

### Guardhouse

Room Clarification	Formula and Basic Data		Floor Area
Guard Room	Watchmen	2 persons $5.5 \text{ m}^2$ $\times 2 = 11.0 \text{ m}^2$	12.0 $\text{m}^2$
Bed Room	For one person	$1.0 \text{ m}^2$	12.0 $\text{m}^2$
Total			24.0 $\text{m}^2$

Note: Design criteria to be adopted to the floor area of each room are as below:

- 1) Manager :  $8.5 \text{ m}^2/\text{person}$
- 2) Clerk :  $7.0 \text{ m}^2/\text{person}$

### 5.2.2 Architectural Basic Design for Storage Facilities

#### (1) Site Planning

The major planning principles for the site plans are as follows:

- 1) Since the proposed construction sites are comparatively long and narrow and access roads face the longer sides of the site, except for Ifwagi site, the proposed godowns will be arranged parallel to the access roads, except for the above mentioned site.
- 2) The storage facilities of Ifwagi site will be arranged by taking into consideration the future plan by the Government of Tanzania to construct agricultural center facilities.
- 3) The space in front of the loading/unloading platform will have enough parking area for 7 tons and/or 10 tons cargo trucks.
- 4) The office buildings will be constructed separately from the godowns and located closely to the main gate of the site as defined by the movement of grains through receiving and delivering.
- 5) Green belts will be provided in front of the loading/unloading platforms to reduce the flow of dust and wind pressure from outside.

(2) Architectural Planning

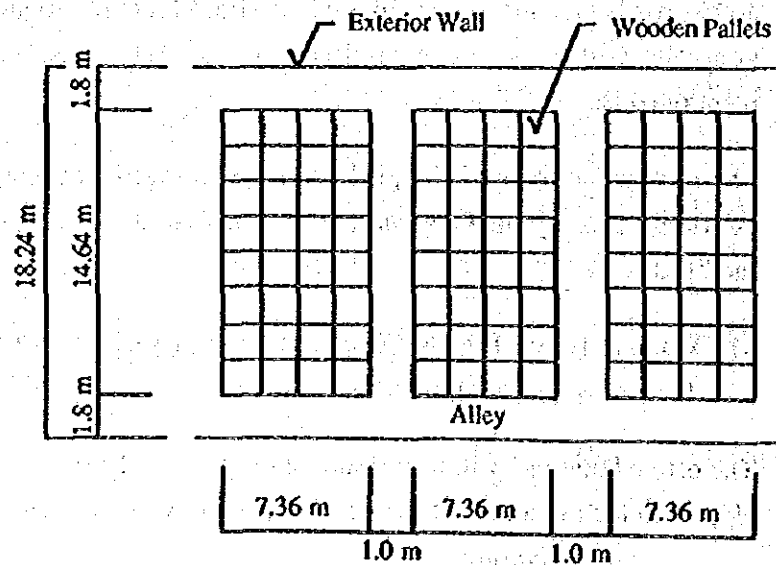
1) Godowns

Plans

The standard unit bond stacking in Tanzania is of 5 bags on a wood dunnage with a size of 6 ft by 6 ft. In planning of godowns, therefore, six feet will be adopted as the basic module.

Spacing of the godowns will be determined by taking into consideration the high efficiency of stacking and dispatching for the function of the transit godown and also conditions of the site areas, especially at Itundu and Matembwe.

This size permits eight (8) wooden pallets plus the necessary 1.8 m alley spaces as shown in the figure below, that is 18.2 m. A basic stacking size is to lay eight (8) pallets by four (4) pallets, i.e. 14.6 m x 7.3 m. With maize bags stacked 22 bags high, each stack (14.6 m x 7.3 m) would contain 3,520 bags (Approximately 316.8 tons).



The size of the godown at each site is shown in the following table.

Site Name	Kilolo	Ifwagi	Matembwe	Itundu
Storage Cap. of Grains (ton)	2,400	1,500	1,900	1,900
Storage Cap. of Fertilizers (ton)	300	200	300	300
Total (ton)	2,700	1,700	2,200	2,200
Godown Size (m)	18.2 x 82.5	18.2 x 52.5	18.2 x 60.0	18.2 x 60.0
Floor Area (m <sup>2</sup> )	1,501.5	955.5	1,092.0	1,092.0

The arrangement of the loading/unloading platforms against the storage is considered from the following typical patterns, the one side type, the both side type and the central type as shown in the table below.

Comparative Item	Pattern		
	One Side Platform Type	Both Side Platform Type	Central Platform Type
	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">           Storage Platform         </div>	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">           Platform Storage Platform         </div>	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">           Storage Platform Storage         </div>
1. Distribution flow	Same direction for receiving and delivery. Short distribution flow.	Different direction for receiving and delivery. Short distribution flow.	Congestion will be occur between receiving and delivery. Long distribution flow.
2. Efficiency of stacking and dispatching	Moderate efficiency	High efficiency	Low efficiency
3. Possibility for future expansion	Possible	Possible	Distribution flow will be longer after expansion.
4. Suitability for site	Suitable	Not suitable	Suitable
Assessment	Very good	Good	Not good

The one side platform type will be applied based on the above result.

- **Section and elevation planning**

The height of eaves is determined at 6.5 m, which includes the height of 22 bags (0.23 m x 22 bags  $\approx$  5.0 m) and working space above the stack (1.5 m). As for the floor level, a raised floor will be adopted to prevent water and dust from entering the floor. The height of the floor will be 90 cm above the ground, the same as the loading/unloading platform.

2) **Office building**

- The rooms accommodated in the building will be aligned so that the staff concerned will be able to look out on the receiving and delivery of goods, and go in and out directly from the outside corridor.
- All rooms are to face outside so as to get sufficient natural light and ventilation.

3) **Guardhouse**

The house will be located nearby the entrance gate. A bed room will be accommodated for the watchman for night shifts.

(3) **Structural Design**

1) **Design concepts**

Steel structures will be adopted for the godowns. The foundations and floor slabs will be of reinforced concrete.

The office buildings and the guardhouses will be constructed with the indigenous construction materials, which is of concrete block walls combined with wooden trusses.

2) **Design criteria**

Design loads for analysis of the structural frame will be in compliance with the statutory requirements of technical guidelines prevailing in Tanzania. Structural calculation other than for load conditions will be based on Japanese standard which is recognized internationally.

Earthquake loads and wind loads are as follows:

- Earthquake loads

$$V_d = K_a \cdot K_s \cdot K_n \cdot K_i \cdot K_f \cdot W_d$$

- where,
- V<sub>d</sub> : the total equivalent static design load
  - K<sub>a</sub> : the design ground acceleration factor given in the seismic risk map of Tanzania (Kilolo and Ifwagi; 0.05, Matembwe and Itundu; 0.07)
  - K<sub>s</sub> : the structural response factor which is equal to  $0.5 T^{1/3}$  where T is the fundamental period (0.12)
  - K<sub>n</sub> : the horizontal force factor (1.3)
  - K<sub>i</sub> : the building importance factor (1.3)
  - K<sub>f</sub> : the foundation factor (1.5)
  - W<sub>d</sub> : the total design load of the structure including service loads

- Wind loads

$$q_d = 0.06 V^2 \text{ (kg/m}^2\text{)}$$

- where,
- q<sub>d</sub> : the static wind load
  - V : velocity of wind
  - 37 m/sec (3 m high)
  - 45 m/sec (10 m high)

3) Design loads

- Dead load

Reinforced concrete	:	2.4 t/m <sup>3</sup>
Structural steel	:	7.85 t/m <sup>3</sup>
Concrete block	:	1.9 t/m <sup>3</sup>
Cement mortar	:	2.0 t/m <sup>3</sup>

- Level load

Roof	:	50 kg/m <sup>2</sup>
Office room	:	200 kg/m <sup>2</sup>
Storage for grains	:	3,000 kg/m <sup>2</sup>
Storage for fertilizers	:	3,500 kg/m <sup>2</sup>

4) Structural materials

Allowable strength and quality of structural materials will be as follows:

- Reinforcing bar : Deformed bar SD30 (JIS) or equivalent
- Concrete : FC 180 kg/cm<sup>2</sup> (28-day strength)
- Cement : Portland cement
- Structural steel : SS41 (JIS) or equivalent

5) Load bearing capacity of subsoil

Judging from the results of the survey by using a cone penetrometer and test pit (Refer ANNEX 3-3), the load bearing capacity of the subsoil is 10 tons/m<sup>2</sup> at from 1.0 m to 1.5 m below ground level.

(4) Finishing Scheme

As a result of the field study of local construction materials and methods, the finishing materials listed in the table below will be utilized in the proposed facilities.

Portions	Building	Local Materials	Proposed Materials	Remarks
Roof	Godown	Galvanized iron sheet or asbestos cement sheet	Polyethylene coated iron sheet	Polyethylene coated iron sheet is durable and maintenance free.
	Office building	Galvanized iron sheet	Polyethylene coated iron sheet	Same as above.
Wall	Godown	Concrete block or galvanized iron sheet	Wainscot: Concrete block (1.5 m high) Wall: Polyethylene coated iron sheet	It may collapse due to earthquake force if concrete blocks are constructed up to eaves height, 6.5 m.
	Office building	Concrete block	Concrete block	The height of eaves is not high, about 3.0 m.
Floor	Godown	Concrete trowel finish	Concrete trowel finish	
	Office building	Cement mortar finish	Cement mortar finish	

**(5) Utilities**

**In view of the present infrastructure condition in and around the sites, i.e. no electric power is supplied by TANESCO and domestic water is only supplied to the Matembwe site, utilities will be planned as follows:**

**1) Lighting system**

**The lighting system for the godowns will be designed to provide the required number of skylights on the roof so as to afford good visibility in the execution of the tasks to be performed within the godowns.**

**When planning, the office buildings will be designed to get sufficient natural lighting for the rooms from the windows.**

**2) Ventilation system**

**A natural ventilation system will be provided for all buildings. The ventilation system of the godowns, which are provided with openings on the walls as air inlets and roof ventilators as air outlets, is utilized to control humidity and radiant heat in the storerooms. In the office buildings and the guardhouses, airing is done through the windows.**

**3) Domestic water supply and drainage system**

**A domestic water supply system will not be provided in the proposed storage facilities in consideration of the present condition of the infrastructure. Accordingly, toilet have to be planned indigenous style with pit latrines which must be located not less than 10 meters from any inhabited room. The Government of Tanzania will undertake construction of the toilets.**

**A drainage system, which will be of concrete ditches, will be provided in the premises and around the buildings so as not to allow standing rainwater in the premises.**

**4) Fire extinguishing system**

**Since no laws and regulations related to fire protection for buildings are established in Tanzania, dry chemical portable fire extinguishers will be provided**

for the godowns. The number of extinguishers is estimated based on the requirements of the Fire Protection Act of Japan.

The following criteria are applied to calculate the required number of extinguishers:

- $\frac{\text{Floor Area (m}^2\text{)}}{100 \text{ m}^2} \leq \text{Total units of fire extinguishers}$
- The maximum distance from any point to the nearest extinguisher is less than 20 meters.

Accordingly, the required number of fire extinguishers for each site is as follows:

Kilolo godown	:	10 units
Ifwagi godown	:	6 units
Matembwe godown	:	8 units
Itundu godown	:	8 units

**(6) Exterior Site Scheme**

The perimeter zone of the premises will be provided with a buffer green zone to reduce the entry of dust from outside and wind pressure. Murrum pavement will be applied to the areas for vehicular access and car parking in consideration of easy repair in future.

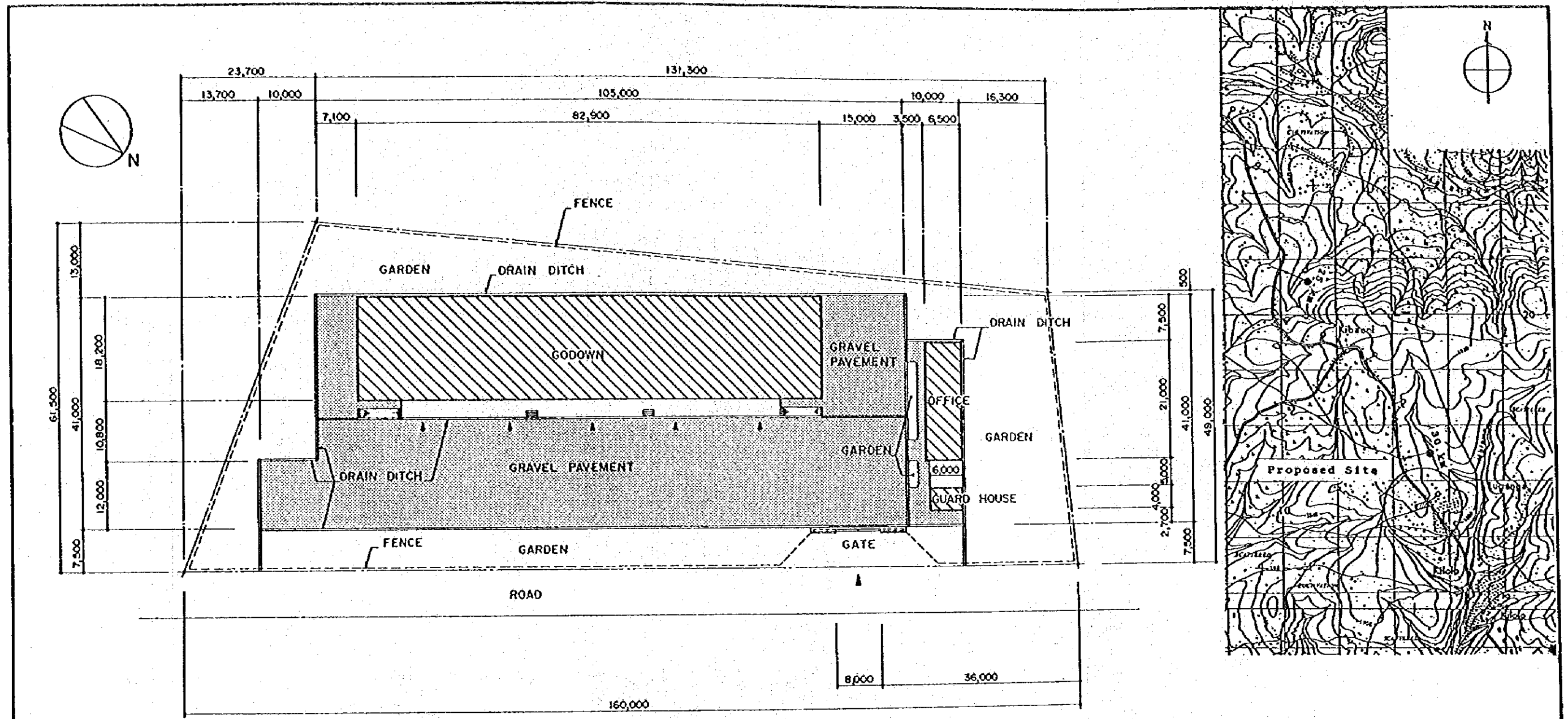
**(7) Basic Design Drawings**

Basic design drawings including site plan, plan, elevation and section are shown in Drawings No. 1 to No. 12.

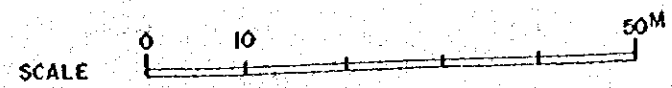


### List of Basic Design Drawings

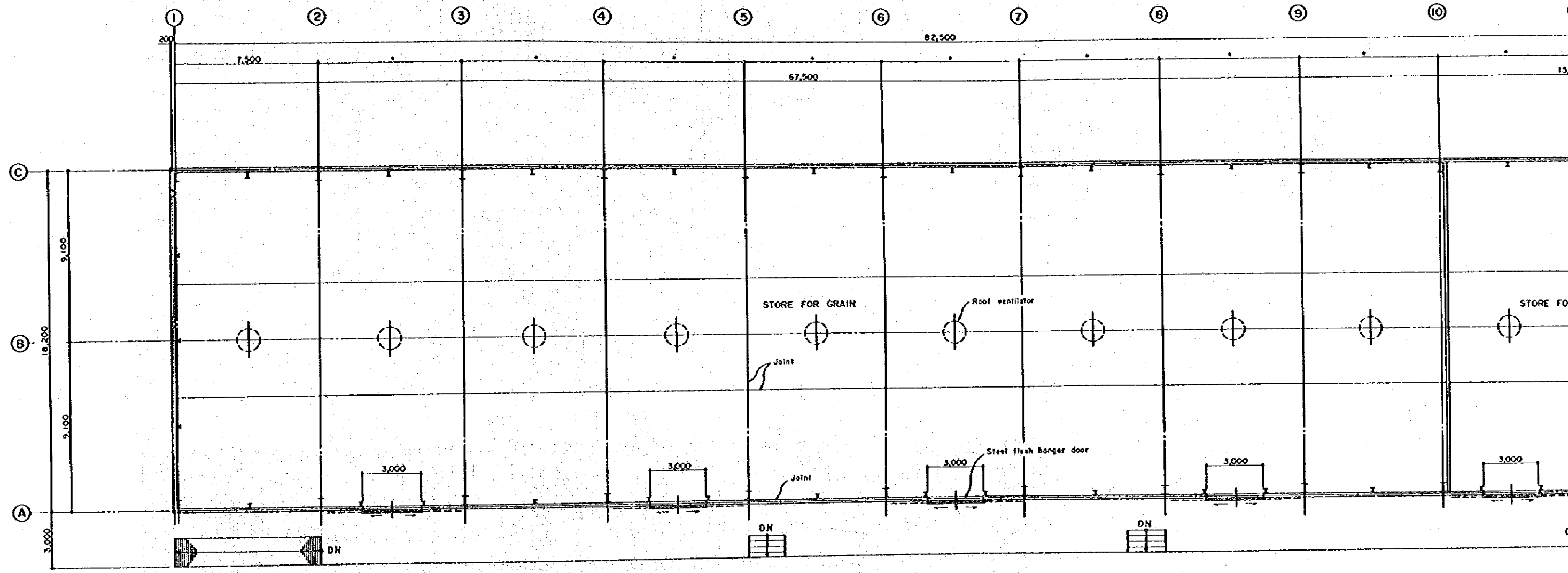
Basic Design Drawing - 1	Kilolo, Site Plan
Basic Design Drawing - 2	Kilolo, Multipurpose Godown, Plan
Basic Design Drawing - 3	Kilolo, Multipurpose Godown, Section & Elevation
Basic Design Drawing - 4	Ifwagi, Site Plan
Basic Design Drawing - 5	Ifwagi, Multipurpose Godown, Plan
Basic Design Drawing - 6	Ifwagi, Multipurpose Godown, Section & Elevation
Basic Design Drawing - 7	Matembwe, Site Plan
Basic Design Drawing - 8	Itundu, Site Plan
Basic Design Drawing - 9	Matembwe & Itundu, Multipurpose Godown, Plan
Basic Design Drawing - 10	Matembwe & Itundu, Multipurpose Godown, Section & Elevation
Basic Design Drawing - 11	Office Building & Guard House, Plan, Section & Elevation
Basic Design Drawing - 12	Exterior & Interior Finish Schedule



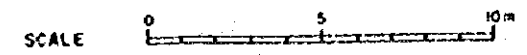
KILOLO SITE PLAN

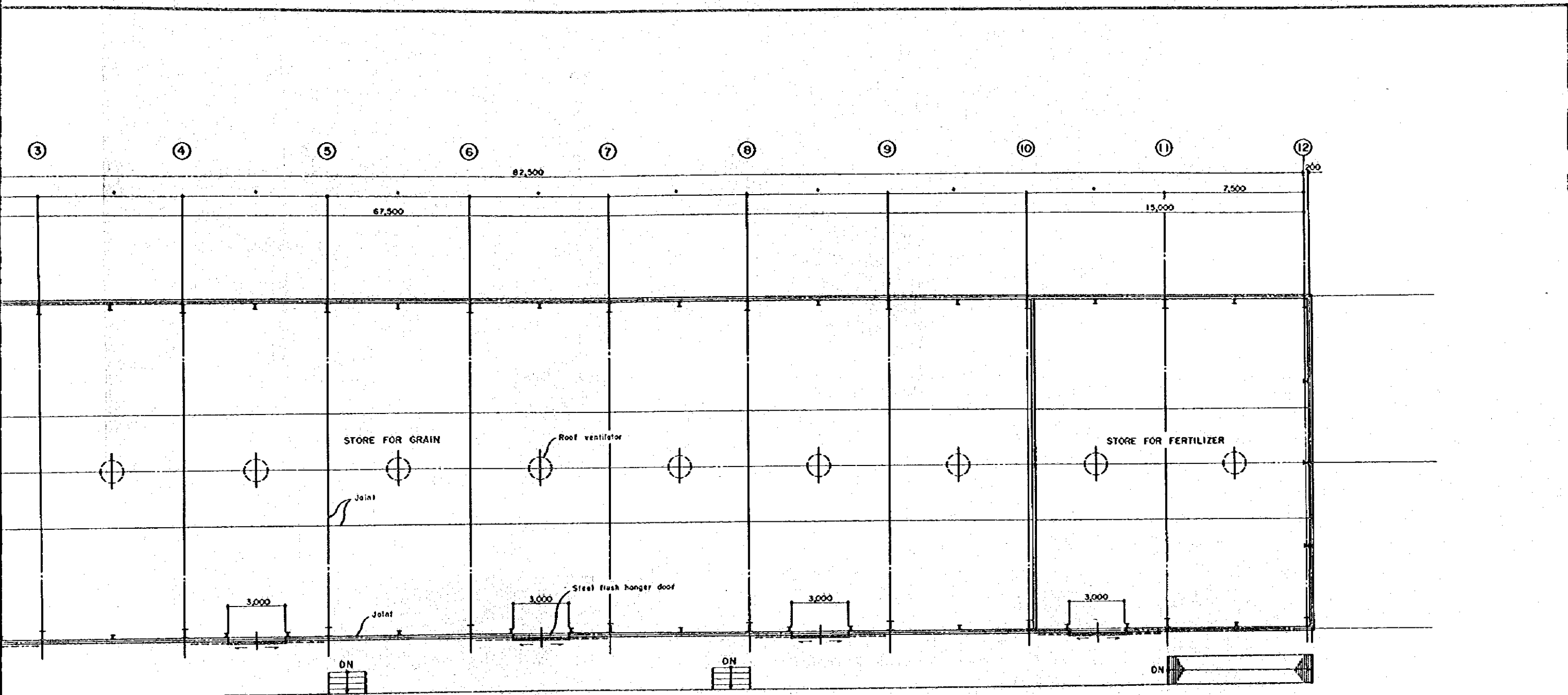


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THE PROJECT FOR IMPROVEMENT OF AGRICULTURAL STORAGE AND TRANSPORTATION SYSTEM IN IRINGA REGION	
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Date	Drawing No
JAPAN INTERNATIONAL COOPERATION AGENCY	

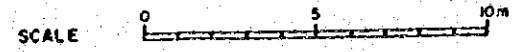


FLOOR PLAN

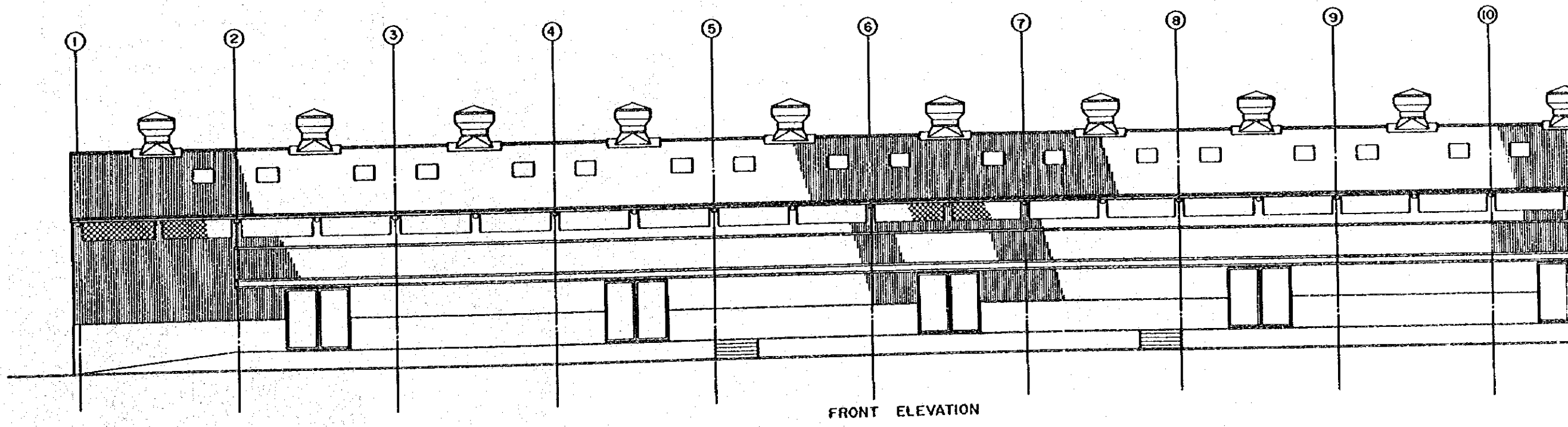
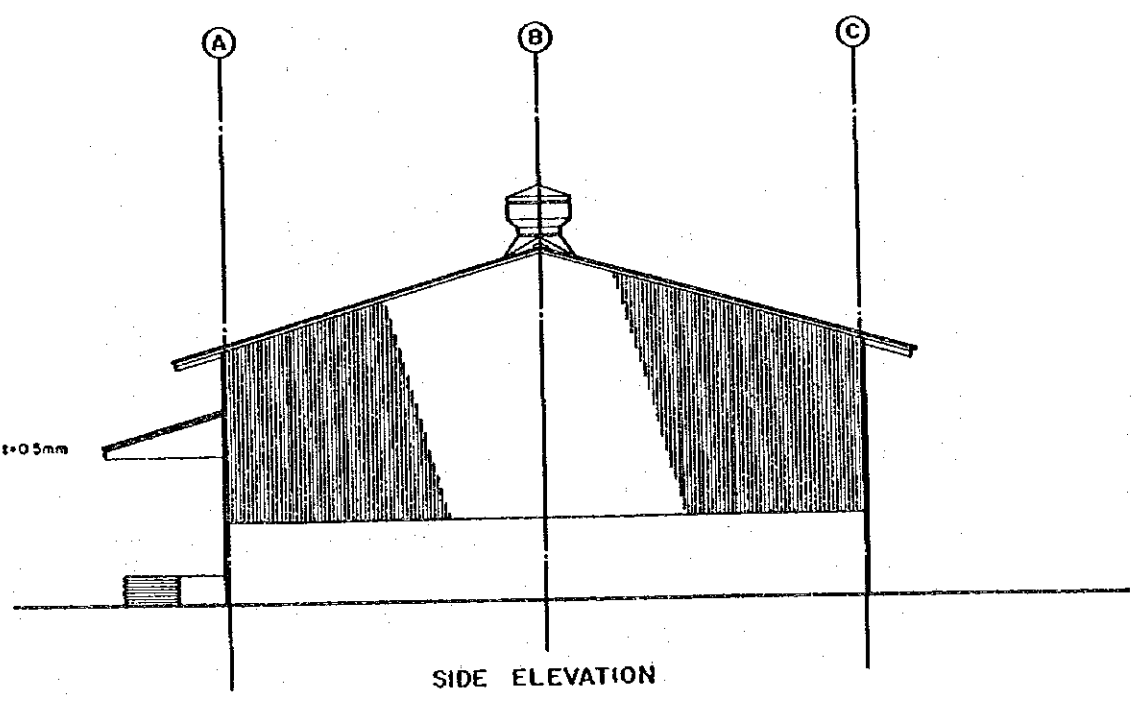
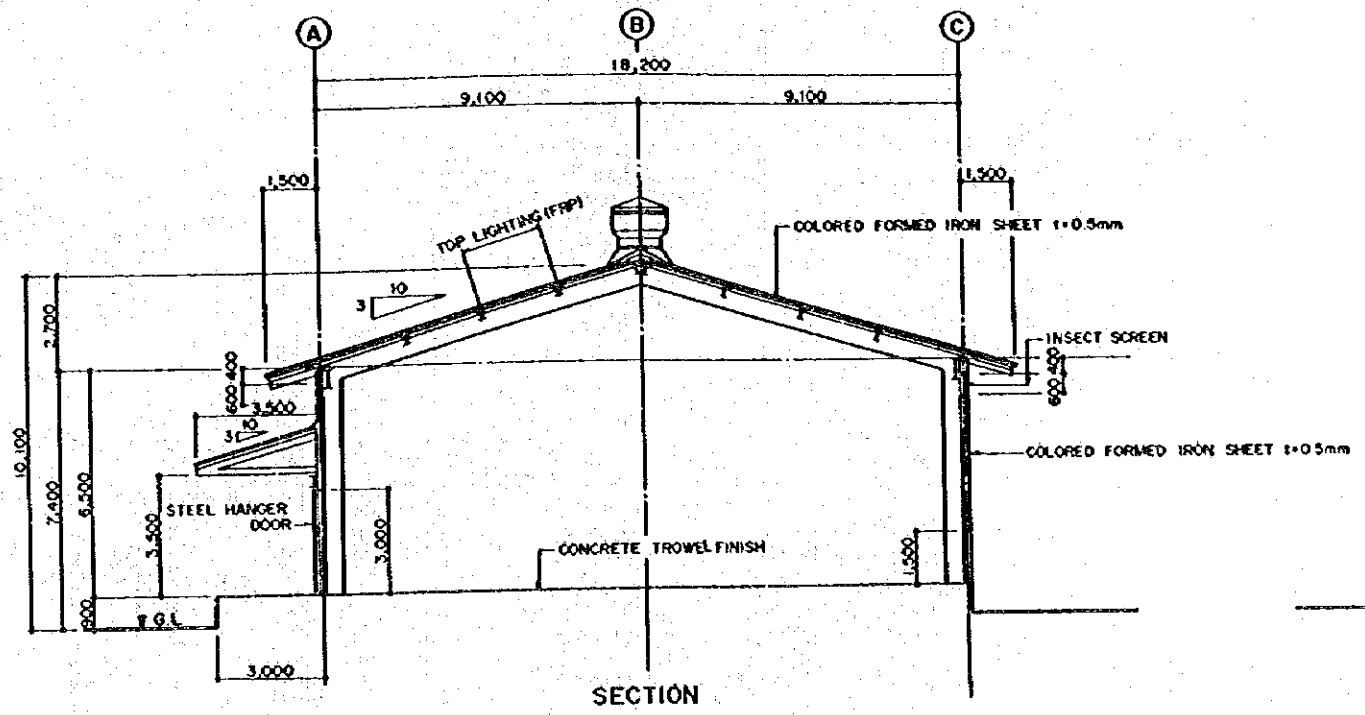




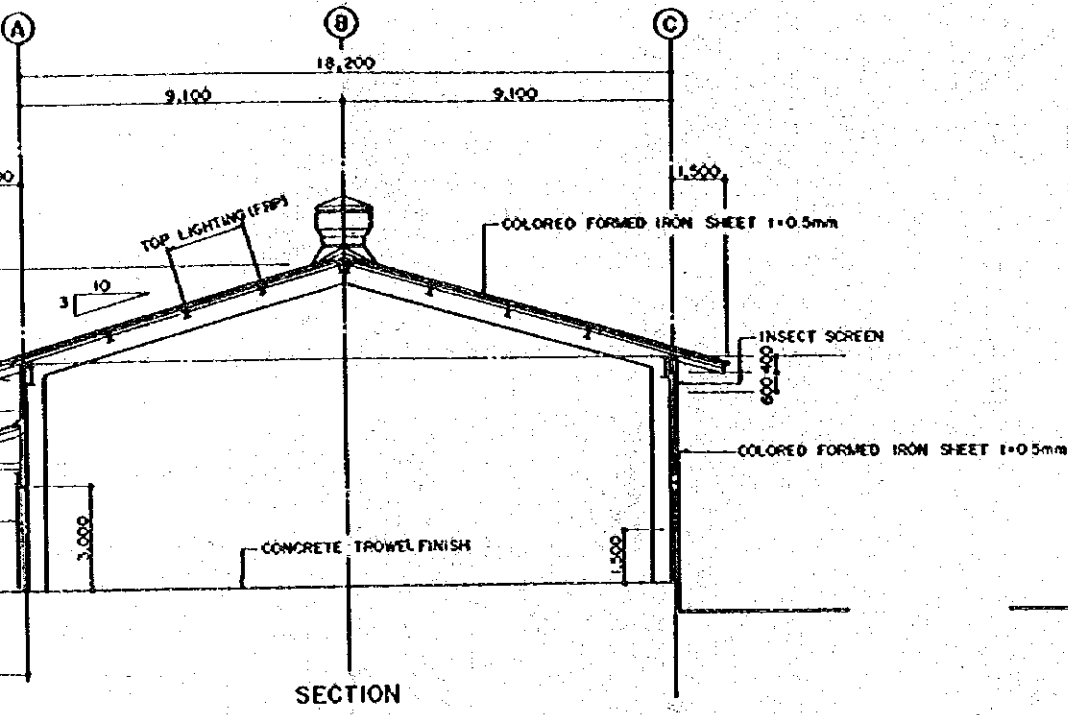
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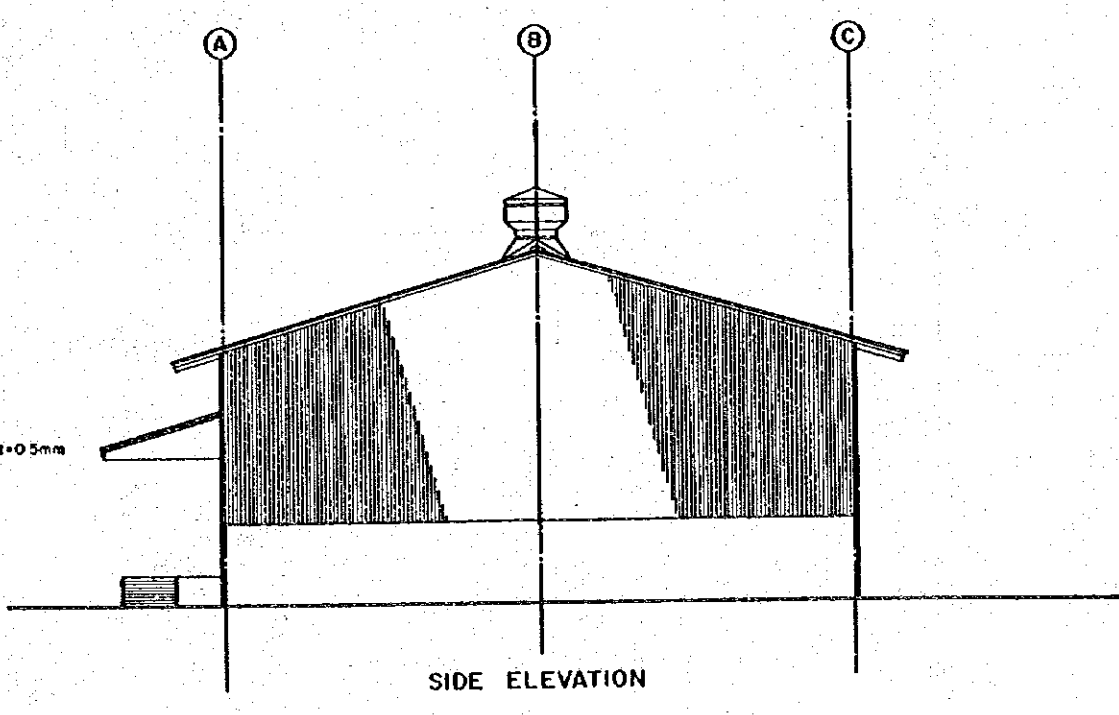
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Date	Drawing No.
JAPAN INTERNATIONAL COOPERATION AGENCY	



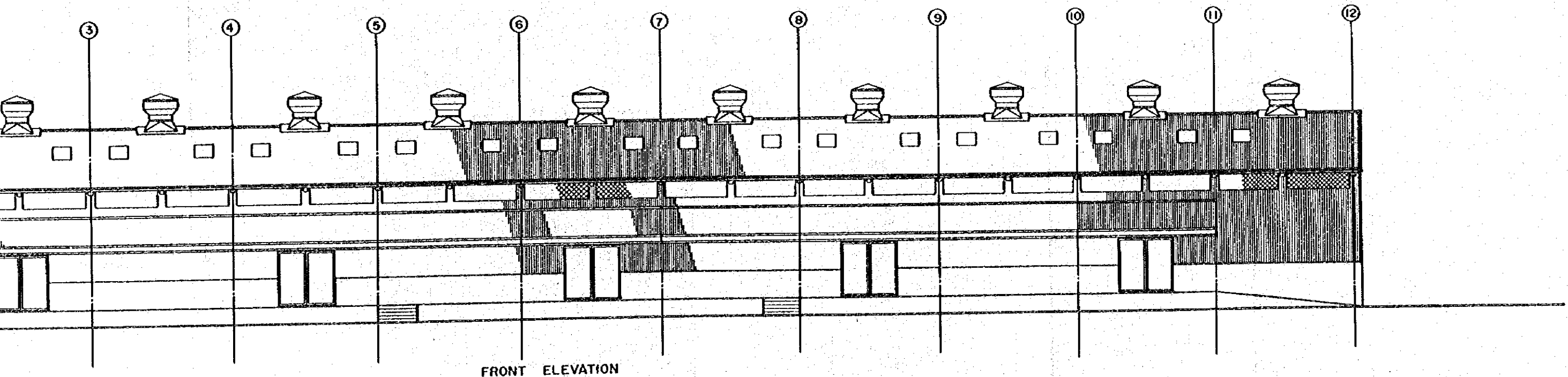
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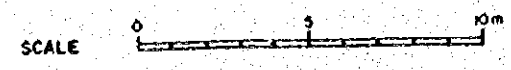
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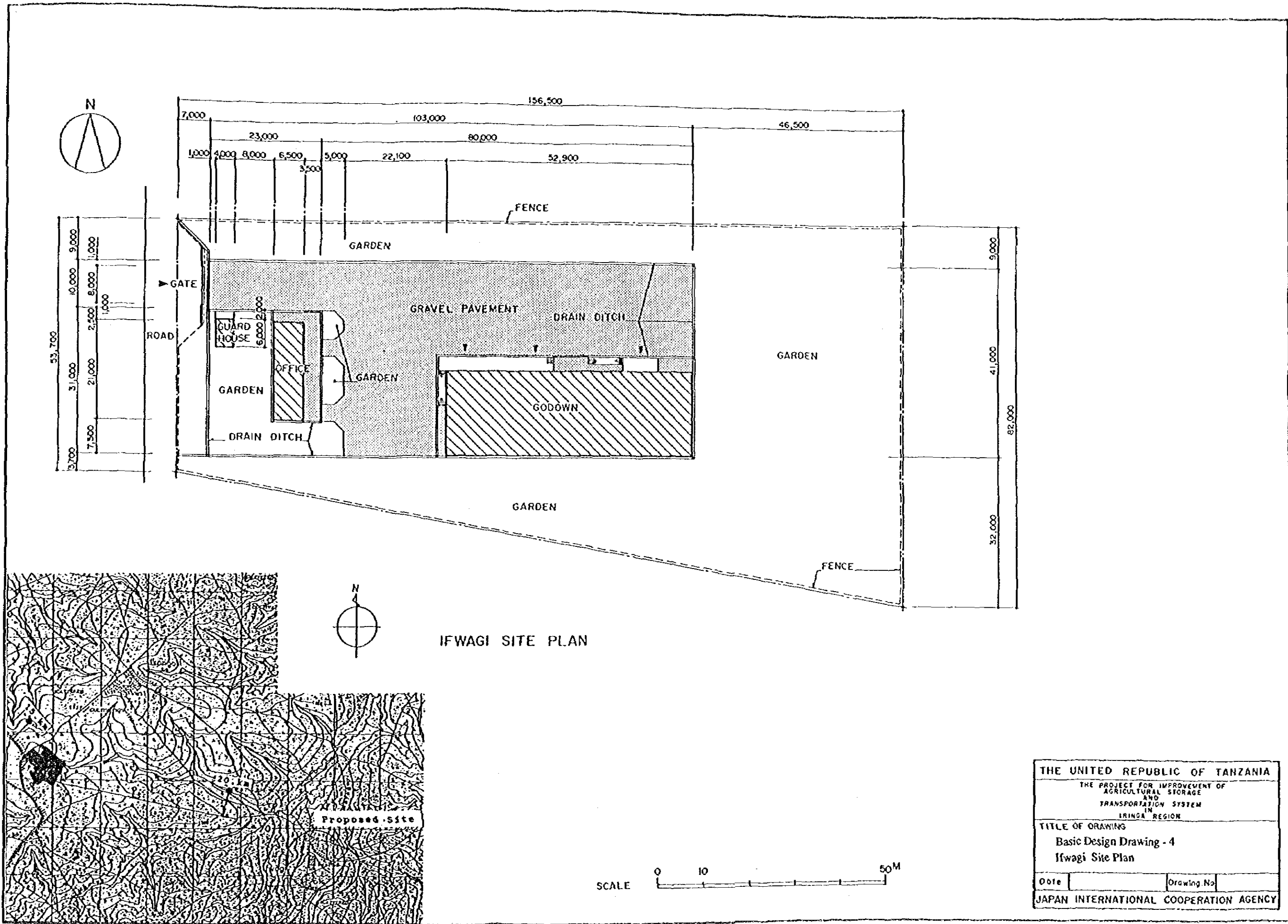
SIDE ELEVATION



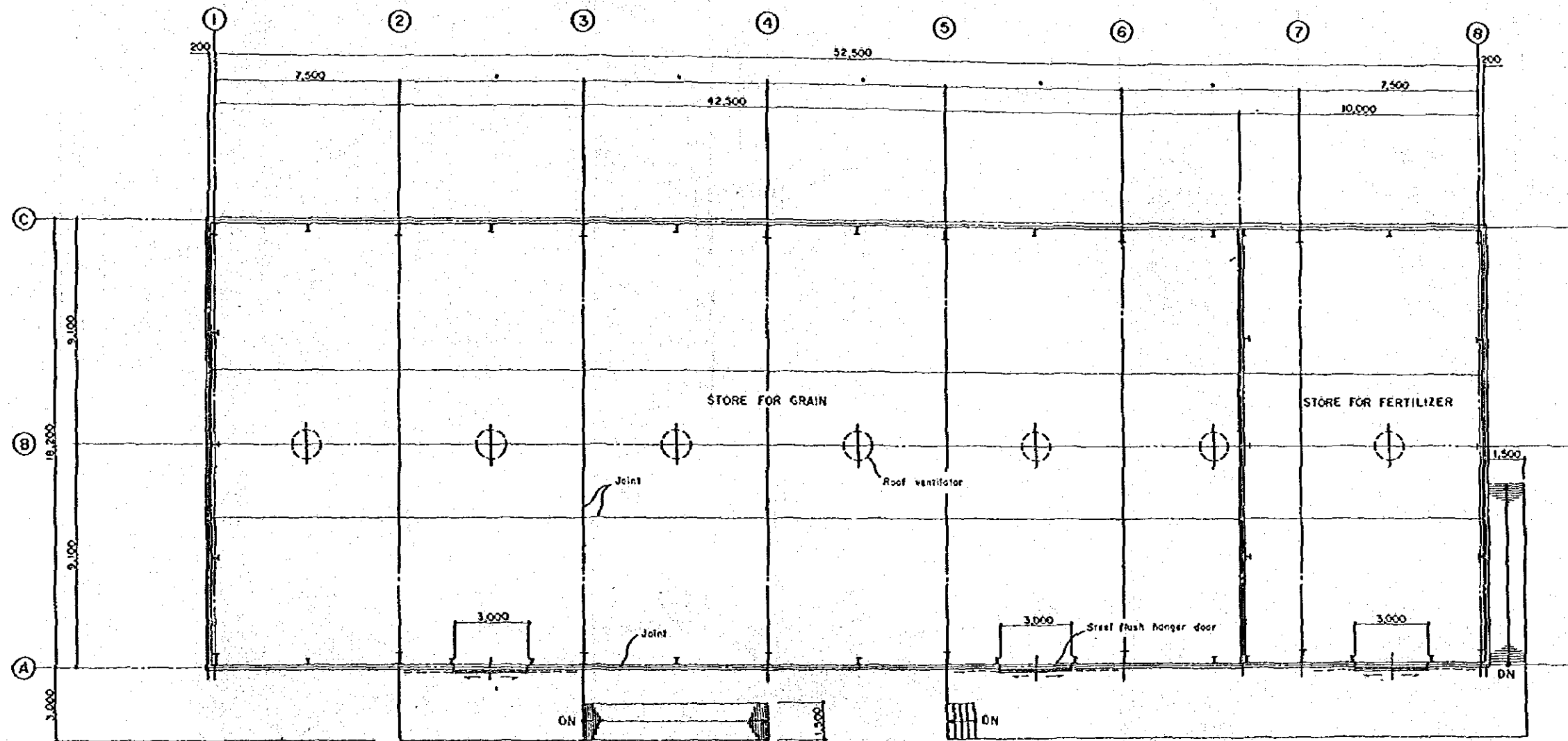
FRONT ELEVATION



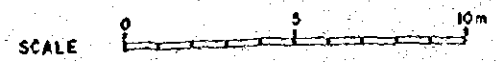
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TITLE OF DRAWING Basic Design Drawing - 3 Kilolo Multipurpose Godown - Section & Elevation	
Date	Drawing No
JAPAN INTERNATIONAL COOPERATION AGENCY	



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Date	Drawing No
JAPAN INTERNATIONAL COOPERATION AGENCY	

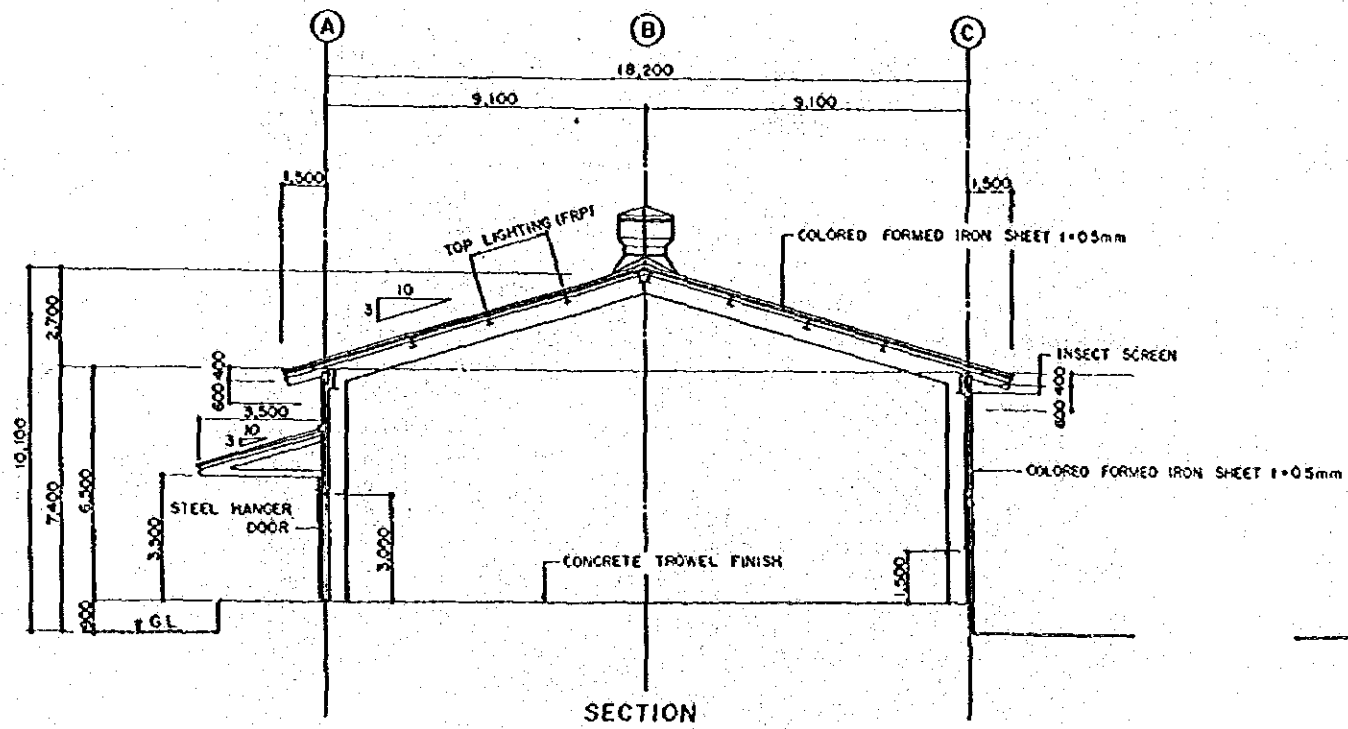


FLOOR PLAN

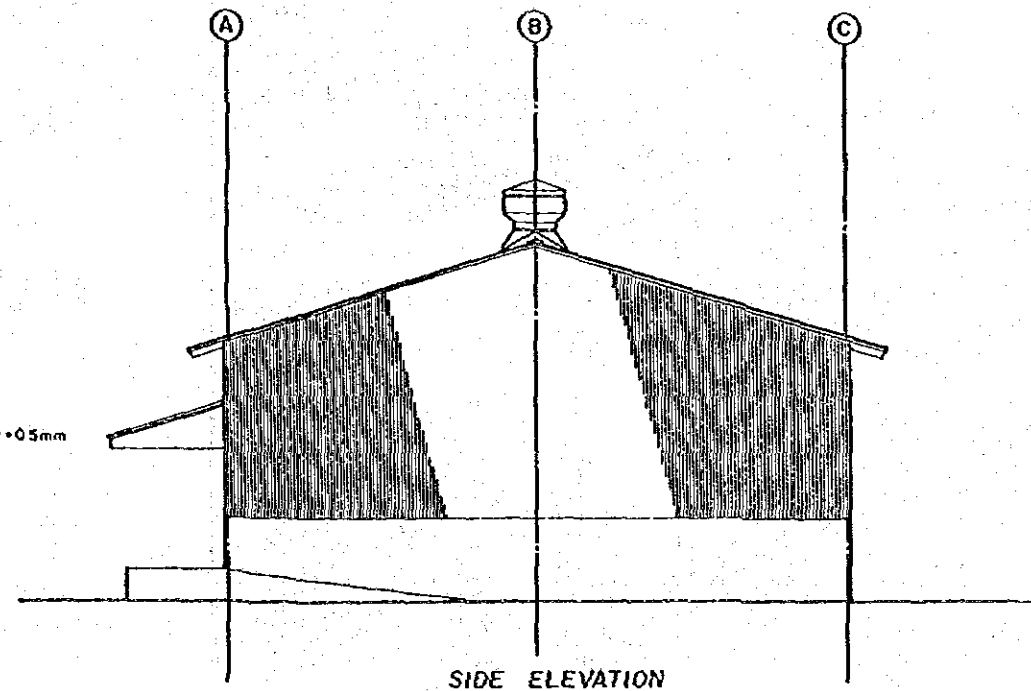


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Basic Design Drawing - 5	
Ifwagi Multipurpose Godown - Plan	
Date	Drawing No
JAPAN INTERNATIONAL COOPERATION AGENCY	

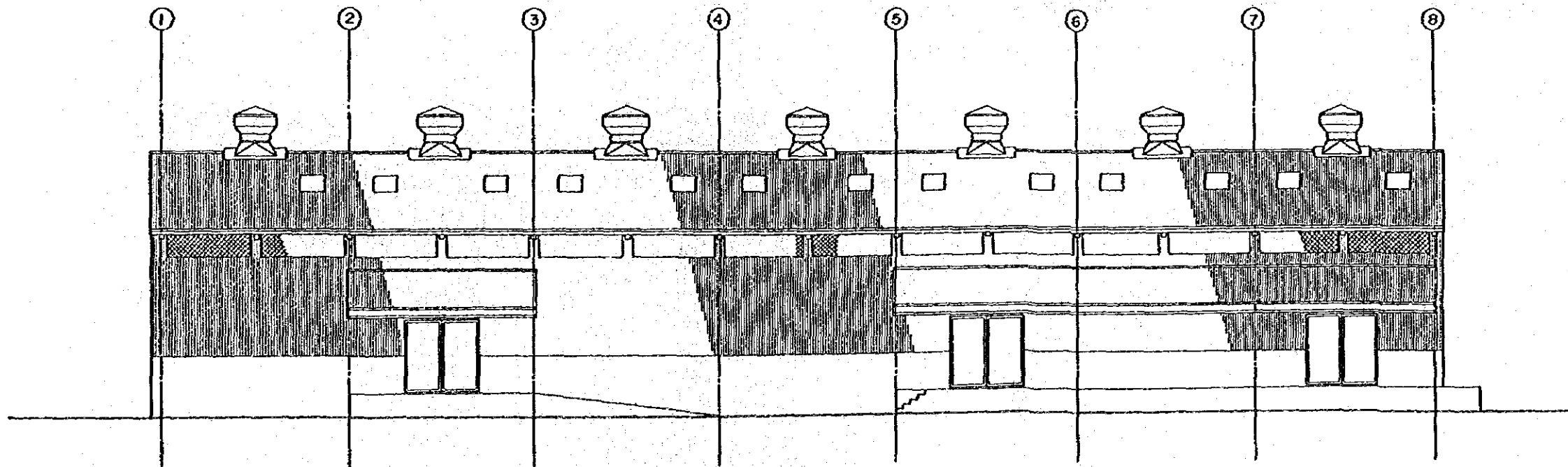




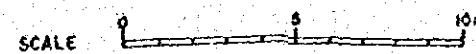
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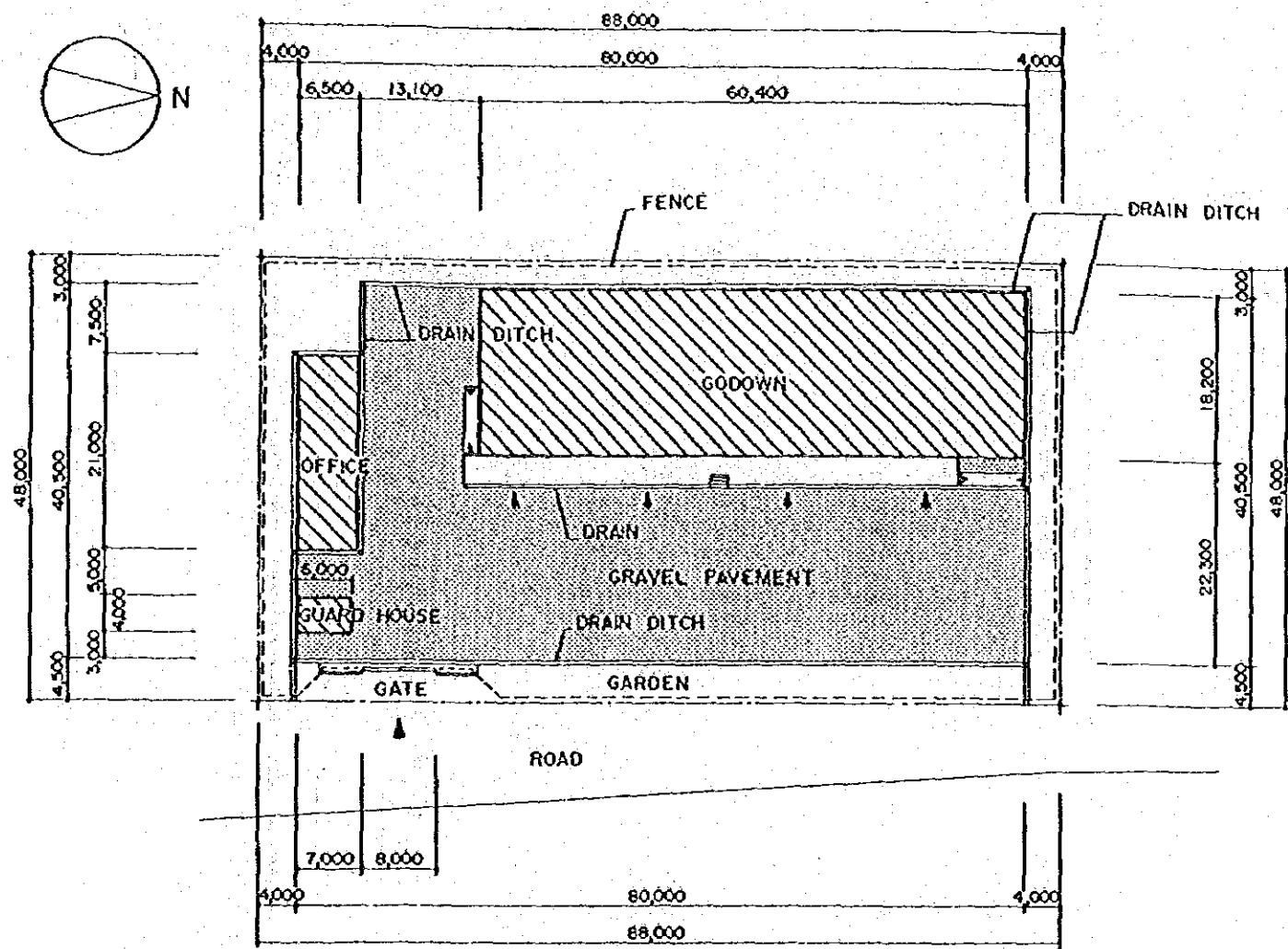
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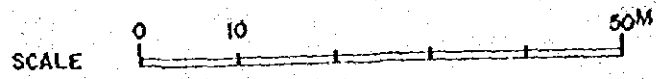
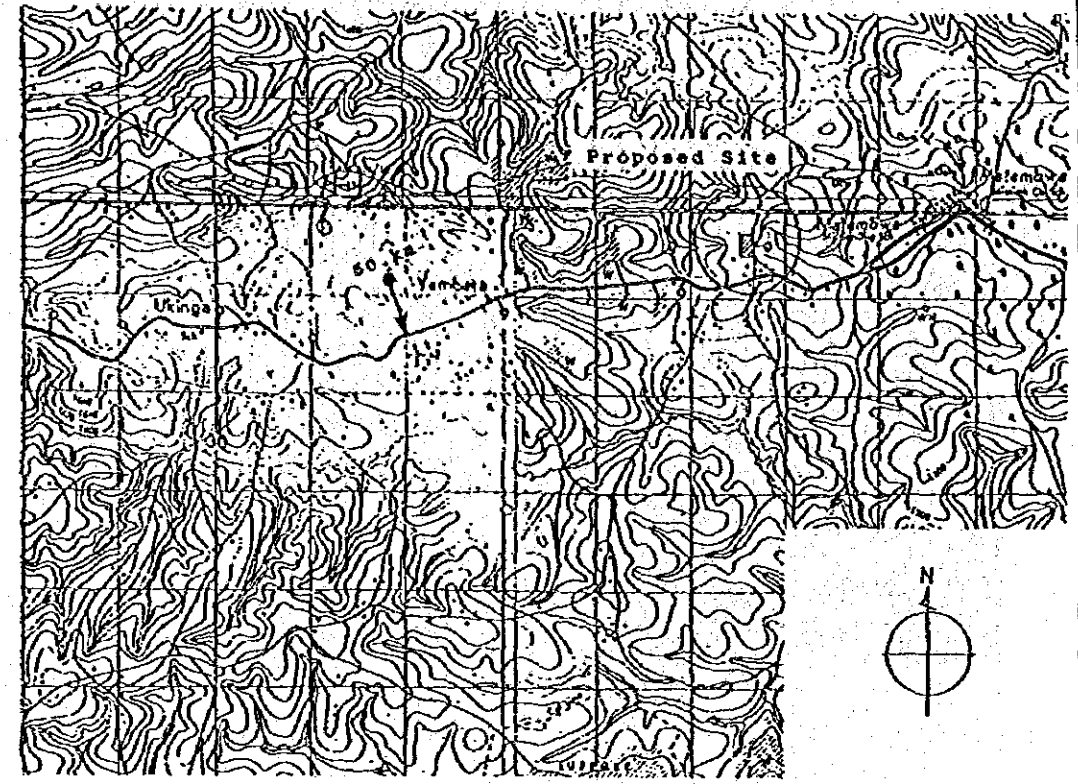
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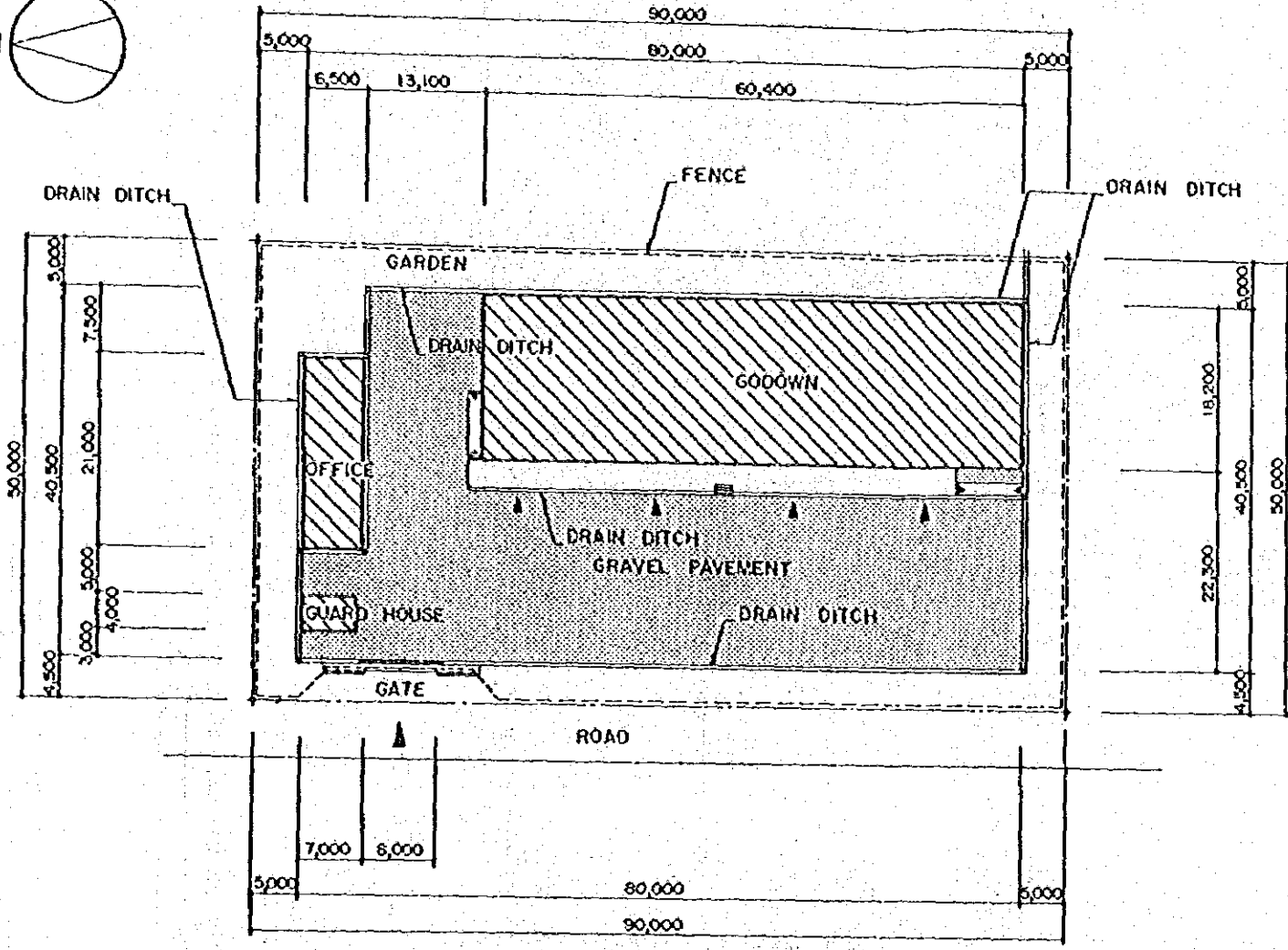
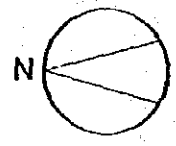
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Date	Drawing No
JAPAN INTERNATIONAL COOPERATION AGENCY	



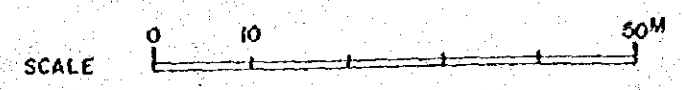
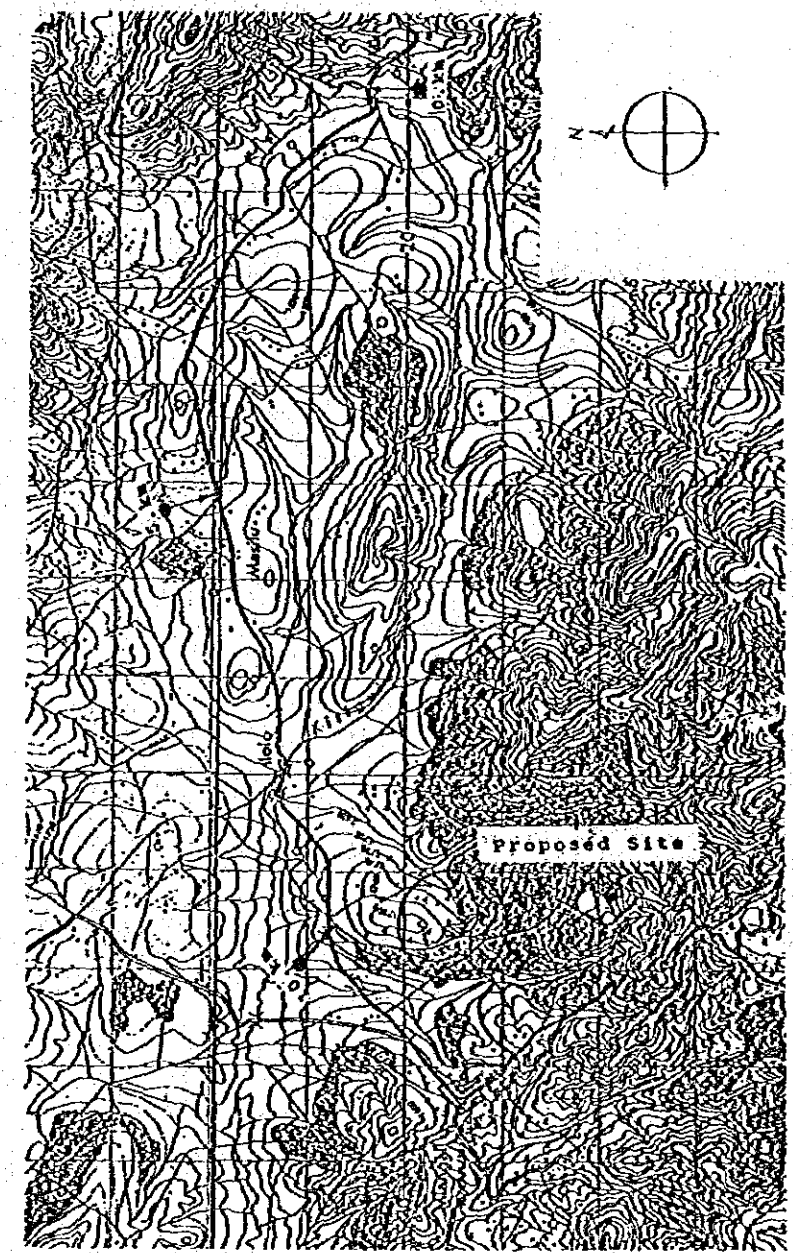
MATEMBWE SITE PLAN



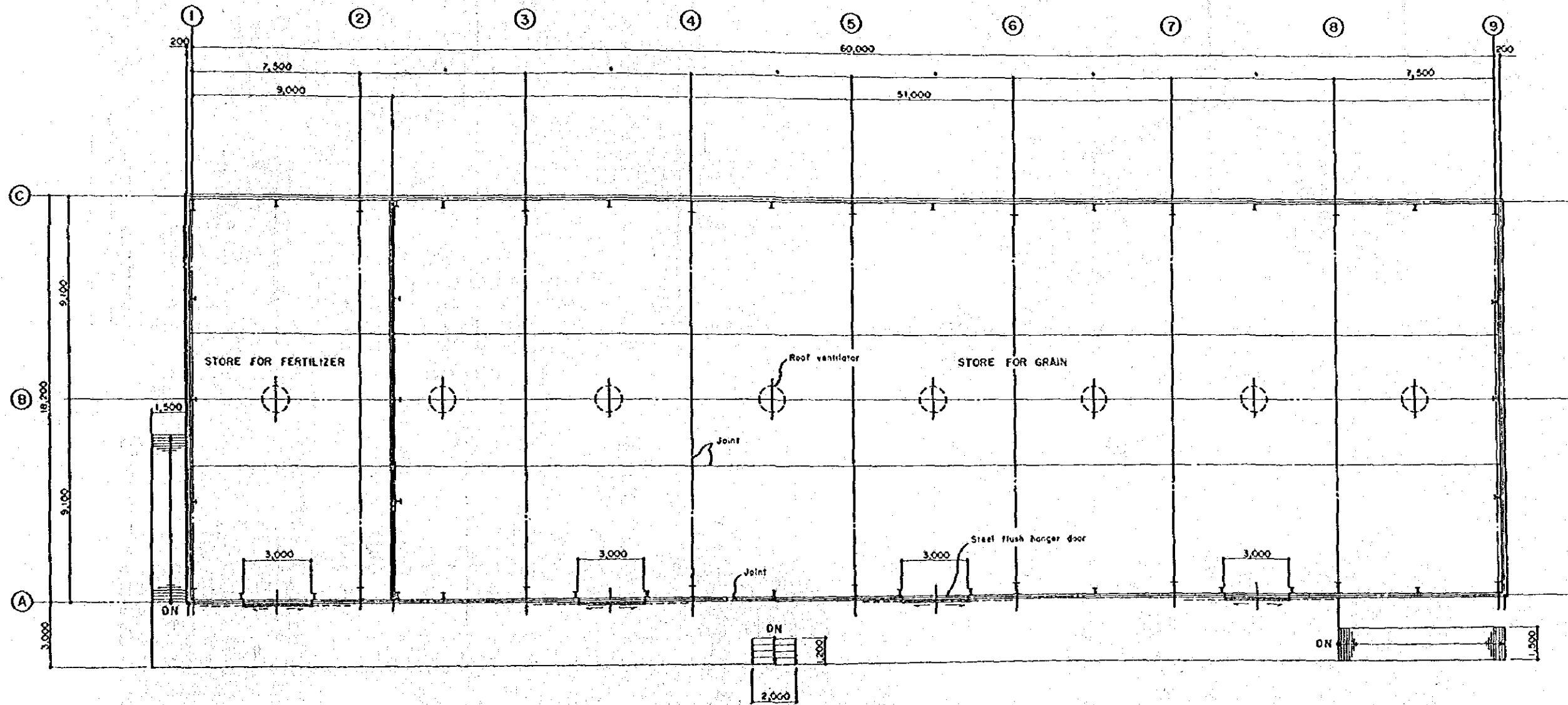
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Date	Drawing No.
JAPAN INTERNATIONAL COOPERATION AGENCY	



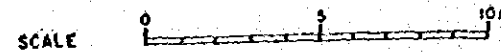
ITUNDU SITE PLAN



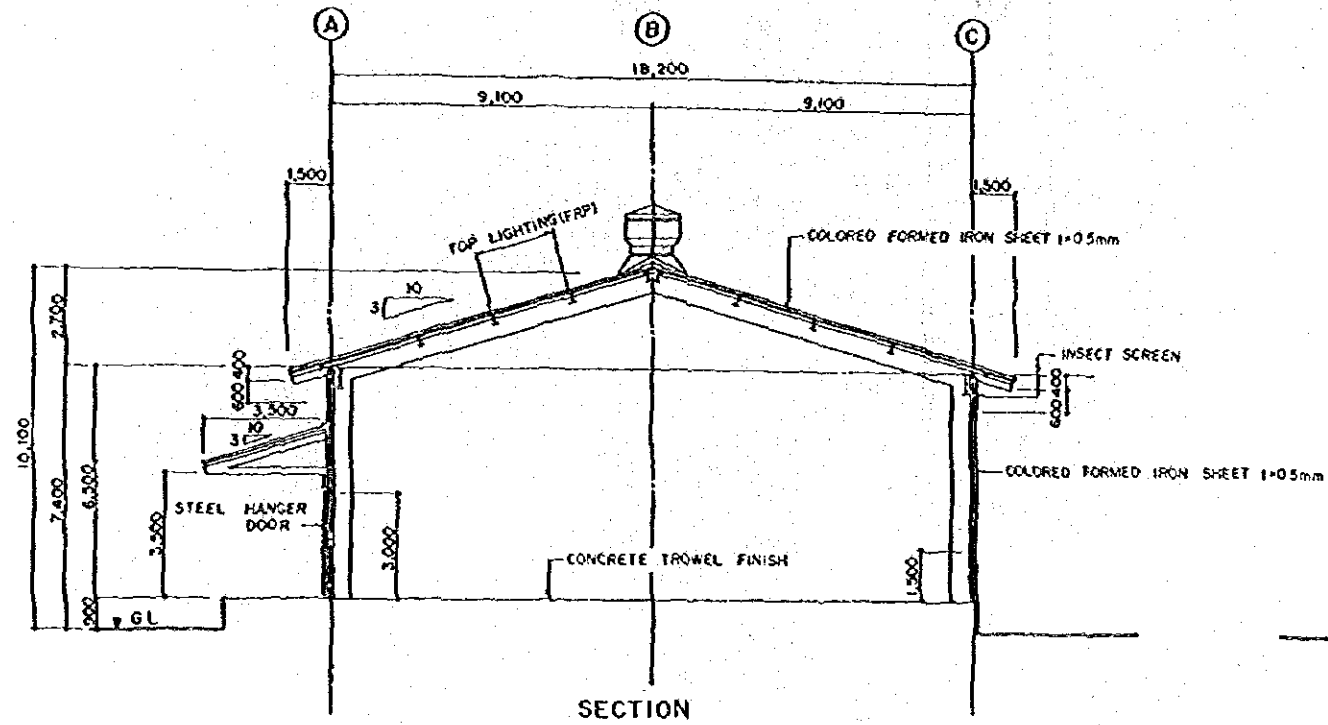
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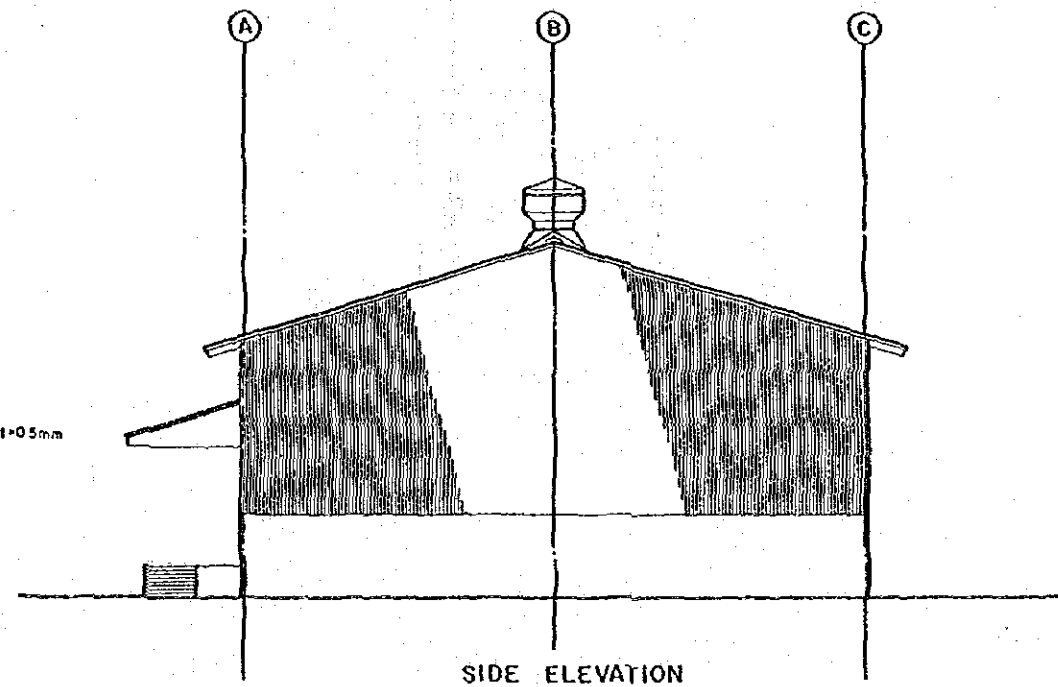
FLOOR PLAN



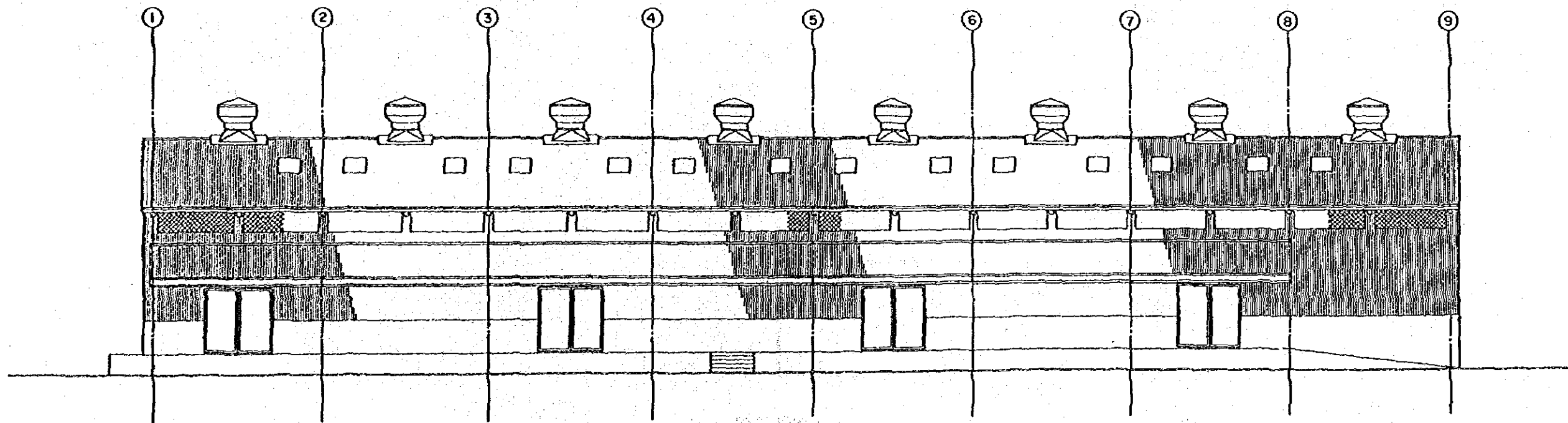
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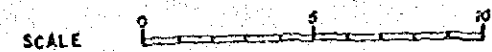
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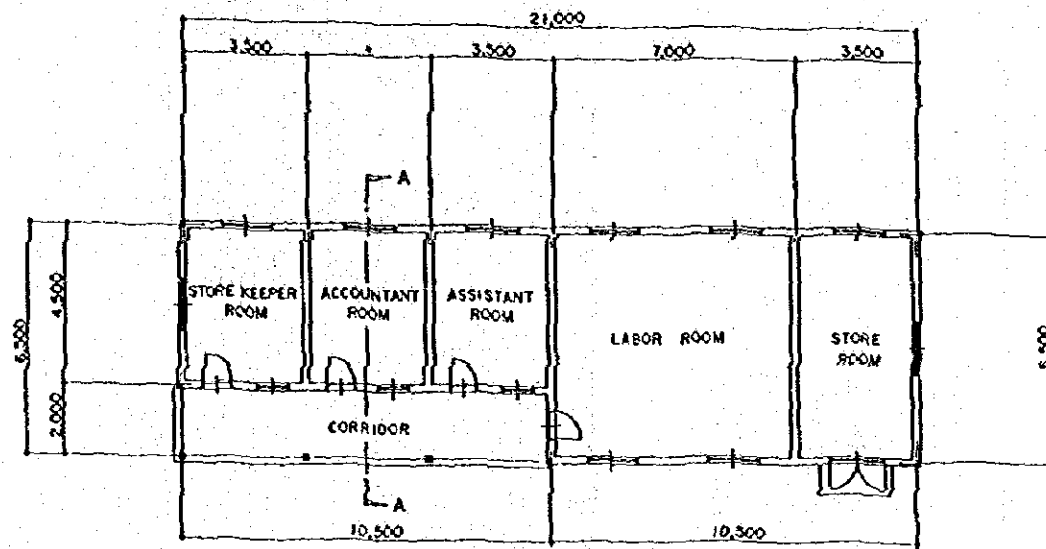
SIDE ELEVATION



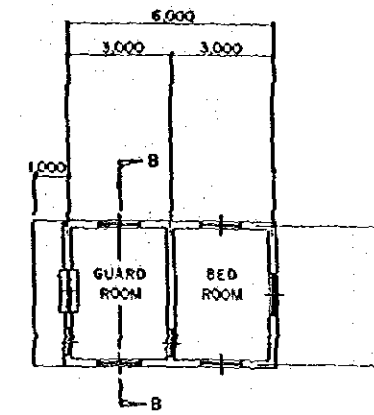
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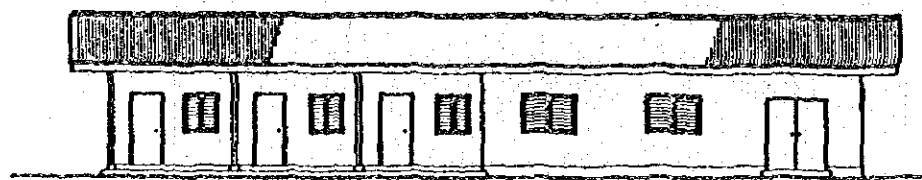
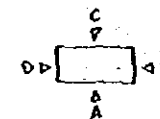
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TITLE OF DRAWING Basic Design Drawing - 10 Matembwe & Itundu Multipurpose Godown - Section & Elevation	
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OFFICE PLAN



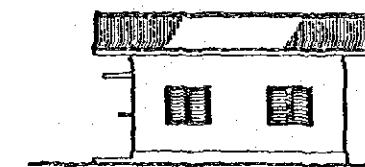
GUARD HOUSE PLAN



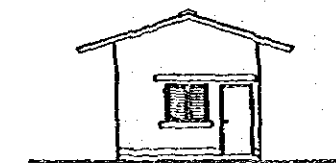
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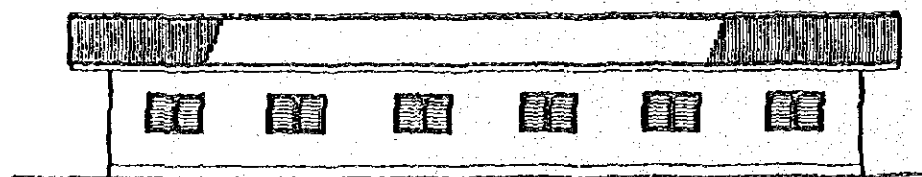
B. SIDE ELEVATION



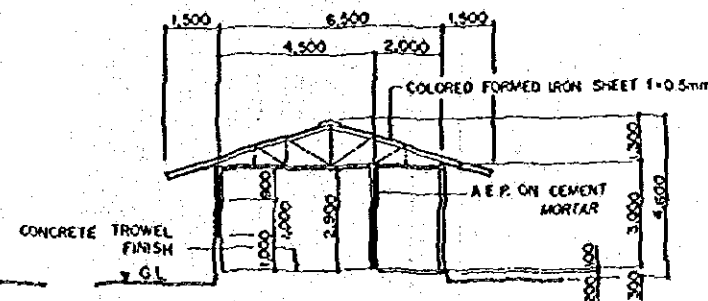
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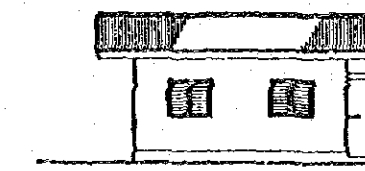
D. SIDE ELEVATION



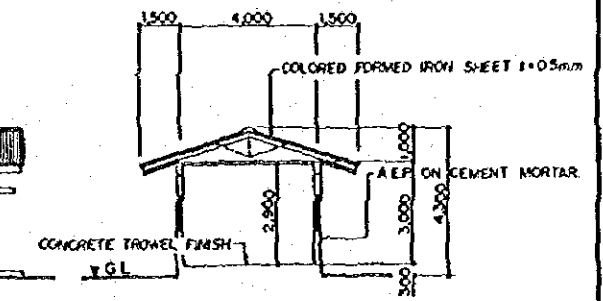
C. SIDE ELEVATION



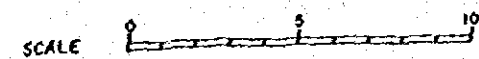
A-A SECTION



C. SIDE ELEVATION



B-B SECTION



THE UNITED REPUBLIC OF TANZANIA	
THE PROJECT FOR IMPROVEMENT OF AGRICULTURAL STORAGE AND TRANSPORTATION SYSTEM IRINBA REGION	
TITLE OF DRAWING Basic Design Drawing - 11 Office Building & Guardhouse - Plan, Section & Elevation	
Date	Drawing No
JAPAN INTERNATIONAL COOPERATION AGENCY	

INTERIOR FINISH SCHEDULE

REMARKS		FLOOR		SKIRTING WAINSCOT		WALL		CEILING		GENERAL NOTES
Vinyl emulsion paint finish										
BUILDINGS	ROOMS	Concrete screed finish	Cement mortar	Cement mortar	HEIGHT	Vinyl emulsion paint on cement mortar	Vinyl emulsion paint on gypsum board	Oil paint on plywood	HEIGHT	NOTES
MULTIPURPOSE GODDAN	STORE FOR GRAIN	○		⊙	1,500	○				Steel surface : oil paint finish
	STORE FOR FERTILIZER	○		⊙	1,500	○				Do
OFFICE BUILDING	CORRIDOR	○		⊙	100	○		○	2,900	
	ACCOUNTANT ROOM	○		⊙	100	○		○	2,900	
	STORE KEEPER ROOM	○		⊙	100	○		○	2,900	
	ASSISTANT ROOM	○		⊙	100	○		○	2,900	
	LABOR ROOM	○		⊙	100	○		○	2,900	
	STORE ROOM	○		○	100	○		○	2,900	
GUARD HOUSE	GUARD ROOM	○		⊙	100	○		○	2,900	
	BED ROOM	○		⊙	100	○		○	2,900	

EXTERIOR FINISH SCHEDULE

MULTIPURPOSE GODDAN	
ROOF	Colored formed iron sheet 1=0.5mm Top lighting (F.R.P)
WALL	Colored formed iron sheet 1=0.5mm
SKIRTING WAINSCOT	Acrylic emulsion paint on cement mortar
DOOR AND WINDOW	Steel flush tongue door
STEP AND PLATFORM	Cement mortar
STEEL SURFACE	Oil paint finish
Roof ventilator	Steel made, Oil paint finish
OFFICE, GUARD HOUSE	
ROOF	Colored formed iron sheet 1=0.5mm
WALL	Acrylic emulsion paint on cement mortar
SKIRTING	Cement mortar
EAVES FASCIA	Oil paint on wooden board
EAVES SOFFIT	Acrylic emulsion paint on waterproof plywood
DOOR AND WINDOW	Aluminium window Wooden flush door
STEP	Cement mortar

OUTDOOR WORK  
DRAIN DITCH ; Concrete ditch  
GRAVEL PAVEMENT ; 2 = 200mm

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TITLE OF DRAWING  
Basic Design Drawing - 12  
Exterior & Interior Finish Schedule

Date: \_\_\_\_\_ Drawing No: \_\_\_\_\_

JAPAN INTERNATIONAL COOPERATION AGENCY





### 5.3 Basic Design of Feeder Road

#### 5.3.1 Determination of Basic Conditions

Following basic conditions of design of feeder road were determined through field survey and discussions with the government officials concerned.

##### (1) Geometric Design

The road surface will be raised up at the portion near the Mafinga bridge in Mafinga-Matembwe road. The geometric design of feeder road of the other portions will not be changed, based on the results of field survey.

##### (2) Width of Road

The feeder roads to be improved shall have a total width of 5.0 meters with the effective width of 4.0 meters paved with gravel, in consideration of the width of trucks and existing road. Cross-grade on gravel surface will be 4 percent.

##### (3) Drainage Facilities for Road Surface

Drainage facilities for road surface will consist of side ditch (width = 1.5 m, depth = min. 0.4 m) and out-drain. The points of road that require out-drain culverts in view of terrain condition will be provided with out-drain culverts.

#### 5.3.2 Basic Design of Feeder Road

##### (1) Geometric Design

Based on the result of field survey, horizontal and vertical alignments of the existing feeder road are generally good except for the following portion which requires improvement.

Road Name	Location	Length	Condition
Mafinga-Ifwagi	Mafinga Bridge	80 m	submerged for about 2 months every year

For the submerged section, the design level for raising up the road surface is determined so as to get more than 50 centimeters above the highest water level experienced in the past.

## (2) Typical Cross Section

Typical cross section of the feeder road is determined in accordance with the following criteria:

- The road width will be 5.0 meters, out of which 4.0 meters are paved, considering the width of trucks and existing road.
- The gravel pavement method will be provided for the road surface improvement, taking account of habitual practices prevailing in Tanzania, and in view of construction cost.
- The thickness of gravel pavement will be 20 centimeters considering the soil nature of subgrade.
- The materials used for gravel pavement are required to satisfy the following standard:

Corrected CBR	:	more than 20
Plasticity Index, (Passing the 0.4 mm sieve)	:	less than 6%
Percentage of contents passing the 0.074 mm sieve	:	less than 10% in weight
Maximum particles	:	less than 50 mm
- Cross-grade will be 4%, and the outside slope of the road will be 1:1.5.

The typical cross section of the improved road is as illustrated in Basic Drawing-15.

## (3) Drainage Facilities

Drainage is one of the most important factors to keep all-weather road in good condition. Existing feeder road to be improved has no cross-grade to drain surface water smoothly and the number of cross drainage structures is also insufficient. Drainage facilities such as side ditch, out-drain and out-drain culvert are planned. Plans of drainage facilities are shown in Basic Drawing-15.

The width and the minimum depth of both side ditch and out-drain are 1.50 m and 0.4 m, respectively. The required intervals of out-drain will be designed based on the side ditch slope and rainfall condition. The designed intervals for each portion are estimated as follows: The detailed calculation is shown in ANNEX 3-5.

Road/Side Ditch Slope (%)	3	4	5	6	7
					(m)
Iringa-Kilolo	361	234	168	127	101
Mafinga-Ifwagi	288	187	134	102	81
Kibena-Matembwe	180	117	84	64	51
Mkiu-Itundu	222	144	103	78	62
Allowable discharge of side ditch	121	79	56	43	34 (lit/sec)

The corrugated pipes will be provided for the out drain culverts, taking account of construction cost and simplicity of construction work. The minimum diameter of the culverts will be 100 centimeters to facilitate maintenance work.

Main features of drainage facilities are as tabulated below.

Name of Road	Length of Side Ditch (km)	Nos. of Out-drain	Nos. of Culvert
Iringa-Kilolo	39.6	230	15
Mafinga-Ifwagi	25.6	190	0
Kibena-Matembwe	55.2	650	10
Mkiu-Itundu	23.0	220	10
Total	143.4	1,290	35

(4) Replacement of Bridge

Following five bridges will be replaced the culvert,

Name of Road	Bridge Name	Location	Type <sup>1</sup>
Mafinga-Ifwagi	Mafinga Bridge	0.6 km from Matinga	RC
Mafinga-Ifwagi	Ifwagi Bridge	20.5 km from Matinga	T
Kibena-Matembwe	Ikowo Bridge	31.8 km from Kibena	T
Mkiu-Itundu	Kisigula No.1 Bridge	0.3 km from Mkiu	T
Mkiu-Itundu	Kisigula No.2 Bridge	8.1 km from Mkiu	T

Note : <sup>1</sup>: RC: Reinforced Concrete Bridge, T: Wooden Bridge

Culvert will consist of corrugated pipe and wet stone masonry for the protection against erosion in consideration of simplicity of construction work and saving of construction cost.

The diameter of the pipe is determined considering the estimated flood water discharge and flow area of existing bridge as shown below.

Bridge Name	Flood Water Discharge <sup>1</sup> (1/20-year return period) (m <sup>3</sup> /s)	Existing Flow Area W (m) x H (m) = A (m <sup>2</sup> )	Pipe Dia. (Flow Area)
Mafinga Bridge	10.0	5.0 x 0.8 = 4.0	ø2,500 (4.9 m <sup>2</sup> )
Ifwagi Bridge	43.9	4.7 x 1.6 = 7.5	ø3,000 (7.1 m <sup>2</sup> )
Ikowo Bridge	99.3	5.5 x 2.5 = 13.8	ø2,500 x 3nos. (14.7 m <sup>2</sup> )
Kisigula No.1 Bridge	23.4	5.0 x 1.1 = 5.5	ø2,500 (4.9 m <sup>2</sup> )
Kisigula No.2 Bridge	41.3	3.6 x 1.8 = 6.5	ø3,000 (7.1 m <sup>2</sup> )

Note: <sup>1</sup>: Flood analysis is shown in ANNEX 3-5.

**(5) Rehabilitation Works of Bridge**

The present conditions of two bridges to be rehabilitated are as follows:

**Ihimbo No.1 Bridge:**

Name of road	:	Iringa-Kilolo
Location	:	21.0 km from Iringa
Type	:	Concrete bridge
Span Length	:	12.0 m
Width	:	3.5 m
Year of construction	:	1986
Damages by flood	:	It was flooded up to superstructures over the distance of about 65 m and the part of the transition to the road was eroded in May, 1987. The flood period was within 24 hours.

**Itulavano Bridge:**

Name of road	:	Mafinga-Ifwagi
Location	:	10.2 km from Mafinga
Type	:	Concrete bridge
Span Length	:	10.0 m
Width	:	3.6 m
Year of construction	:	Before 1973
Damages by flood	:	It was flooded up to the top of the bridge girder and the part of transition to the road was eroded at an interval of three to five years. The flood period was three days in maximum.

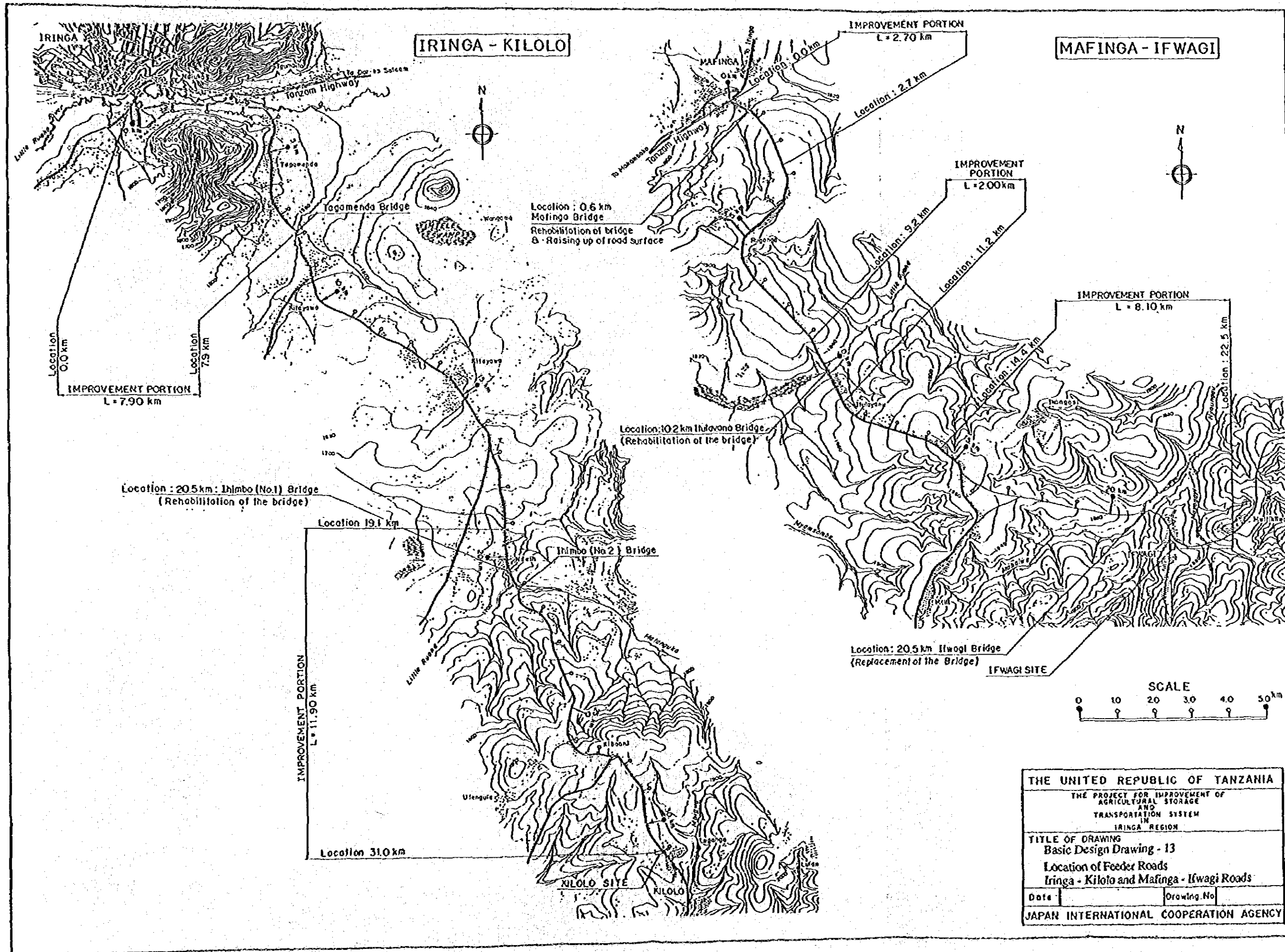
Since the above two bridges are in good condition at present, they will be improved to the type of submersible bridge without any replacement. The rehabilitation works of the bridge will consist of laying corrugated pipes under the part of transitions for the purpose of increase of flow area and lining of road surface and road slope with wet stone masonry to protect against erosion.

**(6) Basic Design Drawings**

Basic Design Drawings for the feeder road improvement are as shown in Drawings No.13 - No.16.

### List of Basic Design Drawings

Basic Design Drawing - 13	Location of Feeder Road Iringa - Kilolo and Mafinga - Ifwagi Road
Basic Design Drawing - 14	Location of Feeder Road Kibena - Matembwe and Mkiu - Itundu Road
Basic Design Drawing - 15	Typical Cross Section and Drainage Facilities
Basic Design Drawing - 16	Replacement of Bridge and Rehabilitation of Bridge



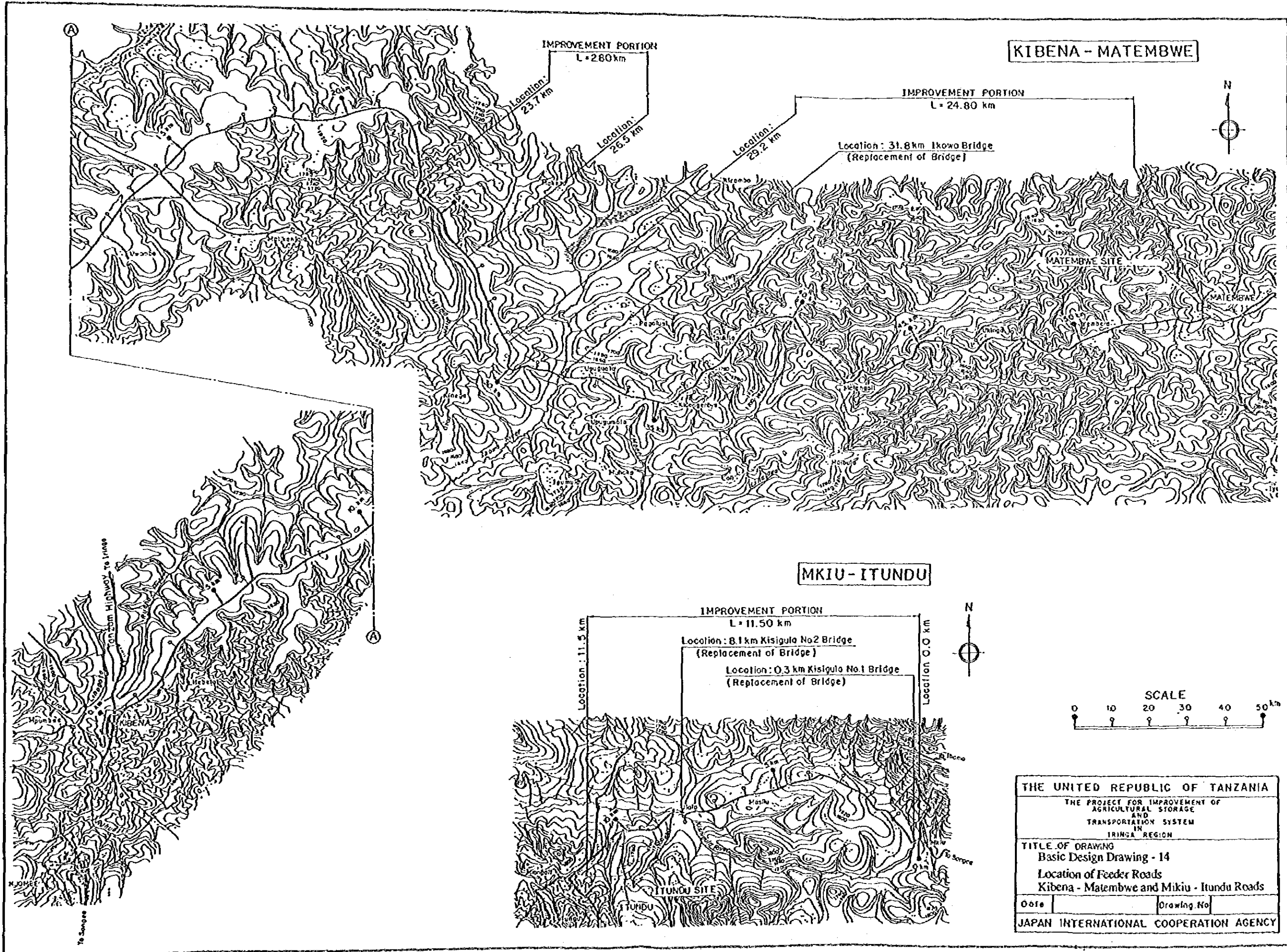
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THE PROJECT FOR IMPROVEMENT OF  
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TITLE OF DRAWING  
Basic Design Drawing - 13  
Location of Feeder Roads  
Iringa - Kilolo and Mafinga - Ifwagi Roads

Date: \_\_\_\_\_ Drawing No: \_\_\_\_\_

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**KIBENA - MATEMBWE**

IMPROVEMENT PORTION  
L = 280 km

IMPROVEMENT PORTION  
L = 24.80 km

Location: 23.7 km

Location: 26.5 km

Location: 29.2 km

Location: 31.8 km Ikowo Bridge  
(Replacement of Bridge)

**MKIU - ITUNDU**

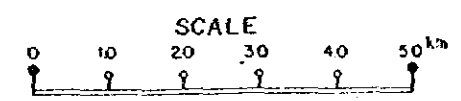
IMPROVEMENT PORTION  
L = 11.50 km

Location: 8.1 km Kisigula No.2 Bridge  
(Replacement of Bridge)

Location: 0.3 km Kisigula No.1 Bridge  
(Replacement of Bridge)

Location: 11.5 km

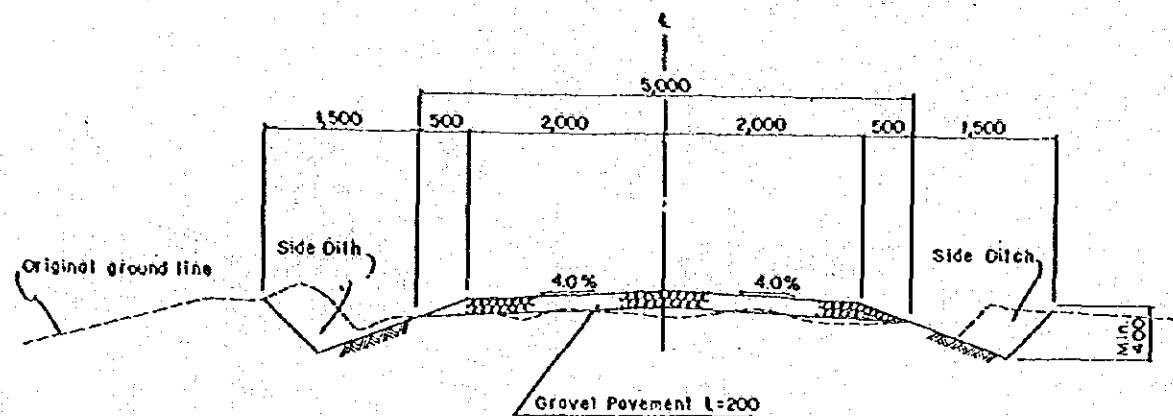
Location: 0.0 km



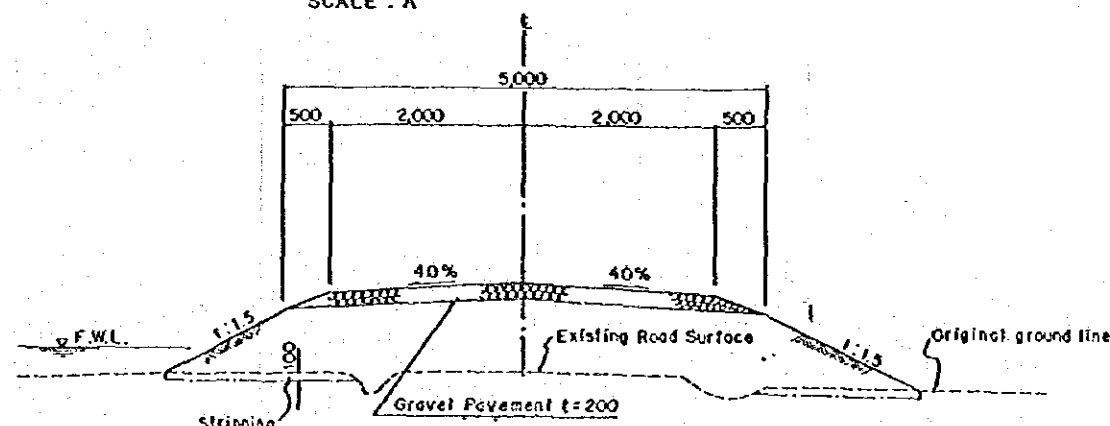
THE UNITED REPUBLIC OF TANZANIA	
THE PROJECT FOR IMPROVEMENT OF AGRICULTURAL STORAGE AND TRANSPORTATION SYSTEM IN IRINGA REGION	
TITLE OF DRAWING Basic Design Drawing - 14 Location of Feeder Roads Kibena - Matembwe and Mkiu - Itundu Roads	
Date	Drawing No
JAPAN INTERNATIONAL COOPERATION AGENCY	



### TYPICAL CROSS SECTION OF ROAD IMPROVEMENT

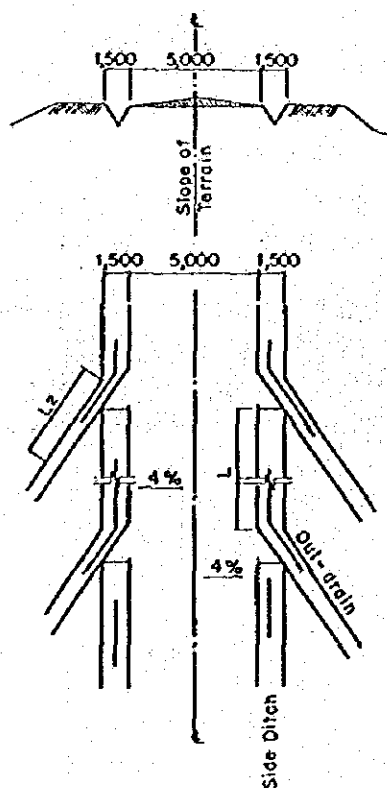


SCALE : A

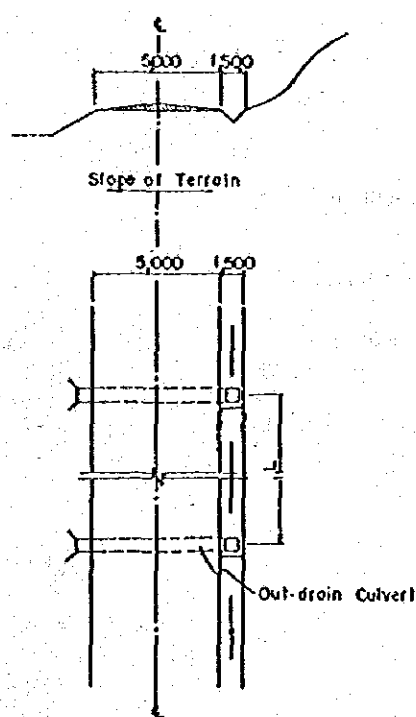


RAISING UP OF ROAD SURFACE

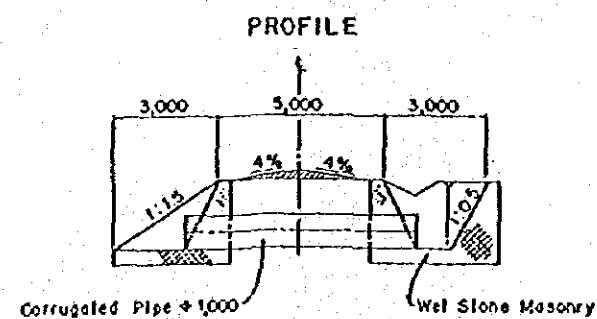
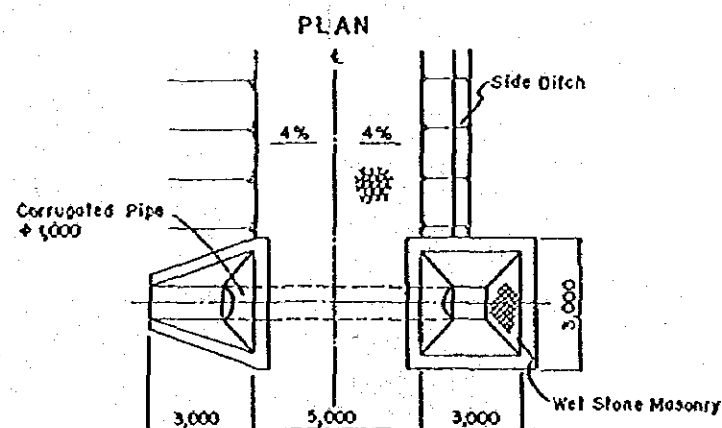
### DRAINAGE FACILITIES



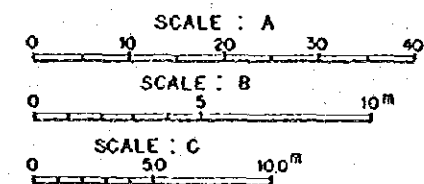
TYPE A : LONGITUDINAL SLOPE OF TERRAIN  
(NORMAL CROSS SECTION)  
SCALE : C



TYPE B : LATERAL SLOPE OF TERRAIN  
(CUT SECTION)  
SCALE : C



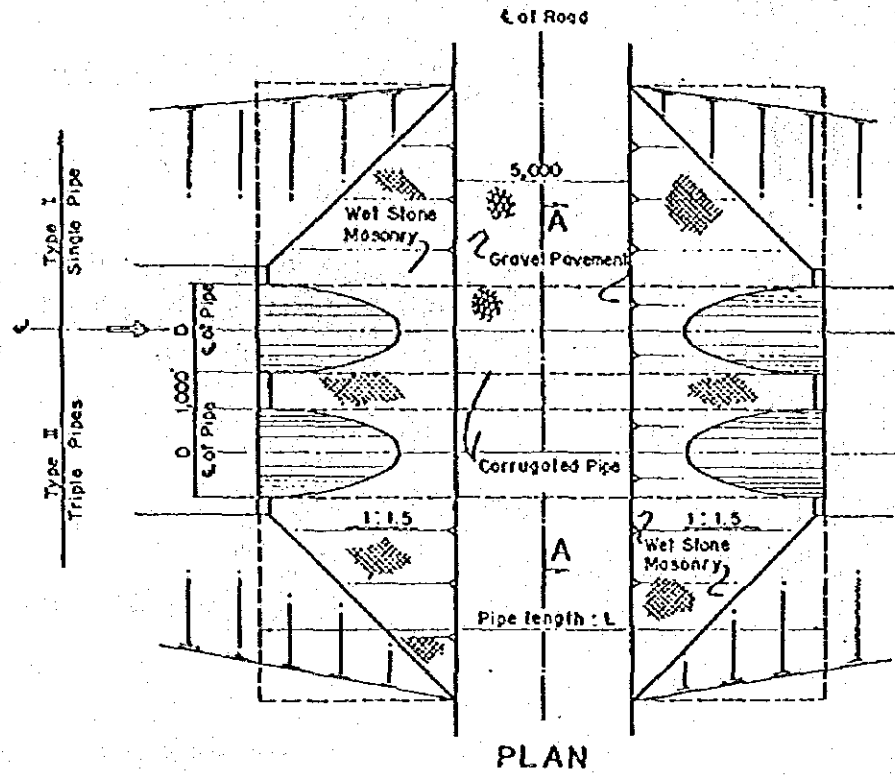
OUT - DRAIN CULVERT  
SCALE : B



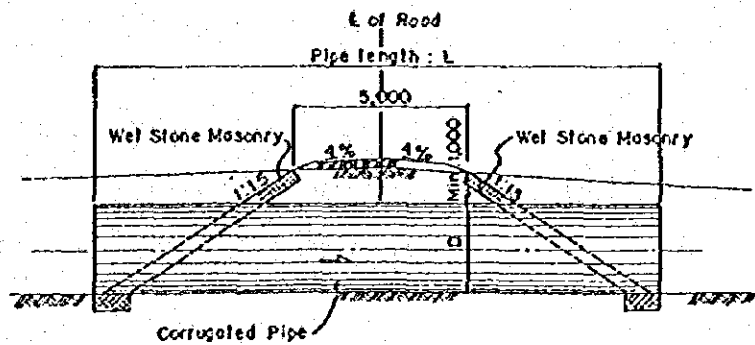
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TITLE OF DRAWING Basic Design Drawing - 15 Typical Cross Section and Drainage Facilities	
Date	Drawing No
JAPAN INTERNATIONAL COOPERATION AGENCY	

### REPLACEMENT OF BRIDGE

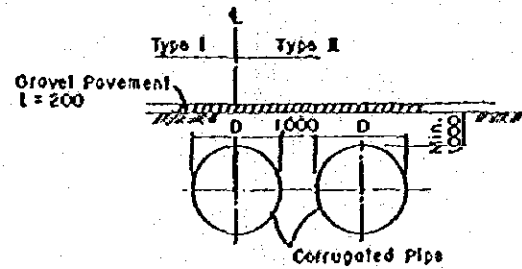
SCALE : B



PLAN



PROFILE



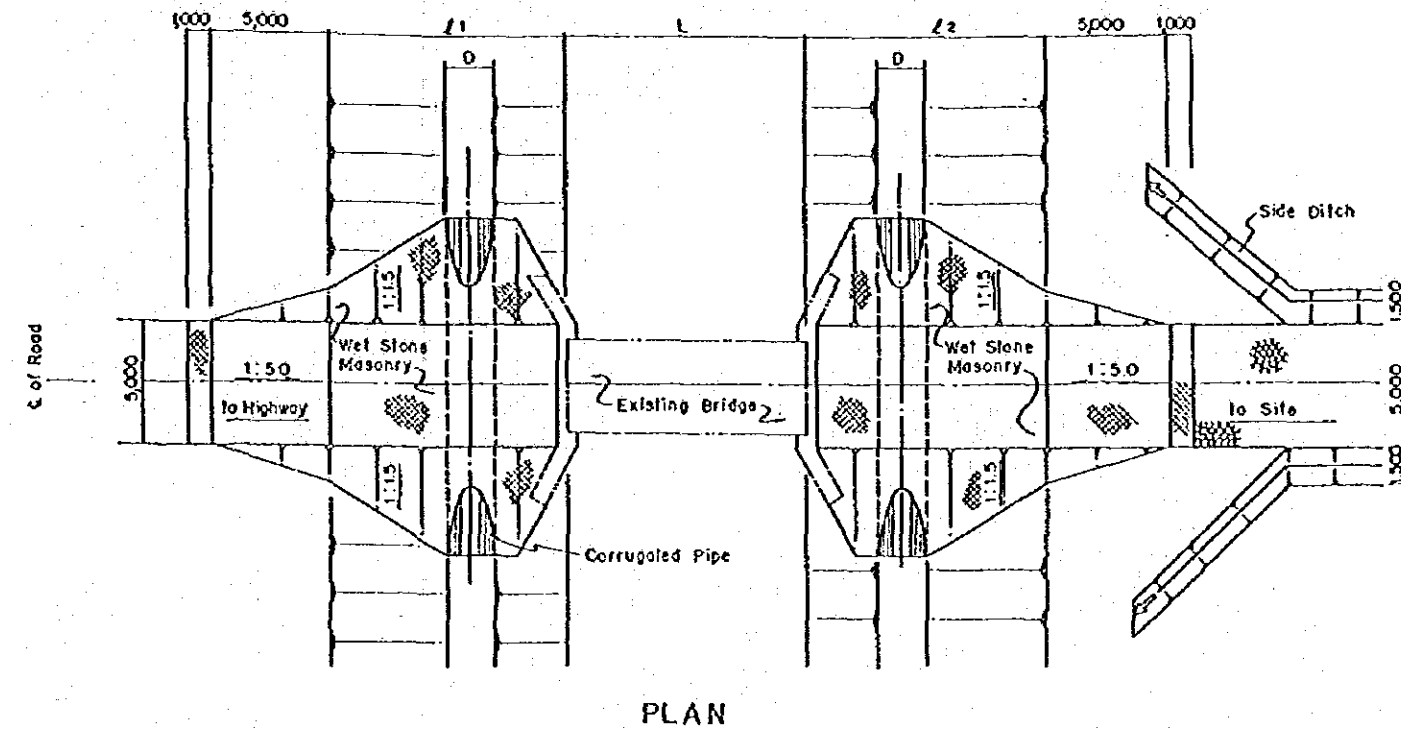
SECTION A-A

TABLE OF DIMENSIONS

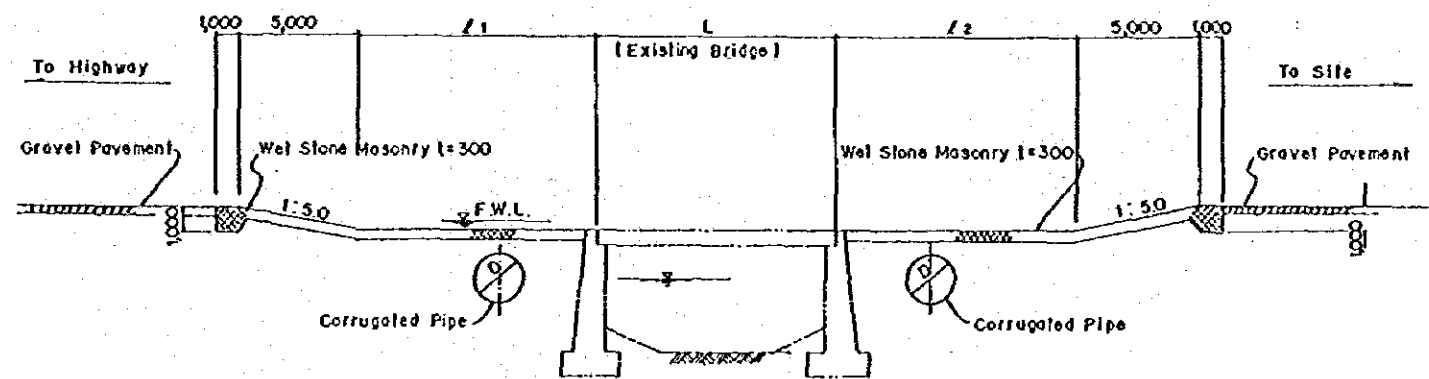
Road Name	Bridge Name	Type	D	L
Malinga - Ifwagi	Malinga Bridge	I	2,500	16,000
"	Ifwagi Bridge	I	3,000	17,000
Kibena Malembwe	Ikowo Bridge	II	2,500	16,000
Mkiu - Ifundu	Kisigura No.1 Bridge	I	2,500	16,000
"	Kisigura No.2 Bridge	I	3,000	17,000

### REHABILITATION OF BRIDGE

SCALE : A



PLAN



PROFILE

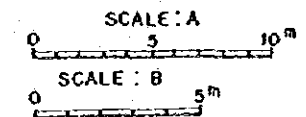


TABLE OF DIMENSIONS

Road Name	Bridge Name	L	1	2	D
Iringa - Kiloto	Ihimbo No.1 Bridge	12,000	15,000	10,000	3,000
Malinga - Ifwagi	Ilulobano Bridge	10,000	5,000	5,000	2,500

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TITLE OF DRAWING  
 Basic Design Drawing - 16  
 Replacement and Rehabilitation of Bridge

Date \_\_\_\_\_ Drawing No. \_\_\_\_\_

JAPAN INTERNATIONAL COOPERATION AGENCY



## 5.4 Basic Plan of Equipment

### 5.4.1 Equipment Plan

#### (1) Storage Facilities

The proposed godowns will be equipped with transport carts, slat conveyors and weighing meters. The capacity and numbers of these equipments are listed below. Two (2) slat conveyors are proposed for inflow and outflow respectively because grain will be carrying in and out simultaneously.

Item	Kilolo	Ifwagi	Matembwe	Itundu
<b>Max. quantity handled daily:</b>				
Grain (tons)	193	121	154	196
Fertilizer (tons)	10	8	10	13
Total	203	130	164	210
Quantity handled hourly (tons/h) <sup>1</sup>	41	26	33	42
<b>Cart:</b>				
Nos. of required carts <sup>2</sup>	17	12	14	18
<b>Slat conveyor:</b>				
Required capacity (tons/h) <sup>3</sup>	105	65	85	105
Required capacity (tons/h/conveyor) <sup>4</sup>	55	35	45	55
Nos. of required conveyors	3	2	2	3
<b>Weighing meter:</b>				
Grain to be carried in (tons/h) <sup>5</sup>	20	13	16	20
Nos. of required meters <sup>6</sup>	5	3	4	5

Note: Details on daily handled quantity are shown in Annex 2-4.

<sup>1</sup> : Actual operation hours are regarded as 5 hours.

<sup>2</sup> : Loading capacity is regarded as 5 bags (450 kg)/cart.

Operation cycle is regarded as 10 minutes.

<sup>3</sup> : Including 2 units of spare for each godown.

<sup>4</sup> : Conveyor's operation rate is regarded as 0.4.

<sup>5</sup> : Two (2) conveyors will be provided.

Including 1 unit of spare in Kilolo and Itundu, respectively.

<sup>6</sup> : Estimated based on ANNEX 2-5.

<sup>7</sup> : Capacity is regarded as 4 tons/h/weighing meter.

1) **Cart**

A bag filled with grain is 60 cm wide, 100 cm long and 23 cm high. Ready-made carts with 600 kg capacity will be proposed considering the bags' size.

2) **Slat conveyor**

The slat conveyor's capacity of each godown will be unified to 65 tons/h so that parts may be replaceable one another. Maximum height will be 5.4 m considering that maximum stacking height is 5.0 m. It will be capable of piling up the loads of 100 kg, and equipped with gasoline engine because of no electricity supply.

3) **Weighing meter**

There are no weighing meters at the cooperative union's godowns, though NMC's godowns at trading center have truck-scales. The proposed weighing meters, platform scales with 1,000 kg maximum weighing capacity, will be used to weigh bagged grain.

(2) **Maintenance Equipment Plan for Feeder Roads**

The following maintenance equipment has been selected in accordance with the above mentioned basic concept. Medium-size equipment will be selected, as the maintenance works will be carried out half by half of road width so that it may not block the passage. Spare parts for the equipment will be provided for two (2) years' operation.

1) **Bulldozer, 17-ton class (tilt type) ..... 1 unit**

The bulldozer will be introduced for compaction works of pavement materials, excavation work of side ditch, etc. Medium-size bulldozer of about 17-ton will be selected.

2) **Motor grader, 9-ton class ..... 1 unit**

Pavement materials transported by dump truck will be spread by the motor grader. And it will be introduced for grading works for road surface. Small-size motor grader of about 9-ton will be used.

- 3) Dump truck, 7-ton class ..... 2 units

The dump truck will be introduced for transportation of pavement materials. Two (2) units of dump trucks are required taking into account the transport distance. Small size dump truck 7-ton will be selected.

- 4) Backhoe, 0.4 m<sup>3</sup> class ..... 1 unit

The backhoe will be used for excavation and loading of the pavement materials, and excavation of out-drain. Small-size backhoe of 0.4 m<sup>3</sup> volume will be appropriate.

(3) Grain Moisture Tester

Required grain moisture testers are as follows:

Proposed Godown	No. of Cooperatives	Simple Type			Infrared Type
		for Cooperative Use	for Spot-check	Spare	
Kilolo	10	10	1	2	1
Ifwagi	4	4	1	1	1
Matembwe	4	4	1	1	1
Itundu	11	11	1	2	1
<b>Total</b>	<b>29</b>	<b>29</b>	<b>4</b>	<b>6</b>	<b>4</b>

(4) Fumigation Equipment

Such equipment as gasproof sheets, gas masks and gas detectors are required. The size of gasproof sheet has been decided so that 300 tons of bagged maize, of which stack dimensions are 7.3 m x 14.3 m x 5 m, may be fumigated at a time. Therefore, the sheet size will be 1.3 m x 25.6 m including 50 cm allowance on both ends.

The sheet will be divided into halves so as to make labor work to cover stack with sheets easier. Accordingly, two (2) sheets, of which size is 18.3 m x 13.0 m, are necessary for one (1) stack. Fumigation will be conducted by one (1) team which consists of four (4) persons. The sheets will be removed and the gas will be detected in order to confirm safety after fumigation by two (2) members of the team with gas masks on. Four (4) sets of gas

masks are required including two (2) sets of spare for one (1) team. The maximum grain monthly handled and fumigation equipment required are tabled below.

Item	Kilolo	Ifwagi	Matembwe	Iundu	Total
Max. quantity monthly handled (tons)	2,400	1,500	1,900	2,600 <sup>1</sup>	8,400
Quantity daily fumigated (tons) <sup>2</sup>	600	380	480	650	2,110
Required equipment (sets)	2	1	2	2	7
- Gasproof sheet (sheets) <sup>3</sup>	5	3	5	5	18
- Gas mask (sets)	4	4	4	4	16
- Gas detector (units)	1	1	1	1	4
- Sand bag (bags) <sup>4</sup> (150 bags/stack)	300	150	300	300	1,050
- Sheet clip (clips) <sup>4</sup> (60 clips/stack)	120	60	120	120	420

Note: <sup>1</sup> : Including 700 tons for existing godowns.

<sup>2</sup> : It takes 7 days for fumigation.

<sup>3</sup> : 1 set of sheet (= 2 sheets) is for 300 tons of grain, 1 spare sheet is included.

<sup>4</sup> : To be used to fix sheets.

The required fumigation chemicals (Phostoxin) are imported by NMC, and cooperative unions can procure them through NMC. Such consumption articles as tubes for gas detectors and gas absorption canisters for gas masks are also required. The table below lists the annual required articles.

Article	Kilolo	Ifwagi	Matembwe	Iundu
1. Fumigation chemicals (Phostoxin) (tablets)	37,000	23,000	29,000	41,000
2. Gas detector tube (tubes)	120	80	100	140
3. Gas absorption canister (cans)	70	50	60	80

Note: See Annex 2-7 for details.

##### (5) Transport Vehicle

The grain and agricultural inputs handled by cooperatives are mostly transported by cooperative union's vehicles. The vehicles, of usually with more than 10-ton capacity, transport grain from godowns along major roads to NMC's godowns at trade centers (Makambako and Iringa).

The medium-size trucks with 7-ton capacity are used for transportation from the village in the project area to the proposed godowns. The trucks will be cargo trucks with high bed and foldable hood for transportation on rainy days. Numbers of required trucks have been decided based on the maximum quantity of grain to be collected daily as shown below. Nine (9) trucks in total, three (3) for Kilolo and two (2) each for others, are required.

Item	Kilolo	Ifwagi	Matembwe	Itundu
Q'ty to be transported (tons/day)	100	63	79	100
Present capacity to be transported (tons/day) <sup>1</sup>	57	11	30	66
Increased capacity to be transported (tons/day)	43	52	49	34
Required times of transportation (times/day) <sup>2</sup>	6	8	7	5
Average transport distance (km)	32	9	17	17
Average hours required (hours/time) <sup>3</sup>	3	1.6	2	2
Nos. of required trucks <sup>4</sup>	3	2	2	2

Note: <sup>1</sup> : Based on the assumption that transport capacity for the volume presently handled is already equipped. The capacity is estimated based on the volume of grain traded at present by each branch office of the cooperative union.

<sup>2</sup> : Truck capacity is 7-ton.

<sup>3</sup> : On the assumption that the average speed is 30 km/h, and it takes 1 hour for loading and unloading.

<sup>4</sup> : Trucks are regarded to be operated for 7 hours a day.



### 5.4.2 List of Equipment to be Procured

List of equipment to be procured by the Project is shown below:

Equipment	Specification	Qty
1. Transport vehicle	7-ton cargo truck (with spare parts)	9 units
2. Equipment for grain handling		
- Cart	600 kg capacity/cart (including 8 units as spare)	61 units
- Slat conveyor	65 tons capacity/hour (including 2 units as spare)	10 units
- Weighing meter (Platform scale)	1,000 kg max. weighing capacity	17 units
3. Equipment for grain quality control		
Simple grain moisture tester	Measuring range : 6-30% Accuracy : $\pm 0.5\%$ Power source : Battery Indication : Digital	39 units
Infrared grain moisture tester	Measuring range : 0-100% Accuracy : $\pm 0.1\%$ Power source : AC 220 V Indication : Digital	4 units
Fumigation equipment		7 sets
- Gasproof sheet	18.3 m x 13.0 m (ultraviolet-proof)	18 sheets
- Gas mask	Against hydrogen phosphate gas	16 sets
- Gas detector	Vacuum type	4 sets
- Sand bag	100 cm x 13 cm	1,050 sheets
- Sheet clip	70 mm width	420 units
- Gas detector tube	For one (1) year's operation	440 tubes
- Gas absorption canister	For one (1) year's operation	260 cans
4. Fire extinguisher	Powder type Quantity of powder : 6 kg Capability unit : A-5	32 units
5. Maintenance equipment for feeder road		
- Bulldozer	17-ton, tilt type	1 unit
- Motor grader	9-ton	1 unit
- Dump truck	7-ton	2 units
- Backhoe	0.4 m <sup>3</sup>	1 unit
- Spare parts	For two (2) years' operation	1 lot

## CHAPTER 6



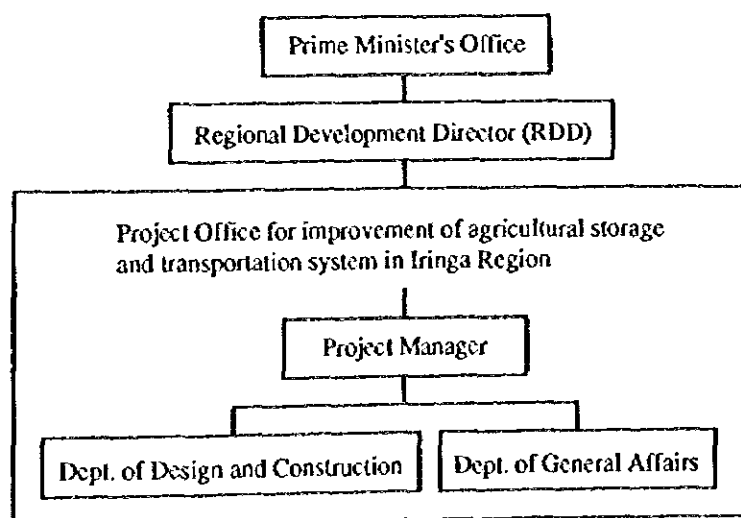
## CHAPTER 6 IMPLEMENTATION PROGRAM

### 6.1 Organization for Project Execution

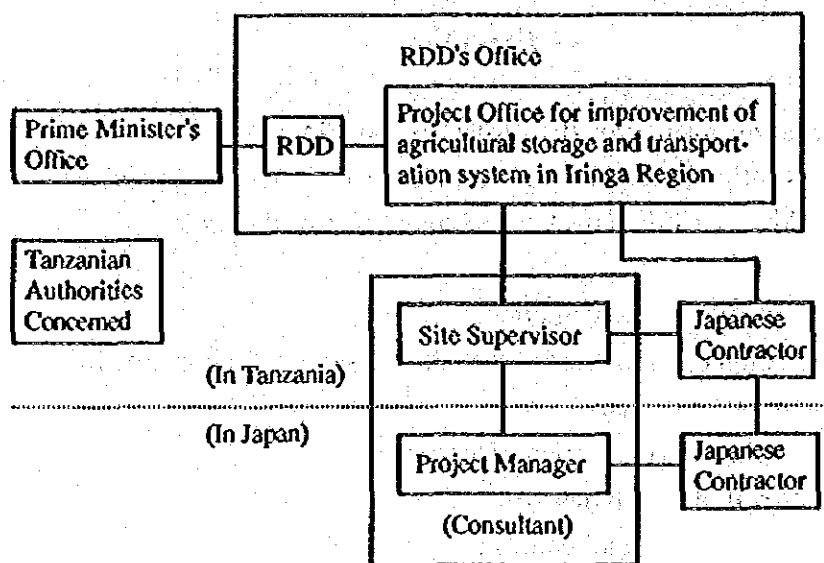
The executing agency of the project is the Iringa Regional Development Director's office (the RDD's office), the Government of Tanzania. The RDD's office will be authorized to execute the following work items for implementation of the project.

- 1) Execution of all construction,
- 2) Execution of contracts for consultancy service for construction,
- 3) Approval of design,
- 4) Tendering and evaluation of tenders,
- 5) Approval of all payments,
- 6) Administration of all contracts,
- 7) Acceptance of completed works, and
- 8) Liaison and coordination with other government agencies.

The representative of the Government will be the Regional Development Director (the RDD). For successful implementation of the project, it is proposed to establish an executing organization tentatively called the Project Office for the improvement of agricultural storage and transportation system in Iringa Region, under control of the RDD. Operational works pertaining to the project will be actually taken in charge by this project office. The organizational structure of the proposed project office under the RDD's office is shown below.



In addition, the overall organization for project implementation including the Japanese side is outlined as follows:



Division of the responsibilities for the project works among the Government of Tanzania, Japanese Consultant and Japanese Contractor is summarized as follows:

- The government of Tanzania will be responsible for the land readjustment prior to commencement of construction of the facilities by the main contractor. Also, from a client's standpoint, the Government and its main executing body, the RDD, will be responsible for ordering of design, supervision and construction works, payment of construction cost and taking-over of the completed storage facilities and feeder road improvement.
- The Japanese Consultant, entrusted by the Government of Tanzania, will be responsible for implementation of the detailed design, tendering, cooperation with the client in selecting the main contractor, supervision of the construction works, approval of payments, inspections for taking-over of the completed facilities and reports to the relevant organizations.
- The Japanese Contractor, after contract signing, will be responsible for construction of storage facilities, feeder road improvement, manufacture, and transport of the granted equipments in accordance with the contract documents. Also, before delivery of the completed storage facilities and improved feeder roads, the Contractor will be responsible for the execution of necessary inspections by the

Consultant. Then after receiving the Consultant's approvals, the Contractor will deliver the storage facilities and the improved feeder roads to the Government of Tanzania according to the prescribed procedure.

## **6.2 Scope of the Works**

The scope of the Project for Improvement of agricultural storage and transportation system in Iringa Region under the Japan's Grant Aid Program will consist of the construction of the storage facilities and the improvement of feeder roads in Kilolo, Ifwagi, Matembwe and Itundu area.

The Government of Tanzania will undertake the following:

### **(1) Construction Works**

- 1) To secure, clear and reclaim the site for the storage facilities,
- 2) To construct a gate, fence and landscape gardening in the premise, and
- 3) To furnish furnitures and fixtures.

### **(2) Administrative Works**

- 1) To furnish data necessary for the detailed design,
- 2) To bear commission for the banking services based on the Banking Arrangement,
- 3) To ensure prompt unloading, tax exemption and customs clearance at the port of disembarkation in Tanzania for the equipment, material and vehicle required for the project,
- 4) To ensure tax exemption for the Consultant and the contractor engaged in the project execution,
- 5) To issue visa, traffic certificates and other certificates necessary for execution of the project to the Consultant and the contractor,
- 6) To ensure contractual payments to the Consultant and the contractor,
- 7) To bear expenses required for proper and effective maintenance and use of the facilities and equipment after completion of the project, and

- 8) To bear all the expenses necessary for the execution of the project other than those to be borne by the grant aid.

### 6.3 Construction Plan

In consideration of the fact that the Project will be executed within the framework of aid from the Japanese Government, the construction plan will be schemed as mentioned below.

#### 6.3.1 Construction Principle

- (1) The construction works under the Project will consist of the construction of the agricultural storage facilities and the improvement works of the feeder roads. Proceeding with both works mentioned above, it will be unnecessary to coordinate both works not only on technical matters but also on the construction schedule. Therefore, it is possible to separate the above works completely in the course of the construction.
- (2) Since the construction sites for the proposed godowns are dispersed in Iringa Region and the feeder roads to be improved are located far from main trunk road, which is extended at the central parts in the Region, construction office will be set up at Iringa town and Njombe town. Each office will control two (2) sites respectively as follows:  
  
Iringa construction office : Kilolo, Ifwagi  
Njombe construction office : Matembwe, Itundu
- (3) It is assumed that local contractors will not have sufficient capability for structural steel works such as long spacing and high caves. Accordingly, Japanese foremen will supervise the said works.

The improvement works of the feeder roads are to repair the existing roads including the existing structures, and the ordinary construction method will be adopted. In consideration of the construction period and its economic aspects, earth works will be carried out by heavy equipment such as bulldozers, backhoes, and motor graders, etc. The road raising works for the submerged sections will be carried out to embank soil from both sides of the road by using bulldozers. Materials to be used for the gravel metalling, which will be obtained from the picking place, should meet the demand of design criteria. The work will be carried out with motor graders, bulldozers, road roller and sprinkler trucks.

- (4) Based on the conditions mentioned above, and taking account the scale of construction works, the capability of the local contractors and present conditions of procurement of local materials, the appropriate construction period is judged to be within one year. Accordingly, no division of the construction schedule is proposed.

### 6.3.2 Attention to the Construction

The rainy season in the project area is from December to April and the maximum monthly rainfall averages 320 mm. The earth work will be affected by rains, so in the rainy season work progress is evaluated to be 70% of that in the dry season. The construction equipment to be used for preparatory works will be brought from Japan because it will be hard to hire or procure in the local market.

### 6.3.3 Detailed Design, Construction and Supervision Works

#### (1) Detailed Design

Immediately after the Exchange of Notes (E/N), the Consultant will enter into a contract with RDD on the consultancy services, hold close discussion with RDD on the detailed design work and then carrying it out. At the same time, RDD will undertake such works as land preparation of the site, lead-in of services, etc., which are to be executed by the Tanzania side, and urgently required before commencement of the main construction works. The design work will be undertaken by the Consultant either at the construction site in Tanzania or in Japan. The RDD's approvals will be needed for the design documents before tendering. The work items of detailed design required for implementation of the project are summarized below:

#### 1) Study and Survey

- Discussion and arrangements on the detailed design with the Government of Tanzania based on the basic design.
- Survey of the construction site, and confirmation of the location.
- Study of present conditions of construction to be necessary for the preparation of the detailed design, cost estimate and construction plan.



**2) Detailed Design and Preparation of Documents Related to Tendering**

- Detailed design and preparation of tender drawings.
- Preparation of documents related to tendering.
- Confirmation of construction cost based on the detailed design
- Approval of the detailed design and tender documents by the Government of Tanzania.

**(2) Construction Supervision**

After signing of the construction contract, the Consultant's representative will go to the construction site to organize the start of construction. The Consultant's chief engineer will be posted at the construction site during the period required for supervision services and will supervise the construction at site. The Consultant's chief engineer will regularly report on construction progress and related matters to the concerned agencies of the Government of Tanzania as well as to the Embassy of Japan and JICA in Tanzania and will coordinate all construction-related matters with the concerned officials of the project.

The Consultant, on supervision services, will pay particular attention to Tanzania's national surroundings, customs, traditions and capability of workers to effect smooth construction and completion of the work within the given period. The construction program will be carefully scheduled to take into account the capability of local workers and the period of delivery of construction materials and equipment to be imported from Japan.

The principal activities to be carried out by the Consultant's personnel are given below:

**1) Assistance Services in Tendering and Contracting**

Assist in prequalification of tenderers, tendering, evaluation of tenders and drafting of contract.

**2) Examination and Approval of Shop Drawings**

Inspect, examine and approve shop drawings, samples, catalogues, etc. and inspect equipment at the manufacturer's plant.

**3) Inspection of Construction Works**

Ensure that construction complies with the contract in terms of schedule, construction methods and quality. Inspect and approve field works.

**4) Approval of Payments**

Approve payment claims based on the progress of the work.

**5) Reporting**

Prepare regular progress reports on all matters concerning construction for information of the concerned agencies of the Tanzanian Government and Japanese Government.

**6) Handing Over of Completed Works**

Hand over to the Government of Tanzania the completed works after examination of the works and after confirmation of fulfillment of all contractual obligations. Upon acceptance of the works by the Government, the Consultant's project manager will be discharged.

**6.3.4 Procurement and Transportation Plan**

**(1) Procurement of Equipment**

It is planned that the construction materials proposed be procured in Tanzania as far as possible. However, materials which will have difficulty in respect to quality and procurement in Tanzania will be procured from Japan.

No construction materials or transportation equipment required for special purpose will be imported from any country other than Japan.

**1) Construction Material**

Materials procurable in Tanzania are fuel and oil, cement, concrete block for buildings, aggregate materials, timber except plywood and materials for road improvement. Though local products of reinforcing bars are available in the country, the output is not enough for a large quantity of procurement, and the

price is on high side comparing with the Japanese product. The reinforcing bars, therefore, will be imported from Japan.

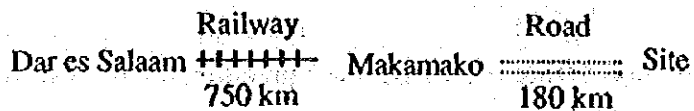
2) **Granted Equipment**

Equipment for storage facilities such as slat-conveyer, grain moisture meters and transportation equipment, road maintenance equipment and their ancillary equipment will be imported from Japan, because these are no procurable in Tanzania.

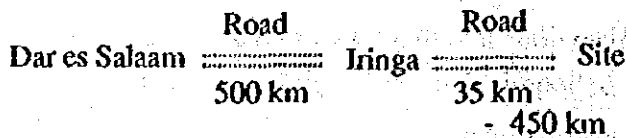
(2) **Transportation of Equipment**

Cargo from Japan for this project will be landed at Dar es Salaam port and then delivered by road or rail to the construction site as shown below.

1) **Trans. by rail (for Matembwe, Itundu site)**



2) **Trans. by road (for all site)**



Marine transportation of cargoes from Japan to Dar es Salaam takes one and half months. Taking account the period required for procurement and loading in Japan, unloading and customs formalities at Dar es Salaam port and inland transportation to the construction site, the transportation period for cargoes from Japan to the site is estimated to be three (3) months.

### **6.3.5 Scope of Works undertaking by the Government of Tanzania**

#### **(1) Construction Works**

- 1) To secure, clear and reclaim the site for the storage facilities,
- 2) To construct a gate, fence and landscape gardening on the premise, and
- 3) To construct toilets (local style) at storage facilities sites.

#### **(2) Administrative Works**

- 1) To furnish data necessary for the detailed design,
- 2) To bear commission for the banking services based on the Banking Arrangement,
- 3) To ensure prompt unloading, tax exemption and customs clearance at the port of disembarkation in Tanzania for the equipment, material and vehicle required for the project,
- 4) To ensure tax exemption for the Consultant and the contractor engaged in the project execution,
- 5) To issue visa, traffic certificates and other certificates necessary for execution of the project to the Consultant and the contractor.
- 6) To ensure contractual payments to the Consultant and the contractor,
- 7) To bear expenses required for proper and effective maintenance and use of the facilities and equipment after completion of the project, and
- 8) To bear all the expenses necessary for the execution of the project other than those to be borne by the grant aid.

### **6.4 Implementation Schedule**

A tentative implementation schedule including all those activities discussed above is illustrated in Fig.-9. Immediately after the Exchange of Notes (E/N) with respect to construction, a contract with the Consultant will be concluded. Then the detailed design, preparation of tender documents, tendering, tender evaluation and contract for execution will be executed. Construction of the project is planned to be completed in 10.5 months including the procurement period of construction materials and equipment.

Item	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
from E/N	E/N																		
I. Preceding Works to construction Signing of Exchange Notes																			
Detailed Design & Preparation of Tender Document																			
Public Announcement & Prequalification					Public Announcement	P/Q													
Tendering, Evaluation & Construction Contracts					Tendering	Contract													
II. Construction Procurement of Construction Materials						Order	Shipment	Arrival at Site											
Construction						Commencement													Completion
III. Consultant's Works Field Works																			

FIG-9 TENTATIVE IMPLEMENTATION SCHEDULE

## 6.5 Cost Estimate

### 6.5.1 Total Project Cost

The total Project cost, to be allotted by Japan and Tanzania together is estimated at about ¥978 million.

### 6.5.2 Project Cost to Japan

The total Project cost to Japan is estimated at about ¥970 million, including the costs of construction works, procurement of equipment and design and supervision works.

### 6.5.3 Construction Cost to Tanzania

The preliminary construction cost to be allotted to Tanzania is estimated at Tsh. 5.59 million (equivalent to ¥7.55 million at the exchange rate of ¥1.35 to Tsh. 1.00) as detailed in the following table.

**Preliminary Cost of Construction Works  
to be Executed by the Government of Tanzania**

Work Item	Construction Cost (10 <sup>3</sup> Tsh.)				
	Kilolo	Ifwagi	Matembwe	Itundu	Total
1. Preparatory and Reclamation of Site	487	637	253	270	1,647
2. Installation of Fence					
- Fence	752	834	490	475	2,551
- Gate	60	60	60	60	240
3. Landscape Gardening					
- Tree planting	97	132	18	24	271
- Grass planting	195	265	37	48	545
4. Toilet	85	85	85	85	340
Total	1,676	2,013	943	962	5,594

