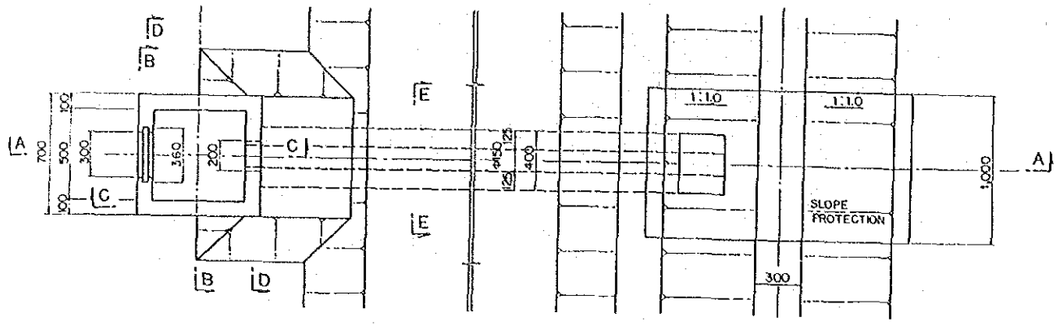
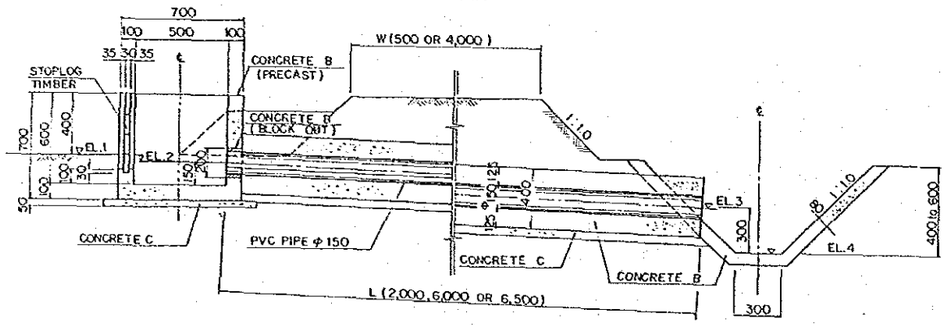
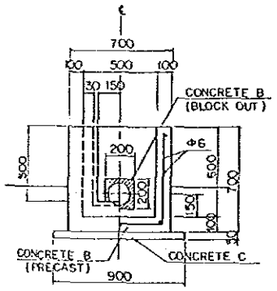
DRAINAGE OUTLET



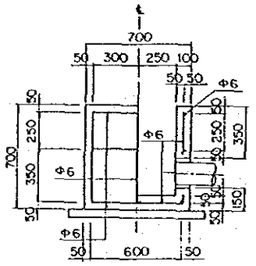
PLAN



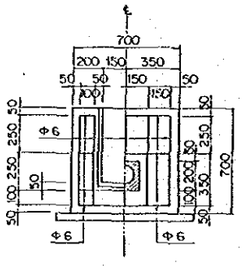
SECTION A-A



SECTION B-B



SECTION C-C



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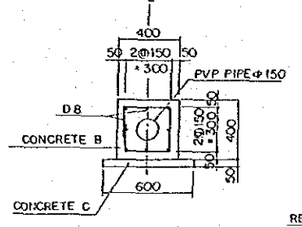
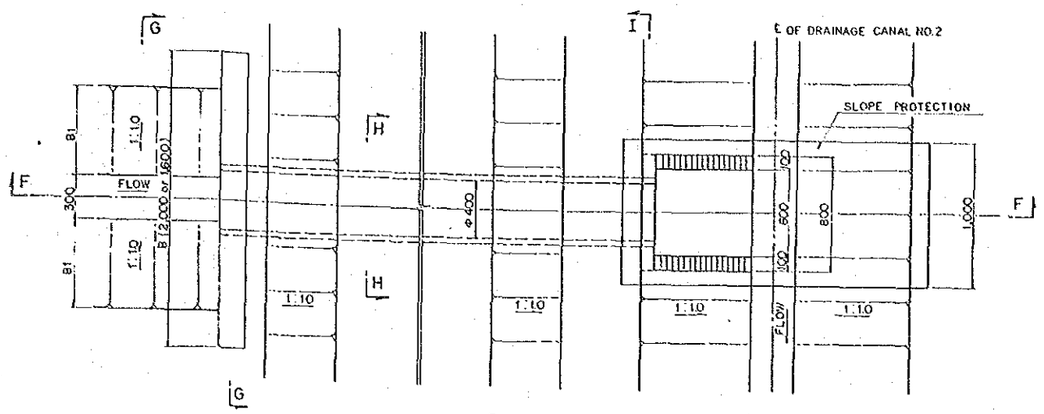
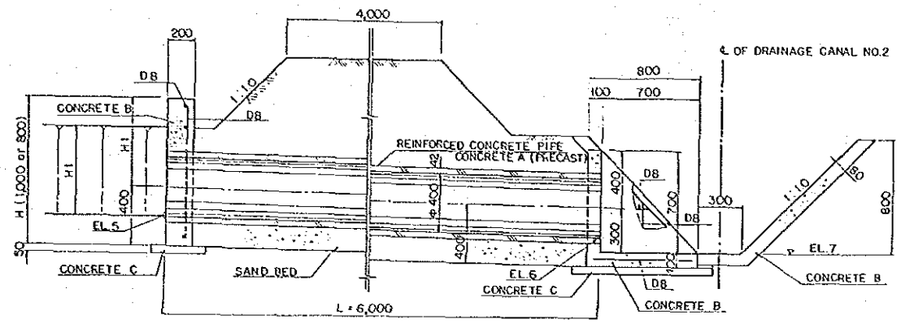


SECTION E-E

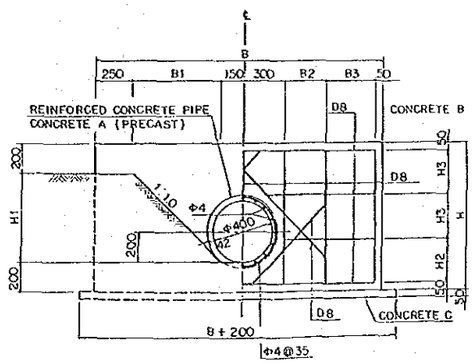
DRAINAGE CULVERT



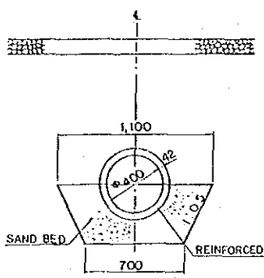
PLAN



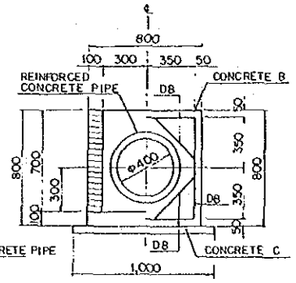
SECTION F-F



SECTION G-G



SECTION H-H



SECTION I-I

DIMENSION TABLE

Canal Name	Drainage Outlet No.	Station No.	Type	Dimension (mm) W	Dimension (mm) L	Elevation (m) EL.1	EL.2	EL.3	EL.4
DC-1	1-1	No.0 + 8.50	A	4,000	6,000	35.88	35.83	35.62	35.32
	1-2	No.2 + 3.00	A	4,000	6,000	36.08	36.03	35.79	35.49
	1-3	No.4 + 3.00	A	4,000	6,000	36.39	36.34	35.99	35.69
	1-4	No.6 + 3.00	A	4,000	6,000	36.60	36.55	36.31	36.01
DC-2	2-1	No.0 + 8.50	B	4,000	6,500	35.90	35.85	35.40	35.10
	2-2	No.2 + 3.00	B	4,000	6,500	36.26	36.21	35.82	35.52
DC-3	3-1	No.0 + 8.50	C	500	2,000	37.00	36.95	36.90	36.60
DC-4	4-1	No.0 +11.50	C	500	2,000	36.80	36.75	36.51	36.21
	4-2	No.1 + 8.00	C	500	2,000	36.80	36.75	36.57	36.27
	4-3	No.2 + 5.50	C	500	2,000	36.80	36.75	36.63	36.33
	4-4	No.3 + 3.50	C	500	2,000	36.80	36.75	36.69	36.39
DC-5	5-1	No.0 + 8.50	C	500	2,000	36.55	36.50	36.26	35.96
	5-2	No.1 + 7.50	C	500	2,000	36.55	36.50	36.32	36.02
	5-3	No.2 + 5.50	C	500	2,000	36.55	36.50	36.38	36.08
	5-4	No.3 + 3.50	C	500	2,000	36.55	36.50	36.44	36.14

DIMENTION TABLE

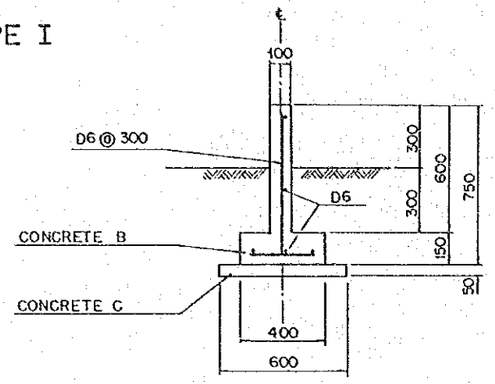
Canal Name	Drainage Culvert No.	Station No.	Type	Elevation (m) EL.5	EL.6	EL.7	Dimension (mm) B	H	B1	B2	B3	H1	H2	H3
DC-3	3-1	No.0 +0.00	B	36.59	36.49	36.44	1,600	800	400	200	250	400	200	250
DC-4	4-1	No.0 +0.00	A	36.20	36.10	36.05	2,000	1,000	600	300	350	600	300	300
DC-5	5-1	No.0 +0.00	A	35.95	35.85	35.80	2,000	1,000	600	300	350	600	300	300

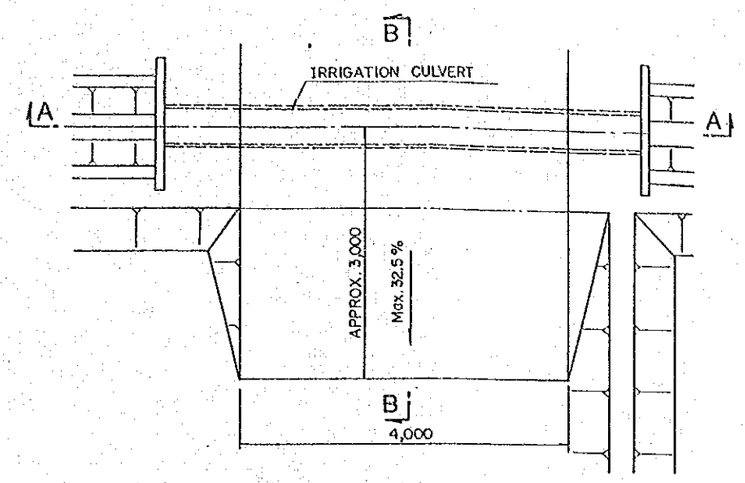
FEDERAL REPUBLIC OF NIGERIA
THE LOWER ANAMBRA IRRIGATION PROJECT
MODEL INFRASTRUCTURE IMPROVEMENT WORKS

DRAINAGE OUTLET AND CULVERT

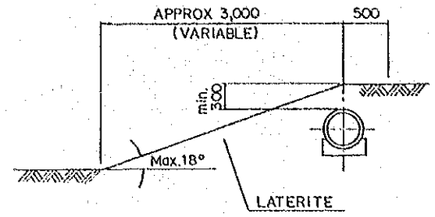
JAPAN INTERNATIONAL COOPERATION AGENCY | DWG NO. 11

TYPE I



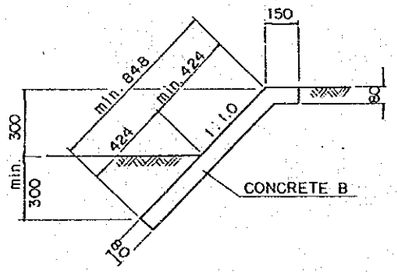


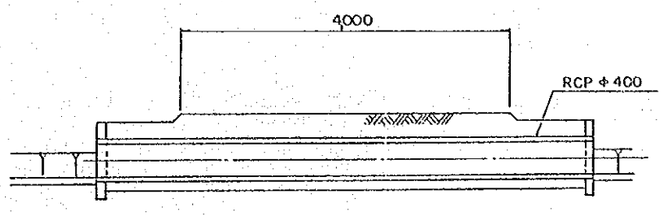
PLAN



SECTION B-B

TYPE II





SECTION A-A

TYPICAL CROSS SECTION OF CONCRETE RIDGE

TRACTOR PASSAGE

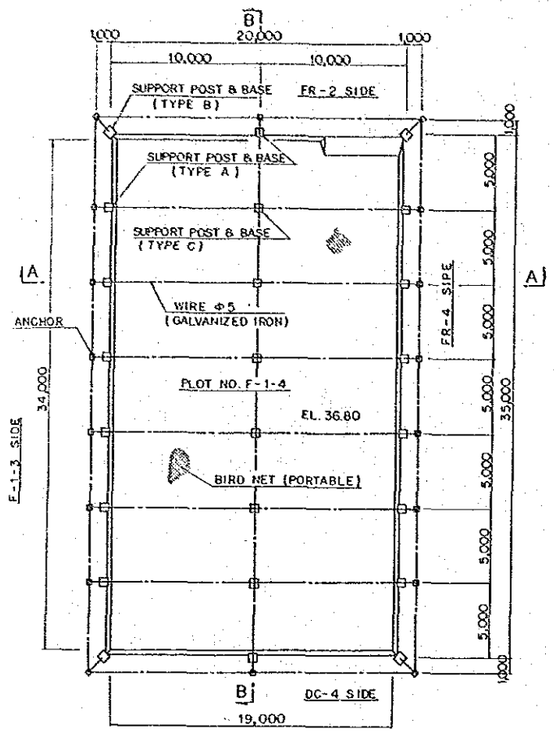
SCALE
0 500 1,000 1,500 2,000 mm

SCALE
0 1,000 2,000 3,000 4,000 5,000 mm

FEDERAL REPUBLIC OF NIGERIA
THE LOWER ANAMBRA IRRIGATION PROJECT
MODEL INFRASTRUCTURE IMPROVEMENT WORKS

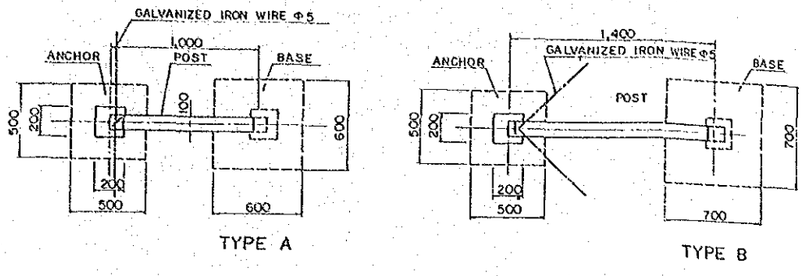
CONCRETE RIDGE AND TRACTOR PASSAGE

JAPAN INTERNATIONAL COOPERATION AGENCY | DWG NO. 12



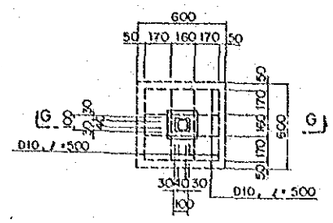
PLAN

BIRD NET AND SUPPORT ARRANGEMENT



PLAN

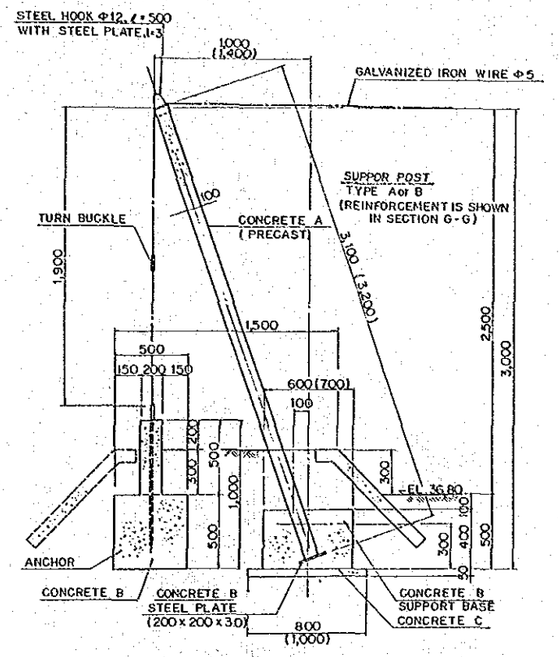
SUPPORT POST TYPE A AND B WITH ANCHOR



SECTION F-F

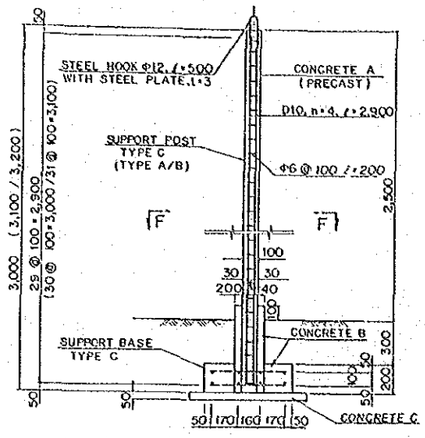
Note :

1. The turn buckle shall have a tensile strength of 0.8 tf or more and an allowable tensile strength of 0.5 tf or more.
2. The galvanized iron wire Φ5 mm shall have a tensile strength of not less than 30 kgf/mm².



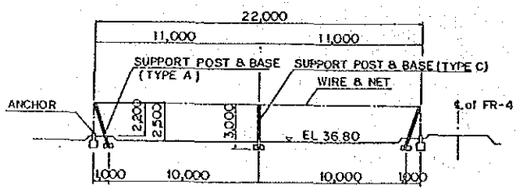
DIMENSIONS IN BRACKETS ARE FOR SUPPORT POST AND BASE TYPE B

SECTION C-C

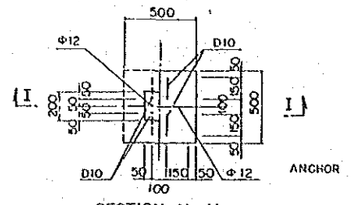


DIMENSIONS IN BRACKETS ARE FOR SUPPORT POST TYPE A/B

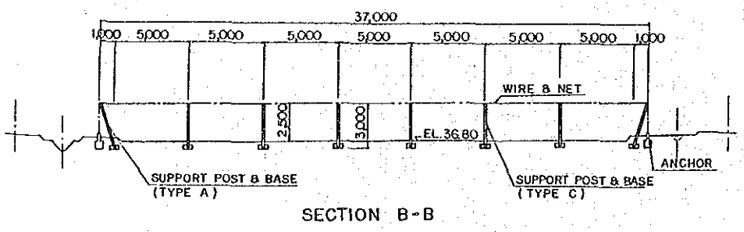
SECTION G-G



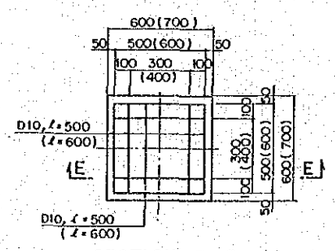
SECTION A-A



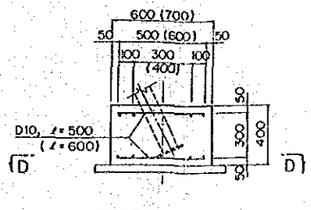
SECTION H-H



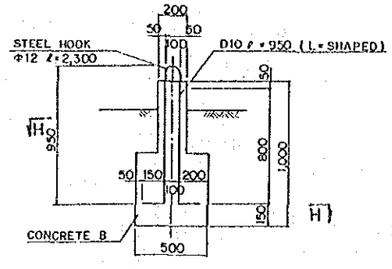
SECTION B-B



SECTION D-D



SECTION E-E



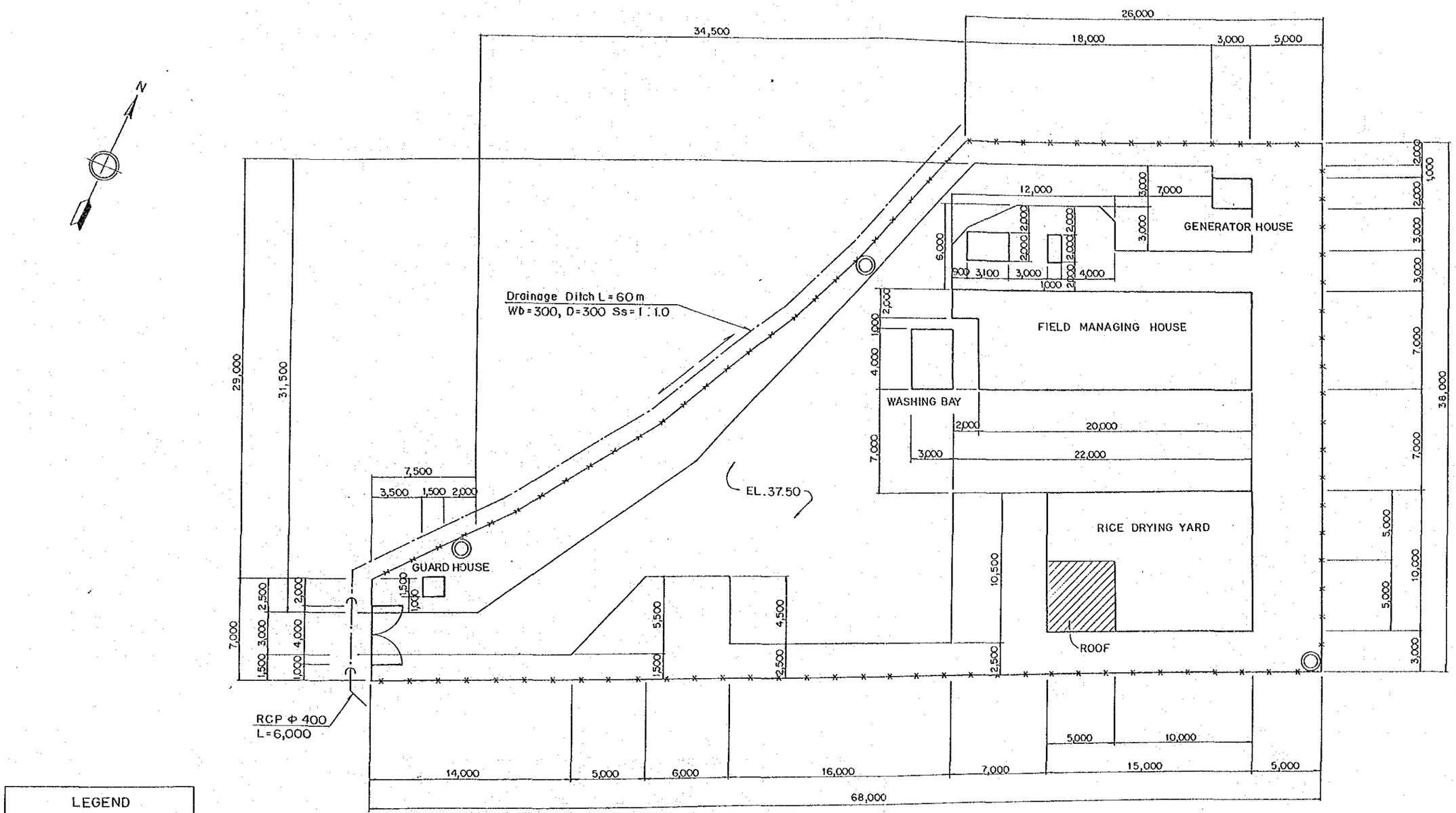
SECTION I-I

POST BASE TYPE A AND B

FEDERAL REPUBLIC OF NIGERIA
THE LOWER ANAMBRA IRRIGATION PROJECT
MODEL INFRASTRUCTURE IMPROVEMENT WORKS

BIRD PROTECTION FACILITY

JAPAN INTERNATIONAL COOPERATION AGENCY | DWG NO. 13



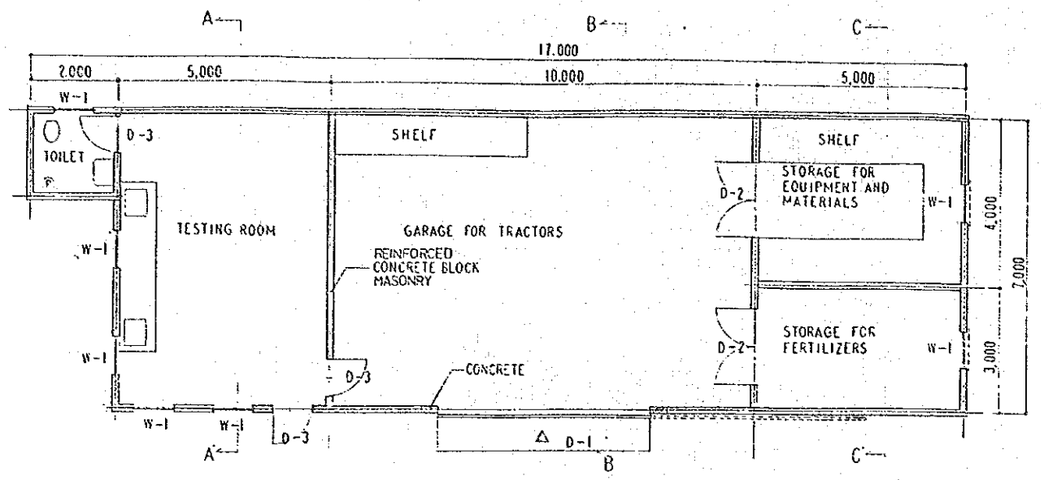
LEGEND

- Security Light
- Gate
- Fence
- Gravel Pavement
- Building, Tank
- Drainage Ditch

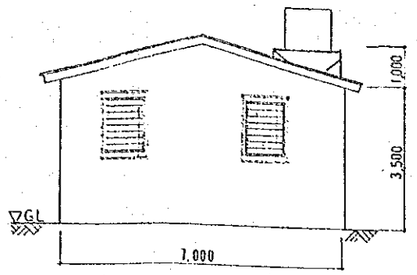
FEDERAL REPUBLIC OF NIGERIA
THE LOWER ANAMBRA IRRIGATION PROJECT
MODEL INFRASTRUCTURE IMPROVEMENT WORKS

FACILITY YARD LAYOUT

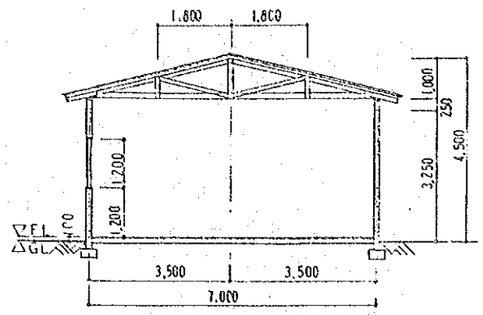
JAPAN INTERNATIONAL COOPERATION AGENCY | DWG NO. 14



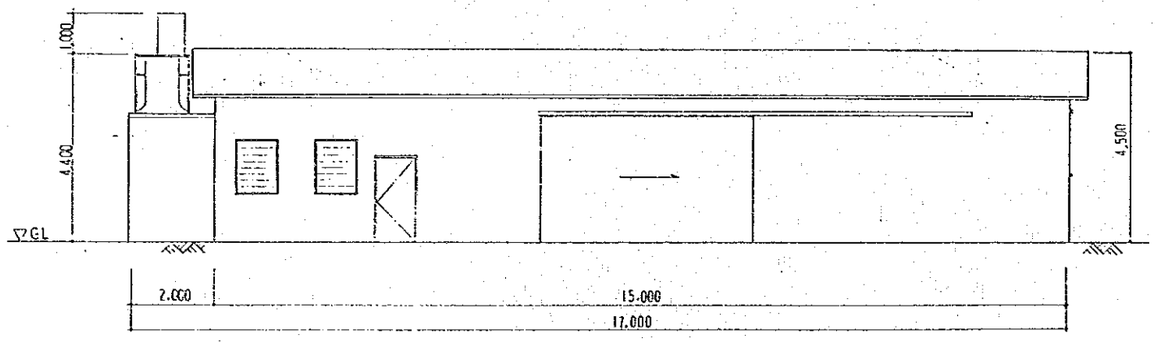
FLOOR PLAN



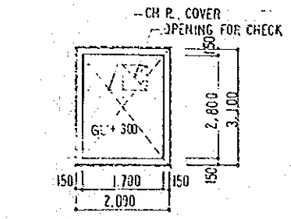
SIED ELEVATION



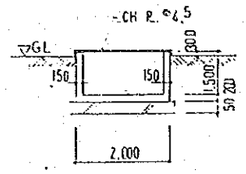
A-A' SECTION



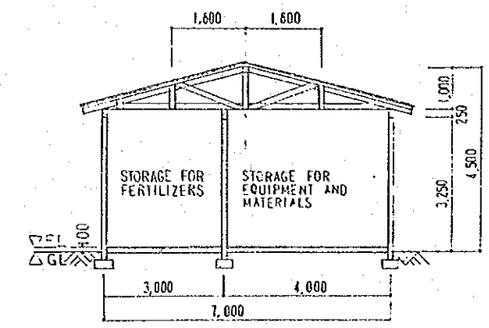
FRONT ELEVATION



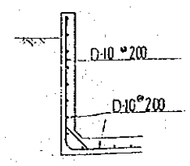
WATER TANK PLAN



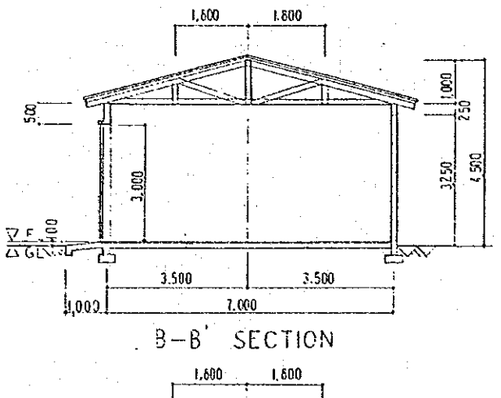
WATER TANK SECTION



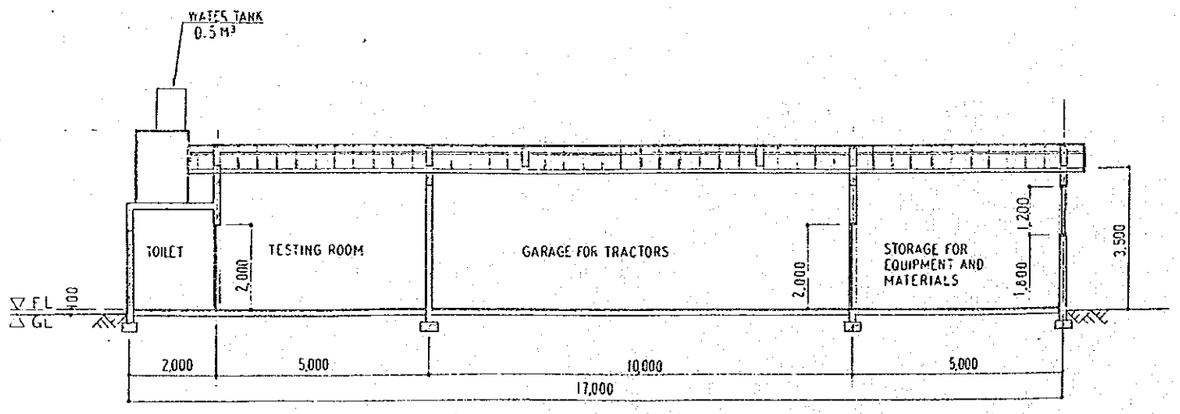
C-C' SECTION



REINFORCEMENT



B-B' SECTION



SECTION

0 2000 4000

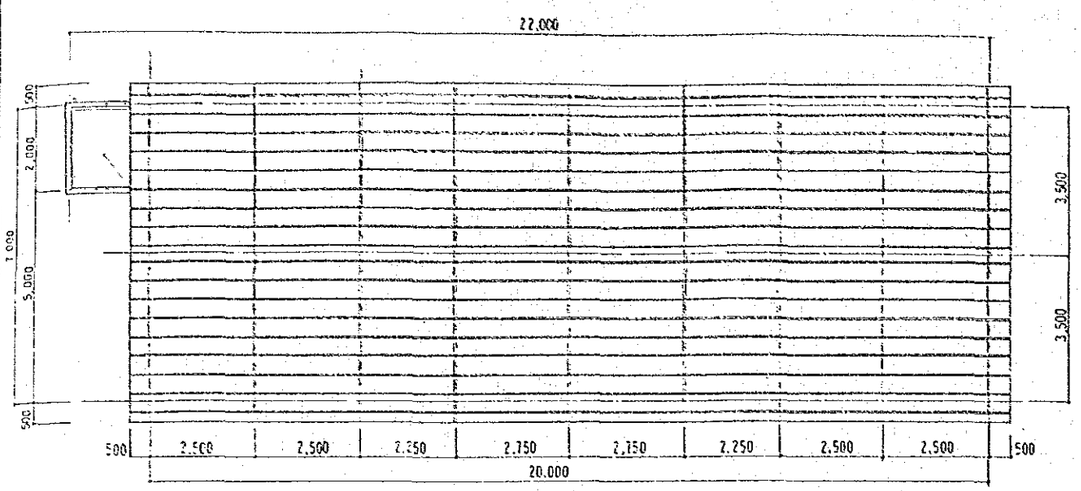
SCALE

GL= 37.50

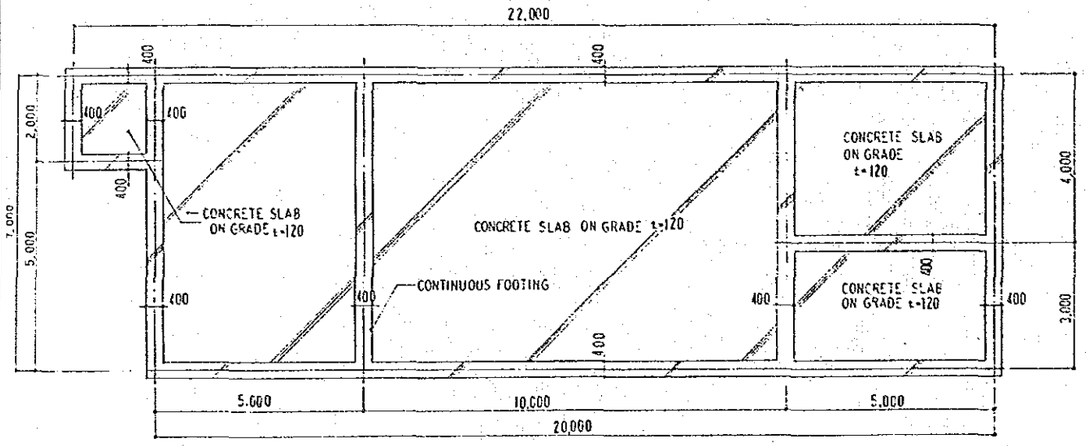
FEDERAL REPUBLIC OF NIGERIA
THE LOWER ANAMBRA IRRIGATION PROJECT
MODEL INFRASTRUCTURE IMPROVEMENT WORKS

FIELD MANAGING HOUSE (1/2)

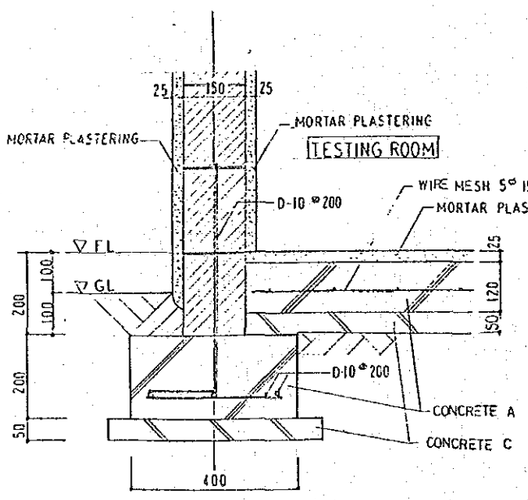
JAPAN INTERNATIONAL COOPERATION AGENCY | DWG NO. 15



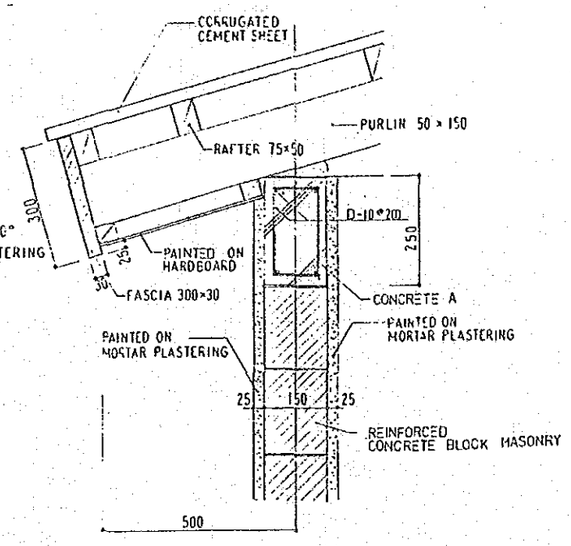
ROOF PLAN



FOUNDATION PLAN



FLOOR DETAIL



WALL GIRDER DETAIL

INTERIOR FINISHING SCHEDULE

BUILDINGS	ROOMS	FLOORS: FLOAT FINISH CONCRETE	FLOORS: MORTAR PLASTERING	SKIRTINGS: MORTAR PLASTERING	WALLS: MORTAR PLASTERING	WALLS: PAINTED ON MORTAR PLASTERING	CEILINGS: PAINTED ON CEMENT BOARD	REMARKS
FIELD MANAGING HOUSE	GARAGE	○			○		○	
	STORAGE	○			○		○	
	TESTING ROOM		○	○		○		
	TOILET		○	○		○		

EXTERIOR FINISHING SCHEDULE

BUILDINGS	SKIRTING: MORTAR PLASTERING	WALLS: MORTAR PLASTERING	WALLS: PAINTED ON MORTAR PLASTERING	WALLS: STEEL GALVANIZED NET 20 MM MESH	ROOF: CORRUGATED CEMENT SHEET	ROOF: STEEL GALVANIZED NET 20 MM MESH	STRUCTURES: RC FOUNDATION	STRUCTURES: RC GRADE SLAB	STRUCTURES: STEEL STRUCTURE	STRUCTURES: CONCRETE BLOK MASONRY	STRUCTURES: STEEL ROOF STRUCTURE	STRUCTURES: WOODEN ROOF STRUCTURE	REMARKS
FIELD M. HOUSE	○		○		○		○	○		○		○	

DOOR AND WINDOW SCHEDULE

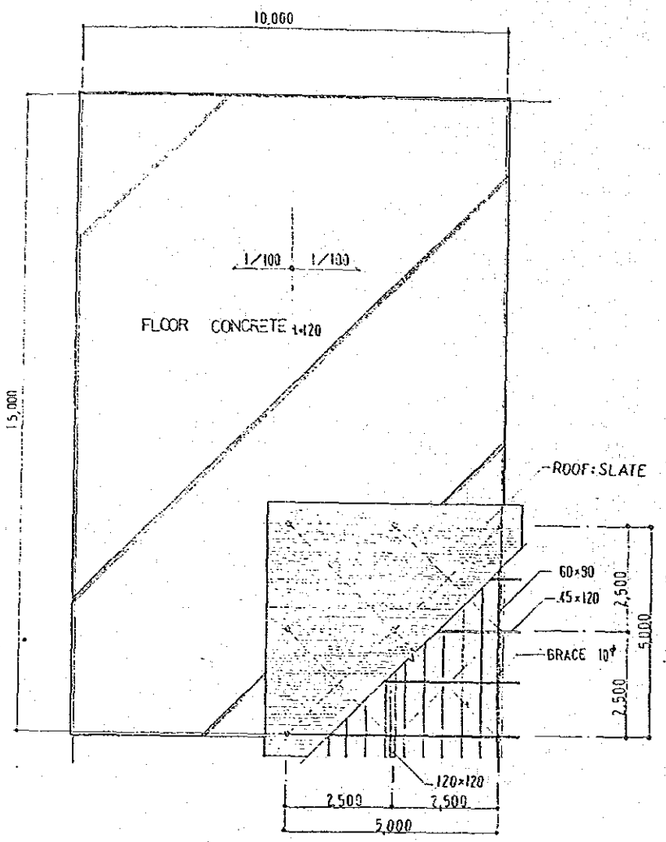
ITEM	DESCRIPTION	DIMENSION W×H
D-1	TOP-RAILED SLIDING DOOR	5,000 × 3,000
D-2	STEEL ANGLE FRAMED DOUBLE SWING DOOR	1,800 × 2,000
D-3	WOODEN FLUSH SWING DOOR	900 × 2,000
W-1	GLASS JALOUSIE WINDOW W/ STEEL LATTICE	900 × 1,200

NOTE . BEARING CAPACITY OF SOIL AT THE BOTTOM OF CONTINUOUS FOOTING SHALL BE 10 TON/M² OR MORE, UNLESS OTHERWISE APPROVED BY THE ENGINEER.

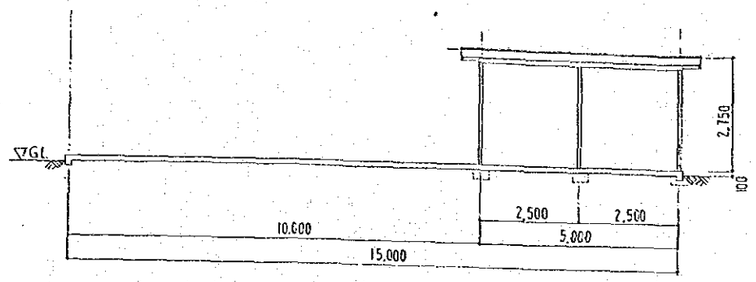
FEDERAL REPUBLIC OF NIGERIA
THE LOWER ANAMBRA IRRIGATION PROJECT
MODEL INFRASTRUCTURE IMPROVEMENT WORKS

FIELD MANAGING HOUSE (2/2)

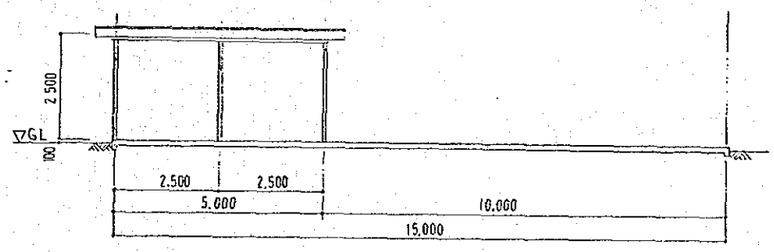
JAPAN INTERNATIONAL COOPERATION AGENCY | DWG NO. 16



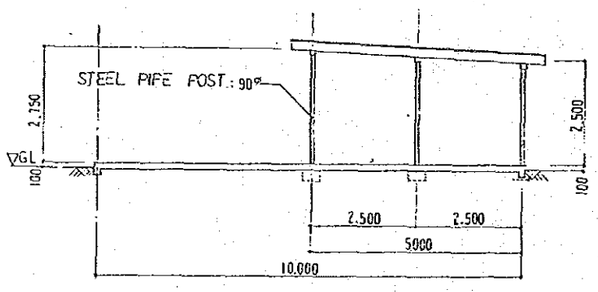
ROOF PLAN



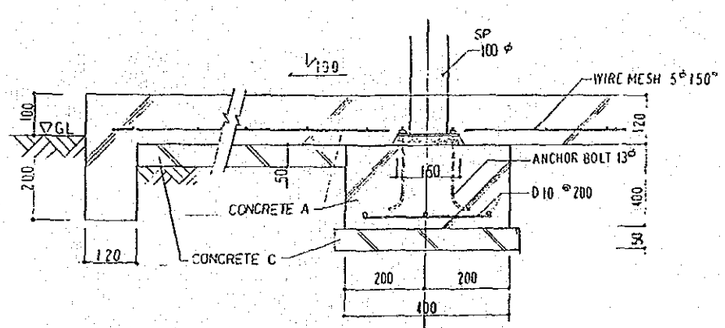
LEFT SIDE ELEVATION



RIGHT SIDE ELEVATION



FRONT ELEVATION

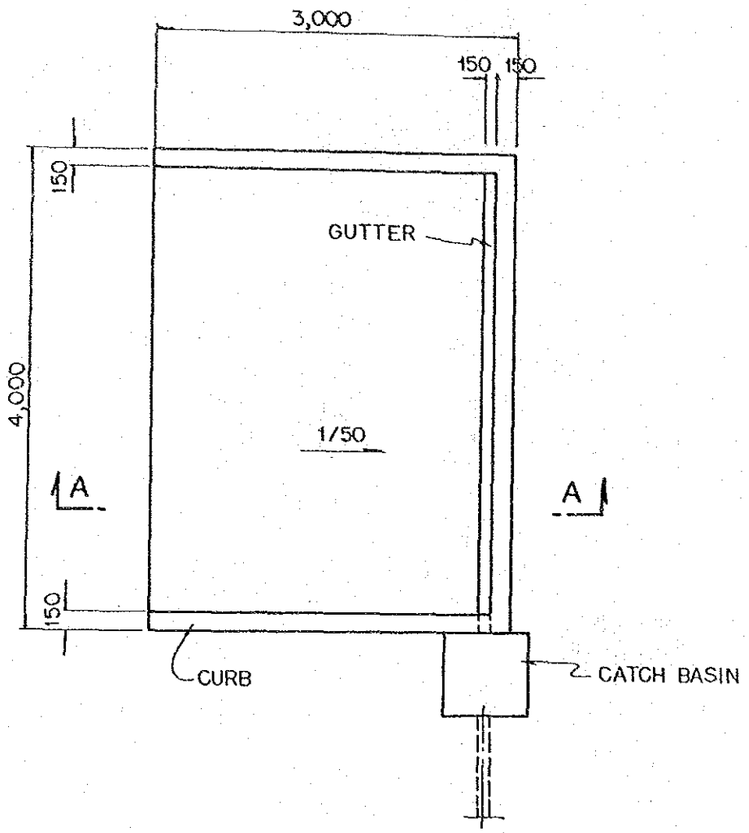


FLOOR AND FOUNDATION MINUTE

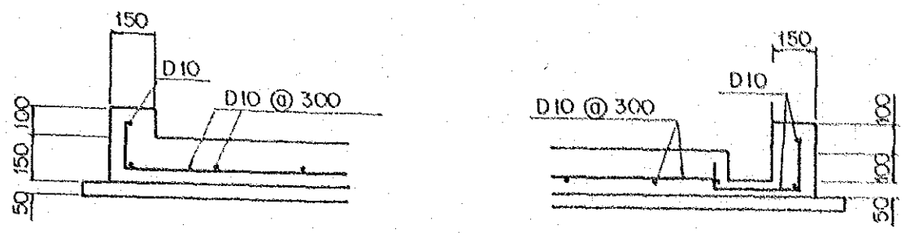
FEDERAL REPUBLIC OF NIGERIA
THE LOWER ANAMBRA IRRIGATION PROJECT
MODEL INFRASTRUCTURE IMPROVEMENT WORKS

RICE DRYING YARD

JAPAN INTERNATIONAL COOPERATION AGENCY DWG NO. 17



PLAN



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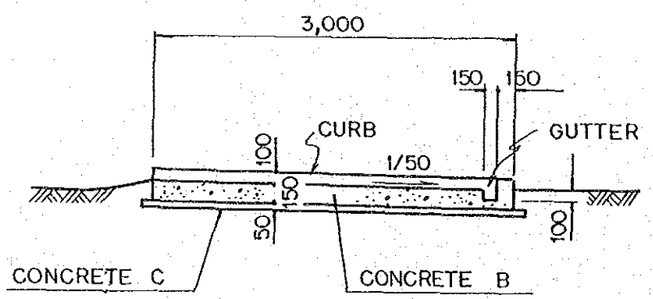
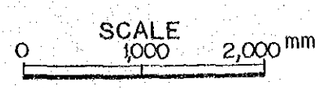


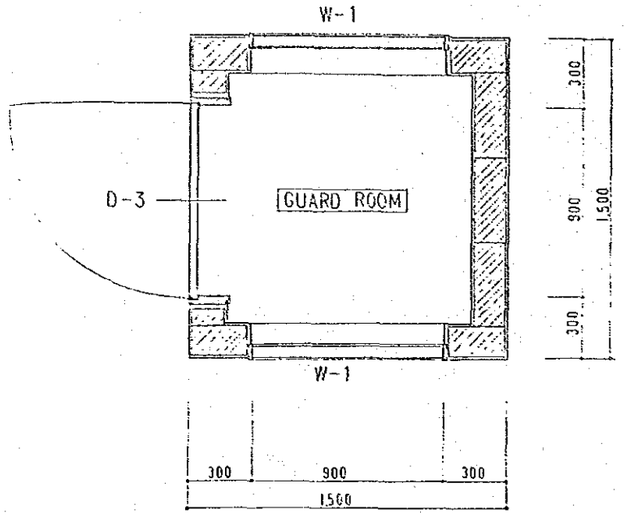
SECTION A-A



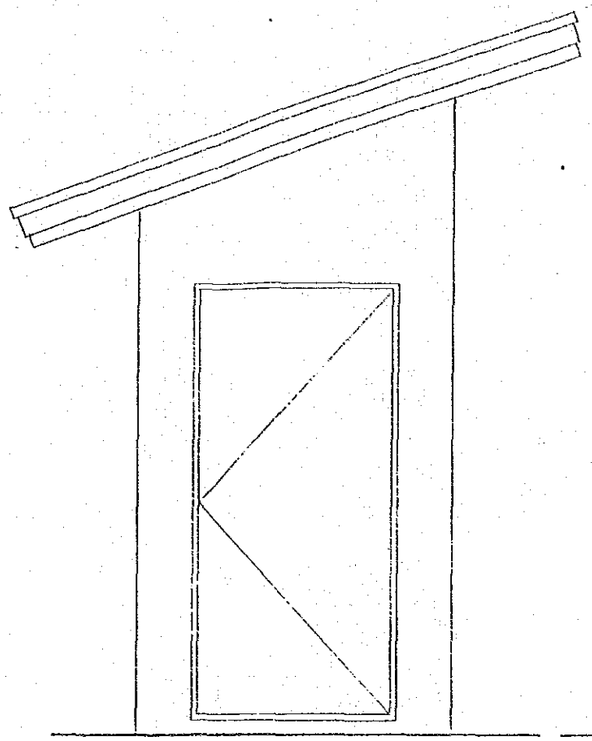
FEDERAL REPUBLIC OF NIGERIA
THE LOWER ANAMBRA IRRIGATION PROJECT
MODEL INFRASTRUCTURE IMPROVEMENT WORKS

WASHING BAY FOR MACHINERY

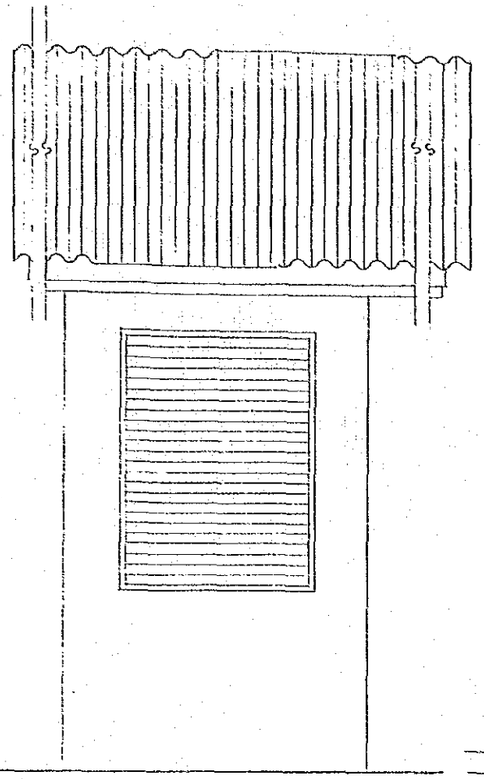
JAPAN INTERNATIONAL COOPERATION AGENCY | IWB NO. 18



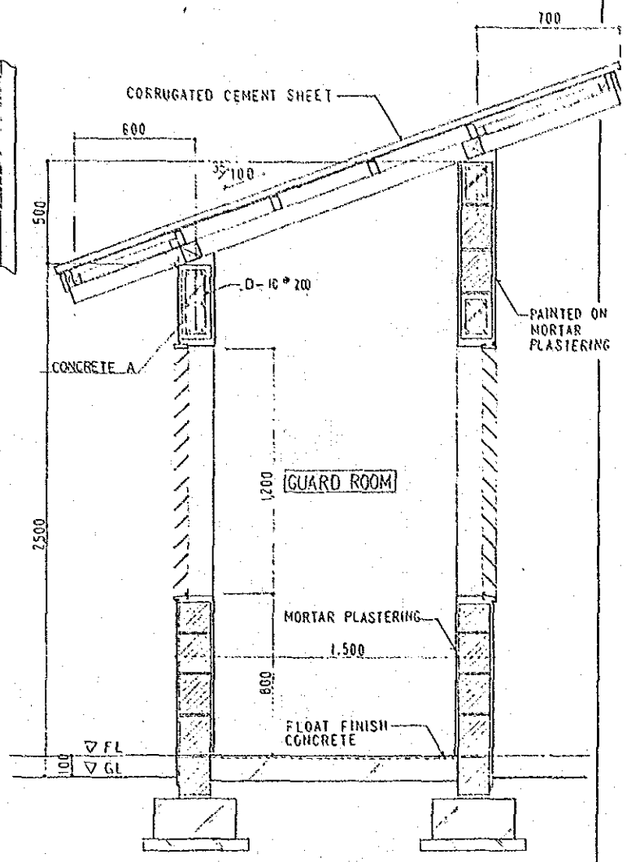
PLAN



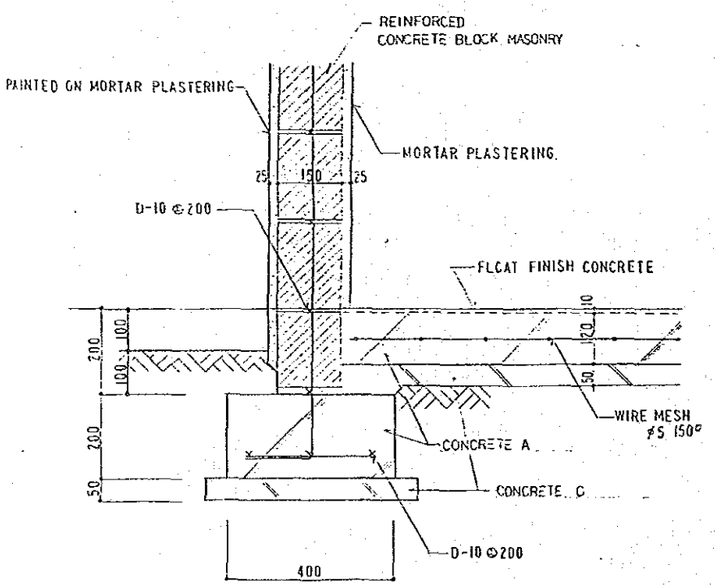
FRONT ELEVATION



SIDE ELEVATION



SECTION DETAIL



FLOOR AND FONDATION MINUTE

INTERIOR FINISHING SCHEDULE

BUILDINGS	ROOMS	FLOORS		SKIRTINGS		WALLS		CEILINGS			REMARKS
		FLOAT FINISH CONCRETE	MORTAR PLASTERING	MORTAR PLASTERING		MORTAR PLASTERING	PAINTED ON MORTAR PLASTERING	PAINTED ON MORTAR PLASTERING			
GUARD HOUSE	GUARD ROOM	○				○					

EXTERIOR FINISHING SCHEDULE

BUILDINGS	SKIRTINGS		WALLS			ROOF		STRUCTURES						REMARKS
	MORTAR PLASTERING		MORTAR PLASTERING	PAINTED ON MORTAR PLASTERING	STEEL GALVANIZED NET 20MM MESH	CORRUGATED CEMENT SHEET	STEEL GALVANIZED NET 20MM MESH	RC FOUNDATION	RC GRADE SLAB	STEEL STRUCTURE	CONCRETE BLOCK MASONRY	STEEL ROOF STRUCTURE	WOODEN ROOF STRUCTURE	
GUARD HOUSE	○			○		○		○	○		○		○	

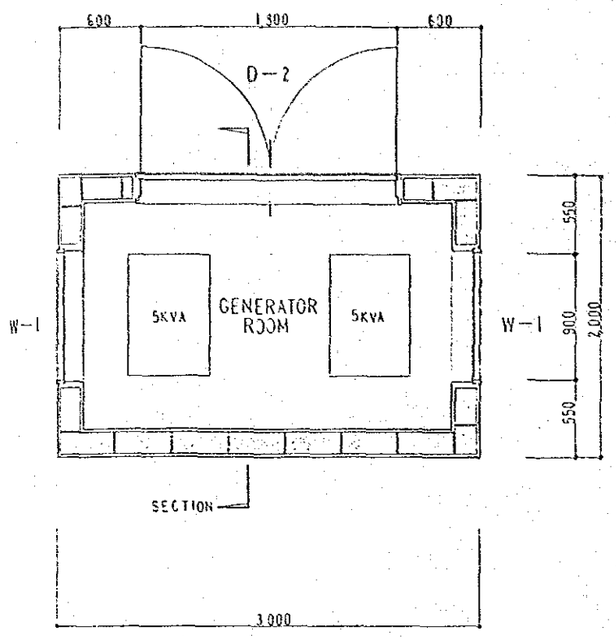
DOOR AND WINDOW SCHEDULE

ITEM	DESCRIPTION	DIMENSION W X H
D - 3	WOODEN FLUSH SINGLE SWING DOOR	900 X 2000
W - 1	GLASS JALOUSIE WINDOW	500 X 1200

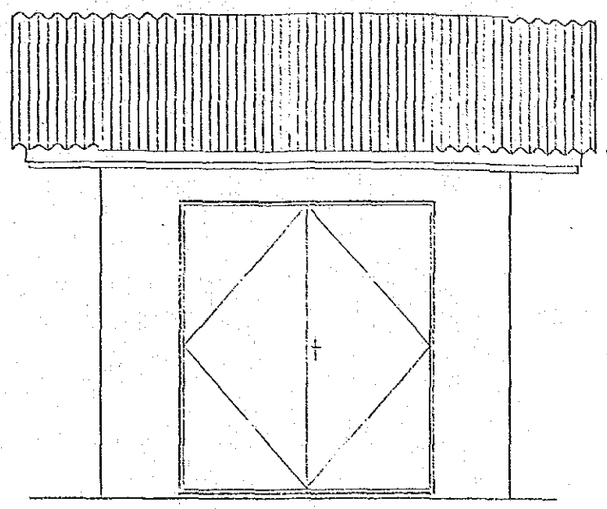
FEDERAL REPUBLIC OF NIGERIA
THE LOWER ANAMBRA IRRIGATION PROJECT
MODEL INFRASTRUCTURE IMPROVEMENT WORKS

GUARD HOUSE

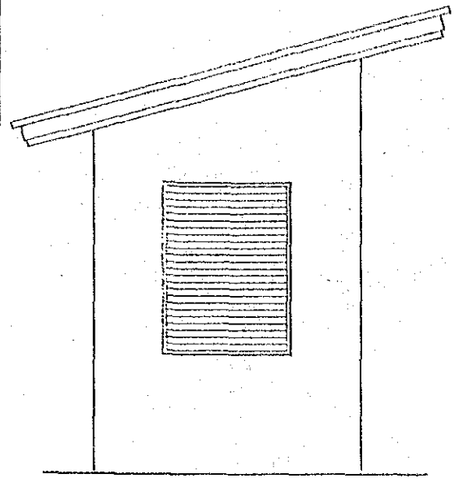
JAPAN INTERNATIONAL COOPERATION AGENCY | DWG NO. 19



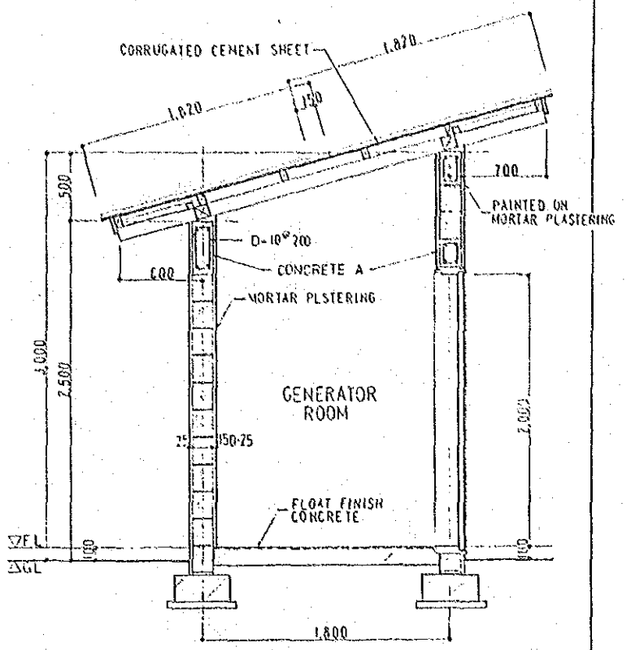
PLAN



FRONT ELEVATION



SIDE ELEVATION



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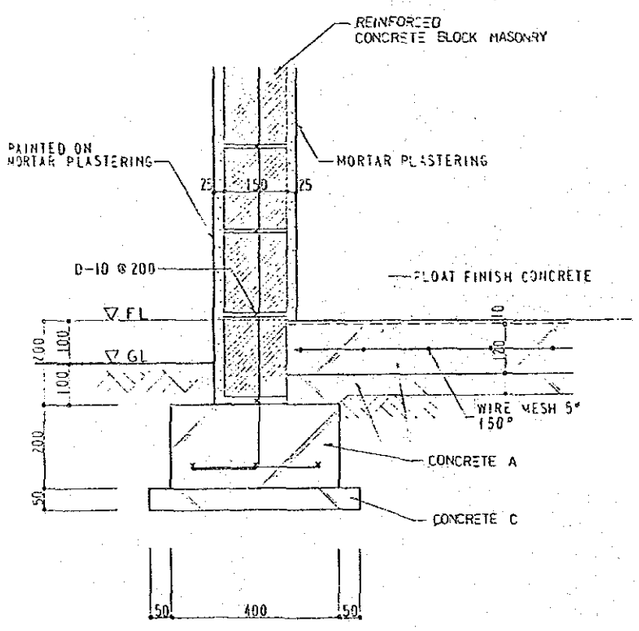


FLOOR AND FONDATION MINUTE

INTERIOR FINISHING SCHEDULE

BUILDINGS	ROOMS	FLOORS		SKIRTINGS			WALLS			CEILINGS			REMARKS
		FLOAT FINISH CONCRETE	MORTAR PLASTERING	MORTAR PLASTERING			MORTAR PLASTERING	PAINTED ON MORTAR PLASTERING		PAINTED ON MORTAR PLASTERING			
GENERATOR HOUSE	GENERATOR ROOM	○					○						

EXTERIOR FINISHING SCHEDULE

BUILDINGS	SKIRTINGS			WALLS			ROOF		STRUCTURES						REMARKS
	MORTAR PLASTERING			MORTAR PLASTERING	PAINTED ON MORTAR PLASTERING	STEEL GALVANIZED NET 20MM MESH	CORRUGATED CEMENT SHEET	STEEL GALVANIZED NET 20MM MESH	RC FOUNDATION	RC GRADE SLAB	STEEL STRUCTURES	CONCRETE BLOCK MASONRY	STEEL ROOF STRUCTURES	WOODEN ROOF STRUCTURES	
GENERATOR HOUSE	○				○		○		○	○		○		○	

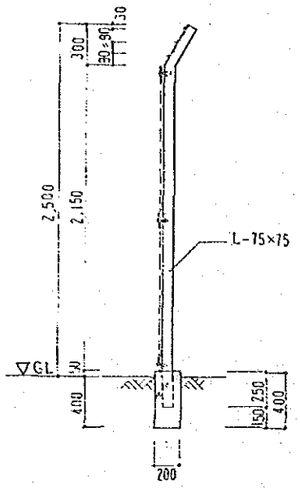
DOOR AND WINDOW SCHEDULE

ITEM	DESCRIPTION	DIMENSION W × H
D-2	STEEL ANGLE-FRAMED DOUBLE SWING DOOR	1,800 × 2,000
W-1	GLASS JALOUSIE WINDOW	900 × 1,200

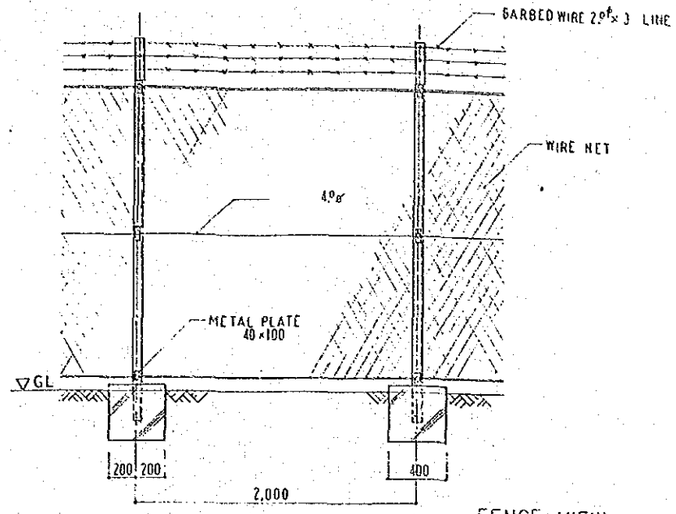
FEDERAL REPUBLIC OF NIGERIA
THE LOWER ANAMBRA IRRIGATION PROJECT
MODEL INFRASTRUCTURE IMPROVEMENT WORKS

GENERATOR HOUSE

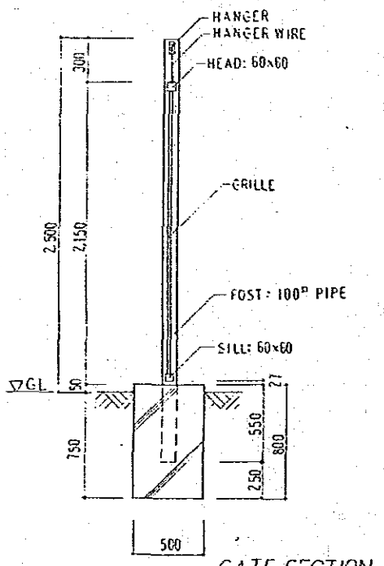
JAPAN INTERNATIONAL COOPERATION AGENCY | DWG NO. 20



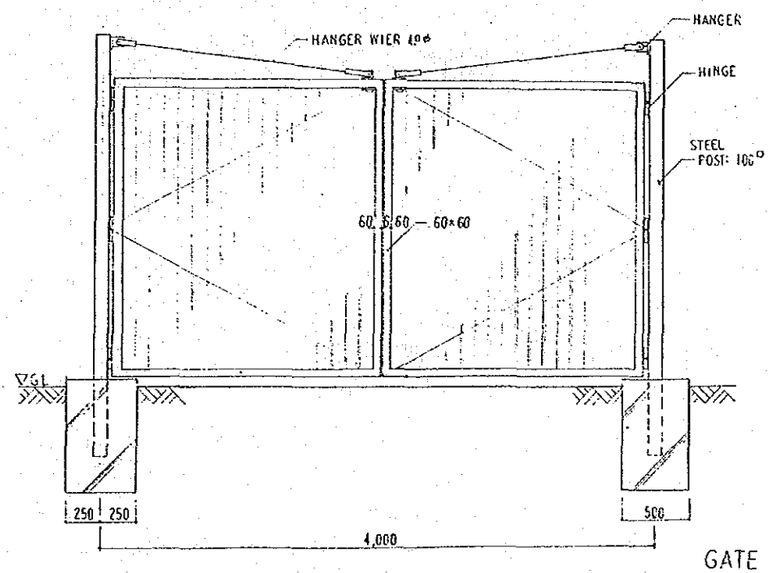
FENCE SECTION



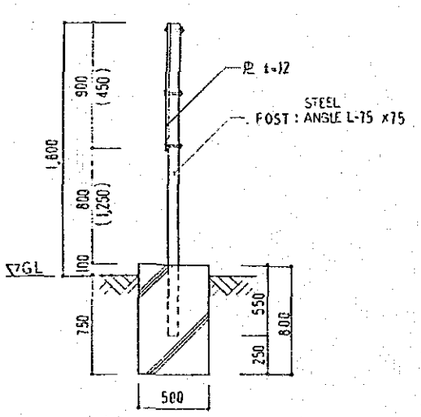
FENCE VIEW



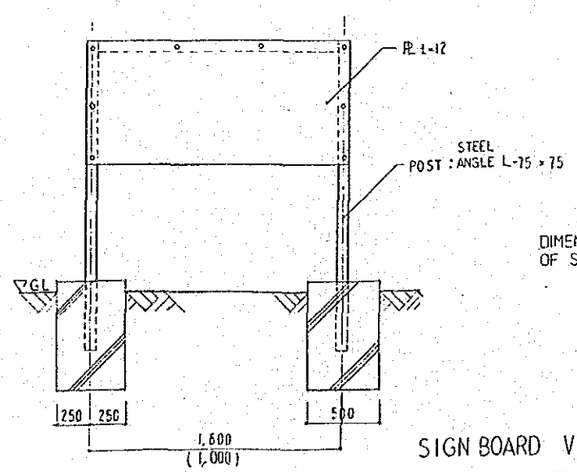
GATE SECTION



GATE VIEW

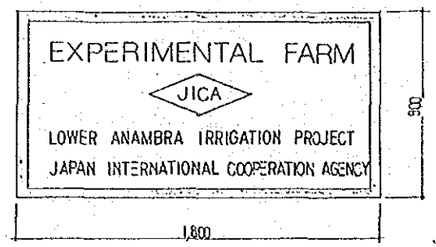


SIGN BOARD SECTION

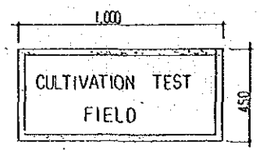


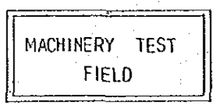
SIGN BOARD VIEW

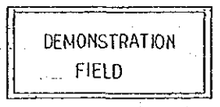
DIMENSIONS IN BRACKETS ARE OF SMALL TYPE.



MAIN SIGN BOARD







SMALL TYPE BOARD

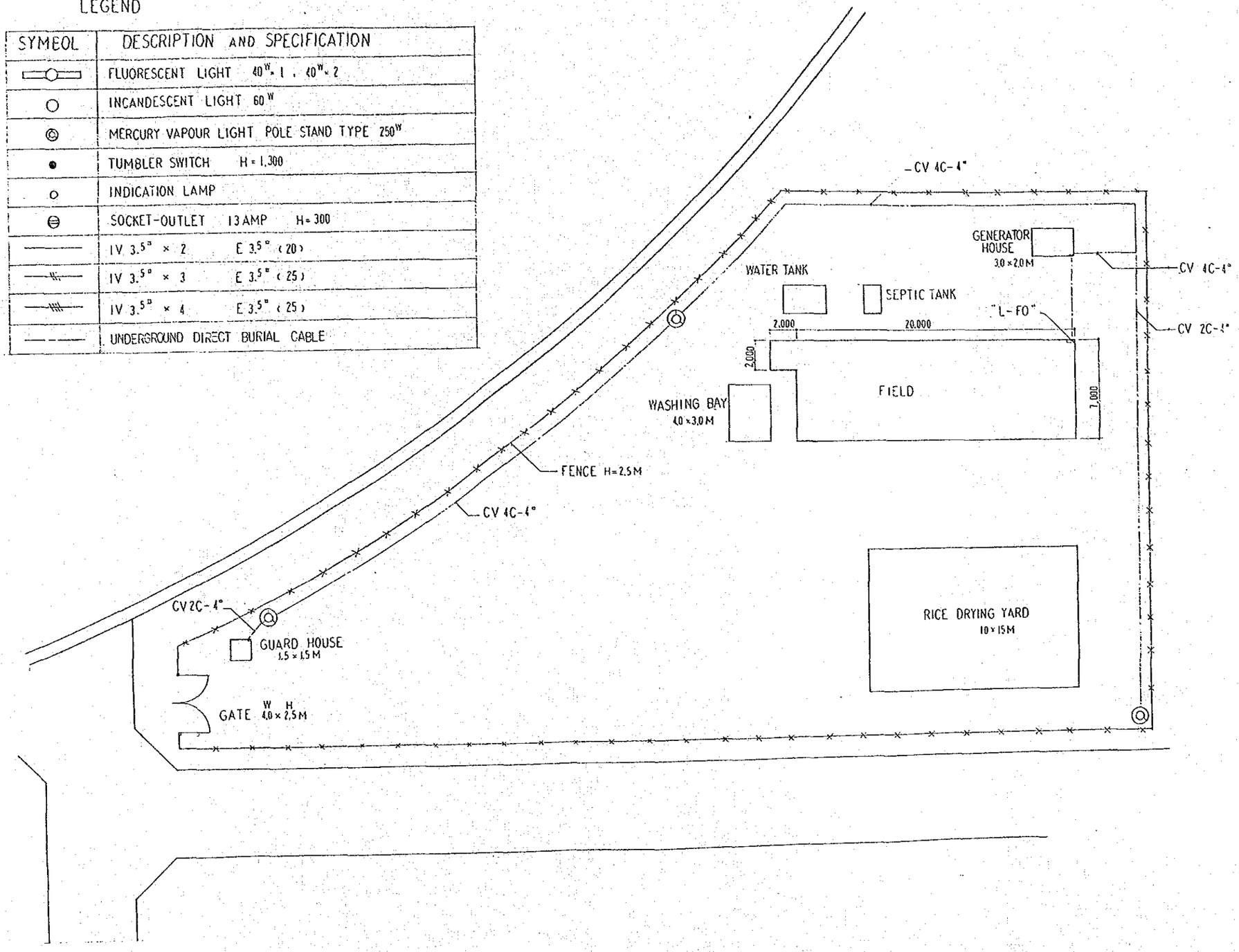
FEDERAL REPUBLIC OF NIGERIA
THE LOWER ANAMBRA IRRIGATION PROJECT
MODEL INFRASTRUCTURE IMPROVEMENT WORKS

FENCE, GATE AND SIGN BOARD

JAPAN INTERNATIONAL COOPERATION AGENCY | DWG NO. 21

LEGEND

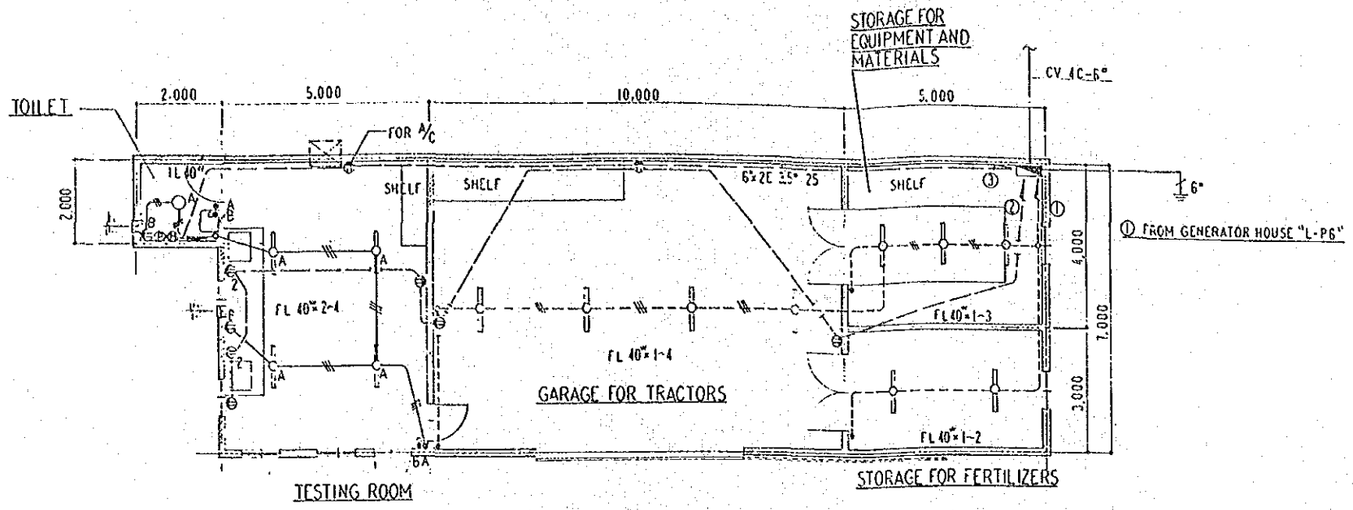
SYMEOL	DESCRIPTION AND SPECIFICATION
	FLUORESCENT LIGHT 40W × 1 , 40W × 2
	INCANDESCENT LIGHT 60W
	MERCURY VAPOUR LIGHT POLE STAND TYPE 250W
	TUMBLER SWITCH H = 1,300
	INDICATION LAMP
	SOCKET-OUTLET 13 AMP H = 300
	IV 3.5" × 2 E 3.5" (20)
	IV 3.5" × 3 E 3.5" (25)
	IV 3.5" × 4 E 3.5" (25)
	UNDERGROUND DIRECT BURIAL CABLE



FEDERAL REPUBLIC OF NIGERIA
THE LOWER ANAMBRA IRRIGATION PROJECT
MODEL INFRASTRUCTURE IMPROVEMENT WORKS

ELECTRIC INSTALLATION (1/2)

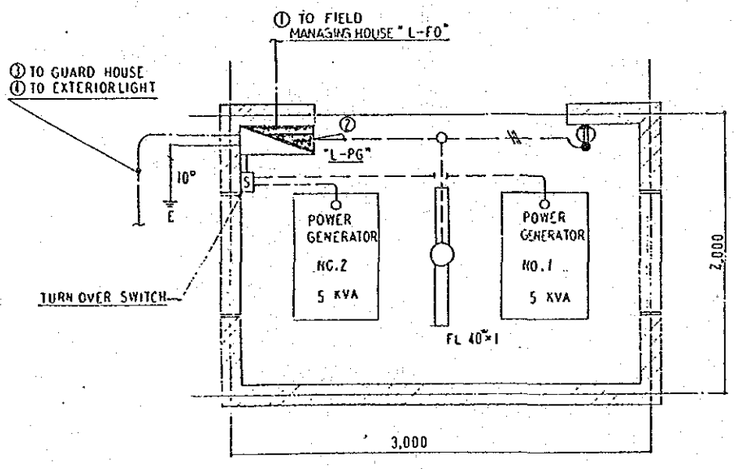
JAPAN INTERNATIONAL COOPERATION AGENCY DWG NO. 22



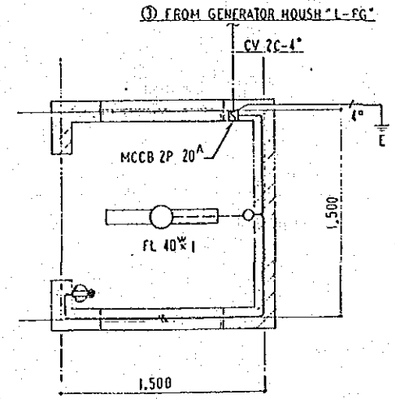
FEILD MANAGING HOUSE ELECTRICAL PLAN

LEGEND

SYMBOL	DESCRIPTION AND SPECIFICATION
	FLUORESCENT LIGHT 40W×1 40W×2
	INCANDESCENT LIGHT 60W
	MERCURY VAPOUR LIGT POLE STAND TYPE 250W
	TUMBLER SWITCH H=1.300
	INDICATION LAMP
	SOCKET-OUTLET 13AMP H=300
	IV 3.5"×2 E 3.5 (20)
	IV 3.5"×3 E 3.5 (25)
	IV 3.5"×4 E 3.5 (25)
	WIREING CONCEALED IN CEILING OR WALL
	WIREING CONCEALED IN FLOOR
	WIREING EXPOSED
	PANEL BOARD



GENERATOR HOUSE ELECTRICAL PLAN

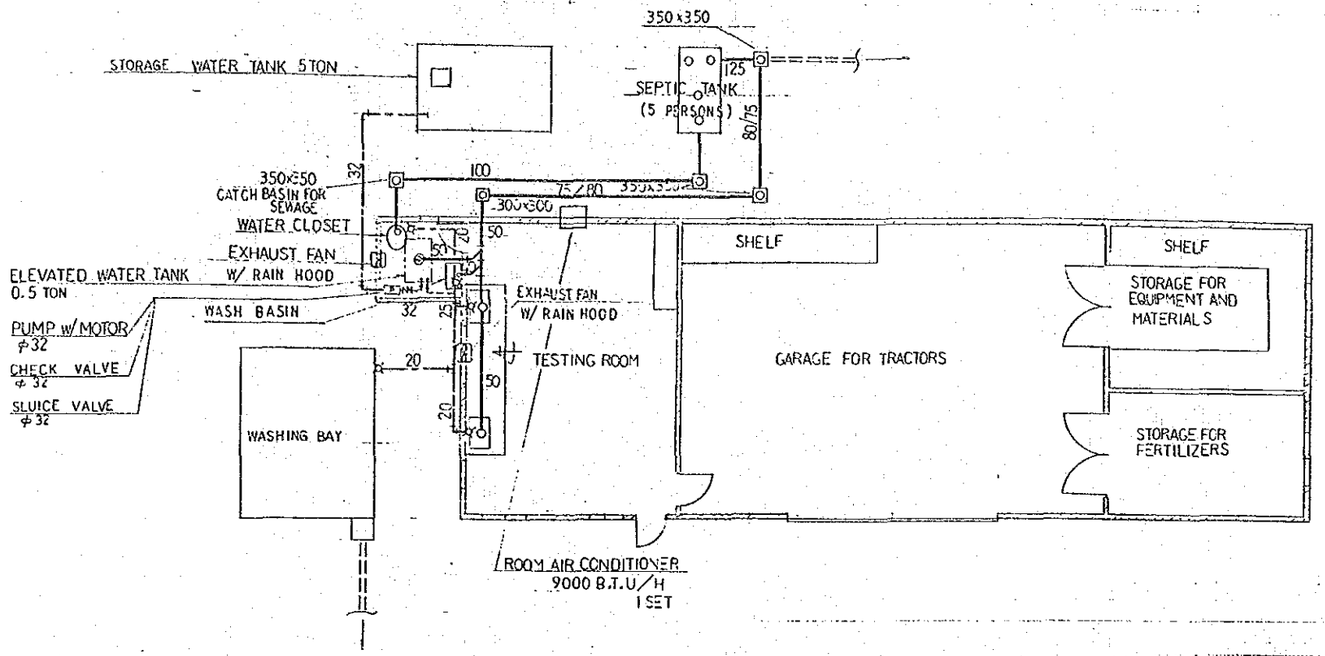


GUARD HOUSE ELECTRICAL PLAN

FEDERAL REPUBLIC OF NIGERIA
THE LOWER ANAMBRA IRRIGATION PROJECT
MODEL INFRASTRUCTURE IMPROVEMENT WORKS

ELECTRIC INSTALLATION (2/2)

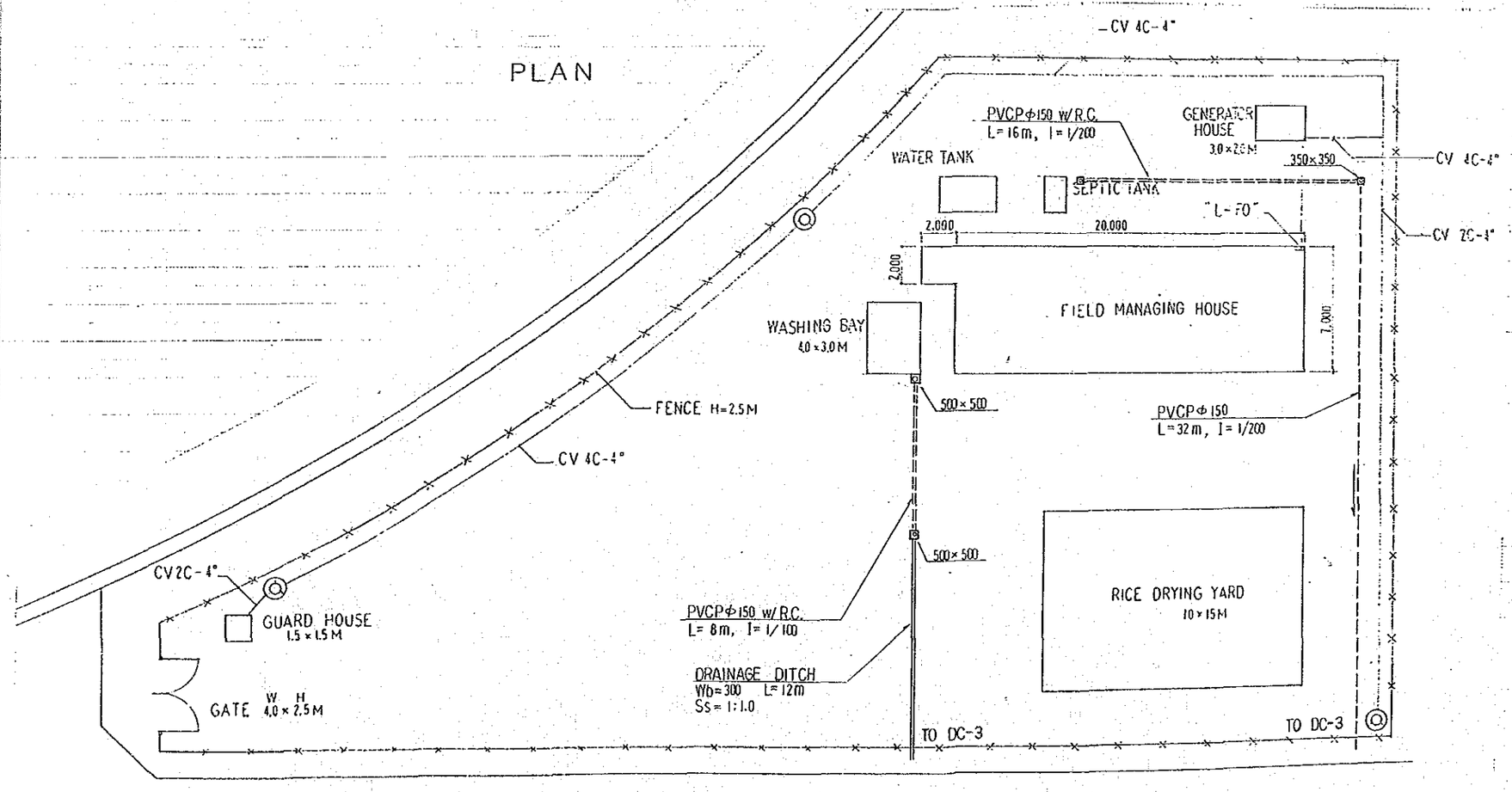
JAPAN INTERNATIONAL COOPERATION AGENCY | DWG NO. 23



PLAN

LEGEND

SYMBOL	DESCRIPTION
	FAUSET
	DRAIN OUTLET
	FLOOR DRAIN
	SLUICE VALVE
	CHECK VALVE
	CATCH BASIN FOR DRAINAGE/SEWARAGE
	WATER SUPPLY PIPE, GALVANIZED S.P
	DRAINAIGE/SEWARAGE PIPE, PVCP
	DITTO W/PROTECTION CONCRETE
	DITTO W/SAND BED
	DRAINAGE DITCH



FEDERAL REPUBLIC OF NIGERIA
THE LOWER ANAMBRA IRRIGATION PROJECT
MODEL INFRASTRUCTURE IMPROVEMENT WORKS

PLUMBING INSTALLATION

JAPAN INTERNATIONAL COOPERATION AGENCY | IDWC TIC 24

7.1　実施設計調査団メンバー

調査団の構成は、下記のとおりである。

担当分野	氏　　名	派　遣　時　現　職
総　括	吉永　健治	農用地整備公団　海外事業室 情報整備課長
業務調整	臼杵　宣春	国際協力事業団　農業開発協力部 農業開発課代理
圃場設計	倉内　　隆	日本工営（株）　第二農業水利部
施設設計	神田　浩史	日本工営（株）　第一農業水利部

7.2　実施設計調査団日程表

日順	月　日	曜日	調査日程	宿泊地	調 査 内 容
1	10月31日	月	東京ー	(機中)	(移動)
2	11月 1日	火	ーAMS	アムス	(移動)
3	月 2日	水	AMS-LAGOS	ラゴス	(移動)　KL587 便にて
4	月 3日	木	表敬／打合せ	ラゴス	R／Dチームと合流／日程・方針打合せ
5	月 4日	金	LAGOS-ENUGU	エヌグ	(移動)
6	月 5日	土	視察	エヌグ	現地調査
7	月 6日	日	打合せ	エヌグ	現地調査／基本方針まとめ
8	月 7日	月	協議／報告	ハーコート	協議／団長レター作成
9	月 8日	火	-LAGOS／報告	ラゴス	(移動) ／大使館報告
10	月 9日	水	打合せ	ラゴス	大使館打合せ
11	月10日	木	LAGOS-	(機中)	資料整理／LH561 便にて
12	月11日	金		コペン	(移動)
13	月12日	土	CPN-	(機中)	(移動)
14	月13日	日	ー東京		(帰任)　官ベース

9	11月 8日	金			
					現地調査、積算資料収集等
26	11月25日	金			
27	11月26日	土	報告 LAGOS-		大使館報告 BA076 便にて
28	11月27日	日			(移動)
29	11月28日	月			(移動)
30	11月29日	火	ー東京		(帰任) コンサルベース
	月 日				
	月 日				
	月 日				

7.3 実施設計調査団レター・リスト

JAPAN INTERNATIONAL COOPERATION AGENCY
(JICA)
DETAILED DESIGN SURVEY TEAM
FOR
THE LOWER ANAMBRA IRRIGATION PROJECT

November 7, 1988

General Manager
Anambra-Imo River Basin
Development Authority
P.M.B. 1301
Owerri

Dear Sir,

Re: The Model Infrastructure Improvement Works
for the Lower Anambra Irrigation Project

The Detailed Design Survey Team has been organized by Japan International Cooperation Agency (JICA) for the purpose of formulating detailed plan on the Model Infrastructure Improvement Works for the Lower Anambra Irrigation Project.

The Team has, so far, made a series of site reconnaissances and discussions with your staff concerned in order to determine the location and scale of the experimental farm and its facilities. As the result, we would like to submit to you the tentative idea for designing of the experimental farm as per the attached.

Two team members, Mr.Kurauchi and Mr.Kanda, 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 Embassy of Japan.

For the timely commencement of the construction of the experimental farm. we would like to ask you to take the necessary formalities in due consultation with the Embassy of Japan.

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

Sincerely Yours,

Kenji YOSHINAGA
Team Leader
Detailed Design Survey Team
Japan International
Cooperation Agency

cc:Secretary
Development Aid Department
Office of Planning and Budget
in the Office of the President
(Att:Mr.B.A.Adeusi)
cc:Director General
Federal Ministry of Agriculture,
Water Resources and Rural Development
(Att:Alh.A.M.Dauda)
cc:Embassy of Japan

1.Objective

This survey is to carry out the detailed design on the experimental farm to be constructed by the Japanese government based upon the Record of Discussions, Article IV (1) signed between both Governments on November 3, 1988.

The experimental farm will be composed of fields for such as cultivation test, demonstraion, training and mechanization, which involves the construction of land-leveling, irrigation and drainage canals, farm roads, etc. And, besides, the experimental farm, also, equip those facilities such as field managing house for agricultural machinery, fertilizer and pesticide and rice drying yard.

The experimental farm will be a core for the activities of the technical cooperation, through which not only the various activities mentioned in the Master Plan will be conducted but also skills and techniques developed will be transferred and disseminated to the farmers.

In light of the above, the team conducted the surveys on selection of site, scale of farm, condition of access road and water resource and had preliminary discussions on the framework of experimental farm.

2.Location and Scale

(1)The location of the experimental farm is planned in consideration of following conditions.

a)access from the project office
b)condition of irrigation water
c)efficiency for demonstration
d)advantage of construction cost

Considering the above, the experimental farm is selected at the area near to the turnout TO-W7 as shown in Fig-1 and 2.

(2)The area of the experimental farm is about 4.5ha including the facility yard as shown in Fig-3.
The experimental farm consists of as follows,

a)cultivation test field
b)demonstration field
c)machinary test field
d)training field
e)field managing house, rice drying yard, etc.

3.Components of Experimental Farm

Experimental Farm

The experimental farm consists of the following facilities.

(1)Irrigation canal

a)Intake
Irrigation water for the experimental farm will be intaken from the West Main Canal at the turnout TO-W7.

b)Irrigation canal
The approach canal (TC-W7-1) from the intake and the distribution canal (DC-W7-1-2) running inside of the experimental farm will be reinforced by concrete lining or concrete block.

(2)Drainage canal

The exiting drains will be used with minor improvement.

(3)Road

In addition to the existing farm road, roads surrounding the experimental farm will be newly constructed for easy approach by machinery and for maintenance work.

(4)Field

The area of the experimental fields will be about 4ha. The farm consists of the following four kinds of field.

a)Cultivation test field
The cultivation test field will be 2 plots (about 1ha). The field will be divided into 8 sub-plots for activities such as rice variety test, fertilizer test and insectcide test. This field will equip the concrete levee and bird scaring net, if necessary.

b)Demonstration field
The demonstration field will be 2 plots (about 1ha). Through this field, the skills and techniques will be extended to farmers.

c)Machinery test field
The machinery test field will be 2 plots (about 1ha). In this field, adaptability test and operation of the machinery will be conducted.

d)Training field
The training field will be 2 plots (about 1ha). This field will be used for various trainings to personnel concerned.

Farm Facilities

In order to manage and maintain the experimental farm, the following facilities will be constructed.

(1)Field managing house

The field managing house will equip those such as (i)storage for fertilizer, pesticide, farm equipment, etc., (ii)garage for agricultural machinery and (iii)test room. Small-scale water supply tank, portable generator and washstand for agricultural machinery will be facilitated outside the house.

(2)Rice drying yard

In order to dry the rice, the rice drying yard is facilitated.

(3)Fence and guard house

Fence will be installed around the farm facilities and guard house will be built at the entrance.

4.Others

(1)The Nigerian side will provide the land for the experimental farm.

(2)The tentative schedule and procedure for the construction work of experimental farm is shown in Table-1.

Table-1

OUTLINE OF THE TENTATIVE SCHEDULE ON THE MODEL INFRASTRUCTURE IMPROVEMENT WORK

	Japanese Side	Nigerian Side
1988		
Nov.	Detailed design survey --Nov.2 to Nov.26--	To provide land for the experimental farm
Dec.		
1989 Jan.	Detailed design work in Japan	
Feb.	Submission of final report ———	
Mar.		
Apr.		Request of construction work for the experimental farm (to the team leader)
	JICA HDQ	
May.	———	Submission of A1 form for expert (to the Embassy of Japan)
Jun.		
Jul.		
Aug.	Exchange of Note Verbale	
Sep.	Dispatch of supervising expert	
	Remittance of budget	
	Contract for construction	
Oct.	Start of construction work	

FIG 1 LOCATION MAP

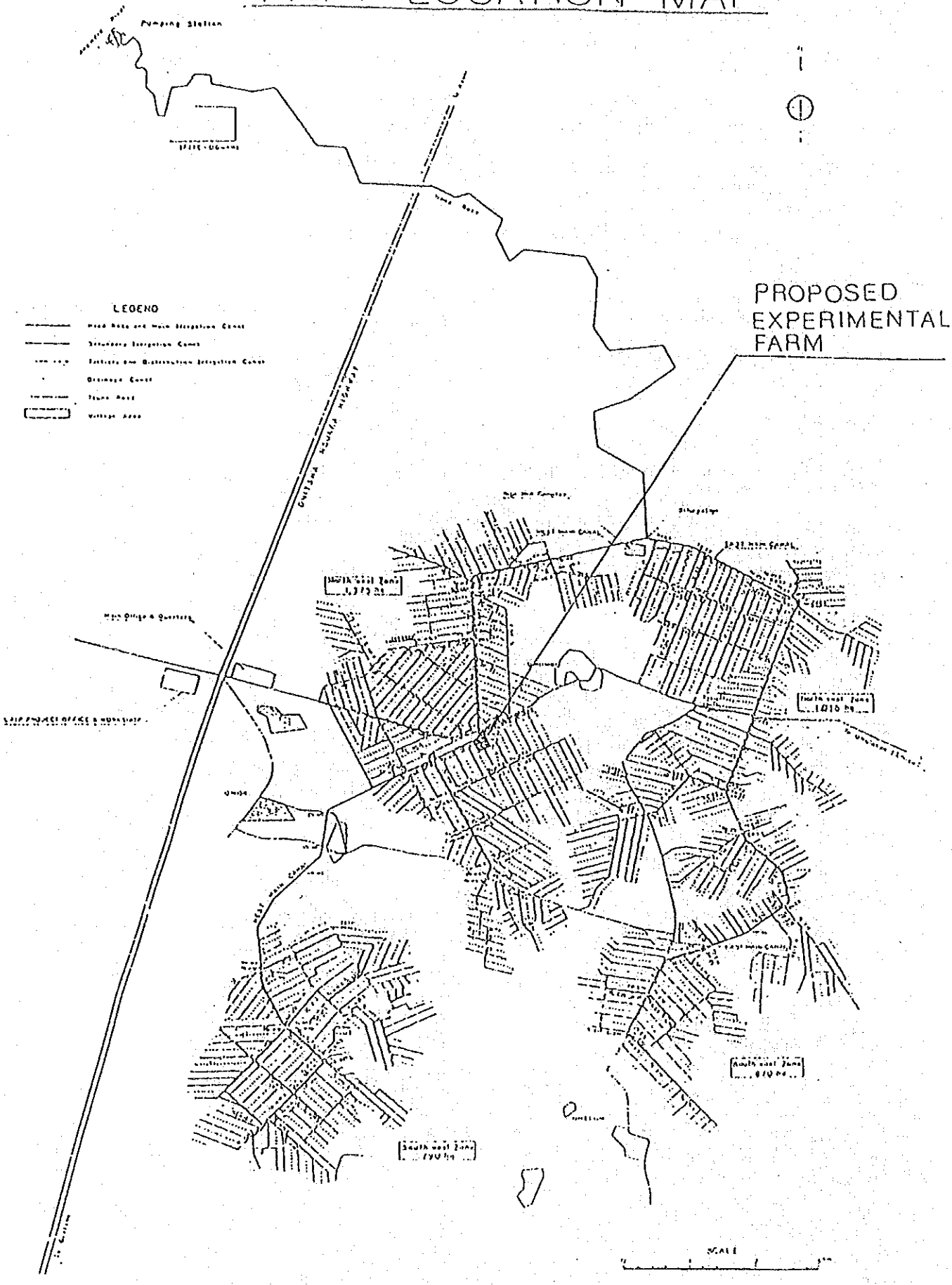


FIG. 2 PLOT NUMBER

TO-W7 AREA

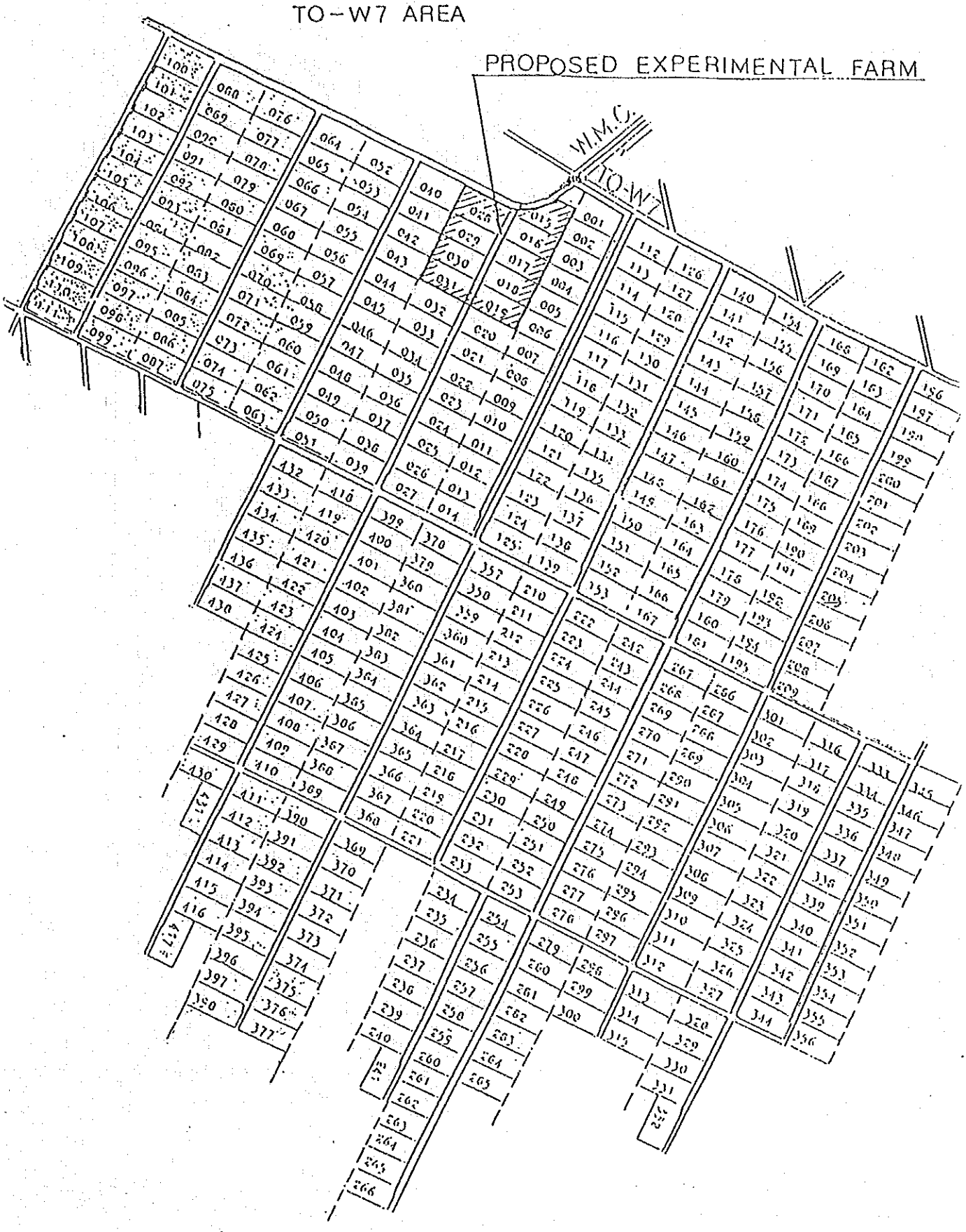
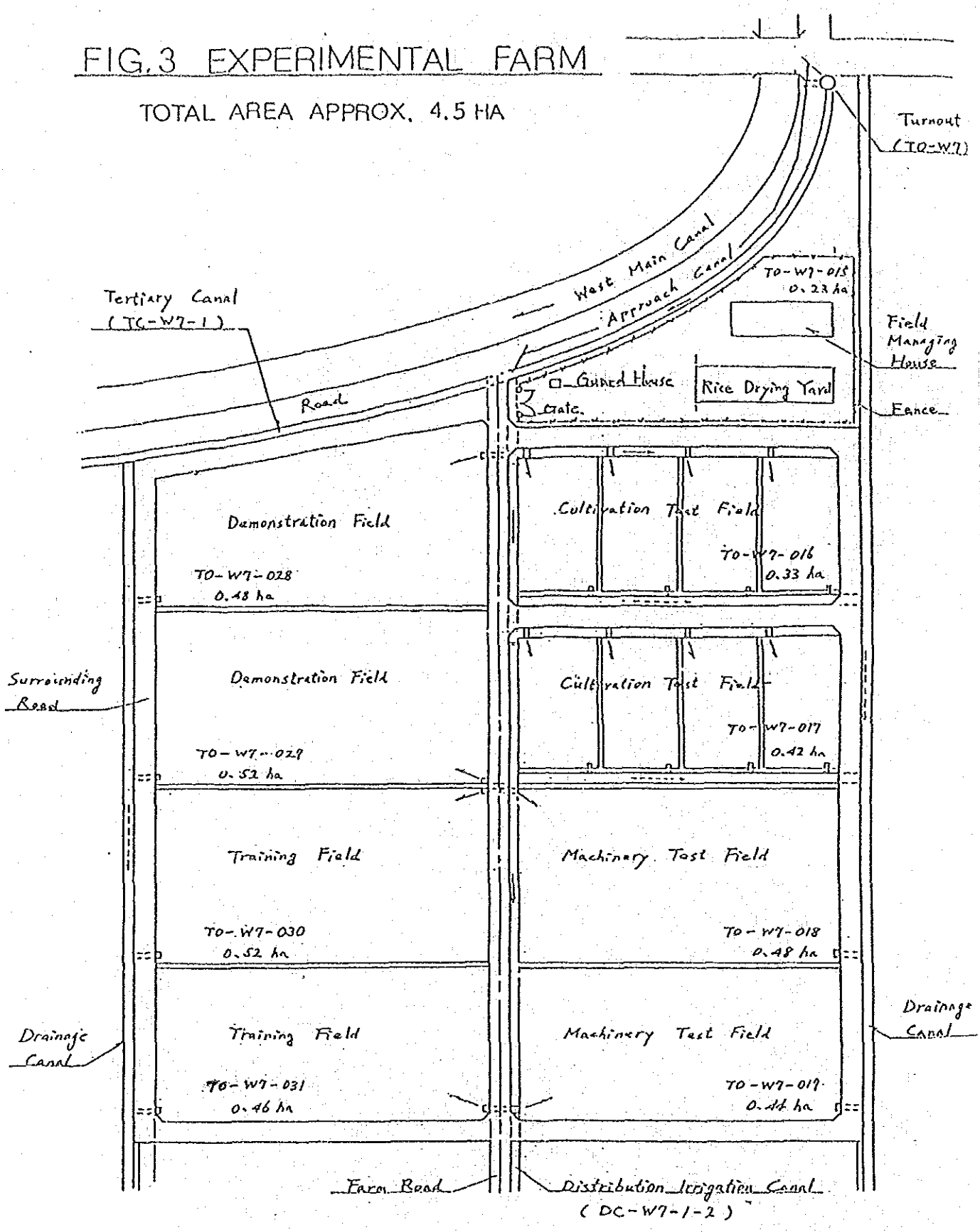


FIG. 3 EXPERIMENTAL FARM

TOTAL AREA APPROX. 4.5 HA



November 9, 1988

General Manager
Anambra-Imo River Basin
Development Authority,
Owerri

Attention : Assistant General Manager
(C.O. & M.)

Dear Sir,

L.A.I.P./Technical Assistance Program JICA

Collection of Necessary Data and Information
Concerning Detailed Design of Model Infrastructure Works

We, the Detailed Design Team of JICA wish to send you herewith the questionnaires regarding the captioned. So, please pre-study these questions prior to our discussion. We will visit you on 10th November, as schedule.

Your understanding and particular attention to the captioned are kindly requested.

Sincerely Yours,

T. Kurauchi

T.Kurauchi
for Team Leader
Detailed Design
Survey Team
JICA

cc: File

Questionnaire

1. Please let us know the standard schedule and procedure which are generally accepted in Nigeria in selection of the contractor.

2. Do you have any specific limitation or authorized conditions in performance of the design and/or the construction works?

3. Please let us know the standard criteria and/or engineering standard to be authorized in Nigeria. For example, which standard is applied to the concrete works in Nigeria?

4. Please prepare the short list of three to four competent local contractors.

   Construction of the experimental farm (4.5ha) will include both civil (land consolidation works) and architectural works (construction of field office), and it will be required high quality works.

   The contractors to be selected must have deep enough experiences in similar to the proposed works and have the working capacity to complete the said works within five months. The outline of construction work is as shown in attachment 1.

5. To carry out the proposed construction works, the contractor will have to utilize the heavy duty equipment so as to enable quality work as well as to complete the works as short time as possible (maximum 5 months). To this end, if the contractor have no enough equipment, is it possible to get lease service of equipment(O/M equipment) from your Authority?

6. To carry out the design works, and then, to estimate the construction cost efficiently and satisfactorily, please provide us the relavant data and information on unit prices and/or costs which are applied to the current works under your administration (see Attachment 2).

Attachment 1

Outline of the Experimental Farm (tentative)

Descriptions		Remarks
Gross area	4.5ha	
Farm plots	4 ha	(to be made and levelling by motor grader)
Irrigation canal		
existing	400 m	(to be concrete lining)
additional construction	200 m	(to be concrete lining)
Drainage canal		
existing	600 m	
Road		
existing	250 m	(to be improved by additional embankment and gravel pavement)
additional construction	800 m	(to be constructed by embankment and gravel pavement)
Bird scaring net	750 m2	
Embankment for office yard	500 m3	
Pavement in office yard	1000 m2	
Field office	140 m2	
Rice drying yard	400 m2	
Guard house	1 no.	
Gate	1 set	
Fence	300 m	
Water tank	3 m3	
Generator	2 sets	
Water supply system	L.S.	
Electricity supply system	L.S.	

Attachment 2

Unit Price

1. Labour cost

Item	Unit	Unit Price	Condition
Common labour	m.d	_____	
Skilled labour	m.d	_____	
Foreman	m.d	_____	
~~Concrete worker~~	m.d	_____	
Steel worker	m.d	_____	
Carpenter	m.d	_____	
Painter	m.d	_____	
Plumber	m.d	_____	
Blacksmith	m.d	_____	
Mason	m.d	_____	
Operator for equipment	m.d	_____	
Operator for truck	m.d	_____	

2. Material price

Item	Unit	Unit Price	Condition
Sand	m3	_____	at quarry or at site
Gravel	m3	_____	
Stone	m3	_____	
Laterite	m3	_____	
Timber	m3	_____	
Cement	kg,t,bag	_____	
Reinforcement steel bar	kg,t	_____	
Structural steel	kg,t	_____	
Steel wire	kg,t	_____	
Steel net for fence	kg,m2	_____	
Steel net for bird scaring	kg,m2	_____	
Steel pipe			
dia. 20mm	m,nos.	_____	
dia. 25mm or 1"	m,nos.	_____	
dia. 50mm or 2"	m,nos.	_____	
dia. 100mm or 4"	m,nos.		
Reinforced concrete pipe			
dia. 200 mm	m,nos.	_____	

dia. 300 mm	m,nos.	_____
dia. 400 mm	m,nos.	_____
dia. 500 mm	m,nos.	_____
dia. 600 mm	m,nos.	_____
PVC pipe		
dia. 50 mm	m,nos.	_____
dia. 100mm	m,nos.	_____
dia.200mm	m,nos.	_____
Generator 5KVA	set	_____
Water tank	m3	_____

3. Unit cost for works

Work Item	Unit	Unit Cost
Excavation by manpower	m3	_____
Excavation by bulldozer	m3	_____
Excavation by hydraulic shovel	m3	_____
Excavation by backhoe	m3	_____
Embankment by manpower	m3	_____
Embankment by bulldozer	m3	_____
Backfill by manpower	m3	_____
Backfill by bulldozer	m3	_____
Land levelling by bulldozer	m3	_____
Land levelling by motor grader	m3	_____
Stripping	m3	_____
Hauling by Truck	m3*km	_____
Sod facing	m2	_____
Gravel pavement ,t=100 mm	m2	_____
Laterite pavement, t=100 mm	m2	_____
Asphalt pavement , t= 50 mm	m2	_____
Concrete , upper class	m3	_____
Concrete , middle class	m3	_____
Concrete , lower class	m3	_____
Formwork	m2	_____
Reinforcement	kg, t	_____
Warehouse (fair quality)	m2	_____
Generator installation	set	_____
Fence, steel net H=2,5m	m	_____
Roof, currugated tin or galvanized iron	m2	_____

November 24,1988

General Manager
Anambra-Imo River Basin
Development Authority,
Owerri

Dear Sir,

L.A.I.P./Technical Assistance Program JICA
Detailed Design of Model Infrastructure Works

We would like to inform you that our field survey for the captioned has completed on schedule and we will leave Nigeria on 26th November. We thank you very much for your kind cooperation during our stay. We could have your significant comments, advices and suggestions at site and at your office.

We will complete the detailed design and draft tendr documents by the end of January, 1989 in accordance with the proposed schedule. In future construction stage, of which period is scheduled to be only about six months including some administrative procedures, you are kindly requested to give us further cooperation for smooth and successful construction of the experimental farm.

Sincerely Yours,

T.Kurauchi
for Team Leader
Detailed Design
Survey Team
JICA

cc. AGM (COM)
Area Manager
Project Manager
Team Leader, NK
File

November 22, 1988

List of Field Surveys for Detailed Design of Model Infrastructure Works (JICA)

1. Field Reconnaissance

2. Physical Data Collection
   (inc. daily rainfall, design values and soil condition)

3. Investigation of Existing Site Conditions
   (inc. field, irrigation, drainage and road)

4. Preliminary Layout of Experimental Farm
   (refer to Fig. 1, 2 and 3)

5. Topographic Survey
   (inc. route survey, levelling and plane table survey)

6. Bearing Capacity Test
   (by corn penetrometer in facility yard)

7. Price Investigation
   (inc. material price and labour cost)

8. Investigation on Construction, Contract and Market Condition

9. Preliminary Work Quantity Estimate

Outline of the Experimental Farm (tentative)

1. Civil Works

(1) Road	1:ex. 250m, new 900m	total 1,150m
(2) Irrigation canal	1:ex. 400m, new 150m	total 550m
(3) Drainage canal	1:ex. 450m, new 200m	total 650m
(4) Canal related structures	division box 16nos, outlet 16nos culvert 15nos	
(5) Farm land levelling	4ha	
(6) Concrete border	1: shaped 300m, lining 600m total 900m	
(7) Facility yard preparation	1,000m2	

2. Building and Related Facilities

(1) Field office	144m2
(2) Drying yard	150m2
(3) Gurad house	2.3m2
(4) Generator house	6.0m2
(5) Bird scaring net	750m2
(6) Gate, fence and sign board	1set, 300m2
(7) Carwash	12m2
(8) Electricity supply system	
(9) Water supply and sewerage systems	
(10) Air conditioning and ventilating systems	

Preliminary Work Quantitv Esimate (tentative) (1/2)

Items	Unit	Quantity
1. Civil Works		
(1) Road		
Stripping	m3	240
Excavation	m3	220
Embankment(Lat.)	m3	2,500
Gravel pavement	m2	3,700
Slope finish	m2	
(2) Irrigation canal		
Excavaion	m3	60
Embankment	m3	50
Concrete, B	m3	74
Wire mesh net	m2	
(3) Drainage canal		
Excavation	m3	150
(4) Canal related strucure		
Excavation	m3	50
Backfill	m3	
Concrete, B	m3	26
Formwork	m2	110
Reinforcement bars	ton	0.38
Stop log	m2	1.5
PVC dia.400	m	90
(5) Farm land levelling		
Land levelling	ha	4
(6) Concrete border		
Excavation	m3	170
Embankment	m3	40
Backfill	m3	160
Concrete, B	m3	62
Concrete, E	m3	9
Formwork	m2	390
Reinforcement bar	ton	2.0
(7) Facility yard preparation		
Stripping	m3	100
Embankment(Lat.)	m3	500
Gravel Pavement	m2	1,000

Preliminary Work Quantity Esimate (tentative) (2/2)

Items	Unit	Quantity
2. Building and Related Facility Works		
(1) Field office		
5 rooms, H=3.5 to 4,0m	m2	144
(2) Driving yard		
W/ post and roof, w/o wall	m2	150
(3) Guard house		
H=2.5 to 3.0m	m2	2.3
(4) Generator house		
H=2.5 to 3.0m	m2	6.0
(5) Bird scaring net		
H=4.0m,	m2	750
Wire mesh	m2	1,210
(6) Gate, fence and sign board		
Gate 4.0x2.5(H)	set	1
Fence H=2.5m	m	300
(7) Carwash		
Thickness t=0.2m	m2	12
(8) Electricity supply system		
Generator 5KVA	set	2
supply system	L.S.	
(9) Water supply and sewerage systems		
Water tank 3m3	set	1
Water supply system	L.S.	
Septic tank	set	1
Sewerage system	L.S.	
(10)Air conditioning and ventilating systems		
Air conditionor	nos	2
Air conditioning & ventilating system	L.S.	

7.4 面談者リスト

(1) 大統領府 (Office of The President)

Mr. M. Shitu	Secretary(次官補), (Development Aid Division) Office of Planning and Budget
Mr. J. C. Chalokwu	Parmanent Secretary(次長), (Development Aid Division) Office of Planning and Budget
Mr. B. A. Adewusi	Parmanent Secretary(次長), (Development Aid Division) Office of Planning and Budget
Mr. H. N. O. Ezenwa	Chief Planning Officer Office of Planning and Budget
Mr. A. A. Aderinto	Senior Assistant Secretary Office of Planning and Budget

(2) アナンブラーイモ流域開発公団 (Anambra-Imo River Basin Development Authority)

Col. C. Ude	Chairman of Board of Director
Mr. W. O. Okonkwo	General Manager (総裁)
Mr. E. C. Nwude	Assistant General Manager (副総裁)
Mr. G. K. Okoro	Assistant General Manager (副総裁)
Dr. F. Soribe	Assistant General Manager (副総裁)

Mr. H. Okoye	Area Manager
Mr. N. Mgbemena	Project Manager of LAIP

(3) 在「ナ」日本大使館

堂之脇　光朗	特命全権大使
柴田　　孝男	参事官
加藤　　高史	一等書記官
落合　　雄彦	

(4) 大成建設（株）

虎谷　　俊朗	西アフリカ地域担当　工事長
松倉　　清明	プロジェクト第一部　課長

(5) 日本工営（株）ローア・アナンブラ開発事務所

神谷　　保広	所長
本間　　進	副所長

7.5 収集資料リスト

(1) Meteorological Data (See ANNEX C)

Daily Rainfall at Umumbo 1984 - 1987

Daily Rainfall at Omor 1987 - 1988

(2) Contract Documents

Maintenance of Structures for Control of Agulu/Nanka Erosion Gullies

The Erection & Completion of 2 Bed Room Boys Quarters at Owerri

付属書A．鳥害防止方法の検討

A-1　鳥害防止方法の比較

栽培試験圃における鳥害を防止するための特別な対策を検討する。

一般に鳥害防止策として次の案が考えられる。

ａ案　鳥追い用見張りのための人を雇用する。

ｂ案　必要な時に支柱を立て網をかぶせる。

ｃ案　支柱は固定施設とし、網は必要な時のみかぶせる。

ｄ案　支柱、網共に固定施設とする。

ｅ案　その他、案山子、空砲、テープ等。

この内ｅ案は効果、経済性の点で実用的でなく、ｂ案は支柱が倒れることが多く、試験圃には不適当と考えられるので検討対象から除外する。鳥害防止効果を試験することも、本試験圃場の試験内容の一つに含めることは有意義となろう。

ａ案、ｃ案、ｄ案の比較

(1) ａ案（鳥追い人雇用）

利点－雇用期間は収穫前２ヶ月、年２回で年４ヶ月になるが、人件費が安価であるので経済的である。

欠点－鳥を見のがすことが絶対ないとはいいきれない。

各筆２名程度が鳴物を持っていれば通常の場合、この案で十分である。

(2) ｃ案（固定支柱と可撤網）

利点－完全な鳥害防止が可能。

－日照等自然条件への影響はほとんどない。

－経済的にはｄ案より有利。

欠点－網の修繕、調達が必要である。

－網の取付、取外しに手間がかかる。

－支柱が自由なトラクタ走行を妨げる。

(3) d案（固定支柱と固定網）

利点－完全な鳥害防止が可能。

欠点－日照量、風、気温分布等の自然環境にかなりの影響を与え、正確な試験結果が得られない。

－網の中をトラクタが走行する高さが必要なので相当大きな骨組が必要となとる。

－支柱が自由なトラクタ走行を妨げる。

－ゲートが必要となる。

－鋼製骨組は塗装が必要で、維持管理が面倒かつ高価となる。

－金属制の網は錆やすく、数年に一度取り替えが必要である。（市場には鳥小屋用金網が出回っているが、それ以上丈夫な金網は調達が見込めない。仮にあっても、日照等の影響が大きすぎて使用できない。）

(4)採用案

以上より一般にはa案を採用するが、栽培試験圃の一部のみc案を採用する。

A-2　経済比較

(1)　a案（人夫雇用案）

建設費：無し

年経費：N 6,000

年経費内訳

項　目	単　位	数　量	単価（N）	金額（N）
人　夫	人・日	500	10	5,000
道具等	－	－	1式	1,000
計				6,000

(2)　C案（固定支柱、可搬網案）

建設費：N23,000

年経費：N16,000

C案　建設費内訳

項目	単位	数量	単価	金額
掘削	m^3	30	10	300
埋戻	m^3	25	10	250
コンクリート	m^3	5.6	450	2,520
型枠	m2	56	20	1,120
鉄筋	kg	287	4	1,148
鋼材	kg	8	7	56
針金	kg	57	7	399
網	m2	1,000	15	15,000
塗装	m2	1	14	14
コンクリートブロック	nos.	60	2	120
清掃、その他	L.S.	-	-	2,073
計				23,000

年経費内訳

項目	単位	数量	単価	金額
針金	kg	30	7	210
網	m2	1,000	15	15,000
コンクリートブロック	nos.	30	2	60
塗装	m2	1	14	14
網とりはずし、その他	L.S.	-	-	716
計				16,000

(3) d案（固定支柱・固定網案）

建設費　N190,000

年経費　N 21,000

建設費内訳

項目	単位	数量	単価	金額
掘削	m^3	54	10	540
埋戻	m^3	30	10	300
コンクリート	m^3	25.8	450	11,610
型枠	m2	72	20	1,440
鉄筋	kg	2,400	4	9,600
鉄骨	kg	17,500	7	122,500
金網	m2	1,140	15	17,100
塗装	m2	700	14	9,800
足場、その他	L.S.	-	-	17,110
計				190,000

年経費内訳

項目	単位	数量	単価	金額
金網	m2	570	7	8,550
塗装	m2	700	14	9,800
網とりはずし、足場その他	L.S.	-	-	2,650
計				21,000

A.3　C案の設計

C案は、支柱と支柱間に渡される番線を固定施設とし、防鳥必要時に魚網等をかける方式である。

(1) 支柱材料

固定支柱は、経済性と維持管理面を考慮し鉄筋コンクリート製とする。鉄筋コンクリート支柱と鋼管支柱のコスト比較は次表のとおりである。維持管理については、鋼管の方が錆止め塗装労力がかかるので、コンクリート製が有利である。

鉄筋コンクリート支柱

	単位	数量	単価	金額
コンクリート（支柱）	m^3	0.032	450	14
〃　（基礎）	〃	0.140	450	63
型　枠（支柱）	m2	0.97	30	29
〃　（基礎）	〃	1.28	30	38
鉄　筋	kg	14	4	56
鋼　板　等	式	1	-	12
計				N210

鋼管支柱

	単位	数量	単価	金額
鋼管100mm　（支柱）	m	3.15	50	157
コンクリート（基礎）	m^3	0.108	450	48
型　枠（〃　）	m2	0.72	30	21
鋼　板　等	式	1	-	14
計				N240

(2) 支柱高さ

トラクタのマフラー先端高さは、2.3m弱であるので、支柱高さを田面より2.5mとし、トラクタ走行時の田面から番線までの高さを2.45m 以上とする。（番線のたるみはトラクタ走行時５cm以内とする。）

(3) 支柱の配置

短辺方向の支柱スパンは、トラクタの走向性を考慮して支柱基礎間隔１０ｍとする。長辺方向のスパンは網の取付と番線にかかる単位長さ当り荷重を考慮して５m とする。

(4) 番線のたるみ

$$D = \frac{W \cdot S^2}{8 \cdot T}$$

D：たるみ(m) 、網をかけない時0.05m以下、網をかける時0.2m以下とする。

W：番線にかかる重量(kg/m)、0.6kg/m(網かけ時) 、0.16kg/m(網無し時) とする。

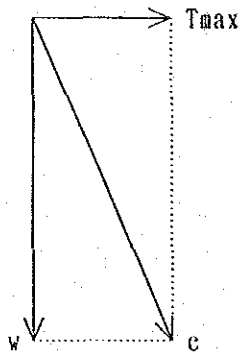
S：スパン(m) 、10m

T：引張荷重(kg ・f)、50kgfとする。

網なし時 $D = \frac{0.16 \times 11.0^2}{8 \times 50} = 0.048\text{m} < 0.05\text{m}$ ∴ＯＫ

網かけ時 $D = \frac{0.6 \times 11.0^2}{8 \times 50} = 0.18\text{m} < 0.2\text{m}$ ∴ＯＫ

(5) アンカー



アンカー重量は普通時330kg で、浮力がかかる場合210kg である。（図. 13より）。隅部分は縦、横の番線の合力がTmaxとなる。

Tmax=50 ×√2=71 kgf

番線の傾きは3.0:1.4 であるから、

W=71×3.0/1.4 =152kgf ＜210　　∴ＯＫ（Ｃ＝168kgf)

隅以外の部分は、番線の傾きが 1:1/3であるから

W=T ×3=50×3=150kgf＜210　∴ＯＫ(C=158kgf)

付属書B　水理計算

B.1　水理計算

既設水路部分は、上下流境界の条件を満たしできるだけ土工量が小さくなるよう設計する。新設用水路は最も条件の不利な小耕区に配水できるよう設計する。等流計算はマニング式を用いる。

$$Q = A \cdot V$$

$$V = \frac{1}{n} \cdot R^{2/3} \cdot I^{1/2}$$

Q：流量(m3/s)

V：流速(m/s)

A：通水断面(m2)

n：粗度係数、コンクリート0.016,土水路0.033

R：径深（m）

I：水面勾配

水理計算は摩擦損失とその他の損失について行われ、結果は次表に示すとおりである。

Hydraulic Dimensions

Canal Name and Location	Reduced Distance	Distance	Original Level	Proposed Canal Bed Level	Flow Depth	Water Surface Level	Head Loss	Discharge	Flow Velocity	Remarks
	m	m	m	m	m	m	m	l/s	m/s	
IC-1 (TC-W7-1)						(38.38)				
BP (DB-1-1)	0.00	0.00	37.90	37.90	0.20	38.10	(0.28)		1.05	
DB-1-2	58.00	58.00	37.60	37.60	0.22	37.82	0.28	105	0.92	
BP OF IC-2 (DB-1-3)	126.25	68.25	37.41	37.45	0.30	37.75	0.07	105	0.58	
EP	134.65	8.40	37.40	37.40	0.32	37.72	0.03	105	0.53	
IC-2 (DC-W7-1-2)			(37.41)	(37.45)		(37.75)				
BP	0.00	0.00	37.36	37.30	0.10	37.40	(0.35)		0.88	
BP OF IC-3 (DB-2-1)	14.50	14.50	37.16	37.21	0.10	37.31	0.11	35	0.88	
BP OF IC-4 (DB-2-2)	63.00	48.50	36.85	36.95	0.10	37.05	0.26	35	0.88	
DB-2-3 (Existing)	117.00	54.00	36.52	36.50	0.12	36.62	0.43	35	0.69	
DB-2-4	166.50	49.50	36.37	36.30	0.12	36.42	0.20	35	0.69	
DB-2-5	216.50	50.00	36.05	36.05	0.18	36.23	0.19	35	0.41	
EP	220.00	3.50	36.02	36.02	0.20	36.22	0.01	35	0.35	
IC-3						(37.31)				
BP	0.00	0.00	37.17	37.11	0.14	37.25	(0.06)		0.56	
DB-3-1	3.00	3.00	37.08	37.10	0.14	37.24	0.01	35	0.56	
DB-3-2	26.00	23.00	36.98	37.04	0.14	37.18	0.06	35	0.56	
DB-3-3	49.00	23.00	37.10	36.97	0.14	37.12	0.06	35	0.56	
EP (DB-3-4)	74.00	25.00	37.06	36.91	0.14	37.05	0.07	35	0.56	
IC-4						(37.05)				
BP	0.00	0.00	36.85	36.86	0.14	37.00	(0.05)		0.56	
DB-4-1	3.00	3.00	36.95	36.85	0.14	36.99	0.01	35	0.56	
DB-4-2	26.00	23.00	36.68	36.79	0.14	36.93	0.06	35	0.56	
DB-4-3	49.00	23.00	36.72	36.72	0.14	36.86	0.07	35	0.56	
EP (DB-4-4)	72.50	23.50	36.81	36.66	0.14	36.80	0.06	35	0.56	

B.2 Water Tank Capacity

Let basic water consumption be 200 lit/man.day,
then 200 x 5 man = 1,000 Lit/day

Elevated water tank : 2 times/day
1,000/2 = 500 lit = 0.5 m^3

Underground water storage tank : for 5 days
1,000 x 5 = 5,000 lit = 5.0 m^3

B.3 Electric Power Supply

	Item	No.	Capacity (W)
1.	Field Managing House		
(1)	FL 400W x 1	9	360
	FL 40W x 2	4	320
	IL 40W	1	40
	Fan 20W	2	40
(2)	Outlet	7	-
(3)	Air Conditioner	1	500
	Lift Pump	1	400
2.	Guard House		
	FL 40W x 1	1	40
3.	Generator House		
	FL 40W x 1	1	40
4.	Outdoor		
	Mercury Vapour Light	3	750

付属書C　雨量資料

RAINFALL RECORD OF 1984 (UMUMBO)

Unit : mm

DAY	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.
1							21.5		8.6			
2						53.4	1.2	5.6				
3							46.8		80.9			
4							19.2		15.6			
5					55.2		0.5		4,2	10.3	9.9	
6				42.9				17.3				
7						29.2	7.6					
8				39.3						4.3		
9						26.6		1.4	8.6			
10					16.0							
11						44.9	14.4		15.3	39.8		
12								30.3		14.2	0.4	
13				4.2			4.0	9.1	24.0			
14					12.7	26.7	9.4					
15			3.3	1.7						15.2		
16					15.8		22.0	45.8	13.9	1.0		
17							24.3	5.0				
18				4.2	60.1	2.5	7.5	12.1		5.0		
19				27.6		35.4			1.0			
20						1.2	30.4		8.3			
21						10.7				6.4		
22			2.8			30.2			14.4	2.0		
23						24.1	7.9	12.0				
24												
25						14.2		69.5				
26					17.2		76.9	0.8	140.2			
27			44.7	2.7					6.6			
28				12.3	13.2	24.5				1.2		
29		X		2.5			41.8	10.9				
30		X		5.4	7.6			50.0	69.0			
31		X		X		X		16.8	X		X	
Total	0.0	0.0	50.8	142.8	197,8	323.6	335.4	286.6	410.6	99.4	10.3	0.0
Days	0	0	3	10	8	13	16	14	14	10	2	0

Annual Rainfall　　1,857.3 mm

RAINFALL RECORD OF 1985 (UMUMBO)

Unit : mm

DAY	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.
1					3.6	27.0				23.2		
2				21.9			16.0		42.4			
3					1.8		5.8	46.3	0.5	25.8		
4				1.7					13.7	13.7		
5				1.1		28.4	2.6	20.7	9.6			
6							41.5	57.9	15.8			
7					1.2		1.1	40.4				
8									13.3	9.2		
9			1.6		11.4				1.9	1.8		
10				18.5			23.7		0.7			
11							21.0	1.5	1.2	29.8	3.5	
12	6.6		20.3			14.7	1.2	5.8	22.6			
13					16.0		4.4					
14						33.9	4.3	3.7	2.0	2.7		
15	7.6						4.2	16.9		8.1		
16								12.2		9.4		
17			42.8		17.8	24.9	85.1		1.6			
18						5.6	9.6	28.0	1.5			
19				69.3	12.9	15.9	2.7		1.3	5.5		
20					13.2		1.8	11.4	5.4			
21			7.7		16.9	0.2	19.0	0.5	0.8		2.5	
22					41.4			9.8				
23								2.5				
24					12.5							
25			3.2	11.6		1.4		5.0	4.0			
26					11.4	6.6			15.6			
27			90.9					2.3	4.5			
28					1.4			1.2				
29		X						4.7				
30		X				29.0	8.8	34.9		4.6		
31		X	14.7	X		X		3.9	X		X	
Total	14.2	0.0	181.2	124.1	161.5	187.6	252.8	309.6	158.4	133.8	6.0	0.0
Days	2	0	7	6	9	11	17	20	19	11	2	0

Annual Rainfall 1,529.2 mm

RAINFALL RECORD OF 1986 (UMUMBO)

Unit : mm

DAY	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.
1						5.7	0.8		9.5	40.6		
2				11.2	13.1							
3							1.0	16.2	8.0			
4							11.5	15.9	4.7	38.6	40.4	
5						36.6		8.8	64.5	31.8	39.8	
6							2.5	7.3				
7			0.7			19.0						
8							6.4		11.4			
9				5.7	16.0	35.0			79.6			
10				32.8	18.0	33.0	37.2					
11			5.3		25.7				11.1			
12							24.8	2.5	13.1			
13	3.4					31.8			60.7			
14						7.6	10.0		9.0			
15				1.4			40.4					
16								3.0		23.9		
17						1.6				15.9		
18					31.0				10.3	3.2		
19						3.2		3.2				
20			10.1		15.9	31.8	15.0					
21									4.0			
22					18.1		82.8			39.8		
23			25.7						2.2			
24			7.3						11.2			
25				5.0				17.5		8.0		
26			9.1							31.8		
27					10.7		21.5	5.6	6.4			
28				29.0						31.2		
29		X							22.3			
30		X						21.2				
31		X	15.7	X		X		42.4	X		X	
Total	3.4	0.0	73.9	85.1	148.5	205.3	253.9	143.6	328.0	264.8	80.2	0.0
Days	1	0	7	6	8	10	12	11	16	10	2	0

Annual Rainfall 1,586.7 mm

RAINFALL RECORD OF 1987 (UMUMBO)

Unit : mm

DAY	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.
1						3.2				39.8		
2		0.3					24.0	41.0		11.8		
3					1.6		32.0			12.1		
4				1.6					22.3			
5							40.0		47.7	41.4		
6									15.9	47.7		
7												
8									23.8			
9								73.2		47.7		
10							64.0	63.7				
11									15.9	31.8		
12												
13												
14							24.0	15.9				
15						2.3			12.7			
16						1.6				16.7		
17					5.6							
18					1.6			23.9				
19												
20									15.9			
21	1.2		5.6			3.2						
22												
23						2.4	24.0					
24												
25					2.7	4.0		25.5				
26		4.0	1.6				16.0					
27						1.6						
28					7.2	4.0						
29		X					38.0					
30		X						66.8				
31		X		X		X		25.5	X		X	
Total	1.2	4.3	7.2	1.6	18.7	22.3	262.0	335.5	154.2	249.0	0.0	0.0
Days	1	2	2	1	5	8	8	8	7	8	0	0

Annual Rainfall 1,056.0 mm

RAINFALL RECORD OF 1987 (OMOR)

Unit : mm

DAY	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.
1								1.0	14.2	43.5		
2								2.0		19.5		
3								11.5				
4							20.0	1.0	11.0	15.0		
5							39.3		27.0	29.0		
6							13.8	1.0	16.0	16.5		
7								2.0	22.5	10.0		
8							1.3	92.0	12.0	1.5		
9									0.5			
10								9.5				
11							34.0	12.0				
12							15.5					
13							2.0	0.3				
14								5.0	18.0			
15							13.0	1.0	2.0			
16							0.5	2.0		7.0		
17							5.0					
18							0.5	42.5				
19							2.0	11.0				
20												
21								0.5	18.0			
22								3.5	6.5			
23								0.3		0.5		
24							25.0	15.0		17.5		
25								6.5				
26								18.5				
27								6.5				
28								0.5	0.5			
29		X					12.5	4.5				
30		X					21.3	68.0				
31		X		X		X		40.0	X		X	
Total	-	-	-	-	-	-	205.7	357.6	148.2	160.0	0.0	0.0
Days	-	-	-	-	-	-	15	26	12	10	0	0

RAINFALL RECORD OF 1988 (OMOR)

Unit : mm

DAY	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.
1						2.0						
2				1.5	13.2							
3			1.5									
4			4.0									
5				1.2	50.0							
6						2.0						
7				0.2								
8			2.0		1.4	12.0						
9												
10												
11												
12												
13						61.5						
14						1.0						
15												
16						31.0						
17						1.0						
18				4.9	15.6							
19				3.3								
20				1.0		15.0						
21				1.0	7.0							
22				26.9								
23					6.5							
24				1.0		9.0						
25	4.9			0.5	2.5							
26					3.8	25.4						
27				2.5	50.2							
28					9.0							
29		X										
30		X		5.0								
31		X		X	16.6	X						
Total	4.9	0.0	7.5	49.0	175.8	159.9						
Days	1	0	3	12	11	10						

付属書D　地耐力測定結果

DEPTH (cm)	BEARING CAPACITY (t/m2)					
	A	B	C	D	E	F
5	-	-	2.38	-	4.08	-
10	1.36	3.40	6.81	6.13	4.42	4.63
15	2.31	4.08	8.85	5.92	5.10	4.08
20	5.85	5.79	11.57	7.90	9.19	6.94
25	8.84	8.16	12.93	6.81	10.89	12.93
30	9.66	8.71	12.25	7.83	12.59	13.61
35	9.26	10.55	11.57	9.66	14.29	13.61
40	8.98	8.84	-	10.89	-	-
45	-	8.64	-	12.93	-	-
50	-	9.60	-	13.61	-	-
55	-	10.89	-	-	-	-

Note:
1. This survey was made by corn penetrometer in ponding condition on November 19, 1988.
2. Measurement point
   X: distance from farm road NW-106
   Y: distance from southern levee of proposed facility yard plot

Point	A	B	C	D	E	F
X (m)	20	50	50	80	80	80
Y (m)	15	15	30	15	30	45

JICA