REPORT OF THE TECHNICAL ADVISORY TEAM
ON
RP-JAPAN PILOT FARM PROJECT
SAN VICENTE, ALANG-ALANG, LEYTE
PHILIPPINES

MAY, 1972

OVERSEAS TECHNICAL COOPEARATION AGENCY

CONTENTS

I PURPOSE OF THE TEAM

The RP-Japan Pilot Farm, San Vicente, Alang-Alang, Leyte, has managed for the last about three year under the agreement between the Government of Japan and the Government of the Republic of the Philippines. But it didn't go as previously planned to construct basic facilities for the Pilot Farm: roads, irrigation and drainage facilities.

Therefore, this technical survey was held to review the original plan, principally the plan for irrigation and drainage, and in case of need, to modify the plan under the cooperation by the Government of the Republic of the Philippines.

II MEMBERS OF THE TEAM

Sinsuke HIRAI	Head of the Team	Construction Division, Agricultural Land Bureau, Ministry of Agriculture and Forestry
Hiroshi MATUI	Member of the Team	Technical Division, Japan Irrigation and Reclamation Consultant.
Yasuo ICHIKAWA	Member of the Team	Construction Division, Agricultural Land Bureau, Ministry of Agriculture and Forestry.
Koji TANABE	Member of the Team	Agricultural Cooperation Department, Overseas Technical Cooperation Agency.

Note: MEMBERS CONCERNED TO THE STUDY.

1. NFAC:

Roberto E. Fronda	Executive Director, NFAC
Emeterio R. Onias	Chief of the Assistant Division, NFAC

2. Philippine Experts for RP-Japan Pilot Farm, Leyte:

Rufino D. Ayaso, Jr.	Project Director
Celestino Tampil	Deputy Director
Baldrich T. Ocanada	Extension Specialist
Solomon Jolbitado	Irrigation Specialist
Francisco Talagtag	Agricultural Engineer
Mario Cabacungan	Agronomist

3. Japanese Experts for RP-Japan Pilot Farm, Leyte:

Sakuyoshiro KITAGAWA	Project Leader
Kazuto MISAWA	Sub-Leader
Eiichiro OTUBO	Agronomist
Hiroshi YAMAKAWA	Extension Specialist
Shinichi YAMADA	Irrigation Specialist

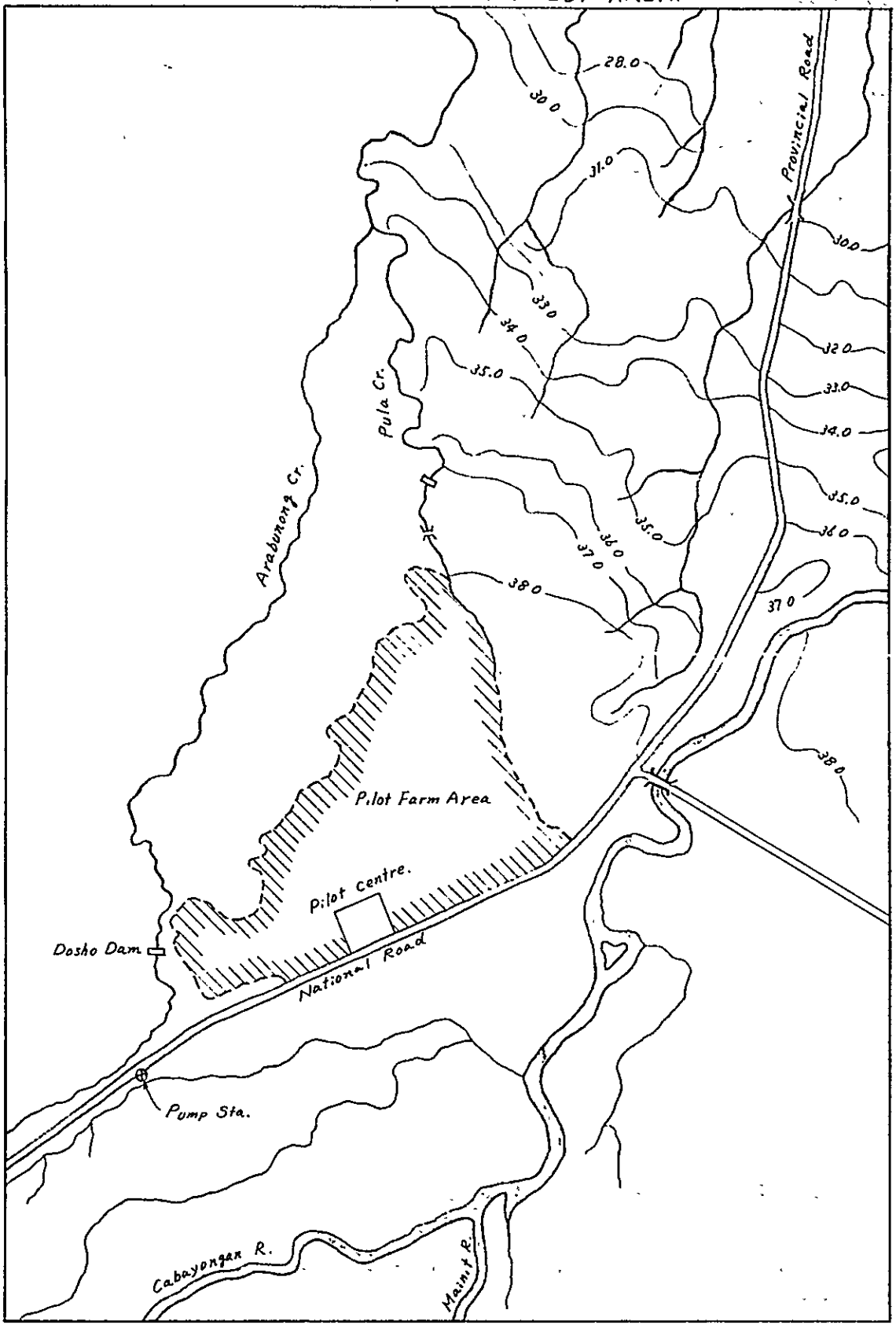
4. Embassy of Japan and OTCA Manila Office:

Kazuhiro MATUSHITA	Secretary of Embassy.
Hiroshi YAMAMURA	Director of OTCA Manila Office.

III SCHEDULE OF THE TEAM

March	23	Arrive at Manila.
	24	Meeting with NFAC.
	25	Leave from Manila - Arrive at Tacloban, Leyte.
	26	
April	5	Study at RP-Japan Pilot Farm, Alang-Alang, Leyte.
	6	Lv. Tacloban - Ar. Manila.
	7	Lv. Manila - Ar. Calapan, Mindro.
	8	Observation at RP-Japan Pilot Farm, Maujan, Mindro.
	10	Lv. Calapan - Ar. Manila.
	12	Consultation with NFAC (Steering Committee).
	13	Meeting with Embassy of Japan.
	14	Lv. Manila - Ar. Tokyo.

Fig. 1 RP-JAPAN PILOT FARM PROJECT AREA.



IV RESULTS OF TNE STUDY

IV-1. CONCLUSION:

(1) The area is not being affected by the diversion weir downstream nor by the Pula Creek even during flood.

(2) The present poor drainage condition in the area is being caused by the insufficient capacity of the existing drains inside the area.

(3) Improvement works of the Pula Creek is unnecessary.

(4) Non-protection against excess water in the Arabunog Creek at the Dosho Dam is accelerating the poor drainage condition in the down area.

(5) Poor water management in the farms is causing a serious drainage problem in the down area.

IV-2. RECOMMENDATION:

(1) The present drainage plan should be implemented. Its details are proposed and attached herewith.

(2) Dosho Dam should be improved with the view of protecting the area against excess water. Improvement plan was designed and attached herewith.

(3) The irrigation canal from the Dosho Dam should be improved and connected to the Main Canal. Plan was attached herewith.

(4) Some counter-measure must be studied in the not so distant future to settle the existing dangerous situation being caused by gravel collection downstream of the Pumping Station.

(5) The model farming block should be established in the area to promote field arrangement and to make proper water management possible.

(6) Water management committee should be established under the Farmer's Association to achieve proper management and maintenance.

IV-3. BACK-WATER EFFECT CAUSED BY THE DIVERSION WEIR DOWNSTREAM IN THE PULA CREEK

There is only one drainage outlet called "Pula Creek" the watershed area of which is almost rice field with an acreage of 89.63 hectares. The creek is also used for irrigation purpose to the other rice areas, approximately 1,000 meters downstream of the project area.

The problem is that the water stream in the creek is being diverted by the weir built in the creek, so that back-water effect by the weir might be causing inundation in the lower part of the area.

According to the hydraulic analysis, the field area is not being affected by the said diversion weir during flood with a probability of once in ten years except the lowest end part of the area with an acreage of only 30 ares. (see the attached Fig. 8)

So it can be said that the present poor drainage condition in the area is apparently being caused by the insufficient capacity of the existing canals in the area.

Therefore it is concluded:

1) that there is slight back-water effect by the diversion dam in the Pula Creek except few area.
2) so that improvement works of the creek is not necessary for the economic reason, and
3) that the present drainage plan proposed by the Japanese Project Team is quite proper to be implemented. Its details are proposed and attached herewith.

IV-4. STUDY ON INTAKE WATER CONTROL AT THE DOSHO DAM

Irrigation water had been taken from the Arabunog Creek through the primitive weir before the Dosho Dam was constructed. Improvement of the intake works, however, was postponed, since the dam was regarded as the temporary irrigation facilities.

It must be pointed out that such a condition is apparently accelerating the poor drainage condition in the down area, because the intake canal at the Dosho Dam is kept opened even during flood, and no intake water control has been taken.

Additionally, the Arabunog Creek should be regarded as a main irrigation resource for the economic reason. Pumps should be operated as an auxiliary system.

From this point of view, the following works are recommended:

1) Improvement works of the Dosho Dam with the view of protecting the area against excess water. (see attached Drawing).
2) Modification of the present irrigation plan with respect to an effective use of stream flow in the Arabunog Creek. Irrigation canal from the Dosho Dam should also be improved and connected to the Main Canal which was already completed. (see the attached).
3) Some counter-measure must be studied in the not so distant future to settle the existing dangerous situation caused by gravel collection downstream of the Pumping Station.

Increase cost for the additional works is estimated as follows:

items	quantity	price
1. Improvement of the Dosho Dam		₱15,000.00
2. Improvement of Irrigation Canal	650 M.	₱ 7,000.00
	T O T A L	₱22,000.00

IV-5. WATER MANAGEMENT PROBLEM

Irrigation water is being supplied both by the Dosho Dam and by the Pumping Station. Irrigation requirement for the area and the maximum water supplying capacity of the said facilities are,

Irrigation requirement: 0.003 cu. m./ha x 82.54 ha
= 0.26 cu. m./s

Max. water supplying capacity of the Dosho Dam:
: Approx, 0.5 c. m./s

Max. water supplying capacity of the pump:
: 0.3 cu. m./s

In spite of such a enough irrigation water supply, a part of the area is under poor irrigation, because of lack of the delivery channel network.

On the other hand, such excess water taken to the upper area is drained without any regulation and is concentrating to the lower part of the area. This fact is forming a major part of the present serious drainage problem in the down area.

Therefore, it can be apparently said that proper irrigation and drainage will be unattainable unless small canal network for irrigation and drainage is re-arranged.

Another problem is water management. Proper water management can be introduced only when the independent inlet for irrigation water and also the independent outlet for drainage are equipped in each farming blocks.

Thus, field arrangement is very assential.

In order to achieve proper irrigation supply and to settle the drainage problem in the down area, the following are recommended:

1) Establishment of the model farming block in the area to give knowledge on the farming technique to the farmers. Field arrangement including land exchange and consolidation must be made in the model block.
2) Establishment of water management committee under the farmers association. In the committee it must be cleared:
   a) that each farmer is responsible to water management in each farming block.
   b) that each irrigation block is responsible to management of each delivery gates from the lateral canals to the irrigation blocks, and
   c) that water management committee is responsible to management of main irrigation facilities such as the Dosho Dam, the Pumping Station and the Main Irrigation Channel.

V. APPENDIX

V−1. APPENDIX-I: Back-Water Analysis

1. Proposed Rainfall

Maximum daily rainfall proposed for design of drainage canal in the area should be 250 mm/day with a recurrence interval of ten (10) years, according to the rainfall record in Tacloban.

2. Proposed Flood

Maximum discharge to be drained from the area should be:

$$Q = r\ f\ A/3,600\ T$$

Q : Max. discharge to be drained (cu.m/s)

r : Max. daily rainfall proposed (mm/day)

f : Run-off coefficient (=0.8)

A : Area (=89.63 ha)

T : Flood Duration (=24 hrs)

Then,

$$Q = 250 \times 0.8 \times 89.63 / (3,600 \times 24)$$
$$= 2.08 \text{ cu.m./s}$$

3. Back-Water Calculation

Back-water calculation was made based on the "Try and Error Method". Result of the calculation is shown in the attached Fig. 3.

4. Conclusion

1) Present drainage plan is reasonable except the downstream end area with an acreage of approx. 0.3 ha elevation of which is lower than 38.00 m.

2) Cross-section of each drainage canal is proposed in the attached Fig. 7.

Fig. 2 PROBABILITY - GRAPH

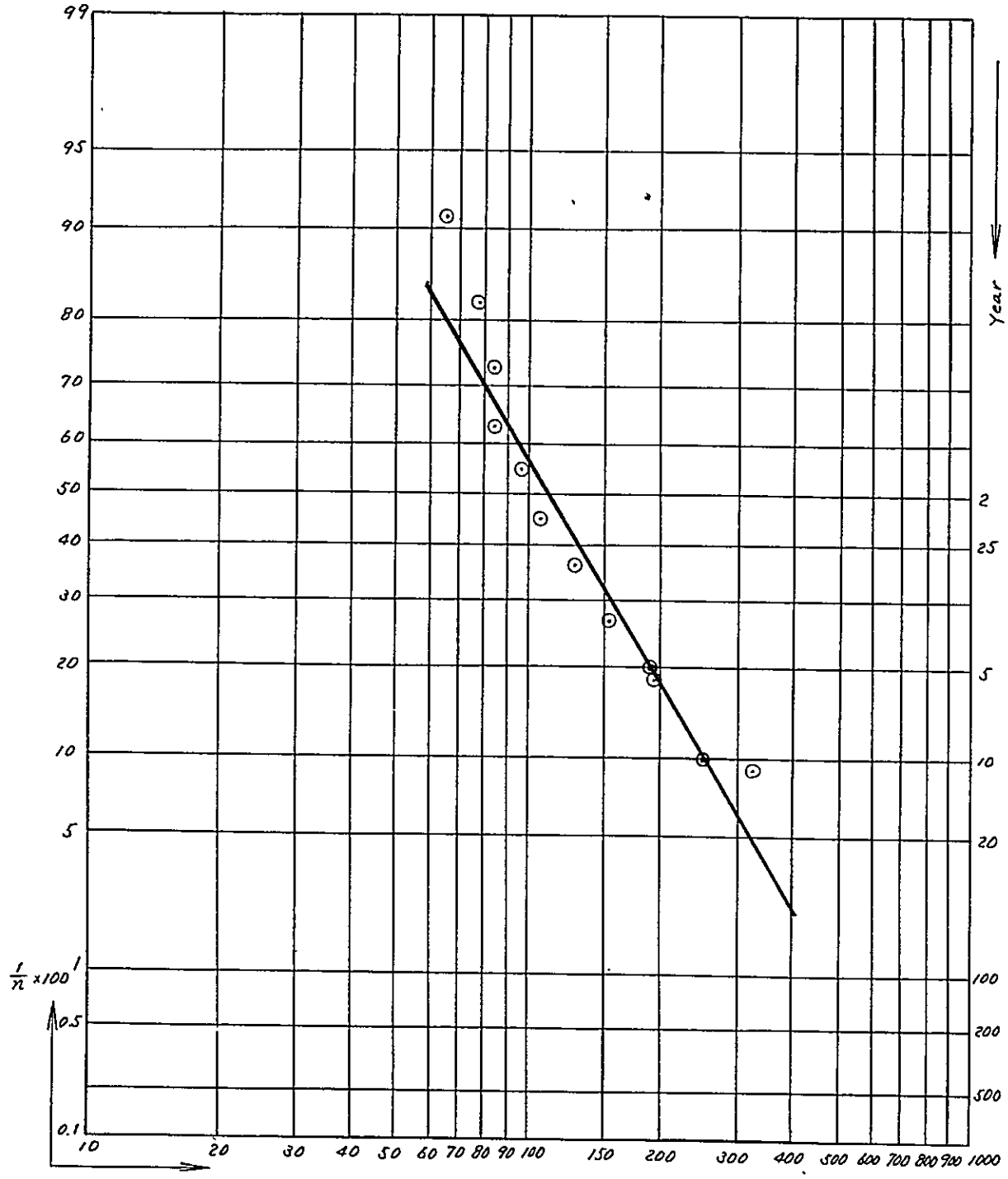


Table-1. CALCULATION OF BACK-WATER

$Q = 2.08\ m^3/sec.$
$n = 0.05$

	Section	0	2	3 (BRIDGE)	8
1	Δx	- m.	94.00	53.00	247.00
2	z	36.38 m.	36.68	37.09	37.20
3	y	1.34 m.	1.09	0.75	0.75
4	h	37.72 m.	37.77	37.84	37.95
5	A	4.72 m^2.	4.36	3.20	2.56
6	V	0.444 m/s	0.478	0.650	0.814
7	$\frac{\alpha V^2}{2g}$	0.0111 m.	0.0128	0.0237	0.0370
8	H	37.721	37.783	37.864	37.987
9	P	4.50 m.	5.00	5.00	4.80
10	R	1.050 m.	0.870	0.640	0.533
11	$R^{2/3}$	1.03 m.	0.911	0.743	0.655
12	$\frac{nV}{R^{2/3}}$	0.0215	0.0263	0.0436	0.0620
13	Sf	0.463×10^{-3}	0.692	1.910	3.840
14	Sf	- $\times 10^{-3}$	0.5775	1.301	2.875
15	Hf	-	0.054	0.069	0.117
16	H'	-	37.785	37.852	37.981
17	ΔH	-	-0.002	+0.012	+0.006
			OK	OK	OK

Fig. 3 PROFILE OF DRAINAGE CANAL

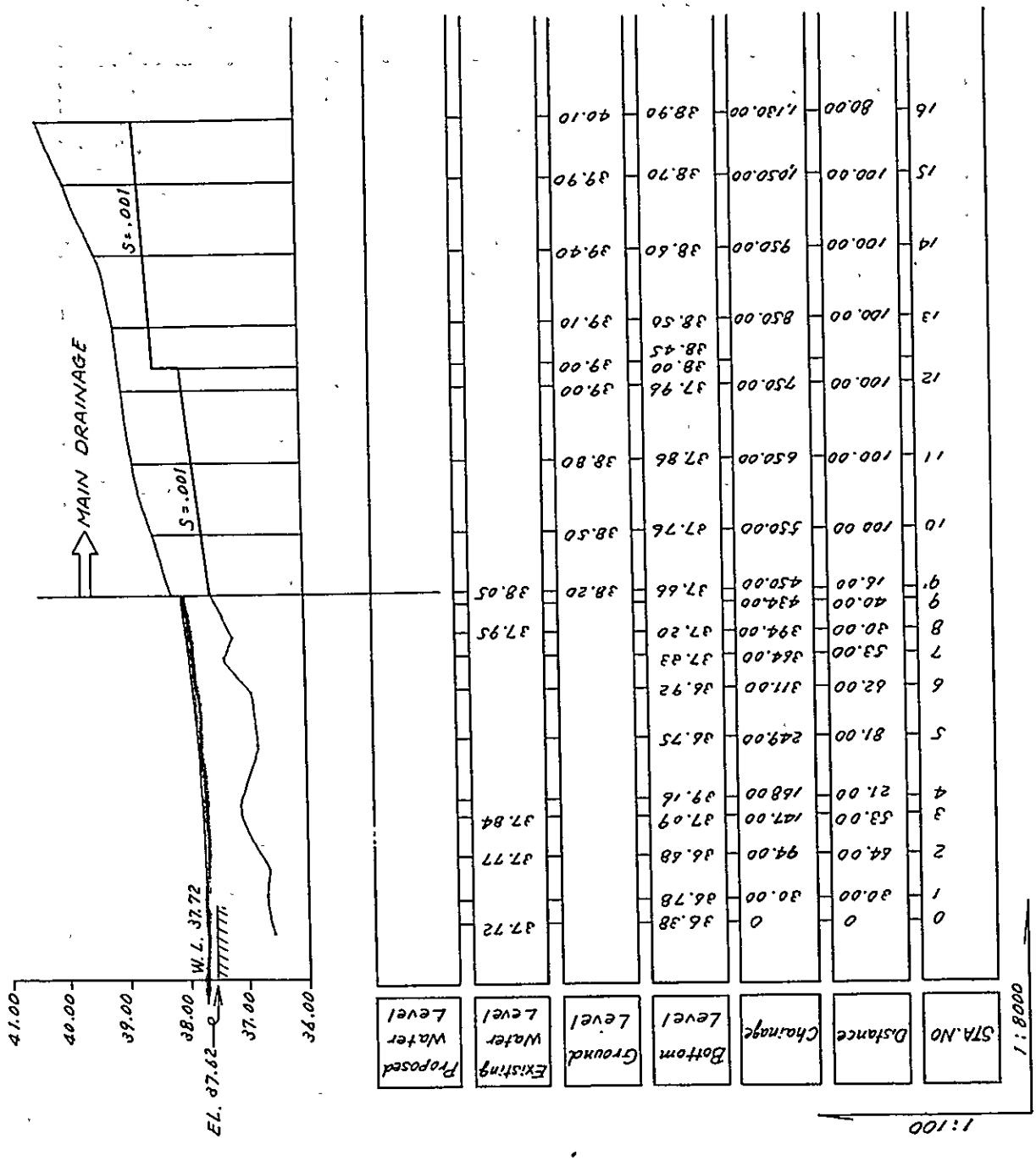


Fig.4-1 CROSS-SECT. OF DRAINAGE CANAL (1)

S 1:100

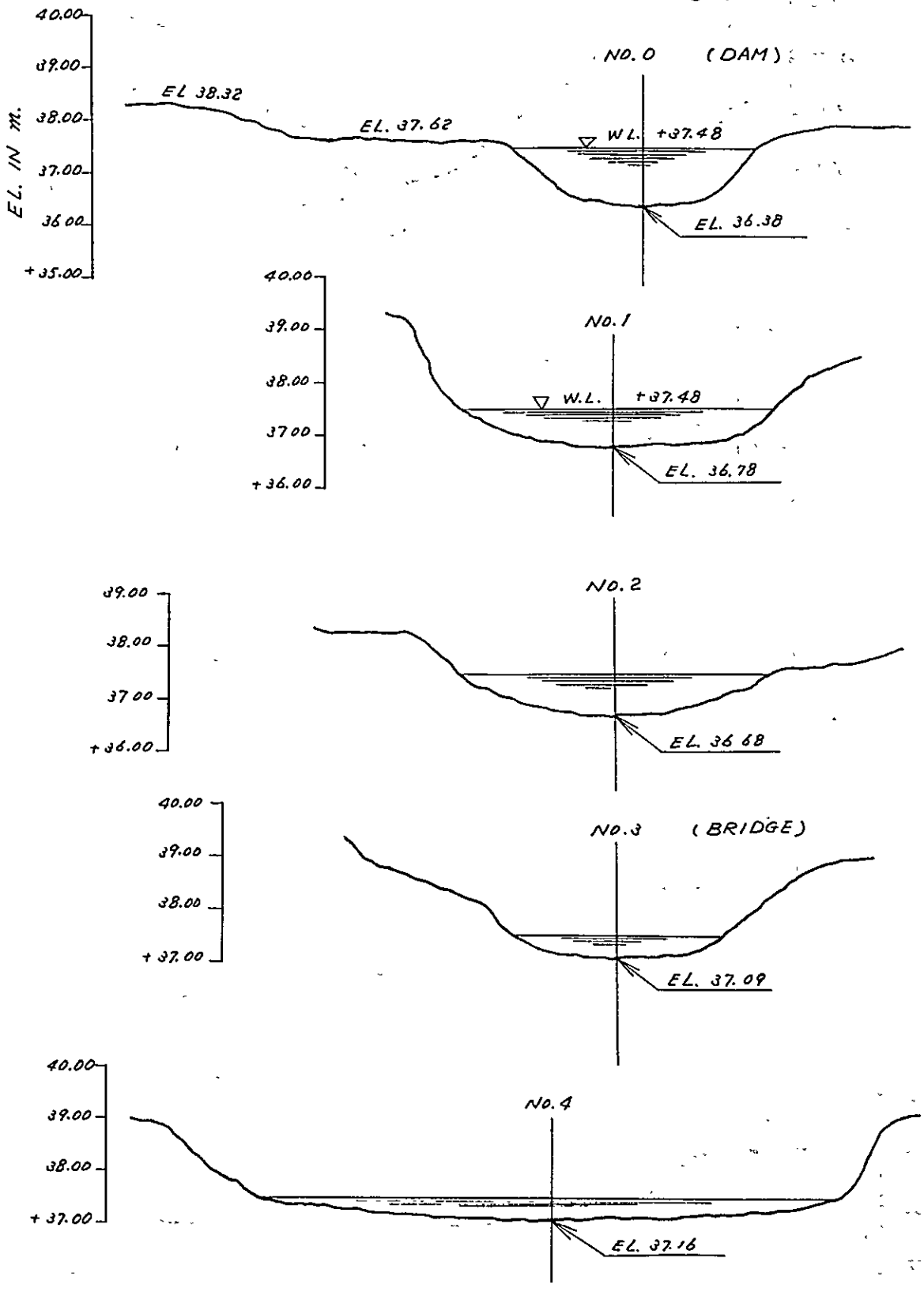


Fig. 4-2 CROSS-SECT. OF DRAINAGE CANAL (2)

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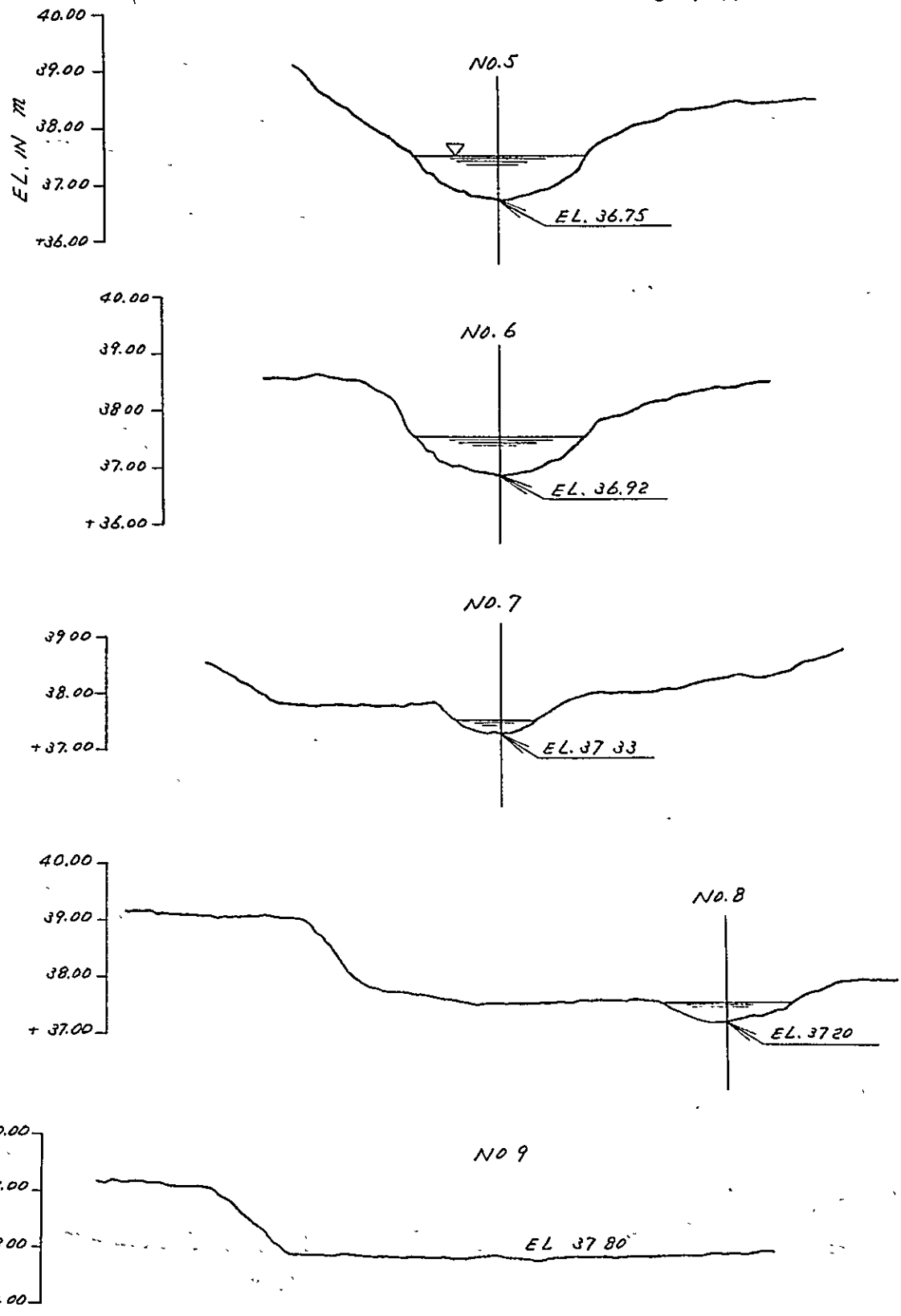


Fig. 5 EXISTING PLAN OF THE DIVERSION DAM IN THE PULA CREEK

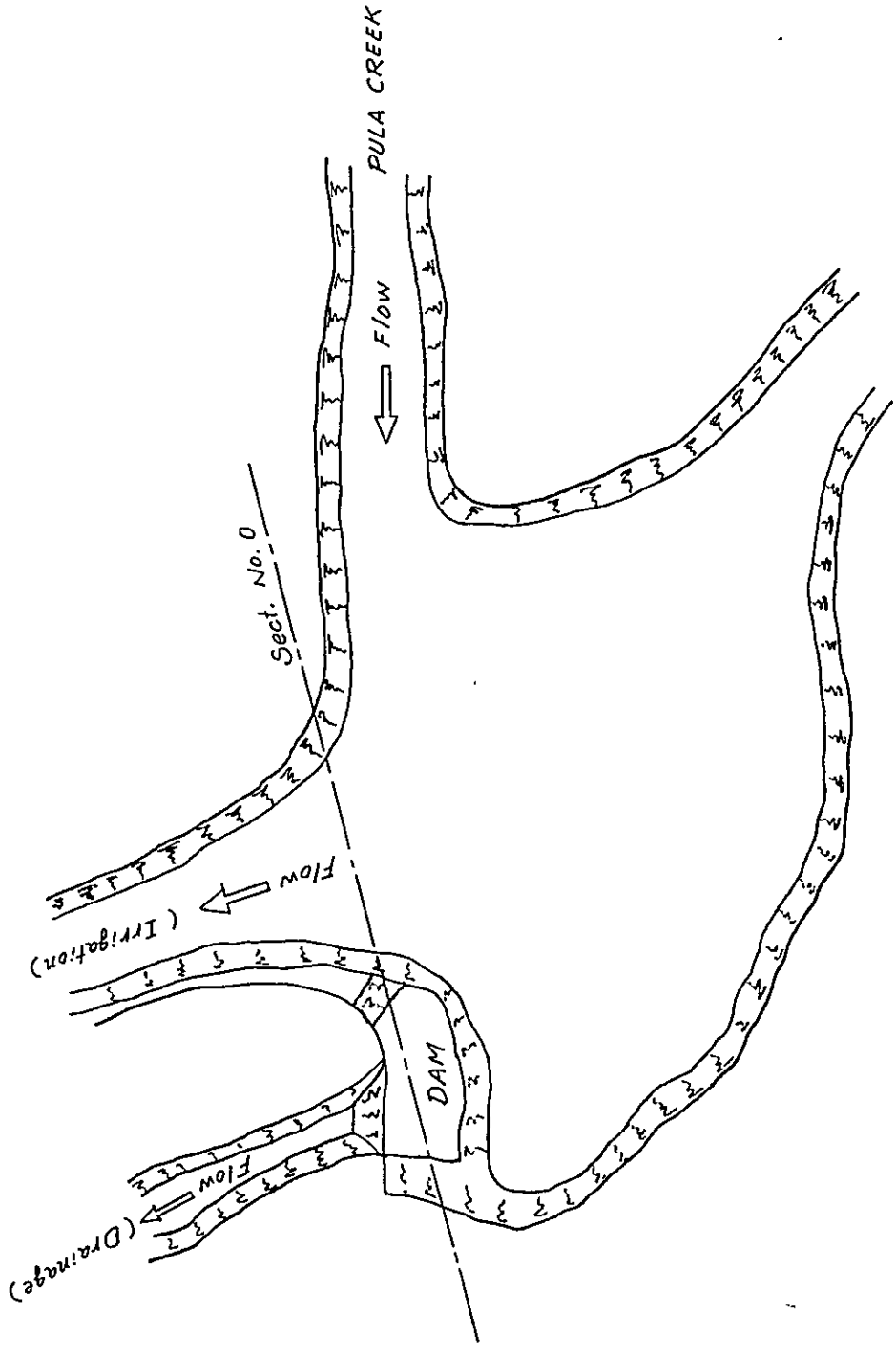


Fig. 6 Q ~ h CURVE (1) DRAINAGE CANAL

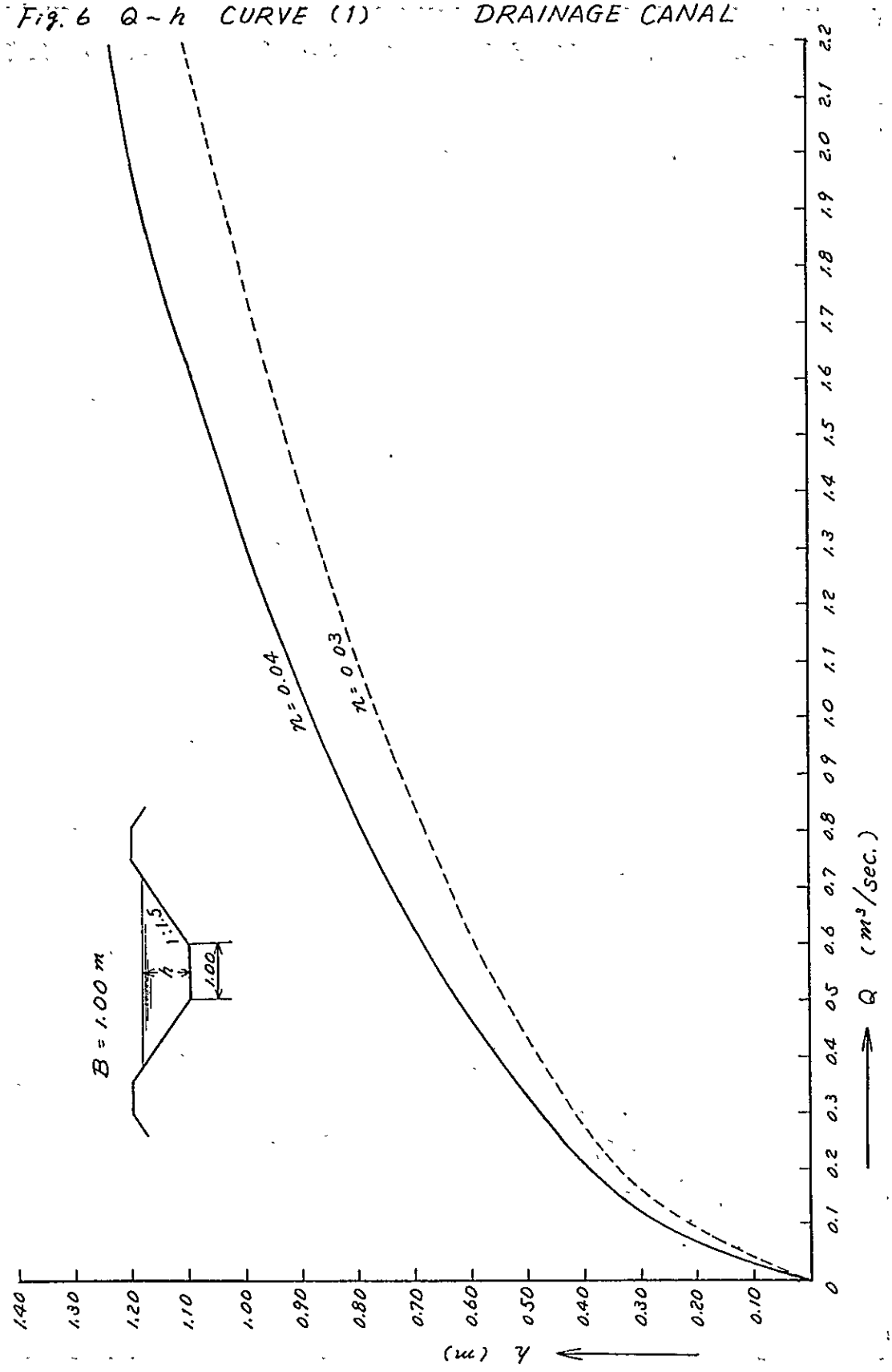


Fig.7 Q ~ h CURVE (2) DRAINAGE CANAL

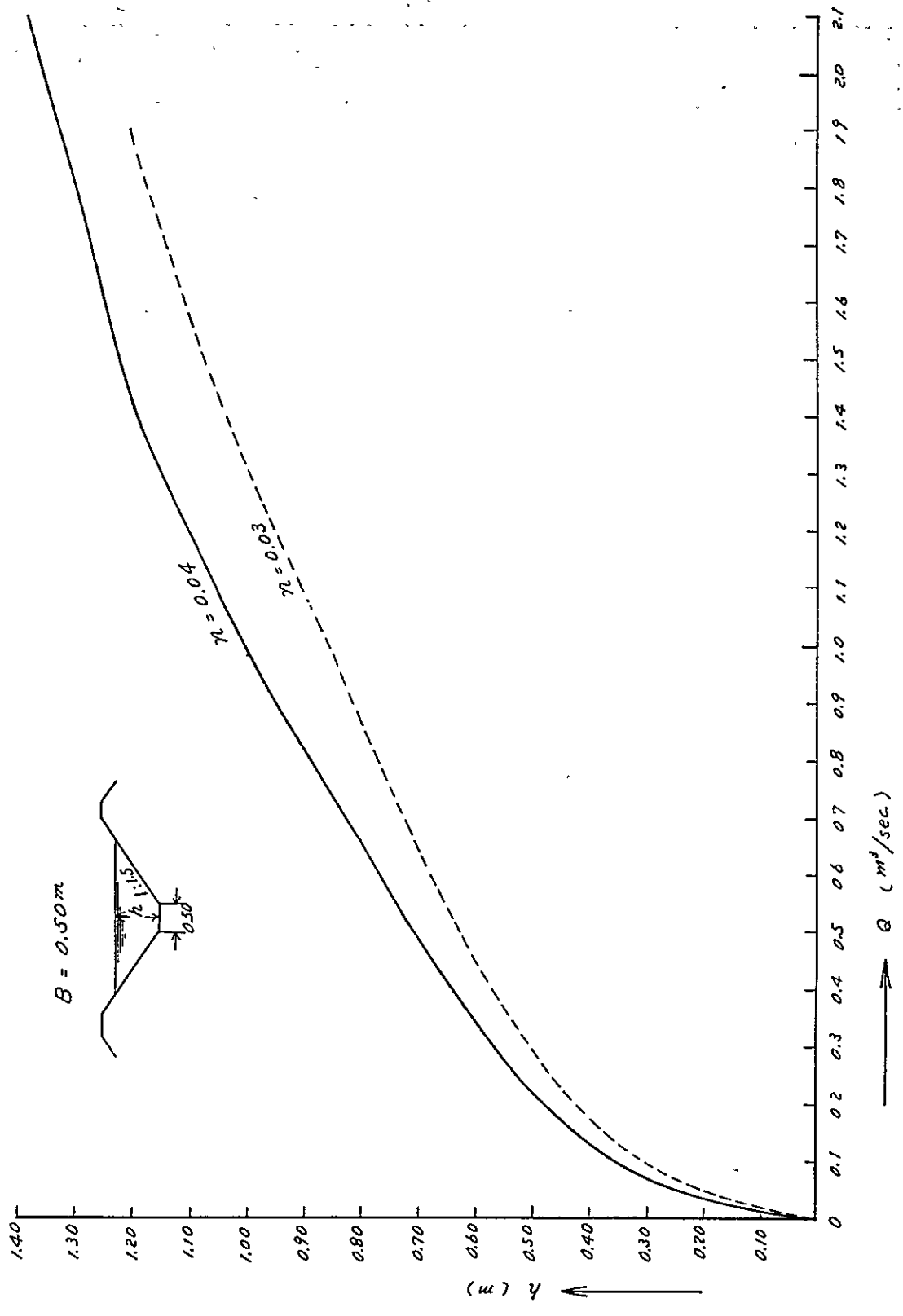


Table-2. DRINAGE CANAL

MAIN DRAIN

Name of Drains	Block	Area (ha)			Discharge (m^3/s)
		Rice Field	Others	Total	
M'	-	75.31	14.32	89.63	2.08
M"	-	60.25	11.30	71.55	1.66

DRAINS

Name of Drains	Block	Area (ha)			Discharge (m^3/s)
		Rice Field	Others	Total	
D - 1	10.	9.65	7.12	16.77	0.39
D - 2'	1,2,3,4,5,6,7,8,9,11,12.	48.26	4.18	52.44	1.22
D - 2"	1,2,3,4,5,6,7,8,9,11.	44.55	4.18	48.73	1.13
D - 3'	8,9.	4.62	0.19	4.81	0.11
D - 3"	8.	2.76	0.19	2.95	0.07
D - 4'	1,2,3,4,5,6.	26.18	3.18	29.36	0.68
D - 4"	1,2,3,4,5.	20.49	1.38	21.87	0.51
D - 5	-	-	-	-	-
D - 6'	1,2,3,4.	14.14	1.38	15.52	0.36
D - 6"	1,2.	9.96	1.38	11.34	0.26
D - 7	-	-	-	-	-
D - 8	3.	0.88	-	0.88	0.02

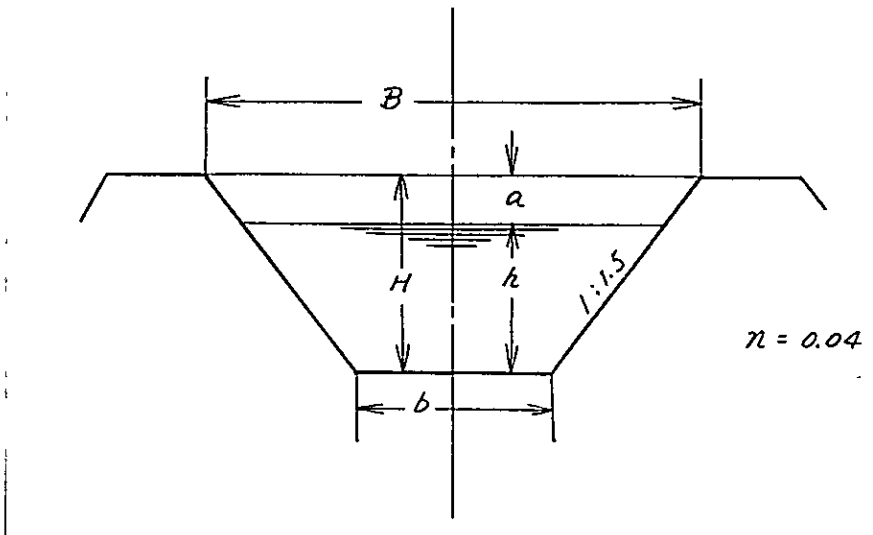
Table-3. DETAILS OF DRAINAGE CANAL

MAIN DRAIN

Name of Drains	b m	B m	h m	a m	H m
M'	1.00	5.20	1.22	0.18	1.40
M''	1.00	4.90	1.11	0.19	1.30

DRAINS

Name of Drains	b m	B m	h m	a m	H m
D - 1	0.50	2.90	0.64	0.16	0.80
D - 2'	1.00	4.45	0.96	0.19	1.15
D - 2''	1.00	4.30	0.92	0.18	1.10
D - 3'	0.50	2.15	0.37	0.18	0.55
D - 3''	0.50	2.00	0.30	0.20	0.50
D - 4'	0.50	3.50	0.82	0.18	1.00
D - 4''	0.50	3.20	0.71	0.19	0.90
D - 5	-	-	-	-	-
D - 6'	0.50	2.90	0.62	0.18	0.80
D - 6''	0.50	2.60	0.54	0.16	0.70
D - 7	-	-	-	-	-
D - 8	0.50	1.85	0.30	0.15	0.45

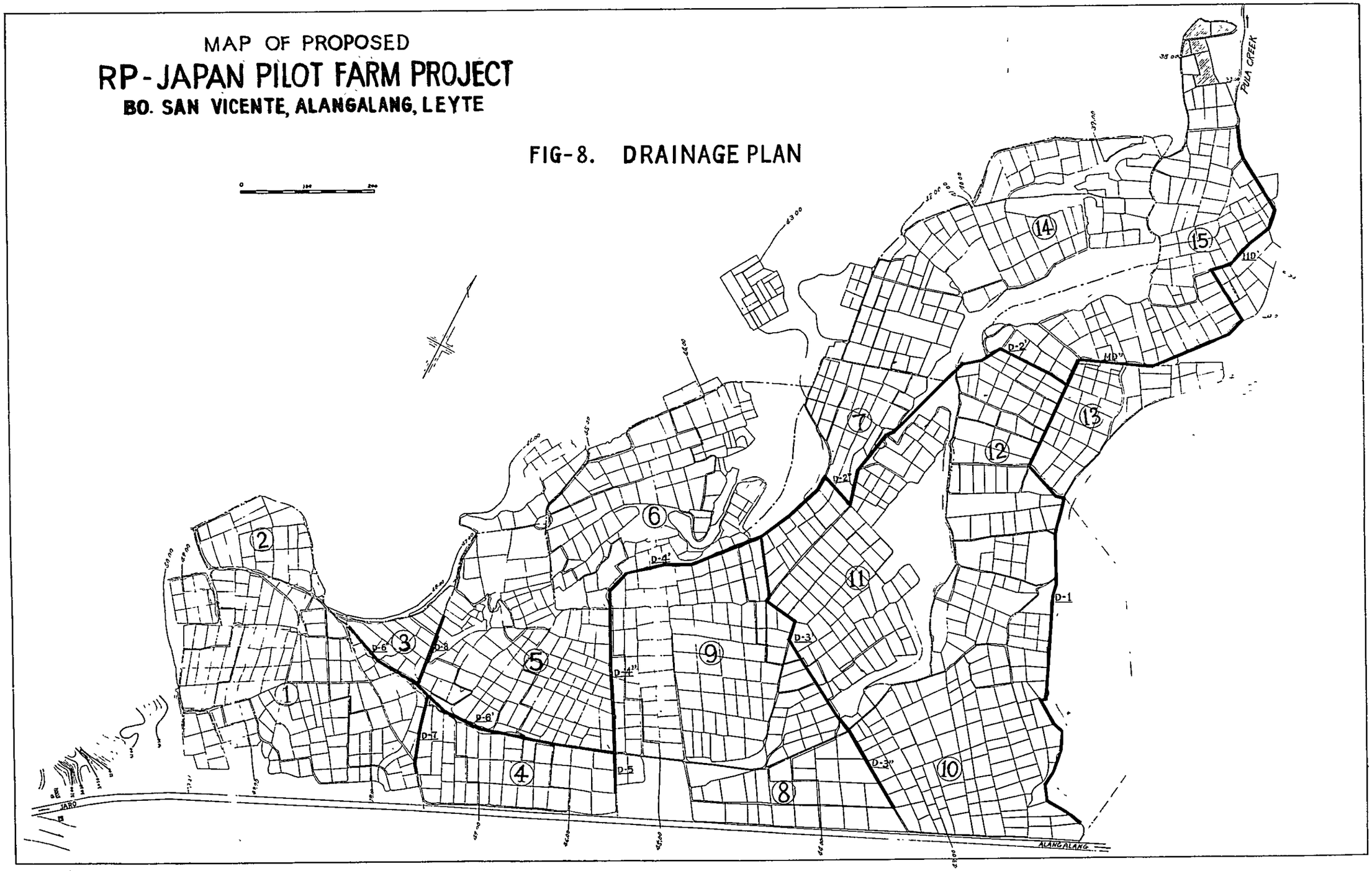


MAP OF PROPOSED

RP-JAPAN PILOT FARM PROJECT

BO. SAN VICENTE, ALANGALANG, LEYTE

FIG-8. DRAINAGE PLAN



V—2. APPNDIX-II: Study on Improvement Works of the Dosho Dam

1. Proposed Flood Discharge

$Q = Q_1 + Q_2$ $\qquad\qquad$ $Q_2 = q\,A$

Q : Proposed Flood Discharge

Q_1 : Inflow from the Jaro Dam (=3.0 cu. m/s)

Q_2 : Run-off from the watershed area

q : Specific Run-off (3.5 cu. m/s/sq.Km)

A : Watershed area (=1.75 sq.Km)

Therefore,

$Q = 3.0 + 3.5 \times 1.75$

$= 9.13$ cu.m/s

2. Flood Discharging Capacity of the Arabunog Creek at the Dosho Dam.

The section is shown in the attached figure

$I = 1/160$

$n = 0.04$

$P = 7.83$ m

$A = 6.0$ sq.m

$R = A/P = 0.766$ m

$V = 1.65$ m/s

$Q = A\,V$

$= 6.0 \times 1.65 = 9.9$ cu.m/s larger than 9.13 cu.m/s

3. Improvement Design of the Dosho Dam

Piers and the concrete wall on the right bank are removed and three collapsible gates are applied in order to allow free flow during flood. Width, height and falling depth of the gate are 2.1 and 0.1 meters, respectively.

Concrete apron is extended 1 meter to the right and 2 meters to upstream to resist against "piping".

Intake water velocity is 0.6 m/s and bottom level of the culvert is 40 centimeters higher than river-bed level in order to prevent silt.

4. Connecting Canal from the Dosho Dam to the Main Canal

Detail design was attached herewith

COST ESTIMATES

For the Proposed Automatic Falling
Shutter Dam Across the Arabunog Creek

1.	Concrete	20 Cu.M at P 400.00/Cu.M	P 8,000.00
2.	Rip-Rap	40 Cu.M at P 70.00/Cu.M	P 2,800.00
3.	Selected Sand Gravel back Fill at P 15.00/Cu.M		P 750.00
4.	Structure Excavation	20 Cu.M at P 10.00/Cu.M	P 200.00
5.	Demolition of existing Concrete Piers and Concrete Walls		P 200.00
6.	Automatic Wooden Shutter including Accessories, Manufacture and Installation ..... P 500.00		P 1,500.00
7.	Steel-Gate for Diversion Canal		P 500.00
8.	Miscellaneous, Overhead and Contingencies		P 1,050.00
		TOTAL	P15,000.00

FIG-9

GENERAL PLAN (AT DOSHO DAM)

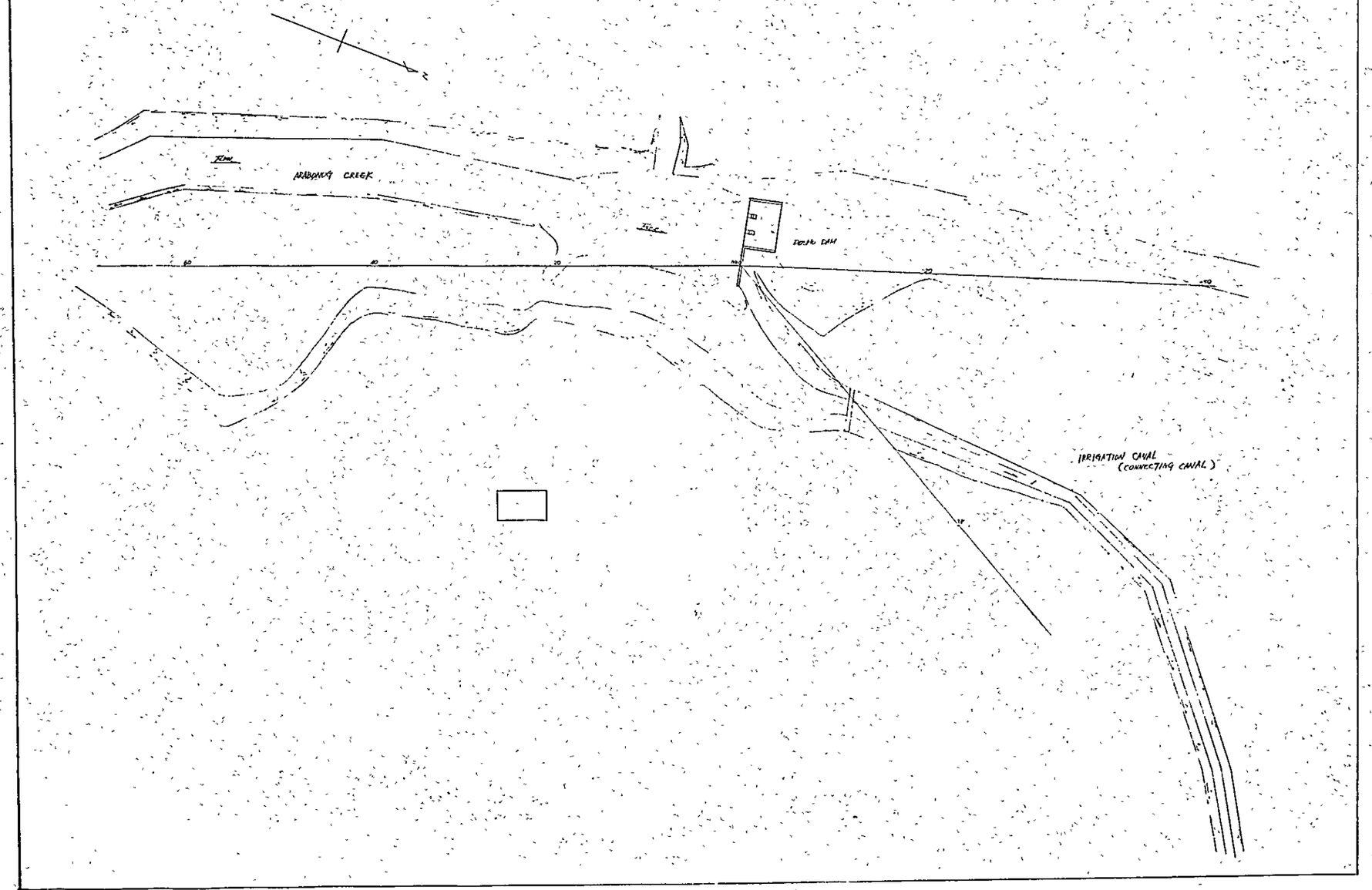
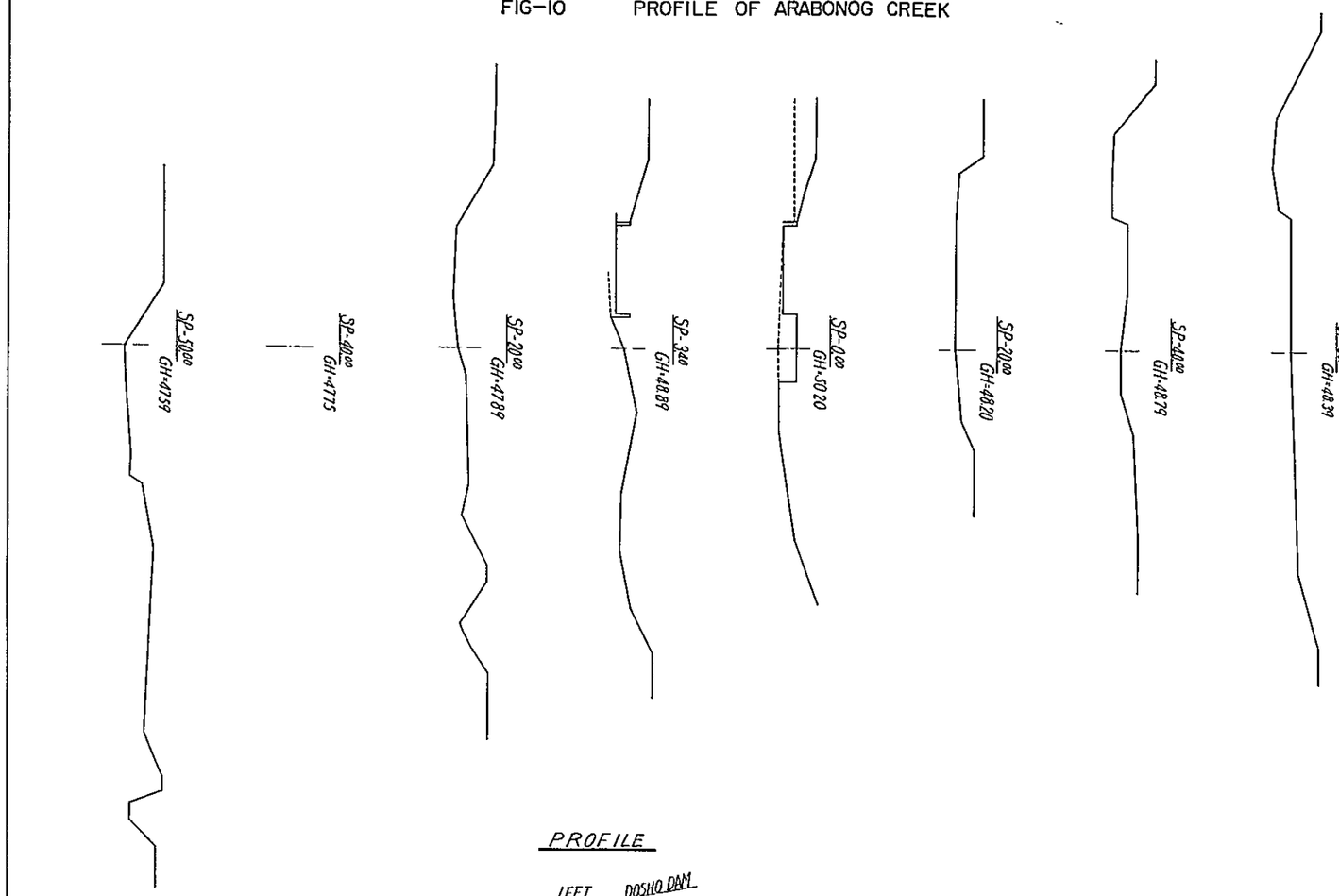
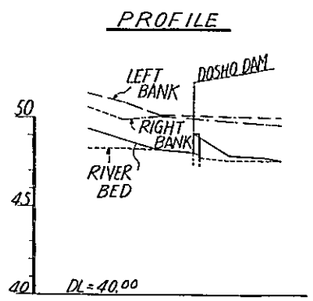


FIG-10 PROFILE OF ARABONOG CREEK

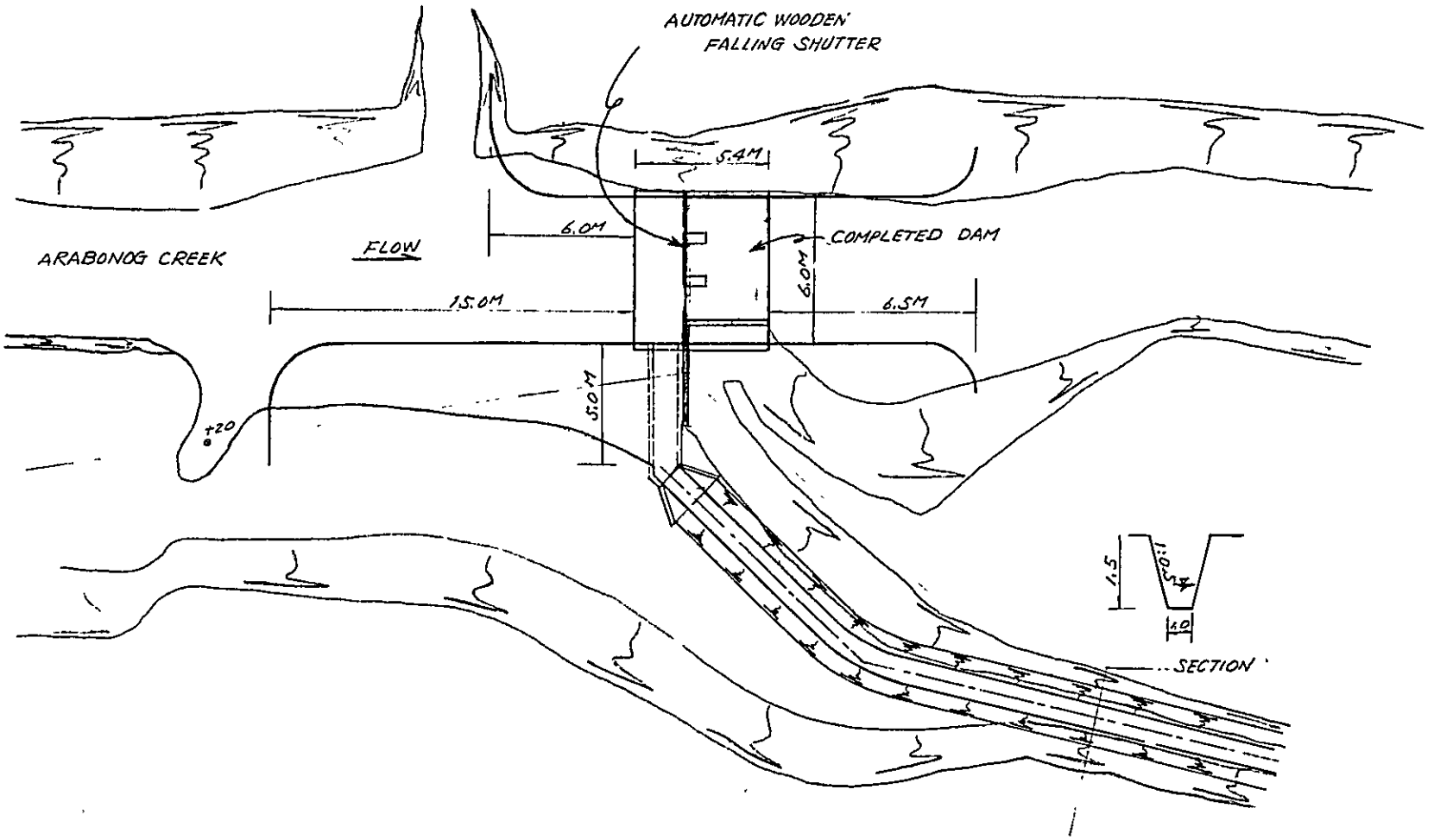


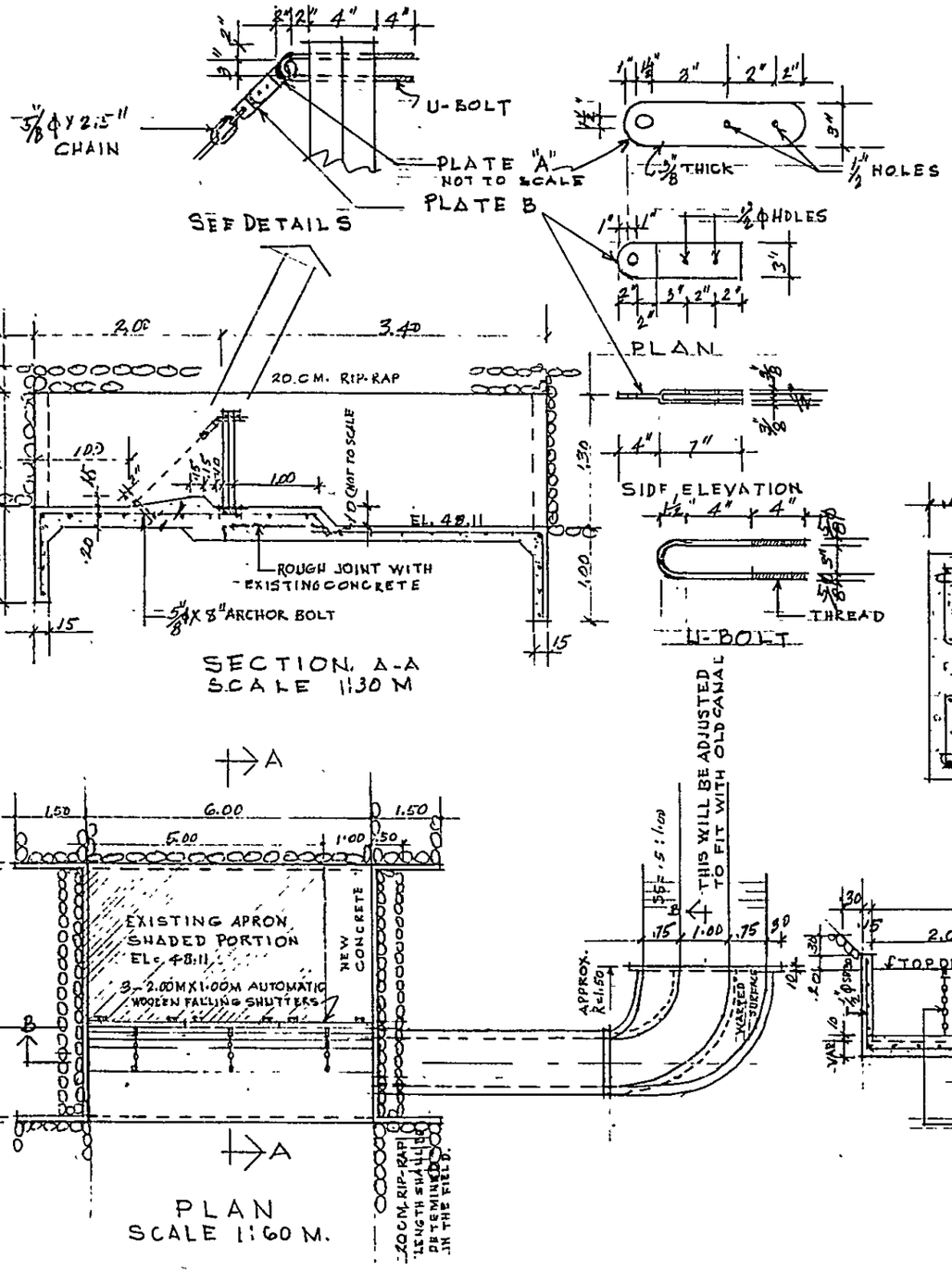


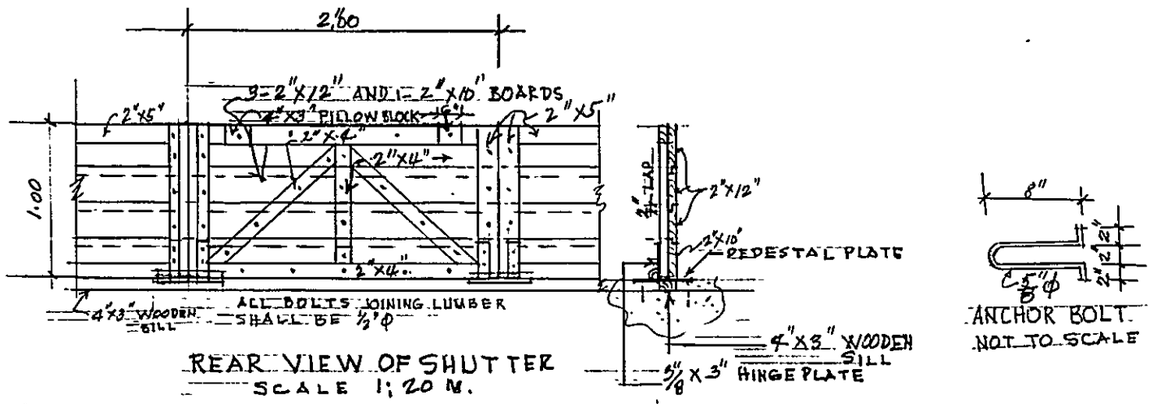
SP	GH	河床高	CA	BA
60	48.39			
40	48.79			
20	48.20			
0	50.20			
-34	48.89			
-20	47.89			
-40	47.75			
-50	47.59			

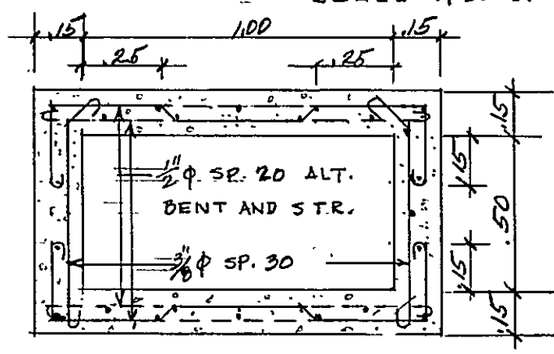
Fig-11 GENERAL PLAN OF DOSHO DAM

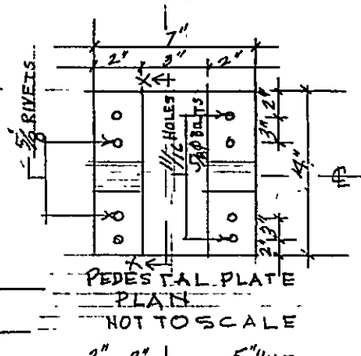
SCALE = 1 : 200

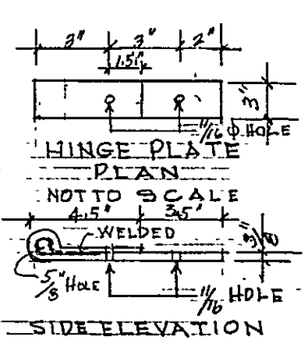












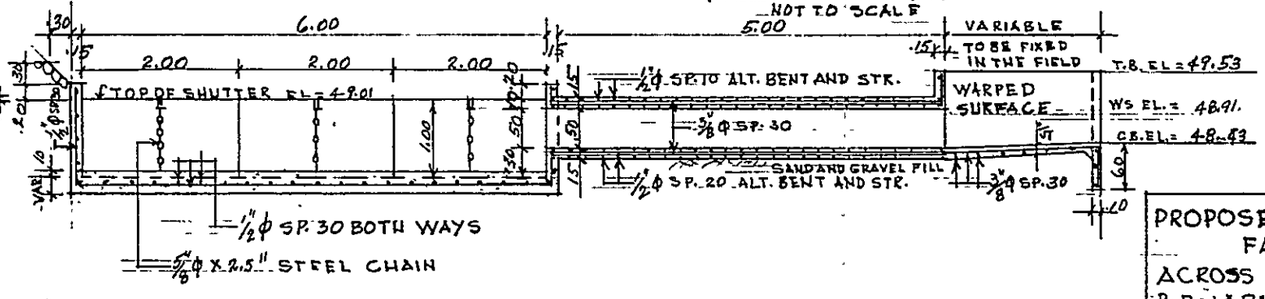
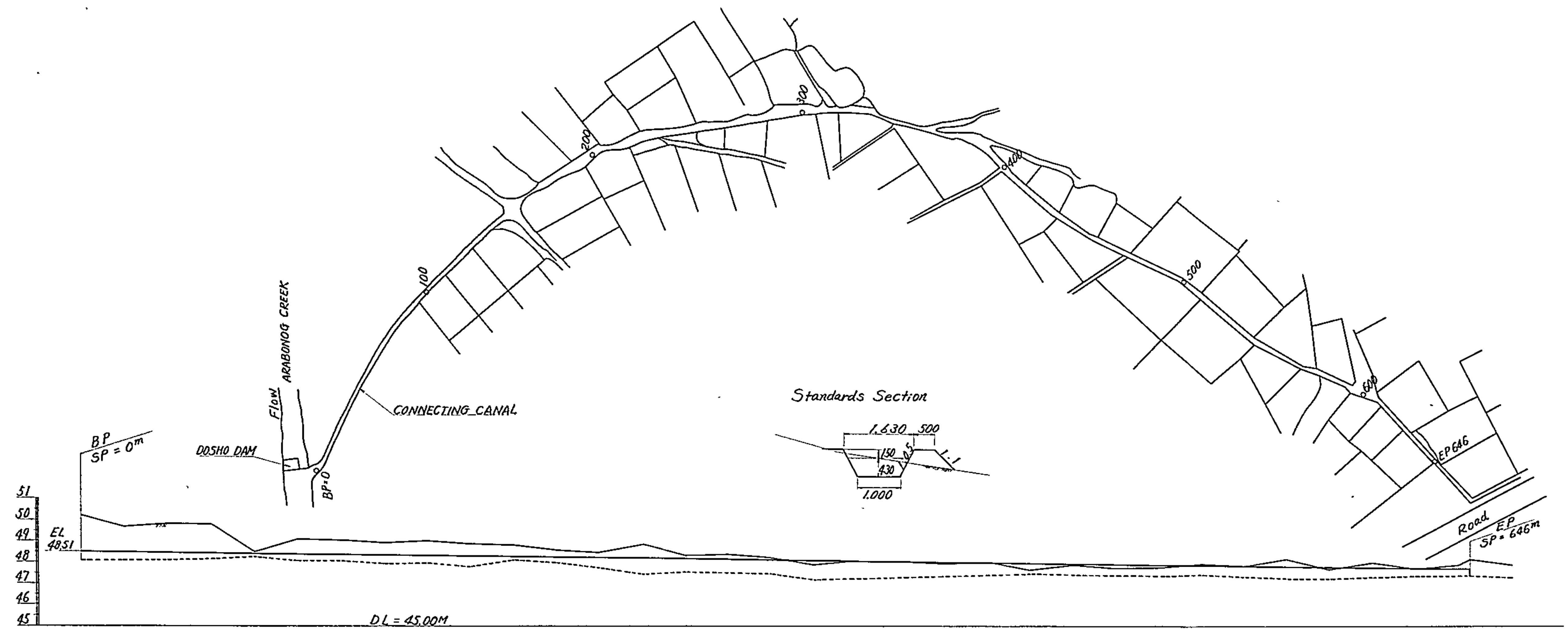


FIG-12

PROPOSED AUTOMATIC WOODEN FALLING SHUTTER ACROSS ARABONOG CREEK
R.P.-JAPAN PILOT FARM PROJECT
ALANG-ALANG LEYTE
DRAWN: E.R. ONIAS
DESIGNED: Y. ICHIKAWA & E.R. ONIAS.
APPROVED: _____ EXECUTIVE DIRECTOR

FIG-13 IRRIGATION PLAN S=1:1000



SP	G.H B	G.H ℄		I	BA	CA
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40	49.79	4816	4846			
60	4982	4816	4844			
80	48.54	4826	4841			
100	4908	4802	4839			
120	9904	4806	4836			
140	4897	47.91	4834			
160	4900	4795	48.31			
180	4887	4779	4829			
200	4879	4813	4826			
220	48.58	4796	4824			
240	4846	4773	4821			
260	4885	4745	4819			
280	48.33	4756	4816			
300	48.38	4748	4814			
320	48.21	4743	48.11			
340	4788		4809			
360	48.06		4806			
380	48.03		4804			
400	4798		4801			
420	48.01		4799			
440	4766	4742	47.96			
460	47.89	47.40	4794			
480	4771	4741	4791			
500	47.72	4734	4789			
520	4791	4743	4786			
540	4784	4731	4784			
560	48.15	4724	4781			
580	4766	4723	4779			
600	4798	4733	4776			
620	4769	4737	4774			
640	4785	4733	4771			
646	48.12	4745	47.70			
660 / 666	4783	4733				

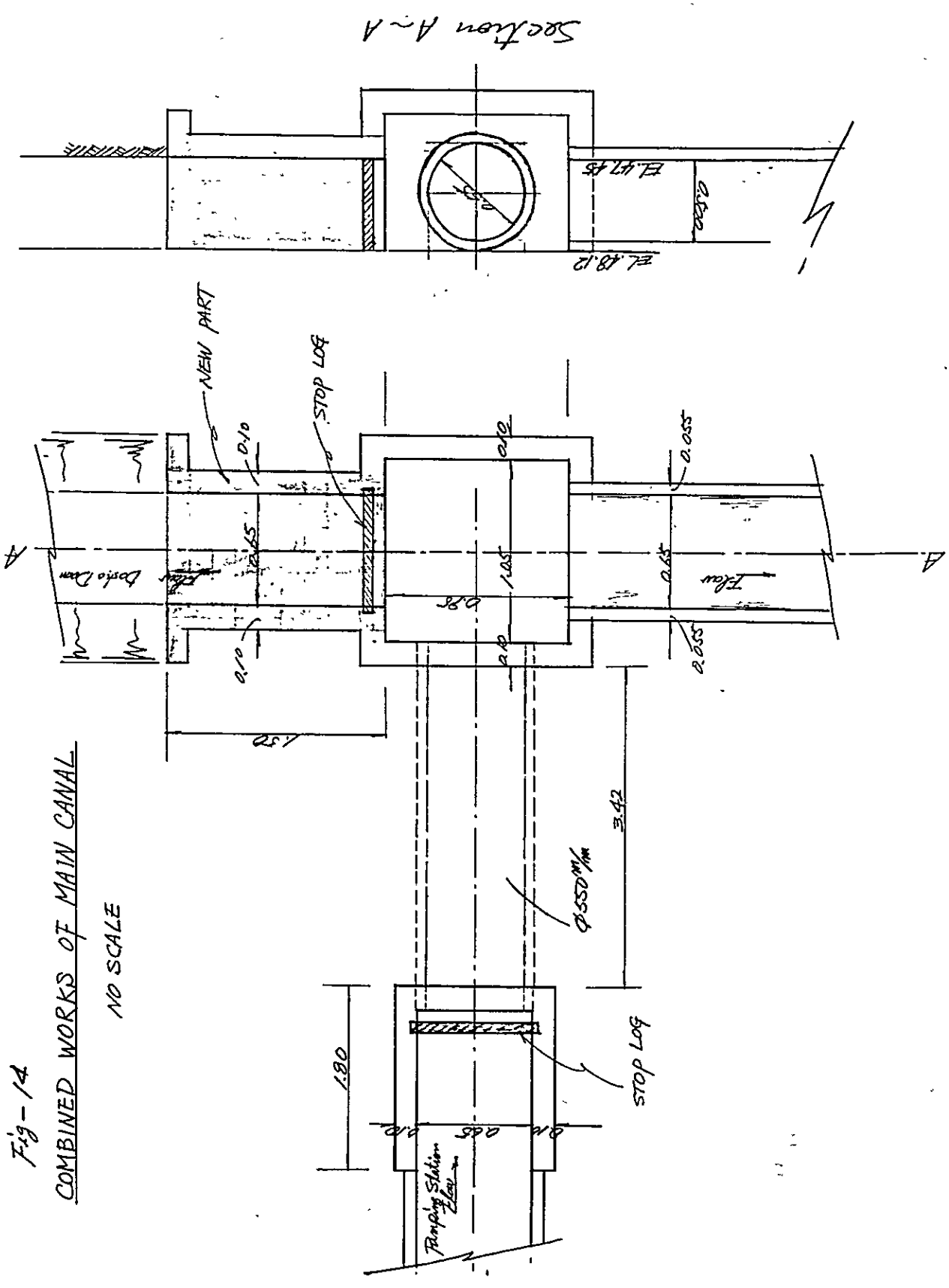

Fig-14
COMBINED WORKS OF MAIN CANAL
NO SCALE

MAP OF PROPOSED

RP-JAPAN PILOT FARM PROJECT

BO. SAN VICENTE, ALANGALANG, LEYTE

scale 1:2000 m

FIG-15 IRRIGATION PLAN