CHAPTER 5

DETAILED DISIGN OF DREKETI PILOT PROJECT

Chapter 5 Detailed Design of Dreketi Project

5-1 Physical Condition

* Dreketi District is the centre of rice production on the northern island and is the site of a rice-production project under the Agricultural Development Programme (DP) based on the Development Programme 9 of the Fijian Government in progress at present.

* The Dreketi Project is is divided into 3 phases. Phase I , with a total cultivation area of 160 ha has already reached completion with aid from Australia and preparation of the fields for Phase Ⅱ (cultivation area: 200 ha) has also been completed.
Preparation works are in progress at present for Phase Ⅲ, covering an area of 50 ha.

* The Fijian Government has intentions of transferring the main area of rice production in the country to the northern island and Dreketi District is to be centre of this rice production. Similar projects are also in progress or under planning in the neighbouring districts of Korokadi and Vua and it is planned that these long-term projects will be implemented with financial and technical assistance from overseas.

* While creation of the paddy fields under these plans has seen smooth progress, upgrading the technology of the dissemination workers and farmers who will be working in these fields has become a major task to be tackled.

* Training and instruction in cultivation techniques are being carried out at the training centre at Koronivia Research Station and are showing good results.

Facilities will also be constructed in Dreketi District as a place for instruction. The scale of the building, however, catering only for 20 trainees will be smaller than that at Koronivia which caters for 40.

* A laboratory will also be provided for experiments to do with cultivation, soil and harmful insects. The building will include, besides the laboratory and space for storage of equipment, an exhibition room for displays on research carried out so far.

5-2 Site Selection

The site of the centre is on a gentle hill facing north. Of the 2 buildings, that for the training activities will located on the side nearer the road and the laboratory will be built on a slightly higher ground behind. A road, 5 m wide will be constructed surrounding the training building.

5-3 Training Center Plan

The building will be on the scale as shown below and will contain rooms such as the lecture room with a capacity for 20, waiting room for the lecturer and the equipment room.

Scale : 15 m × 8 m (A = 120 m², excluding terrace)

Structure :- wooden bungalow

Room Composition : lecture room, waiting room for lecturer, equipment room, boiler room etc. The layout of the buildings is shown in Figure 5-1.

5-4 Laboratory and Equipment House Plan

A building will be constructed to accommodate a laboratory for carrying out

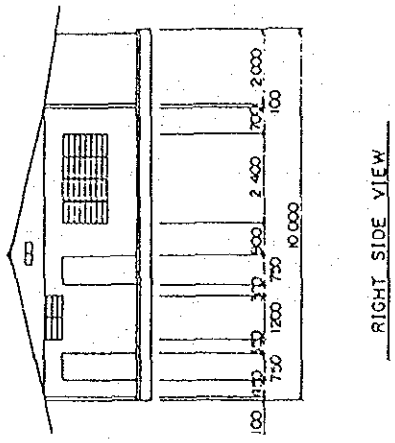
cultivation tests and soil tests to do with rice cultivation, a room for display of samples and a room for maintenance of equipment needed for these.

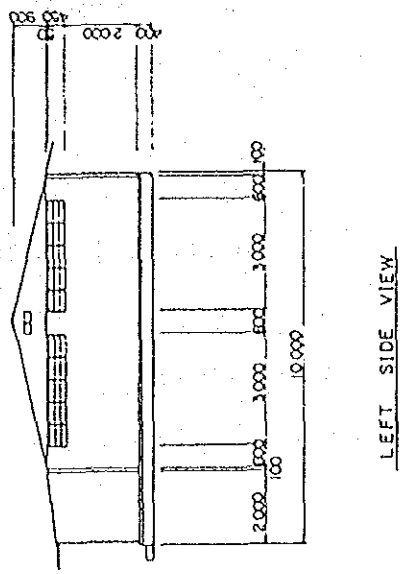
Scale : 14 m × 8 m (A = 112 m2, excluding terrace)

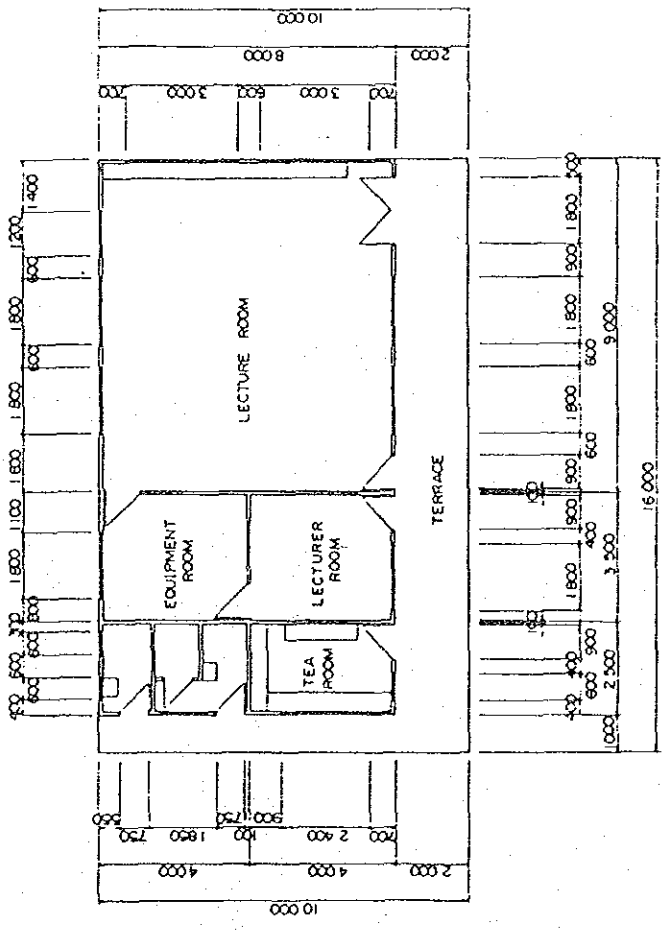
Structure : 2 storeys, concrete columns and block walls

Room Composition : laboratory, display room, storage room for equipment, preservation room, boiler room, waiting room for lecturer etc. The layout of the buildings is shown in Figure 5-2.

Fig.5-1 Extention Training Center Plan







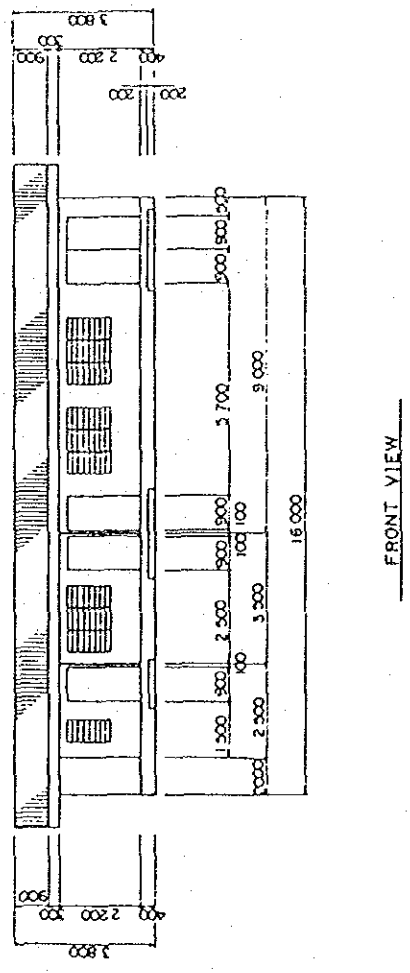
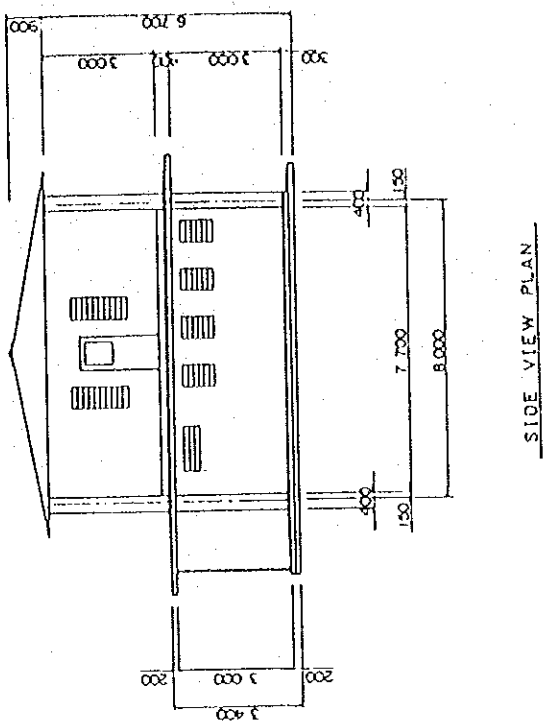
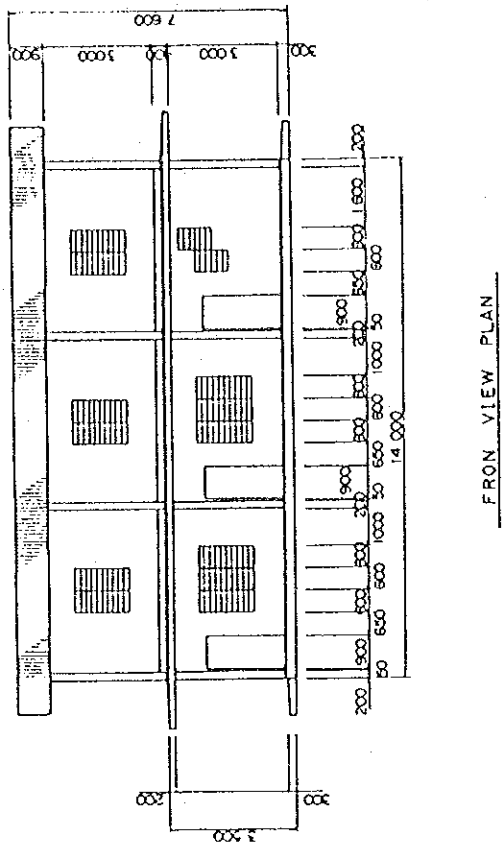
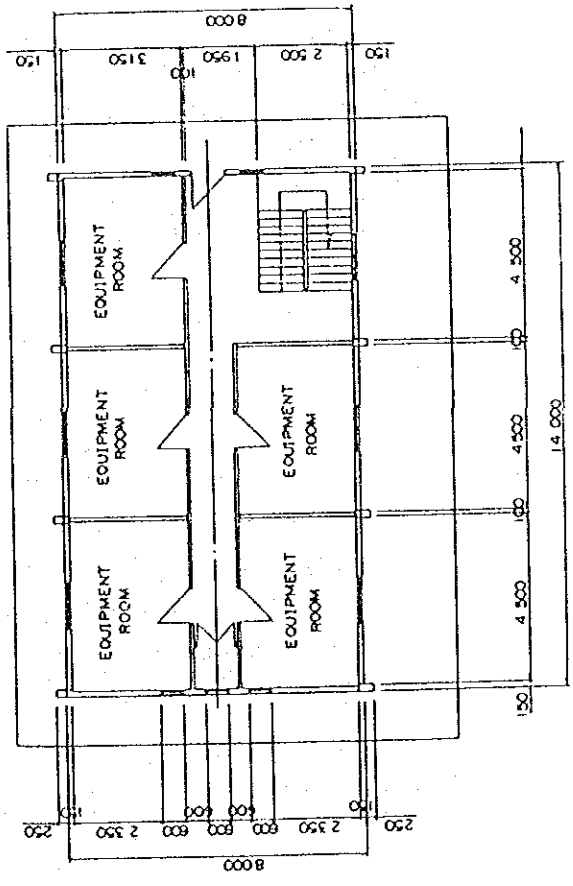
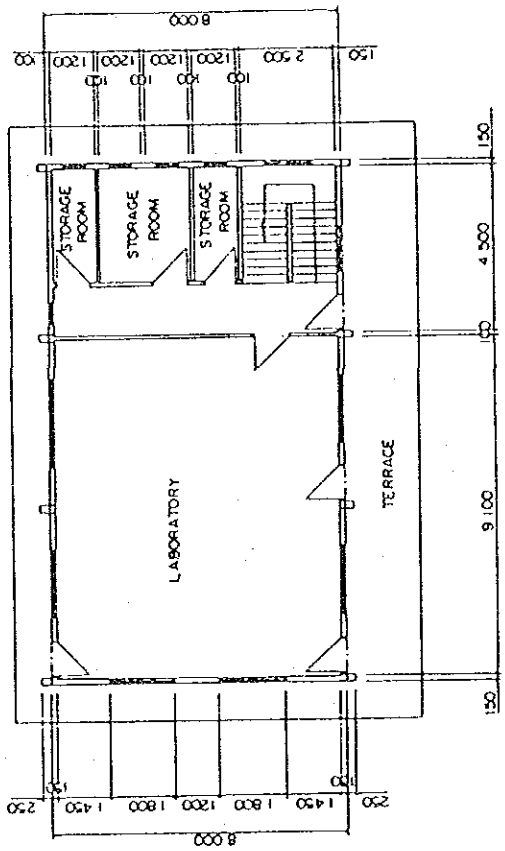


Fig.5-2 Laboratory and Equipment Storage House Plan









CHAPTER 6 IMPLEMENTATION PLAN

Chapter 6 Implementation Plan

6-1 Implementation Plan

1. Schedule Plan

The works at Tabia, Korokadi and Dreketi can be grouped into 2 groups according to regions of that at Tabia and that at Korokadi and Dreketi.

The works for both groups will be carried out simultaneously and the planned term of works is 6 months. As the main component of the works at Tabia and Korokadi is the levelling of the fields and earth-moving works make up the major part of the works, it will be desirable to implement these during the dry season after the harvest (May to October).

Since the sites are divided between the northern and southern sides of Vanua Levu Island and it will be difficult for 1 person to supervise works at both, 2 supervisors will be appointed.

Either the supervisors may be responsible also for conclusion of contracts prior to commencement of works, or a person responsible for contract work may be sent to the site for a short period.

A schedule chart taking account of above considerations is given in Table 6-1.

2. Implementation Plan

Implementation plan for the works is as follows.

(1) Preparatory Works

Establishment of offices on site, confirmation and reinforcement of construction roads, centring of roads and waterways and securing sites for

Table 6-1 Construction Schedule

Work Item	Quantity	First Month	Second Month	Third Month	Forth Month	Fifth Month	Sixth Month
1. Tabia Project							
1) Temporary work	LS						
2) Land consolidation							
- Cut & Bank in A							
- Cut & Bank in B							
- Land levelling	11.6ha						
- Levee work	2,384m						
3) Irri. facilities							
- Irri. canal work	2,230m						
- Related facilities	LS						
4) Pump, Pipe line							
- Pump work	2 set						
- Pipe line (1)	24m						
- Pipe line (2)	355m						
5) Drain. facilities							
- Drain. canal work	1,630m						
- Related facilities	LS						
6) Road work	2,400m						
2. Korokadi project							
1) Temporary work	LS						
2) Land levelling							
- Surface soil handl	4.6ha						
- Cut & bank in A							
- Cut & bank in B							
- Land levelling	9.0ha						
- Levee work	2,469m						
3) Irri. facilities							
- Irri. canal work	1,560m						
- Related facilities	LS						
4) Drain. facilities							
- Drain. canal work	1,158m						
- Related facilities	LS						
5) Road work	1,560m						
3. Dreketi project							
1) Temporary work	LS						
2) Training House							
- Foundation work	160m^2						
- Housing work	120m^2						
3) Labo.& Equip.House							
- Foundation work	140m^2						
- Housing work	112m^2						

storage of construction materials and equipment

(2) Preparation of Fields

a) Creation of Fields at Tabia

Soil surface treatment will be carried out throughout the project area. The depth of soil subject to treatment will be 10 cm and soil cut will be gathered at proposed sites of the levees within the area. Cutting and banking works will then be carried out on the subsoil, involving cutting, transportation and banking and compaction using bulldozers. Banking of branch roads and waterways will also be carried out at this stage. The surface soil will be returned when the levelling work in all the plots has been completed.

Estimating the amount of work from the quantity of soil treated (12,000 m3), using an 11-ton bulldozer, which, under normal circumstances, will handle 8.3 m3 of soil per hour, the total time required is 1,446 hours (12,000 m3 ÷8.3 m3/hour). Working 8 hours per day, it will take 181 days with 1 bulldozer.

Working 20 days in a month and with 2 bulldozers in constant use, the term required is 4.5 months (181 ÷ (20 days × 2)).

b) Creation of Fields at Korokadi

Only Division B will be subject to surface soil treatment at Korokadi. The depth of removal will be 10 cm and the soil removed will be gathered at the sites of the boundaries of plots. Levelling works, involving cutting and banking using bulldozers will then follow. Banking of branch roads and waterways will be carried out at the same time. The surface soil will be returned when the levelling work in each planned plot has been completed.

(3) Irrigation Channels

a) Tabia

The branch waterways will be built along the roads. Since the cross-sections of the waterways are small and they will be of earth, banking work will be carried out at the same time as the levelling of the fields and this will be followed by compaction and excavation using back hoes.

The quantity of work is as follows.

Construction Length : L = 2,226 m

b) Korokadi

As at Tabia, banking work will be carried out at the same time as the levelling work of the fields and this will be followed by compaction and excavation using back hoes.

The quantity of work is as follows.

Construction Length : L = 1,585 m

(4) Drainage Works

a) Tabia

All branch drains will be newly-built and excavation with back hoes will be carried out at the same time as the levelling work of the fields.

The quantity of work is as follows.

Construction Length : L = 1,826 m

b) Korokadi

On the existing drains, excavation to the design elevation will be carried out after removal of deposit and grass with back hoes. For new drains, excavations will be carried out using back hoes at the same time as the levelling work of the fields.

The quantity of work is as follows.

Construction Length : L = 1,158 m

(5) Roads

a) Tabia

All the branch roads will be newly-constructed. Subsoil dug up in the levelling work will be used for banking works. After adequate compaction and adjustments, gravel will be laid to a depth of 10 cm. Bulldozers will be used for this work.

The quantity of work is as follows.

Construction Length : L = 2,351 m

b) Korokadi

As at Tabia, banking work will be carried out at the same time as the levelling work of the fields using the subsoil dug up. After compaction and adjustment with bulldozers, gravel will be laid to a depth of 10 cm.

The quantity of work is as follows.

Construction Length : L = 1,585 m

(6) Pumps and Irrigation Pipes

Works to be implemented at Tabia include construction of pumping pit, works for pumping pipes, installation of pumps and works for the delivery tank. The works for the pumping pit consists of the intake point on the river, intake pipe and the pit. As the construction of the intake point involves work right on the river, adequate cut-off and drainage of water with sand bags will be carried out before implementation of the works. In the works for the pumping pipes, which are laid on the bank of the river and slopes of roads and a hill, sufficient burial depths must be secured and stable construction assured through layout, for example, of anchor blocks. Since the delivery tank is to be built on a slope, adequate measures will be taken against failure of the ground and inflow of stormwater before commencement of works.

Installation of concrete pipes, 300 mm in diameter, connecting the delivery tank with the farm pond and the construction of the farm pond itself will then be carried out. The work for laying of the concrete pipes can be divided between that for the part passing underneath the slope of the hill and that passing through the settlement. In each, safety measures will be taken by securing adequate depth under ground and laying of anchor blocks. Back hoes will be used in principle for the excavation works but parts on steep slope and parts for installation of anchor blocks will also entail manual labour.

Quantity of works are as follows.

Length of Pumping Pipe : L = 24 m

Length of Delivery Pipe : L = 355 m

(7) Training Centre

Construction works for the 2 buildings in Dreketi District will commence

after the completion of levelling works at the sites. Works for the foundation of the training building include footing works for the columns and placement of foundation concrete for the floor surface. This will be followed by construction of columns, walls, roof and the interior, in that order, and the work will be completed with electrical equipment works and exterior works.

Foundation works for the laboratory building include footing works for the columns and construction of the underground walls which form the lower parts of the block walls. This will be followed by construction of columns, walls, roof and the interior, in that order, and the work will be completed with electrical equipment works and exterior works.

As regards the term of works, the construction of the training building is expected to take 3 months and that of the laboratory building 5 months. They will commence at the same time and will be carried out in parallel with each other. There will be no creation and levelling of land, road works and electrical and water works outside of the boundary.

Quantities of work are as follows.

Training Building - building area: 120 ㎡ (excluding terrace), wooden bungalow

Laboratory Building - building area: 112 ㎡ (excluding terrace), concrete 2-storey building

6-2 Construction Cost

The construction cost of Pilot Infrastructure Works in Tabia, Korokadi and Dreketi Projects is shown as bellow ;

1. Total Cost

	(¥)	
(1) Construction Cost		
- Tabia Project	19,114,000	
- Korokadi Project	12,189,000	
- Dreketi Project	9,300,000	
sub total	40,603,000	— (a)
(2) Overhead		
(a) × 20%	8,120,000	
Total	48,723,000	— (b)
(3) Contingency		
(b) × 10%	4,872,000	
Total	53,595,000	— (c)
(4) Other Expence		
(c) × 5%	2,605,000	
Total	56,200,000	— (d)
(5) Supplied Material Cost	8,000,000	— (e)
(6) Total Cost		
(d) + (e)	64,200,000	

2. Construction Cost Every Project

(1) Direct Cost of Tabia Project

The breakdown is as follows.

Work Item	Quantity	Unit Cost	Amount	Remarks
① Land Consolidation works				
• Cut & Bank in Area A	10,209.6m³	2.08	21,236.00	
• Cut & Bank in Area B	9,036.6m³	2.35	21,236.00	
• Levelling Work	11.6ha	1,234.57	14,321.01	

・Levee work	2,384m	2.17	5,173.28
Sub total			62,066.29

② Irrigation Facility works

・Irrigation Canal	2,230m	6.63	14,784.90
・Inlet work (A-type)	53 places	138.14	7,321.42
・Inlet work (B-type)	26 places	63.68	1,655.68
・Plot access road (A-type)	23 places	930.57	21,403.11
・Plot access road (B-type)	13 places	2.34	30.42
・Plot access road (C-type)	5 places	651.31	3,256.55
・Plot access road (D-type)	2 places	1.17	2.34
・Road crossing work	13 places	822.87	10,697.31
Sub total			59,152.21

③ Pump, Pipe line work

・Pump pit work	1 place		2,000.00
・Pipe line work (1)	24m	50.00	1,200.00
・Outlet box work	1 place		2,000.00
・Pipe line work (2)	355m	50.00	17,750.00
・Farm pond work	1 place		5,000.00
Sub total			27,950.00

④ Drain Facility work

・Drainage canal work	1,630m	12.03	19,608.90
・Pipe culvert work	8 place	337.87	2,702.96
・Outlet work	79 place	63.68	5,030.72
Sub total			27,342.58

⑤ Road work

・Road Work	2,400m	12.09	29,016.00
Sub total			29,016.00

Total F$ 205,527.08

F$ 205,527.08× 93 yen = ¥ 19,114,000

(2) Direct cost of Korokadi Project

The breakdown is as follows

Work Item	Quantity	Unit Cost	Amount	Remarks
① Land consolidation work				
・Surface soil handling	4,600㎥	3.67	16,882.00	
・Cut and Bank in Area A	4,500㎥	2.08	9,360.00	
・Cut and Bank in Area B	3,500㎥	2.35	8,225.00	
・Levelling work	9ha	1,234.57	11,111.13	
・Levee work	2,469m	2.17	5,357.73	
Sub total			50,935.86	
② Irrigation facility work				
・Irrigation canal work	1,560m	6.63	10,342.80	
・Inlet work (A-type)	28 places	138.14	3,867.92	
・Inlet work (B-type)	50 places	63.68	3,184.00	
・Plot access road (A-type)	23 places	30.57	21,403.11	
・Plot access road (B-type)	13 places	2.34	30.42	
・Plot access road (C-type)	3 places	651.31	1,953.93	
・Plot access road (D-type)	2 places	1.17	2.34	
Sub total			40,784.52	
③ Drainage facility work				
・Drainage canal work	1,158m	12.03	13,930.74	
・Pipe culvert work	4 places	337.87	1,351.48	
・Outlet work	77 places	63.68	4,903.36	
Sub total			20,185.58	
④ Road work				
・Road work	1,585m	12.09	19,162.65	
Sub total			19,162.65	
Total			F$ 131,068.61	

F$ 131,068.61 × 93 yen/F$ = ¥ 12,189,000

(3) Direct cost of Dreketi Project

The breakdown is as follows

Work Item	Quantity	Unit Cost	Amount	Remarks
① Training House				
・Foundation work	1 LS		7,000	
・Housing work	1 LS		26,000	
Sub total			33,000	
② Laboratory and Equipment House				
・Foundation work	1 LS		12,000	
・Housing work	1 LS		55,000	
Sub total			67,000	
Total			100,000	

F$ 100,000× 93 yen ／F$ = ¥ 9,300,000

3. Unit Cost

Unit costs used for cost estimation are listed in Table 6-2.

These are based on data collected in Fiji.

4. Cost of Supplied Material

Submurgible pump faciliteis used in Tabia project are supplied material.

The breakdown is as follows.

Item	Specification	Q'ty	Unit Price	Amount
Submergible Pump	φ100, Q=1.8m³/min	2	800,000	1,600,000
Generator	20 KVA	1		2,500,000
Switch board		2	900,000	1,800,000
Accessary		1 LS		1,100,000
Sub total				7,000,000(FOB)
			⟶	8,000,000(CIF)

Table 6-2 Unit Price (F$)

No.	Item	Unit	Unit Price	Remarks
1.	Surface Soil Handling (ℓ = 40m)	m^3	3.67	t=10cm
2.	Cutting and Banking (ℓ = 65m)	m^3	3.10	t=10cm
3.	Cutting and Banking (ℓ = 40.5m)	m^3	2.08	t=10cm
4.	Cutting and Banking (ℓ = 35m)	m^3	2.35	t=10cm
5.	Land levelling work	ha	1,234.57	
6.	Road work	m	12.09	
7.	Irrigation canal work	m	6.63	
8.	Drainage canal work	m	12.03	
9.	Pipe culvert (ϕ300 mm)	Place	337.87	
10.	Pipe culvert (ϕ450 mm)	Place	404.57	
11.	Inlet work (A-type)	Place	138.14	
12.	Inlet work (B-type)	Place	63.68	
13.	Outlet work (A-type)	Place	138.14	
14.	Outlet work (B-type)	Place	63.68	
15.	Plot access road (A-type)	Place	930.57	
16.	Plot access road (B-type)	Place	2.34	
17.	Plot access road (C-type)	Place	651.31	
18.	Plot access road (D-type)	Place	1.17	
19.	Levee work	m	2.17	
20.	Road crossing work	Place	822.87	
21.	Farm pond work	Place	10,694.30	
22.	Pipe line work	m	36.78	
23.	Outlet box work	Place	1,507.97	
24.	Pump pit work	Place	1,529.42	

6-3 Contract Specification

1. Contract (Draft)

CONTRACT

ON

THE PILOT INFRASTRUCTURE IMPROVEMENT WORKS

FOR

THE IMPROVEMENT OF RICE CULTIVATION TECHNOLOGY PROJECT

April 1990

JAPAN INTERNATIONAL COOPERATION AGENCY

CONTRACT

on

The Pilot Infrastructure Improvement Works

for

The Improvement of Rice Cultivation Technology Project

This Contract is made entered into this _____ day of_____ 1988 at the JICA Suva Office between Japan International Cooperation Agency, Suva Office by _____ , Title _____ as its authorized representative of the Fiji Office, hereinafter called "The JICA" of the one part, and _____ whose office is situated at _____ Represented by _____, Title _____ hereinafter called "The Contractor" of the other part.

Both parties mutually agree under the terms of this Contract as follows:-

Article - 1 (a) (Description of Work)

Contractor shall carry out the construction of Pilot Farm in Tabia and Korokadi areas and Extention Training House at Dreketi Project for the Pilot Infra-structure Improvement Works.

Article - 1 (b)

The following documents shall be deemed to form, be read and constructed as port of this agreement viz:-

i) Bill of quantities (itemized statement)

ii) The attached construction drawings

iii) The attached specification

Article - 2 (Contract Sum of Construction)

The contract sum of construction shall be F$_____

(_____)

and be based on the bill of quantities attached here.

Article - 3 (Time Limit on Construction and its Prolongation)

The Contractor shall start work within ten (10) days of signing by both parties of this agreement, and complete work by the ____th of _____ , 19___.

Article - 4 (Delays)

In a case where it is clear that the Contractor is failing to fulfill his obligations within the period referred to in the preceding Article. The Contractor shall inform the JICA of this as soon as possible and if the JICA agrees that the delay is due to such causes as natural calamity or others for which the Contractor is not liable, a reasonable extension of time shall be approved. In this case, the sum referred to in Article 15 shall not be collected.

Article - 5 (Process of carrying out of Work)

The Contractor shall carry out the work in accordance with the drawings and specification referred to in Article 1(b). And in cases where it is necessary for carrying out such work as is not mentioned therein for the purpose of promoting the present construction or for reasons of established practices, the Contractor shall carry out the said work under the direction of the JICA. In cases where the Contractor finds any doubt in the plans of construction, the Contractor shall ask the JICA for the necessary directions before commencing work

on that part for which there exists some doubt. The JICA must provide such information and details within seven (7) days of the written request from the Contractor.

Article - 6

The Contractor shall follow the direction of the JICA or the Engineer to be appointed by the JICA. As to materials for the construction, the Contractor shall use only those inspected and approved by the JICA or the Engineer appointed by the JICA. In cases where any defective work has been done as a result of such use of materials which have not been inspected by the Engineer. The Contractor shall be liable to change the materials or repair the work at his own responsibility. The construction shall be carried out in accordance with the proper technique and durability shall be the principal aim as regards to the construction.

Article - 7

As to the workman to be hired by the Contractor for the work, the Contractor shall assume the responsibility as entrepreneur or employer, as provided for by Laws and Regulations.

Article - 8 (Transfer of Right and Obligation)

The Contractor shall not assign or sublet to a third party the whole or part of the construction except in cases where the Contractor has obtained written approval from the JICA.

Article - 9 (Damages)

In cases where any damage is caused to the JICA or a third party, materials or buildings, through carelessness on the part of the Contractor during the course of work or transportation of materials, the Contractor shall be liable to repair or compensate such damage at his own expense by the date appointed by the JICA or the third party.

Article - 10

In case where the Contractor fails to repair or compensate such damages referred to in the proceeding Article by the fixed date, the JICA may pay for such repair on behalf of the Contractor and collect compensation from the Contractor by deducting the amount from the sum of construction to be paid to the Contractor under the provisions of Article 20, and in cases where the damages exceed the sum of construction, the JICA may collect the deficit.

Article - 11(a) (Change of Construction Drawing and Submission of Necessary Documents)

In cases where the JICA feels it necessary to discontinue work owing to unavoidable circumstances or to alter the plan of construction, the JICA may request the Contractor to calculate, on the basis of the unit prices as detailed in the priced bill of quantities referred to in Article - 2, as increase or decrease in the sum of construction resulting from the suspension or alteration of the work and the Contractor shall comply with the request. When the JICA orders such a suspension or alteration, depending on the statement of the above mentioned calculation, the Contractor shall submit a written consent by the date appointed the JICA.

Article - 11(b)

Where additional work cannot be properly measured and valued on the basis of the unit price in the bill of quantities referred to in Article - 2, the Contractor shall be allowed daywork rates in accordance with a written consent by the JICA .

Article - 12 (Price Adjustment)

(a) In the case of the costs of materials rising sharply as a result of the fluctuation in the market prices due to an unexpected change in the economic conditions, a reasonable adjustment of the above mentioned sum or the contents of the work, will be made according to a mutual agreement between the JICA and the Contractor.

(b) In a case where the Contractor incurs loss or suffers loss unreasonably in some item of Bill of quantities due to the JICA's failure to provide the information and details referred to in Article - 5 of the particular item or work, then reasonable adjustment of the above mentioned losses shall be considered by the JICA on the detailed claim submitted by the Contractor.

Article - 13 (Right to Rescind Contract and Penalty)

In cases where the Contractor fails to fulfill his obligations under this contract, the JICA may rescind the whole or part of the Contract. In such a case, the JICA may collect from the Contractor a sum as a penalty of 10 percent (10%) of the amount which is equivalent to the rescinded. In cases where the damages caused on the JICA, on account of the non-fulfillment of contract by the Contractor, exceed the sum referred to in the

preceding paragraph, the JICA may further demand the Contractor to pay the excess.

Article - 14

In cases other than provided for in the preceding Article where the Contractor fails to fulfill his obligations, or in cases where the fulfillment of obligation by the Contractor is regarded to be difficult, the JICA may have a third party fulfill, at the cost of the Contractor, the whole or part of the obligations of the Contractor. Even if liability of the Contractor exceeds the contract sum referred to in Article - 2 in consequence of this, the Contractor may not raise any objection to it.

Article - 15

In cases other than provided for in Article 13, where the Contractor fails to complete the construction at his own responsibility, within the period referred to in Article - 3, the Contractor shall be liable, a period fixed by the JICA, to pay the JICA, per week of delay, a sum equivalent to 0.2 percent (0.2%) of the contract sum referred to in Article - 2.

Article - 16 (Damages caused by Natural Calamity etc.)

In cases where serious damages occur to the completed part of the work, or the materials, tools etc., already carried into the field of construction, the Contractor shall promptly inform the JICA of the circumstances. If such damages are caused by a natural calamity, an earthquake, a flood, a civil war, a war, an epidemic, or a general/trade strike, rioting or other unavoidable reasons, for the occurance of which no responsibility

can be attributed to either the JICA or the Contractor and it is admitted that the Contractor has paid the care of good administration to avoid the occurance of such damages, the JICA shall be liable for the amount of the damages which shall be fixed through negotiations between the JICA and the Contractor.

Article - 17(a) (Inspection)

The work at any stage shall be subject to inspection to be conducted by the JICA or an inspector appointed by the JICA, in the presence of the Contractor and necessary labour and articles required for such an inspection shall be provided by the Contractor.

Article - 17(b)

In cases where the work fails to pass the inspection referred to in the proceeding paragraph, the Contractor shall carry out necessary repair at his own cost, under the direction of the JICA.

Article - 18 (Date of completion of construction and obligation thereafter)

The date of completion of construction shall be regarded as that on which the final work, including removal of temporary constructions and cleaning, has passed the inspection referred to in Article - 17 and on that date the object of the total construction shall be delivered to the JICA by the Contractor. For a period of three (3) months thereafter, any defect in the construction, the cause of which is judged in the opinion of the JICA to be attributable to faulty or inadequate technique or materials employed by the Contractor, shall be immediately repaired or improved at the cost of the Contractor.

Article - 19(a)(Payment & currency)

The JICA shall pay to the Contractor in local currency as follows:-

Payment for the part of the work already completed shall be allowed by the JICA three times during the course of construction at the request of the Contractor, provided that it has passed the inspection referred to in Article - 17.

However, the amount of the payment shall be limited to ninety per cent (90%) of the work already completed. The final payment will be carried out within one month after the JICA receives the bill which will be submitted by the Contractor on or after the date of completion of construction referred to in the preceding Article.

Article - 19(b)

Ten per cent (10%) of the contract price shall be paid as advance payment for mobilization with order to commence, upon production of a refund bond or Bank Guarantee for the same amount as the said advance payment.

Article - 19(c)

This advance payment shall be adjusted from subsequent monthly bills by such sum as the proportionate to the monthly progress stated in the said bills.

Article - 19(d)

The refund bond or bank guarantee as provided in paragraph (b) here or shall be returned to the Contractor by the JICA upon the delivery of the works.

Article - 20 (Interest for the delay of payment)

In cases of the payment referred to in the preceding Article being delayed owing to a cause or causes attributable to the JICA, the Contractor may request the JICA to pay, per week of delay, a sum equivalent to 1.0 per cent (1.0%) of the bill sum on arrear of payment.

Article - 21(a)(Settlement of dispute)

If there arises any dispute with regard to this Agreement or the construction Drawings or Specification referred to in Article - 1(b) it will be settled by a mutual consultation between the JICA and Contractor.

Article 21(b)

Should it not be possible to reach a mutual agreement between the JICA and the Contractor on such dispute, then it shall be referred to an Arbitrator or Arbitrators acceptable to both the JICA and the Contractor and the decision of this Arbitrator or/of Arbitrators shall be binding on both the JICA and the Contractor.

The Conclusion of the Agreement:

Two copies of the Agreement shall be prepared with the signature of both parties affixed to each of the copies, one copy to be held by each party.

Date :_____

.....JICA

Mr. _____ , Resident Representative
JICA, Suva Office

.....Contractor

.....Witness

.....Witness

2. Specification (Draft)

Specification

Specification

Section 1. General

1-1. Application

1) This specification is applicable to "Construction of Pilot Farm at Tabia and Korokadi areas and Extention Training House at Dreketi Project in Fiji".

2) Quantity of main work

A) TABIA PROJECT (Pilot Farm)

(i)	Land Consolidation Works	11.6 ha
(ii)	Irrigation Facilities	
	Irrigation Canal	2,230 m
	Submergible Pump	2 sets
(iii)	Drainage Facilities	
	Drainage Canal	1,630 m
(iv)	Road works	
	Farm road	2,400 m

B) KOROKADI PROJECT (Pilot Farm)

(i)	Land Consolidation Works	9.0 ha
(ii)	Irrigation Facilities	
	Irrigation Canal	1,560 m
(ii)	Drainage Facilities	
	Drainage Canal	1,138 m
(iii)	Road Works	
	Farm road	1,560 m

C) DREKETI PROJECT (EXTENTION TRAINING HOUSE)

(i) Training House

(ii) Laboratory and Storage House

3) Specifications entered in the drawing shawing shall be treated in reference to this specification.

1-2. Engineer

"Engineer" means the engineer who was appointed to supervise the works by the JICA.

1-3. Site Representative

Site representative shall be well qualified in supervision or have enough experience of supervision. The Contractor shall submit career history of a site representative to the Engineer for his approval.

1-4. Work Schedule

The Constractor shall submit his work schedule before the commencement of the works at the job site. If the Contractor intends to change the work schedule, the approval from the Engineer shall be obtained prior to the modification of schedule.

Also the Contractor shall submit the machineries scheme including the numbers, and kind of machineries and using period of them.

1-5. Field Test and Inspection

The field tests in accordance with the specifications and the demands from the Engineer shall be the responsibility for the Contractor. The charges for such fields test shall be included in the total amount of the construction cost, and the Contractor is not entitled to claim any amount of the field test charges.

1-6. Temporary Office and Residence

In case the Contractor intends to build the temporary office, residence and so forth, the Contractor shall submit the plan to the Engineer for approval at least 10 (ten) days in advance of the commencement of such works.

The Contractor is required to always keep the buildings and facilities in good condition and to make proper drainage and sanitary system. Should the Contractor build them outside of the job site, the Contractor shall arrange with the owner of such land and at its own expense.

1-7. Record on Construction

The Contractor shall submit the record on whole progress of Construction every week to the Engineer.

1-8. Clearance of the Work Site

Upon completion of the works, the Contractor shall clear the site within period of construction.

Section 2. Earth Works

2-1. Scope

The work under this Section shall consist of all classes of grading, leveling, ditching, earthmoving, all other excavation, backfill, banking, surfacing and any other such construction work.

2-2. Clearing and Stripping

(1) Clearing

All areas to be cleared will be as designated on the Drawings and/or as directed by the Engineer. This work shall basically consist of clearing all vegetation, roots, brush, rubbish and other objectionable matter from the specified area to the satisfaction of the Engineer.

(2) Stripping

All the surfaces which are to be stripped will be as shown on the Drawings and/or as directed by the Engineer. This work shall basically consist of removing boulders, underground roots and other undesirable items to a depth as shown on the Drawings or as otherwise stipulated by the Engineer.

Materials obtained from stripping work shall be deposited in places approved by the Engineer. Stockpiled material shall be smoothed to a measurable outline and shall not be higher than that specified by the Engineer.

2-3. Excavation

(1) Excavation of all canals, ditches, pipelines and structure shall be in accordance with cross-section, line and grades shown in the drawings. Excavation operations shall be such that all suitable materials for embankment shall be separated from objectionable materials which are to be wasted.

(2) If the spontaneous landslide of the slope occurs or is expected to occur, the Contractor shall inform the Engineer without any delay and shall ask him how to deal with landslide.

(3) The excavation of the slope shall be finished with tools to have the gradient indicated in the drawings or by the Engineer.

(4) If the slope and the foundation of the canals, ditches, or the foundation of pipe, structures are over excavated, the Contractor shall backfill with gravel or other material approved by the Engineer at the Contractor's expense and the backfilled materials shall be compacted sufficiently.

2-4. Backfill and Fill

Backfill and fill shall be placed to the lines and dimensions as shown on the Drawings.

The materials to be used for backfill and fill shall be all classes of disposed or excavated materials available in-situ. The quality of such materials shall be approved by the Engineer and shall be free from any organic matter or other objectionable material such as large clods or stones, boulders, etc.

The material shall be handled and placed in such manner as to achieve favorable compaction and density. The method of placing, moisture controlling and compacting backfill and fill shall be subject to approval by the Engineer.

2-5. Embankment

Embankments shall be placed and trimmed to the lines and dimensions as shown on the Drawings. The materials to be used for embankment shall be all classes of disposed or excavated materials available in-situ. The quality of such materials shall be approved by the Engineer and shall be free from any organic matter or other objectionable material such as large clods or stones, boulders, atc. The material shall be placed in successive horizontal layers of loose material not more than 200mm in depth. Each layer shall be spread uniformly on a soil surface that has been moistened or aerated as necessary and scarified or otherwise broken up in such a manner that the fill will bond with the surface on which it is placed. The material shall be handled and placed in such manner as to achieve favorable compaction and density. The method of placing, moisture controlling, compacting and trimming of the embankment shall be subject to approval by the Engineer. The surface of the embankment shall be left 150mm above final grade to allow for settlement. After an adequate period approved by the Engineer, the Contractor shall return and fill in low spots, or scrape off high spots.

2-6. Disposal of Excavated Material

Excavated materials may be used for backfilling and/or embanking unless otherwise specified or directed by the Engineer. Excavated material in excess of requirements, shall be disposed of in the disposal area appointed by the Engineer. Waste material shall be piled by taking sufficient measures to avoid injury or damage to adjacent area and properties.

Section 3. Concrete Works

3-1. General

All concrete works shall be performed as established on the Drawing or directed by the Engineer. Unless specifically provided in this specification, the concrete shall be produced, transported, placed, cured, finished and tested in accordance with the ASTM and JIS provisions or equivalent standard approved by the Engineer.

3-2. Materials

(1) Cement

(i) Cement used in Concrete mixture shall be normal portland cement, properties of which shall be in accordance with ASTM-C150 and JIS-R5210 or equivalent standard approved by the Engineer.

(ii) Cement shall be reliable brand, good quality and absolutely dry.

(iii) The Contractor shall construct a water-proof cement storage shed at the job site, floor of which shall be higher than the ground surface at least 30 (thirty) cm.

(iv) The Contractor shall not keep cement at the job site more than 1 (one) month, and the storage period is counted from the date when the cement is transported from the manufacturing factory to the job site.

(v) During the course of construction, the Contractor shall not use cement for the works properties of which are changed, especially consolidated.

(2) Fine aggregate

(i) Fine aggregate shall be river sand that is clean and rigid without organic matter and other substance.

Fine aggregate shall have the properties as shown in following table.

Sieve No.	Percent Retained by Weight
4	0 - 5
16	25 - 40
100	93 - 97

The fineness modules shall be in the range from 2.30 to 3.00

(ii) The Contractor shall keep fine aggregate at clean and good drainage place, which shall be protect against the mixture with harmful substance such as clay, soil and so on.

(3) Coarse aggregate

(i) The Contractor shall use crushed stone as coarse aggregate which is rigid and endurable substance without organic and harmful materials.

(ii) Coarse aggregate shall have the grading as shown in the following table.

Sieve Size	Percent Retained by Weight
1"	0
3/4"	0 - 10
3/8"	45 - 80

(iii) Coarse aggregate shall be stored in such manner as to avoid inclusion of foreign materials. All coarse aggregate

shall be maintained in saturated moisture content and surface dry conditions.

(4) Water

(i) Water used in Concrete shall be clean free from oils, acid, alkali or other matters detrimental to the quality or durability of the concrete.

(ii) Water shall be stored in tanks and not to be exposed to the direct rays of the sun.

3-3. Mixing Design of Concrete

Concrete shall have the proportion as follows:

Class	Compressive Strength 28 days	Mixing portion Cement:Fine A: Coarse A	Slump
Reinforce concrete	f'c=210 kg/cm	1:2:3 (by volume)	8 - 12 cm
Plain concrete	f'c=160 kg/cm	1:3:6 (by volume)	8 - 12 cm
Lean concrete	-	1:4:6 (by volume)	

Fine A : fine aggregate

Coarse A : coarse aggregate

Other proportions for mixed design may be indicated by the Engineer at the job site, if it is necessary.

3-4. Slump Test

The Contractor shall make slump test in each batch in accordance with JIS 1101. In case the Contractor intends to place concrete, the Contractor shall not pour the concrete without prior inspection for the value of slump test by the Engineer.
After the completion of the concrete Works, the Contractor shall submit the data of slump test to the Engineer.

3-5. Mixing the Concrete

The Contractor shall use a power-driven concrete mixer and quantities of cement, aggregate and water in concrete mixture shall be measured correctly in each time. The driving time for mixing concrete shall be more than 2 (two) minutes and less than 5 (five) minutes in order to make concrete with constant consistency and good quality. Take out from the concrete mixer, concrete shall be placed in the form within 30 (thirty) minutes. The concrete mixer shall be checked and cleaned every day and the Contractor shall remove concrete debris attached the concrete mixer.

3-6 Concrete Form Work

(1) Concrete form shall be rigid and strong enough to support the weight of concrete without deformation, and the Contractor shall make concrete form tightly in order to prevent water seepage from unsolid concrete.

(2) The Contractor may use wood form, plywood form and steel form, in any case surface of form shall be smooth and have no damage.

(3) In case the Contractor set up concrete form, the iron embedded within concrete to hold the form shall be cut at concrete surface.

(4) Before placing concrete, concrete form shall be inspected by the Engineer for correctness of size, good preparation and so on.

(5) Before placing concrete, the Contractor shall paint oil on inner side of concrete form for good separation between concrete and concrete form after solidness of concrete.

3-7. Placing Concrete

(1) Before placing concrete, the Contractor shall check and clean the floor and the surface of concrete form.

(2) After a batch of concrete is placed, the surface height of concrete in concrete form shall have same height in a block, and the height of placed concrete layer shall be less than 40 (forty) cm in each placing.

(3) The Contractor shall place concrete continuously into a look of structure such as wall, slab and so on.

(4) In case the new concrete is placed on solid concrete, the Contractor shall take out laitance, loose aggregate, low quality concrete on the surface of solid concrete.

3-8. Compaction of Concrete

After placing concrete, the Contractor shall compact concrete by using immersion type vibrator. Should the Contractor

intends to use another type of vibrator, the Contractor shall obtain the prior permission of the Engineer.

3-9. Curing

The Contractor shall cure concrete completely with water. If the Contractor intends to use curing chemical, the Contractor shall obtain the prior permission of the Engineer.

3-10. Reinforcing Bars

(i) Reinforcing bars which are used in reinforced concrete works shall be round bar or deformed bar in accordance with ASTM designation A-7-55 and A-141-55 or JIS G 3112, when the Contractor uses round bars, hook shall be provided as directed by the Engineer.

(ii) The equipment and tool which are to be used to cut, bend and manufacture shall be approved by the Engineer. Hot manufacturing of the reinforcing bar is not permitted.

(iii) Before the bar is erected, the surface of the bars and the surface of any metal supports shall be clean and free from all the dirt and deteriorates which in the opinion of the Engineer is objectionable.

(iv) The minimum coverage for all main reinforcing bars shall be 5 cm.

(v) Cutting and bending of reinforcing bars may be done in a slop or at the job site. All bending works shall be in accordance with the standard approved practice of the industry or by other approved machine methods. Radial for bend and hooks will be as per the detailed approved drawings.

(vi) Laps at joints of reinforcing bar shall have a length at least thirty times of the diameter of bar and shall be bound by steel wire.

Section 4. Land Consolidation Works

4-1 Scope

The work under this Section shall consist of clearing and stripping and grading works, all in accordance with the Drawing and these specifications or as directed by the Engineer.

4-2 Work Preparation

Prior to the work, the planned area shall be isolated from outside drainage to prevent the water coming in. During the work, surface water in the planned area shall be removed as much as practicable.

4-3 Clearing and stripping Work

(1) The Contractor shall conform the boundary of work area in attendance of the Engineer before the commencement of work and stall place boundary post,if necessary.

(2) Clearing and stripping work shall conform to the requirements specified under Section 2.

4-4 Earthmoving and Filling

(1) Primary earthmoving and filling shall be made within the planned area as a rule.

(2) Earthmoving and filling work shall conform to the requirements specified under Section 2.

(3) Slope surface shall be finished evenly with the grade given in the Drawings. Final grading shall be carried out using a bulldozer.

(4) In case of over-excavation, the Contractor shall dispose according to the instruction of the Engineer. Its cost shall be borne by the Contractor.

Section 5. Irrigation canal works

5-1 Scope

This Scope under this Section shall consist of excavation, embankment and relative structures for the irrigation canals, all in accordance with the Drawings and these Specifications or as directed by the Engineer.

5-2 Earth Work

Earth Work for irrigation canals shall be in accordance with Section 2.

5-3 Concrete Work

Where shown on the Drawings or as directed by the Engineer, the Contractor shall construct division and inlet works for the irrigation canals. Those structures shall be constructed in accordance with the applicable provision as Section 3 and the relevant Drawings.

Section 6. Drainage Canal works

6-1 Scope

The scope under this Section shall consist of excavation of canals and construction of the pipe culvert for drainage canal in accordance with the Drawings and Specifications or as directed by the Engineer.

6-2 Earth Work

Earth Work for drainage canals shall be in accordance with Section 2.

After banking operations are terminated the slope of banking shall be formed by means of slope tamping.

6-3 Pipe Culvert

Pipe culvert shall be made with locally manufactured concrete pipes. Concrete works shall comply with the descriptions of Section 3.

Section 7. Road Works

7-1 Scope

The scope under this Section shall cover the construction of farm road.The work shall include grubbing clearing embankment and excavation, all in accordnce with the Drawings and these specification, or as directed by the Engineer.

7-2 Earthwork

The earthwork needed for construction of the roads shall be conducted according to the applicable provisions of Section 2.

7-3 Earth Materials

The road base shall be formed with those earth materials as surplus in excavation of ditch, when those materials are appropriate or equivalent in quality to those found in borrow pits.

7-4 Compaction

The base of the embankment shall be compacted with bulldozer and thickness of one compaction shall be about 15 cm in spread. During compaction, water shall be sprinkled for keeping optimum moisture content of the materials.

Section 8. Housing Works

8-1 Scope

The scope under this Section shall cover the construction of Extention Training house in accordance with the Drawings and Specifications.

8-2 Earth work

The earthwork needed for construction of the foundation of those facilities above mentioned shall be conducted according to the applicable provisions of Section 2.

8-3 Concrete Work

The concrete work needed for construction of the foundation of those facilities above mentioned shall be conducted according to the applicable provisions of Section 3.

8-4 Brick Masonry

The work under this clause consists of all brick masonry work shown in the Drawings. Local products can be used and it shall be the first class. All bricks shall be laid after applying mortor.

8-5 Carpentry

The work under this paragraph consists of all carpentry work shown in the Drawings. Local timber can be used and it should be first class. The construction method shall conform to Fiji specifications.

APPENDIX

Appendix 1. Members of the Study Team

MEMBERS LIST

Field	Name	Title
Team Leader	Keizaburou NAGAYOSI	Director, Planning Dep., KANTOU Regional Agricultural Administration, Office, MAFF
Coordination	Noriharu USUKI	Deputy Head, Agricultural Development Div., Agricultural Development Cooperation Dept., JICA
Field Design	Yosizou MOCHIZUKI	Managing Director, Taiyo Consultants CO., LTD.
Facility Design	Ryosuke SAKANASHI	Civil Engineer, Overseas Dept. Taiyo Consultants CO., LTD.

2. Letter of Team Leader

JAPAN INTERNATIONAL COOPERATION AGENCY
(JICA)
DETAIL DESIGN SURVEY TEAM
FOR
THE IMPROVEMENT OF RICE CULTIVATION TECHNOLOGY PROJECT
IN FIJI

29, March, 1989

Mr. Tui Cavuilati
Acting Deputy Permanent Secretary
for Primary Industries and Project Director,
Ministry of Primary Industries,
SUVA

Re: The Pilot Infrastructure Improvement Works
for the Improvement of Rice Cultivation Technology Project

Dear Sir,

The Detailed Design Survey Team (herein after referred to as "The Team") has been organized by Japan International Cooperation Agency (hereinafter referred to as "JICA") for the purpose of formulating detailed Plan on the Pilot Infrastructure Improvement Works for the Improvement of Rice Cultivation Technology Project (herein after referred to as "The Project").

The Team has, so far, made a series of site reconnaissances and discussions with authorities concerned of Fiji as well as Japanese experts in order to determine the location and scale of the facilities. As the result, we would like to submit to you the Basic Plan as per the attached.

The team will proceed with your staff to conduct further field surveys and investigations at the site and make the detailed design on the basis of the result of those surveys. After the completion of the detailed design and assessment of its cost estimated by JICA, you will be informed of its result through the JICA Fiji office.

Further, for the timely commencement of the construction, we would like to ask you to take the necessary formalities in due consultation with the JICA Fiji office.

Lastly, We would like to express our appreciation for the kind cooperation of you and your staff during our stay.

Sincerely Yours,

Keizaburou NAGAYOSI
Team Leader
Detail Design Survey Team
for the Improvement of Rice
Cultivation technology
Project

c.c. Ministry of Foreign Affairs
Ministry of Finance
Embassy of Japan
JICA Fiji Office

BASIC PLAN
ON
THE PILOT INFRASTRUCTURE IMPROVEMENT WORKS

I. Objective

The Team has been dispatched for the purpose of formulating detailed plan on the Pilot Farm and Training facilities in Vanua Levu (Northern Island). Each have a role of the extension and demonstration in Northern Island on the results of rice cultivation technology which studied and developed in Koronivia Research Station.

The Pilot Farm was planned on the basis of the recommendation on MATSUYAMA Mission in 1987.

II. Outline of Pilot Infrastructure Improvement Works

The Team carried out the reconnaissance survey with Fiji officials concerned as well as Japanese experts, in accordance with the request.

The survey carried out taking into consideration the conditions of topography, irrigation and drainage, water source, etc.

Candidate areas were selected two sites as pilot farms in Tabia and Korokadi Valley, and one site as training center in Dreketi.

The result of survey is shown below.

III. Outline of Candidate Areas

1. Pilot Farm

(1) Tabia

About 40 hectares are utilized for rainfed paddy field, and Fiji government has a new development plan of about 80 hectares paddy field in the eastern adjoining area.

Existing paddy field is being kept at good condition for

farming, introduction of double cropping, therefore, shall be easy if irrigation water is prepared.

As the Pilot Farm, about 10 hectares shall be reclaimed newly. New reclaimed farm is considered to plan 0.4 hectare (1 acre) as a unit plot which equiped tertiary irrigation canal, drain, farm road, levelling and others.

Water source is Tabia river and a weir and intake canal are established for existing and new reclaimed paddy field for double cropping (120 hectares).

(2) Korokadi Valley

Korokadi project area is about 200 hectares, in which double cropping system is already introduced with a main canal and main drain. The area exist between a main drain which looated in central low land and main irrigation canals which located on the both hill-foot.

About 8 hectares (20 acres) is selected as the Pilot Area which is a unit irrigable area of a division work. Consolidation works are levelling, tertiary irrigation canal, drain, farm road and others.

Unit plot is considered as existing wide.

2. Extension and Training facilities

Dreketi project area, which is the central area of rice production in Northern Island, is selected the lot for extension and training facilities of rice cultivation technology.

A part of hill area adjoining of the project office area is selected for the plot. Components of the Center are considered to be included lecture rooms, laboratory, showing room of achievement, etc.

3. Detailed Design

The detail engineering designs of the two pilot farms and the

training facilities will be prepared by the remaining two members after consultation with the Fiji side and the Japanese Expert Team.

IV. Others

The Fiji Government should take the full responsibilities on the following items on the execution of the Pilot Infrastructure improvement Works.

(1) to get agreement of the concerned farmers to be used as a pilot farm under the technical cooperation and other related areas for the construction works.
(2) to handle any problem which arises during and after the construction works.
(3) to prepare and consolidate the plot for Extension and Training facilities at Dreketi.
(4) to arrange counterparts during the construction period.
(5) to assign extension staffs of the Pilot farm and instructors for Training Center as full-time counterparts under the project.

Necessary measures is requested to the Fiji authorities for the procedure of the future programme.

OUTLINE OF THE TENTATIVE SCHEDULE ON PILOT INFRASTRUCTURE IMPROVEMENT WORK

1989	Japanese Side	Fiji Side
MARCH	Detail Design Survey Basic Plan of Work	
APRIL	Report of the Mission (information of outline on construction work)	
MAY	-- 3rd May -- Detailed Designing (in Japan)	° Preparation of land ° Getting agreement with farmers,etc ° Preparation of Form A1 for experts
JUNE	* -- 3rd June -- * * JICA HDQ Submitting Final Report Consultation with Ministry of Foreign Affairs -- late in June --	° Request of Construction Work -- early in June -- (through JICA Office) Form A1 -- early in June --
JULY		Exchange of Note Verbal -- early in July --
	Dispatch of Supervising Expert -- late in July -- Remittance of Budget -- late in July --	
AUGUST	Start of Construction Work -- late in August --	

3. Field Report

JAPAN INTERNATIONAL COOPERATION AGENCY

(JICA)

DETAIL DESIGN SURVEY TEAM

FOR

IMPROVEMENT OF RICE CULTIVATION TECHNOLOGY PROJECT

IN FIJI

May 1st, 1989

Mr J. Teaiwa
Actg. Permanent Secretary
Ministry of Primary Industries
SUVA

Dear Sir,

Re : FIELD REPORT OF THE DETAIL DESIGN SURVEY FOR THE PILOT INFRASTRUCTURE IMPROVEMENT WORKS FOR THE IMPROVEMENT OF RICE CULTIVATION TECHNOLOGY PROJECT.

The Detail Design Survey Team organized by JICA visited Fiji on March 21st, 1989 to carry out field works for above mentioned Project.

The Team has carried out necessary field survey and discussions with Fiji authorities concerned, as the result, we would like to submit to you attached Field Report.

In Japan we will prepare the Final Report of detail design and it shall be sent to you through JICA Fiji Office.

Finally we would like to express our appreciation for the kind co-operation of you and your staff during our stay.

Sincerely Yours,

.....
Keizaburo Nagayoshi
Team Leader
Detail Design Survey Team
for the Improvement of
Rice Cultivation Technology
Project.

Encls.

DETAILED DESIGN SURVEY
ON
THE PILOT INFRASTRUCTURE IMPROVEMENT WORKS
FOR
THE IMPROVEMENT OF RICE CULTIVATION
IN
FIJI

FIELD REPORT

MAY 1989

JAPAN INTERNATIONAL COOPERATION AGENCY

I GENERAL

Detail Design Survey Team has been dispatched from March 20 to May 3, 1989 to carry out the detail design survey for the Pilot Infrastructure Improvement Works in Fiji.

Survey Team has prepared Basic Plan , which based on a reconnaissance survey in Northern Division carried out at the first quarter of the survey term, and Fiji side agreed on it.

This Interim Report was compiled in accordance with the field survey, which shown in Basic Plan, by Team members of consultant engineers.

Consultant engineers explained on the Interim Report to Japanese organizations concerned in Fiji, and discussed with Fijian organizations concerned also.

Final Report shall be prepared till the end of June in Japan, and submitted to Fiji side.

II RESULT OF SURVEY

1. Scope of Survey

Field survey carried out at following three sites, namely Tabia and Korokadi Valley for pilot area and Dreketi for extension and training facilities.

Scope of survey in each site are as follows,

(1) Tabia Pilot Area

a) selection of intake site
b) alignment of intake and main canal
c) selection of pilot area (about 10ha)
d) confirmation of soil and water

/3...

(2) Morokadi Valley Pilot Area

a) selection of pilot area (about 8 ha)
b) survey of actual conditions of irrigation and drainage
c) confirmation of soil

(3) Dreketi Extension and Training Facilities

a) selection and survey of plot
b) confirmation of foundation

2. Analysis of Survey Results

2-1 Tabia Pilot Area

(1) Acreage Concerned

Acreage of each concerning area are confirmed by the field survey as follows:

Project Area	
existing paddy field	40.2 ha
fallow field	4.8
Total	45.0
Pilot Area	
existing paddy field	5.7 ha
fallow field	4.8
Total	10.5
Planning Irrigable Area	
project area	45.0 ha
undeveloped area	15.0
Total	60.0
Potential Area (Left bank)	
potential area I (upper)	30.0 ha
" " II (lower)	55.0
Total	85.0

/4...

(2) Irrigation Canals

Main canal in the project area

open canal	825m
pipeline	363
Total	1,188

Intake open canal 1,335m

(3) Intake Facilities

(1) In the survey three options were compared as an intake facility, namely weir No. 1, weir No. 2 and pumping station.

(2) Original proposal of Fiji side was weir No. 1.

This site of weir No. 1 is located in a center of the alluvion of Tatia river, therefore both banks of the river are relatively low (EL(+)1.60m).

According to the calculation, planning water head in this point are needed EL(+)6.17m, therefore it is required to construct the weir No. 1 6.53m high from the river bed and 30m in width, and the connecting dikes 370m long to both hillsides.

Intake canal between weir No. 1 and beginning point of the main canal is 595 m long.

(3) Weir No. 2 is a point of relatively short distance of both hillsides. In this point planning water head is EL(+)6.67m, therefore construction works required are the weir 6.21m high and 20m in width, connecting dikes 190m long and intake canal 1,335m long.

/5...

(4) Weir systems are anyway required so big construction works, therefore pumping system for an intake facility is studied as an option.

In the pumping system a farm pond (control reservoir) is needed, therefore maximum planning water head is required EL(+)7.27m in P point.

Specification of pumps are as follows,

type	inclined type
actual head	6.77m
diameter	250mm
number	2 sets

In case of pumping system, weir, connecting dike andintake canal are naturally no needed, however maintenance cost is needed.

(5) Considerations

Construction cost of 3 options are shown attached table, needless to say, pumping system is drastically lower than weir systems in initial cost.

Survey Team recommends strongly the pumping system for Tabia Project.

In future when the potential area I and II in the left bank of Tabia river shall be developed, Tabia Project can be joined into the new project. In this case two pumping sets can, of course, be diverted to another project or purpose.

/6...

2-2 Korokadi Valley Pilot Area

(1) Selection of Pilot Area

In accordance with the recommendation of the Irrigation Office and the agreement of farmers concerned, following 9.7 ha of 2 blocks with 5 farmers were selected for Korokadi Valley Pilot Area.

Block No. 1		4.7 ha
	1 - 1	K. Krishna
	1 - 2	H. Prasad
Block No. 2		5.0 ha
	2 - 1	P. Lal
	2 - 2	D. Narayan
	2 - 3	B. Narayan

(2) Existing Irrigation and Drainage

Korokadi Project Area is about 200 ha, in which double cropping system is already introduced with a main canals and main drain. Main drain is located in the central low land and main irrigation canals are located on the both hill-sides.

In the paddy fields, there are very few tertiary canals and drains, therefore distribution of irrigation water is very disparity.

Moreover, each plot has considerable undulation, therefore it makes detarioration of water disparity.

(3) Plan of Field Improvement

For the effective extension works by specialists, following improvement works are carried out in the pilot area.

(a) levelling work
(b) construction of tertiary irrigation canal and drains
(c) construction of some farming roads

/7...

2-3 Dreketi Extension and Training Facilities

Topographical survey was carried out in the plot adjoining to the Office of Dreketi Irrigation Project to construct extension and Training facilities.

As the facilities one or two buildings including a training room, a laboratory, a display room and others, shall be designed after ground levelling.

The space of training room is considered for 20 peoples and attached instructors' room, warehouse for instruments.

Specification of the buildings, such as the building in Koronivia Station, is considered the block layer type with one or two stories.

4. Comment

TEL. NO. 312355

MINISTRY OF PRIMARY INDUSTRIES

P O BOX 1292 SUVA FIJI ISLANDS

REF. NO. DI 1/11

DATE :

Mr K Nagayoshi
Team Leader
Detail Design Survey Team
for the Improvement of Rice
Cultivation Technology Project
JICA

Dear Sir,

DRAFT FIELD REPORT : DETAIL DESIGN SURVEY FOR PILOT INFRASTRUCTURE WORKS FOR THE IMPROVEMENT OF RICE CULTIVATION TECHNOLOGY PROJECT

This is to advise you that the draft field report on the above project submitted by Messrs Mochizuki and Sakanashi today had been discussed. Those present during the discussion were the Acting Permanent Secretary for Primary Industires, Mr John Teaiwa, Acting Deputy Secretary, Mr T. Cavuilati, Director (Drainage and Irrigation), Mr V. Nath, Principal Engineer (Drainage and Irrigation), Mr S. Swami and the consultants Messrs Mochizuki and Sakanashi.

During the discussion the following were agreed to:

(a) The consultants prepare a preliminary engineering design for the option weir No. 2 site giving the cost estimates. This option will entail a command area of 150 ha on both banks of the Tabia River in Cakaudrove.

(b) The detail design for the proposed Pilot Infrastructure using the pumping system of irrigation be prepared with cost estimates. The area for the pilot infrastructure will now be in excess of 10.5 ha.

(c) That the irrigation pumps be supplied with the spare parts to the value of about 12% to 15% of the pump and engine.

(d) Korokadi

Prepare detail Engineering design with cost estimates as laid out in the draft report.

(e) Dreketi

Prepare detail Engineering design with cost estimates as outlined in the draft report.

J Teaiwa

J. Teaiwa
Actg. Permanent Secretary for Primary Industries

DRAWINGS

TABIA PILOT PROJECT

DRAWING NO. 1 General Plan
DRAWING NO. 2 Pump Pit Work, Pipe Line Work and Outlet Box Work
DRAWING NO. 3 Farm Pond Work, Drop Work
DRAWING NO. 4 Inlet Works, Pipe Culvert, Outlet Work, Others
DRAWING NO. 5 Typical Section
DRAWING NO. 6 Tabia Head Work Plan

KOROKADI PILOT PROJECT

DRAWING NO. 7 General Plan
DRAWING NO. 8 Inlet Work, Pipe Culvert, Outlet Work, Others
DRAWING NO. 9 Typical Section
DRAWING NO.10 Drop Work

DREKETI PILOT FACILITIES

DRAWING NO.11 Extention Training Center
DRAWING NO.12 〃 〃 , Detail (1)
DRAWING NO.13 Laboratory and Storage House
DRAWING NO.14 〃 〃 , Detail (1)
DRAWING NO.15 〃 〃 , Detail (2)

GENERAL PLAN (TABIA PILOT FARM)

NOTE

LEGEND

◯	: FIELD PLOT NUMBER
IC. NO.1	: IRRIGATION CANAL NO.1
DC. NO.1	: DRAINAGE CANAL NO.1
RD. NO.1	: ROAD NO.1
PCI NO.1	: PIPE CULVERT (IRRIGATION) NO.1
PCD NO.1	: PIPE CULVERT (DRAINAGE) NO.1
IA-1	: INLET (TYPE-A) NO.1
IB-1	: INLET (TYPE-B) NO.1
O-1	: OUTLET NO.1

SCALE 1:1000

0 50 100m

THE GOVERNMENT OF FIJI
THE IMPROVEMENT OF RICE CULTIVATION TECHNOLOGY PROJECT

TITLE OF DRAWING

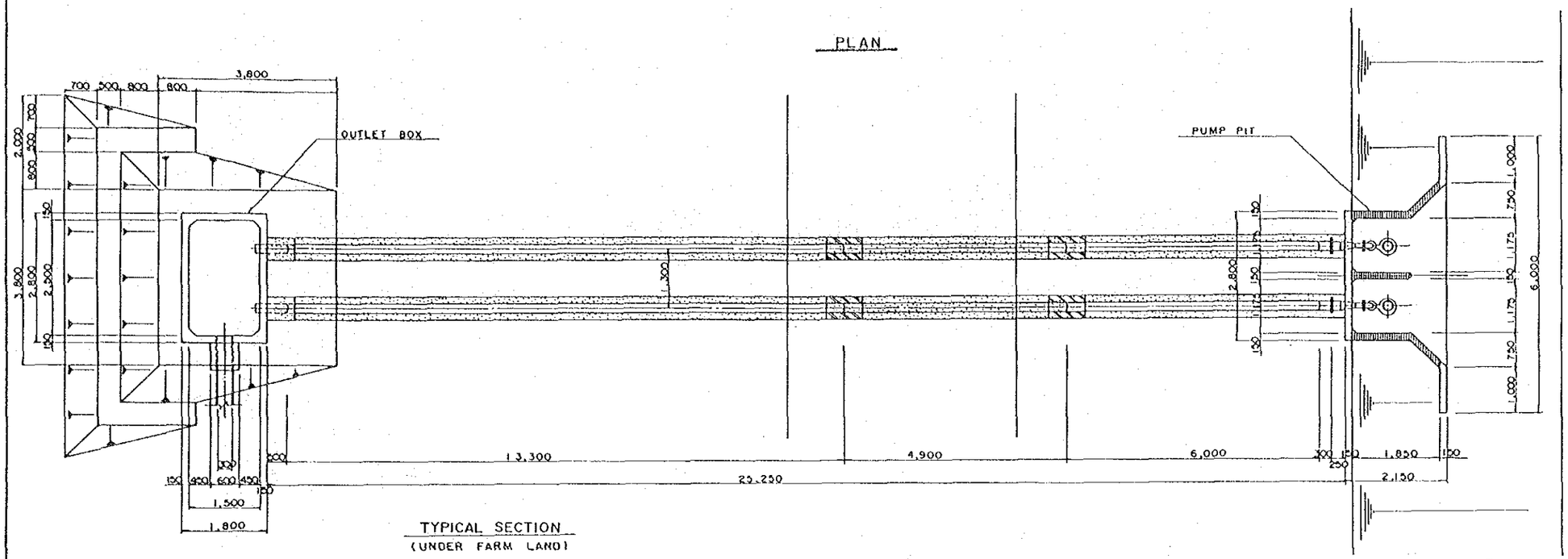
GENERAL PLAN
(TABIA PILOT FARM)

JAPAN INTERNATIONAL COOPERATION AGENCY
TOKYO JAPAN

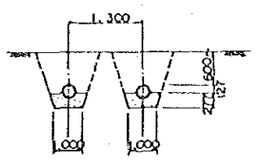
DWG.No 1

PIPELINE : PUMP ~ OUTLET BOX

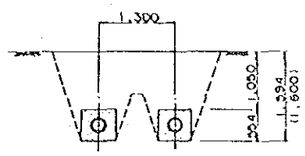
PLAN



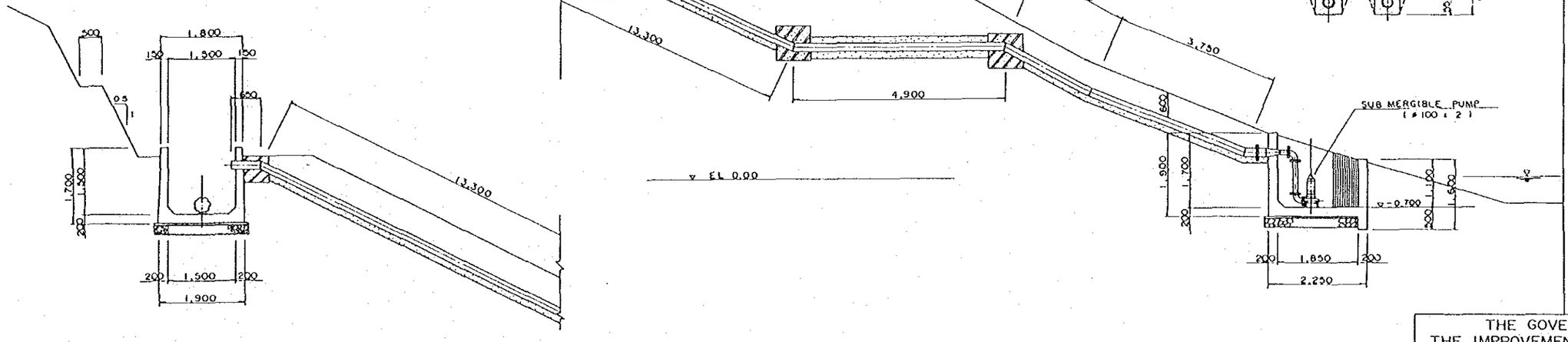
TYPICAL SECTION (UNDER FARM LAND)



TYPICAL SECTION (UNDER ROAD)



CROSS SECTION



NOTE

THE GOVERNMENT OF FIJI
THE IMPROVEMENT OF RICE CULTIVATION TECHNOLOGY PROJECT

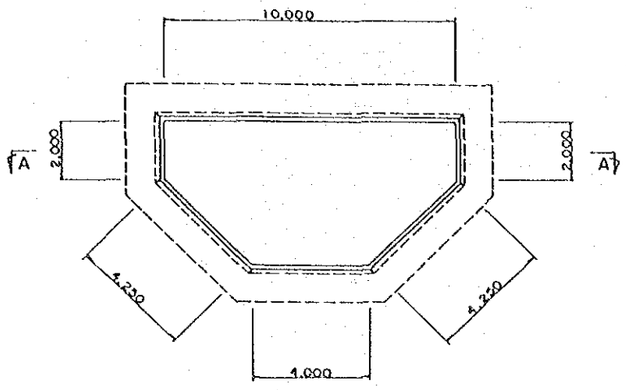
TITLE OF DRAWING
PUMP PIT, PIPE LINE AND OUTLET BOX WORKS

JAPAN INTERNATIONAL COOPERATION AGENCY
TOKYO JAPAN

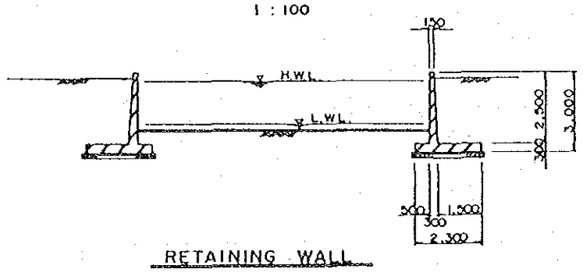
DWG.No 2

FARM POND

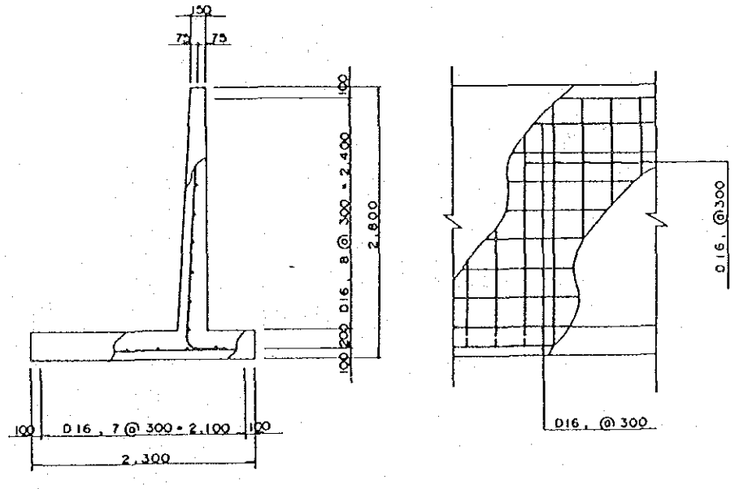
PLAN
1 : 100



SECTION A—A
1 : 100

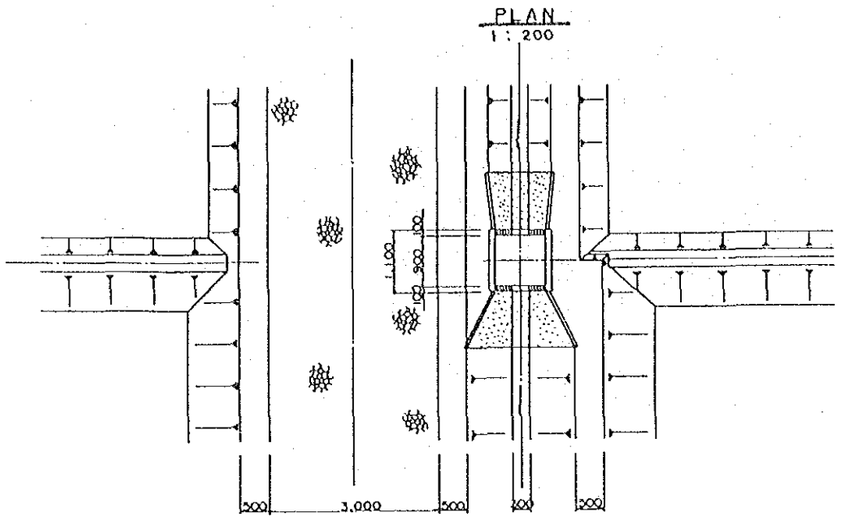


RETAINING WALL

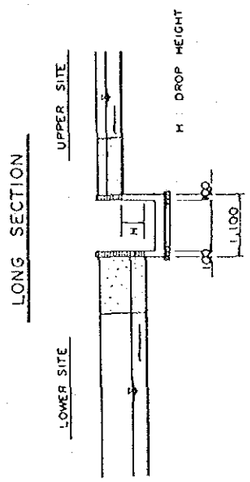


DROP WORKS

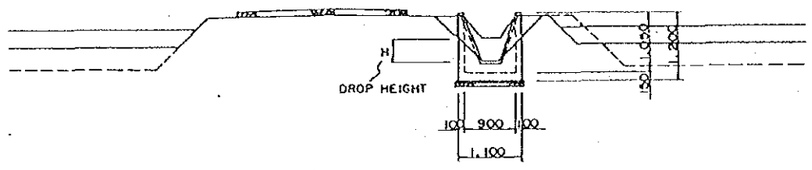
PLAN
1 : 200



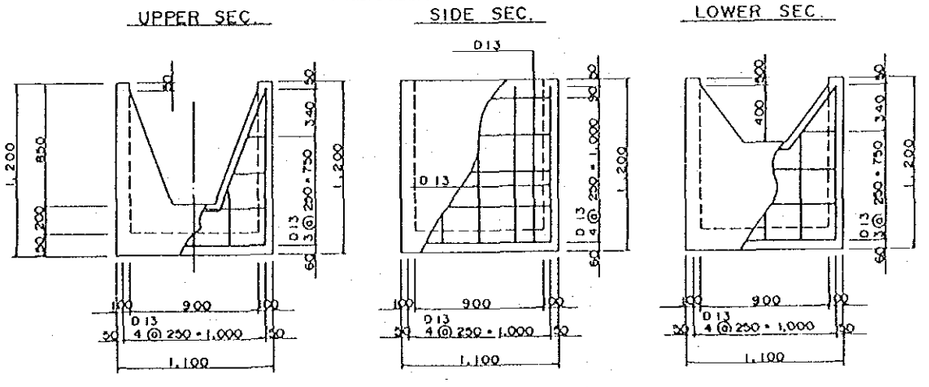
LONG SECTION



CROSS SECTION



DETAIL 1 : 20

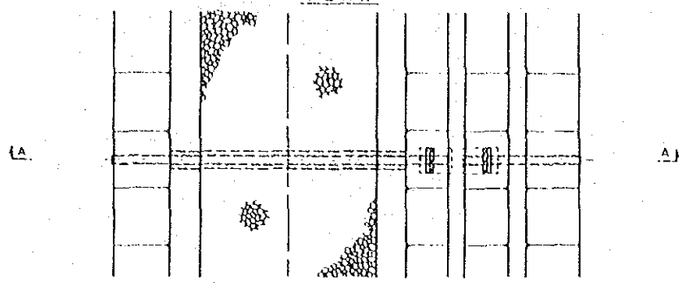


NOTE

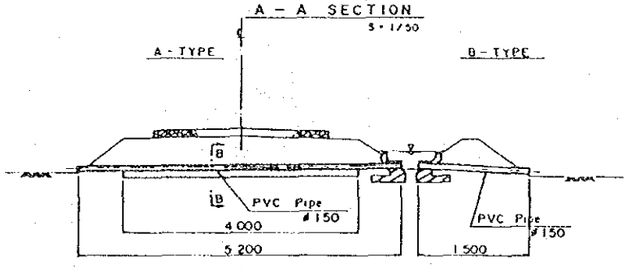
THE GOVERNMENT OF FIJI THE IMPROVEMENT OF RICE CULTIVATION TECHNOLOGY PROJECT	
TITLE OF DRAWING FARM POND , DROP WORKS	
JAPAN INTERNATIONAL COOPERATION AGENCY TOKYO JAPAN	DWG.No 3

INLET WORKS S=1/50

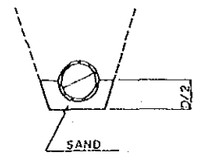
PLAN



A - A SECTION
S=1/50

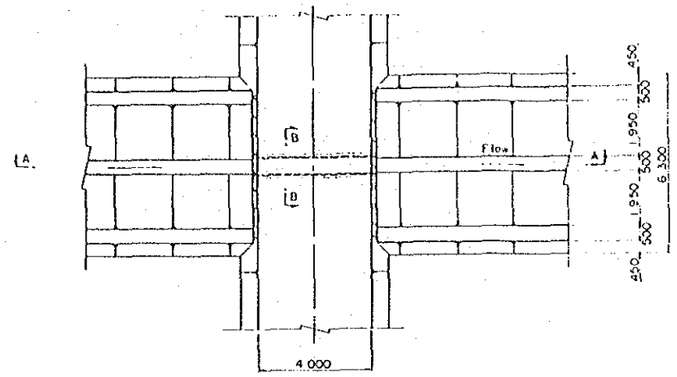


B - B SECTION

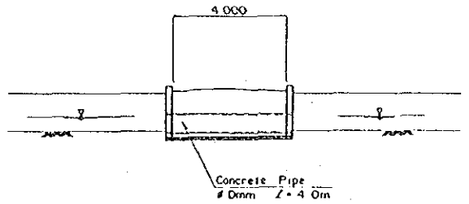


PIPE CULVERT S=1/100

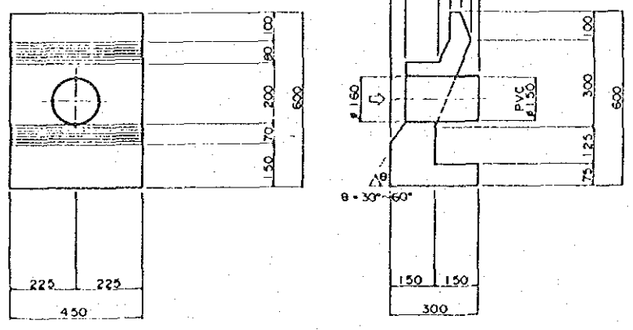
PLAN



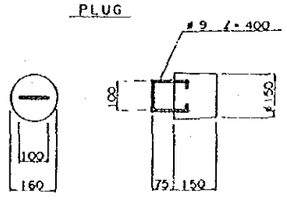
A - A SECTION



INLET, OUTLET WALL

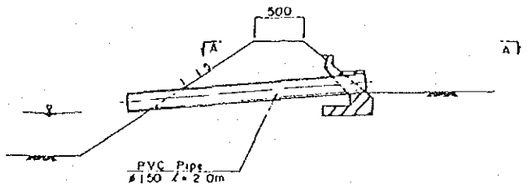


PLUG



OUTLET WORKS S=1/30

CROSS SECTION



NOTE

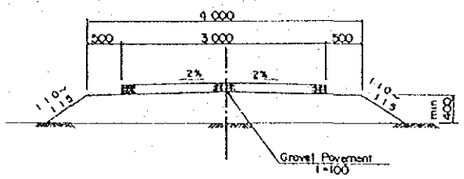
THE GOVERNMENT OF FIJI
THE IMPROVEMENT OF RICE CULTIVATION TECHNOLOGY PROJECT

TITLE OF DRAWING
INLET WARKS, PIPE CULVERT
OUTLET WORKS, OTERS

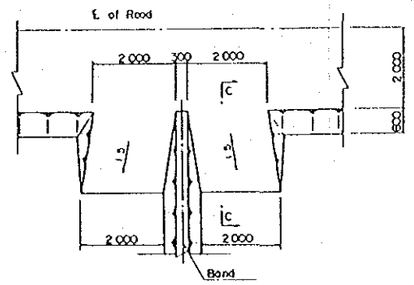
JAPAN INTERNATIONAL COOPERATION AGENCY
TOKYO JAPAN

DWG.No 4

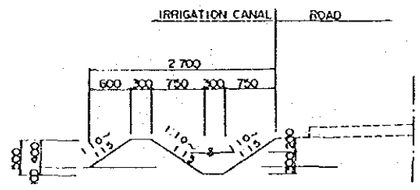
TYPICAL SECTION



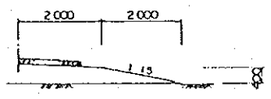
SECONDARY FARM ROAD



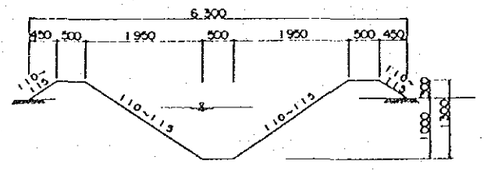
ACCESS TO PLOT



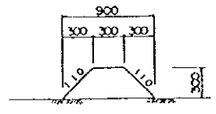
SECONDARY IRRICATION CANAL



C-C SECTION



SECONDARY DRAINAGE CANAL



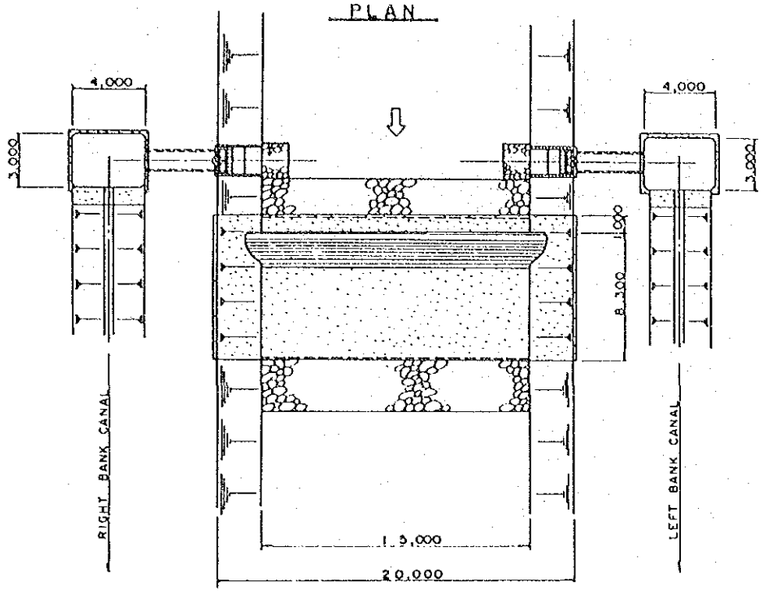
FIELD BAND

NOTE

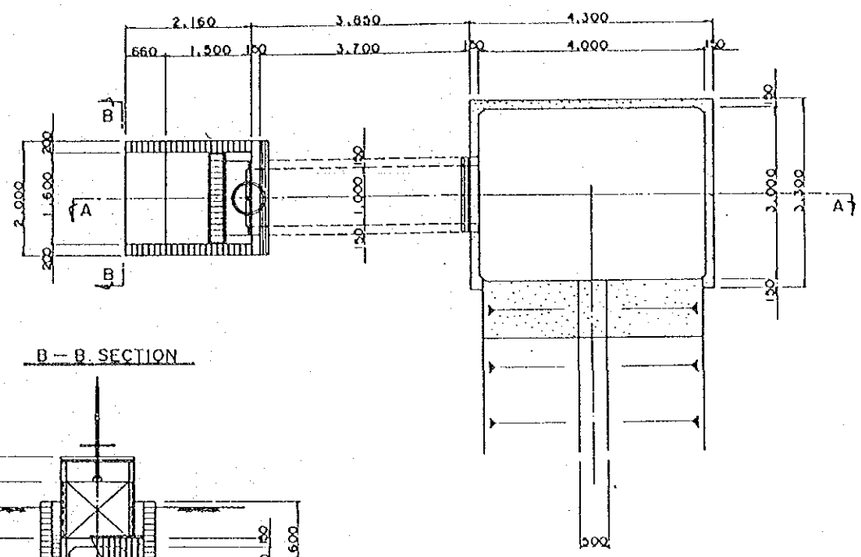
THE GOVERNMENT OF FIJI THE IMPROVEMENT OF RICE CULTIVATION TECHNOLOGY PROJECT	
TITLE OF DRAWING TYPICAL SECTION	
JAPAN INTERNATIONAL COOPERATION AGENCY TOKYO JAPAN	DWG.No. 5

NOTE

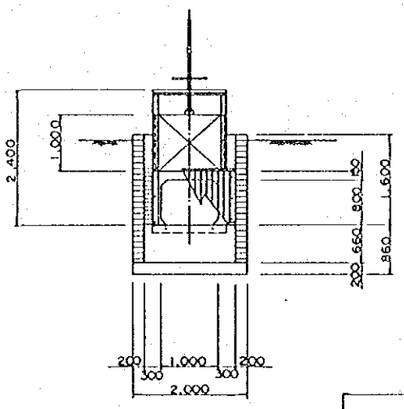
PLAN



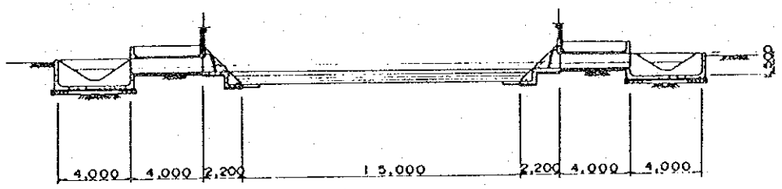
INTAKE WORK



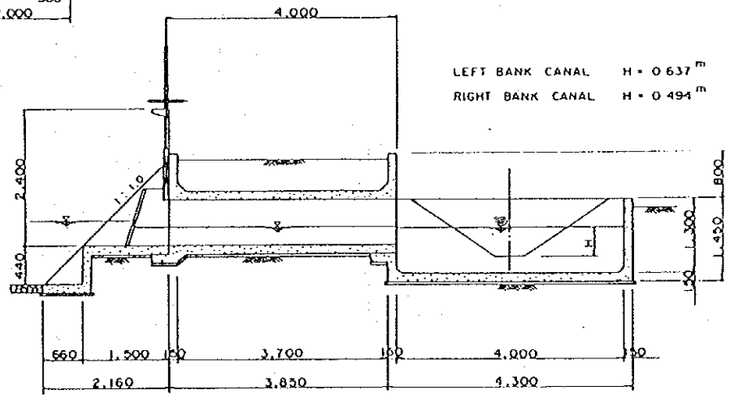
B – B SECTION



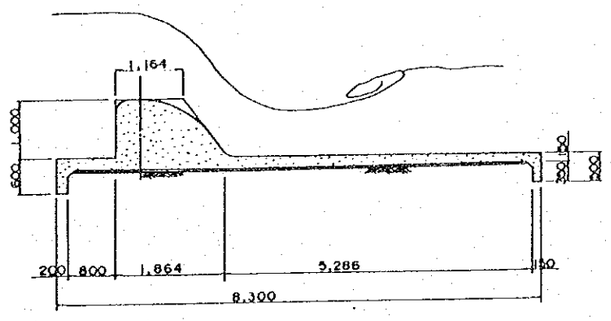
CROSS SECTION



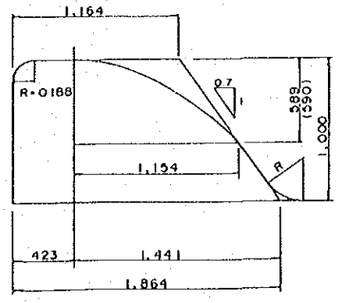
A – A. SECTION



HEAD WORK



DETAIL



THE GOVERNMENT OF FIJI
THE IMPROVEMENT OF RICE CULTIVATION TECHNOLOGY PROJECT

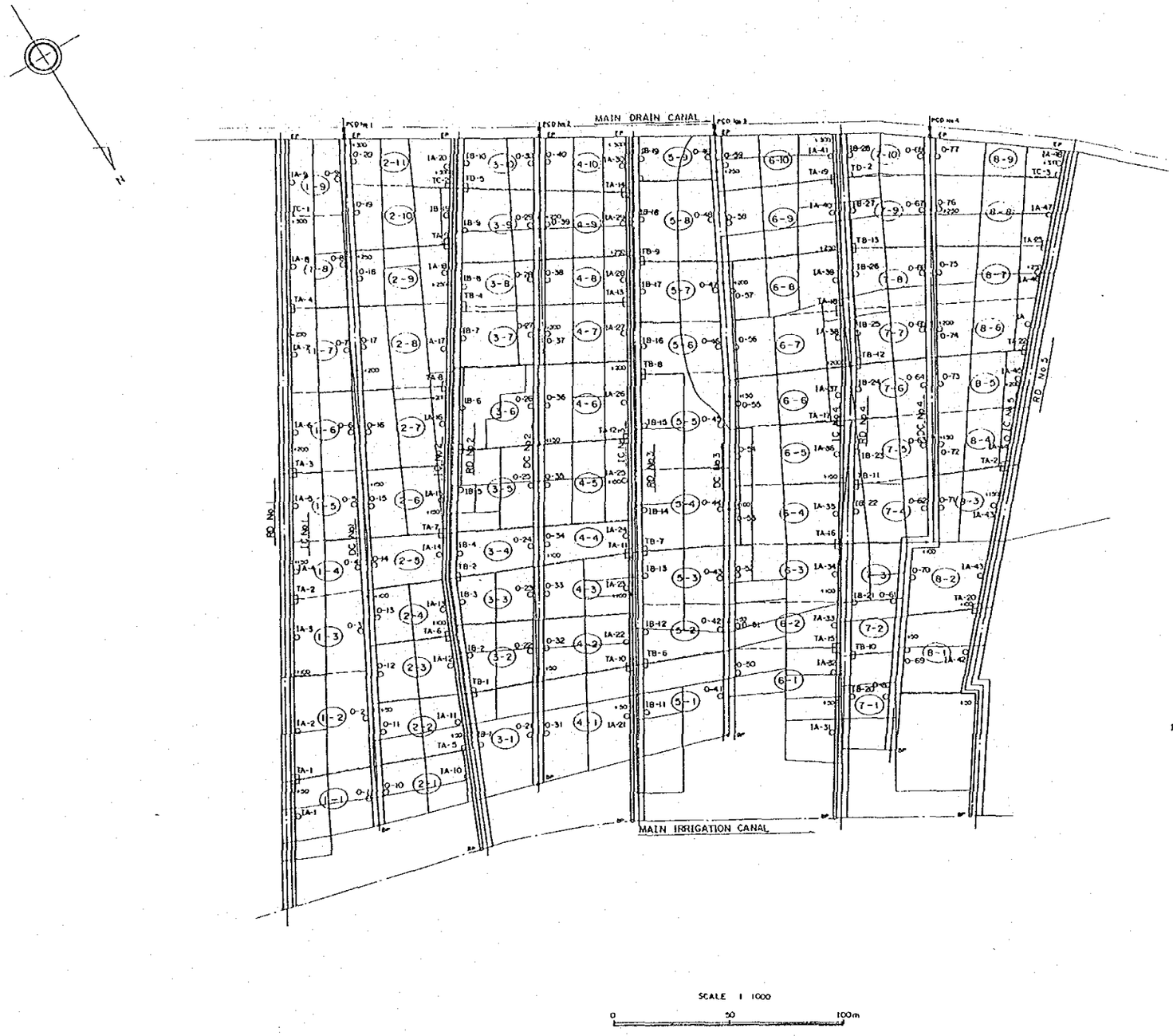
TITLE OF DRAWING

TABIA HEAD WORK PLAN

JAPAN INTERNATIONAL COOPERATION AGENCY
TOKYO JAPAN

DWG. No 6

GENERAL PLAN (KOROKADI PILOT FARM)



SCALE 1 1000

0 50 100m

NOTE

LEGEND

○	FIELD PLOT NUMBER
IC No.1	IRRIGATION CANAL No.1
DC No.1	DRAINAGE CANAL No.1
RD No.1	ROAD No.1
RCD No.1	PIPE CULVERT (DRAINAGE) No.1
IA-1	INLET (A-TYPE) No.1
IB-1	INLET (B-TYPE) No.1
O-1	OUTLET No.1

THE GOVERNMENT OF FIJI
THE IMPROVEMENT OF RICE CULTIVATION TECHNOLOGY PROJECT

TITLE OF DRAWING

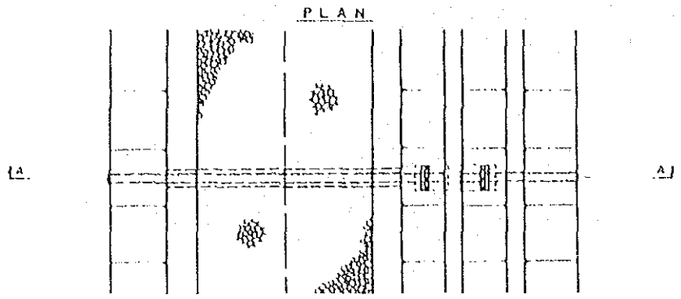
GENERAL PLAN
(KOROKADI PILOT FARM)

JAPAN INTERNATIONAL COOPERATION AGENCY
TOKYO JAPAN

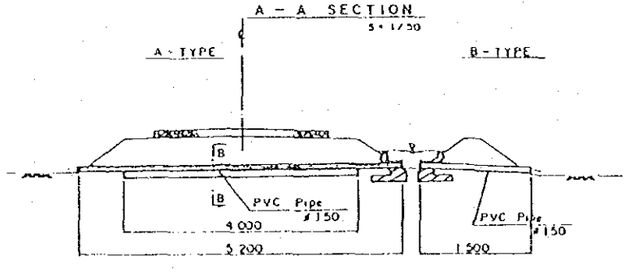
DWG No. 7

INLET WORKS S・1/50

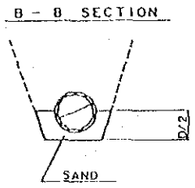
PLAN



A - A SECTION
S・1/50

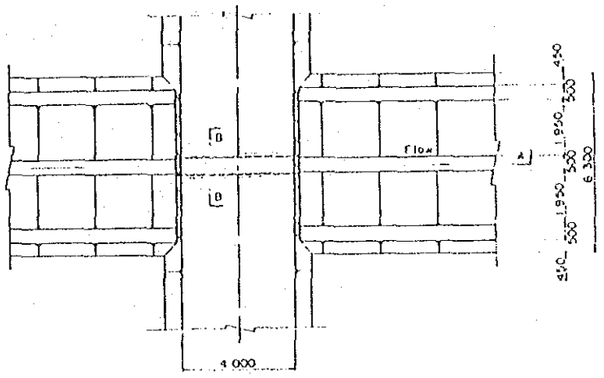


B - B SECTION

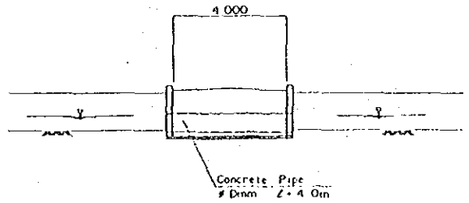


PIPE CULVERT S・1/100

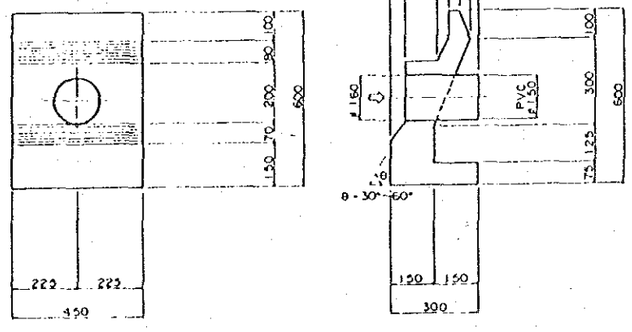
PLAN



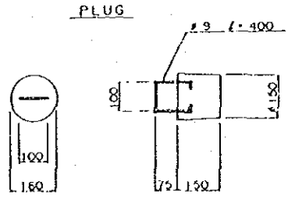
A - A SECTION



INLET, OUTLET WALL

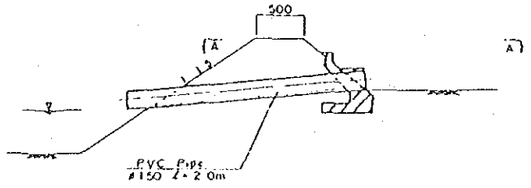


PLUG



OUTLET WORKS S・1/30

CROSS SECTION



NOTE

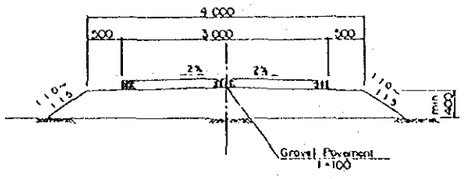
THE GOVERNMENT OF FIJI
THE IMPROVEMENT OF RICE CULTIVATION TECHNOLOGY PROJECT

TITLE OF DRAWING
INLET WARKS, PIPE CULVERT
OUTLET WORKS, OTERS

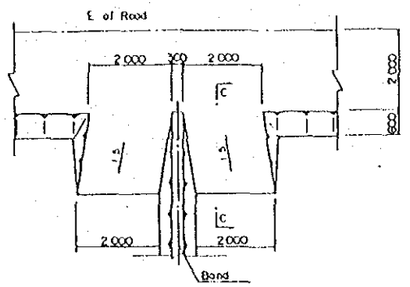
JAPAN INTERNATIONAL COOPERATION AGENCY
TOKYO JAPAN

DWG.No
8

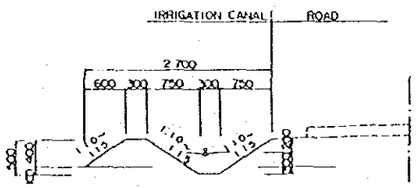
TYPICAL SECTION



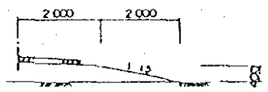
SECONDARY FARM ROAD



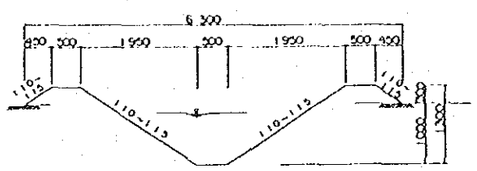
ACCESS TO PLOT



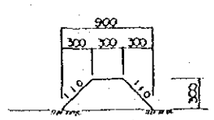
SECONDARY IRRIGATION CANAL



C-C SECTION



SECONDARY DRAINAGE CANAL



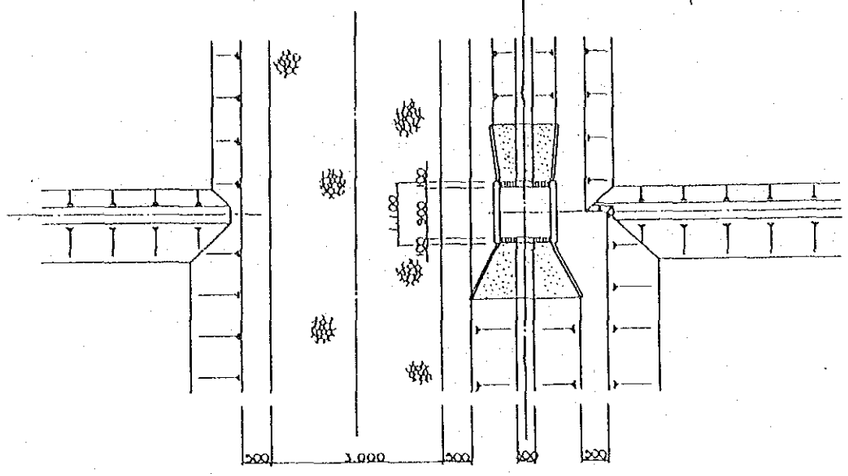
FIELD BAND

NOTE

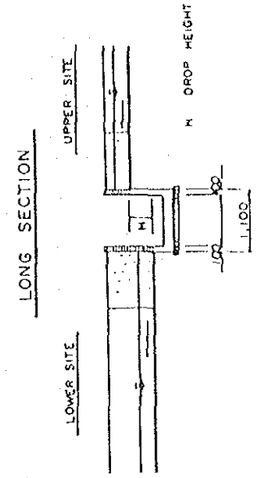
THE GOVERNMENT OF FIJI THE IMPROVEMENT OF RICE CULTIVATION TECHNOLOGY PROJECT	
TITLE OF DRAWING TYPICAL SECTION	
JAPAN INTERNATIONAL COOPERATION AGENCY TOKYO JAPAN	DWG No 9

DROP WORKS

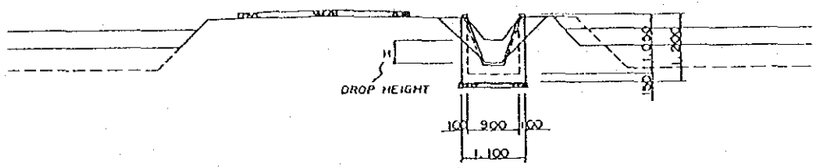
PLAN
1 : 200



LONG SECTION

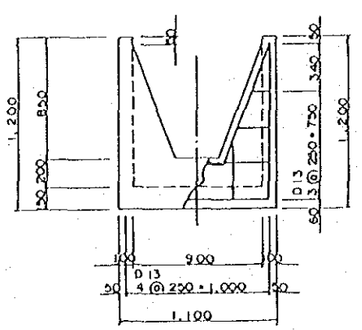


CROSS SECTION

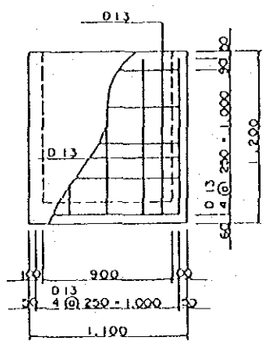


DETAIL 1 : 20

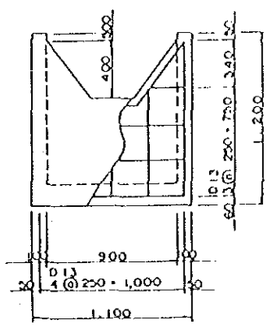
UPPER SEC.



SIDE SEC.



LOWER SEC.



NOTE

THE GOVERNMENT OF FIJI
THE IMPROVEMENT OF RICE CULTIVATION TECHNOLOGY PROJECT

TITLE OF DRAWING

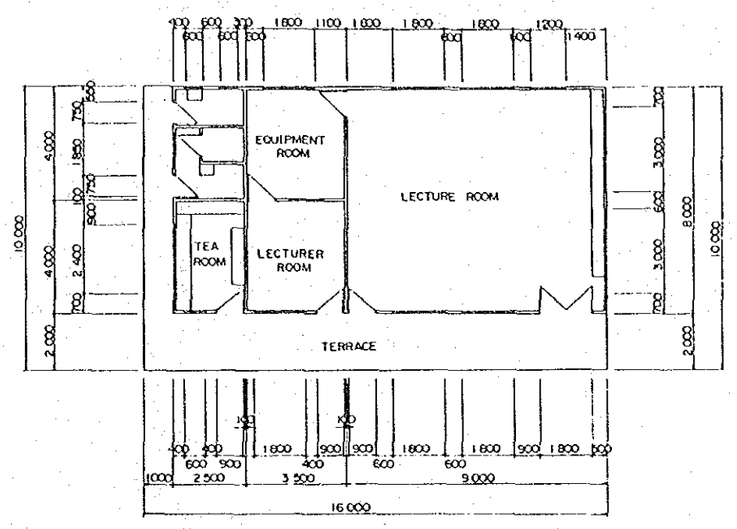
DROP WORKS

JAPAN INTERNATIONAL COOPERATION AGENCY
TOKYO JAPAN

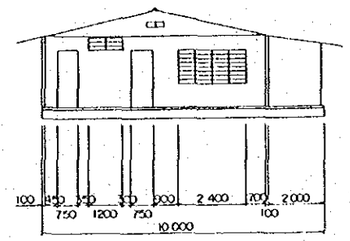
DWG No
10

EXTENSION TRAINING CENTER

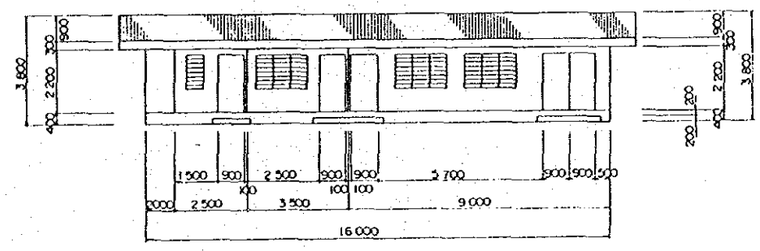
S = 1 : 100



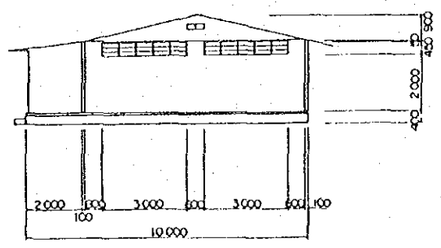
FLOOR PLAN



RIGHT SIDE VIEW



FRONT VIEW



LEFT SIDE VIEW

NOTE

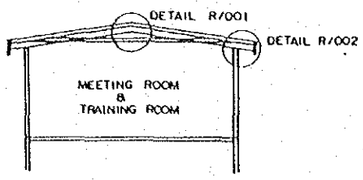
THE GOVERNMENT OF FIJI
THE IMPROVEMENT OF RICE CULTIVATION TECHNOLOGY PROJECT

TITLE OF DRAWING

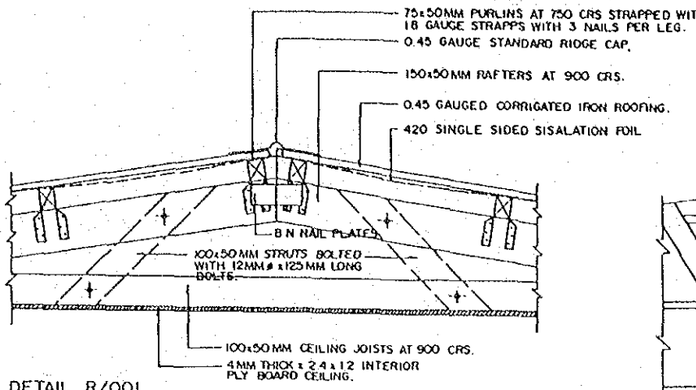
EXTENSION TRAINING CENTER

JAPAN INTERNATIONAL COOPERATION AGENCY
TOKYO JAPAN

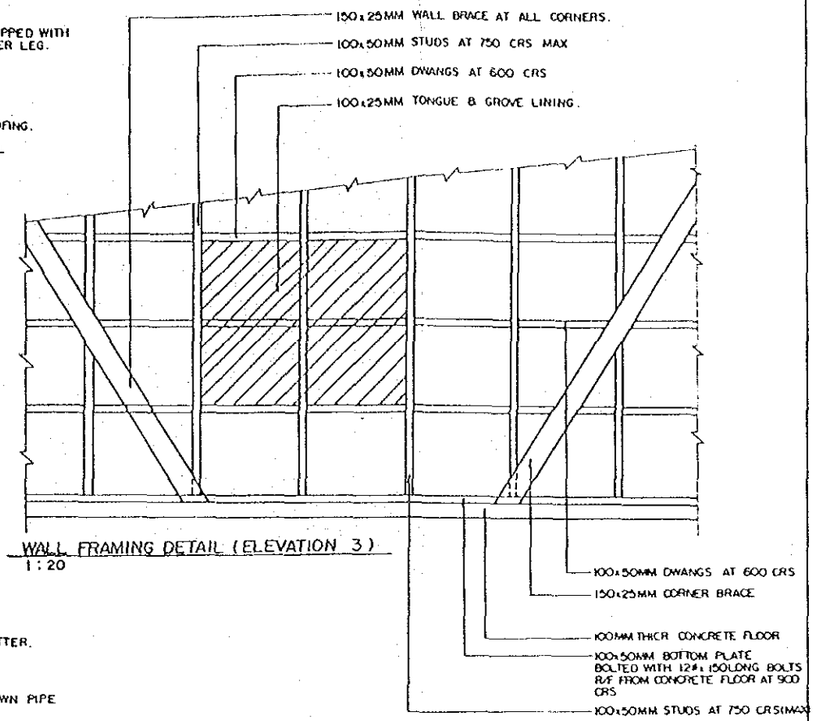
DWG No 11



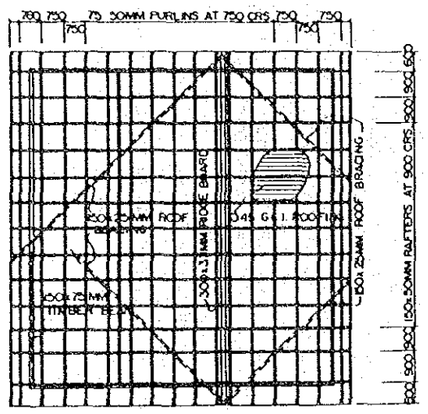
CROSS SECTION AT XX
1 : 100



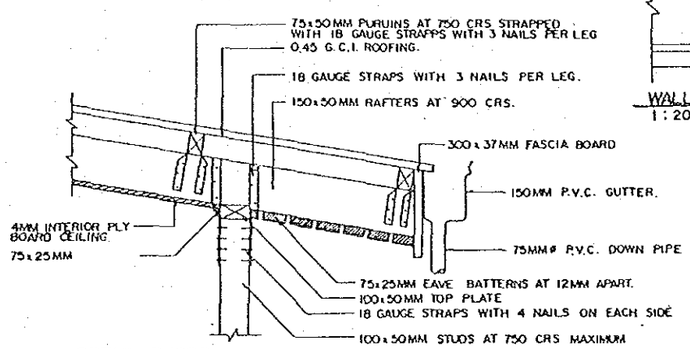
DETAIL R/001
1 : 10



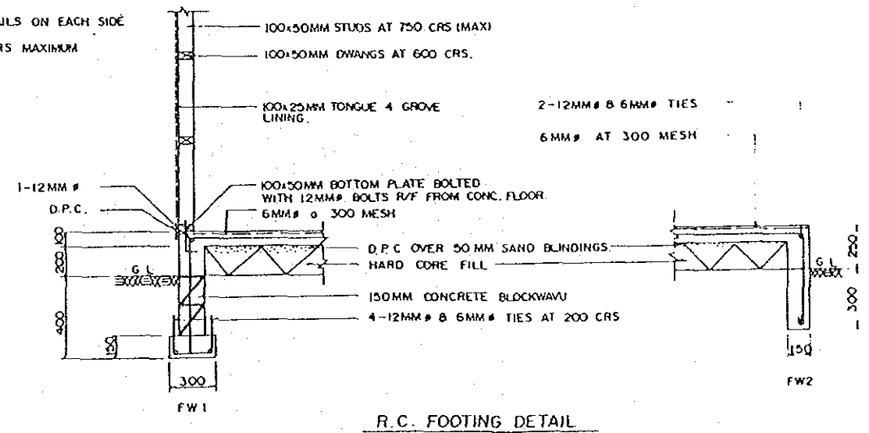
WALL FRAMING DETAIL (ELEVATION 3)
1 : 20



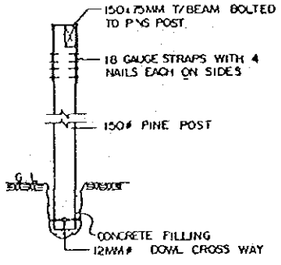
ROOF PLAN
1 : 100



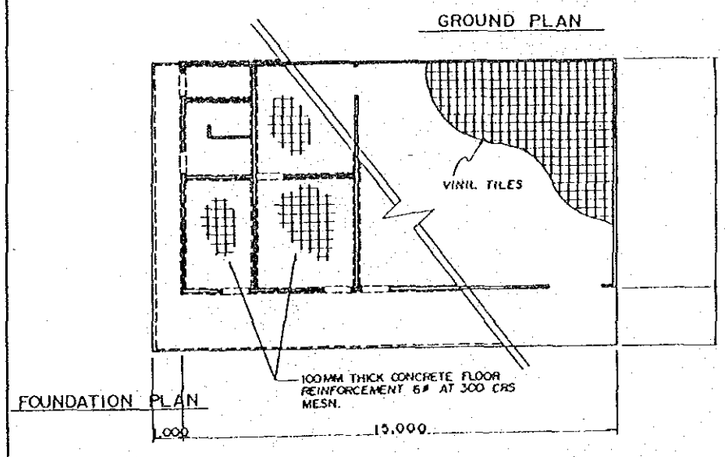
DETAIL R/002
1 : 10



R.C. FOOTING DETAIL
1 : 20



POST FIXING DETAIL
1 : 20



FOUNDATION PLAN

NOTE

THE GOVERNMENT OF FIJI
THE IMPROVEMENT OF RICE CULTIVATION TECHNOLOGY PROJECT

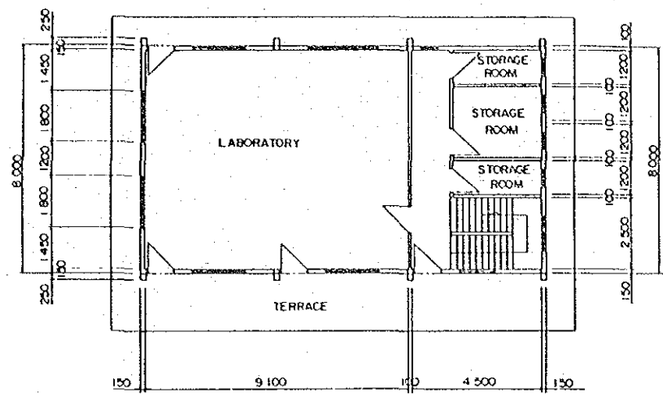
TITLE OF DRAWING
EXTENSION TRAINING CENTER
DETAIL (1)

JAPAN INTERNATIONAL COOPERATION AGENCY
TOKYO JAPAN

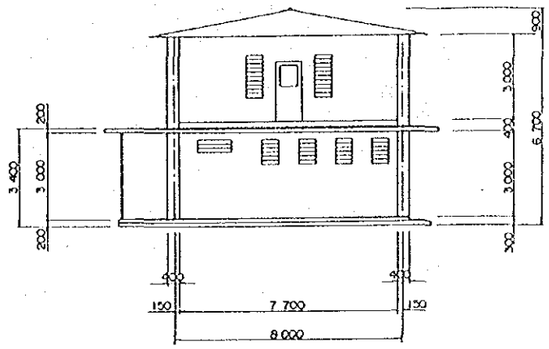
DWG.No
12

LABORATORY AND STORAGE HOUSE

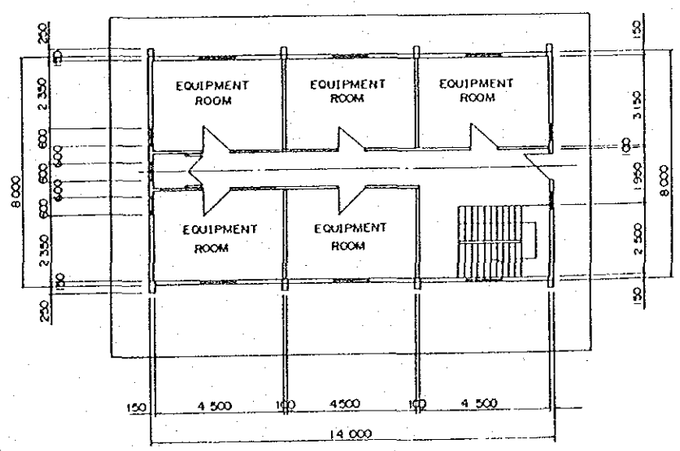
S = 1 : 100



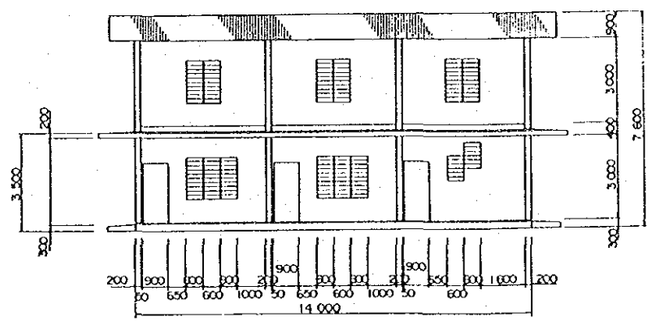
FIRST FLOOR PLAN



SIDE VIEW PLAN



SECOND FLOOR PLAN



FRON VIEW PLAN

NOTE

THE GOVERNMENT OF FIJI
THE IMPROVEMENT OF RICE CULTIVATION TECHNOLOGY PROJECT

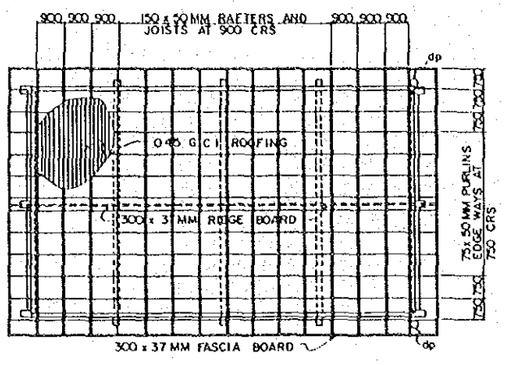
TITLE OF DRAWING

LABORATORY AND STORAGE HOUSE

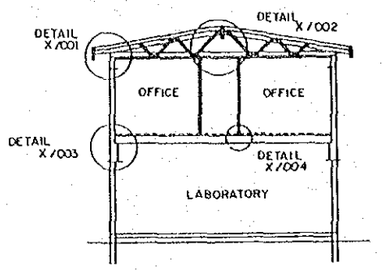
JAPAN INTERNATIONAL COOPERATION AGENCY
TOKYO JAPAN

DWG No 13

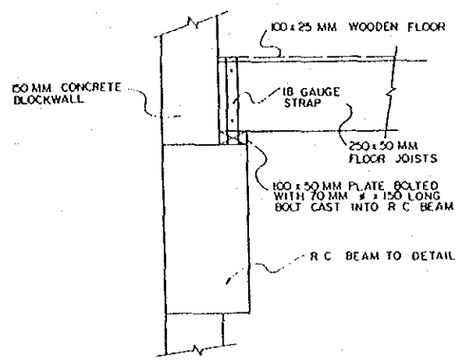
DETAIL



ROOF PLAN
1:100



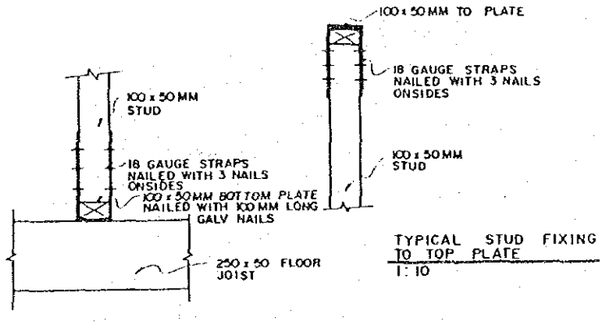
CROSS SECTION AT 1/001
1:100



DETAIL X/003
1:10

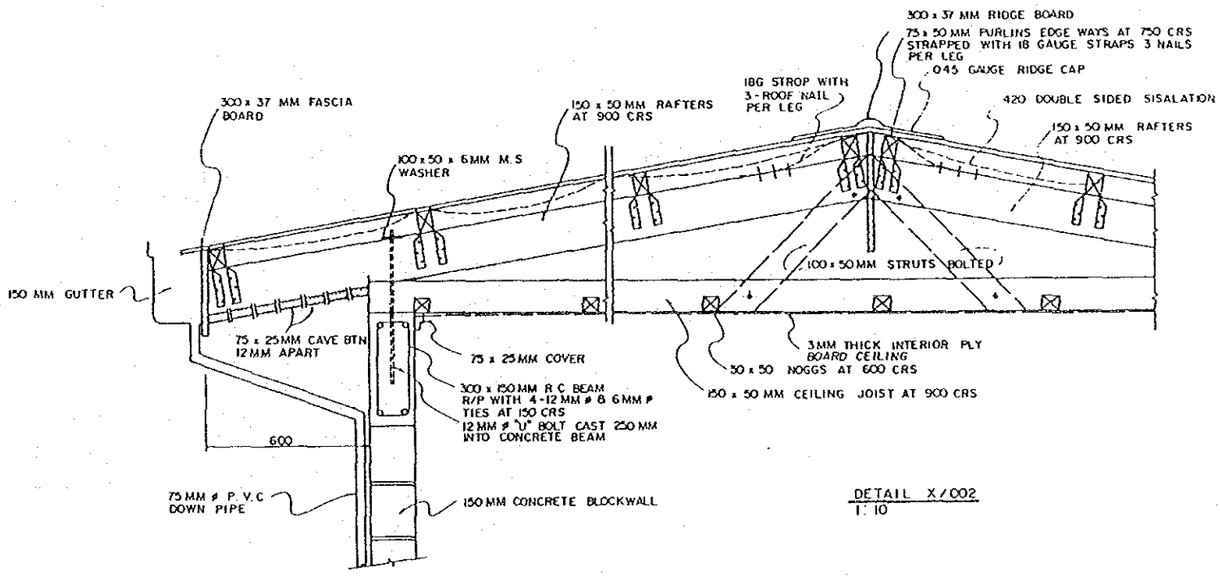
NOTE

STRAP ALL PURLINS TO RAFTERS USING 18 GAUGE STRAPS WITH 3 NAILS PER LEG



TYPICAL STUD FIXING TO TOP PLATE
1:10

DETAIL X/004
1:10



DETAIL X/001
1:10

DETAIL X/002
1:10

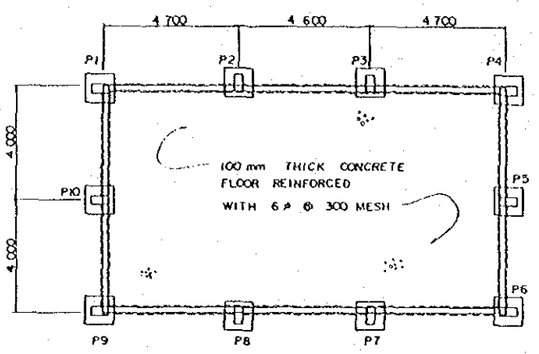
THE GOVERNMENT OF FIJI
THE IMPROVEMENT OF RICE CULTIVATION TECHNOLOGY PROJECT

TITLE OF DRAWING
LABORATORY AND STORAGE HOUSE
DETAIL (1)

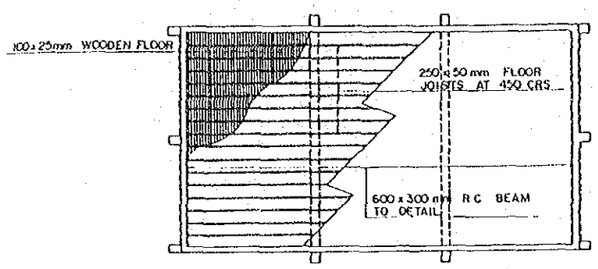
JAPAN INTERNATIONAL COOPERATION AGENCY
TOKYO JAPAN

DWG.No
14

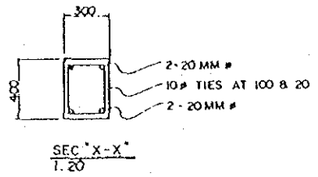
DETAIL



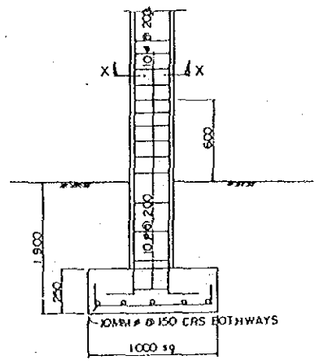
FOUNDATION PLAN
1:100



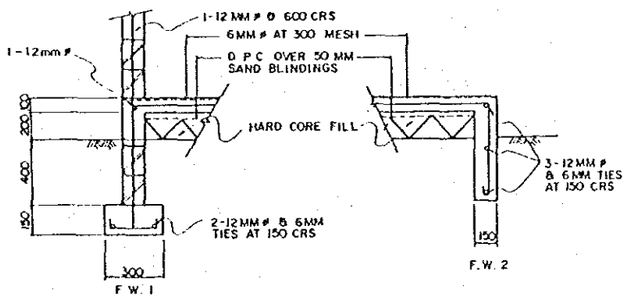
FIRST FLOOR FOUNDATION
1:100



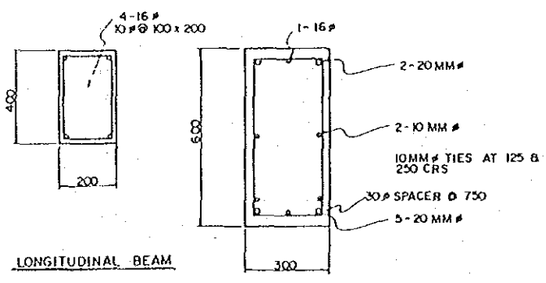
SEC "X-X"
1:20

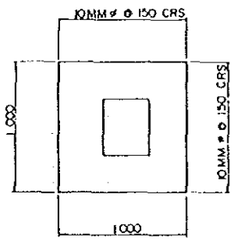


PAD SECTION P1-P12
1:20



R.C FOOTING DETAIL





PAD PLAN P1 – P10
1:20

NOTE

- CONCRETE MIX TO RATIO 4 3½ 1
- ALL REINFORCED CAVITIES TO BE FILLED WITH CONCRETE
- USE BOND BLOCK AT EVERY FOURTH ROW OF BLOCKS USE 16MM ø BARS IN BOND BEAM
- STEEL COVER TO BE 75MM CLEAR

THE GOVERNMENT OF FIJI
THE IMPROVEMENT OF RICE CULTIVATION TECHNOLOGY PROJECT

TITLE OF DRAWING
LABORATORY AND STORAGE HOUSE
DETAIL (2)

JAPAN INTERNATIONAL COOPERATION AGENCY
TOKYO JAPAN

DWG No
15