I: Percolation 1mm is considered for safety, as the ground consists mainly of heavy clay and so much underground percolation cannot be expected.

A: Irrigation area 4.6 ha

$$Q = \frac{1}{0.9} (5.8 + 1.0) \times 10^{-3} \times 4.6 \times 10^{4} \times \frac{1}{24 \times 60} = 0.241 \ (m^3/min)$$

2) Design total head

According to the results of the test boring carried out near the site for the installation of the groundwater pump, No. 1 aquifer lies below a depth 3-4 meters from the ground surface. At a depth 15-20 meters below the ground surface is a clay layer, and below it exists No. 2 aquifer. And the groundwater level is about 3 meters below the ground surface in the existing wells in dry season.

As the design discharge is very small, it is planned to draw water from No. 1 aquifer.

Elevation of ground surface	R.L. 2.56
Groundwater level (natural water level)	R.L. -0.50.
Lowering of water table allowance	5.00 m
Water level at outlet	R.L. 3.50
Loss on outlet pipeline	About 1.0 m

Design total head 3.50 - (-0.50) + 5.00 + 1.00 = 10.00 m

3) Specifications of pump

If it is planned to use the submergible motor pump as groundwater pump, the specifications of the pump are described as follows:

Discharge	0.241 (m^3/min)
Pump 65 (mm) ϕ Well 500 mm ϕ	
Number of steps	2 steps
Output 1.5 KW 50 Hz 2P 3,000 RPM	
Number of units	1

4) Well for pumping up water

The minimum bore of a well for a submergible pump with 65 mm bore is 200 mm, but 500 mm is used for the sake of safety. Steel pipe is used as the casing, and holes of 2.5 cm diameter are made around the casing at intervals of about 10 cm. Ballasts are placed on the lower edge of the well to protect the piping.

5) Pump station

The discharge of the groundwater pump is made directly into the regulating box (water distribution box), but the layout of the outlet pipe must be such that the discharge into the pond is possible through the intake pipe for irrigation pump.

5 - 5 Irrigation ditches

Ditch with semi-circular cross section is used for irrigation. Water depth of uniform flow is obtained by using the irrigation requirement for puddling.

Discharge $Q = 0.0106\ m^3/sec$

Radius of ditch 0.375 m (Ready-made canals are used)

Slope of ditch 1/20,000 $n = 0.015$

$$\frac{Q.n}{I^{1/2} \cdot \gamma\ 8/3} = \frac{0.0106 \times 0.015}{(1/20,000)^{1/2} \times 0.375^{8/3}} = 0.3075$$

$$\frac{d}{\gamma} = 0.53 \qquad d = 0.53 \times 0.375 = 0.20\ (m)$$

Therefore, water depth is 20 cm and freeboard is 17.5 cm.

6. Drainage facilities

6 - 1 Bi-purpose pump

It is planned to drain as much as possible the runoff due to rainfall in the area by natural drainage as a rule, but natural drainage becomes impossible in case the surrounding is flooded. In such case, pumping drainage is adopted. On the other hand, the pump can be utilized for irrigation.

(1) Design drainage discharge

Three-day continuous rainfall is planned to be drained in 3 days. The design drainage discharge is $0.2095\ m^3/sec$ ($12.57\ m^3/min$) (See 2, and 2-1, and 4)

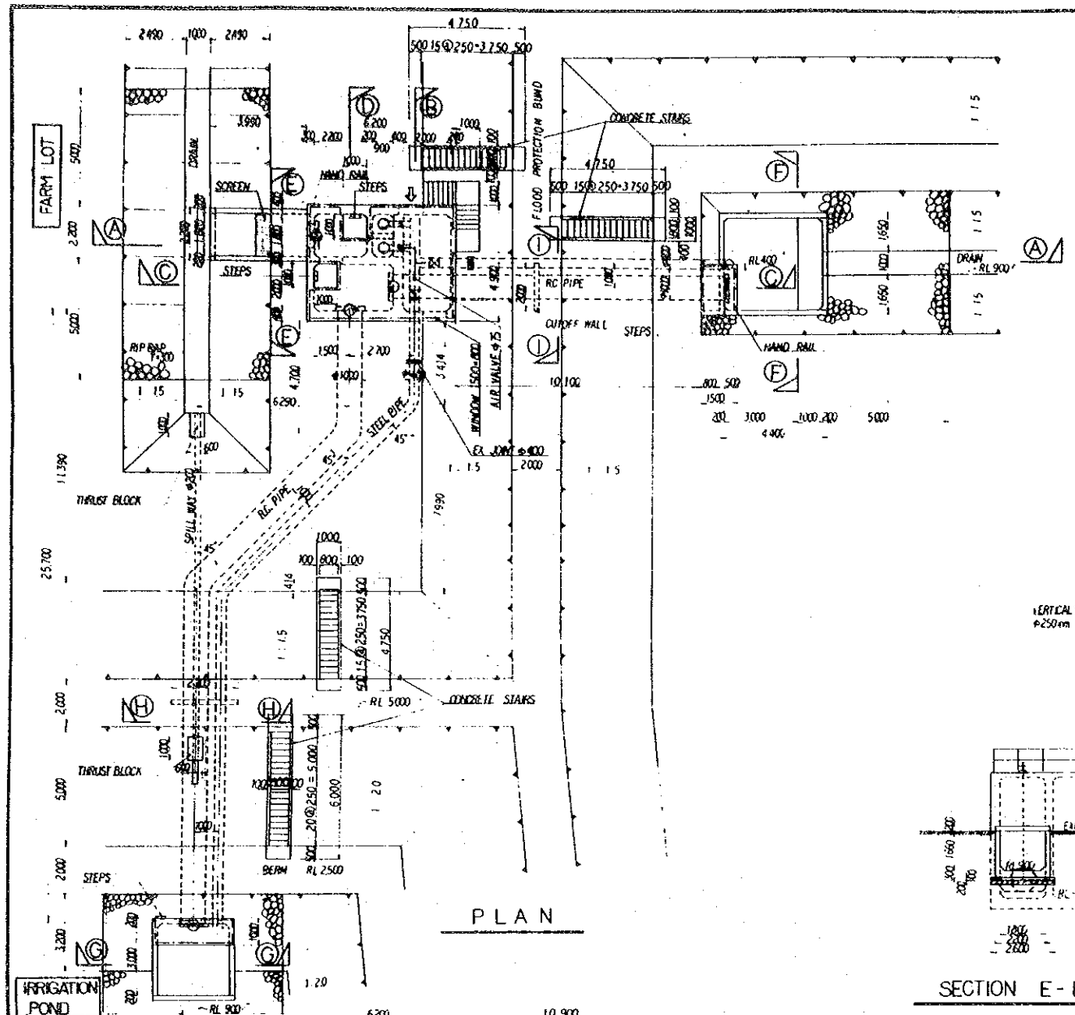
(2) Design total head

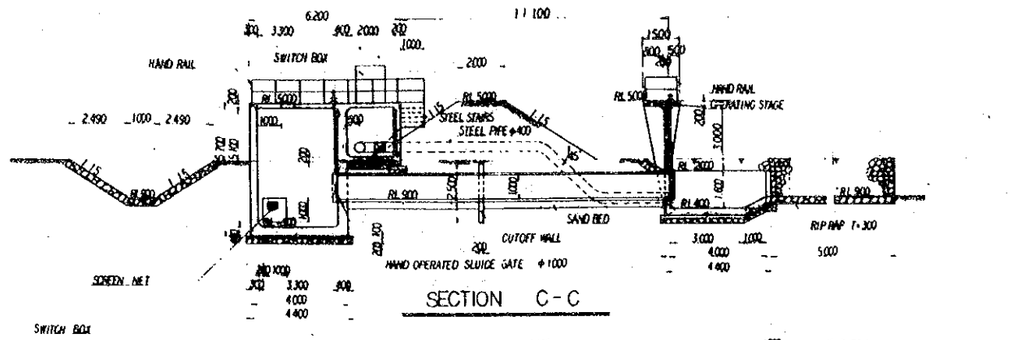
At the time of drainage

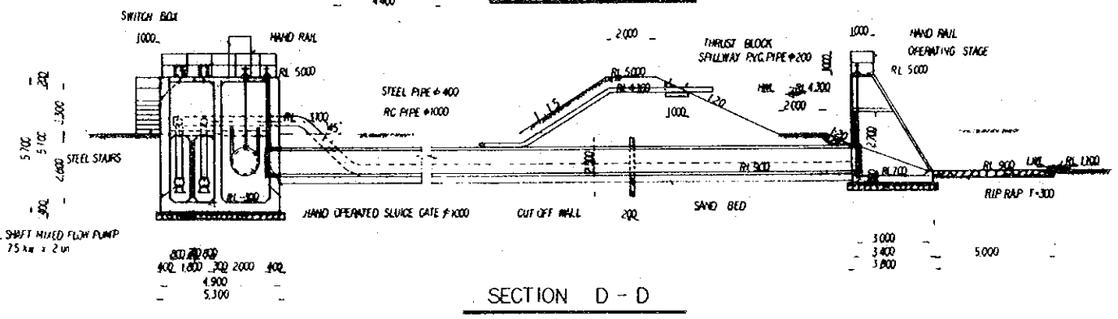
Design inlet water level	Present ground level less screen loss of 20 cm. R.L. 2.40 minus 0.20 = R.L. 2.20 m
Design outlet water level	1967 flood water level R.L. 4.73 m
Design actual head	2.53 (m)
Loss at pump	1.00 (m)
Friction loss in pipeline	ℓ= 20 m Steel pipe C = 100 ϕ 300 mm

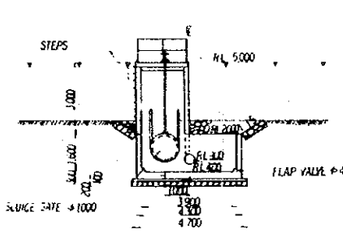
$$h = 10.666 \times C^{-1.85} \times D^{-4.87} \times Q^{1.85} \times 1 = 0.83\ (m)$$

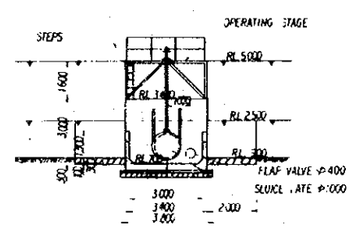
Design total head 4.36 ÷ 4.40 (m)

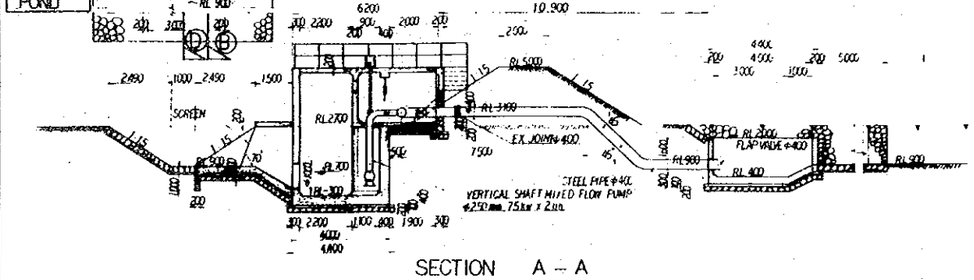


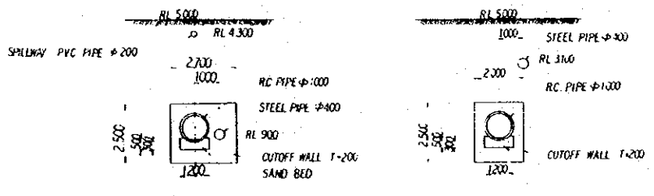


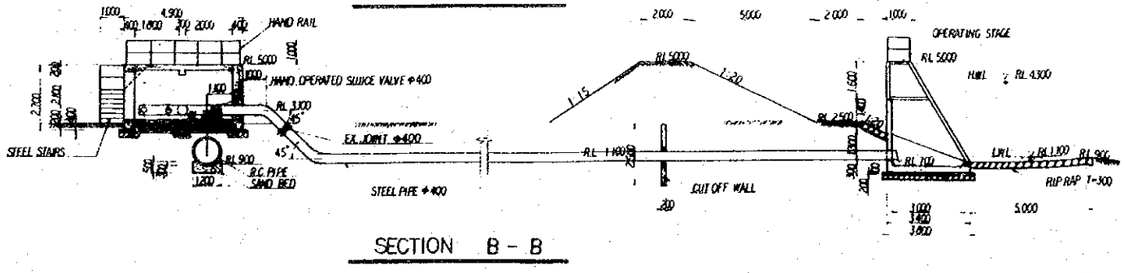












WATER MANAGEMENT TRAINING PROJECT		
GENERAL PLAN OF BI-PURPOSE PUMP STATION		
Japan International Cooperation Agency		
DRAWN		NO 5-6
TRACED		
CHECKED		SCALE 1:100
APPROVED		

(3) Specifications of pump

Two pumps are to be installed in due consideration of diversification of risks, and the small discharge.

Discharge per pump	6.29 m^3/min/pump
Total head	4.40 m
Bore of pump	250 mm ϕ, vertical shaft mixed flow pump
Output 7.5 KW	8P 50HZ 750 RPM
Number of pumps:	2 units

(4) Pump station

To prevent flood damage on machinery and equipment, motors and electric apparatuses are installed above the crest of bund, R.L. 5.00, and outdoor type motors and switchboard are used.

(a) Elevation of the bed of suction chamber

The minimum water level of the drainage ditch is decided as R.L. 0.90 which is the water level at the bottom of the ditch. It is planned to maintain the water depth at 0.60 m from L.W.L. to the end of the bell mouth pipe and at 0.40 m between the end of pipe and the bottom slab of the suction chamber with taking into consideration the loss of head of 0.20 m due to screen. Then the elevation of the bed of suction chamber is set at R.L. -0.30 m.

(b) Delivery pipe

Steel pipe is used for piping on the outlet side. The design velocity is set about 1.5 m/sec.

$Q = A.V.$ $\quad A = \frac{2D^2}{4}$ $\quad Q = 0.2095\ m^3/sec$ $\quad V = 1.5\ m/sec$

Therefore, $D = \sqrt{\frac{(0.2095/1.5) \times 4}{\pi}} = 0.422\ (m) \fallingdotseq 0.40\ (m)$

Consequently, bore of steel pipe on the outlet side is planned as 400 mm. And, steel pipe of the same bore is used for piping to the pond, and the exchange from drainage to storage is done by means of the sluice valve 400 mm in diameter. At the each outlet of the delivery pipe a steel flap valve will be installed.

(c) Gravity intake conduit

It is planned to draw flood water outside of the bund either by pumping up into the pond or by gravity inflow when the water level outside the bund is high. As it may be only a few days when the outer water level is high, the conduit must be of the cross section of sufficient capacity.

The flood water level of normal year is about R.L. 3.00. At this water level, the quantity of water which can be stored is 35,000 - 5,000 = 30,000 m^3 according to H-Q curve. The cross section of the conduit that will be possible

to store this quantity of water in one day at mean velocity of 0.50 m is calculated below.

$$Q = 30{,}000/24 \times 60 \times 60 = 0.347\ m^3/sec \qquad V = 0.5\ m/sec$$

$$D = \sqrt{\frac{(0.347/0.5) \times 4}{\pi}} = 0.94\ (m) \fallingdotseq 1.00\ (m)$$

A control chamber is installed adjacent to suction chamber in the pump station, and the conduit is switched for pumping intake to gravity intake or vice versa by operating the gates.

The conduit is made of the Hume pipe, and a round watertight sluice gate is installed on the inlet side as well as the outlet side.

6 - 2 Drainage ditch

As underground drainage is planned for a part of the field, it is planned to maintain a depth of about 1.5 m at the end of the drainage canal. And, as the capacity of the drainage pump is designed for draining 3-day rainfall in three days, the depth of flooding of the field can be reduced by increasing the quantity of water stored temporarily in the drainage ditches within the area. Upon consideration of these points, the cross section of the drainage ditch is planned as follows:

Bottom width	1.0 m
Side slope	1:1.5
Longitudinal gradient	1/5,000

Water depth for design drainage discharge $Q = 0.412\ m^3/sec$ is obtained as follows.

$$\frac{Q.n}{I^{1/2} \times b^{8/3}} = \frac{0.412 \times 0.035}{(1/5{,}000)^{1/2} \times 1.0^{8/3}} = 1.02 \qquad n = 0.035$$

From the graph of calculation of uniform flow-water depth

$\frac{d}{b} = 0.793$ Therefore $d = 0.793 \times 1.00 = 0.793$ m

The elevation of the bed of culvert crossing for the drainage ditch now under construction by DID on the downstream is R.L. 1.83. Therefore, pump drainage is necessary if the water level at drainage ditch is lower than this level, and it is desirable to lower the elevation of the bed of the drainage canal in the future.

6 - 3 Drainage facilities outside the area

Run off from the outside of the area is regulated by the watertight sluice gate to be installed at the entrance of the conduit pipe. The cross section of this conduit pipe is Hume pipe 300 mm in diameter, and a round sluice gate is installed. As it is anticipated that the slope on the outlet down to the drainage ditch may be eroded by scouring, a revetment is provided for protection.

6 - 4 Drainage facilities for sewage

(To be designed by the Malaysian Authorities)

(1) Facilities for removing slush

Waste water from the workshop, warehouse for agricultural machinery and equipment, etc. contains slush. To allow such water to flow directly into the drainage ditch is not desirable from the viewpoint of the reuse of the water as irrigation water after pumping it up. Therefore, a facility to remove slush in the waste water is required. It is suggested to construct a box 3.0 m wide, 5.0 m long and 1.0 m deep and spread gravel in it. Slush is removed as the waste water passes through this box.

(2) Drainage of sewage

After sewage treatment, the water is drained to the outside of the embankment by natural flow through the conduit pipe.

7. Field Facilities

7 - 1 Roads

(See 3 - 1 - 2)

7 - 2 Facilities for the measurement of discharge

As the discharge during puddling is about 3 m^3/hour, the 60° triangular weir is used for the measurement of discharge. Ready-made portable triangular weir made of stainless steel is used to prevent corrosion.

Formula of discharge from JIS formula is:

$$Q = 0.577\ kh^{5/2} \qquad K = 83 + \frac{0.0624}{Bh^{3/4}}$$

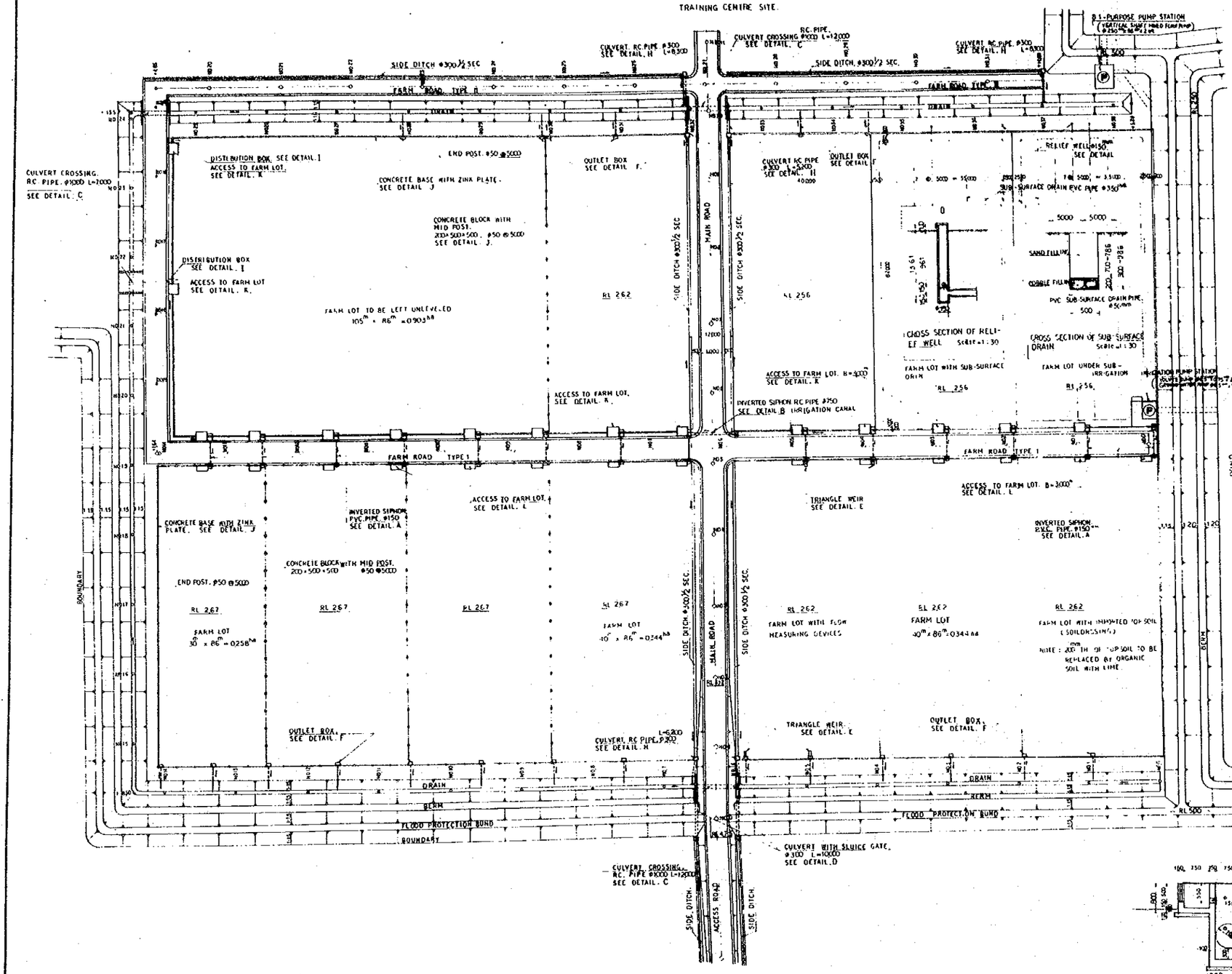
Where Q = Discharge (m^3/min)

B = Width of canal (m)

h = Water head (m)

K = Coefficient of discharge

However, as it could be surmised that the measured value is inaccurate



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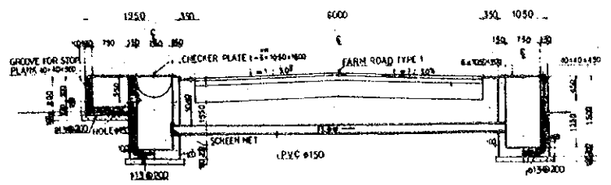

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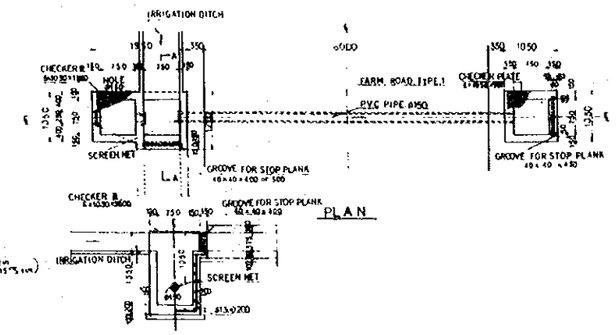

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SECTION A – A

DETAIL. A (INVERTED SIPHON ø150mm)

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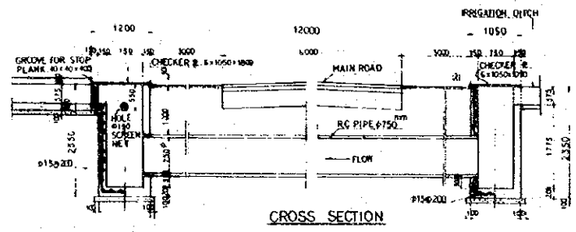

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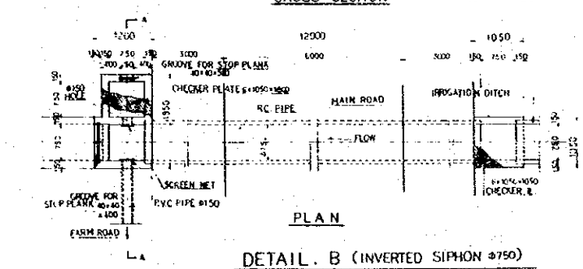

PLAN

DETAIL. B (INVERTED SIPHON ø750)

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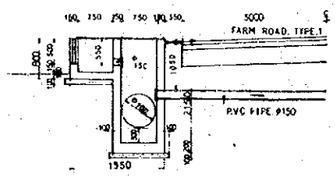


SECTION. A – A

NOTE

HOOKS TO BE PROVIDED AT BOTH ENDS OF EACH BAR
HOOKS ARE NOT SHOWN IN THIS DRAWING

WATER MANAGEMENT TRAINING PROJECT	
DETAILS OF DEMONSTRATION FARM AND RELATED STRUCTURES (1)	
Japan International Cooperation Agency	
DRAWN	NO. 3-3 (1/2)
TRACED	
CHECKD	SCALE 1 : 500
APPROVED	

because the discharge is small, it would be more acuurate to measure the difference in the water level of paddy fields and then to calculate the discharge.

7 - 3 Sub-surface facilities

(1) Depth and interval of drain

As to the decision of the interval of conduits, it is given as 10 to 15 times (clayey soil to sandy soil) of the depth of conduit from experience. As a method of deciding by the nature of soil, it is given as follows by Tanaka and Schroeder.

Interval of conduit — By Shinji Tanaka

Soil	Interval (m)
Clay	10-14
Loam soil	14-20
Sandy soil	20-40
Peat	12-18

Note: In case the depth of drain is 1.25 m.

Interval of Conduit — By Schroeder

Nature of Soil	Grain size 0.02mm and less Ratio by weight (%)	Depth of drain (m) 0.8	1.0	1.2	1.4
Heavy clay	100 ∿ 75	6 ∿ 8	6.5∿ 8.5	7 ∿ 9	7.5∿ 9.5
Ordinary clay	75 ∿ 60	8 ∿ 9	8.5∿10	9 ∿11	9.5∿11.5
Clayey soil	60 ∿ 50	9 ∿10	10 ∿11.5	11 ∿12.5	11.5∿13.5
Loam soil	50 ∿ 40	10 ∿11.5	11.5∿13	12.5∿14.5	13.5∿16
Sandy loam soil	40 ∿ 25	11.5∿14.5	13 ∿17	14.5∿19.5	16 ∿22
Loamy sand	25 ∿ 10	14.5∿18	17 ∿22	19.5∿26	22 ∿30
Sand	< 10	>18	>22	>26	>30

Note: It is necessary to make the interval smaller in a country like Japan where the mean annual rainfall is as large as 1,000-2,300 mm, although 600-650 mm is being used as the basic water quantity.

This area consits of calyey soil containing more than 50% of clay, and the annual mean rainfall is over 2,900 mm. Again, as the period for sub-surface drainage is limited in case double cropping is to be realized, it is desirable that the interval of conduit is made as small as possible.

Consequently, the interval of drains planned is 5.0 m corresponding to the depth of drain of 0.8 m.

It is planned to secure 0.8-0.9 m as the depth of drains at the end.

(2) Underground unit drainage discharge is obtained from the following formula.

$$Q = \frac{P \times R \times 10{,}000 \times 1{,}000}{D \times 1{,}000 \times 86{,}400} \quad \text{(Lit./sec/ha)}$$

Where

R: 5-year probility continuous 3-day rainfall 535.00 mm/3 days

P: Underground percolation 1/3

D: Number of days required for draining 3 days

$$Q = \frac{535 \times 1/3 \times 10{,}000 \times 1{,}000}{3 \times 1{,}000 \times 86{,}400} = 6.9 \text{ lit./sec/ha}$$

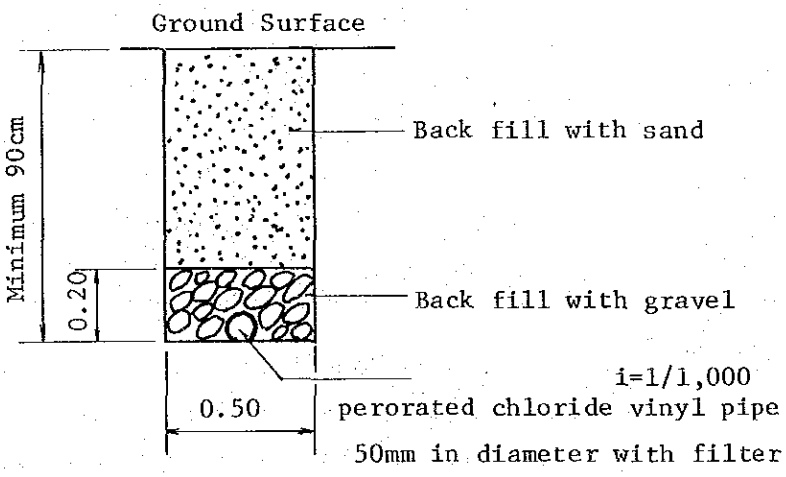
As the area covered by one conduit is 5.0 m x 86.0 m = 0.0043 ha, the drainage discharge of one drain is 0.03 lit./sec.

(3) Diameter of pipe and the slope

Assuming that the slope of drain is 1/1,000 and the diameter of conduit pipe is 5 cm,

$$Q = \frac{\times \times 0.05^2}{4} \times \frac{1}{0.008} = \left(\frac{0.05}{4}\right)^{2/3} \times (1/1{,}000)^{1/2} =$$

$0.000418\ m^3/sec = 0.418$ lit/sec > 0.03 lit./sec.

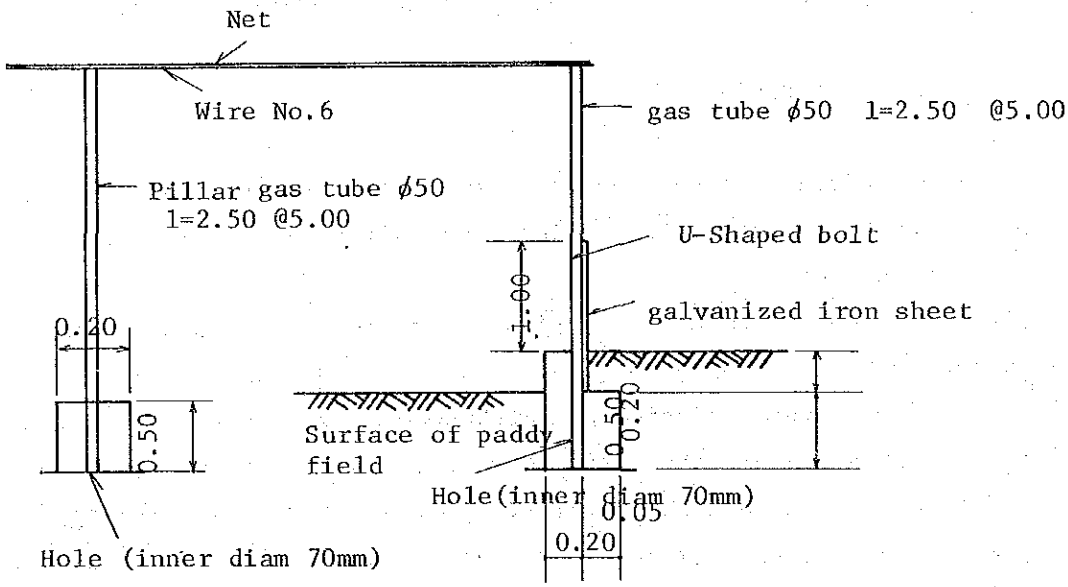


7 - 4 Sub-irrigation facilities

The end facilities for sub-irrigation are of the same dimensions and cross section as those of the facilities for sub-surface drainage. The irrigation water is taken by gravity from the drainage ditch, where water level is controled by a gate.

7 - 5 Facilities for prevention of damages caused by rats and birds

As the Demonstration Farm is located in the zone where single cropping is carried out on the rainfed paddy field, damages caused by rats, sparrows, etc. could be anticipated in case paddy cultivation is conducted in the dry season. Therefore, facilities to prevent such damages are required. These facilities are of the following dimensions.



III Pilot Farm

1. Purpose

As clearly indicated in the investigation report (March, 1977), the purpose of the Pilot Farm is to provide the trainees with the text for on-the-job training and the subjects for research, and also to expect the effect of demonstration on the local famers. It is planned to make efforts for establishing four pilot farms which are most acceptable to the farmers. An elementary ditch network which satisfies the minimum condition of supplying water to the specified field in required quantity within a given time will be constructed.

2. Determination of the types of ditch

There are many types of ditches from earth ditch to pipeline. Earth ditch is cheap and is acceptable to the farmers. As the result of the field survey, it has become clear that the necessity of providing ditch with lining because some parts of the area have to be 70-80 cm mounded ditch on account of the gradient of the ditch in a limited area.

The introduction of more advanced types of ditches suitable to the area and its topography would be a favourable thing for the trainees in the course of training and research.

The following four types of ditches are selected, based on the above-mentioned viewpoints and the basic concept of designing.

(A) Earth ditch

(B) Winding ditch with lining

(C) Straight ditch with lining (with farm road)

(D) Straight ditch with lining, Inter-unit rotation irrigation

3. Basic concept of design

Earth ditch

* Construct ditches on the boundary of the lots to reduce as much as possible the exchange, separation, and unification of lots and the purchase of lots.
* Use the ditches both for irrigation and drainage purposes.

Winding ditch with lining

* Lining ditch along existing border bunds. Advanced type of earth ditch.
* The construction of this ditch is of the type for maintaining as much as possible the conventional drainage system by installing the drainage pipe in the fill-up portion. Straight ditch with lining and farm road
* This type provides the field with be st facilities among the four areas.
* Exchange, separation, and unification of lots may become necessary to some extent.
* Increase the effect of demonstration of the advantageous nature of water management and cultivation by constructing farm roads passable for light machinery.
* Maintain as much as possible the conventional drainage system by installing pipes in the fill-up portion.

Straight ditch with lining, Inter-unit rotation irrigation

* To shorten the conventional 30-day irrigation to 6 days in a unit and to plan for increased efficiency of water management, centralization and joint-operation of cultivation.

4. Characteristics of each type of ditch

(A) Earth ditch

The construction cost is low, and it can be used both for irrigation and drainage purposes. Hydraulic loss is large due to large coefficient of roughness.

(B) Winding ditch with lining (improved type of earth ditch).

Suitable in case it is difficult to acquire lots. Quite popular.

(C) Straight ditch with lining and farm road

The area will have the most modern field among the four areas. Easy maintenance and control. Cost of lots and construction cost are high.

(D) Straight ditch with lining, inter-unit rotation irrigation

Efficient mechanization can be expected. Centralization and joint operation can be promoted.

5. Type of dich for each area

Padang Lindong ..... earth ditch

The acreage of the area is largest among pilot farms. Ownership and shape of lots are complicated. Comparatively steep slopes of the ground are suitable for the earth ditch.

P2 M ..... Winding ditch with lining

The shape of the area and the ownership of lots are complicated.

P3 T1 S6 K ..... straight ditch with lining and farm road

As the shape of the area is rectangular, the lots stand in line. It is easier to install straight canals and roads.

P4 S3 L ..... straight canal with lining, 6-day interval irrigation

The acreage is the smallest among the four areas. The capacity of off take is enough. Less fill-up sections on the upstream. Each lot stands in line.

6. Determination of the type of lining

Types of lining

(1) Concrete (cast in situ)

(2) C.U.G. (U-shapes concrete flume)

(3) Corrugated pipe

(4) Glass fibre flume

(5) Block

The results of economic comparison are as shown in the following table.

Item	Standards	Unit	Price
C.U.G.	500 x 600	m	$21.2
Corrugated flume	t=1.6 mm 600 x 300	m	$32.5
Glass fibre	600 x 600	m	$68.7
Glass fibre	450 x 450	m	$55.1

As a rule C.U.G. is used as the lining because of the low cost as shown above. However, most ditches in P3 T1 S6 K Area are fill-up ditches, therefore, troubles such as the collapse of the ditches due to unexpected sinking, leakage, etc. could be anticipated in case C.U.G. lining is provided on the fill-up containing heavy clay. For this reason, the corrugated pipe which is light and strong is used for P3 T1 S6 K Area.

And the price of the corrugated pipe is based on the price of the corrugated pipe transported from Japan on ship. As "Ricewart Company" is manufacturing the corrugated pipe in Malaysia, it is considered that the price is slightly lower than that mentioned above.

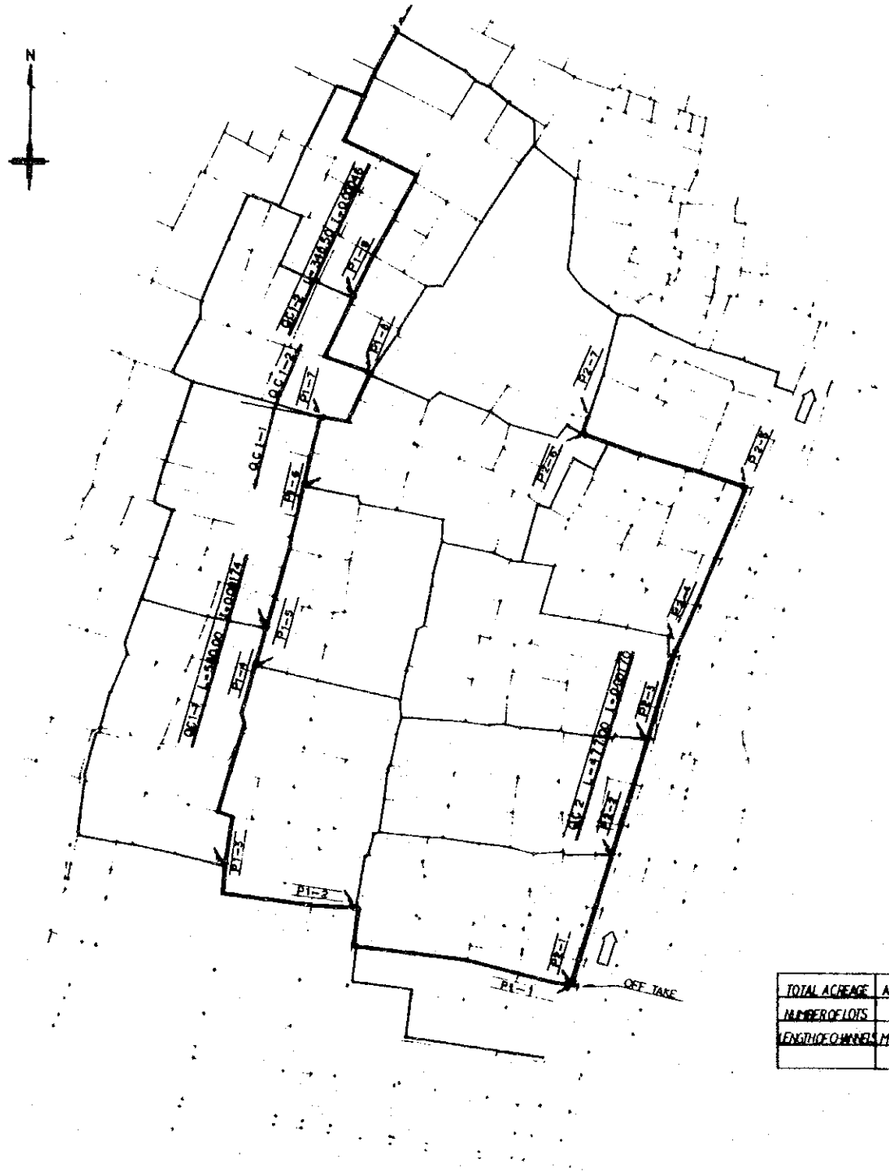
As regards P4 S3 L Area, ditches must be constructed by cast in situ concrete since the cross section of the ditches require b= 0.75 m and H = 0.266 m due to the limitations of topography, slope wand water level.

For P2 M Area, C.U.G. is used.

Conclusion

Area	Type of ditch
Padang Lindong	Earth ditch
P2 M	C.U.G. winding ditch
P3 T1 S6 K	Straight corrugated pipe lining and farm road
P4 S3 L	Straight canal, concrete placing on the spot, 6-day irrigation

Different types of ditches with lining have been employed for the respective areas according to the topography of each area and the relations concerning slope and water level, etc. This is due to the characteristics of each area, and it is believed that this is not contradictory to the objective of the Training Centre. And, as to the field of extension, it is desirable to realize the advantageous nature of water management based on QC network facilities, and then gradually promote the installation of ditch network suitable to each area.



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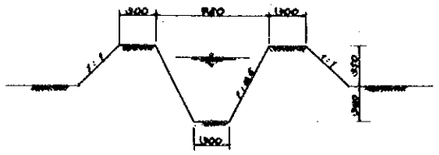

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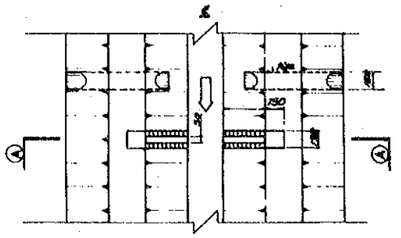
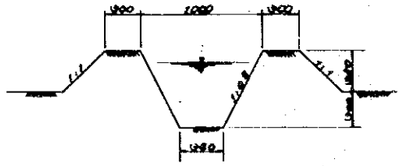
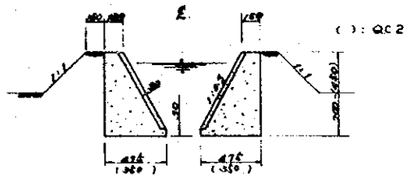


PLAN



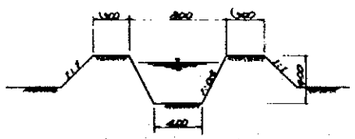
QC1-2 TYPICAL CROSS SECTION S=1:20



SECTION A - A

DETAIL OF OFF TAKE S=1:20

TOTAL ACREAGE	ACRE	45.0	
NUMBER OF LOTS		153.0	
LENGTH OF CHANNELS	METER	1405.5	



QC2 TYPICAL CROSS SECTION S=1:20

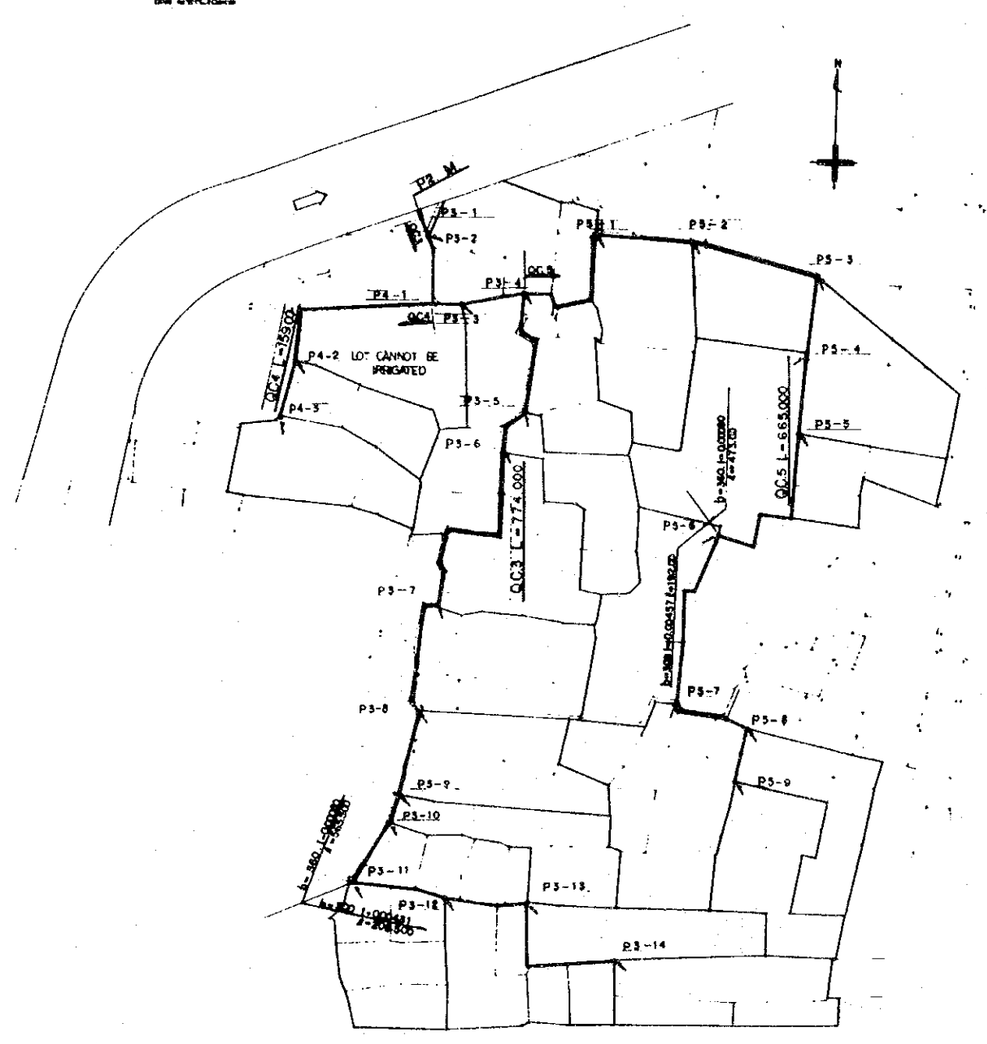
PLAN OF PILOT FARM PADANG LINDONG

WATER MANAGEMENT TRAINING PROJECT

PLAN OF PILOT FARM
PADANG LINDONG AREA (1)

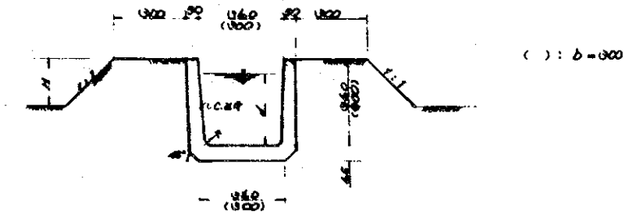
Japan International Cooperation Agency

DRAWN		NO C-2 (1/2)
TRACED		
CHECKED		SCALE 2 chains to an inch. 1 : 1584
APPROVED		

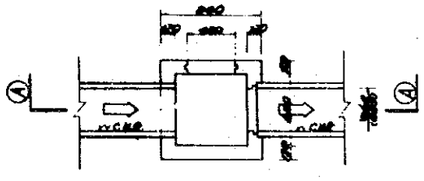


PLAN

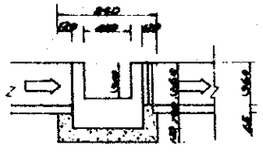
PLAN OF PILOT FARM P2.M



TYPICAL CROSS SECTION S-1:10



PLAN S=1:20



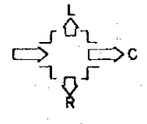
SECTION A—A S=1:20

DETAIL OF OFF-TAKE

TOTAL ACREAGE		37.5
NUMBER OF LOTS		69
LENGTH OF CHANNELS METER		1598.00

DIRECTION	P3-1	P3-2	P3-3	P3-4	P3-5	P3-6	P3-7	P3-8	P3-9	P3-10	P3-11	P3-12	P3-13	P3-14	P4-1	P4-2	P4-3
C	○	○	○	○	○	○	○	○	○	○	○	○	○	○	–	○	○
L	–	○	–	–	○	○	–	○	○	○	○	–	–	–	○	○	–
R	–	–	○	○	–	–	○	–	–	–	–	○	○	–	○	–	–
E.L																	

DIRECTION	P5-1	P5-2	P5-3	P5-4	P5-5	P5-6	P5-7	P5-8	P5-9
C	○	○	○	○	○	○	○	○	○
L	–	–	–	–	○	○	○	–	–
R	○	○	○	○	–	–	–	○	–
E.L									

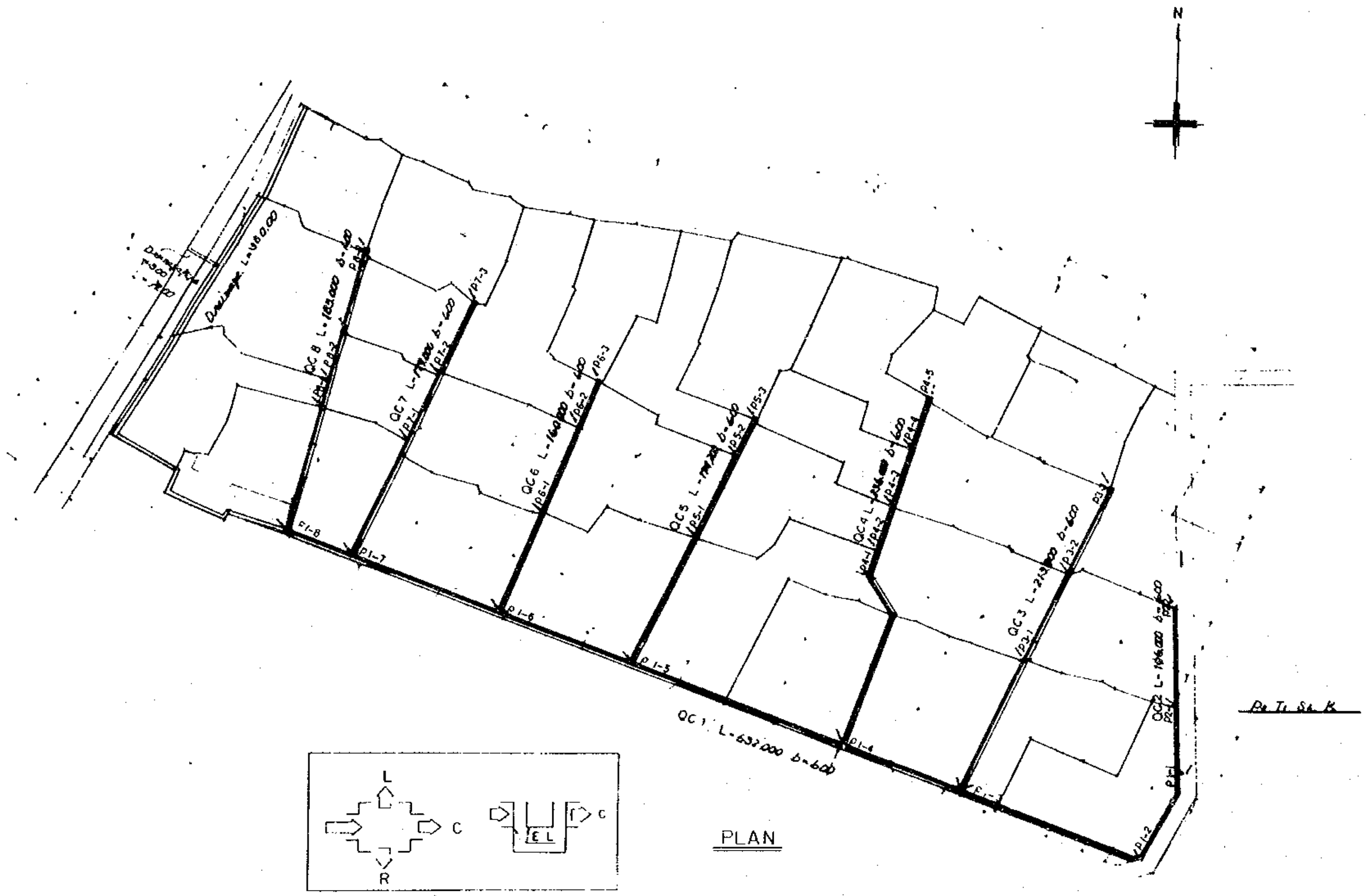


WATER MANAGEMENT TRAINING PROJECT.

PLAN OF PILOT FARM. P2M (1)

Japan International Cooperation Agency.

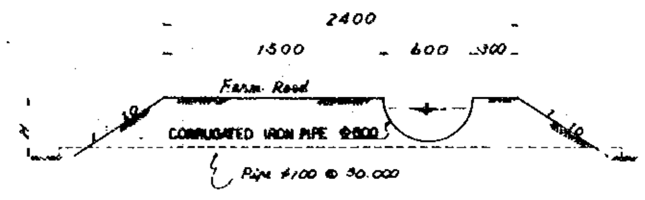
DRAWN		NO C-3 (12)
TRACED		
CHECKED		SCALE 2 chains to an inch 1:1584
APPROVED		



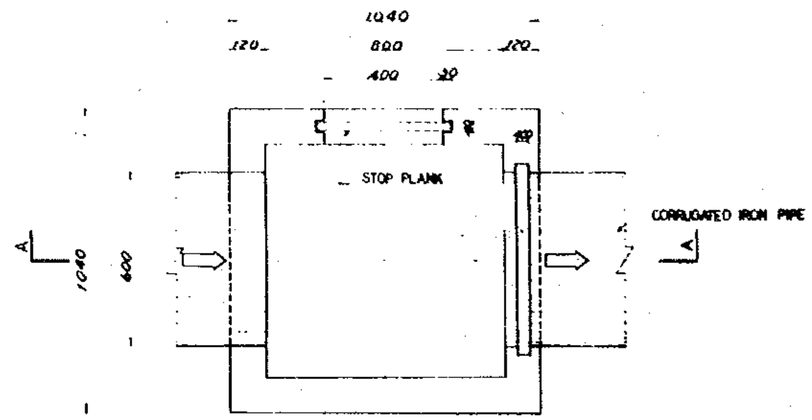
		P1-1	P1-2	P1-3	P1-4	P1-5	P1 6	P1-7	P1-8	P2-1	P2-2	P3 1	P3-2	P3-3	P4-1	P4-2
DIRECTION	C	–	O	O	O	O	O	O	O	O	O	O	O	O	O	O
	L	O	–	–	–	–	–	–	–	O	–	O	O	–	O	O
	R	O	O	O	O	O	O	O	O	–	–	–	–	–	–	–
E L		7.230	7.167	7.044	6.963	6.820	6.731	6.629	6.485	7.097	6.900	6.875	6.750	6.650	6.757	6.777

		P4-3	P4-4	P4-5	P5-1	P5-2	P5-3	P6-1	P6-2	P6-3	P7-1	P7-2	P7-3	P8-1	P8-2	P8-3
DIRECTION	C	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
	L	O	O	–	O	O	–	O	O	–	O	O	–	–	O	–
	R	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
E L		6.675	6.608	6.530	6.654	6.547	6.500	6.407	6.506	6.460	6.540	6.501	6.450	6.505	6.489	6.400

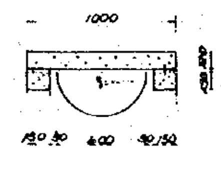
TOTAL ACREAGE	ACRE	44.8	
NUMBER OF LOTS		94.0	
LENGTH OF CHANNELS	METEA	1884.0	
DRAINAGE CHANNELS	"	380.0	



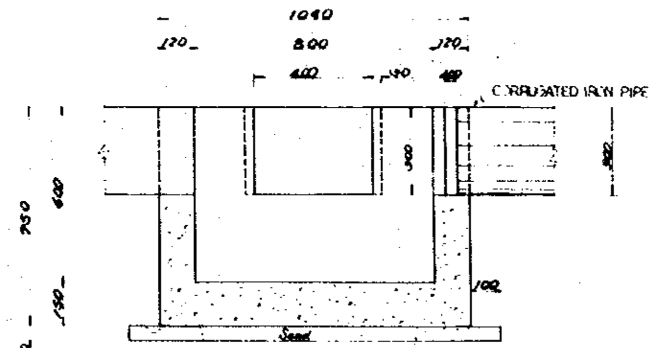
TYPICAL CROSS SECTION S=1:2



PLAN S=1:10



DETAIL OF BRIDGE S=1:20 @100.00m

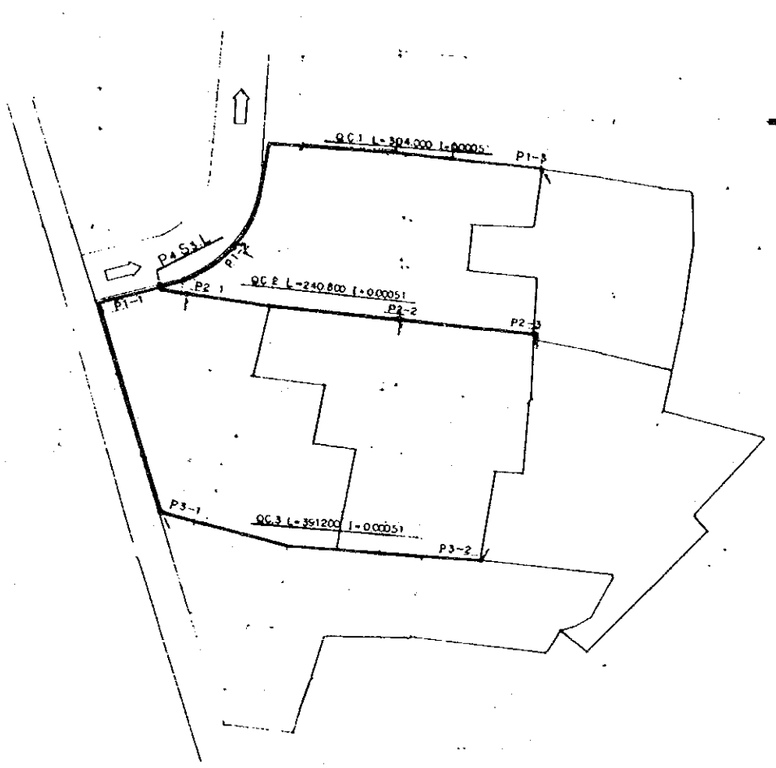


SECTION A - A

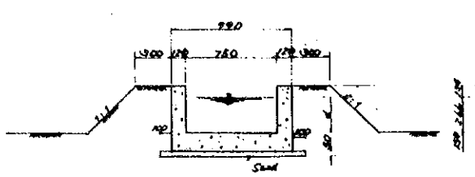
DETAIL OF OFFTAKE S=1:10

PLAN OF PILOT FARM P3 T1 S6 K

WATER MANAGEMENT TRAINING PROJECT	
PLAN OF PILOT FARM P3T1S6K (1)	
Japan International Cooperation Agency	
DRAWN	NO. C - 4 (1/2)
TRACED	
CHECKED	SCALE 2 chains to an inch 1:1584
APPROVED	

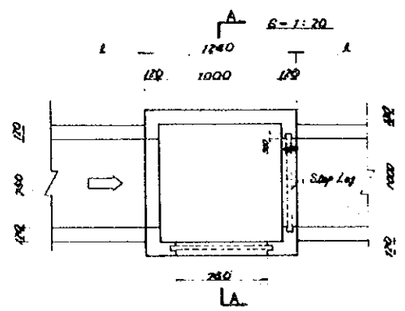


PLAN

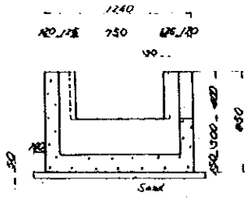


TYPICAL CROSS SECTION

	I=0.00051
A (㎡)	0.300
V (m/s)	0.635
Q (m³)	0.266



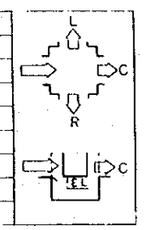
PLAN



SECTION A – A

DETAIL OF OFF TAKE S=1:20

	DIRECTION C	L	R	E.L		L
P1-1	○	○	○	8.800		
P1-2	○	–	○	8.770	P1-1 ~ P1-2	43.00
P1-3	–	–	○	8.650	P1-2 ~ P1-3	247.00
P2-1	○	–	○	8.790	P1-1 ~ P2-1	19.00
P2-2	○	–	○	8.770	P2-1 ~ P2-2	143.00
P2-3	–	–	○	8.680	P2-2 ~ P2-3	88.00
P3-1	○	○	–	8.710	P1-1 ~ P3-1	182.00
P3-2	○	–	–	8.600	P3-1 ~ P3-2	208.00



TOTAL ACREAGE	ACRE	27.4	
NUMBER OF LOTS		34.0	
LENGTH OF CHANNELS	METER	936.0	

PLAN

PLAN OF PILOT FARM P4 S3 L

WATER MANAGEMENT TRAINING PROJECT

PLAN OF PILOT FARM P4 S3L (1)

Japan International Cooperation Agency.

DRAWN	NO. C – 5 (1/2)
TRACED	
CHECKED	SCALE 2 cms to an inch. 1 1584
APPROVED	

IV. Construction Plan

1. Construction plan

1 - 1 Demonstration Farm

(1) Excavation of drainage ditch

As the excavation of the drainage ditch will be carried out in the dry season, back hoe with the bucket capacity of 0.5 m^3 will be used. Excavated earth is used as banking material for the ring bund.

Volume of excavation work 5,174.07 m^3

Calculation of work capacity

$$Q = \frac{3,600 \times q \times k \times f \times E}{Cm}$$

Where Q : Volume of excavation per operating hour (m^3/hour)

q : Nominal capacity of bucket 0.5 m^3

k : Coefficient of bucket, Medium excavation 0.88

f : Coefficient for conversion of the volume of earth 1.0

E : Operation efficiency 0.7

Cm : Cycle time 23 (sec)

Therefore $Q = \frac{3,600 \times 0.5 \times 0.88 \times 1.0 \times 0.7}{23} = 48.2$ (m^3/hour)

Operating time: $\frac{5,174.07}{48.2} = 107.3$ (hr)

No. of operating days: $\frac{107.3}{7.0 \text{ (hr/day)}} = 15.33$ (days)

If the number of operating days in a month is 23 days, the number of operating month $= \frac{15.33}{23} = 0.67$ (month)

(2) Land levelling

Temporary removal of surface soil of the field and land levelling are carried out by the 11-ton class bulldozer. Excavation of culverts and drains are carried out by the back hoe having a capacity of 0.5 m^3. In the lots where sub-surface drainage and sub-irrigation are to be carried out, land levelling will be carried out upon completion of the construction of the drains.

Volume of surface soil removing 9,200 m^3

Volume of land levelling 494.03 m^3

Calculation of work capacity

$$Q = \frac{60 \times q \times f \times E}{Cm}$$

Where Q : Volume of operation per operating hour (m^3/hr)

q : Volume of earth compacted each time = qo x P

qo : Capacity of earth removing plate 11t, 18 m^3

P : Coefficient depending on distance and slope of raod

Flat, 70 m 0.76

f : Coefficient for converting earth volume 1.0

E : Operation efficiency, medium operation, normal ±0.6

Cm : Cycle time (min)

In case of 70 m 3.0 (min)

$$Q = \frac{60 \times 18 \times 0.76 \times 1.0 \times 0.6}{30} = 16.42 \ (m^3/hour)$$

Number of operating hours (surface soil removing)

$$= \frac{2 \times 9,200}{16.42} = 1,120.6 \quad (hours)$$

Number of operating days (Surface soil removing) $= \frac{1,120.6}{7.0} = 160$ (days)

Number of operating months (Surface soil removing) $= \frac{160}{23} = 6.96 \fallingdotseq 7$ (months)

Number of operating hours (Land levelling) $= \frac{494.03}{16.42} = 30.1$ (hrs.)

Number of operating days (Land levelling) $= \frac{30.1}{7.0} = 4.3$ (days)

Number of operating months (Land levelling) $= \frac{4.3}{23} = 0.19 \fallingdotseq 0.2$ (month)

(3) Excavation of pond

Excavation of pond will be carried out with the back hoe having the bucket capacity of 0.5 m^3. A drain pit is installed during excavation work to carry out the work under dried condition while carrying out the drainage during construction period, it is necessary to be careful not to cause heaving on the bottom surface of the pond when the groundwater level is high.

Excavated earth is used as banking matrrial for flood protection bund. 4-ton dump truck is used for the transportation of the excavated earth.

Volume of excavation work 23,594.26 m^3

Calculation of work capacity (Same as for the excavation of drainage ditch)

Volume of work per hour: 48.2 m^3/hr

No. of operating hours $= \frac{23,594.26}{48.2} = 489.5$ (hr)

No. of operating days = $\frac{489.5}{7.0}$ = 69.9 (days)

No. of operating months = $\frac{69.9}{23}$ = 3.04 ≒ 3.0 (months)

Calculation of volume of work of a 4-ton dump truck

$$Q = \frac{60 \times C \times f \times E}{Cmt}$$

Where Q : Quantity of earth transported per hour (m^3/hr)

C : Quantity of earth loaded each time

$\gamma 1/L = 1.8$, C = 2.64 m^3 (20% increase)

f : Coefficient for converting quantity of earth 1.0

E : Operation efficiency 0.9

Cmt : Cycle time (min) of dump truck

$$Cmt = \frac{Cms.n}{60\ Es} + (T1 + t1 + T2 + t2)$$

Where Cms: Cycle time 23 (sec) of loading machinery.

n : $n = \frac{C}{q.K}$

q : Capacity of bucket 0.5 m^3

K : Coefficient of bucket 0.88

$$n = \frac{3.4}{0.5 \times 0.88} = 7.7 = 8 \text{ times}$$

Es: Operation efficiency of loading machinery 0.7

T1: Time required (min) by dump truck for transport

$$T = \frac{D}{V} \times 60 \text{ (min)}$$

D : Running distance 1.0 (km)

V : Average speed of dump truck 8 (km/hr)

T1: $\frac{1.0}{8.0} \times 60 = 7.5$ (min)

T2: Time required by dump truck to return (min)

$$T2 = \frac{1.0}{10.0} \times 60 = 6.0 \text{ (min)}$$

t1 = Time required for unloading 1.5 (min)

t2 = Time from arrival at loading place till the beginning of loading 0.7 (min)

$$Cmt = \frac{0.38 \times 8}{60 \times 0.7} + (7.5 + 1.5 + 0.7 + 6.0) = 4.38 + 15.7 = 20.08 \text{ (min)}$$

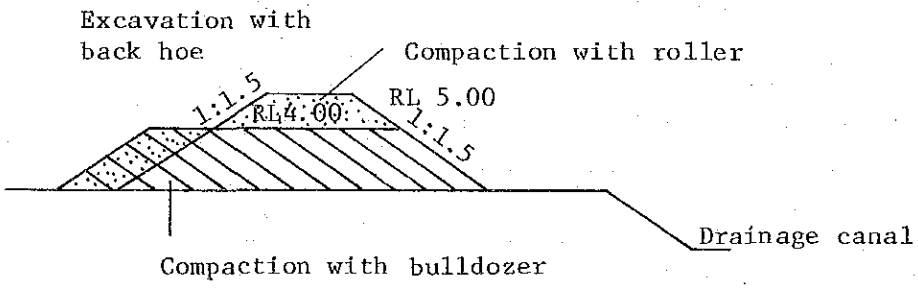
$$Q = \frac{60 \times 2.64 \times 1.0 \times 0.9}{20.08} = 7.1 \ (m^3/hr)$$

Number of dump trucks required n

$$n = \frac{48.2}{7.1} = 6.8 \fallingdotseq 7 \text{ dump trucks}$$

(4) Banking material for flood protection bund and pond

Banking of the bund is to be carried out during the period when the paddy fields in the neighbourhood are not being cultivated. A part of the nearby paddy fields will be rented, and banking will be carried out in two stages. In the first stage, sufficient quantity of earth is placed to R.L. 4.00, and banking is carried out while compacting the soil with 11-ton class bulldozer to a layer of 0.20 m each time. In the second stage, the outside of the fill-up portion is excavated with back hoe the capacity of its bucket is 0.5 m^3, and banking is carried out to R.L. 5.00. 0.5-ton class vibrating roller is used for the compaction of this portion. In this case, the layer of compaction each time is 0.20 m also. Side slope will be finished by manual labor with sodding. The fill-up portion is watered at the time of compaction



Volume of work	Flood protection bund	Banking for pond	Total
Total volume of banking	13,573.65 m^3	8,808.00	22,381.65 m^3
Length	1,064.73	607.33	1,672.06 m
Compaction by bulldozer	13,578.65	8,808.00	22,381.65 m
Excavation by back hoe	@5.00 x 1064.73 =5,323.65 m^3	@5.5 x 607.33 = 3.340.32 m^3	8,663.97 m^3
Compaction with roller	5,323.65 m^3	3,340.32 m^3	8,663.97 m^3

Calculation of compaction work by bulldozer

$$Q = \frac{1{,}000 \times V \times W \times H \times f \times E}{N}$$

Where Q: Volume of work per operating hour (m^3/hr)

V: Operating speed 2.0 km/hr

W: Effective compaction each time 0.7 (m)

H: Thickness of soil layer compacted each time 0.20 (m)

f: Coefficient of converting earth volume 0.69

E: Operation efficiency 0.8

N: Times of compaction 3

$$Q = \frac{1{,}000 \times 2 \times 0.7 \times 0.2 \times 0.69 \times 0.8}{3} = 51.52 \ (m^3/hr)$$

As this volume of work is larger than the capacity of the back hoe, it is adjusted to the capacity of the back hoe.

$$Q = 482 \times 0.9 = 43.38 = 43.4 \ (m^3/hr)$$

Calculation of volume of work by roller

$$Q = \frac{1{,}000 \times V \times W \times H \times f \times E}{N}$$

Where V: 0.6 (km/hr)

W: 0.4 (m)

H: 0.20 (m)

f: 1.0

E: 0.8

N: 3

$$Q = \frac{1{,}000 \times 0.6 \times 0.4 \times 0.2 \times 0.8 \times 1.0}{3} = 12.8 \ (m^3/hr)$$

Three rollers are to be used to keep balance with the capacity of the back hoe. Therefore, the working capacity of the back hoe is adjusted to the working capacity of the rollers.

$$Q = 3 \text{ rollers} \times 12.8 \ m^3/he = 38.4 \ (m^3/hr)$$

	Flood Protection Bund	Bund for pond
Number of operating hrs 1st stage banking	$\frac{13{,}573.65}{43.4} = 312.8$ (hr)	$\frac{8{,}808.00}{43.4} = 202.9$ (hr)
No.of operating days 1st stage banking	$\frac{312.8}{7.0} = 44.7$ (days)	$\frac{202.9}{7.0} = 29.0$ (days)
No.of operating months 1st stage banking	$\frac{44.7}{23.0} = 1.94 \fallingdotseq 2.0$ (months)	$\frac{29.0}{23} = 1.26 \fallingdotseq 1.3$ (months)
No.of operating hours 2nd stage banking	$\frac{5{,}323.65}{38.3} = 138.64$	$\frac{3{,}340.32}{38.4} = 87.0$ (hr)
No.of operating days 2nd stage banking	$\frac{138.64}{5.0} = 27.73$	$\frac{870}{5.0} = 17.4$ (hr)
No. of operating months 2nd stage banking	$\frac{27.73}{23} = 1.20$ (months)	$\frac{17.4}{23} = 0.76 \fallingdotseq 0.8$ (months)

(5) Road construction

The road will be paved with bitumen. Crusher run is spread on the lower

road bed to a thickness of 35cm, and levelling is done by 3.1-m class motor grader. For compaction, 10~12 ton class macadam roller is rolled over 3 times, and 8-20 ton class tire roller 8 times. The upper road bed consists of grain adjusting material 10cm thick, and levelling is done by 3.1 m class motor grader. For compaction, macadam roller is rolled over 5 times, and tire roller 10 times. The surface layer consists of 5 cm thick bitumen, and levelling is done by 2.75 m class asphalt finisher. For compaction, macadam roller is rolled over 5 times, and tire roller 10 times. When executing the work it is necessary to pay special attention to the upper part of the conduit pipe.

(6) Piling

Bakao pile 5" in diameter and 5.00 m long is used as foundation pile. Pile-driving is done by drop hammer using winch.

Machines to be used

Winch 0.75 t, drop hammer 0.15 t. (one unit)

Diesel engine 10 Ps One unit

Pile driving

Total number of piles required	102 piles
Standard working time	5.18 hr/10 piles
No. of piles driven per day	(7.0 - 5.18) x 10 ≒ 13 piles
No. of working days	102/13 = 7.8 ≒ 8 days

(7) Concrete

For mixing concrete, concrete mixer having the capacity of mixing 0.09 m^3 each time and equipped with 3 Ps diesel engine is used at site.

Quantity mixed per hour	1.26 m^3
Quantity mixed per day	8.82 m^3

(8) Drainage during construction period

Excavation of the sites for the pond and structures is carried out under dry condition, and groundwater and surface water are drained by 1.5 kW submergible pump with 50 mm in diameter.

(9) Watering

The fill-up portions of the pond and the bund must be constructed in the dry season, but compacting is very difficult as the banking material is excessively dry. 1.5 kW submergible pump 50 mm in diameter will be used for watering during the compaction work.

1 - 2 Pilot Farm

(1) Earthwork

As to Padang Lindong, P2 M and P4 S3 L Areas, the volume of excavation work and banking is small and extend over a wide area. Therefore, the construction work will be carried out by using the manual labour as a rule.

Excavation (manual labour) Normal soil B III

0.311 person/m^3 3 persons/day 9.6 m^3/day

Banking (manual labour) Soil compactor (50 kg) is used

Small carts are used for minor transport.

Working capacity of soil compactor

$$Q = \frac{1{,}000 \times V \times W \times H \times f \times E}{N} \quad (m^3/hr)$$

Where V: Working speed (km/hr) 0.6

W: Effective compaction each time (m) 0.4

H: Thickness of compacted soil layer each time (m) 0.15

f: Coefficient for conversion of soil volume C/L 0.69

E: Operation efficiency 0.8

N: Number of times of compaction 2

Therefore, $Q = \frac{1{,}000 \times 0.6 \times 0.4 \times 0.15 \times 0.69 \times 0.8}{2}$

$= 9.936 \fallingdotseq 10\ m^3/hr$

Capacity of minor transport

Average distance of transport

Padang Lindong L = 310 m

P2 M L = 260 m

P4 S3 L L = 140 m

Transport speed

When loaded 20 m/min Loading 3 min/cart

When empty 30 m/min Unloading 1.5 min/cart

Padang Lindong	310 ÷ 20 = 15.5	30 min/one return trip
	310 ÷ 30 = 10	
	Loading and unloading 4.5	
P2M	260 ÷ 20 = 13	26 min/one return trip
	260 ÷ 30 = 8.5	
	Loading and unloading 4.5	
P4 S3 L	140 ÷ 20 = 7	16 min/one return trip
	140 ÷ 30 = 4.5	
	Loading and unloading	

Volume of work per day

Each area will have two carts, and the net working time per day is 5 hours.

Padang Lindong (300 ÷ 30) x 0.5 m^3/cart x 2 = 10 m^3/day

P2 M (300 ÷ 26) x 0.5 x 2 ≒ 11.5 m^3/day

P4 S3 L (300 ÷ 16) x 0.5 x 2 = 18.8 m^3/day

P3 T1 S6 K Area

Earth transported by the 2-ton dump truck is gradually compacted using 35-ton bulldozer. Upon completion of banking, canals are excavated by manual labor.

$$Q = \frac{1{,}000 \times 1.0 \times 0.5 \times 0.3 \times .0.69 \times 0.8}{2}$$

$= 41.4\ m^3/hr$

(2) Concrete work

9 m/day 3m/barrel x 3 = 9.00 m 2 teams 18.0 m/day

(3) Calculation of working days (25 days/month)

Padang Lindong

Excavation	133.4 ÷ 10 = 13.3 days	13.3 x 30/25 =	16 days
Banking	514.5 ÷ 10 = 51.4	51.4 x 30/25 =	62 days
Offtake work	16 ÷ 2 = 8	2 x 30/25 =	10 days
Adjustment of slope	2965.7 ÷ 100 = 29.7	29.7 x 30/25=	36 days

P2 M

Excavation	63 ÷ 10 = 6.3	6.3 x 1.2 =	8 days
Banking	472.8 ÷ 11.5 = 41.1	41.1 x 1.2 =	49 days
Offtake work	26 ÷ 2 = 13	13 x 1.2 =	16 days
C.U.G.	2,664 ÷ 50 = 53.3	53.3 x 1.2 =	64 days
Adjustment of slope	1,452.8 ÷ 100 = 14.5	14.5 x 1.2=	17 days

P3 T1 S6 K

Excavation	38.0 ÷ 10 = 3.8	3.8 x 1.2 =	5 days
Banking	2,533.5 ÷ 4144 = 61.2	61.2 x 1.2 =	73 days
Offtake work	30 ÷ 2 = 15	15.0 x 1.2 =	18 days
Corrugated pipe	1,884 ÷ 60 = 31.4	31.4 x 1.2 =	38 days
Adjustment of slope	2,592.5 ÷ 100 = 25.9	25.9 x 1.2 =	31 days

P4 S3 L

Excavation	171.8 ÷ 10 = 17.2	17.2 x 1.2 =	21 days
Banking	389.8 ÷ 18.8 = 20.7	20.7 x 1.2 =	25 days
Offtake work	8 ÷ 2 = 4.0	4.0 x 1.2 =	5 days
Concrete canal	936.0 ÷ 18.0 = 52.0	52.0 x 1.2 =	62 days
Adjustment of slope	1,153.9 ÷ 100 = 11.5	11.5 x 1.2 =	14 days

2. Work Schedule

2 - 1 Demonstration Farm

The construction work of the Demonstration Farm will be promoted with the objective of commencing paddy cultivation as early as possible after commencement of construction. The construction work will be promoted according to the extent of urgent necessity of the items of work.

What should be constructed first of all is the access road, and the field facilities and irrigation facilities in order. The construction of a pond is not urgently necessary because the groundwater can be used if the groundwater pump is installed first.

And, the construction of the flood protection bund is not absolutely necessary in the initial stage if the period of November to January is excluded from the paddy cultivation period. The following order of execution of the construction work is adopted.

(1) Order of execution of work

1. Road construction (lower road bed only)
2. Field facilities
3. Irrigation facilities
4. Drainage facilities
5. Irrigation pump station
6. Bi-purpose pump station
7. Pond
8. Bund
9. Road construction (upper road bed and surface layer)

(2) List of construction machines

It is the intention of the Department of Irrigation and Drainage of Malaysia to execute most of the work under contracts with the contractors. The construction machines employed for carrying out cost estimation and the work schedule are as follows:

Name of machine	Specification	No. of Unit	Place
Back hoe	0.5 m^3	1	Excavation for embankment, reservoir & structures
Bulldozer	11 t	1	Excavation of road & land improvement
Dump truck	4 t	7	Transport of excavated soil from Drainage canal & reservoir
Roller	0.5	3	Banking for reservoir & embankment
Motor grader	width of blade 3.1 m	1	Road construction, levelling
Macadam roller	10 - 12 t	1	Road construction compaction
Tire roller	8 - 20 t	1	Road construction compaction
Asphalt finisher	275 m wide	1	Levelling of surface layer
Winch drop hammer with diesel engine	0.75 t	1	Foundation piling
Submerge pump	ϕ 50 mm 1.5 kW	2	Unwatering and watering
Concrete mixer with 3PS engine	0.09 m^3	1	Concrete mixing on the spot

IV. OPINIONS AND PROBLEMS

Chapter IV. Opinions and Problems

4. Opinions and Problems

4 - 1 Problems on Training Programme and its Management

1. The term for the training

In consideration of both the total number of I.I in employment who are to be major participant of the training and affect of their participation to their normal duty, the ten months' course may be too long. However, it needs at least 5 months, considering the paddy cultivation period.

2. Inclusion of I.O.into I.I training course

Although I.O. are scheduled to attend the training together with I.I., it may be an idea worthy of consideration to separate I.I. from I.O. so that each group to attend alternately every other year when the difference of scholarship between the two groups is remarkable.

3. Comments on Curriculum

Mathematics may be taught in the course of special subject lessons. Reconsideration seems to be necessary, regarding the contents of engineering designing of farm facilities. Water management is the most important subject, so that nothing more than irrigation, drainage and observation of the discharge is taken up. It is desirous that new techniques to be established and be introduced as soon as possible to meet the requirements by the actual situation of existing water management facilities in Malaysia. The experimental facilities to be provided shall be determined in accordance with the details of the course of training, yet it will be necessary that a simplified experimental equipment for hydraulic test be additionally provided. Lessons on soils, structure and materials were deleted from the subject of training. Nevertheless, it goes without saying that acquiring correct knowledge concerning the nature of soil for cultivation of farm products, and the nature of the ground which supports irrigation facilities is very important. Under the circumstances, any subject that is found in the course of training to have importance or special bearings in this sountry shall be assigned to all the participants as a subject for their further learning. With respect to the material and construction work, outline of the nature of the materials which are used more often in this country shall be taken up in the lesson.

4 - 2 Problems on Facility Planning

1. Due to high consistency of saline in the river water, which was proposed

at the beginning of the survey to be used as a source of irrigation water for the demonstration farm, it was judged that the water is not suited for the purpose. Various alternatives were studied such as, to take water from the terminal canals in Kemubu scheme, diversion of drinking water, making use of ground water, or making use of flood water or excessive water by construction of a pond. Finally, it was decided to construct pond as the main source while the ground water shall be used as the secondary source. To construct a bund on this flat ground at an average height of 2 meters in order to construct the pond and also to protect the Training Centre from flood will probably be an object of people's antipathy not to speak of high construction cost. Therefore, it is desirable that the lowering of the bund height and reduction of the designed water storage capacity will be studied before the construction is commenced.

2. Different type of designs are employed for each of the 4 pilot farms. Nevertheless, further changes in the design are still conceivable according to the explanatory meeting to be held for farmers by KADA and the future policy to be taken by DID in consideration of extension of water management technique. Appropriate change in design shall be made depending on the changes in the situation from time to time.

3. A proposal was made in the interim report of the survey team which was presented on 21st July for a measures to facilitate drainage from the vicinities of the training centre, that the drainage to be connected to a drainage canal which is being constructed by DID at about 1.0 kilometer north of the training centre. In fact, however, the base height of the training centre's drainage ditch is lower than the DID's by more than 1.0 meter. Thus, it is necessary to lower the base of the DID's drainage ditch for connecting these ditches. Now, however, there was another drainage ditch suggested in May 1977 by DID as another drainage measure around the training centre. This drainage ditch is situated near the center in north east direction and the geographical position of which is low and better than the former drainage ditch which is under construction now. Therefore, it is recommended that the latter drainage ditch to be constructed for the training centre rather than the former one which was once suggested by the interim report, although both the planning and construction of the drainage ditch is to be undertaken by DID.

4. In carrying out the construction of the pond and the ring bund for the training centre, careful attention should be paid as the clay contents in the available soil is as high as more than 60%, according to the record. At the same time, its moisture content is also high. Therefore, both the construction method and machineries conforming to the nature of the soil should be adopted in

compaction of the embankment. In excavation of the pond, serious attention must be exercised not to break the impermeable strata which lies at the planned bottom level of the pond, and at the same time, an equal attention should be paid against heaving phenomenon.

5. Laying of 1,000 mm Hume concrete pipe in east to west direction underneath the access road of the demonstration farm is designed to function as an drainage culvert. On account of thin layer of soil to cover the Hume pipe, it is feared that the pipe may be damaged during the construction work unless the quality of Hume pipe is adequate. Therefore, reinforced concrete culvert may be used instead of the Hume pipe if necessary.

6 Use of DID data has been best tried in the estimation of the construction cost, but no consistent data were available on the rate of labour and equipment. As a result, available Japanese rate was used instead. For later reference, the writer has to admit that some difference in the construction cost may result when the Malaysian side makes the estimation of construction cost based on some other basis.

7. Some measures for prevention of rats and birds hazards have been included in this design. Nevertheless, no established method is known with which to cover a wide area, while, the available methods are all with both merits and demerits. It is hoped that an improved or entirely new measures be worked out in the future through collecting various information from different countries on the prevention methods.

8. There are, besides the main training facilities, various appurtenant facilities such as storage for farm machineries and tools, car-washing yard, material storage house, garage, farm product handling room (including drying room). However, no information about their scale, specifications, etc. is given in this report. As a rule, all these facilities are to be planned, designed and worked out by the Malaysian side. Therefore, each expert to be despatched is hereby asked to give advice on the planning and design of the same to the Malaysian side as they are so required.

4 - 3 Problems on Cooperation with Japan

(1) No better way may be found than trying to embody those items that are indispensable or cannot be postponed untill next year among various items on the detailed design required to be carried out within this year.

(2) The name of articles and quantity of various materials, machineries and

equipment to be furnished to Malaysia should be decided with extra urgency. All these items are planned to be stored in the workshop of State DID in Kota Bharu. One thing important is a protection of that workshop against the flood.

(3) The training programme should be completed prior to the designing of facilities and the estimation of the various equipment and materials to be furnished. However, further study of the programme will be conducted in conformity with the actual situation of facility construction, educational equipment and participants to the training, etc.

APPENDIX

RECORD OF DISCUSSIONS

APPENDIX

RECORD OF DISCUSSIONS

THE RECORD OF DISCUSSIONS BETWEEN THE JAPANESE AGRICULTURAL SURVEY TEAM AND THE DRAINAGE AND IRRIGATION DIVISION, MINISTRY OF AGRICULTURE OF THE GOVERNMENT OF MALAYSIA WITH REGARD TO TECHNICAL COOPERATION PROJECT ON WATER MANAGEMENT TRAINING PROGRAMME IN MALAYSIA

In pursuance of the detailed design for Water Management Training Programme, the Japanese Agricultural Survey Team, organized by the Japan International Cooperation Agency and headed by Mr. Michio Nakahara, Director, Agricultural Development Cooperation Department, Japan International Cooperation Agency, visited Malaysia from August 24 to September 3, 1977 for the purpose of finalizing concrete plans for the Technical Cooperation Project on Water Management Training Programme which will be carried out in order to contribute to the promotion of agricultural development in Malaysia.

During its stay in Malaysia, the Team exchanged views with the representatives of the Ministry of Agriculture and the Economic Planning Unit of the Government of Malaysia on the necessary measures to be taken by both Governments to successfully implement the above-mentioned Technical Cooperation Project.

As a result of the exchange of views, both parties agreed to recommend to their respective Governments to carry out the various undertakings referred to in the Record of Discussions.

Kuala Lumpur, 3rd September, 1977.

For the Japan International Cooperation Agency

Mr. Michio Nakahara,
Head of the Japanese
Agricultural Survey Team.

For the Drainage and Irrigation Department

Mr. Pang Leong Hoon
Director-General,
Drainage and Irrigation Division,
Ministry of Agriculture,
Malaysia.

RECORD OF DISCUSSIONS

1.

1.1 Both Governments, in accordance with the laws and regulations in force in the respective countries, will cooperate with each other in implementing the Technical Cooperation Project on Water Management Training Programme (hereinafter referred to as "the Project") for the purpose of contributing to the promotion of agricultural development in Malaysia through the establishment of water management techniques and its extension.

1.2 The Project, comprises a Training Centre (with a demonstration farm) and four Pilot Farms, will be implemented in accordance with the Project Plan as stipulated in Annex. I.

1.3 The Project will be implemented by the Drainage and Irrigation Division of the Ministry of Agriculture, Malaysia, in accordance with the operational work plan to be formulated annually by the Joint Committee referred to in paragraph 10 of this Record of Discussions.

2.

2.1 The Government of Japan will take necessary measures through the Japan International Cooperation Agency to provide at its own expense the services of the Japanese experts as listed in Annex II under the Colombo Plan Technical Cooperation Scheme.

2.2 The Japanese experts referred to in paragraph 2.1 above and their families will be granted in Malaysia the privileges, exemptions and benefits in accordance with General Circular No. 1 of 1969 of the Government of Malaysia.

3.

3.1 The Government of Japan will take necessary measures through the Japan International Cooperation Agency to provide at its own expense

such equipment, machinery, instruments, vehicles, tools, spare parts and other materials required as listed in Annex III for the implementation of the Project under the Colombo Plan Technical Cooperation Scheme.

3.2 The goods referred to in paragraph 3.1 above will become the property of the Government of Malaysia upon being delivered c.i.f. at the ports of disembarkation to the Drainage and Irrigation Division of the Ministry of Agriculture, Malaysia, and will be utilized exclusively for the implementation of the Project in consultation with the Japanese Team Leader referred to in Annex II.

4.

4.1 The Government of Japan will take necessary measures through the Japan International Cooperation Agency to sponsor Malaysian personnel engaged in the Project for technical training and/or study tours in Japan under the Colombo Plan Technical Cooperation Scheme.

4.2 The Government of Malaysia will take necessary measures to ensure that the knowledge and experience acquired by the Malaysian personnel mentioned in paragraph 4.1 above through technical training and/or study tours in Japan will be utilized effectively for the implementation of the Project.

5.

5.1 Some of the equipment and machinery referred to in paragraph 3.1 may be rented out at reasonable rates to farmers in Pilot Farms and portions of the consumable items such as fertilizers and agricultural chemicals may be supplied at reasonable prices to the farmers in the above-mentioned areas with the joint approval of the Project Director and the Japanese Team Leader.

5.2 The Government of Malaysia will take necessary measures to secure the budget, no less than the amount of the estimated annual proceeds

from the above-mentioned rentals and supplies, for the implementation of the Project.

6. The Government of Malaysia will undertake to bear claims, if any, against the Japanese experts engaged in the Project resulting from, occurring in the course of, or otherwise connected with, the discharge of their official duties in Malaysia, except for those claims arising from wilful misconduct or gross negligence of the Japanese experts.

7. The Government of Malaysia will take necessary measures to provide at its own expense :

(i) the services of the Malaysian counterparts and other personnel as listed in Annex IV;

(ii) land and buildings as listed in Annex V;

(iii) supply or replacement of equipment, machinery, implements, vehicles, tools, spare parts and any other materials necessary for the implementation of the Project other than those provided by the Government of Japan through the Japan International Cooperation Agency under paragraph 3.1 above.

8. The Government of Malaysia will take necessary measures to meet :

(i) expenses necessary for the construction and improvement of buildings, demonstration farms, irrigation facilities, roads, etc. for the implementation of the Project;

(ii) customs duties, internal taxes and any other charges imposed in Malaysia in respect of the goods referred to in paragraph 3.1 above;

(iii) expenses necessary for transportation within Malaysia of the goods referred to in paragraph 3.1 above as well as for the installation, operation and maintenance thereof;

(iv) all running expenses necessary for the implementation of the Project.

9. The Drainage and Irrigation Division of the Ministry of Agriculture of the Government of Malaysia, will be responsible for the administration and implementation of the Project, and the Japanese experts will provide necessary technical guidance and advice for the implementation of the Project.

10. There will be close consultation between the Japanese experts and the officials concerned of the Government of Malaysia for effective implementation of the Project. For this purpose a Joint Committee will be established as specified in Annex VI. The Joint Committee will meet at least once in six (6) months.

11. Both Governments will consult with each other with respect to any major issues that may arise from or in connection with the implementation of this Record of Discussions.

12. The provisions of the various undertakings mentioned in this Record of Discussions will come into force on the date of signature and remain in force for a period of five (5) years, and may be extended by mutual agreement between the two parties for a further specified period. However, either party may, at any time, give notice to the other party of its intention to terminate these provisions in which case the technical cooperation related to the Project will terminate six months after such notice has been given.

ANNEX I - The Project Plan

1. Training Centre

Water Management Training Centre (with a Demonstration Farm) will be set up in Kota Bharu, Kelantan, and the following activities will be implemented :

(a) establishment of basic water management techniques;

(b) training of water management officers;

(c) demonstration of improved paddy cultivation system with emphasis on water management techniques;

(d) management and operation of Pilot Farms;

(e) investigation, planning, guidance and advice necessary for the activities related to the items mentioned above.

2. Pilot Farms

Training Centre will set up four (4) Pilot Farms each of about 20 ha. nearby and will implement the following activities with the cooperation of authorities concerned :

(a) installation of irrigation, drainage, farm roads, and other facilities in the Pilot Farms;

(b) introduction of water management techniques and on-the-job training for technical staff;

(c) guidance and advice to farmers in Pilot Farms for introduction of improved paddy cultivation system with emphasis on water management techniques;

(d) guidance and advice on the formation of water management organizations.

ANNEX II - List of Japanese Experts

Category	Subject Matter
(1) Team leader	
(2) Experts	Irrigation
	Water management
	Agronomy
(3) Coordinator	

Note : (i) At least one expert will be provided for each subject matter.

(ii) Short-term experts on the above-mentioned or other subject matter may be dispatched when necessary.

ANNEX III - List of the Goods to be provided by the Government of Japan

1. Construction equipment, machinery and their spare parts.
2. Agricultural machinery, implements and their spare parts.
3. Experimental and research instruments and their spare parts.
4. Teaching materials including audio-visual aids.
5. Fertilizers and agricultural chemicals.
6. Machinery and tools for repair and their spare parts.
7. Vehicles and their spare parts.
8. Other necessary equipment, machinery, tools and materials to be mutually agreed upon.

ANNEX IV - List of Malaysian Counterpart Officials and other Personnel

Category	Subject Matter
(1) Project director	
(2) Counterpart officials	Irrigation Water management Agronomy
(3) Field staff	Irrigation Agronomy Agricultural machinery
(4) Adminstrative support staff	
(5) Labourers	

ANNEX V - List of Land and Buildings

1. Training Centre :
   - (a) Land about 11 ha.
   - (b) Office
   - (c) Classrooms
   - (d) Laboratory
   - (e) Hostel
   - (f) Instructor rooms
   - (g) Meeting room
   - (h) Sheds for agricultural machinery
   - (i) Garages and workshop
   - (j) Storehouse for farming materials
   - (k) Other necessary buildings and facilities

2. Pilot Farms (on farmers' land) :
   - (a) Land about 80 ha. (each Pilot Farm about 20 ha. x 4 Pilot Farms)

ANNEX VI - Composition of the Joint Committee

Chairman : Secretary-General of the Ministry of Agriculture, Malaysia, or his representative

Secretary : Project Director of the Training Centre

Japanese Side :

1. Team Leader
2. Experts
3. Coordinator
4. Representative of the JICA

Malaysian Side :

1. Representative of EPU
2. Representative of the State Government of Kelantan
3. Representative of DID
4. Representative of DOA
5. Representative of KADA
6. Representative of MARDI

Note : Officials of the Embassy of Japan and person appointed by the Embassy may attend the meeting of the Joint Committee as an observer.

Abbreviations :

(1) JICA - Japan International Cooperation Agency.
(2) EPU - Economic Planning Unit of the Prime Minister's Department.
(3) DID - Drainage and Irrigation Department.
(4) DOA - Department of Agriculture.
(5) KADA - Kemubu Agricultural Development Authority
(6) MARDI - Malaysian Agricultural Research and Development Institute.