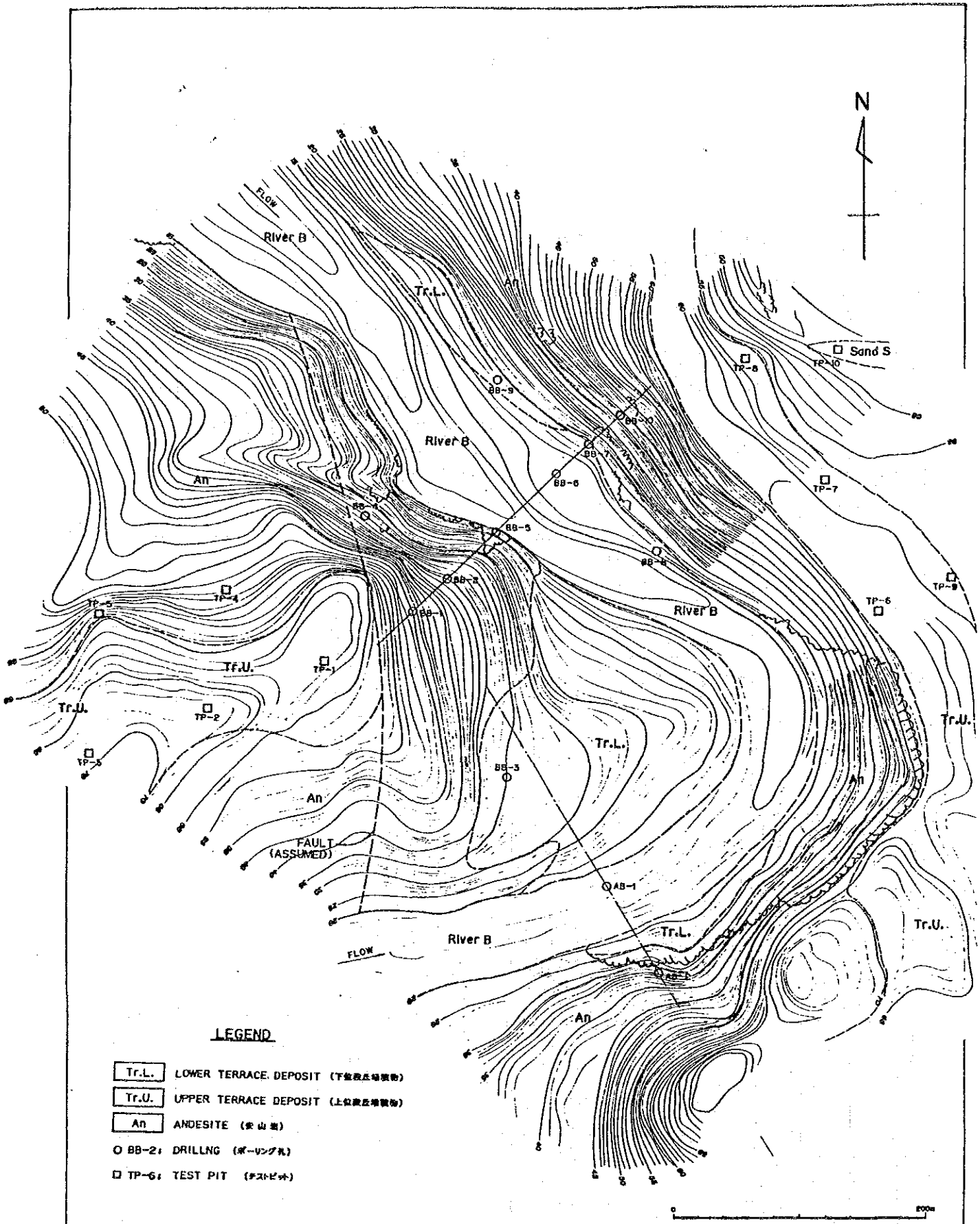
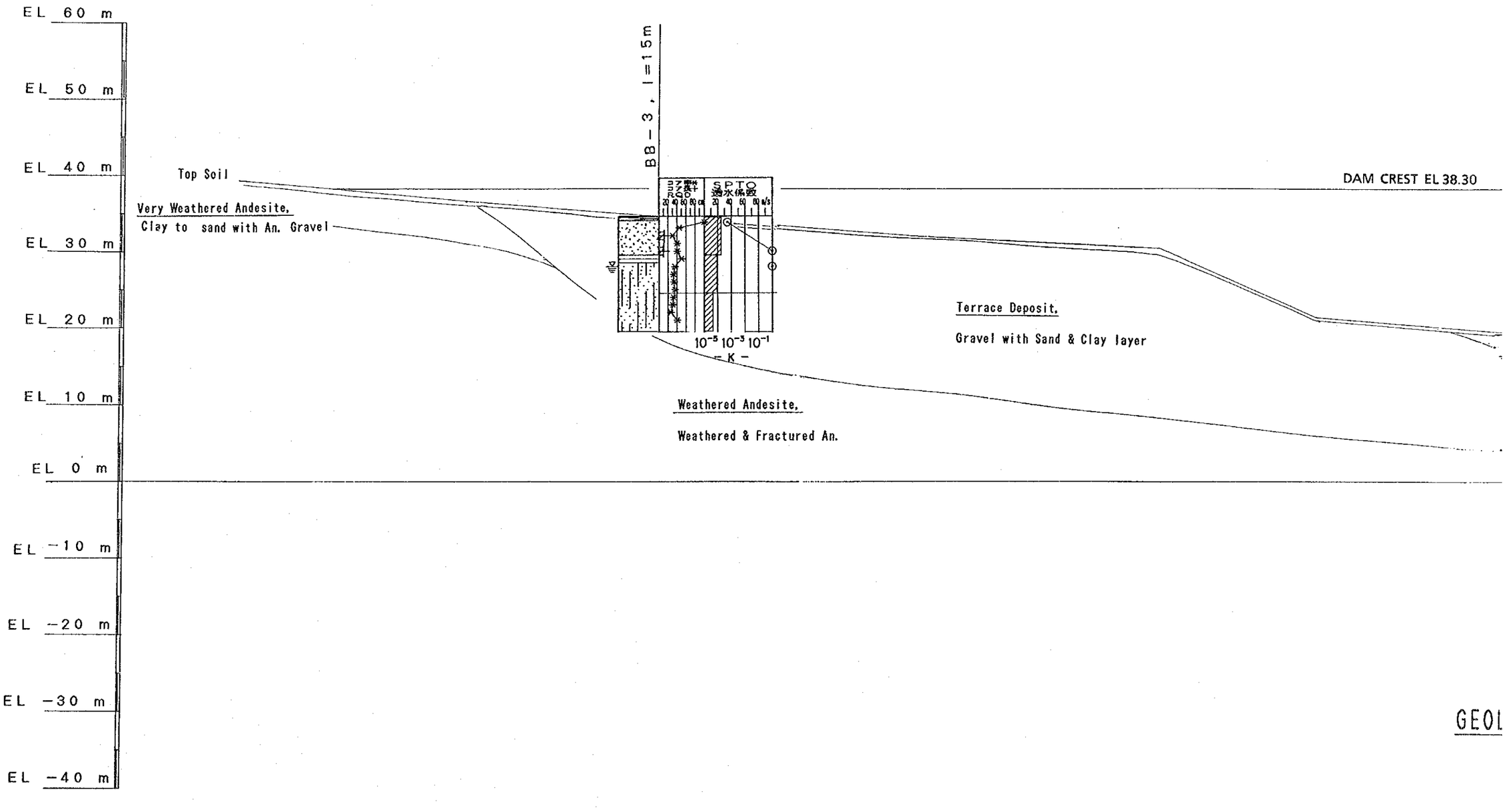
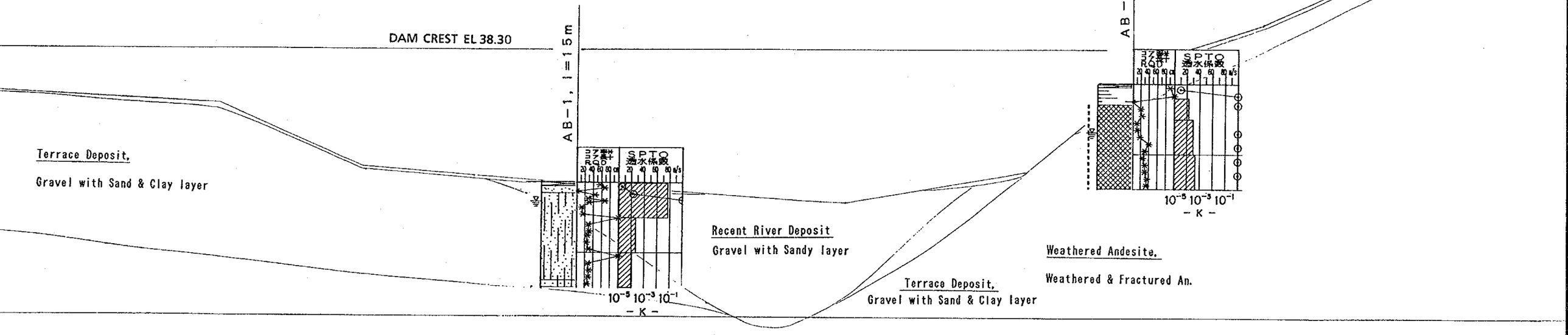


FIGURE E - 5 GEOLOGICAL MAP


EL 60 m
EL 50 m
EL 40 m
EL 30 m
EL 20 m
EL 10 m
EL 0 m
EL −10 m
EL −20 m
EL −30 m
EL −40 m
BB−3, l=15m
SPT
RQD
透水係数
10⁻⁵ 10⁻³ 10⁻¹
− K −
Top Soil
Very Weathered Andesite,
Clay to sand with An. Gravel
DAM CREST EL 38.30
Terrace Deposit,
Gravel with Sand & Clay layer
Weathered Andesite,
Weathered & Fractured An.

GEOL



GEOLOGICAL CROSS SECTION ALONG A DAM AXIS

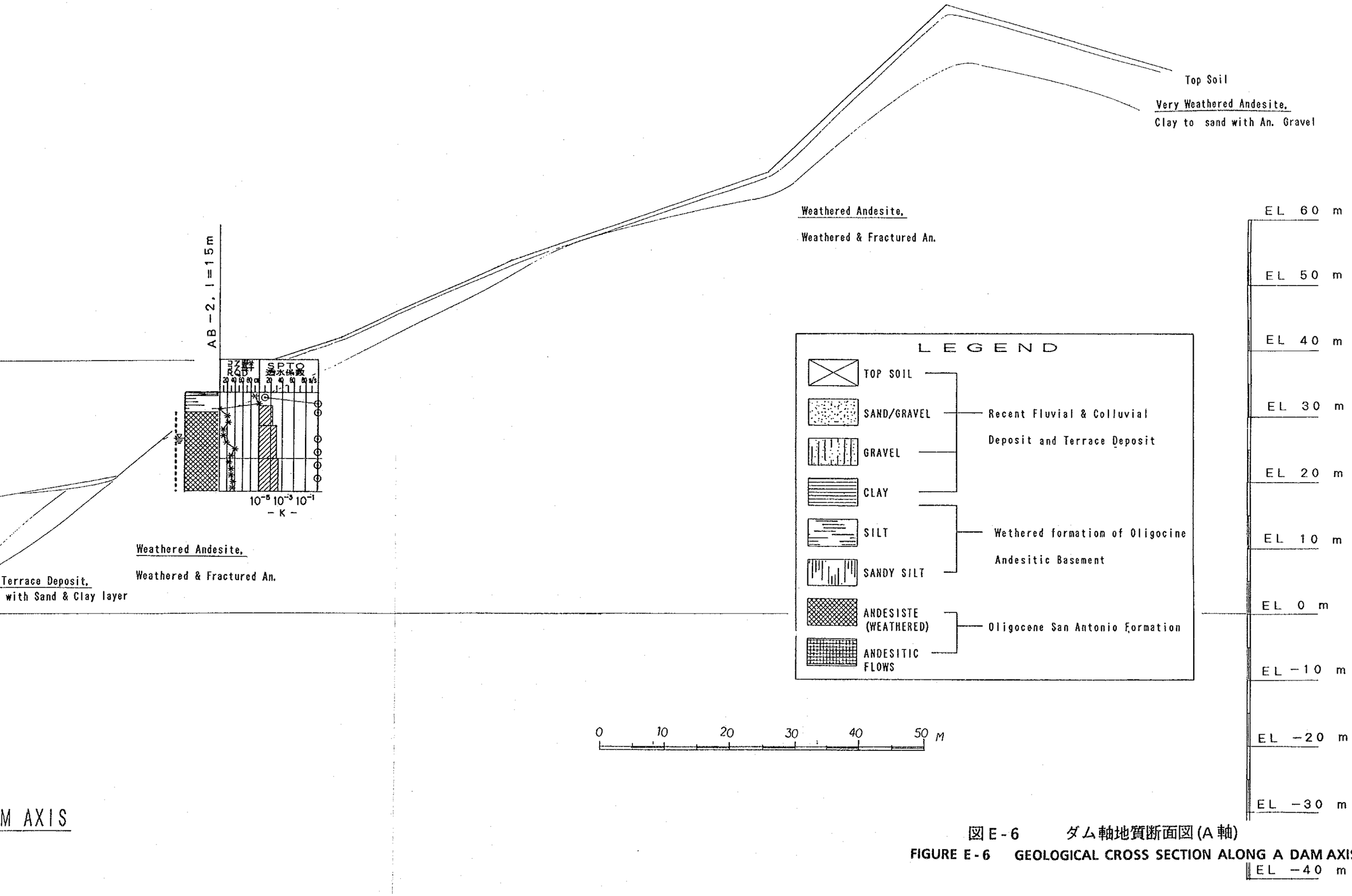


図 E－6　　ダム軸地質断面図 (A 軸)

FIGURE E－6　GEOLOGICAL CROSS SECTION ALONG A DAM AXIS

EL 60 m
EL 50 m
EL 40 m
EL 30 m
EL 20 m
EL 10 m
EL 0 m
EL −10 m
EL −20 m
EL −30 m
EL −40 m
EL −50 m

Top Soil

Very Weathered Andesite,
Clay to sand with An. Gravel

Weathered Andesite,
Weathered & Fractured An.

BB−1, l=15m

BB−2, l=15m

BB−5, l=15m

コア採取率
RQD
SPT N
透水係数

20 40 60 80 cm
20 40 60 80 10⁻⁵ 10⁻³ 10⁻¹ cm/s

10^{-5} 10^{-3} 10^{-1}
− K −

Top Soil

Weathered Andesite,
Weathered & Fractured An.

DAM CREST EL

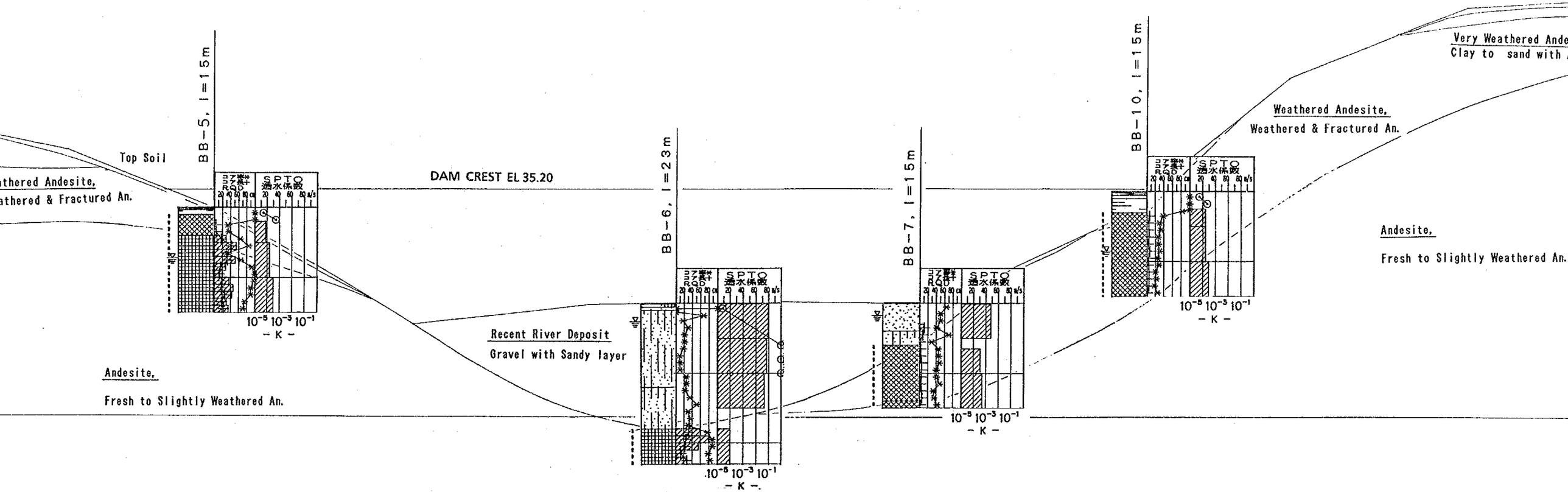
Recen
Grave

Andesite,

Fresh to Slightly Weathered An.

No.0
No.1
No.2
No.3
No.4
No.5
No.6

GEOL



No.4 No.5 No.6 No.7 No.8 No.9 No.10 No.11 No.12

GEOLOGICAL CROSS SECTION ALONG B DAM AXIS

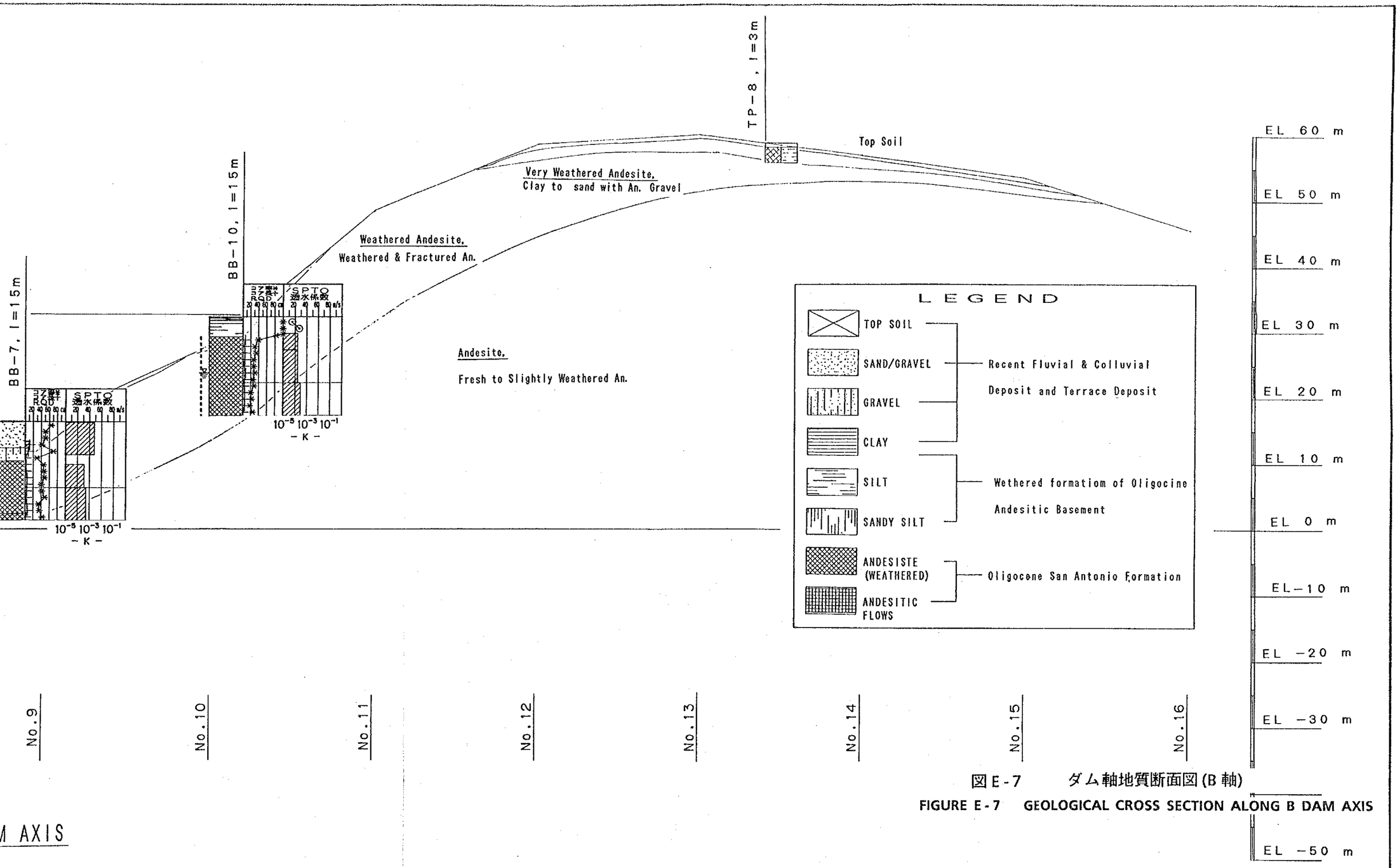


図 E-7　　ダム軸地質断面図 (B 軸)

FIGURE E-7　GEOLOGICAL CROSS SECTION ALONG B DAM AXIS

FIGURE E - 8 BORING PROFILES

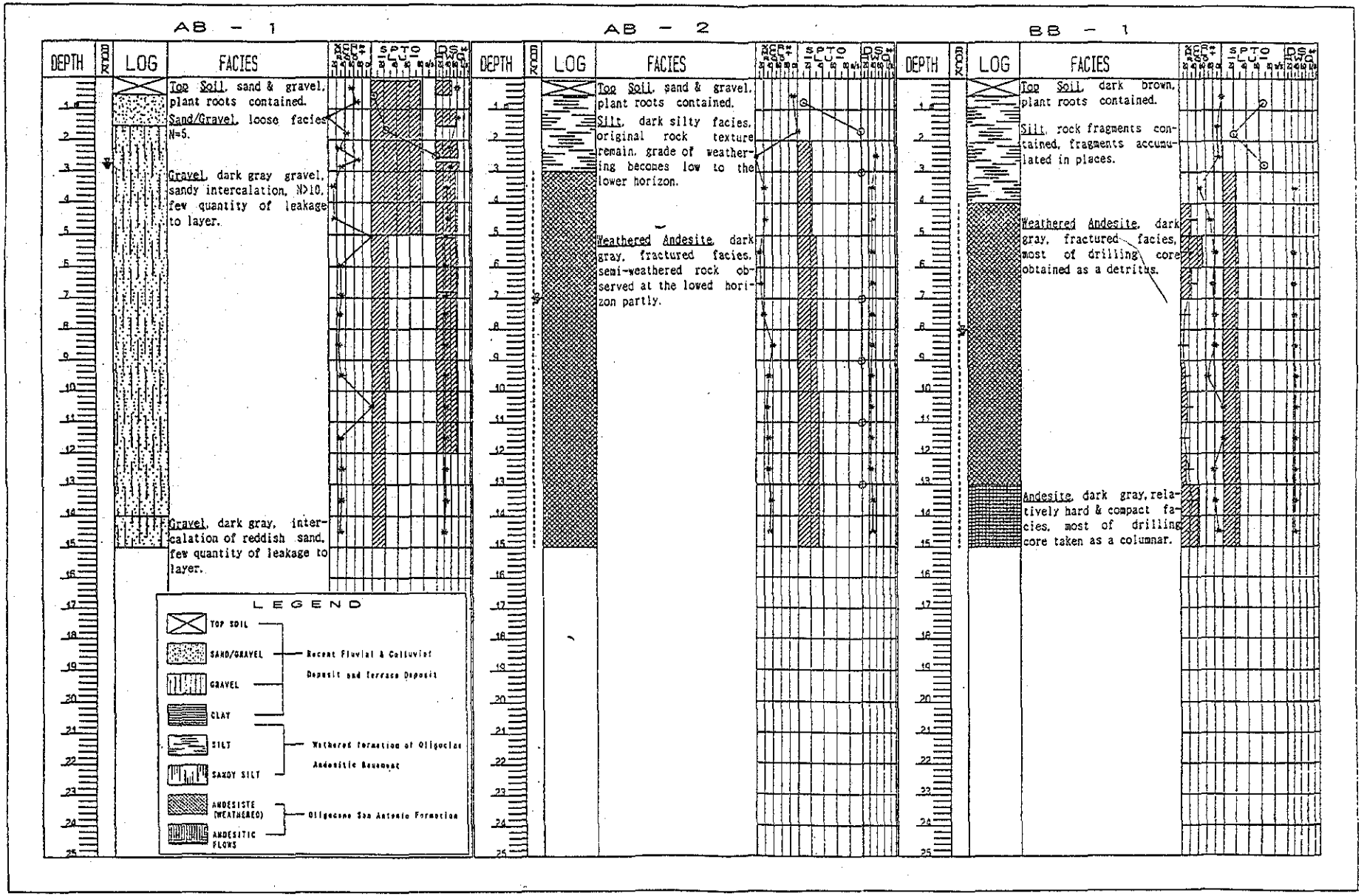


FIGURE E-8 BORING PROFILES

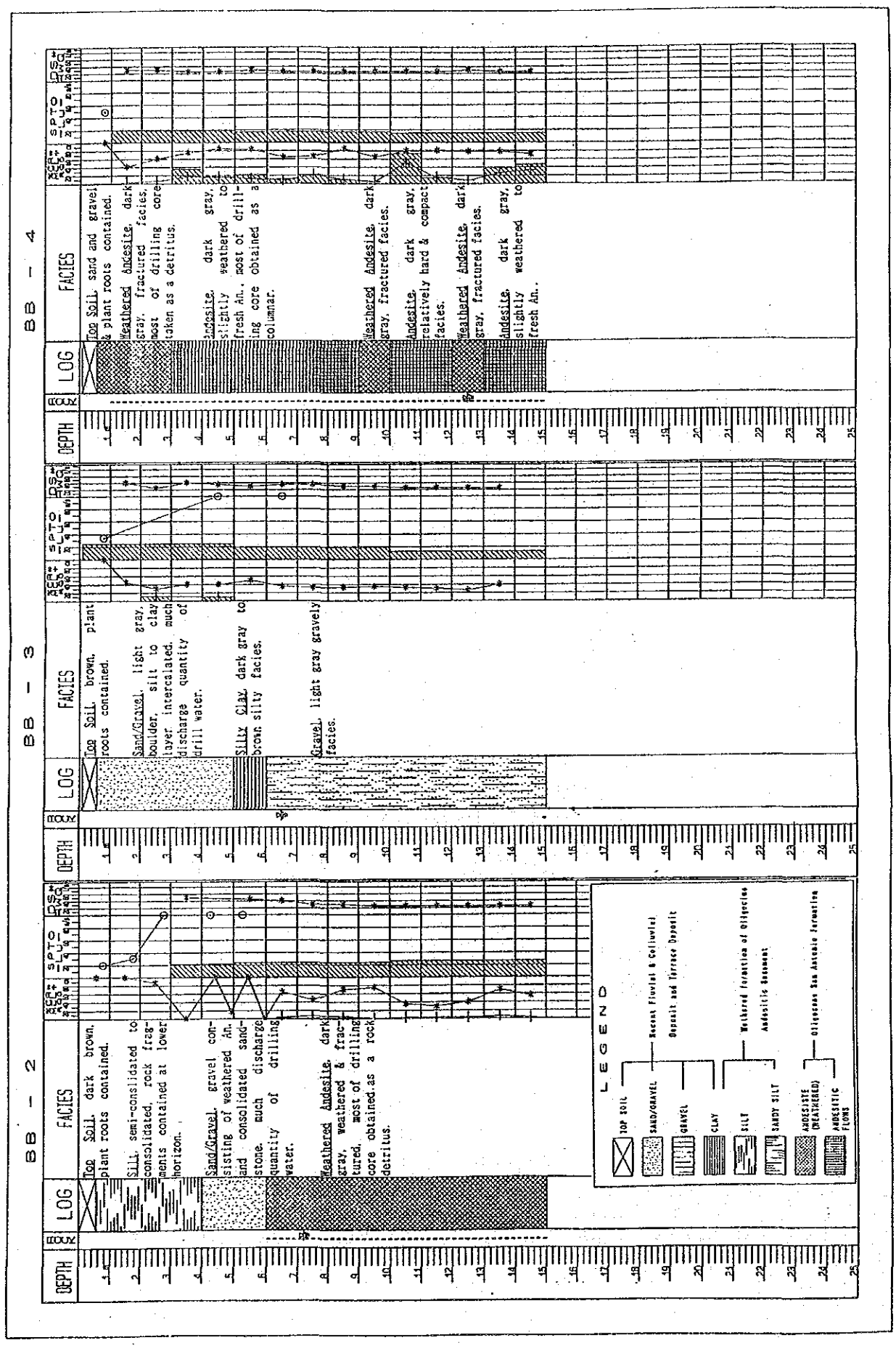


FIGURE E-8 BORING PROFILES

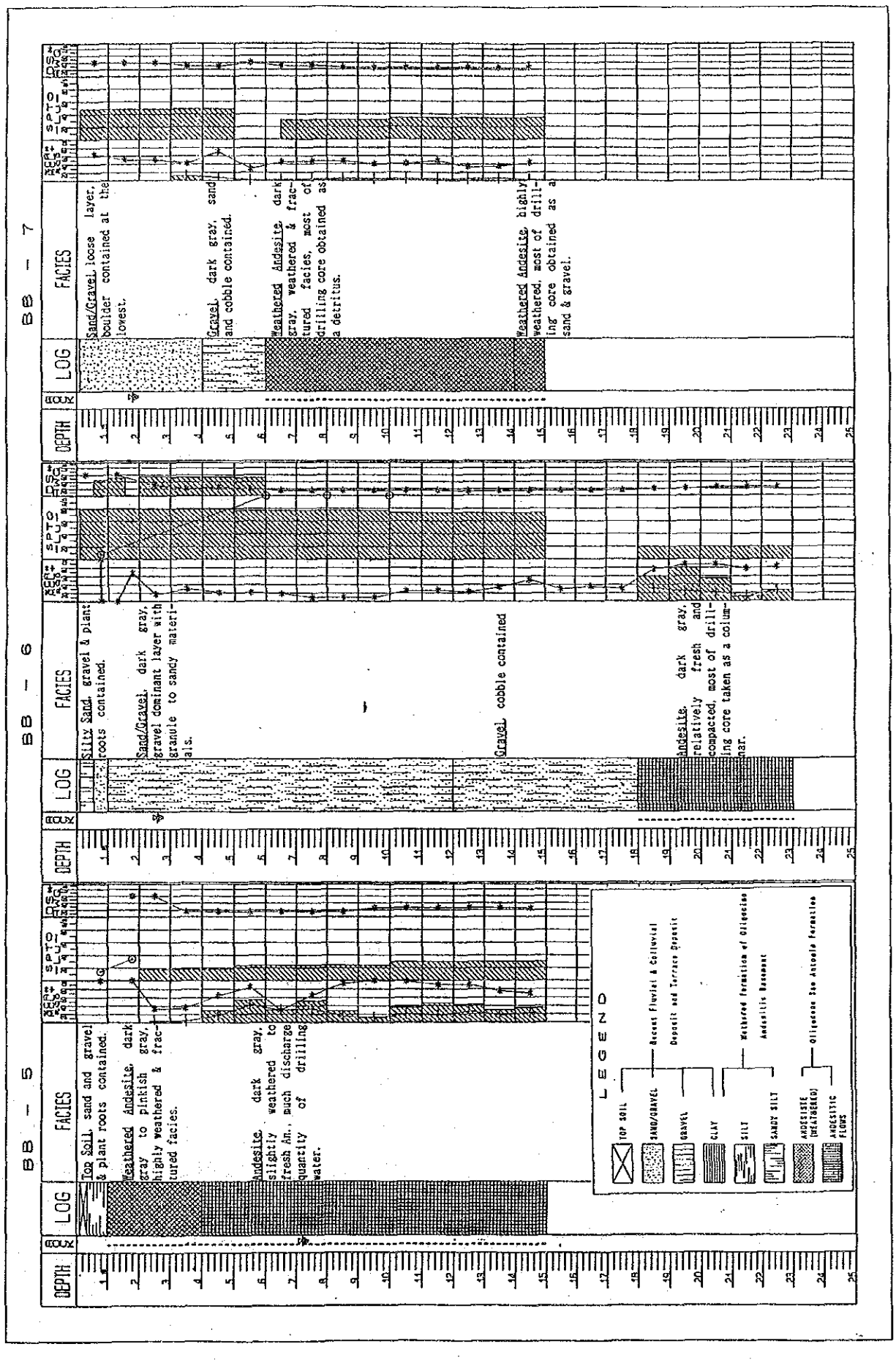
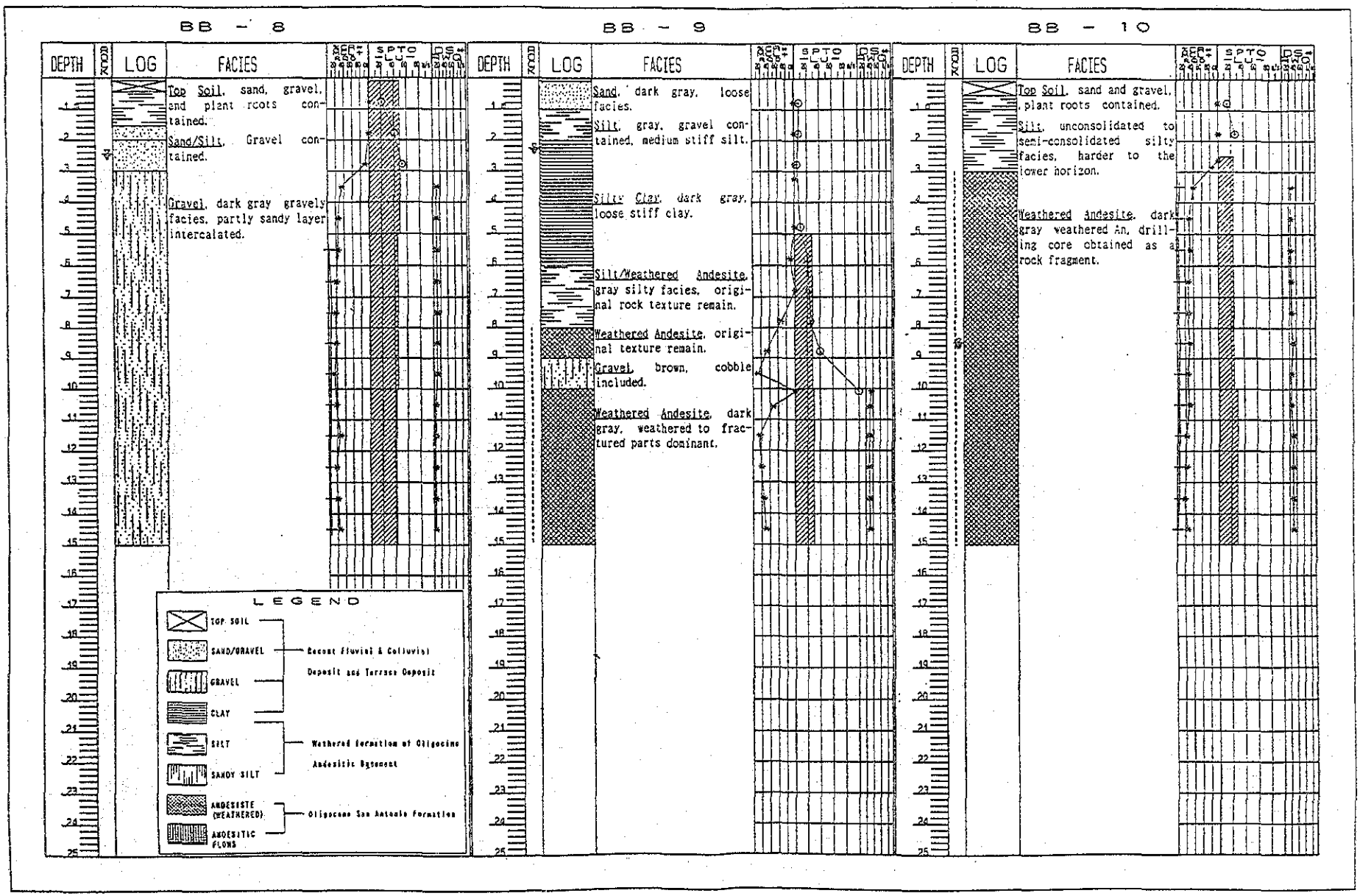


FIGURE E-8 BORING PROFILES



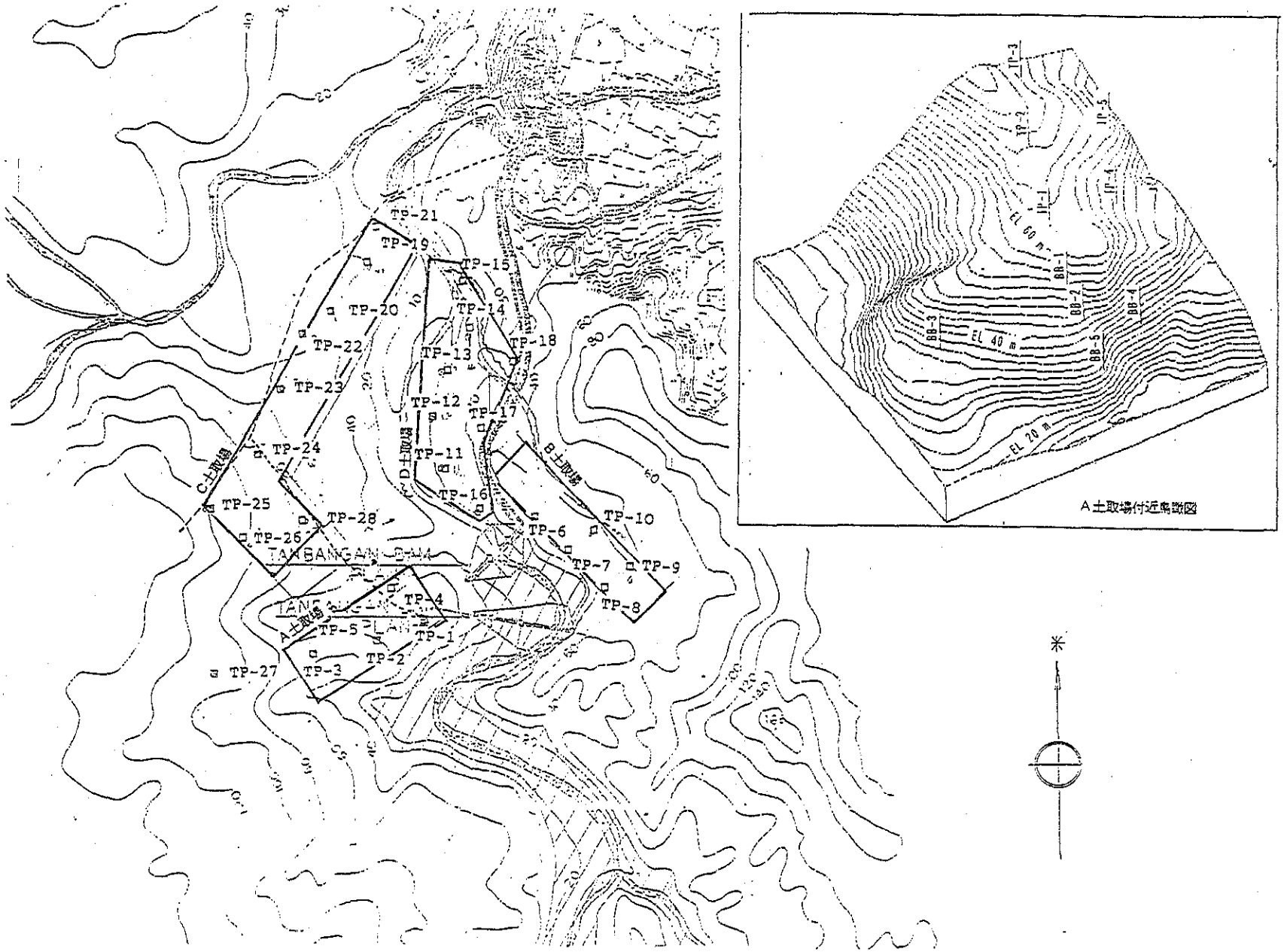
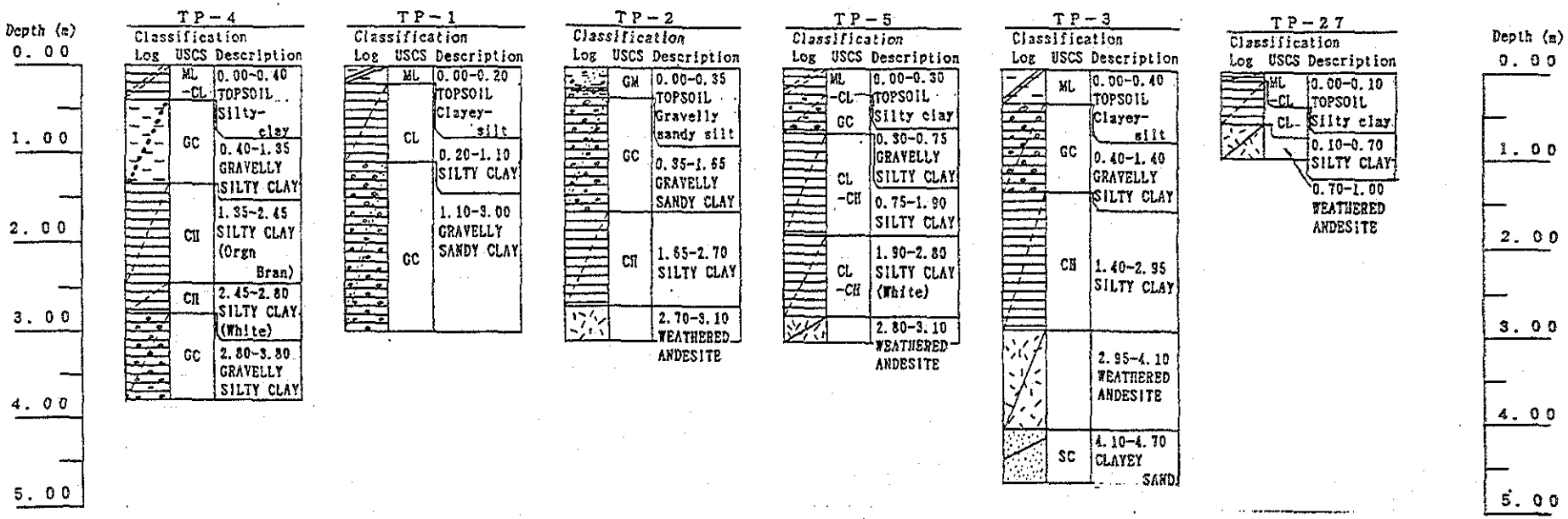


FIGURE E - 9 LOCATION MAP OF TEST PITS AND BORROW AREA



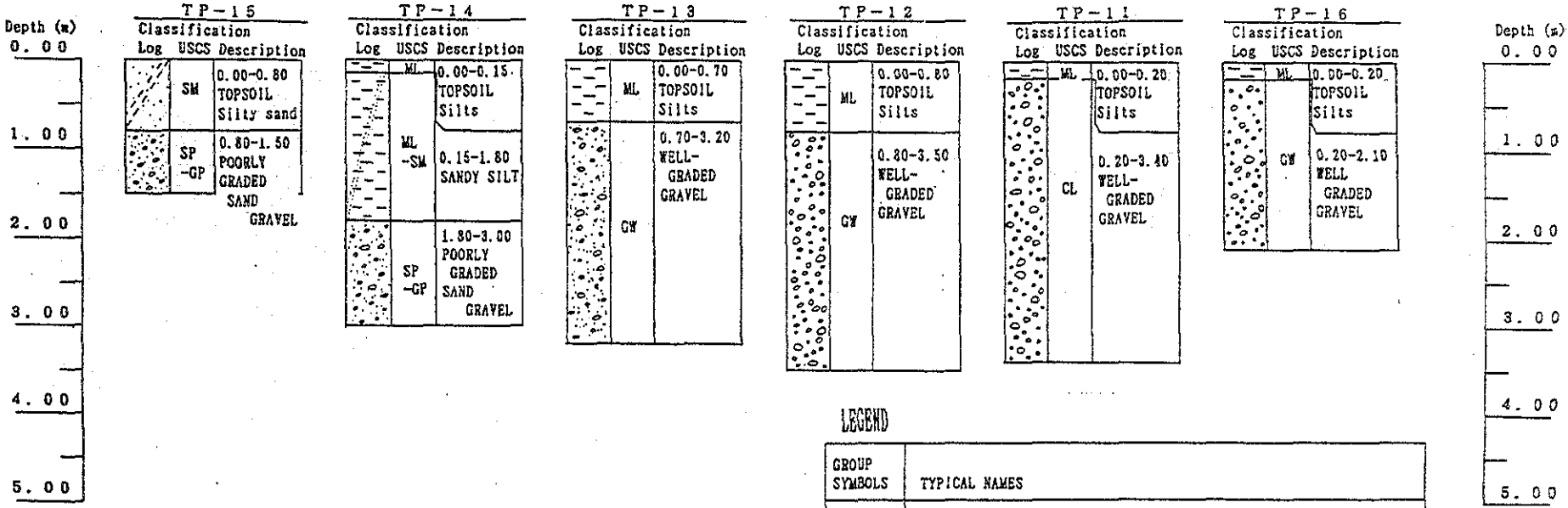
LEGEND

GROUP SYMBOLS	TYPICAL NAMES
GW	Well-graded gravels, gravel-sand mixtures, little or no fines.
GP	Poorly graded gravels, gravel-sand mixtures, little or no fines.
GM	Silty gravels, gravel-sand-silt mixtures.
GC	Clayey gravels, gravel-sand-clay mixtures.
SW	Well-graded sands, gravelly sands, little or no fines.
SP	Poorly graded sands, gravelly sands, little or no fines.
SM	Silty sands, sand-silt mixtures.
SC	Clayey sands, sand-clay mixtures.
ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity.
CL	Inorganic clays of low to medium plasticity, gravelly clay, sandy clays, silty clays, lean clays.
OL	Organic silts and organic silty clays of low plasticity.
MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
CH	Inorganic clays of high plasticity, fat clays.
OH	Organic clays of medium to high plasticity, organic silts.
Pt	Peat and other highly organic silts.

USCS : Unified Soil Classification System.

FIGURE E-10 RESULT OF TEST PITS

A(Right Abutment)



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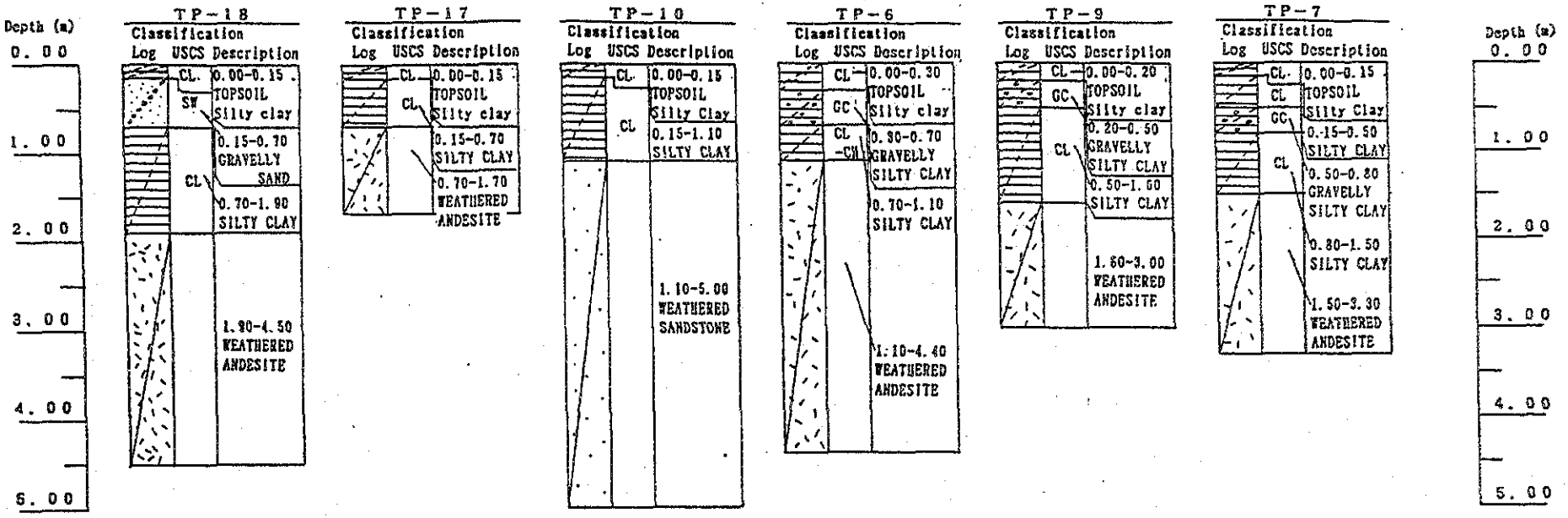
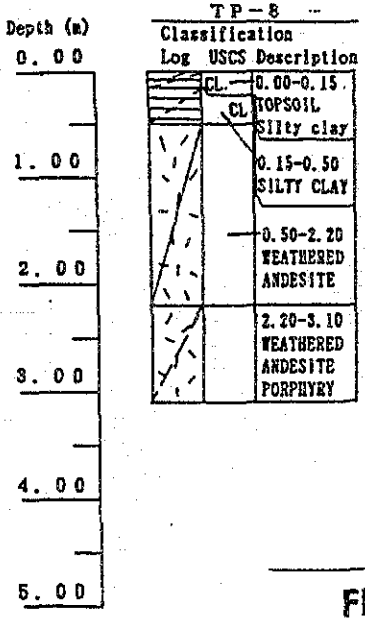
Pt	Peat and other highly organic silts.

USCS : Unified Soil Classification System.

FIGURE E-10 RESULT OF TEST PITS

D(Riverbed)





LEGEND

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MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
CH	Inorganic clays of high plasticity, fat clays.
OH	Organic clays of medium to high plasticity, organic silts.
Pt	Peat and other highly organic silts.

Depth (m)
0.00
1.00
2.00
3.00
4.00
5.00

USCS : Unified Soil Classification System.

FIGURE E-10 RESULT OF TEST PITS

B(Left Upstream~Left Abutment)

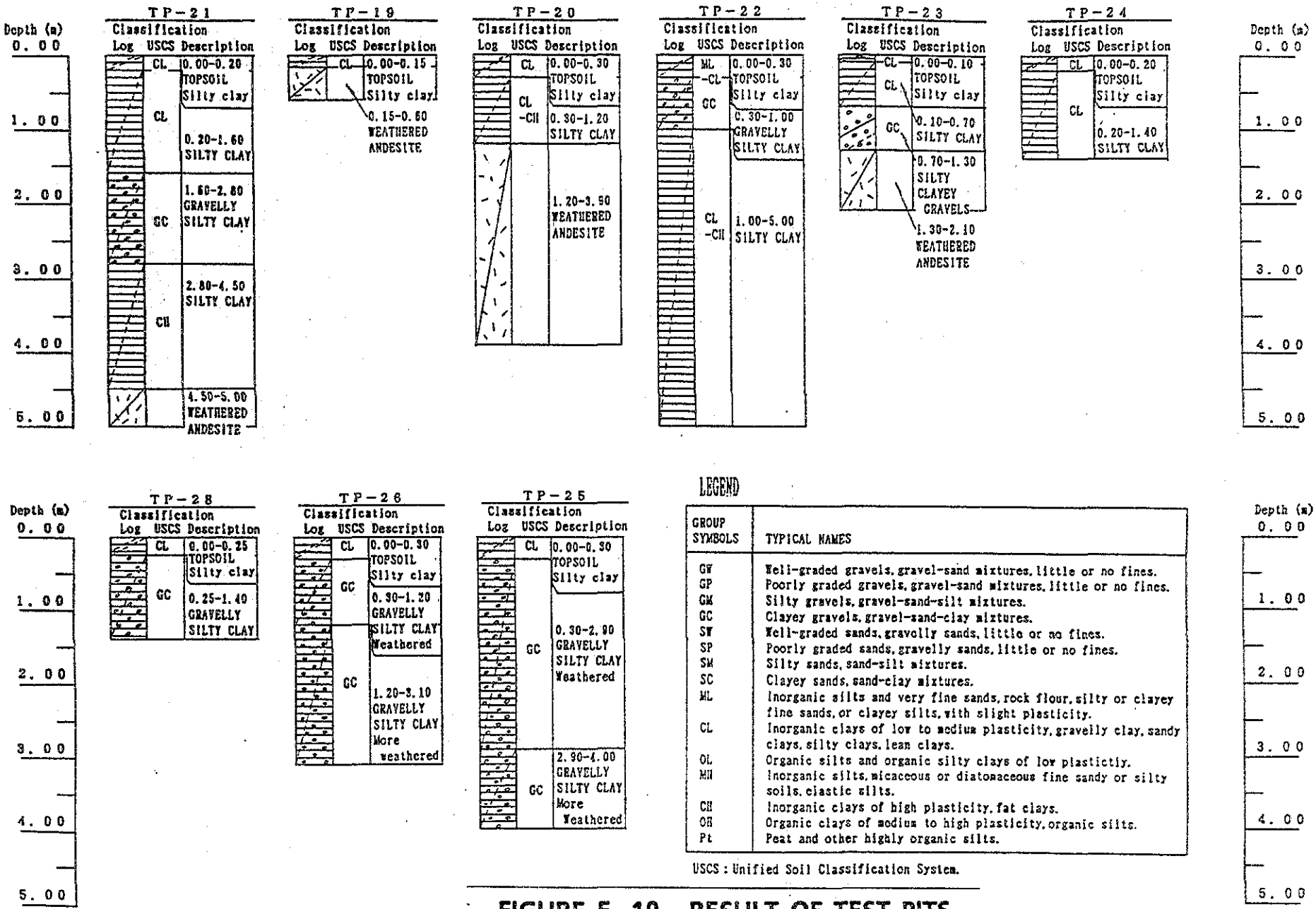
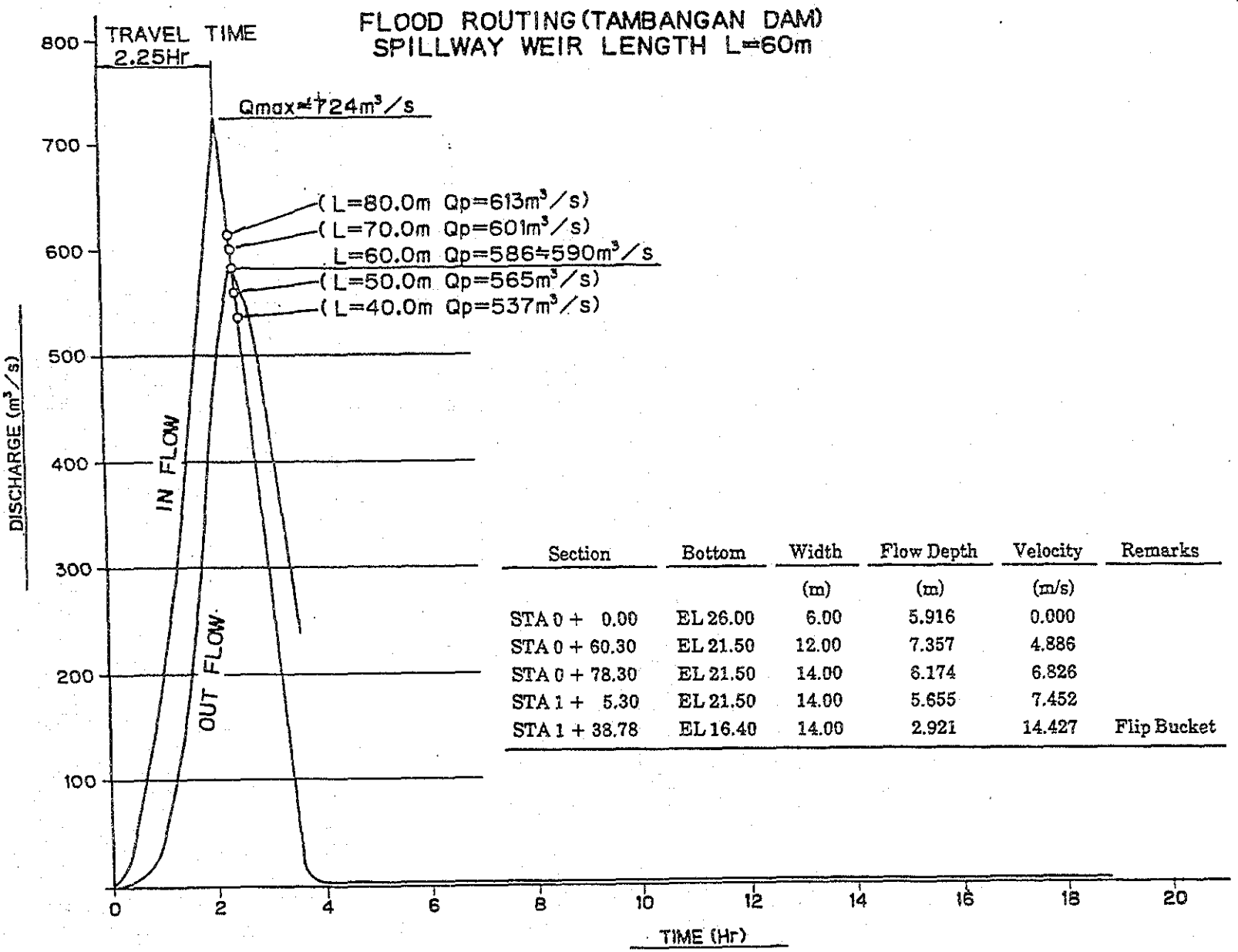


FIGURE E-10 RESULT OF TEST PITS

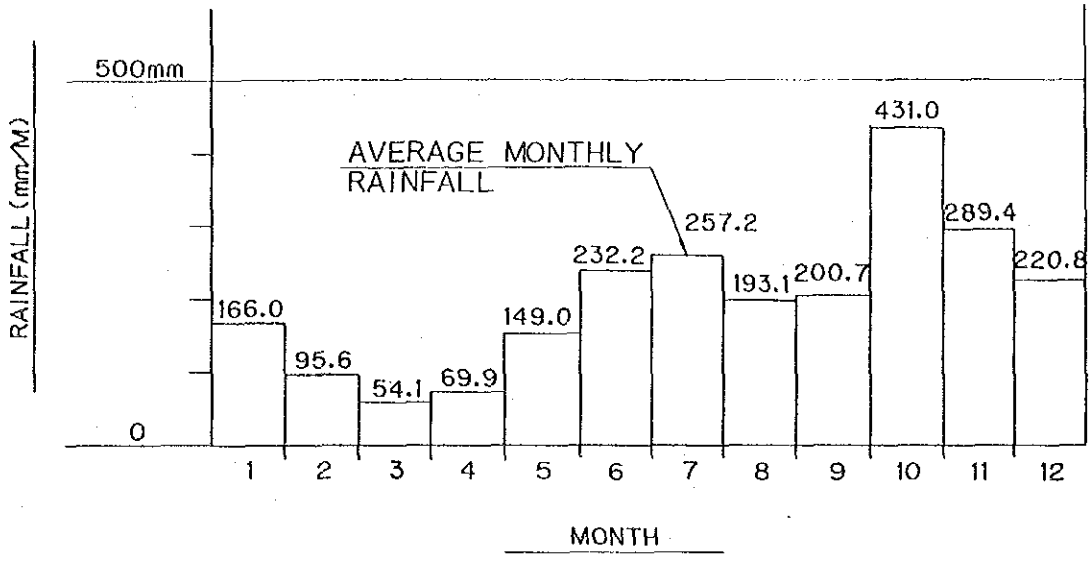
C(Right Upstream)

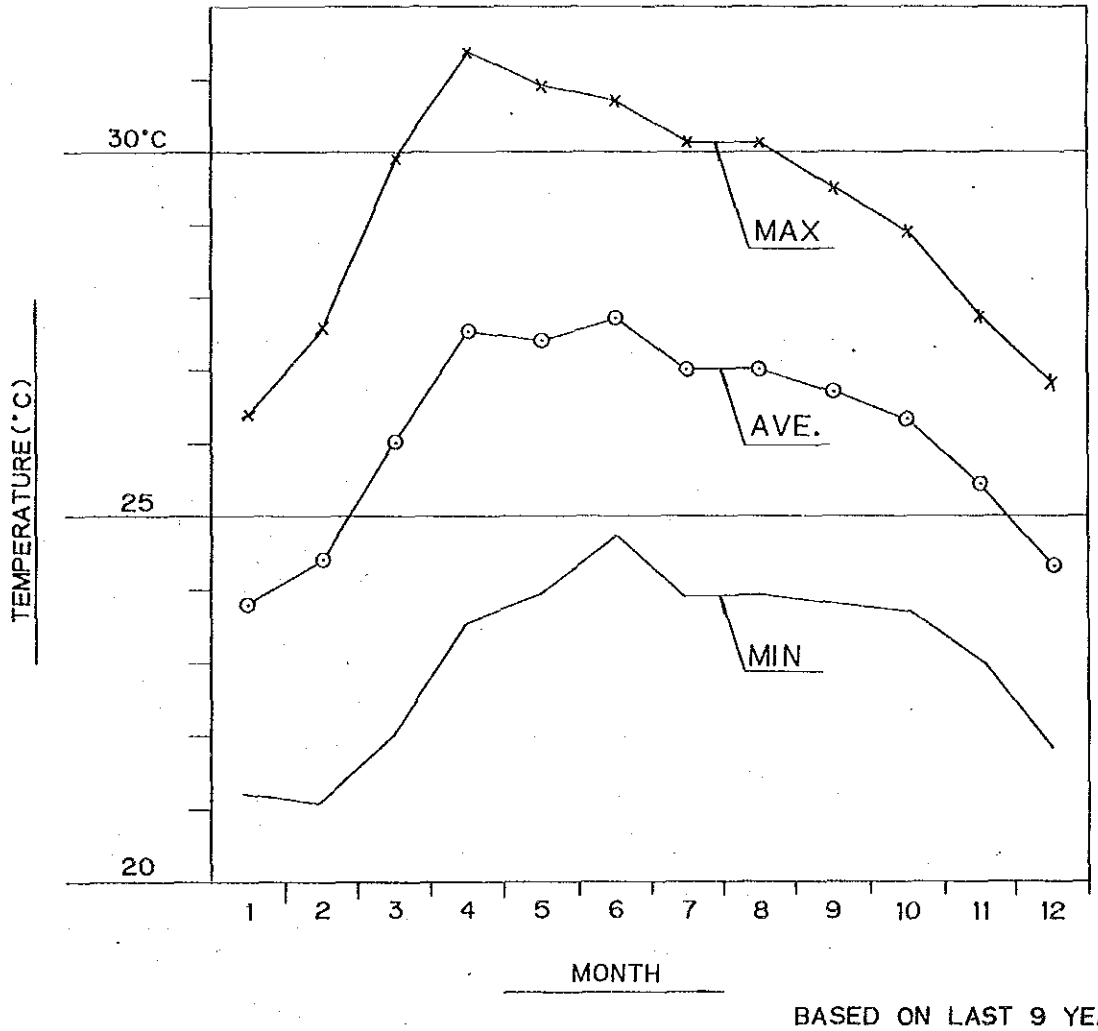
FIGURE E-11 FLOOD ROUTING CURVE



Section	Bottom	Width	Flow Depth	Velocity	Remarks
		(m)	(m)	(m/s)	
STA 0 + 0.00	EL 26.00	6.00	5.916	0.000	
STA 0 + 60.30	EL 21.50	12.00	7.357	4.886	
STA 0 + 78.30	EL 21.50	14.00	6.174	6.826	
STA 1 + 5.30	EL 21.50	14.00	5.655	7.452	
STA 1 + 38.78	EL 16.40	14.00	2.921	14.427	Flip Bucket

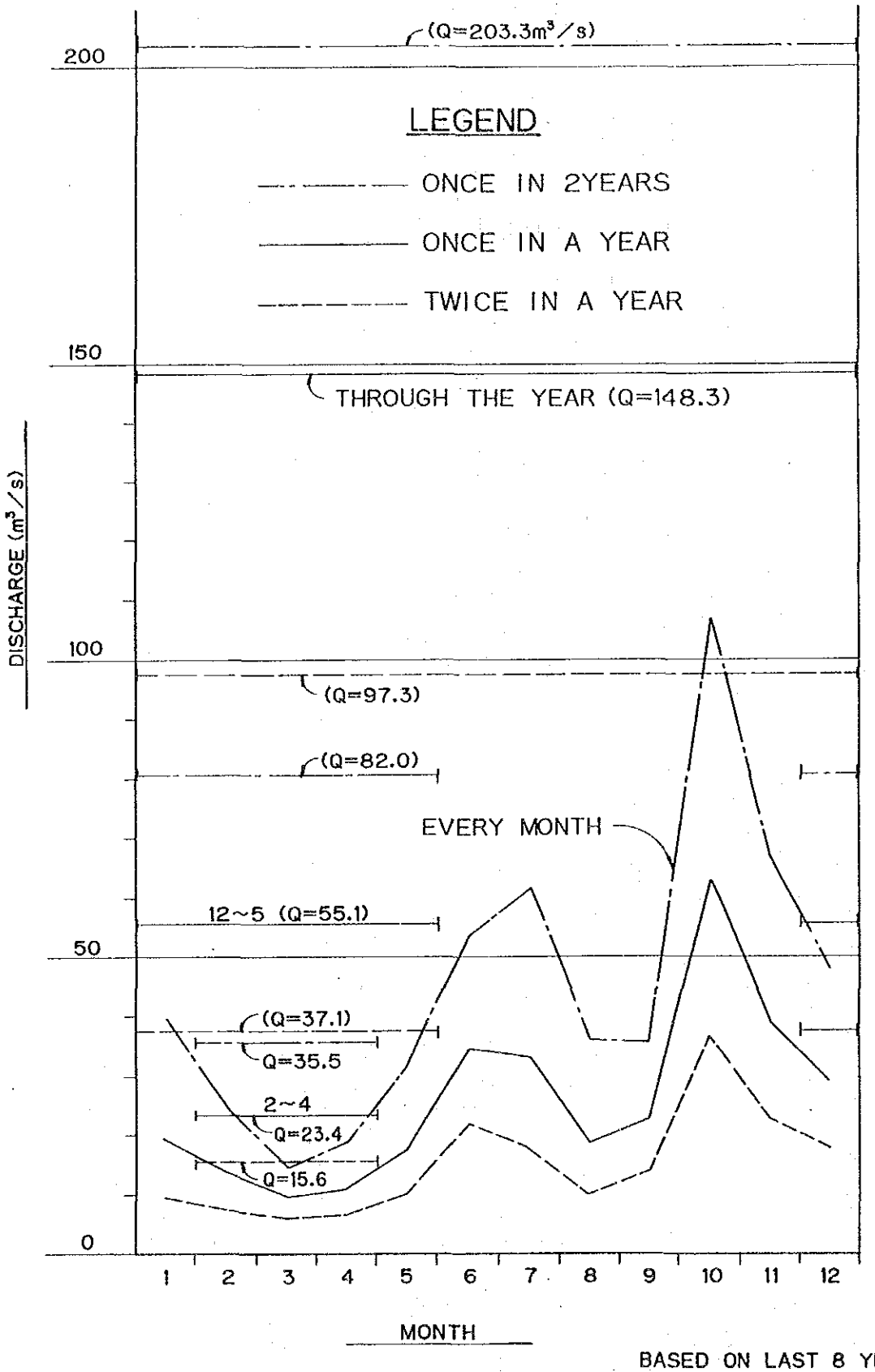
FIGURE E - 12 MONTHLY MEAN RAINFALL AND TEMPERATURE





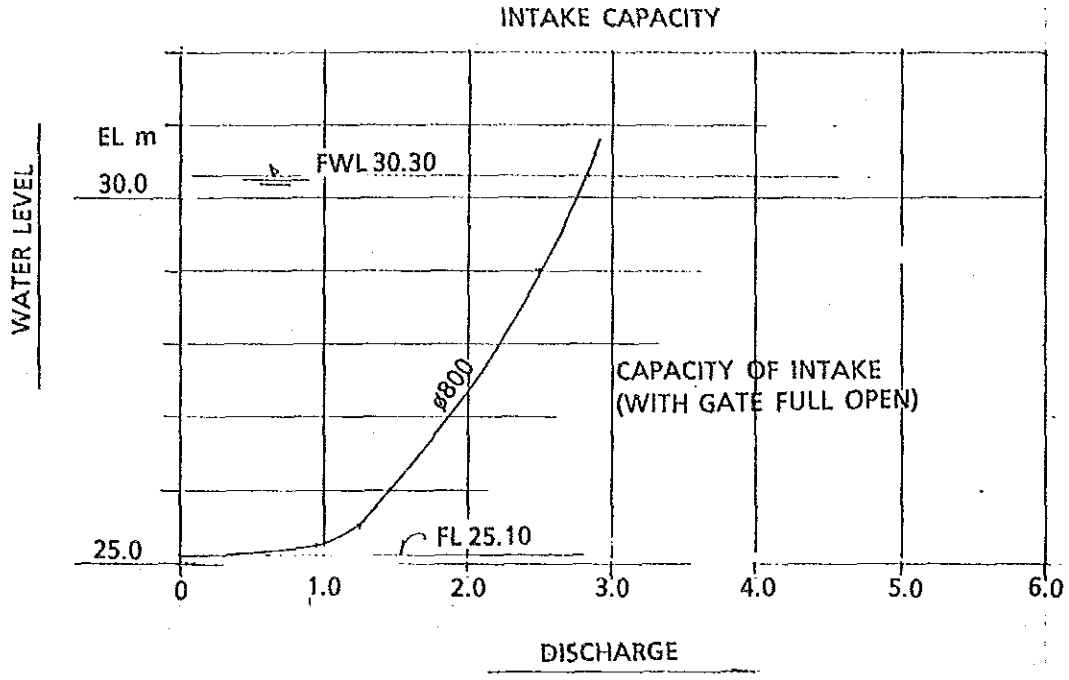
BASED ON LAST 9 YEARS
OF RECORDS AT STA. CRUZ

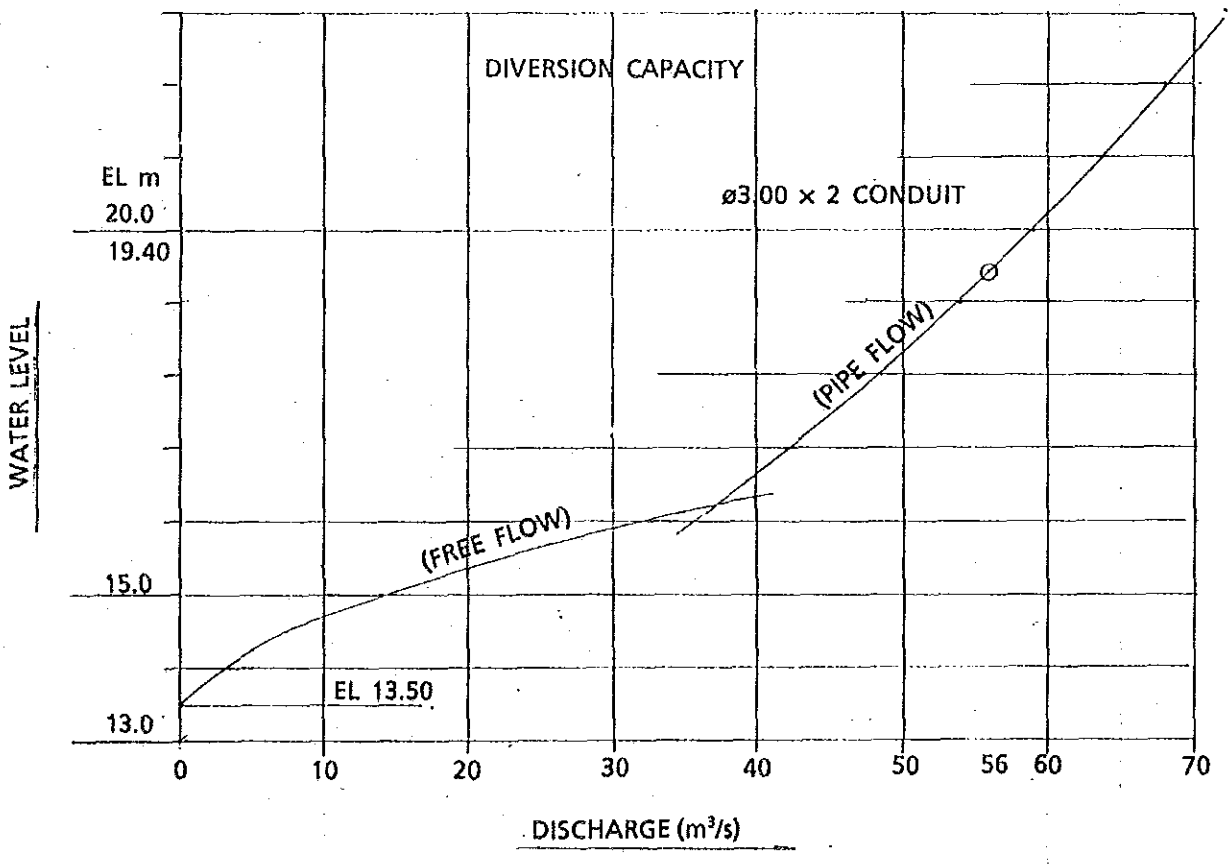
FIGURE E-13 MONTHLY PROBABLE FLOOD



BASED ON LAST 8 YEARS
OF RECORDS AT STA. CRUZ

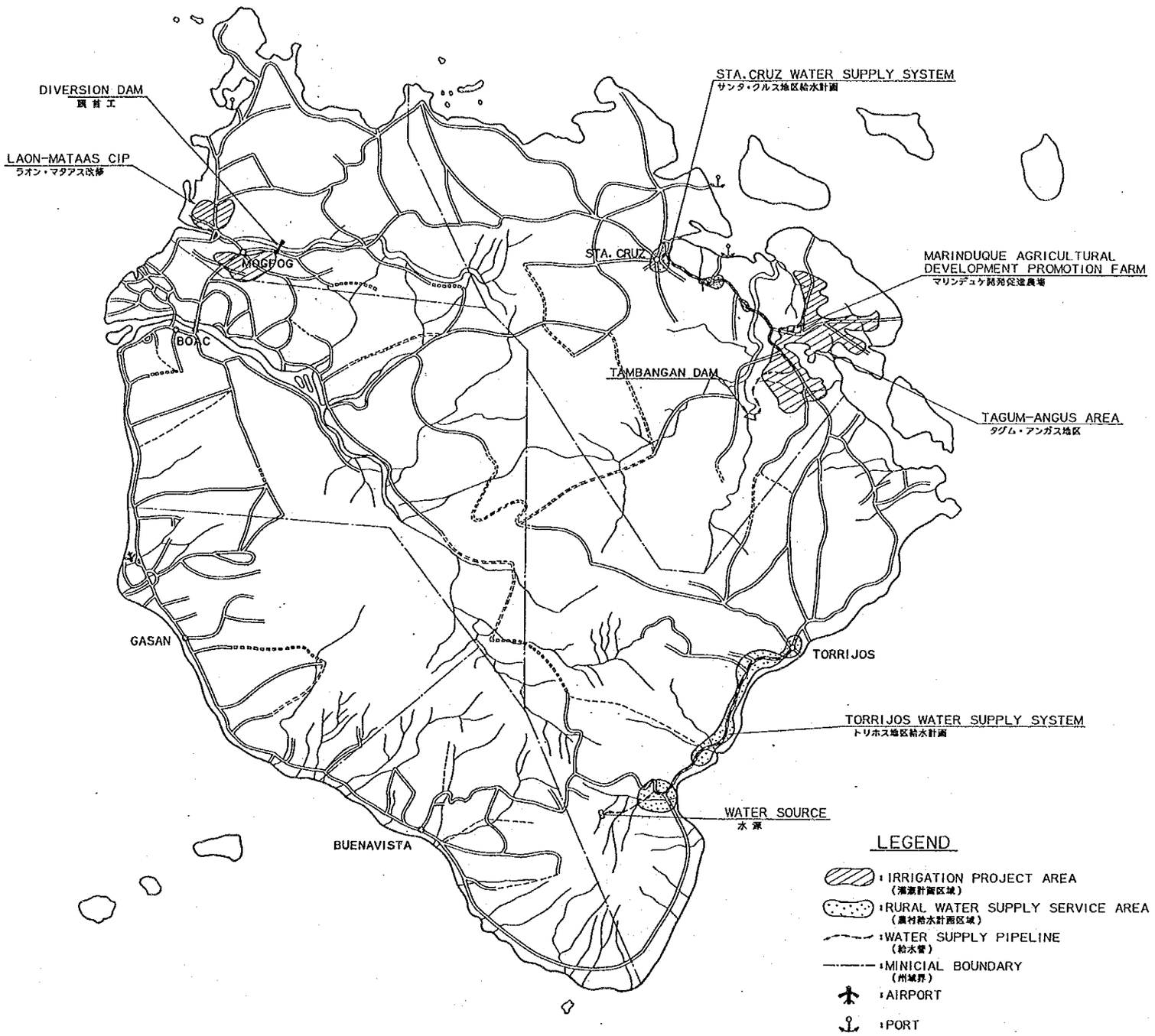
FIGURE E - 14 DISCHARGE CURVES OF INTAKE DISCHARGE



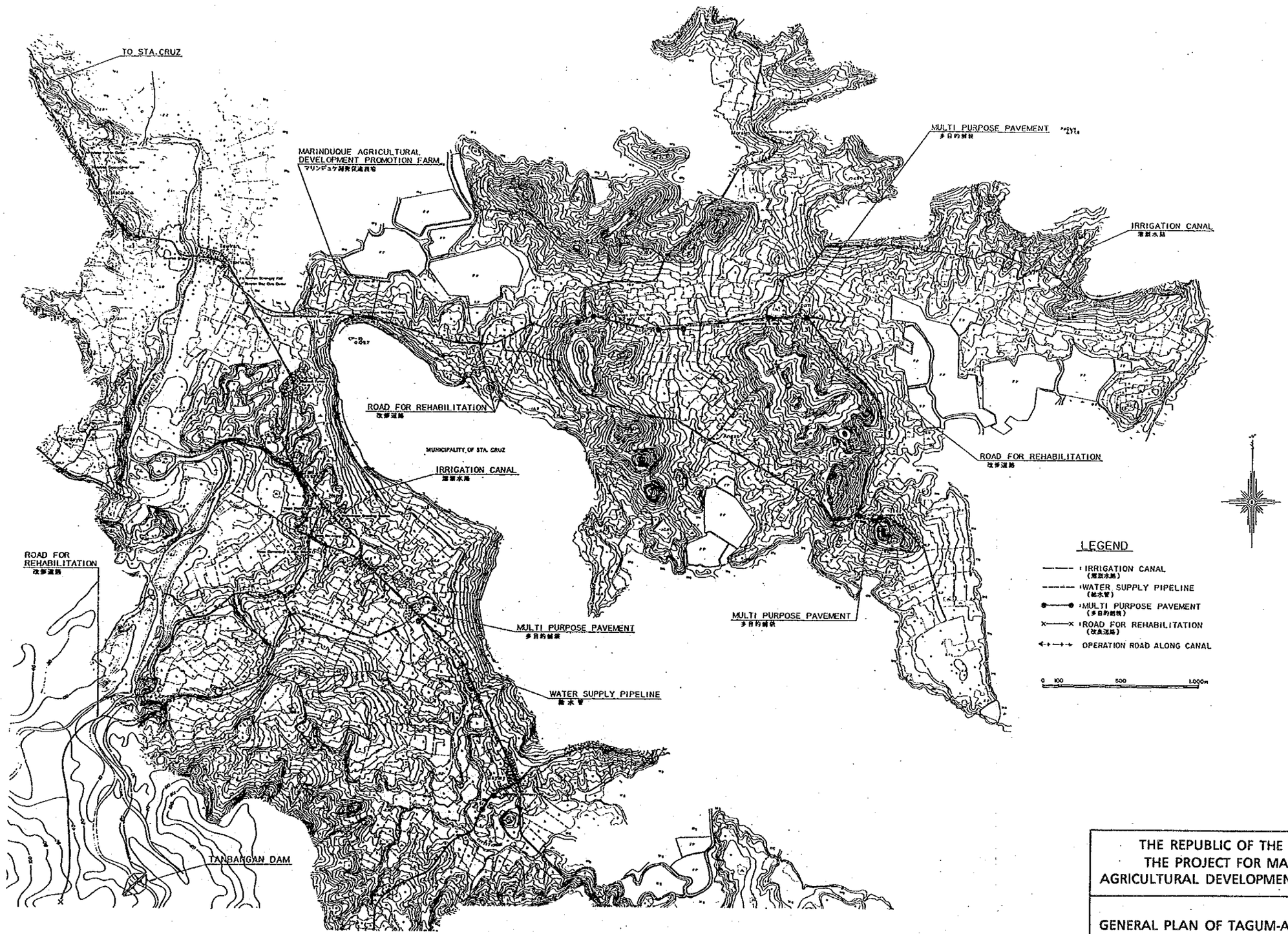


LIST OF BASIC DESIGN DRAWINGS

No of Drawing	Title
DWG No.1	General Map
DWG No.2	General Plan of Tagum-Angas Area
DWG No.3	Plan of Tambangan Dam
DWG No.4	Cross Section of Tambangan Dam
DWG No.5	Spill Way of Tambangan Dam
DWG No.6	Canal Profile of Tagum-Angas Irrigation Canal
DWG No.7	Canal Cross Section of Tagum-Angas Irrigation Canal
DWG No.8	Check & Drop of Tagum-Angas Irrigation Canal
DWG No.9	Turn-Out of Tagum-Angas Irrigation Canal
DWG No.10	Road Crossing & Cross Drain of Tagum Irrigation Canal
DWG No.11	Plan of Diversion Dam Laon-Mataas
DWG No.12	Section of Diversion Dam Laon-Mataas
DWG No.13	Canal Profile of Laon-Mataas CIP
DWG No.14	Standard Drawings of Road Improvement & Multipurpose Road Pavement
DWG No.15	Pipe Profile of Sta. Cruz Water Works
DWG No.16	Filtration Plant of Sta. Cruz Water Works
DWG No.17	Pump Station of Sta. Cruz Water Works
DWG No.18	Pipe profile of Torrijos Water Works
DWG No.19	Intake & Disinfection Facility of Water Works
DWG No.20	Plan of Agriculture Development & Promotion Farm
DWG No.21	Training & Administration Building (1)
DWG No.22	Training & Administration Building (2)



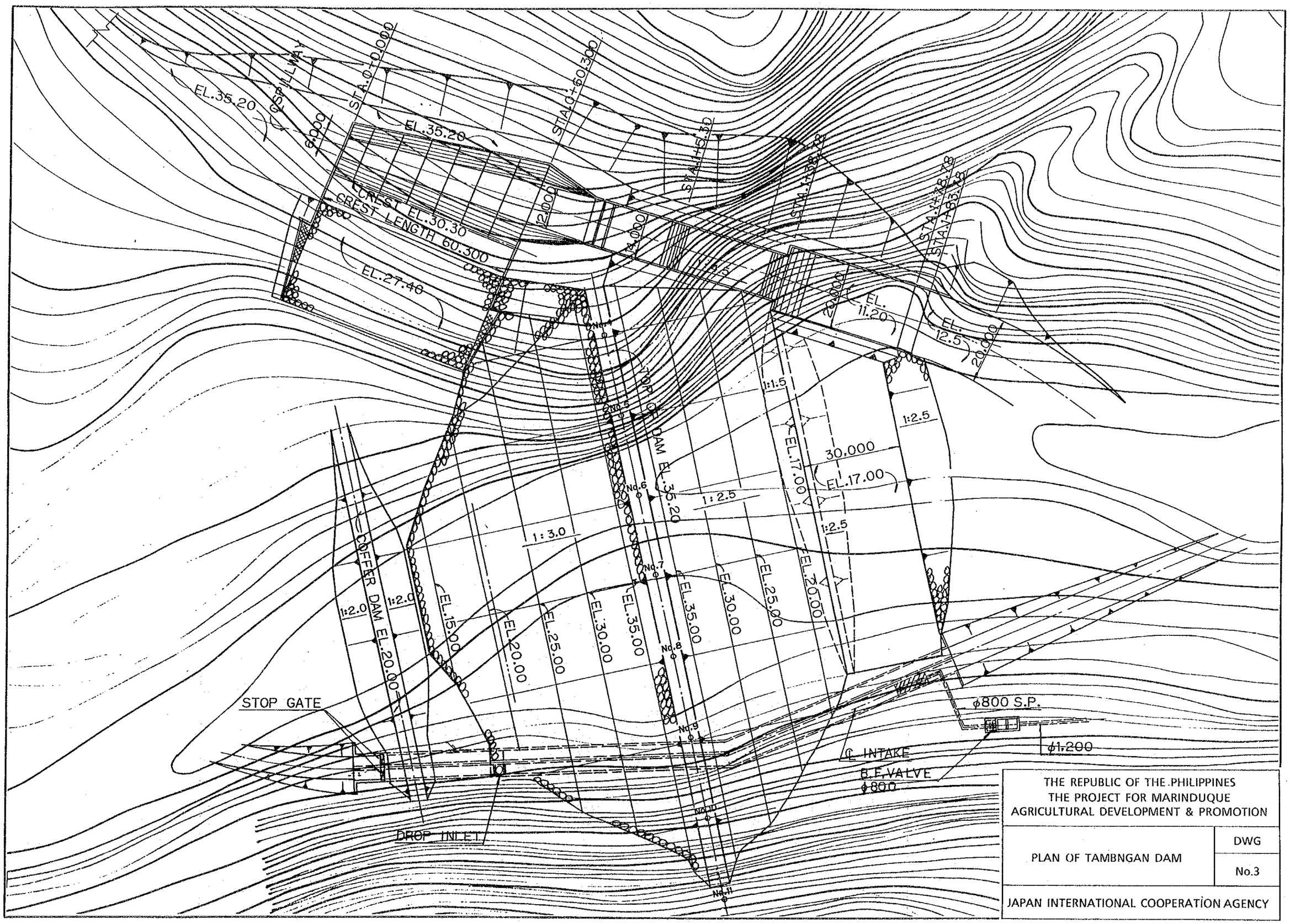
THE REPUBLIC OF THE PHILIPPINES THE PROJECT FOR MARINDUQUE AGRICULTURAL DEVELOPMENT & PROMOTION	
GENERAL MAP	DWG No.1
JAPAN INTERNATIONAL COOPERATION AGENCY	



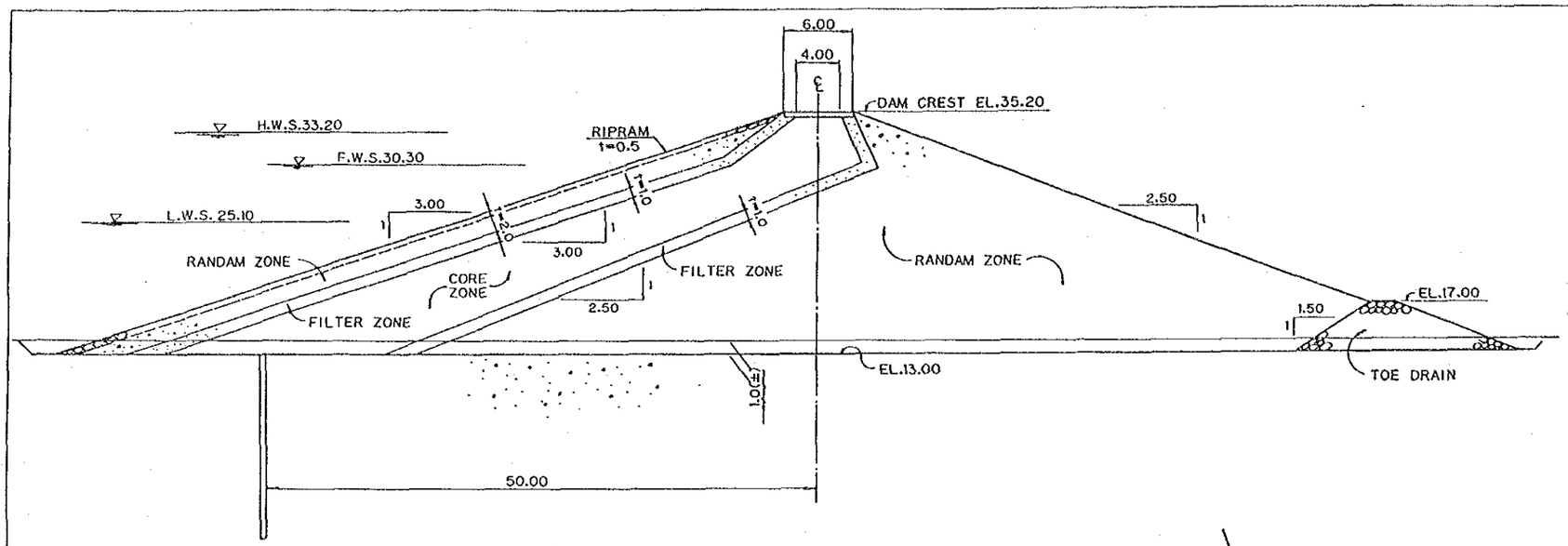
THE REPUBLIC OF THE PHILIPPINES
THE PROJECT FOR MARINDUQUE AGRICULTURAL DEVELOPMENT & PROMOTION

GENERAL PLAN OF TAGUM-ANGAS AREA	DWG No.2

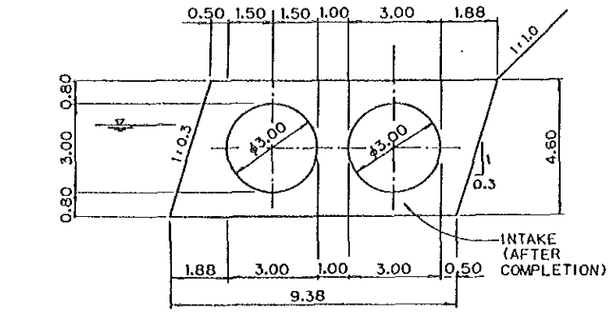
JAPAN INTERNATIONAL COOPERATION AGENCY



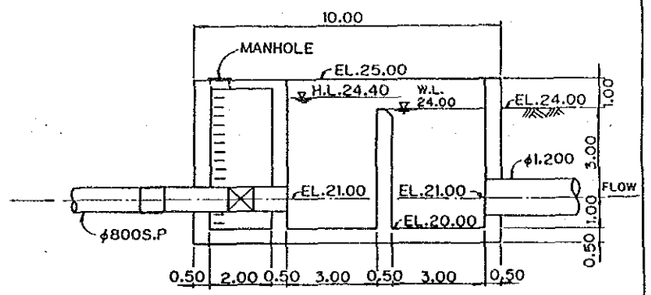
THE REPUBLIC OF THE PHILIPPINES THE PROJECT FOR MARINDUQUE AGRICULTURAL DEVELOPMENT & PROMOTION	
PLAN OF TAMBNGAN DAM	DWG No.3
JAPAN INTERNATIONAL COOPERATION AGENCY	



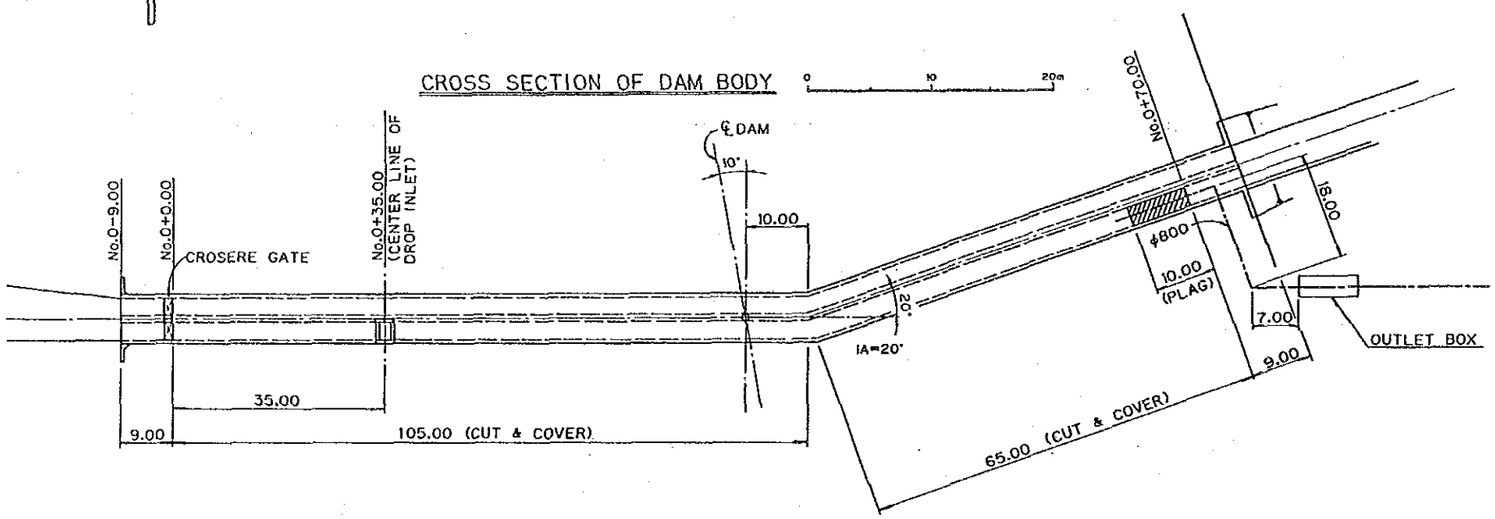
CROSS SECTION OF DAM BODY



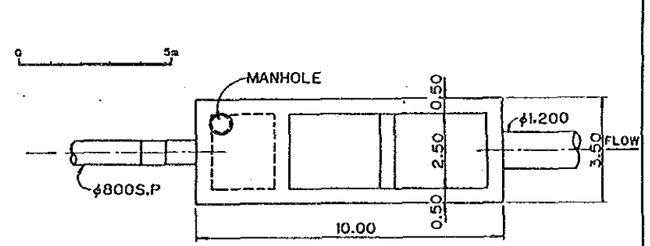
CROSS SECTION OF CONDUTE



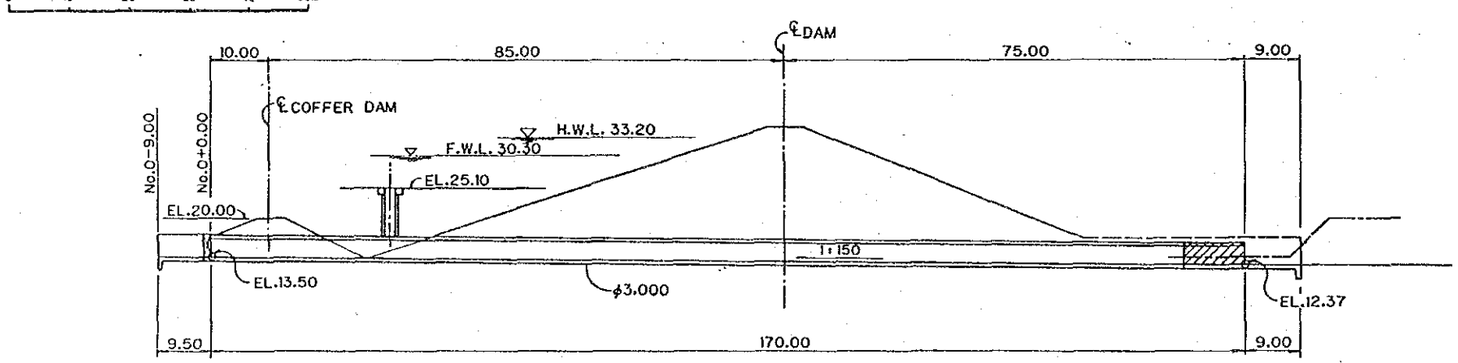
PROFILE OF OUTLET BOX



PLAN OF INTAKE

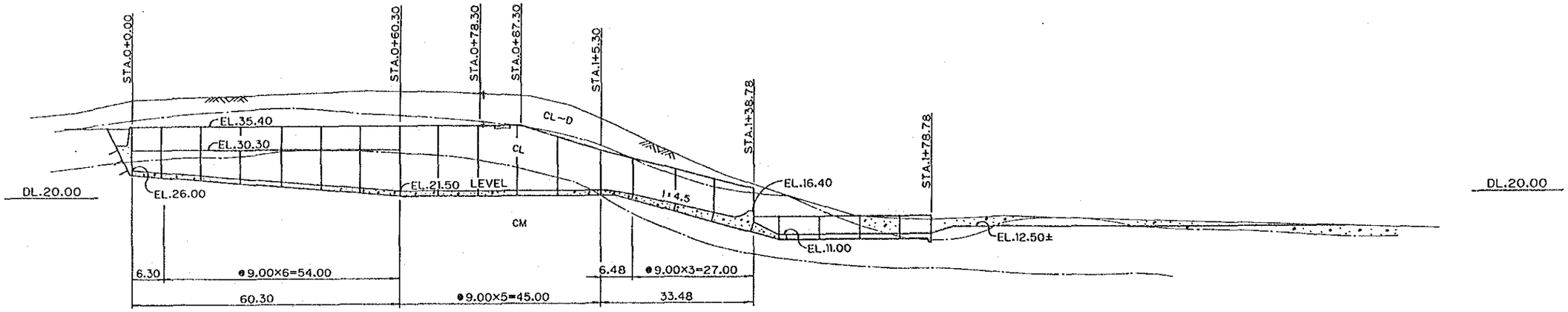


PLAN OF OUTLET BOX

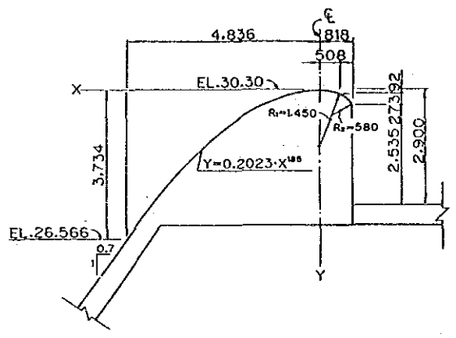


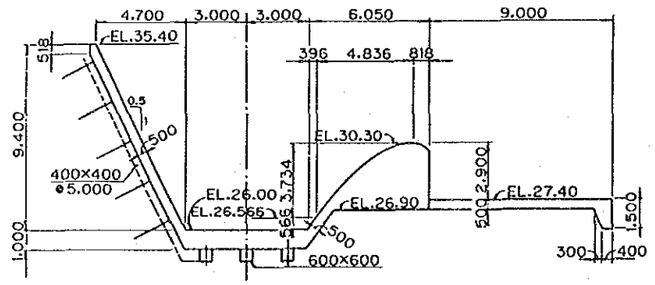
PROFILE OF INTAKE

THE REPUBLIC OF THE PHILIPPINES THE PROJECT FOR MARINDUQUE AGRICULTURAL DEVELOPMENT & PROMOTION	
CROSS SECTION OF TAMBANGAN DAM	DWG No.4
JAPAN INTERNATIONAL COOPERATION AGENCY	

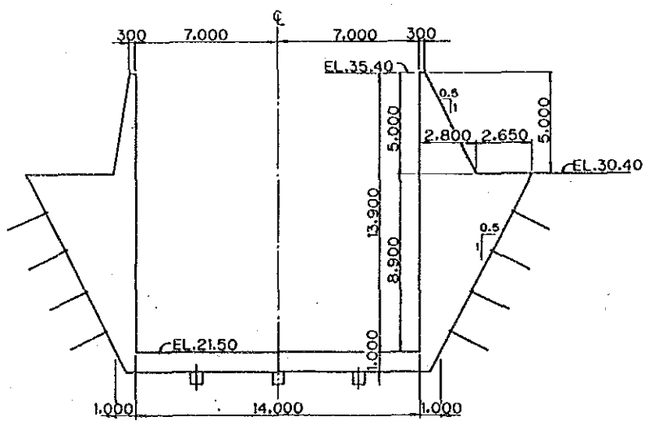


PROFILE OF SPILLWAY 0 10 20 30 40 50m

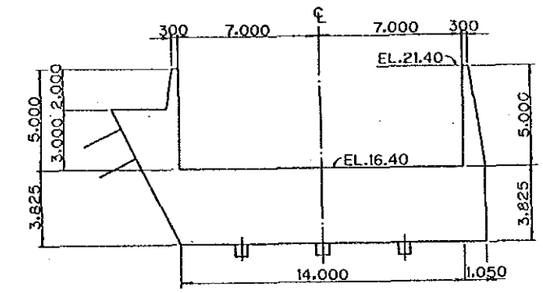




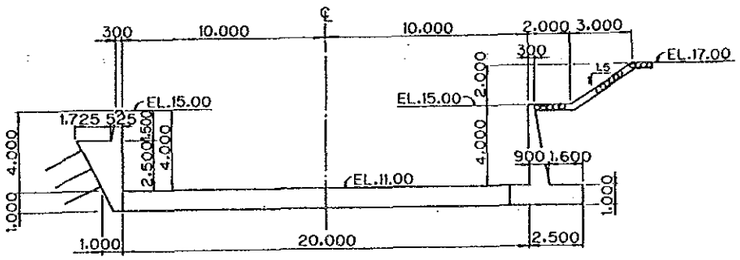
STA.0+0.000



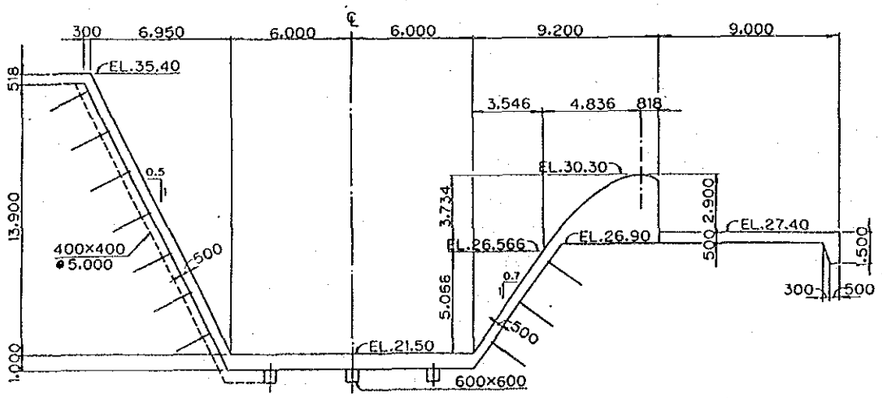
STA.0+78.30~0+87.30



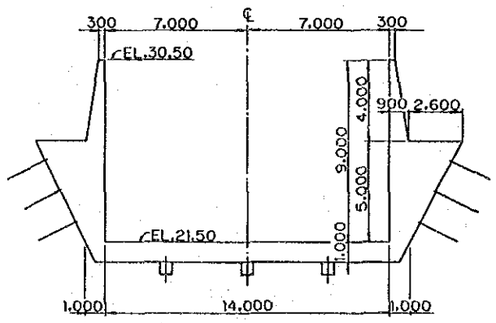
STA.1+38.78



STA.1+46.506~1+78.78

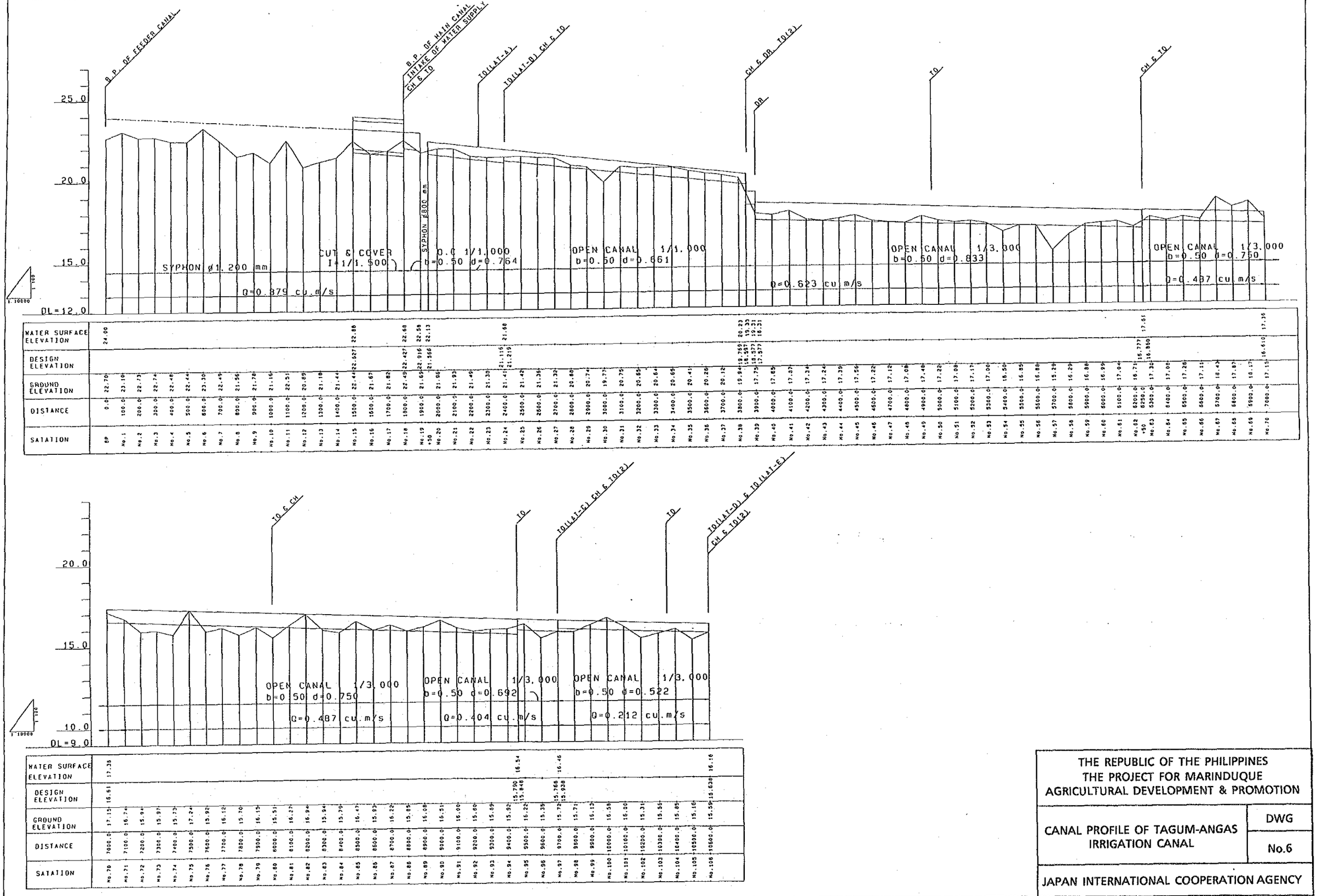


STA.0+60.30(−)

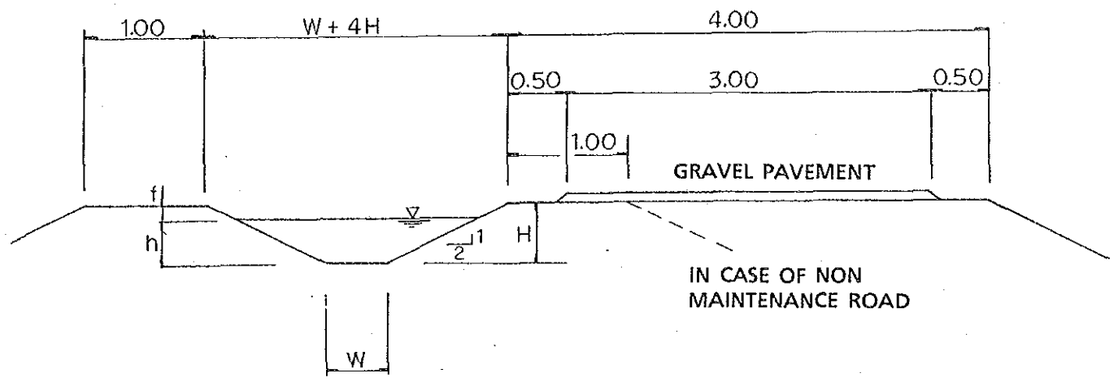


STA.1+5.30

THE REPUBLIC OF THE PHILIPPINES THE PROJECT FOR MARINDUQUE AGRICULTURAL DEVELOPMENT & PROMOTION	
SPILL WAY OF TAMBANGAN DAM	DWG No.5
JAPAN INTERNATIONAL COOPERATION AGENCY	



THE REPUBLIC OF THE PHILIPPINES THE PROJECT FOR MARINDUQUE AGRICULTURAL DEVELOPMENT & PROMOTION	
CANAL PROFILE OF TAGUM-ANGAS IRRIGATION CANAL	DWG No.6
JAPAN INTERNATIONAL COOPERATION AGENCY	



TYPICAL CROSS SECTION

DIMENSIONS TABLE OF MAIN AND LATERAL CANAL

	UNIT	TYPE I	TYPE II	TYPE III	TYPE IV	TYPE V	TYPE VI
DISCHARGE	m³/s	0.879	0.623	0.623	0.487	0.404	0.212
n		0.030	0.030	0.030	0.030	0.030	0.030
SLOPE		1/1,000	1/1,000	1/3,000	1/3,000	1/3,000	1/3,000
BOTTOM WIDTH (W)	m	0.50	0.50	0.50	0.50	0.50	0.50
WATER DEPTH (h)	m	0.764	0.661	0.833	0.750	0.692	0.522
FLOW AREA	m²	1.549	1.204	1.804	1.500	1.304	0.806
VELOCITY	m/s	0.567	0.517	0.345	0.325	0.310	0.263
FREE BOARD (f)	m	0.236	0.239	0.267	0.250	0.208	0.278
CANAL DEPTH (H)	m	1.000	0.900	1.100	1.000	0.900	0.800

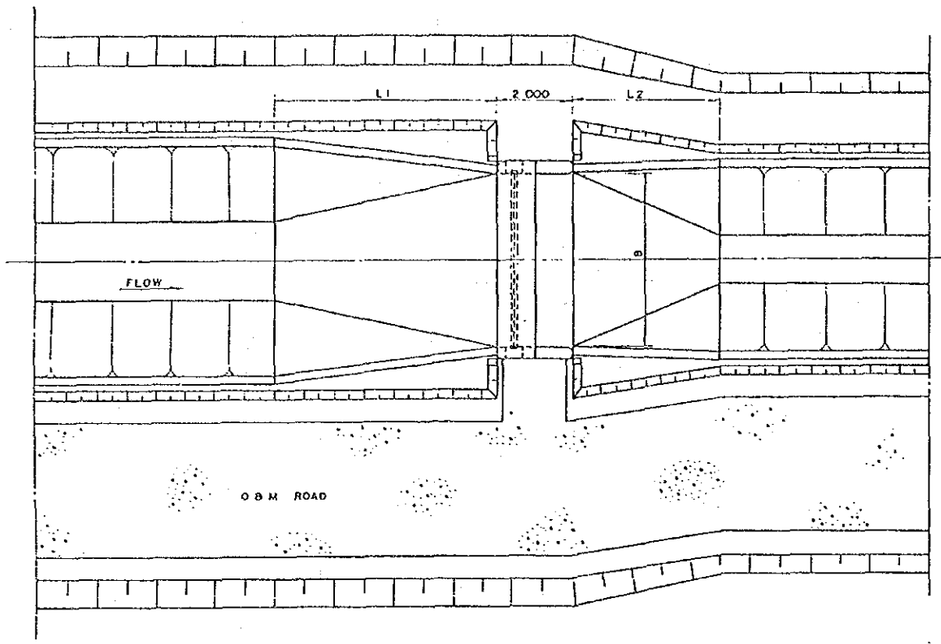
THE REPUBLIC OF THE PHILIPPINES
THE PROJECT FOR MARINDUQUE
AGRICULTURAL DEVELOPMENT & PROMOTION

CANAL CROSS SECTION OF TAGUM-ANGAS IRRIGATION CANAL

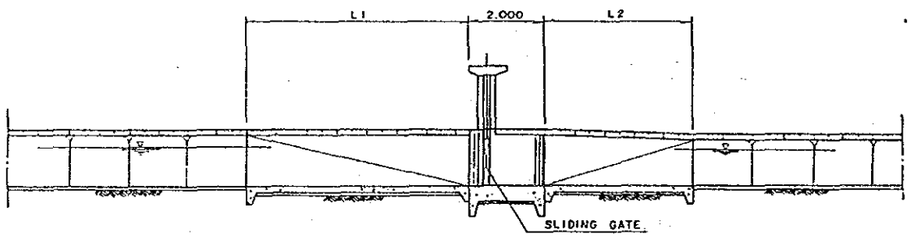
DWG No.7

JAPAN INTERNATIONAL COOPERATION AGENCY

CHECK



PLAN

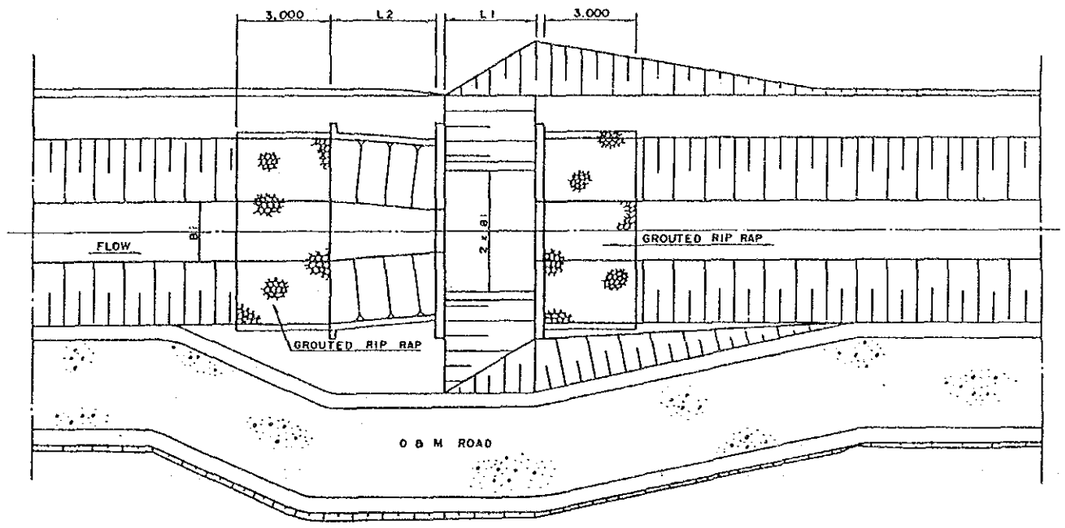


PROFILE

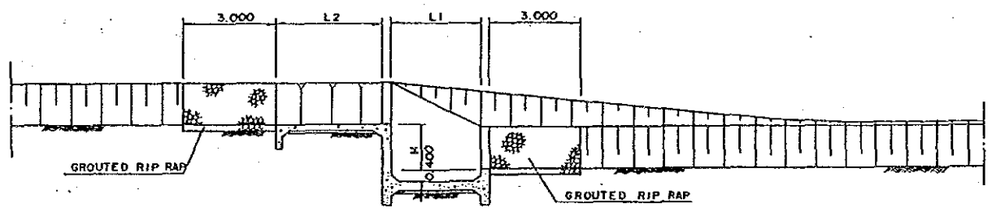
TABLE OF DIMENSIONS FOR CHECK

TYPE	Q (CMS)	B m	L1 m	NOS OF GATE	L2 m
CH-1	LESS THAN 0.5	1.00	3.00	1	2.00
CH-2	0.50~1.00	2.60	3.00	2	2.00
CH-3	1.00~2.00	3.00	4.00	3	3.00

DROP



PLAN



PROFILE

TABLE OF DIMENSIONS FOR DROP

TYPE	Q (CMS)	B m	L1 m	L2 m
DP-1	LESS THAN 0.5	1.00	2.00	2.50
DP-2	〃	1.50	2.50	〃
DP-3	LESS THAN 2.5	1.00	2.50	3.50
DP-3	〃	1.50	3.00	〃

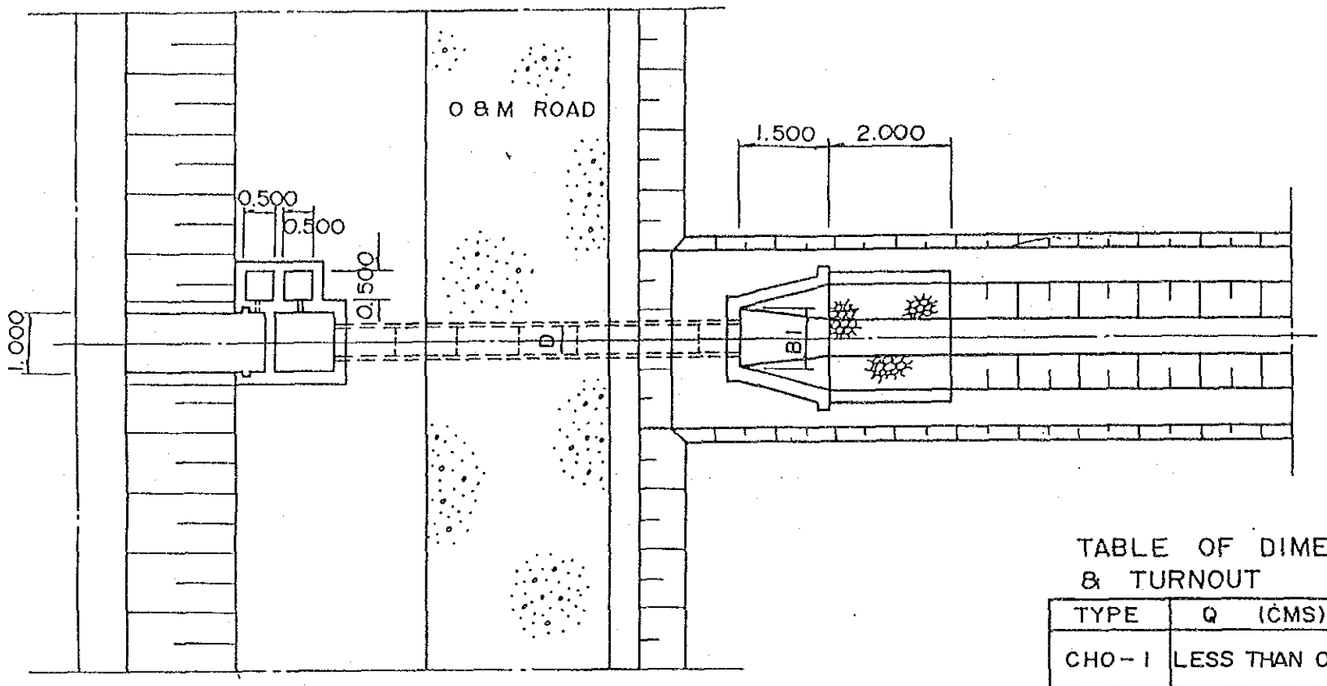
THE REPUBLIC OF THE PHILIPPINES
THE PROJECT FOR MARINDUQUE
AGRICULTURAL DEVELOPMENT & PROMOTION

CHECK & DROP OF TAGUM-ANGAS IRRIGATION CANAL

DWG No.8

JAPAN INTERNATIONAL COOPERATION AGENCY

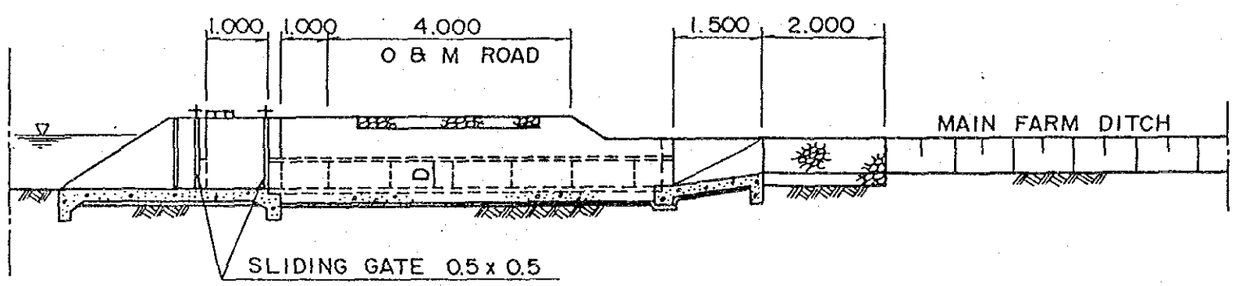
DIVERSION STRUC. & TURNOUT



PLAN

TABLE OF DIMENSIONS FOR DIVERSION STRUC & TURNOUT

TYPE	Q (CMS)	D m	B1 m
CHO-1	LESS THAN 0.1	0.45	1.00
CHO-2	0.10~0.50	0.60	1.00
CHO-3	MORE THAN 0.5	0.80	1.20

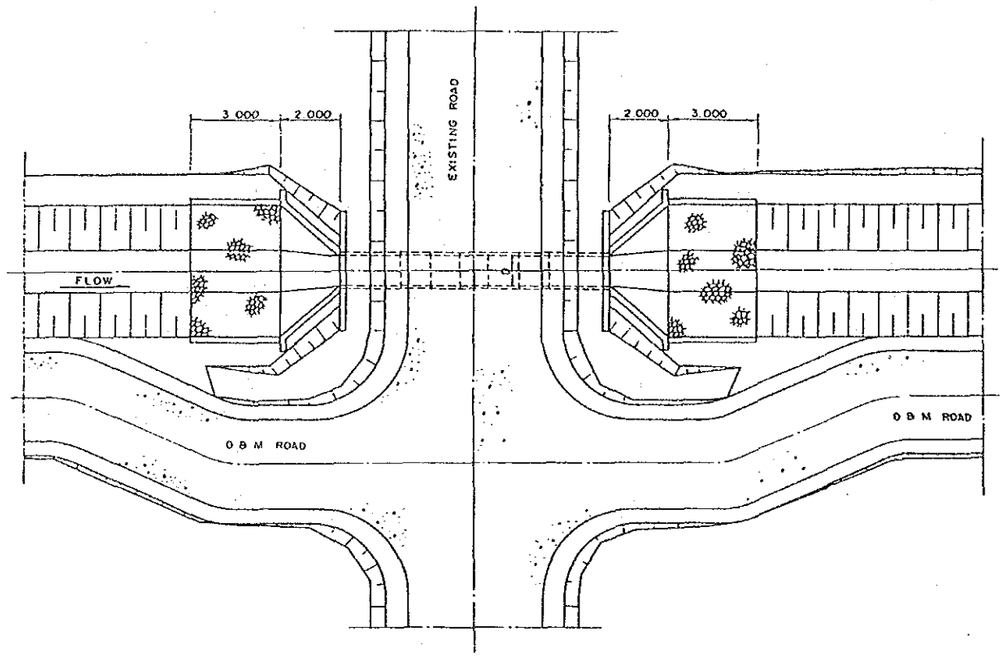


PROFILE

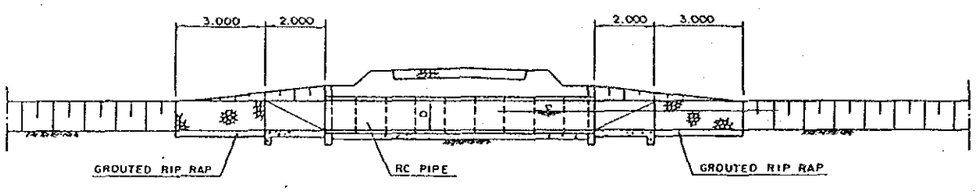
S = 1 : 100

THE REPUBLIC OF THE PHILIPPINES THE PROJECT FOR MARINDUQUE AGRICULTURAL DEVELOPMENT & PROMOTION	
TURN-OUT OF TAGUM-ANGAS IRRIGATION CANAL	DWG No.9
JAPAN INTERNATIONAL COOPERATION AGENCY	

ROAD CROSSING



PLAN

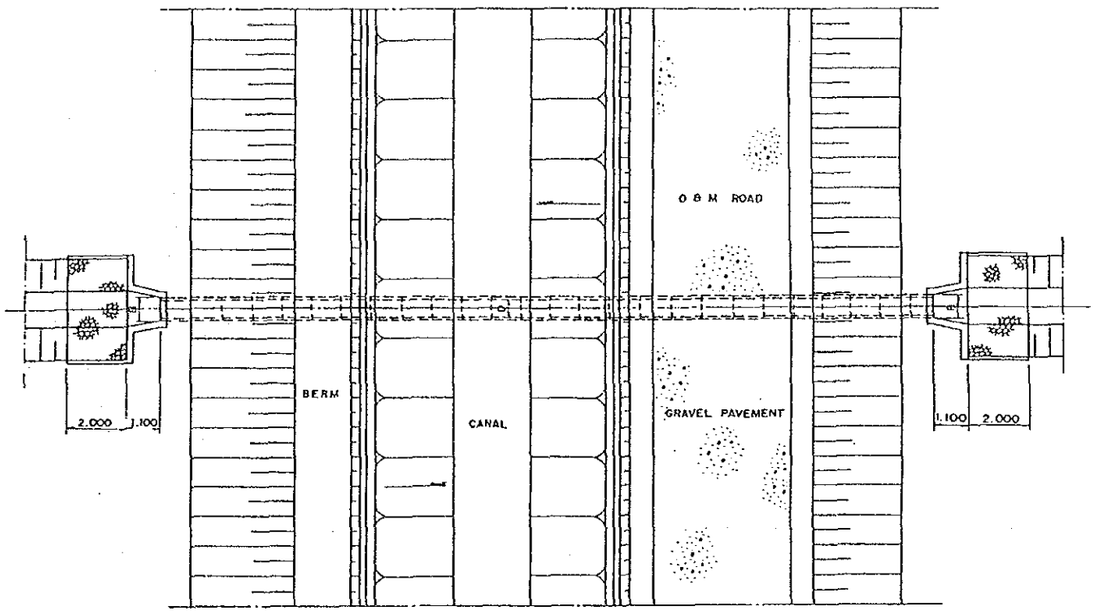


PROFILE

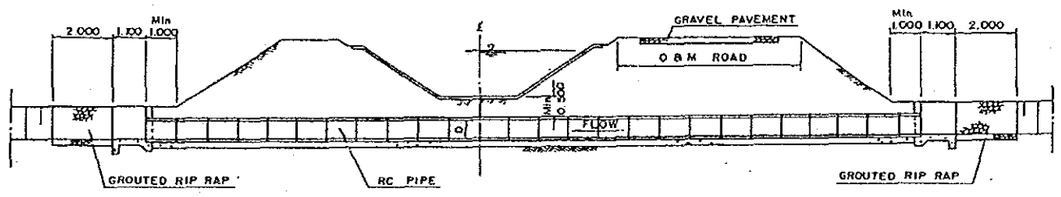
TABLE OF DIMENSIONS FOR ROAD CROSSING

TYPE	Q (CMS)	TYPE OF BARREL	D mm
CR-1	LESS THAN 0.3 m^3/s	PRE-CAST CONCRETE PIPE	450
CR-2	0.3 ~ 0.6	"	600
CR-3	0.6 ~ 1.0	"	1,000

CROSS DRAIN



PLAN



PROFILE

TABLE OF DIMENSIONS FOR CROSS DRAIN

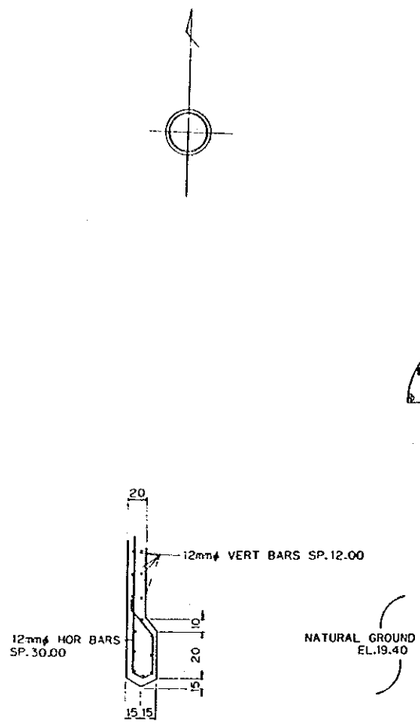
TYPE	Q (CMS)	TYPE OF BARREL	D mm	B m
CD-1	LESS THAN 1.00	PRE-CAST CONCRETE PIPE	450	0.60
CD-2	1.00 ~ 1.50	"	600	0.80
CD-3	MORE THAN 1.50	"	1,000	1.20

THE REPUBLIC OF THE PHILIPPINES
THE PROJECT FOR MARINDUQUE
AGRICULTURAL DEVELOPMENT & PROMOTION

ROAD CROSSING & CROSS DRAIN OF TAGUM IRRIGATION CANAL

DWG No.10

JAPAN INTERNATIONAL COOPERATION AGENCY



DETAIL "I"

PLAN

NOTE: 1. DIMENSIONS ARE GIVEN IN CENTIMETER UNLESS OTHERWISE NOTED.

2. ELEVATIONS ARE SHOWN IN METER.

HYDR

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